IN THE MATTER OF:
ELECTRONIC 2023 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2023-00310

BIG RIVERS ELECTRIC CORPORATION'S RESPONSES TO
SIERRA CLUB'S POST-HEARING DATA REQUESTS

REQUEST NO. PH-1: ***Please refer to Sierra Club's cross-examination of Big Rivers witness James Burden beginning at approximately 10:16 AM on May 22, 2024. Please also refer to BREC Response to Sierra Club Data Request 2-10 "Wilson GADS data," and refer to maintenance codes in 2022.***

a. Examining the 2022 data, why were so many derates and outages (71 of 109) tied to the induced draft fan?

b. Please confirm whether these derates and outages were in fact related to the induced draft fan or were related to other issues.

i. Please identify and explain each incorrect maintenance code for derates and outages in 2022.

c. Please identify when and where induced draft fans were fixed in response to derates and outages in 2022.

d. Examining the 2022 data, please identify and explain any remedial measures and/or fixed parts that were undertaken in response to review of patterns in Wilson's GADS data.

i. Please identify the costs of each such remedial measure as well as the cost of these remedial measures in total.

RESPONSE:

a. This request was addressed during the hearing in this matter, when Big Rivers' Director of Production Services, Mr. Jason Burden, testified, "[e]arly on in 2022, most of the issues were mainly [attributed] to the Kellog FGD that was in the process of getting replaced and was

causing ID [induced draft] fan amp issues[.]"[1] Mr. Burden further explained that, subsequent to the replacement of that FGD in October of 2022, ID fan repairs were required due to vibration issues experienced in connection with the commissioning of the new FDG.[2] Mr. Burden's testimony also described the causes of the other necessary ID fan repairs.[3]

b. The cause codes reflected in the attachment to Big Rivers' response to Sierra Club's Request No. 2-10 (the "SC 2-10 Attachment") are correct.

i. N/A.

c. The SC 2-10 Attachment reflects when the ID fans were repaired. The repairs were implemented at Wilson.

d. Please see response i., below.

i. As explained during the hearing in this matter, Big Rivers does not track specific remedial measures or maintenance expenses on a GADs-event basis.[4] Please see the confidential attachment to Big Rivers' responses to Kentuckians for the Commonwealth/Kentucky Resources Council's Request No. 1-10 for Wilson's 2022 historical costs.

[1] 2023 IRP Hearing, Testimony of Jason Burden (May 22, 2024), 10:14:45 a.m. – 10:15:09 a.m.

[2] *Id.,* beginning at 10:35:41 a.m.

[3] *Id.,* at 10:12:13 a.m. – 10:13:21 a.m., 10:36:26 a.m.

[4] *Id.,* at 10:16:15 a.m., 10:17:38 a.m., 10:18:46 a.m., 10:19:43 a.m., 10:20:21 a.m.

IN THE MATTER OF:
ELECTRONIC 2023 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2023-00310

BIG RIVERS ELECTRIC CORPORATION'S RESPONSES TO
SIERRA CLUB'S POST-HEARING DATA REQUESTS

Witnesses: **Jason Burden (Subparts a-c)**

Christopher A. Warren (Subpart d)

IN THE MATTER OF:
ELECTRONIC 2023 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2023-00310

BIG RIVERS ELECTRIC CORPORATION'S RESPONSES TO
SIERRA CLUB'S POST-HEARING DATA REQUESTS

REQUEST NO. PH-2: ***Please refer to Sierra Club's cross-examination of Big Rivers witness James Burden beginning at approximately 10:24 AM on May 22, 2024. Please also refer to Sierra Club Data Request 2-10 "Wilson GADS data" and BREC Response to Sierra Club Data Request 1-18a, Attachment 1 a.***

a. Please state whether the information in BREC Response to Sierra Club Data Request to 2-10 or 1-18a is correct with regards to the forced outage at DB Wilson from December 22 to December 23, 2022.

b. If neither are correct, please share accurate derate and outage information for DB Wilson from December 22 to December 23, 2022.

RESPONSE:

a. Big Rivers' Response to Sierra Club's Request No. 2-10 was retrieved directly from the NERC GADS system and accurately provides all forced outage events during the years 2014-2023 (including December 22-23, 2022), as requested.

b. See above.

Witness: Jason Burden

IN THE MATTER OF:
ELECTRONIC 2023 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2023-00310

BIG RIVERS ELECTRIC CORPORATION'S RESPONSES TO
SIERRA CLUB'S POST-HEARING DATA REQUESTS

REQUEST NO. PH-3: ***Please refer to Sierra Club's cross-examination of Big Rivers witness James Burden beginning at approximately 10:58 AM on May 22, 2024 and Big Rivers witness Terry Wright beginning at approximately 7:12 PM on May 22, 2024. Please also refer to Sierra Club Data Request 2-10 "Wilson GADS data."***

a. Please provide any workpapers and analysis prepared by Big Rivers in evaluating the reliability of DB Wilson in 2022 by looking at GADS data.

b. Please provide any workpapers and analysis for determining the equivalent availability factor of DB Wilson in 2022.

c. Please explain what Big Rivers considers an acceptable equivalent availability factor when analyzing the reliability of DB Wilson.

i. Please provide any workpapers and analysis underpinning this determination.

RESPONSE:

a. Big Rivers objects to this request as vague and based on an improper assumption. Subject to and without waiving the foregoing, Big Rivers again states that it does not evaluate generator reliability by observing data from only a single year.[1] The North American Electric Reliability Corporation's (NERC) Reliability Standards define the reliability requirements for

[1] 2023 IRP Hearing, Testimony of Jason Burden (May 22, 2024), 11:24:46 – 11:25:22 ("One year is just a glimpse in time and it's not representative.").

planning and operating the North American bulk power system and are developed using a results-based approach that focuses on performance, risk management, and entity capabilities. GADS is a mandatory industry program for conventional generating units that are 20 MW and larger. As such, Big Rivers submits operating and event data per the NERC GADS Data Reporting Instructions (DRI). NERC performs all of the performance and reliability equations using the data submitted by the utility. The latest DRI and performance equations used by NERC are provided as an attachment to this response.

b. The Equivalent Availability Factor (EAF) as calculated by NERC in 2022 for D.B. Wilson was 70.12%. This rate includes the planned outage to complete the installation of the FGD relocated from Coleman Station.

c. Big Rivers objects to this request as vague. Subject to and without waiving the foregoing, Big Rivers states that it has not identified an "acceptable" EAF with respect to the Wilson Station or any of its generating units. While a unit's EAF over time is certainly a relevant consideration in attempting to ascertain the current and projected values of a generation asset, multiple factors and metrics, both internal and external, require analysis in order to determine whether a unit's reliability is "unacceptable" such that repair, upgrade, or replacement is necessary.

Concerning Wilson specifically, it has a demonstrated record of strong performance, and Big Rivers considers it reliable.[2]

i. N/A. Big Rivers has not identified an "acceptable" EAF with respect to the Wilson Station or any of its generating units.

Witness: Jason Burden

For the Objection(s): Counsel

[2] *See* 2023 IRP Hearing, Testimony of Jason Burden (May 22, 2024), 10:56:40 a.m. – 10:57:02 a.m. ("A decade worth of GADS data the EAF across 10 years was 85% roughly, including 2022. If someone tells me that a power plant is available 85% of the time, I think that is a pretty good number, that's pretty reliable.")

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Generating Availability Data System

Data Reporting Instructions

Effective January 1, 2024

RELIABILITY | RESILIENCE | SECURITY




3353 Peachtree Road NE
Suite 600, North Tower
Atlanta, GA 30326
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Table of Contents

Section I: Introduction

NERC developed the *GADS Data Reporting Instructions* to assist utility personnel in reporting information to the Generating Availability Data System (GADS). This reporting system, initiated by the electric utility industry in 1982, expands and extends the data collection procedures begun by the industry in 1963. NERC-GADS is recognized today as a valuable source of reliability, availability, and maintainability (RAM) information. This information, collected for both total-unit and major equipment groups, is used by analysts industry-wide in numerous applications (Table I.1). GADS maintains complete operating histories on more than 8,000 generating units, representing over 90% of the installed generating capacity of the United States and Canada. As of January 1, 2013, GADS became a mandatory industry program for conventional generating units 20 MW and larger. GADS remains open to all non-required participants in the Regional Entities (shown in Table I.2) and any other organization, domestic or international,[1] that operate electric generating facilities willing to follow the GADS mandatory requirements as presented in the document *Final GADSTF Recommendations Report* dated July 20, 2011.

Table I.1: Applications of GADS Data

New Plants	**Plant Strategies**	**Maintenance Strategies**
Design	Load following	Preventive/Predictive
Procurement	Power reductions	Inspection Scheduling
Construction	Goals/benchmarking	Surveillance
	High-impact outages	
System Strategies	**Plant Modifications**	**Outage Planning**
Dispatch	Replacement	Critical Items
Maintenance	Reconfiguration	Resource allocation

Utility designers, operating engineers, and system planners developed GADS to meet the information needs of the electric utility industry. For this purpose, they established specific objectives for the GADS program: compilation and maintenance of an accurate, dependable, and comprehensive database capable of monitoring the performance of electric generating units and major pieces of equipment. GADS is not a substitute for the detailed and often unique data systems typically found at power plants or for maintenance data programs that record detailed equipment failures and repair techniques. The objectives of the GADS program can be met through the collective effort of participating GADS members, the cooperation in reporting to GADS, and sharing information with the industry.

With the GADS mandatory program, participating organizations must be prepared to commit the necessary effort needed to provide timely, accurate, and complete data. The *GADS Data Reporting Instructions* detail the data elements collected by GADS, data identified by the industry as being vital to the understanding and interpretation of generating unit and major equipment performance. By following the strict guidelines set forth in these instructions, we have found that the industry analysts can best apply the data in the most beneficial manner.

Industry Development of GADS

Before any data element was included in GADS, an industry committee determined its applicability to utility operation and RAM analyses scrutinized it. A series of industry meetings were held to discuss the analytical usefulness of each

[1] NERC management reserves final approval authority for GADS data with international organizations on a case-by-case basis.

element and to determine if utilities could reasonably provide that data to GADS. Consequently, the only data requested in the *GADS Data Reporting Instructions* meet industry-prescribed needs. In reviewing this document, you will find that most, if not all, of the requested data elements are already being collected in your utility's plant-specific data system.

The industry also realized a need to include standardized terminology in the GADS program if it were to function on an international scale. As a result, the definitions promulgated by the Institute of Electrical and Electronic Engineers' (IEEE) Standard 762, "Definitions for Reporting Electric Generating Unit Reliability, Availability and Productivity" were incorporated.

Utilities started their reporting using the GADS guidelines on January 1, 1982. GADS superseded the earlier data collection procedures begun by the Edison Electric Institute (EEI), a program started in the mid-1960s. GADS contains many of the same elements previously collected by EEI in addition to the many new data items. This seeming duplication of data was created intentionally: the EEI information can be derived from GADS so analyses that include data from earlier than 1982 can be completed.

Unit Boundaries and Problems Outside Plant Control

A number of generating companies have been deregulated over the last several years. As a result, part of the GADS database contains deregulated units and regulated units. As more and more electric utilities divide into owners and/or operators of generating, transmission, and distribution companies, GADS must also make changes to accommodate industry needs. To do so, we must determine where the GENCO responsibilities end, and the TRANSCO take over.

Based on research by the IEEE Standard 762 committee, the boundary between the GO and TO is as follows: "A generating unit includes all equipment up to (in preferred order) (1) the high-voltage terminals of the generator step-up (GSU) transformer and the station service transformers; (2) the GSU transformer (load) side of the generator-voltage circuit breakers; or (3) at such equipment boundary as may be reasonable considering the design and configuration of the generating unit."

Not all plants have the high-voltage terminals of the generator step-up (GSU) transformer and the station service transformers as shown in (1) above. Therefore, the boundaries are shown in preferred order based on unit design. If (1) is not applicable, then (2); if not (2) then (3).

GADS will continue to collect all problems that prevent the generating facility from providing electrical power to the customer. However, there are additional guidelines provided by IEEE Standard 762. In Appendix K of this manual "Outside Plant Management Control" are guidelines to determine what is and is not within the plant management responsibilities. As a result, new equations are introduced for measuring plant performance. For further details, refer to Appendix F of this manual.

Table I.2: Regional Entities

MRO Midwest Reliability Organization	SERC SERC Reliability Corporation
RF Reliability*First*	WECC WECC
NPCC Northeast Power Coordinating Council	TRE Texas Regional Entity

Arrangement of Data Reporting Instructions

The *GADS Data Reporting Instructions* document details the procedures, format, and frequency to follow when reporting data to GADS.

This document has several sections, and each section treats a particular area of data to report to GADS. Section II describes the three general types of data to be reported to GADS: event, performance, and design. Sections III and IV provides the details for the event and performance reporting requirements, respectively. Section V describes the format and procedure to follow when reporting design data to GADS.

Section II: Data Scope and Transmittal

Scope

There are three types of data reported to GADS:

1. Event (07 format)
2. Performance (05 format)
3. Design

The GADS Data Reporting Instructions document describes the event and performance data in detail in Sections III and IV. The nine mandatory design data fields described in Section V must be submitted before reporting any event or performance data to NERC. All other design appendices in Appendix E are voluntary but encouraged for GADS work.

For the purposes of data reporting, the term "unit" is defined as follows:

Nuclear and fossil (steam) units — units consisting of a single reactor or boiler and a single turbine generator. In cases where multiple boilers and/or multiple turbine-generators are headed together, the entire group is considered a single unit and reported using the "Miscellaneous Unit" design data forms found in Appendix E, pages E-MS-1 to E-MS-5.

Hydro, pumped storage, gas turbine, jet engine, and diesel units — units consisting of the unique prime mover and a single generator. In cases where multiple combinations of turbines/engines and generators exist, either physically or because of operating philosophy, the entire group may be considered as a single unit or reported as individual units. You should note your specific reporting criteria on the design data forms.

Combined-Cycle units (or blocks) — By definition, a combined-cycle is a process for generating energy (either electricity or steam) constituted by the marriage of a Rankine Cycle (use heat to boil water to make steam to turn a steam turbine) and a Brayton Cycle (expand hot gas to turn a gas turbine). The combined-cycle consists of one or more gas turbines/jet engines and one or more heat recovery boilers. The heat recovery boiler sends steam to a steam turbine for generating electricity. Each gas turbine/jet engine and each steam turbine is a "unit". The entire group is considered a "block". Units where the gas turbines/jet engines can generate independent of the heat recovery boilers and steam turbine are also combined-cycle blocks. Report design data using the "Combined-Cycle Block" design data forms found in Appendix E, pages E-CC-1 to E-CC-25.

Co-generation units — units consisting of one or more gas turbines/jet engines and one or more heat recovery boilers. Co-generation is similar to the combined-cycle block except part of the steam from the heat recovery boiler is used for other purposes (process steam), not generating electricity. The entire ensemble is considered a single block. Report design data using the "Combined-Cycle Block" design data forms found in Appendix E, E-CC-1 to E-CC-25.

Fluidized bed combustion units — units consist of one or more bubbling, circulating, or pressurized bed boilers or steam turbines. Consider the entire group as a single unit.

Miscellaneous units — Miscellaneous conventional generating units are all other units (including variable fuel – biomass, landfill gases, etc.) used to generate electric power for the grid. Groups of units using the same electric meter are also categorized in the miscellaneous units group. For example, if you have five hydro units of 5 MW each and they all have the same common revenue meter (measuring the electric output of the five units combined), then this block of hydro units would be considered a 25 MW miscellaneous unit.

Reporting data to NERC-GADS begins when either one of the two following conditions is met:

1. The unit first enters the active state. This is termed the "service date" and occurs when the unit is first declared available for the dispatch of power at some level of its capability.
2. The unit first operates at 50% of its generator nameplate megawatt capability. For purposes of determining reporting requirements, the generator nameplate capability can be calculated by multiplying the MVA (megavolt amperes) by the rated power factor found on the nameplate affixed to the generator (nameplates in the case of multiple generator units).

The nine required design fields must be reported to GADS prior to reporting event and performance data. Your generating company is required to report to GADS if your organization owns generating facilities and is listed on the NERC Compliance Registry (NCR). This requirement applies to generators within North America that have a nameplate capacity of 20MW or greater. All other generating units by non-registered generating companies or units smaller than the required MW size are invited to participate in GADS on a voluntary basis.

We encourage all generating organizations to report all data elements currently collected for their units and any additional information they can reasonably provide.

Transmittal and Format

Submit event and performance data to Open Access Technology International, Inc. (OATI) using the webE-GADS data collection system **within 45 days after the end of every calendar quarter** throughout the life of each unit. If a unit is deactivated (retired) or sold, continue to report that unit for the remainder of the calendar year using the instructions shown on Page III-6 of these reporting instructions. In addition, please complete the "Change in Unit Status" form found in Appendix A. The completed "Change in Unit Status" form should be submitted to NERC at gads@nerc.net.

Section III: Event Reporting

An "event" occurs any time a generating unit's operating status or capability changes. GADS receives reports on four general classifications of events: outages, derates, reserve shutdowns, and non-curtailing events. Reporting event data, in addition to performance and design data, provides all the information needed to evaluate generating unit availability. Event data are especially useful since they are often used to do specialized unit and equipment operation and design analyses.

As of January 1, 2013, reporting to the GADS program is mandatory for all conventional units that have a nameplate capacity of 20 MW and larger. Reporting the level of detail requested in these *GADS Data Reporting Instructions* enables you and other industry analysts to perform detailed, useful analyses. Table III-1 below presents the classes of events generating companies must report for different types and sizes of conventional, non-renewable generating units.

Table III-1: Event Reporting Requirements vs Unit Type/Size Starting January 1, 2013

Units		Event Classifications			
Types	**Size (MW)**	**Outage**	**Derates**	**Reserve Shutdown**	**Non-Curtailing**
Fossil (Steam)	20+	Required	Required	Required	Voluntary
Nuclear	20+	Required	Required	Required	Voluntary
Hydro & Pumped Storage (with automatic data recording equipment)	20+	Required	Required	Required	Voluntary
Hydro & Pumped Storage (without automatic data recording equipment)	20+	Required	Required	Voluntary	Voluntary
Gas Turbines/Jet Engines	20+	Required	Required	Required	Voluntary
Combined Cycle/Co-generators	20+	Required	Required	Required	Voluntary
Internal Combustion/Reciprocating Engines	20+	Required	Required	Required	Voluntary
Fluidized Bed Combustion	20+	Required	Required	Required	Voluntary
Miscellaneous – including multi-boiler/multi-turbine, geothermal, other miscellaneous conventional generating units (such as variable fuel – biomass, landfill gases, etc.) used to generate electric power for the grid and similar in design and operation as the units shown above	20+	Required	Required	Required	Voluntary

Detailed event data reporting for all units is mandatory and is indicated by the term "required." The term "voluntary" implies that each operating company must determine if it can reasonably provide detailed data. NERC encourages all electric generating organizations to report all event data information and any additional information they can reasonably provide.

You are required to report reserve shutdown events on all units except hydro and pumped storage units without automatic data recording equipment. All other events (forced, maintenance, and planned) must be reported.

Event Report (07 Format)

Report event data to GADS in the event report (07) format, described in this section. Submit the data to Open Access Technology International, Inc. (OATI) using the webE-GADS data collection system **within 45 days after the end of each calendar quarter.**

There are four distinct sections of the event report: A) event identification; B) event magnitude; C) primary cause of event; and, D) additional cause of event or components worked during event. Together, these sections provide a complete description of each event experienced by a unit.

A description of each section and the data elements within it follows. Included are detailed instructions for reporting each event data element.

Section A: Event Identification

There are seven data elements, referred to as "fields," in this section (see Table III-2). These elements form a "key" — an identifier that makes each event card unique from all others in the database. This key is referenced at the beginning of every event record.

Record Code (columns 1-2) - Required
The "07" code uniquely identifies this data as an event report.

Utility (Company) Code (columns 3-5) - Required
Enter the three-character (alpha-numeric) code NERC assigned to your operating company. Appendix C contains a complete list of the operating companies participating in GADS and their assigned (operating company) codes.

Unit Code (columns 6-8) - Required
Enter the three-digit code your operating company assigned to the unit that you are reporting. This code distinguishes one unit from another in your operating company. Appendix C, Page C-1, contains a guide for selecting unit codes.

Year (columns 9-12) – Required

Table III-2: Record Layout of Section A – Event Identification

Column ID	Number of Columns	Starting Position
All Records		
A – Event Identification		
Record Code (required)	2	1
Utility (Company) Code (required)	3	3
Unit Code (required)	3	6
Year (required)	4	9
Event Number (required)	4	13
Report Revision Code (voluntary)	1	17
Event Type (required)	2	18

Enter the four-digit year in which the event occurred. Please note that this is not necessarily the year you reported the event to GADS, demonstrated in the following example:

> An event occurred on December 2, 2012 and was reported to GADS on January 31, 2013. Complete columns 9-12 as 2012. (Refer to Page III-21 for instructions on reporting events that begin in one year and continue into the next.)

Event Number (columns 13-16) - Required
Each time a unit experiences an event, assign it a unique "event number" and enter it in this field. Two events occurring on the same unit in the same year cannot have the same event number.

You do not have to assign event numbers sequentially, although it is preferred. If you find you have omitted one after gathering all the events to submit for a quarter, do not renumber all the events for the year; simply assign the next available event number to the omitted event.

All events start when they start and end when they end. Never create new events to continue an event from month to month or year to year. Events that continue from one year into the next should be programmatically truncated for inclusion in the input file submitted to webE-GADS with a new end/start date; webE-GADS will combine the pieces back into one long event. They should always remain as one long year crossing event in your in-house GADS system. Refer to Page III-21 for further instructions.

Report Revision Code (column 17) - Voluntary
This one-character data field signals that a change must be made to an event already submitted to GADS. Changes can be corrections, additions, or deletions of existing events.

The first time you submit an event to GADS it is called an "original" event. All original events have a revision code of zero (0).

Use the following codes when making changes to an original event:

> **1, 2 … 9**
> Use these codes when making **corrections or additions** to original events. Each time you make a change, you must increase the revision code by one. Up to nine corrections and additions to an original event can be made.
>
> When making **corrections or additions** to an original event, you need to send NERC all records relating to that event on which the changes are to be made. On the record:
>
> 3. Complete columns 1-16, repeating the information from the original event; and
> 4. Increase the revision code in column 17 by one; and,
> 5. Make sure the same record number used in the original report is in columns 81-82. DO NOT LEAVE THE RECORD NUMBER BLANK; and,
> 6. Enter the correct or additional information in the appropriate field.
>
> **To delete data** from one or more data fields, GADS RECOMMENDS that you resubmit the entire data set — year-to-date — for that unit (or all units you report) to GADS. This procedure will ensure that both you and the GADS database have the same records on file. You have the option to find the record that has the highest revision code and then increase this number by one or set all revision codes back to zero.

Event Type (columns 18-19) - Required
There are two "Unit States" defined by IEEE Standard 762: Inactive and Active. Inactive States are shown on Page III-4-5; Active States on Pages III-5-17. Enter the two-character code which best describes the event (inactive, outage, derates, reserve shutdown, or non-curtailing) experienced by the unit. For outages and deratings, the event type codes also define the urgency of the event (i.e. how long can you live with the problem?).

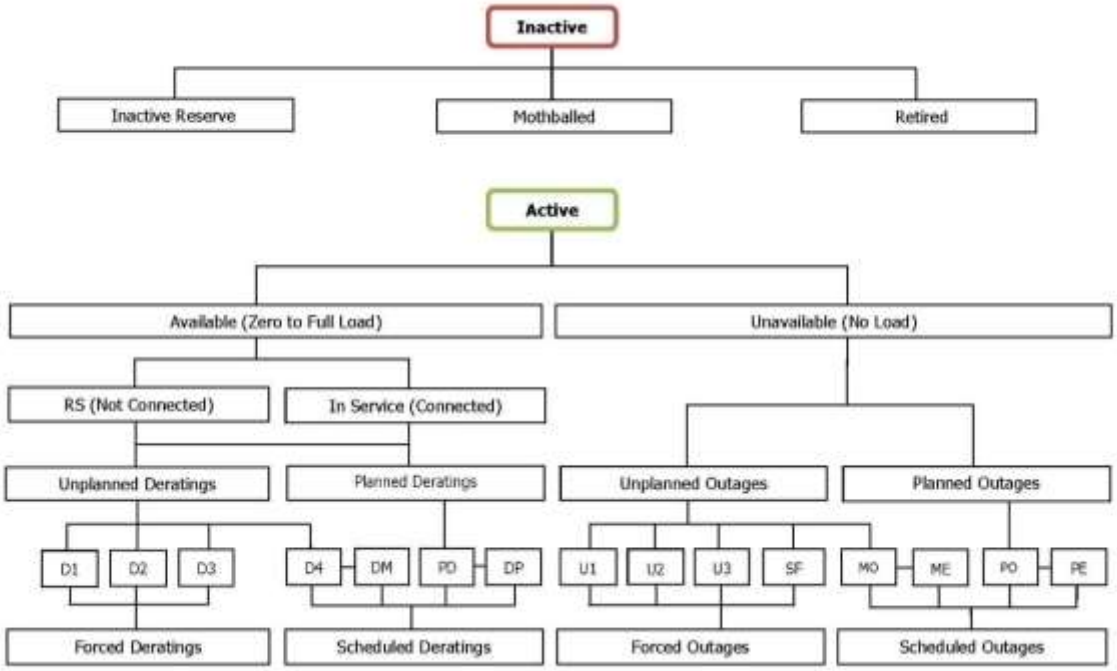

Figure III-1: Unit States Diagram

Inactive States

The two most general unit states are shown at the top of Figure III-1: active and inactive. Inactive state is called "Deactivated Shutdown" in IEEE Standard 762 and is defined as "the state in which a unit is unavailable for service for an extended period of time for reasons not related to the equipment." GADS interprets this to include:

IR **Inactive Reserve**

IR is defined by IEEE Standard 762 and GADS as "the state in which a unit is unavailable for service but can be brought back into service after some repairs in a relatively short duration of time, typically measured in days." GADS added "after some repairs" and defines the phrase "after some repairs" to mean that some action may be needed to prepare the unit for service because it had been sitting idle for a period of time, and some equipment parts have deteriorated or need replacing before the unit can be operated. The unit should be operable at the time the IR begins. This does not include units that may be idle because of a failure and dispatch did not call for operation. A unit that is not operable or is not capable of operation at a moment's notice should be on a forced maintenance or planned outage and remain on that outage until the proper repairs are completed and the unit can operate. The unit must be on RS a minimum of 60 days before it can move to IR status. Use Cause Code "0002" (three zeros plus 2) for these events.

MB **Mothballed (MB)**

MB is defined by IEEE Standard 762 and GADS as "the state in which a unit is unavailable for service but can be brought back into service after some repairs with appropriate amount of notification, typically weeks or months." GADS added "after some repairs" and defines the phrase "after some repairs" to mean that some action may be needed because the unit had been idle for a period of time and some equipment, systems or

parts may have deteriorated and should be replaced or repaired prior to the units return to service. The unit may have also experienced a series of mechanical problems, prior to the MB event, for which management may wish to wait for a period of time to determine if the unit should be returned to service or retired. Granted IEEE Standard 762 states that the unit must be capable of operation prior to being placed in the deactivated state; however, in actual practice management may want to delay a decision to fix the generator and 'suspend' it in a deactivated state until a decision to repair or retire is rendered. If this option is chosen the unit must enter the MB event no earlier than 60 days after the preceding outage event (In other words, the unit must incur a forced outage of a minimum 60 days prior to the start of an MB event if the unit is inoperable). If the choice is to retire the generator after a decision is made, then the generator can be immediately retired coincident with the end of the MB event; If the decision is to repair, all repairs to make the unit operable must be completed under an outage of same type that preceded the MB event (in other words, if the generator entered the MB event on the heels of a forced outage, it must return to a forced outage for repairs to make the generator operable). If repairs are being made on the unit in order to restore it to operating status once the MB event has started, the MB event must end prior to the commencement of those repairs and the appropriate outage type started until those repairs have been completed and the outage ended. Also, if there are long lead-time item(s) that are ordered (such as a GSU, a generator rotor or the like) the MB event should end when the initial order has been placed, since a decision at that time has been rendered to repair the generating unit. Again, once a decision is rendered to repair the unit, whether or not orders are placed and/or work is started, the mothball event must end, and the appropriate outage type started. Repair work cannot be conducted on a unit in the mothball state. Use Cause Code "9991" for these events.

RU **Retired**

RU is defined by IEEE Standard 762 and GADS as "the State in which a unit is unavailable for service and not expected to return to service in the future." RU should be the last event for the remainder of the year (up through December 31 at 2400). The unit must not be reported to GADS in any future submittals. Use Cause Code "9990" for these events.

Active States

The lower part of Figure III-1 more precisely describes the operating state of a unit at any given time. The fourth level shows the most detailed operating states; this is the level of detail incorporated into the GADS program. The codes in the blocks are the GADS event types.

Notice on the diagram that D4 (maintenance derating) and MO (maintenance outage) are classified as both "unplanned" and "scheduled." IEEE Standard 762 classifies these types of events as "unplanned." GADS recognizes that, historically, many operating companies referred to these events as "scheduled" and continue to do so. Both classifications are shown here to illustrate the relationship between unplanned and scheduled events. The evaluation of unit availability is not affected by the difference in terminology.

Outages

An outage exists whenever an active unit is not synchronized to the grid system and not in a reserve shutdown state. The general outage event classification is divided into eight distinct event types. Special instructions for reporting testing during and following outages can be found on Page III-10.

An outage starts when the unit is either desynchronized from the grid or when it moves from one unit state to another (for example, goes from a reserve shutdown to a maintenance outage.) The outage ends when the unit is synchronized to the grid or moves to another unit state.

When a unit moves from one outage state to another, the exact date and time that the first outage ends will be the same as when the second outage starts. The unit state can only be changed if the first outage ends. For example, if

the unit is forced off-line due to a water wall tube leak (just before it was to come off-line for a planned outage), then the forced outage leak repair must be completed before the unit state can be changed from a U1 to a PO. The maintenance crew can start the PO work, but it will not be a PO until the U1 outage work is complete and the unit could have been put back in service if not scheduled to go on PO.

PO Planned Outage

An outage that is scheduled well in advance and is of a predetermined duration, can last for several weeks, and occurs only once or twice a year. Typically, these events are specifically listed in the plant budget. Turbine and boiler overhauls or inspections, testing, and nuclear refueling are typical planned outages. For a planned outage, all of the specific individual maintenance and operational tasks to be performed are determined in advance and are referred to as the "original scope of work." The general task of repairing turbines, boilers, pumps, etc. is not considered a work scope because it does not define the individual tasks to be performed. For example, if a general task such as repair boiler is considered the work scope, it is impossible to conclude that any boiler work falls outside of the original scope of work. Discovery work and re-work which render the unit out of service beyond the estimated PO end date are not considered part of the original scope of work. A planned extension may be used only in instances where the original scope of work requires more time to complete than the estimated time. For example, if an inspection that is in the original scope of work for the planned outage takes longer than scheduled, the extra time should be coded as an extension (PE). However, if damage found during the inspection results in an extension of the outage, the extra time required to make repairs should be coded as a forced outage.

MO Maintenance Outage

An outage that can be deferred beyond the end of the next weekend (defined as Sunday at 2400 hours or as Sunday turns into Monday), but requires that the unit be removed from service, another outage state, or Reserve Shutdown state before the next Planned Outage (PO). Characteristically, a MO can occur any time during the year, has a flexible start date, may or may not have a predetermined duration, and is usually much shorter than a PO. Discovery work and re-work which render the unit out of service beyond the estimated MO end date are not considered part of the original scope of work. A maintenance extension may be used only in instances where the original scope of work requires more time to complete than the estimated time. For example, if an inspection that is in the original scope of work for the outage takes longer than scheduled, the extra time should be coded as an extension (ME). If the damage found during the inspection is of a nature that the unit could be put back on-line and be operational past the end of the upcoming weekend, the work could be considered MO. If the inspection reveals damage that prevents the unit from operating past the upcoming weekend, the extended work time should be Forced Outage (U1).

There are cases when there are equipment issues and a unit could theoretically run past the next weekend, but the unit would not be run because of high risk for unit damage. If the risk is too high to run the unit, management is unwilling to run the unit, running the unit violates sound engineering practice or running the unit would invalidate your insurance, the outage is forced not maintenance. Examples are DC emergency equipment out of service or one ground on the generator.

Note: If an outage occurs before Friday at 2400 hours (or before Friday turns into Saturday), the above definition applies. But if the outage occurs after Friday at 2400 hours and before Sunday at 2400 hours (the 48 hours of Saturday and Sunday), the MO will only apply if the outage can be delayed <u>past the next, not current, weekend</u>. If the outage cannot be deferred, the outage shall be a forced event.

PE Planned Outage Extension

GADS defines a planned outage extension as an extension of a Planned Outage (PO) beyond its estimated completion date. This means that at the start of the PO, the outage had an estimated duration (time period)

for the work and a date set for the unit to return to service. All work during the PO is scheduled (part of the original scope of work) and all repair times are determined before the outage started.

For more information on PE rules and regulations see below.

ME Maintenance Outage Extension

GADS defines a maintenance outage extension as an extension of a maintenance outage (MO) beyond its estimated completion date. This means that at the start of an MO, the outage had an estimated duration (time period) for the work and a date set for the unit to return to service. All work during the MO is scheduled (part of the original scope of work) and all repair times are determined before the outage started.

For more information on ME rules and regulations see below.

PE and ME Rules and Regulations

The "predetermined duration" of an outage also determines the "estimated completion date" of the PO or MO. If the unit is scheduled for four weeks of repairs, then the unit is expected back in service at a certain date four weeks after the start of the outage. In cases where the outage is moved up or back according to the needs of the operating company, ISO, or power pool, then the start of the outage plus duration of the outage determines the new completion date. As long as the outage is no longer than planned, the expected completion date is moved to coincide with the predetermined duration period.

If the unit is on outage (for example, U1 outage due to a boiler tube leak) at the time the unit is scheduled to start the PO or MO work, then the work on the cause of the outage (tube repairs) must be completed before changing from the U1 outage to the PO or MO outage. PO and MO work can start but is not counted as PO or MO work until the U1 repairs are complete.

All work during PO and MO events is determined in advance and is referred to as the "original scope of work." Use ME and PE only in instances where the original scope of work requires more time to complete than originally scheduled. Where applicable, the extension of the planned or maintenance outage may be required to be approved in advance by your power pool or ISO. Advance warning of an extension is very important. However, GADS is not a dispatch-orientated database but rather an equipment-orientated one. The reporting of the PE and ME is based on IEEE Standard 762-GADS rules, not ISO requirements. Therefore, if the extension meets the GADS rules, then report it as an ME or PE and not a U1 when reporting to GADS only.

Do not use ME and PE in instances where unexpected problems or conditions are discovered during the outage which render the unit out of service beyond the estimated end date of the PO or MO. Report these delays as Unplanned (Forced) Outage-Immediate (U1). Do not use ME and PE if unexpected problems occur during unit startup. If a unit completes a PO or MO before the original estimated completion date and volunteers to return to service (i.e., the unit is released to dispatch), then any problems causing outages or deratings after that date are not considered to be part of the PO or MO.

ME, PE or U1 must start at the same time (month/day/hour/minute) that the PO or MO ended. See *Appendix G*, Example 7, Pages G-26 to G-27.

SF Startup Failure

This is an outage that results when a unit is unable to synchronize within a specified startup time following an outage or reserve shutdown.

The startup period for each unit is determined by the operating company. It is unique for each unit and depends on the condition of the unit at the time of startup (cold, warm, and hot). A typical unit startup

occurs in three phases: warm up, synchronization, and ramp up. NERC defines a startup period to begin with the command to start and end when the unit is synchronized. An SF begins when a problem preventing the unit from synchronizing occurs. The SF ends when the unit is synchronized, another SF occurs, or the unit enters another permissible state. Problems encountered during ramp up that force the unit offline are considered outages not SF events.

U1 Unplanned (Forced) Outage — immediate

This is an outage that requires immediate removal of a unit from service, another outage state, or a reserve shutdown state. This type of outage usually results from automatic control system trips or operator-initiated manual trips of the unit in response to unit alarms but can also occur while the unit is offline.

A number of the NERC Planning Committee working groups and subcommittees have a need to collect the various types of trips experienced by generating units. They are most interested in automatic grid separation trips caused by many things, including transmission. In order to maintain the historical meanings of the existing component trip codes 82 and 83, GADS created the two amplification codes T1 and T2 to be used for unit trips:

T1 – Tripped/shutdown grid separation — automatic. A full outage that suddenly trips the unit from some loading to zero loading without operator initiation. This is an unexpected grid separation event where the unit is in normal operation when the mechanical, electrical, or hydraulic control or protective systems automatically trip the generating unit(s). This trip is not when the unit is manually tripped, or when the unit operator assisted to lower loadings and then the unit automatically tripped. The unit must be in service (breakers closed) before a grid separation trip event is accepted by GADS. No other unit outage condition can precede this event.

T2 – Tripped/shutdown grid separation — manual. The unit is quickly removed from service with operator assistance. This type of outage includes operator-initiated trips in response to unit alarms.

If the cause of the trip is not known, then you can use amplification code 84, but it must be changed to the appropriate amplification code (T1 or T2) before the end of the year to be acceptable by GADS.

84 - Unknown – investigation underway (change this code once failure mechanism is determined)

If the U1 is not a trip but the result of a change of state (from planned outage to U1, for example), then the amplification code can be any other amplification code if the operating company chooses to report it. In other words, the amplification code under such conditions is voluntary.

Starting January 1, 2011, the need to report T1, T2 or 84 amplification codes became mandatory to pass GADS edits. For a complete list of the amplification codes see *Appendix J* of the *GADS Data Reporting Instructions.*

U2 Unplanned (Forced) Outage — Delayed

This is an outage that does not require immediate removal of a unit from the in-service state, instead requiring removal within six hours. This type of outage can only occur while the unit is in service.

U3 Unplanned (Forced) Outage — Postponed

This is an outage that can be postponed beyond six hours but requires that a unit be removed from the in-service state before the end of the next weekend (Sunday at 2400 or before Sunday turns into Monday). This type of outage can only occur while the unit is in service.

Interpretation of Outages and Their Reporting

The IEEE Standard 762 defines the outage types and when the appropriate outage should be reported. However, the experiences of the industry also dictate interpretations of which outage type is most appropriate for a situation. The following are interpretations of when certain full outages should be reported and the reason for the apparent difference to the IEEE Standard 762 rules. In these examples, we will illustrate the points using fictitious generating units but real-life situations.

Scenario #1: Forced Outage to Planned Outage

Riverglenn #1, a fossil unit, is four days away from its scheduled planned outage when it experiences a boiler tube leak. The unit must come off-line within 6 hours for repairs. Since the unit is scheduled for a planned outage, the dispatch (or ISO) allowed the unit to go into its outage early.

It normally takes 36 hours to repair a tube leak. Therefore, the first 36 hours of the outage would be forced (U2) outage. After the 36-hour period, the PO outage starts.

Scenario #2: Forced Outage that Can Wait for Repairs Until the End of the Next Weekend.

On a Thursday, Riverglenn #1 experiences a sudden increase in vibration in its ID Fan. The vibration is not severe enough to trip the unit, but there are signs that the unit must be removed from service soon to check the problem and make repairs. After some discussion, management decides Riverglenn can be removed from service next week without further damage to the unit or endangering the safety of the personnel. On Friday, dispatch (or ISO) allows Riverglenn to come down for repairs because another unit that had been out for maintenance is now available for operation.

Even though Riverglenn came off-line the same week as its problem started, the outage is a maintenance outage because it could have remained on-line until the end of the next weekend.

Scenario #3: Forced Outage that Cannot Wait for Repairs Until the End of the Next Weekend.

Jumbo #1, a gas turbine, began to vibrate on Friday. At first, the vibrations were not severe, but over the following 4 hours, the mils of vibration increased to where the unit needed to be removed from service. The unit continued to generate until after the peak period was over. Jumbo was not needed again until the following Monday afternoon. Shortly after the peak period, the operator tripped the unit.

Even though the unit was not needed until Monday, the unit could not have operated through the weekend because of the vibration problem. Therefore, the outage is a forced outage (U3) and is enforced until the vibration problem is solved.

Scenario #4: Forced Outage to Reserve Shutdown with Economic Repairs.

High Top #3, a small fossil unit, experienced a forced-outage failure in its boiler. However, the unit was not needed the remainder of the week. Management decided to repair the unit on standard work time with no overtime or weekend pay. Working standard 8-hour days, crews completed the repairs in 12 hours over a two-and-a-half-day period (44 hours).

Although the unit was not needed, the unit was not available due to management decision for the full 44 hours and so the forced outage is reported from the time the unit came off-line until the unit was available for operation (44 hours later). No part of the 44 hours is RS time. The RS time starts after the repairs and unit is available for operation.

Scenario #5: Extending a Planned/Maintenance Outage When Work Is Part of Original Scope of Work.

During the planned overhaul of Riverglenn #1, the planned repairs to the electrostatic precipitator were more extensive than expected. More parts were ordered to complete the repairs. However, unexpected longer repairs to the ESP delayed the return to service for 3 additional days.

Since the ESP repairs were part of the original scope of work and the unit receives the okay for extension from its ISO, the additional 3-day delay is the justification for the planned outage extension.

Scenario #6: Extending a Planned Outage when work is not part of original scope of work.
Part way through the planned outage of Riverglenn #1, the mechanics checked the packing on the boiler startup feed pump and decided it would be best to replace it. It was not part of the original scope of work but was determined important to prevent a future unit outage. As a result of the repairs and no packing on site, the PO was delayed from returning to service on time for 12 hours.

All hours of the outage except the last 12 hours are PO. The last 12 hours is a Forced Outage (U1) because it 1) delayed the startup of the unit and 2) was not part of the original work scheduled during the outage.

Scenario #7: Unexpected Repairs During Planned/Maintenance Outage But Completed Within the Scheduled Outage Time.
Riverglenn #1 was in its annual overhaul when it was discovered that several blades on its ID fan needed replacement. It was not part of the original scope of work to repair the blades, but parts were available through the OEM and repairs to the fan were completed during the allotted planned outage time. There were no delays in unit startup caused by the ID fan repairs.

Since the unit was not delayed from its scheduled startup due to the fan repairs, there was no penalty to the unit because of the "surprise" repairs. The company reported the ID Fan repair as part of the "work completed during the outage" section to GADS.

Notes on Reporting Outages

Testing Following Outages
Typically following outages, equipment that was repaired or replaced is tested. These testing periods must be reported to GADS. The reporting procedure to follow depends on whether the unit was synchronized during the testing period:

a. **On-line testing (synchronized)**
   If the unit must be on-line and in service at some reduced load to perform testing following a Planned Outage (PO), Maintenance Outage (MO), or Unplanned (Forced) Outage (U1, U2, U3, SF), report the testing as a Planned Derating (PD), Maintenance Derating (D4), or Unplanned (Forced) Derating (D1), respectively. The PD, D4, or D1 starts when the testing begins, and ends when testing is completed. Report any generation produced while the unit was on-line during the testing period on the performance report (see Page IV-4).

b. **Off-line testing (not synchronized)**
   In cases where the unit does not have to be synchronized after the outage to perform testing, report the testing as part of the outage event using Section D of the event report. The outage ends when the testing is complete and the unit is placed in service or enters another state.

   If you wish, you may report this type of testing separate from the outage event. In this case, the testing period becomes a new event, the outage ending when the testing period begins. You must use the same event type for the testing event as you did for the original outage (a PE or ME is not considered an original outage — use the PO or MO event type, as appropriate). The testing event ends when the unit is synchronized or placed in another unit state.

Outside Management Control Outages
There are outages from outside sources that can result in restricted generating capabilities or full outages in generating units. These outages include (but are not limited to) ice storms, hurricanes, tornados, poor fuels, interruption of fuel supplies, etc. A list of causes and their cause codes are presented in Appendix K of the *GADS Data*

Reporting Instructions. Appendix K also sets special limits to the Outside Management Control (OMC) uses of the cause codes.

REPORT ALL OMC events to GADS, and they should not be classified as reserve shutdown or non-curtailing events. The GADS software performs calculations of events with and without OMC events. The calculation details are described in Appendices F and K. The use of equations without OMC events is left to the decision of plant and corporate management.

Special Comment Regarding the Reporting of Pumped Storage Units to GADS

GADS collects data on all conventional unit types, including pumped storage units. Pumped storage units provide two types of service: generating and non-generating. In the generating mode, the unit acts like a generator and turbine to provide electric power. In the non-generating mode, the pumped storage unit acts as a motor and pump to move water back into the reservoir for reuse in the future. The 2006 version of IEEE Standard 762 credits pumped storage units in several statistics whether the unit is in the generating or non-generating mode.

When reporting pumped storage units to GADS, know that NERC is more interested in the generating aspect of pumped storage units than the non-generating mode. Therefore, if the unit is prevented from generating power, then those events must be reported to GADS using the standard procedures.

In the case where the pumped storage unit cannot operate in the non-generating mode but can operate in the generating mode, then the operator should report the non-generating mode equipment failure as an NC forced outage event.

In the case where the pumped storage unit cannot operate in the generating mode but either can or cannot operate in the non-generating mode, then the event must be reported using the normal outage procedure. NC event types are not appropriate in this case. The event should describe the reason why it cannot generate electricity.

Deratings

A derating exists whenever a unit is limited to a power level that is less than the unit's net maximum capacity. Similar to outages, the general derating event classification is divided into distinct event types, based on IEEE Standard 762.

A derating starts when the unit is not capable of reaching 100% capacity. The available capacity is based on the output of the unit and not on dispatch requirements. The derating ends when the equipment that caused the derating is returned to service, whether it is used at that time by the operators or not. More than one derate can occur at one time.

If a derating is less than 2% of the unit's Net Maximum Capacity (NMC) **and** less than 30 minutes in duration, then report the derating at your discretion (optional). Otherwise, all other deratings shall be reported to GADS. For example, a derate that is 10% of the NMC but last 10 minutes should be reported to GADS, and a derate that is 1% of the NMC but last 6 hours should be reported to GADS.

Do not report deratings caused by ambient-related conditions or system dispatch requirements (see notes on reporting deratings, Page III-13).

PD Planned Derating

This is a derating that is scheduled well in advance and is of a predetermined duration.

Periodic deratings for tests, such as weekly turbine valve tests, should not be reported as PD's. Report deratings of these types as Maintenance Deratings (D4).

On combined cycle and co-generation units always account for the loss of waste heat input to the HRSG whenever a gas turbine goes on planned outage by adding a concurrent planned derate to the steam turbine. Be sure to use the same start/end dates/times and the same cause code as the planned outage and specify in the description that this is a concurrent planned derate due to the outage on the appropriate gas turbine.

D4 Maintenance Derating

This is a derating that can be deferred beyond the end of the next weekend (Sunday at 2400 or before Sunday turns into Monday) but requires a reduction in capacity before the next Planned Outage (PO). A D4 can have a flexible start date and may or may not have a predetermined duration.

On combined cycle and co-generation units always account for the loss of waste heat input to the HRSG whenever a gas turbine goes on maintenance outage by adding a concurrent maintenance derate to the steam turbine. Be sure to use the same start/end dates/times and the same cause code as the maintenance outage and specify in the description that this is a concurrent maintenance derate due to the outage on the appropriate gas turbine.

Note: *If a derate occurs before Friday at 2400 hours (or before Friday turns into Saturday), the above definition applies. But if the derating occurs after Friday at 2400 hours and before Sunday at 2400 hours (the 48 hours of Saturday and Sunday), the D4 will only apply if the derating can be delayed passed the next, not current, weekend. If the derating cannot be deferred, the derating shall be a forced derating event.*

DP Planned Derating Extension

GADS defines a planned derating extension as an extension of a planned derate beyond its estimated completion date. This means that at the start of the PD, the derate had an estimated duration (time period) for the work and a date set for the unit to return to service. All work during the PD is scheduled (part of the original scope of work) and all repair times are determined before the outage started.

Use a DP only in instances where the scope of work requires more time to complete than originally scheduled. Do not use a DP in instances when unexpected problems or delays outside the scope of work are encountered that render the unit incapable of full load beyond the estimated end date of the PD. The DP must start at the same time (month/day/hour/minute) that the PD ended.

DM Maintenance Derating Extension

If a maintenance derating (D4) continues beyond its estimated completion date, then it is considered maintenance derate extension (DM). This means that at the start of the D4 event, the derate has an estimated work time and a set date for the unit for returning to service. All work during the D4 is scheduled (part of the original scope of work) and all repair times are determined before the outage started.

Use a DM only in instances where the scope of work requires more time to complete than originally scheduled. Do not use a DM in those instances where unexpected problems or delays outside the scope of work are encountered which render the unit incapable of full load beyond the estimated end date of the D4. The DM must start at the same time (month/day/hour/minute) that the D4 ended.

D1 Unplanned (Forced) Derating — Immediate

This is a derating that requires an immediate reduction in capacity.

D2 Unplanned (Forced) Derating — Delayed

This is a derating that does not require an immediate reduction in capacity, but rather within six hours.

D3 Unplanned (Forced) Derating — Postponed

This is a derating that can be postponed beyond six hours but requires a reduction in capacity before the end of the next weekend.

On combined cycle and co-generation units always account for the loss of waste heat input to the HRSG whenever a gas turbine goes on forced outage or a startup failure by adding an appropriate concurrent derate (D1, D2, or D3) to the steam turbine. Be sure to use the same start/end dates/times and the same cause code as the as the forced outage or startup failure and specify in the description that this is a concurrent derate due to the forced outage or startup failure on the appropriate gas turbine.

Notes on Reporting Deratings

Ambient-related Losses

Do not report ambient-related losses, such as those caused by high cooling water intake temperatures (other than regulatory-imposed discharge limits — cause code 9660, etc.), as derating events to GADS. There are two reasons for this: first, the level of record keeping required to track these types of losses as events is excessive; second, ambient-related losses are easily computed using the information you supply to GADS on the performance report, specifically maximum and dependable capacity. The difference between these two values reflects losses due to ambient conditions only. To determine ambient losses in megawatt hours (MWh), simply multiply the difference between maximum capacity and dependable capacity by the total number of hours in the study period.

System Dispatch Requirements

Sometimes units operate at less than full capacity for reasons other than ambient-related conditions or equipment failures. This operating mode, imposed by system dispatch requirements, is referred to as "load following." Load following is not reported to GADS. That information is not relevant to unit availability and is therefore beyond the scope of the GADS program.

Although load following is not reported to GADS, any maintenance, testing, etc. done during the load following period should be reported as an event. Under certain conditions, this work can be reported as a non-curtailing event (NC).

Figure III-2 describes the relationships between maximum capacity, dependable capacity, and available capacity as a result of deratings, and system dispatch requirements.

Ramping Up at Unit Startup and Down at Unit Shutdown

Each unit has a "standard" or "normal" time for reaching full load capabilities after a full outage or ramping down (coming off-line) to a full outage state. GADS doesn't set time periods for each unit; the operators know the units and can judge if a unit is taking longer than normal to ramp up after an outage or coast down for removal from service.

If a unit ramps up to the full load level OR up to the level of required load within the "normal" time period — set by the operators of the unit — following a full outage, there is no derating on the unit from the time of synchronization to the load point.

If the unit takes longer than normal ramp up time to the full load level OR up to the required load, then there is a derating. The generating capacity of the unit at the end of the normal period will be the level of the derate and the derate will last until the unit can either reach full load capability or level of required load.

FOR ALL UNITS EXCEPT NUCLEAR: There is no derating for unit shutdown. Each unit must be shut down safely, without damaging equipment or posing a safety hazard to personnel. Some shutdowns are quick as a unit trip; others are slower such as coast down to unit planned outages. In either case, the unit is not derated.

FOR NUCLEAR UNITS: Coast down to refueling may take weeks, depending on the operation of the unit. If the unit can recover from coast down and can still produce 100% capability during coast down, there is no derating. If the unit is not capable of 100% capacity, the derate is at the level of capability until the unit is taken off-line.

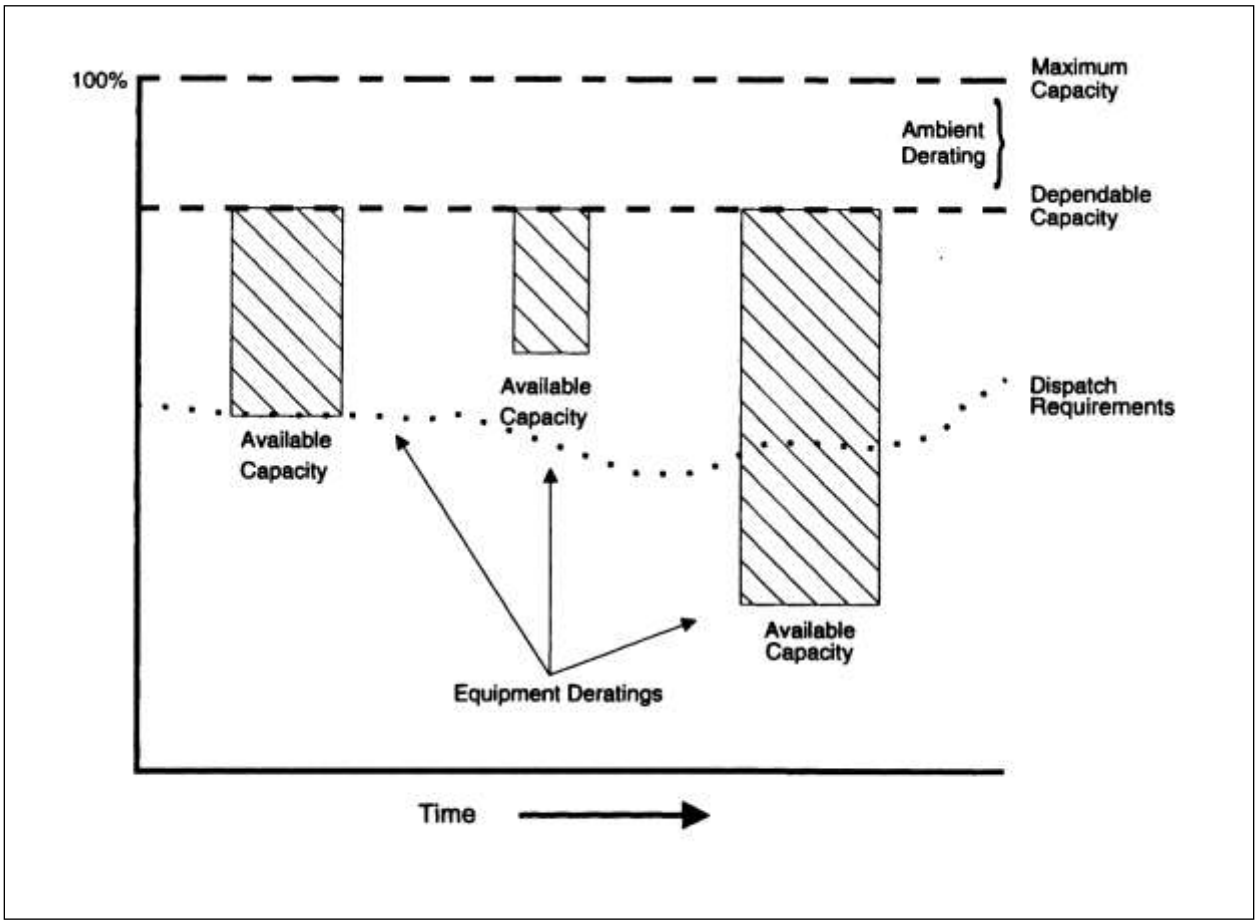

Figure III-2: Possible Derating Situations

Overlapping Deratings

Deratings often overlap with each other in duration. GADS considers all deratings additive except the parts which are shadowed by an outage or a dominant derating. Additive simply means that the total capacity reduction on the unit is the sum of the individual overlapping derating reductions. Shadowed means that all or a portion of a derating occurs during another outage or dominant derate, during which the non-dominant derate does not affect the available capacity of the unit. While the shadowed derate is not used in equivalent hour calculations, the equipment unavailability should still be reported using one of the following methods:

1. Report each component failure as a separate derating. Use engineering judgement to determine the available capacity as a result of each. NERC processes the data first by sorting by start date and time, then derated capacity, and lastly event number. This means that when start dates are identical, the GADS will process the derating with the lower available capacity first. In instances where both the start dates and the derated capacities of the events are the same the system will process the derating with the lower event number first.
2. Report as one derating event, indicating one component as the primary cause of the event and the other(s) using Section D of the event report.

Deratings that Vary in Magnitude with Time

Certain deratings vary in magnitude over time, such as those caused by stack emission, thermal discharge, and fuel limitations. You may use one of two methods to report these types of deratings to GADS:

1. Report a new derating to GADS each time the available capacity of the unit changes.
2. Determine the unit's average available capacity during the entire restricted period and report only one continuous averaged derating event to GADS. The start and end dates of the averaged derating event would be the start and end of the overall restricted period.

The averaging technique used to determine the unit's available capacity involves first calculating the megawatt hours (MWh) lost at each level of the derating, summing them, and then dividing them by the number of hours in the overall derating period. This calculation yields the average megawatts (MW) lost during the period, from which the average available capacity of the unit during the period is determined. This is the only number you report in Section B of the event report (see Page III-28).

The following example demonstrates this averaging technique:

A 1000 MW unit experienced a derating caused by a stack emission limitation over a 10-day period (240 hours). During this period, the magnitude of the derating varied as follows:

1. 40 hours at 30 MW
2. 10 hours at 60 MW
3. 110 hours at 20 MW
4. 80 hours at 40 MW.

During this time, the unit also experienced an Unplanned (Forced) Outage – Immediate (U1) event for 90 hours and a Reserve Shutdown (RS) event for 20 hours.

First, the total megawatt hours (MWh) lost at each derating level are calculated and summed:

(40 hours x 30 MW) + (10 hours x 60 MW) + (110 hours x 20 MW) + (80 hours x 40 MW) = 7200 total MWh lost.

Next, the average megawatts (MW) lost over the 10-day period is calculated by dividing the total MWh lost by the number of hours in the entire derating period:

7200/240 = 30 average MW lost

Finally, the available capacity for the unit over the 10-day derating period is calculated by subtracting the average MW lost from the unit's dependable capacity.

1000 MW - 30 MW = 970 MW available capacity

Again, the start and end dates of this derating would be the start and end dates of the entire period. The available capacity as a result of the event to be reported on the event report is 970.

Notice in the example that one outage and one reserve shutdown event also occurred during the period of the stack emission limitation. It is important to note that deratings of the type described above exist even if the unit is shut down, limited by a more severe derating, or masked by a reserve shutdown. For this reason, the average megawatts lost over the 10-day period in the example is calculated based on the total number of hours in the period (240), not

just the number of hours the unit was synchronized. NERC computer programs recognize any full power outages that occur during a continuous derating period and do not double-count the overlapping periods when calculating performance indexes.

Dominant Derating Reporting
(See Page III-19 for details)

Reserve Shutdowns - RS

This is an event where a unit is available for load but is not synchronized due to lack of demand. This type of event is sometimes referred to as an economy outage or economy shutdown. If a unit is shut down due to any equipment-related problems, whether the unit was needed by the system, report an Unplanned (Forced) Outage, Maintenance Outage, or Planned Outage. **Do not** report a Reserve Shutdown.

While a unit is on RS, maintenance work is often performed that would have resulted in a unit outage or derating had the unit been on-line. This work can be reported as part of the RS event if, at any time, the work can be stopped or completed without preventing the unit from:

1. Synchronizing after a normal startup cycle, and
2. Reaching its available capacity after a normal loading cycle.

The criteria above remain the same whether or not the system needed the unit.

If the above criterion is met, report maintenance work done during the RS on the event report, section D (beginning with record 04), using an event contribution code 3 – other components worked during event.

If maintenance work cannot be stopped or completed, the reserve shutdown condition of the unit changes and an outage or derating must be reported. If the unit cannot be synchronized while the work is being performed, an outage exists, and the RS must end. If the unit cannot attain its available capacity while the work is being performed, a derating exists. The RS event does not end but report the derating as well. Estimate the available capacity as a result of the derating.

Non-curtailing Events - NC

This is an event that occurs whenever equipment or a major component is removed from service for maintenance, testing, or other purposes that do not result in a unit outage or derating.

An NC also can exist when a generating unit is operating at less than full capacity due to system dispatch requirements. During this period, equipment can be removed from service for maintenance, testing, or other reasons and be reported as an NC if both the following conditions are met:

1. The available capacity of the unit is not reduced below what is required by system dispatch, and
2. Maintenance work can be stopped or completed, and the unit can reach its net dependable capacity (NDC) level within its normal ramp-up time if and when the system needs the unit.

If the conditions cannot be met, report an outage or derating event rather than an NC.

Section B: Event Magnitude

GADS uses the information in this section to determine the impact of the event identified in Section A on the unit. This section is located on record 01 of the event report. See *Table III-3*.

Table III-3: Record Layout of Section B – Event Magnitude		
Column ID	**Number of Columns**	**Starting Position**
Record 01		
B – Event Magnitude		
Start of Event (required)	8	20
(Blank Columns)	20	28
End of Event (required)	8	48
Gross Available Capacity (voluntary but recommended)	4 + 2 decimals	56
Net Available Capacity (required)	4 + 2 decimals	62
(Blank Columns)	1	68
Dominant Derating Code (voluntary but highly recommended)	1	69
(Blank Columns)	11	70
Record Number (required)	2	81

Start of Event (Record 01, columns 20-27) - Required
Enter the time (month/day/hour/minute) the event began:

Outages — time the unit was desynchronized (either operator or equipment initiated) or entered the outage state from another state.

Deratings — time the system, major component, or piece of equipment became unavailable for service affecting an actual or potential loss of unit capacity.

Reserve Shutdowns — time the unit was desynchronized or entered the reserve shutdown state from another state.

Non-curtailing Events — time the system, major component, or piece of equipment became unavailable for service (either operator or equipment initiated).

Use a 24-hour clock to record time. Record midnight as **2400** and the beginning of a new day as **0000**. For an event that began on July 31 at 3:26 p.m., the start of event is recorded as:

07	31	15	26

Event Transitions
Sometimes events occur in succession with no intervening unit synchronization. These events are considered "related," even though they must be reported separately. The matrix below describes the relationships between events, and it details permissible event type changes. See Example 9 in Appendix G.

TO / FROM	U1	U2	U3	SF	MO	PO	ME	PE	RS	DM	DP
U1 – Immediate	Yes	No	No	Yes	Yes	Yes	No	No	Yes		
U2 – Delayed	Yes	No	No	Yes	Yes	Yes	No	No	Yes		
U3 – Postponed	Yes	No	No	Yes	Yes	Yes	No	No	Yes		
SF - Startup Failure	Yes	No	No	Yes	Yes	Yes	No	No	Yes		
MO – Maintenance	Yes	No	No	Yes	Yes	Yes	Yes	No	Yes		
PO – Planned	Yes	No	No	Yes	Yes	Yes	No	Yes	Yes		
ME – Maintenance Extension	Yes	No	No	Yes	Yes	Yes	No	No	Yes		
PE – Planned Extension	Yes	No	No	Yes	Yes	Yes	No	No	Yes		
RS – Reserve Shutdown	Yes	No	No	Yes	Yes	Yes	No	No	Yes		
D1 – Immediate	*IEEE Standard 762 does not recognize transition to/of deratings from/to other event types except as shown.*									No	No
D2 – Delayed										No	No
D3 – Postponed										No	No
D4 – Maintenance										Yes	No
PD – Planned										No	Yes
DM – Maintenance Derating Extension										No	No
DP – Planned Derating Extension										No	No

Figure III-3: Allowable Event Type Changes

"YES" denotes that a change from one event type to another without intervening synchronization is permissible, and the end date of the first event can be the same as the start date of the successive event. "NO" indicates that there is no relationship between the event types and individual events separated by some period of time must be reported.

When there is no intervening synchronization between events, the start time of one event is the same as the end time of the immediately preceding event.

End of Event (Record 01, columns 48-55) - Required
Enter the time (month/day/hour/minute) the event ended:

Outages — time the unit was synchronized or placed in another appropriate unit state.

Deratings — time the system, major component, or piece of equipment became available for service affecting an actual or potential increase in unit capacity.

Reserve Shutdowns — time the unit was synchronized or placed in another appropriate unit state.

Non-curtailing Events — time the system, major component, or piece of equipment became available for service.

For events that extend through multiple months or quarters within the same year, do not wait until the event is over before reporting it to GADS. Instead, report the event and leave the end date blank. When the event does end, submit the end date as a revision, following the instructions on Pages III-3. Every event must have an end date at the end of every year.

All events start when they start and end when they end. Events that continue from one year into the next should be programmatically truncated for inclusion in the input file submitted to webE-GADS with a new end/start date; webE-

GADS will combine the pieces back into one long event. They should always remain as one long year crossing event in your in-house GADS system. For events that continue into the next year, report the end date as **12312400**. Report the event in the next year with a start date of **01010000**.

Take care to change the Year (Section A, columns 9-12) to reflect the current year for the end date and the next year for the start date.

In addition to the year and start date, the event being carried into the next year must have a revision code of zero (0). All other details remain the same.

Gross Available Capacity (GAC) as a Result of the Event
(Record 01, columns 56-61) – Voluntary (but recommended)

Net Available Capacity (NAC) as a Result of the Event
(Record 01, columns 62-67) – Required

Enter the capacity that is available from the unit given the restriction imposed by the derating event being reported. This is the capacity after the reduction has been taken into account. *Complete these fields only when the event type is a derating.*

The GAC is the greatest capacity at which the unit can operate during the period of restriction caused by the derating. The NAC is the GAC less any capacity utilized for station service or auxiliary loads.

Either GAC or NAC or both must be completed when the event type is a derating. Net data is required. If you voluntarily report the gross available capacity (GAC) then you must report, gross maximum capacity (GMC), gross dependable capacity (GDC), and gross actual generation (GAG) on the performance report (95). Data consistency is necessary to calculate availability statistics.

See *Notes on Reporting Deratings*, for more information concerning the reporting of deratings.

Dominant Derating Code (Record 01, column 69) – Voluntary but strongly recommended.

The purpose of the dominant derating code is to mark the dominate derating if two or more deratings are occurring at the same time. By marking the dominate derate, the computer program will process the cause code for that dominate derating for its full impact and hide part of the impact credited to other derates. In other words, the computer program will not treat the dominant derate as additive and it will shadow any derates it overlaps like an outage. Unit performance statistics will not be affected. Cause code statistics will be more accurate by recording the true frequency and impact of the dominate derate.

Use the Dominant Derating Code in column 69 of record 01. Identify a dominant derate with a “D”.

See Appendix G, Examples 3B and 3D for examples of dominant derates.

One example of how two derates should be reported to GADS – one without the Dominant Derating Code and one with the Dominant Derating Code – is shown in *Figure III-4*.

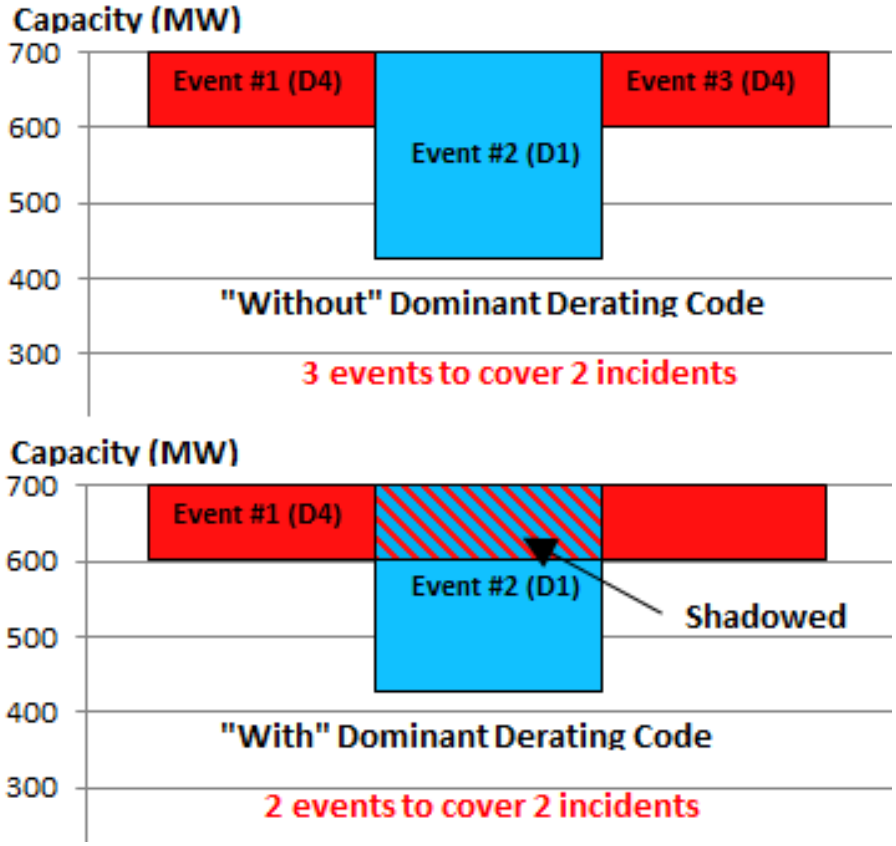

Figure III-4: Example of Dominant Derating Code Reporting

Section C: Primary Cause of Event
Section D: Additional Cause of Event or Components Worked during Event

The *GADS Data Reporting Instructions* describes the data elements reported in Sections C and D together because they are the same.

Use Section C to detail the system, major component, or piece of equipment primarily responsible for causing the event. You can find Section C on records 02 and 03 of the event report (refer to *Table III-4*). You must complete one Section C for every event submitted to GADS with the exception of reserve shutdown events. Because the only "cause" of a reserve shutdown is economic, reporting Section C is optional. **Only one Section C may be reported for each event.**

Use Section D to report factors contributing to the cause of the event that are not primarily responsible; additional components worked on while the event was in progress; factors significantly affecting the startup/ramping of the unit; or problems that extended the event. Section D begins with records 04 and 05 of the event report (refer to *Table III-5*).

Since you can use Section D for several different reasons, multiple Section D cards are allowed. Use only one Section D for each system, component, or piece of equipment you are describing. Up to 46 sets of Section D records (numbers 04-99) are allowed, so you can describe up to 46 different items. See question in change list.

Both Sections C and D consist of two cards each, one even-numbered and one odd-numbered. Use the even-numbered record, which contains information like man-hours worked, to begin the description of the causes or contributing factors of the event. The odd-numbered record is used *only* to continue the description begun on the

even-numbered card. If additional space is not needed for a description, omit the odd-numbered record rather than submit a blank one to GADS.

The first 19 characters (A – Event Identification) of each record (04-99) are identical to that of Record 01. These 19 characters link the records together.

Note: *Never begin describing a new system, major component, or piece of equipment on an odd-numbered card.*

Table III-4: Record Layout of Section C – Primary Cause of Event (Records 02 and 03)

Column ID	Number of Columns	Starting Position
Record 02		
A – Event Identification		
Record Code (required)	2	1
Utility (company) Code (required)	3	3
Unit Code (required)	3	6
Year (required)	4	9
Event Number (required)	4	13
Report Revision Code (voluntary)	1	17
Event Type (required)	2	18
C – Primary Cause of Event		
System/Component Cause Code (required)	4	20
Cause Code Amplification Code – (required for U1 events coming from in service only; strongly recommended for all other events.)	2	24
Time Work Started (voluntary)	8	26
Time Work Ended (voluntary)	8	34
(Blank Columns)	2	42
Event Contribution Code (voluntary)	1	44
Contributing Operating Condition (required)	1	45
Man-hours Worked (voluntary)	4	46
Verbal Description (voluntary but strongly recommended.)	31	50
Record Number (required)	2	81
Record 03		
A – Event Identification		
Record Code (required)	2	1

Table III-4: Record Layout of Section C – Primary Cause of Event (Records 02 and 03)		
Column ID	**Number of Columns**	**Starting Position**
Utility (company) Code (required)	3	3
Unit Code (required)	3	6
Year (required)	4	9
Event Number (required)	4	13
Report Revision Code (voluntary)	1	17
Event Type (required)	2	18
C – Primary Cause of Event		
System/Component Cause Code (required)	4	20
(Blank Columns)	2	24
Verbal Description (voluntary but strongly recommended.)	55	26
Record Number (required)	2	81

Table III-5: Record Layout of Section D – Additional Work During Event (Records 4+ and 5+)		
Column ID	**Number of Columns**	**Starting Position**
Record 04+ (Even Numbered)		
A – Event Identification		
Record Code (required)	2	1
Utility (Company) Code (required)	3	3
Unit Code (required)	3	6
Year (required)	4	9
Event Number (required)	4	13
Report Revision Code (voluntary)	1	17
Event Type (required)	2	18
D – Additional Work During Event		
System/Component Cause Code (required)	4	20
Cause Code Amplification Code (Required for U1 events coming from in service only; strongly recommended for all other events.)	2	24
Time Work Started (voluntary)	8	26
Time Work Ended (voluntary)	8	34

Table III-5: Record Layout of Section D – Additional Work During Event (Records 4+ and 5+)		
Column ID	**Number of Columns**	**Starting Position**
(Blank Columns)	2	42
Event Contribution Code (voluntary)	1	44
Contributing Operating Condition (required)	1	45
Man-hours Worked (voluntary)	4	46
Verbal Description (voluntary but strongly recommended.)	31	50
Record Number (required)	2	81
Records 05+ (Odd Numbered)		
A – Event Identification		
Record Code (required)	2	1
Utility (Company) Code (required)	3	3
Unit Code (required)	3	6
Year (required)	4	9
Event Number (required)	4	13
Report Revision Code (voluntary)	1	17
Event Type (required)	2	18
D – Additional Work During Event		
System/Component Cause Code (required)	4	20
(Blank Columns)	2	24
Verbal Description (Voluntary but strongly recommended.)	55	26
Record Number (required)	2	81

System/Component Cause Code (Record 02, columns 20-23) – Required
Enter the four-digit code from Appendix B that best identifies the system, major component, or piece of equipment you are describing. Appendix B is divided into sections for easily locating the appropriate cause codes for each unit type. Appendix D – Cause Code Cross Reference, identifies the allowable range of system/component cause codes for each type of unit.

Cause Code Amplification Code (Record 02, columns 24-25) **-** Required for Unplanned (Forced) Outages – Immediate (U1) events coming from in service to U1 only. No other amplification codes are required for U1 or any other event type. Amplification codes are strongly recommended for all other events but on a voluntary basis only.

The purpose of the amplification code is to further identify the cause of an outage by describing the failure mode. The amplification code is two alpha-numeric characters following the cause code. Failure modes are leaks, corrosion, personnel error, fire, etc. They are almost identical to the GADS failure mechanism codes (see Appendix H), except

the amplification code is just two characters. Some existing cause codes already contain these amplification codes as part of their description. The amplification code allows all cause codes to be described with the set of failure modes without increasing the number of cause codes. It will also allow analysts to further explore the common causes of outages.

You can find a list of the cause code amplification codes in Appendix J.

Time: Work Started (Record 02, columns 26-33) - Voluntary
Enter the date (month/day/hour/minute) the system or component became unavailable for service. This time can be before the start of the event but should not factor into time spent during preparatory work before the system or component was physically taken out of service. You may leave this field blank, but if you do not provide this information, GADS assumes that the work started when the event began.

Time: Work Ended (Record 02, columns 34-41) - Voluntary
Enter the date (month/day/hour/minute) the system or component became available for service. You can leave this field blank, but if you do not provide this information, GADS assumes that the work ended when the event ended.

Event Contribution Code (Record 02, column 44) - Voluntary
Enter the one-digit code that best describes how the system, major component, or piece of equipment identified in columns 20-23 contributed to the event. Choose the appropriate code from the following list:

Codes

1 **Primary cause of event**
The contribution code (1) must always appear in Section C: Primary Cause of Event. A (1) can only be used on Section D -Additional Cause of Event for a Planned Outage (PO) or a Maintenance Outage (MO) when work on multiple components is scheduled.

2 **Contributed to primary cause of event**
Use this code to describe other systems, components, external conditions, or human factors that contributed to cause the event but were not primarily responsible for the event.

3 **Work done during the event**
Use this code to identify systems or components that were worked on during the event but did not contribute to the initiation of the event or cause a delay in startup.

5 **After startup, delayed unit from reaching load point**

Note: *Event Contribution Codes 2, 3, and 5 can be reported on Section D cards, and may be used more than once.*

Contributing Operating Condition (Record 02, column 45) - Required
The Contributing Operating Condition provides context for the conditions which led to the Event. The Contributing Operating Condition field distinguishes the failure mode ("what failed") from the failure mechanism ("conditions under which it failed"). NERC uses the contributing Operating Condition to differentiate between generating units that go out during large scale environmental impacts such as hurricanes, intense cold, or similar events. If the event had happened even if the extreme conditions did not exist, then you would report No Contributing Condition. Most reported events will occur during normal operating conditions and will report No Contributing Condition.

Table III-6: Contributing Operating Condition (Required)		
Contributing Operating Condition	**Code**	**Description**
No Contributing Condition*	0	Outage, derate, or damage that occurred during normal operating ("blue-sky") conditions without external influence.
Flood or High Water	1	Outage, derate, or damage occurred that are determined to be outside of design considerations due to due to flooding or high-water that occurs due to a natural or man-made event. This includes pre-emptive actions as well.
Drought or Low Water	2	Outage, derate, or damage occurred due to drought or low-water conditions that are determined to be outside of design considerations and that occurs due to a natural or man-made event.
Fire, including wildfires	3	Outage, derate, or damage occurred due to fire that occurs due to a natural or man-made event or equipment that gets involved from a fire initiated from another system in the plant. This includes pre-emptive actions as well.
Lightning	4	Outage, derate, or damage occurred due to lightning striking the equipment during a thunder and lightning storm.
Geomagnetic Disturbance	5	Outage, derate, or damage occurred due to a geomagnetic disturbance. This includes pre-emptive actions as well.
Earthquake	6	Outage, derate, or damage occurred due to an earthquake.
Tornado	7	Outage, derate, or damage occurred due to a tornado. This includes pre-emptive actions as well.
Hurricane	8	Outage, derate, or damage occurred due to a hurricane. This includes pre-emptive actions as well.
Cold Weather Conditions	9	Outage, derate, or damage occurred due to cold.
Hot Weather Conditions	A	Outage, derate, or damage occurred due to heat.
Ice, Hail, and/or Snow	B	Outage, derate, or damage occurred due to ice, hail, and/or snow accumulation.
Turbulent Wind	C	Outage, derate, or damage occurred due to abnormally turbulent winds.
Avalanche or Landslide	D	Outage, derate, or damage occurred due to an avalanche or landslide.
State of Emergency declared by applicable authority or Other External Disturbance	Z	Outage, derate, or damage occurred due to state of emergency declared by applicable authority or other external disturbance.

When more than one Contributing Operating Condition can be assigned for a single cause, report the most impactful Contributing Operating Condition. If multiple causes are reported, the most impactful Contributing Operating Condition for each cause should be selected.

Examples of each Contributing Operating Condition Code

No Contributing Condition (Code 0)

- During normal operations on a fair-weather day, the generator experiences a spontaneous failure due to excessive wear and tear.
- The unit experiences a spontaneous failure in a temperature-controlled environment when it happens to be -30 degrees outside. Since the failure is not driven by the cold weather the Contributing Operating Condition would be reported as 0 (No Contributing Condition).
- A hydro unit is unable to run at maximum capacity due to normal changes in water availability.
- A coal site experiences a bearing failure on a conveyor belt pulley. The overheating bearing starts a fire that damages the conveyor structure. The repairs to the structure impact the unit's ability to move coal to the unit forcing the unit into a derate condition until the repairs can be made.
    - This scenario would use the "No Contributing Condition". Even though there was a fire as the result of the equipment failure, the failure was not dependent on the fire.

Flood or High Water (Code 1)

- Desert storm summer flood exposed high voltage cabling and undermined several pad mount transformers.
- At a hydro plant, high stream flows caused by normal spring freshets causes the tailwater level to rise to an elevation where there is no longer enough operating head for the unit to run and make power. The unit must be shut down.
- The make up water intake for a power plant needs to be shut down due to debris accumulation on its intake screen from a flood or freshet condition. The water intake shutdown requires that the plant be derated (or shut down) to allow for time for the condition to pass and the intake to be cleared.
- Due to flood or extreme rain conditions, a settling pond at a power plant is threatening to spill over and the plant must be derated (or shut down) to prevent a pond failure.
- The intake to a hydro unit has built up a layer of debris due to a flood (or freshet) transporting and depositing excessive debris on the trash rack. The unit needs to be de-rated or shutdown until the debris is cleared.
- A system delivers excessive rain that causes containment systems (such as transformer oil containment basins, plant drain systems, emission management chemical, etc.) to exceed their capacity and the output of a unit is impacted until the containment system can be safely managed again.

Drought or Low Water (Code 2)

- Due to unusual drought conditions, dust clouds cause problems of filter plugging that cause a unit to be derated or shut down for cleaning.
- The river that a power plant receives its water supply from is below minimum levels due to a river basin wide drought or an upstream "take" from another source. The plant must be derated or shut down to avoid running out of water.

- At a hydro plant, the river flows are so low such that there is not enough water to run any units of the plant for more than twenty-four consecutive hours due to the river flow level being too low to supply at least one individual unit at its minimum load.
    - Most all hydro plants are sized such that for a majority of the year, units will be shutdown due to low water flows. This is considered normal operation and Drought or Low Water Contribution Code should not be applied. As long as at least one unit is capable of producing some minor amount of energy during the 24- hour period, it is considered to be within normal design.
    - If dispatch or the operator intentionally draw down the reservoir to provide peaking power and then must shut down the plant for 24 hours or more for the reservoir to refill, this is not considered a Drought or Low Water condition.
- An upstream system (dam or irrigator) shuts off flows due to abnormal water demand and the cooling system of a power plant must be shut down.
    - If this is a normal, periodic occurrence, then this would not require the Contribution Code.

Fire, including wildfires (Code 3)

- Preemptive shutdown of a plant to prevent damage due to approaching wildfire.
- Plant shut down due to fire prevention during high wind / low humidity conditions in forested areas
- Due to a thunder storm in the area, dispatch directs that the plant be removed from service so a transmission line can be de-energized to proactively address possible fire ignition from the transmission lines. (The root cause of the shutdown is to prevent a fire.)
- A unit synchronizing breaker fails. As part of the failure, it catches fire and soon involves additional buss work that requires an adjacent unit to be tripped off (either automatically (U1) or manually (U2)).
    - The original breaker failure that causes the first unit to trip is NOT fire related. The fire is a consequence of the breaker failure. Subsequent impacts to the output of units due to the breaker fire, would be due to Fire Contributing Condition.

Lightning (Code 4)

- During a thunder and lightning storm, a unit is tripped offline due to a relay operation. The unit is cleared for return to service relatively quickly as no damage to the unit or to other plant equipment had occurred.
- During a thunder and lightning storm, a pole fire is started on a structure within the plant switchyard. The pole fire causes the plant to be taken offline.
- Outdoor circulating water pumps are experiencing operational concerns that require technicians to immediately troubleshoot on site. However, at the same time lightning alerts are in the area that prevent any work from taking place outdoors. The circulating water pumps cannot be addressed and must be taken offline to prevent further damage. The unit is removed from service due to the lack of operational circulating water pumps.

Geomagnetic Disturbance (Code 5)

- Preemptive shutdown of generating units due to a large X class earth directed solar flare. These types of flares can cause large current excursions on transmission lines burning out connected equipment
- A geomagnetic disturbance occurs and can cause the generator field to collapse likely causing severe overloads and possible winding damage to the generator. To prevent possible damage to the equipment, the generator is taken offline pre-emptively.

- Generator step up transformers are also susceptible to this magnetic field collapse and subsequent overloads.

Earthquake (Code 6)

- Substation and pad mount transformers moved off of their concrete pads. Some high voltage connections damaged.
- After the earthquake event, vibration levels in rotating machinery reach levels of concern (i.e. hit an alarm state) and require the unit load to be backed off or to be removed from service to correct the high vibration condition.

Tornado (Code 7)

- Tornado takes out overhead feeder lines to a plant
- Equipment at a plant is damaged by the tornado or by debris from the tornado.

Hurricane (Code 8)

- Hurricane tidal surge damages 2 of 5 underwater power cables causing a 40% derating
- Heavy rains from a hurricane residual cause flooding or other damage that floods the area and damages plant equipment and requires a derate or shutdown

Cold Weather Conditions (Code 9)

- Cold weather at a plant in a generally mild-climate area cause most of the units to fault. The units in this area are usually not equipped for extreme cold.
- A unit outage during -35F temperatures prevents startup when power is restored due to cold electronic components. Large load on system to heat up the equipment.
- Temperatures drop to the point that the fuel source freezes and can no longer be input into the generator.
- Temperature drops result in weather conditions which make transportation of fuel infeasible or unsafe, forcing the plant to shutdown.
- Because the temperature is below freezing, a control valve fails to operate due to moisture in the air system.
- Because the temperature is below freezing, a control valve fails to operate due to the heat tracing not functioning. The problem was not caught by inspection or procedure.

Hot Weather Conditions (Code A)

- The ambient temperatures at a plant exceed the design limits resulting in unit shutdowns.
- High ambient temperatures and high generation result in derated output in order to prevent GSU overheating.
- High ambient conditions are beyond the capacity of the cooling system to keep up and a derate or shutdown must take place to not exceed temperature limits of equipment.
- At a power plant, the ambient water temperature of a river goes above a threshold established by a regulatory agency and the discharge from the plant into the river must be shut off to avoid further heating of the river.

Ice, Hail, or Snow (Code B)

- Freezing rain causes overhead gen tie lines to gallop causing line slaps. Due to a large amount of snow, it took several weeks to manually reset all the units.
- An outage occurs and due to road conditions, the workers are unable to arrive for two days to perform corrective actions and return the unit to service.
- Icicle buildup at a roof drain breaks free and drops onto an external electrical breaker room causing the trip of several pieces of equipment and the unit.
- Leakage through a spillgate on a dam causes a buildup of ice. At a point, the ice releases and comes down on a generator causing the generator to shutdown.
- Due to large snowfall, operators are unable to make normal inspections and an oil leak goes undetected. The leak causes the oil level to go below alarm levels and trips a unit.

Turbulent Wind (Code C)

- High wind takes the roof off an external motor control center leading to the trip of several breakers, loss of key equipment, and immediate load reduction.
- During severe winds, a trampoline from a nearby house is picked up and blown onto the plant switchyard bus causing a fault and prohibiting a unit from connecting to the grid.

Avalanche or Landslide (Code D)

- An avalanche from a nearby hill or mountain damages the GSU forcing the plant offline until the debris is cleared and repairs are made.

State of Emergency declared by applicable authority or Other External Disturbance (Code Z)

- Any event where a governing authority intervenes with orders that require a unit or a plant to be shutdown.
- A multiple vehicle accident occurs on a highway where transmission lines are involved. Governmental authorities require the transmission lines be de-energized and that requires the plant to be shut down as well.
- During an epidemic, plant staffing is impacted such that a minimal staff can no longer be maintained, and a plant must be shutdown.
- A transportation labor strike occurs impacting the company's ability to acquire fuel or equipment.

Man-hours Worked (Record 02, columns 46-49) - Voluntary
Enter the number of man-hours spent correcting the cause of the event or making repairs. Include hours expended for on-site repairs as well as any off-site work. If man-hours exceed four digits, enter 9999 in this field, and describe the actual number of man-hours expended in the verbal description. If this situation occurs, consider reporting more detailed cause codes, and subdividing the man-hours into segments associated with each system or component.

Verbal Description (Record 02, columns 50-80; Record 03, columns 26-80) - Voluntary but strongly recommended.
GADS provides this space to allow you to give a more detailed explanation of the event and the cause(s) you identified by system/component cause code(s). You can also use it to report the expanded data format as described, beginning on Page III-27. Use only two sequential records (02-03, 04-05, etc.) to provide the description for each cause code you report.

Your narrative should include a balanced description of the major aspects of the event, focusing on these key areas: 1) System/Component Cause Code, 2) Failure Description and Appearance, 3) Cause of Immediate Failure and Contributing Factors, and 4) Corrective Actions. You have limited space available for your description, so NERC suggests using common abbreviations as much as possible. Be brief as only the first 86 characters of what is written is recorded by web-EGADS. Following the guidelines below will help you to develop a complete and concise description encompassing the key areas noted below.

1. **System/Component Cause Code** (Record 02, columns 20-23) – Required

   Enter the four-digit code from Appendix B that best identifies the system, major component, or piece of equipment. Appendix B is divided into sections for easily locating the appropriate cause codes for each unit type.

2. **Failure Description and Appearance**

   Describe the manner in which the failure occurred. Identify the failure mode in generic terms, not in terms of the failure mechanism or failure effect(s). The following key words may be useful in describing the type and mode of the failure, but these lists are by no means comprehensive. You may use these words as well as any others you feel are appropriate.

Types of Failure	**Typical Failure Modes**
Erosion	Leak
Corrosion	Crack
Electrical	Breach
Electronic	Physical Distortion
Mechanical	Physical Displacement
Hydraulic	Collapse
Instruments	Fracture/Break
Operational	Not Start/Move
	Not Stop
	Not Close
	Not Open
	Not Hold
	Not Release
	Out of Limits
	Out of Adjustment
	Spurious Operation, False Response

3. **Cause of Immediate Failure and Contributing Factors**

   The cause code already specifically identifies the primary system/component that caused the failure. However, it is advantageous to describe other observed factors which contributed to the failure such as non-operational or physical factors (e.g., engineering, design, human error, etc.). You may find the key words listed below useful in describing immediate and contributing factors, but this list is by no means comprehensive. You may use these words as well as any others you feel are appropriate.

Typical Contributing Factors	
Foreign/Wrong Part	Instrument/Switch Miscalibration
Foreign/Incorrect Material	Insulation Breakdown
Particulate Contamination	Short/Grounded
Normal Wear	Open Circuit
Abnormal Wear	Contacts Burned/Pitted/Corroded
Lubrication Problem	Connection Defective

Weld Related	Circuit Defective
Abnormal Load	Burned/Burned Out
Abnormal Temperature	Electrical Overload
Abnormal Pressure	Material Defect
Abnormal Flow	Excess Vibration
Set Point Drift	Fire/Explosion
Improper Previous Repair	Natural Catastrophe
Incorrect Procedure/Instruction	Cyclic Fatigue

4. **Corrective Actions**

Record the actions taken to repair and correct the failure problem. If tests or recalibration are made to verify that repairs are successful, note them as well. You may find the key words listed below useful to describe corrective actions, but this list is by no means comprehensive. You may use these words as well as any others you feel are appropriate.

Typical Corrective Actions

Recalibrate	Replace Part(s)
Adjust	Repair Component(s)
Temporary Repair	Replace Component(s)
Temporary Bypass	Reseal
Redesign	Repack
Modify	Request License Revision
Repair Part(s)	

As an example, 1A relay coil wire burns open because of electrical overload and has to be replaced. The failure description would be “relay coil wire,” the appearance would be “burned open” and the cause would be “electrical overload.” Corrective action would be “replaced.” The verbal description would be completed as follows: “1A RELAY COIL WIRE BURNED OPEN-ELECTRICAL OVERLOAD REPLACED WIRE”

Expanded Data Reporting

Some operating companies have expressed an interest in reporting more detailed operating and maintenance data that will allow them to perform more detailed reliability analyses. Also, by including these new data elements, they can eliminate duplicate reporting to other industry databases. To accommodate this request, NERC has added several new data elements to GADS.

Reporting of this additional information is optional, although strongly encouraged. We believe the reporting of this information will enhance the usefulness of our database and benefit the entire electric power industry. If you choose to report this information to GADS, follow the instructions below (see *Table III-7*). If you choose not to supply the additional data, report the verbal description.

Failure Mechanism Code* (Record 02, columns 50-53) - Voluntary
From the list provided in *Appendix H*, enter the code that best describes the manner in which the component failed. Report the failure mechanism code in columns 50-53 on all even-numbered records containing a system/component cause code.

Trip Mechanism (manual or automatic)* (Record 02 column 54) - Voluntary
Enter the code that describes how the unit was shut down. Use “A” for automatically (control system initiated), or “M” for manually (operator initiated). Report the trip mechanism in column 54 of all even-numbered records containing a contribution code of 1 in column 44.

Cumulative Fired Hours at Time of Event* (Record 02, columns 55-60) - Voluntary
Enter the cumulative number of fired hours the unit experienced at the time the event began. This data is taken directly from the fired-hours meter typically located on the unit's control panel. This meter clocks cumulative operating hours since unit start-up. Report the fired hours in columns 55-60 of all even-numbered records containing a contribution code of 1 in column 44.

Cumulative Engine Starts at Time of Event* (Record 02, columns 61-65) - Voluntary
Enter the cumulative number of engine starts the unit experienced at the time the event began. This data is taken directly from the engine starts counter, typically located on the unit's control panel. This counter clocks cumulative engine starts since unit start-up. The engine starts must be reported in columns 61-65 of all even-numbered records containing a contribution code of 1 in column 44.

Table III-7: Record Layout of Event Records Using Failure Codes

Column ID	Number of Columns	Starting Position
Record 02		
A – Event Identification		
Record Code (required)	2	1
Utility (Company)Code (required)	3	3
Unit Code (required)	3	6
Year (required)	4	9
Event Number (required)	4	13
Report Revision Code (voluntary)	1	17
Event Type (required)	2	18
C – Primary Cause of Event		
System/Component Cause Code (required)	4	20
Cause Code Amplification Code (Required for U1 events coming from in service only; strongly recommended for all other events.	2	24
Time Work Started (voluntary)	8	26
Time Work Ended (voluntary)	8	34
(Blank Columns)	2	42
Event Contribution Code (voluntary)	1	44
Contributing Operating Condition (required)	1	45
Man-hours Worked (voluntary)	4	46
Failure Mechanism Code* (voluntary)	4	50
Trip Mechanism* (voluntary)	1	54

Table III-7: Record Layout of Event Records Using Failure Codes		
Column ID	**Number of Columns**	**Starting Position**
Cumulative Fired Hours at Time of Event* (voluntary)	6	55
Cumulative Engine Starts at Time of Event* (voluntary)	5	61
Verbal Description (Voluntary but strongly recommended.)	15	66
Record Number (required)	2	81
Record 03		
A – Event Identification		
Record Code (required)	2	1
Utility (Company)Code (required)	3	3
Unit Code (required)	3	6
Year (required)	4	9
Event Number (required)	4	13
Report Revision Code (voluntary)	1	17
Event Type (required)	2	18
C – Primary Cause of Events		
System/Component Cause Code (required)	4	20
(Blank Columns)	2	24
Verbal Description (Voluntary but strongly recommended.)	55	26
Record Number (required)	2	81

*Gas turbine and jet engine units only.

Section IV: Performance Reporting

Performance data provide information, in a summarized format, pertaining to overall unit operation during a particular month in a given year. These data are needed to calculate unit performance, reliability, and availability statistics. NERC requires performance data for all unit types and sizes reported to the GADS program.

Reporting to the GADS program is mandatory for all conventional units 20 MW and larger, starting January 1, 2013. Reporting the level of detail *GADS Data Reporting Instructions* requests enables you and other industry analysts to perform detailed and useful analyses. Figure III-1 presents the classes of events generating companies must report for different types and sizes of conventional, non-renewable generating units.

Performance Report (05 Format)

Report performance data to GADS in the Performance Report (05) format, as described in this section. Submit the data to Open Access Technology International, Inc. (OATI) using the webE-GADS data collection system **within 45 days after the end of each quarter**. You must submit performance data for a unit even if it was off-line during the entire quarter. It is preferred to report year-to-date information each quarter rather than four, single quarterly submittals.

There are six distinct sections of the performance report: A) unit identification; B) unit generation performance; C) unit starting characteristics; D) unit time information; E) primary fuel; and F) secondary fuel. Together, these sections provide an overall summary of the operating status of a unit.

The performance report (05) is divided into several sections. The different sections of the performance report are on different records: Section A is on all records, B, and C on Record 01, section D on record 02, and sections E and F on records 03 and 04 respectively. Unless otherwise stated, do not zero fill or asterisk fill unused data fields in any section of the performance report.

NERC invites Generator Owners and Operators to report on units that have a nameplate capacity of 20MW or less on a voluntary basis.

A description of each section and the data elements within it follows. Included are detailed instructions for reporting each performance data element.

Section A: Unit Identification

There are six data elements, referred to as "fields," in this section. See Table IV-1. These elements form a "key" — an identifier that makes each performance record unique from all others in the database. This key is referenced at the beginning of every record used to report performance data.

Table IV-1: Record Layout of Section A – Unit Identification

Column ID	Number of Columns	Starting Position
All Records		
A – Unit Identification		
Record Code (required)	2	1
Utility (Company) Code (required)	3	3
Unit Code (required)	3	6

Table IV-1: Record Layout of Section A – Unit Identification		
Column ID	**Number of Columns**	**Starting Position**
Year (required)	4	9
Report Period (required)	2	13
Report Revision Code (voluntary)	1	15

Record Code (columns 1-2) - Required
This "05" code uniquely identifies these data as a Performance Report.

Utility (Company) Code (columns 3-5) - Required
Enter the three-character (alphanumeric) code NERC assigned to your operating company. Appendix C contains a complete list of the operating companies participating in GADS and their assigned utility (operating company) codes.

Unit Code (columns 6-8) - Required
Enter the three-digit code your operating company assigned for the unit that you are reporting. This code distinguishes one unit from another in your utility. Appendix C, Page C-1, contains a guide for selecting unit codes.

Year (columns 9-12) - Required
Enter the year (YYYY) for which data are being summarized.

Report Period (columns 13-14) - Required
Enter the month of the year for which data are being summarized:

Table IV-2: Monthly Summaries		
01 - January	05 - May	09 - September
02 - February	06 - June	10 - October
03 - March	07 - July	11 - November
04 - April	08 - August	12 - December

Report Revision Code (column 15) - Voluntary
This one-character data field signals that you wish to make a change to a performance report already submitted to GADS. Changes can be corrections, additions, or deletions of existing reports.

The first time you submit a performance report to GADS it is called an "original." Give all original reports a revision code of zero (0).

Use the following codes when making changes to an original performance report:

1, 2, … 9
Use these codes when making corrections or additions to original performance reports. Each time you make a change, you must increase the revision code by one. You can make up to nine corrections and additions to an original report.

When making **corrections or additions** to an original report, you need to send GADS all records relating to the performance report you intend to change. On the record:

1. Complete columns 1-14, repeating the information from the original report;
2. Increase the revision code in column 15 by one;
3. Make sure the same record number used in the original report is in columns 124-125. Do not leave the record number blank; and
4. Enter the updated information in the appropriate field.

To delete data from one or more data fields, GADS recommends that you resubmit the entire data set–year-to-date–for that unit (or all units you report) to GADS. This procedure will ensure that both you and the GADS database have the same records on file. You also have the option to find the record that has the highest revision code and then increase this number by one or set all revision codes back to zero.

Section B. Unit Generation Performance

GADS uses the data you provide in this section to calculate performance statistics. GADS requests both gross and net values but only requires certain net values. Reporting gross data, net data, or both depends on how the unit is electrically metered. Some units are metered on a single basis (gross or net). Enter your unit's data based on how your unit is actually metered. If you meter both gross and net, enter both values. If you meter on a single basis but can estimate the other, do so and enter the estimated value in the appropriate field. Complete the elements in section B as detailed below. The value you report whether it is gross or net must be consistent with the available capacity as a result of deratings reported on the event reports (07).

Table IV-3: Record Layout of Section B – Unit Generation Performance

Column ID	Number of Columns	Starting Position
Record 01		
B – Unit Generation Performance		
Gross Maximum Capacity (voluntary)	4 + 2 decimals	16
Gross Dependable Capacity (voluntary)	4 + 2 decimals	22
Gross Actual Generation (voluntary)	7 + 2 decimals	28
Net Maximum Capacity (required)	4 + 2 decimals	37
Net Dependable Capacity (required)	4 + 2 decimals	43
Net Actual Generation (required)	7 + 2 decimals	49

Gross Maximum Capacity (GMC) (Record 01, columns 16-21) – Voluntary but recommended

Enter the maximum capacity the unit can sustain over a specified period of time when not restricted by ambient conditions or deratings. To establish this capacity, a formal demonstration is required. No standard demonstration test method or test duration exists at this time, but many of the NERC Regions have their own criteria that all operating companies in those Regions follow. If your operating company has not set demonstration test requirements, contact your regional manager listed in Appendix C.

The GMC of a unit should change only as a result of a new performance tests or permanent unit modifications. Never change the GMC due to equipment problems even if they persist for a lengthy period of time **unless** the unit is permanently modified as a result. If the unit is permanently modified, note changes in the unit's design on a new design data form and submit it to NERC-GADS for updating.

Gross Dependable Capacity (GDC) (Record 01, columns 22-27) - Voluntary but recommended
Enter the gross power level that the unit can sustain during a given period if there are no equipment, operating, or regulatory restrictions. Therefore, by definition, the GDC is the GMC modified for ambient limitations.

The GDC is the same in intent and purpose as the historically reported Maximum Dependable Capacity (MDC).

Gross Actual Generation (GAG) (Record 01, columns 28-36) - Voluntary but recommended
Enter the actual number of gross electrical megawatt-hours (MWh) generated by the unit during the month.

If you report both service hours and gross actual generation (one to 9999999), you must also report GMC or GDC. Similarly, if you report both service hours and a gross capacity value, you must also report gross actual generation. This provides consistency when calculating performance statistics.

Net Maximum Capacity (NMC) (Record 01, columns 37-42) - Required
NMC is the unit's GMC minus any capacity (MW) utilized for that unit's station service or auxiliary load.

Net Dependable Capacity (NDC) (Record 01, columns 43-48) - Required
NDC is the unit's GDC minus any capacity (MW) utilized for that unit's station service or auxiliary load.

Net Actual Generation (NAG) (Record 01, columns 49-57) - Required
NAG is the unit's GAG minus generation (MWh) utilized for that unit's station service or auxiliary load. If NAG is negative during the month being reported, enter a minus sign in the column immediately before the reported value.

For consistency in calculating statistics, if you report net actual generation (negative integer or positive integer), you must also report NMC or NDC. Similarly, if you report a net capacity value, you must also report net actual generation.

Please note: *If you only report either the gross or the net capacities, the GADS editing program will calculate any missing GAC, GAG, GMC, GDC, NAC, NAG, NMC, or NDC using the following criteria:*

Table IV-4 Unit Capacity/Generation Estimation Factors and MW Multipliers

Unit Type Name	Capacity/ Generation Estimation Factor	MW Multiplier	Unit Type Code Ranges
CC GT units	2.00	0.20	300-399, 700-799
CC steam units	5.00	0.20	100-199, 600-649
CoG GT units	2.00	0.20	300-399, 700-799
CoG steam units	5.00	0.20	100-199, 600-649
Co-generator Block	4.00	0.10	800-899
Combined Cycle Block	4.00	0.15	800-899
Fluidized Bed	5.00	0.10	650-699

Table IV-4 Unit Capacity/Generation Estimation Factors and MW Multipliers			
Unit Type Name	**Capacity/ Generation Estimation Factor**	**MW Multiplier**	**Unit Type Code Ranges**
Fossil-Steam	5.00	0.30	100-199, 600-649
Gas Turbine/Jet Engine (Simple Cycle Operation)	2.00	0.30	300-399, 700-799
Geothermal	4.00	0.10	800-899
Internal Combustion/Reciprocating Engines	0.00	0.10	400-499
Miscellaneous	4.00	0.10	800-899
Multi-boiler/Multi-turbine	4.00	0.10	800-899
Nuclear	5.00	0.10	200-299
Pumped Storage/Hydro	0.00	0.50	500-599, 900-999

Typical performance data validations where the MW Multipliers are used:
Gross Maximum Capacity MW <= Nameplate Rating * (1.00+ MW Multiplier)
NAG <= ((NMC+1) * Service Hours * (1 + MW Multiplier)

For example, if you report a fossil unit's NMC and NDC, then the program will take your NMC and multiply it by 1.05 to determine the new GMC. The same operation would occur for determining the GDC from the NDC number and the GAC from the NAC number reported on a derating.

If you report only one capacity (for example NMC), then the program will assume the NMC and NDC are equal and will record the unit as such. It will then calculate the GMC and GDC using the calculation stated above.

If you think the differences between gross and net are different than the numbers stated above, then complete all capacities (maximum and dependable) with the correct numbers. The computer will accept entered numbers and will only calculate new numbers if the fields are blank, zero-fielded, or have an asterisk (*).

The MW multipliers shown above are used in data error checking routines on your performance data. Several typical checks involving the MW multipliers are shown below Table IV-4. These types of data error checks only produce warnings which should always be investigated as an error of this type would not be normal.

Special Note on Gas Turbines and Jet Engines
Gas turbine and jet engine capacities are very sensitive to outside temperatures and their capacities are not as constant as fossil or nuclear plants. See *Figure IV-1* below as an example. Therefore, base the GMC and NMC capacities of these units on the International Organization of Standardization (ISO) charts (at standard temperatures and pressures) for each individual Gas Turbine and Jet Engine unit. Once the GMC and NMC are determined, any non-equipment restriction that lessens the capacity would be the GDC and NDC numbers. Report the monthly average GMC, GDC, NMC and NDC to GADS.

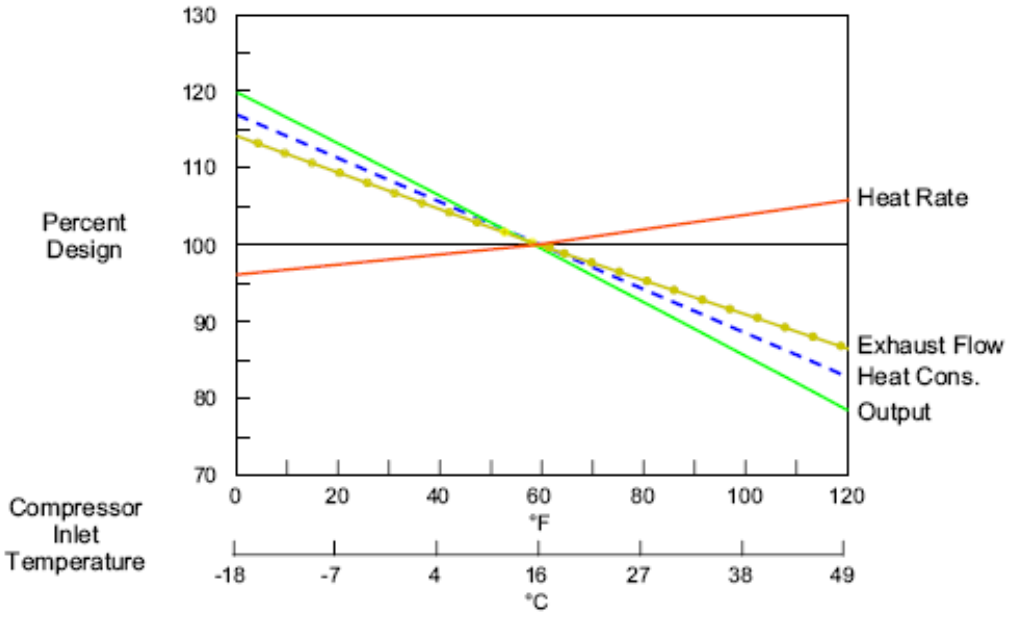

Figure IV-1: Effects of Ambient Temperature on Gas Turbines/Jet Engines

Section C: Unit Starting Characteristics

Use the data elements in this section to establish the manner in which the unit was operated during the month. This information is needed when sorting data for use in special availability and reliability applications. Section C is located on record 01; refer to *Table IV-5* below.

Table IV-5: Record Layout of Section C – Unit Starting Characteristics

Column ID	Number of Columns	Starting Position
Record 01		
C – Unit Starting Characteristics		
Typical Unit Loading Characteristics (voluntary)	1	58
Attempted Unit Starts (required)	3	59
Actual Unit Starts (required)	3	62
(Blank Columns)	34	65
Verbal Description (voluntary)	25	99
Record Number (required)	2	124

Typical Unit Loading Characteristics (Record 01, column 58) - Voluntary
Enter the code from Table IV-6 below that best describes how the unit was operated or loaded during the month being reported. Generally, these are numbered from least starts to most starts.

Table IV-6: Unit Loading Characteristics	
Code	**Description**
1	Base loaded with minor load following at night and on weekends
2	Periodic startups with daily load-following and reduced load nightly
3	Weekly startup with daily load-following and reduced load nightly
4	Daily startup with daily load-following and taken off-line nightly
5	Startup chiefly to meet daily peaks
6	Other (describe in verbal description)
7	Seasonal Operation

If the unit was off-line during the entire period, describe how the unit typically would have been loaded had it been on-line.

Attempted Unit Starts (Record 01, columns 59-61) – Required
Enter the number of attempts made to start the unit during the month to either generate, pump, or synchronous condense where the unit goes from a stopped position to generating, pumping, or synchronously condensing mode. Please note that:

- Repeated failures for the same cause without attempted corrective actions are considered a single start.
- Repeated initiations of the starting sequence without accomplishing corrective repairs are counted as a single attempt.

If you abandon startup attempts, the unit is shut down for repairs, and then started at a future time, report two startup attempts.

Actual Unit Starts (Record 01, columns 62-64) - Required
Enter the number of times the unit actually starts during the month to generate, pump, or condense where the unit goes from a stopped position to generate, pump, or synchronous condensing mode.

The number of actual unit starts must be less than or equal to the number of attempted unit starts.

Verbal Description (Record 01, columns 99-123) - Voluntary
If you enter Code 6 (Other) for the typical unit loading characteristics, as noted in column 58 in Table IV-5, describe how the unit operated during the month.

Unlike the verbal description field on the event report (07), you must abbreviate your description to fit in columns 99-123. **You may not use additional records.**

Section D. Unit Time Information

The data reported in Section D (see *Table IV-7*) summarizes information reported on the event report (07). The technique for summarizing event data is described on page IV-9. If reserve shutdown event data are not reported for the special group of hydro and pumped storage units (see *Table III-1*, Page III-1), the data needed to complete section D must be computed from your own station records.

The first 15 characters of Record 02 (A – Unit Identification) are identical to that of record 01. These 15 characters link the records together.

Table IV-7: Record Layout of Section D – Unit Time Information		
Column ID	**Number of Columns**	**Starting Position**
Record 02		
A – Unit Identification		
Record Code (required)	2	1
Utility Code (required)	3	3
Unit Code (required)	3	6
Year (required)	4	9
Report Period (required)	2	13
Report Revision Code (voluntary)	1	15
D – Unit Time Information		
Unit Service Hours (required)	3 + 2 decimals	16
Reserve Shutdown Hours (required)	3 + 2 decimals	21
Pumping Hours (required)	3 + 2 decimals	26
Synchronous Condensing Hours (required)	3 + 2 decimals	31
Available Hours (required)	3 + 2 decimals	36
Planned Outage Hours (required)	3 + 2 decimals	41
Forced Outage Hours (required)	3 + 2 decimals	46
Maintenance Outage Hours (required)	3 + 2 decimals	51
Extensions of Scheduled Outages (required)	3 + 2 decimals	56
Unavailable Hours (required)	3 + 2 decimals	61
Period Hours (required)	3 + 2 decimals	66
Inactive Hours (required)	3 + 2 decimals	71
(Blank Columns)	48	76
Record Number (required)	2	124

Unit Service Hours (Record 02, columns 16-20) - Required
Enter the number of hours the unit was synchronized to the system. For units equipped with multiple generators, count only the hours when at least one of the generators was synchronized, whether one or more generators were actually in service.

Reserve Shutdown Hours (Record 02, columns 21-25) - Required
Enter the sum of all hours the unit was available to the system but not synchronized for economy reasons.

Pumping Hours (Record 02, columns 26-30) - Required
Enter the number of hours the hydro turbine/generator operated as a pump/motor.

Synchronous Condensing Hours (Record 02, columns 31-35) - Required
Enter the number of hours the unit operated in the synchronous condensing mode (applies primarily to hydro/pumped storage and some combustion turbine units). Do not report these hours as unit service hours.

Available Hours (Record 02, columns 36-40) - Required
Enter the sum of the unit service hours, reserve shutdown hours, pumping hours (if applicable), and synchronous condensing hours (if applicable), as entered in columns 16-35 above.

Planned Outage Hours (Record 02, columns 41-45) - Required
Enter the sum of all hours the unit was off-line due to planned outages (PO) as detailed in the event reports completed for this unit. The technique used to compute hours from the event reports is described below.

Unplanned (Forced) Outage Hours and Startup Failure Hours (Record 02, columns 46-50) – Required
Enter the sum of all hours the unit was off-line due to immediate, delayed, and postponed outages (U1, U2, and U3) and startup failures (SF) outages as detailed on the event reports completed for this unit. The technique used to compute hours from the event reports is described below.

Maintenance Outage Hours (Record 02, columns 51-55) - Required
Enter the sum of all hours the unit was off-line due to maintenance outages (MO) as detailed on the event reports completed for this unit. The technique used to compute hours from the event reports is described below.

Extensions of Scheduled Outages (Record 02, columns 56-60) - Required
Enter the sum of all hours the unit was off-line due to extensions of scheduled (maintenance and planned) outages (ME and PE) as detailed on the event reports completed for this unit. The technique used to compute hours from the event reports is described below.

Unavailable Hours (Record 02, columns 61-65) - Required
Enter the sum of planned outage hours (PO), unplanned (forced) outage hours (U1, U2, U3, SF), maintenance outage hours (MO), and extensions of scheduled outages (ME, PE), as entered in columns 41-60 above.

Computing Hours from the Event Report (07)

5. Calculate the duration of each outage (PO, MO, ME, PE, U1, U2, U3, and SF) and reserve shutdown (RS) reported as an event to the GADS database by subtracting the START OF EVENT from the END OF EVENT. Convert this to hours and adjust for Daylight Savings Time (DST) as appropriate.
6. Add the total number of hours during the month spent in each outage category (PO, MO, ME, PE, U1, U2, U3, and SF) and the reserve shutdown category (RS). Round the resultant values to two decimal places and enter in the appropriate fields in Section D of the Performance Report.

Period Hours (Record 02, columns 66-70) - Required
Enter the number of hours in the month being reported that the unit was in the **active** state (see Page III-5). The sum of available hours and unavailable hours must equal period hours. The period hours in each month or year are as follows in Table IV-8:

Table IV-8: Period Hours	
Month*	**Hours**
January	744
February	672*
March	744 < 2007, 743** >= 2007
April	719** < 2007, 720 >= 2007
May	744
June	720
July	744
August	744
September	720
October	745** < 2007, 744 >=2007
November	720 < 2007, 721** >= 2007
December	744
Year	8760*

* Add 24 hours during a leap year.
** May be adjusted one hour as appropriate for daylight saving time.

Inactive Hours (Record 02, columns 71-75) - Required
Enter the number of hours in the month being reported that the unit was in the **inactive** state. (See Page III-5 for details of inactive states.)

Section E. Primary Fuel

Section F. Secondary Fuel

Sections E and F, shown in *Table IV-9*, detail the type, amount, and quality of fuels burned in the unit during the reporting period. These sections are used to report primary and secondary fuels burned and are located on Record 03 of the Performance Report. Tertiary and quaternary fuels may be reported; however, no unique sections of the Performance Report exist for this purpose. Instead, use another Section E and another Section F, changing the record number from 03 to 04. Enter the tertiary fuel data in Section E on the 04 record and the quaternary fuel data in Section F on the 04 record.

Reporting **E. Primary Fuel Code is required** for all units except hydro/pumped storage units (optional for these units only). If a unit was not operated during the reporting period, enter the type of fuel that would have been burned in the unit had it been on-line.

Secondary, tertiary, and quaternary fuel sections are not used for hydro/pumped storage units, wind- or solar-powered units, or nuclear units.

The first 15 characters of Records 03 and 04 (A – Unit Identification) are identical to that of Records 01 and 02. These 15 characters link the records together.

Table IV-9: Record Layout of Section E – Primary Fuel; and F – Secondary Fuel		
Column ID	**Number of Columns**	**Starting Position**
Record 02		
A – Unit Identification		
Record Code (required)	2	1
Utility Code (required)	3	3
Unit Code (required)	3	6
Year (required)	4	9
Report Period (required)	2	13
Report Revision Code (voluntary)	1	15
E – Primary Fuel (03); Tertiary Fuel (04)		
Fuel Code (required)	2	16
Quantity Burned (voluntary)	5 + 2 decimals	18
Average Heat Content (voluntary)	6	25
% Ash (voluntary)	2 + 1 decimal	31
% Moisture (voluntary)	2 + 1 decimal	34
% Sulfur (voluntary)	1 + 1 decimal	37
% Alkalines (voluntary)	2 + 1 decimal	39
Grindability Index / % Vanadium (voluntary)	2 + 1 decimal	42
Ash Softening Temperature (voluntary)	4	45
(Blank columns)	21	49
F – Secondary Fuel (03); Quaternary Fuel (04)		
Fuel Code (required)	2	70
Quantity Burned (voluntary)	5 + 2 decimals	72
Average Heat Content (voluntary)	6	79
% Ash (voluntary)	2 + 1 decimal	85
% Moisture (voluntary)	2 + 1 decimal	88
% Sulfur (voluntary)	1 + 1 decimal	91
% Alkalines (voluntary)	2 + 1 decimal	93

Table IV-9: Record Layout of Section E – Primary Fuel; and F – Secondary Fuel		
Column ID	**Number of Columns**	**Starting Position**
Grindability Index / % Vanadium (voluntary)	2 + 1 decimal	96
Ash Softening Temperature (voluntary)	4	99
(Blank columns)	21	103
Record Number (required)	2	124

Please Note: *Performance record 04 for the tertiary and quaternary fuels is identical to performance record 03*

Fuel Code (Records 03 & 04, columns 16-17 and 70-71) - Required
Enter the two-character code from Table IV-10 that identifies the fuels burned in the unit during the reporting period.

Table IV-10: Fuel Types and Codes			
Code	**Description**	**Code**	**Description**
BM	Biomass	**PC**	Petroleum Coke
CC	Coal	**PR**	Propane
LI	Lignite	**SL**	Sludge Gas
PE	Peat	**GE**	Geothermal
WD	Wood	**NU**	Nuclear
OO	Oil	**WM**	Wind
DI	Distillate Oil (No. 2)	**SO**	Solar
KE	Kerosene	**WH**	Waste Heat
JP	JP4 or JP5	**OS**	Other-Solid (Tons)
WA	Water	**OL**	Other-Liquid (BBL)
GG	Gas	**OG**	Other-Gas (Cu. Ft.)

Report in **E. Primary Fuel** the code for the fuel that made the greatest contribution to thermal generation during the period. In **F. Secondary Fuel,** enter the code for the fuel that made the second greatest contribution to generation. You can only report fuels used for ignition or warm-up in this section if there was no more important secondary fuel. Tertiary and quaternary fuels, reported in Sections E and F on Record 04 of the Performance Report, are those which made the third and fourth greatest contribution to generation, respectively.

Quantity Burned (Record 03 & 04, columns 18-24 and 72-78) - Voluntary
Enter the quantity of fuel consumed during the reporting period. Note, NERC-GADS computer programs recognize a decimal place indicator that appears in the performance report. Therefore, enter a factor of the actual quantity burned in this field. Use the following factors to determine the correct number to enter: 1,000 short tons (2,000 pounds) for coal; 1,000 barrels (42 gallons/barrel) for oil; and 1,000,000 cubic feet for gas. Do not attempt to manually enter a decimal place.

Example:
If coal is your primary fuel and the unit burned 900 tons of coal during the reporting period, enter 0000090 in columns 18-24 of record 03. (900/1000 = 0.90, which when assuming two decimals, becomes 0000090.)

If oil is your primary fuel and the unit burned 900,000 barrels of oil, enter 0090000 in columns 18-24 of Record 03. (900,000/1000 = 900.00, which when assuming two decimals, becomes 0090000.)

When reporting data for geothermal units, enter in this field the quantity of steam brought into the plant from the geothermal wells. The factor used to determine the number to enter is 1,000,000. Thus, 1,234,500,000 pounds of steam is entered as 0123450 in columns 18-24 of Record 03.

Leave columns 18-24 blank when reporting data for nuclear units.

If a unit didn't burn one of its fuel types in a given month enter zero (0) as its quantity burned.

Average Heat Content (Records 03 & 04, columns 25-30 and 79-84) - Voluntary
Enter the average heat content for the fuel, to the nearest Btu/lb. of coal, Btu/gal. of oil or Btu/cu. ft. of gas. Enter a weighted average if the heat content of the fuel varied.

When reporting data for geothermal units, enter the heat content calculated using the following equation:

$$\frac{\text{Steam Consumption (lbs.)} \times 1195.5 \text{ (Btu/lb.)}}{\text{Net Generation (kWh)}}$$

For nuclear units, enter the Net Plant Heat Rate (Btu/kWh) in this field.

If a unit didn't burn one of its fuel types in a given month enter zero (0) as its heat content.

% Ash (Records 03 & 04, columns 31-33 and 85-87)* - Voluntary
Enter the average ash content of the fuel to the nearest 0.1% (by weight). Obtain this factor from an ultimate analysis of the fuel.

% Moisture (Records 03 & 04, columns 34-36 and 88-90)* - Voluntary
Enter the average moisture content of the fuel to the nearest 0.1% (by weight). Obtain this factor from an ultimate analysis of the fuel.

% Sulfur (Records 03 & 04, columns 37-38 and 91-92)* - Voluntary
Enter the average sulfur content of the fuel to the nearest 0.1% (by weight). Obtain this factor from an ultimate analysis of the fuel.

% Alkalis (Records 03 & 04, columns 39-41 and 93-95)* - Voluntary
Enter the sum of the average sodium and potassium contents of the fuel to the nearest 0.1% (by weight), as obtained from an ash analysis.

Coal Units Only: Grindability Index (Records 03 & 04, columns 42-44 and 96-98)* - Voluntary
If the fuel type has been identified as coal (CC) or lignite (LI), enter the weighted average grindability index of the fuel burned during the period. When entering the grindability index, disregard the decimal point.

Oil Units Only: % Vanadium and Phosphorus (Records 03 & 04, columns 42-44 and 96-98)* - Voluntary
If the fuel type has been identified as oil (OO), kerosene (KE), JP4/5 (JP), or distillate oil (DI), enter the sum of the average vanadium and phosphorus contents of the fuel to the nearest 0.1% (by weight) as obtained from an ash analysis.

Ash Softening Temperature (Records 03 & 04, columns 45-48 and 99-102)* - Voluntary
Enter the average ash softening temperature (^{o}F) of the fuel. This temperature should be determined under reducing atmosphere conditions.

** Because the average heat content (Btu), ash, moisture, sulfur, alkalis, grindability index, vanadium and phosphorus, and softening temperature values may change during a month due to new fuel supplies, etc., these values should be weighted averages.*

Example:

(15,000 Btu x 10 tons of coal + 18,000 Btu x 20 tons of coal)/30 tons of coal = Weighted Average Heat Content. The number of columns shown on these sections indicates a computer-inserted decimal point. Do not manually insert a decimal point. For example, a % Moisture value of 6.8% would be entered as 068 in columns 34-36 because the number of columns shown, 2 + 1 decimal, indicates a computer inserted decimal point one column from the right.

Section V: Design Data Reporting

In the approved recommendations by the NERC Board of Trustees, you must submit design data fields for all units you report to the GADS database. This required design data must be reported to GADS before submitting GADS event and performance data. The nine required design data fields for all unit types are:

- GADS utility code (assigned by GADS Services)
- GADS unit code (assigned by the reporting company following the guidelines in Appendix C of the *GADS Data Reporting Instructions*.)
- NERC Regional entity where the unit is located
- Name of the unit
- Commercial operating date
- Type of generating unit (fossil, combined cycle, etc.)
- MW size (nameplate)
- State or province location of the unit
- Energy Information Administration (EIA) Plant number (US units only)

Along with the historical nine required design data fields for all unit types, NERC is requiring additional design data for fossil steam, fluidized bed, gas turbine/jet engines, internal combustion reciprocating engines, hydro, and combined cycle/cogeneration units starting in 2024. The additional requirements can be found in the appropriate design data E Appendices. Data should be reviewd on an annual basis.

Appendix A: Change in Unit Status Report Form

Complete the following *Change in Unit Status Report Form* whenever a unit is purchased, de-registered or reactivated from service.

If a unit is deactivated (retired), ***the retirement process has been updated. Please do not use this form.*** The updated retirement process can be done directly in webE-GADS. Please see the updated process on the NERC website.
https://www.nerc.com/pa/RAPA/gads/GADSCOSummariesDL/GADS_ChangeOrder_13_Phase_2_20200428.pdf

If a unit is purchased, continue to report that unit for the remainder of the calendar month using the instructions shown in Section III of the *GADS Data Reporting Instructions*. Submit the completed *Change in Unit Status Report Form to* gads@nerc.net. Please fill out both sections of the Unit Purchase/Transfer section, including original company and new company information. If you do not know who the new company is, contact NERC or your Regional Coordinator. Regional Coordinator information can be found at the NERC website.
http://www.nerc.com/pa/RAPA/gads/Pages/default.aspx

If a unit changes owners at a company level, but keeps the same utility and unit information, keep reporting under the same utility and unit codes. Fill out the NCR number information for Original Company NCR Number and New Company NCR Number.

If a unit was previously retired but has come back into service, fill out the reactivation part on page A-3.

Seller Information

Unit Purchase / Transfer

(This page should be filled out by the seller. Please provide this Form to the buyer to have the buyer information filled out.)

Company Number NCR | | | | | | |

Entity Contact Name: _____

Entity Contact Email: _____

Original Utility Code: | | | |

Entity Contact Phone: _____

Original Unit Code (s)

Sold date: Month | | Day | | Hour | | Year | | | |

Buyer Information

Unit Purchase

(This page should be filled out by the buyer.) To search for NCR numbers go to: https://www.nerc.com/pa/comp/Pages/Registration.aspx, and then navigate down the page to Registration > Compliance Registry Files > NERC Active Entities List.

New Company NCR Number

Entity Contact Name: _____

Entity Contact Email: _____

New Utility Code:

Entity Contact Phone: _____

New Unit Code (s)

Unit Deregistration Information

Deregistration date: Month Day Hour Year

Reason(s) for deregistration:

Do you plan on reactivating the unit, and if so, what (month/year)?

No Yes Month Year

What major equipment work, if any, will be done while the unit is inactive?

Unit Reactivation Information:

Entity Contact Name: _____

Entity Contact Email: _____

Entity Contact Phone: _____

	Month	Day	Hour	Year
Reactivation date:				

Reason(s) for reactivation:

What major equipment work, if any, was done while the unit was inactive?

(Submit new design data as needed)

Appendix B01: Index to Combined Cycle Gas Turbine Unit Cause Codes

Using This Appendix

This appendix contains system/component cause codes to use when completing GADS Event Report (07). For ease of use, it is divided into sections based on the type of generating unit, and each section contains all the codes that can be used for a specific unit type. For example, Section B08 contains the cause codes to be used when reporting fossil steam units, and Section B15 contains the cause codes to be used when reporting hydro/pumped storage units. Appendix D – Cause Code Cross Reference, identifies the allowable range of system/component cause codes for each type of unit.

When copying the *GADS Data Reporting Instructions* for distribution to individual plants, copy only the section(s) of this appendix that are appropriate for the type(s) of unit(s) at each plant. Then the plant data reporter will have only the codes needed to report events, and may avoid some data reporting errors.

Guide for Code Selection

The intent of this appendix is not to provide an exhaustive list of codes for all possible causes or all components, but to provide the most common cause codes. Please add the details of events in the verbal description field to help understand what issues are occurring at the plant. Also, utilities have the option of reporting more detailed information concerning the manner in which a system or component failed using the Failure Mechanism Code. See Section III, page 27 and Appendix H for more information.

When reporting an event, select the code which best describes the cause or component responsible for the event. The following criteria are to be used in selecting a code:

- Assign the cause of the event to the major component or system that was responsible for the event, not to an auxiliary component or operation that triggered the failure of a major component or system. For instance, failure of an air line to one feedwater regulating valve may cause closure of that valve, resulting in a boiler trip on low level. In this case, the cause code for the feedwater regulating valve would be reported, not the code for the service air system. Note the fact that the valve closure was triggered by an air line failure in the verbal description. On the other hand, if the feedwater regulating valve closure had resulted from a complete loss of station air, the cause code for the station air system would be reported as the primary cause of the event. In this case, the station air system problem causes malfunctions of numerous valves and instruments throughout the plant, and no one major component or system could be uniquely identified as causing the outage.
- Report power supplies (motor control centers, breakers, etc.) which serve a particular component using the code for that component. Report power supply systems that serve multiple components using the code for the power supply system. For instance, if a breaker failure results in the loss of an FD fan, the code for the FD fan would be used. However, if a problem in the AC power distribution caused not only the loss of the FD fan but also the loss of several other major components, then use the code for AC power distribution.
- Report instruments or controls (such as pressure switches, pressure regulators, position indicators, etc.) that are part of a particular fan, pump, or valve, using the code for that component. Codes have been assigned to some control systems, such as feedwater control. Report all instruments, transmitters, logic modules, etc., associated with these systems using the code for that control system.

- Use the codes for major overhaul only for non-specific overhaul work as shown below. Major repairs conducted during a major overhaul are to be reported separately using the appropriate code(s). For example, consider the case where a general turbine overhaul is conducted, during which reblading of a high pressure turbine wheel is required. Use the code 4400 to report the overhaul and include such things as opening and closing of the turbine, cleaning, and minor repairs as man-hours worked. Use the code 4012 to report the reblading of the HP turbine wheel and include only the man-hours worked on the reblading in the man-hours worked field. Appendix D contains a table of acronym definitions for the unit types (CCGT, CCST, etc.) shown below.

CROSS REFERENCE BY UNIT TYPE OF THE MAJOR OVERHAUL CAUSE CODES FOR NON-SPECIFIC OVERHAUL WORK IN APPENDIX B

System Name	Component Name	Cause Code ID	Cause Code Name	CCGT	CCST	CoGT	CoST	CoB	CCB	FBC	FS	GT/JE	GEO	IC/RE	MISC	MB/MT	NU	PS/H	Total
Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections	1800	Major boiler overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	6
Boiler	Boiler Overhaul and Inspections	1800	Major boiler overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)	0	0	0	0	0	0	1	1	0	0	0	1	1	0	0	4
Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections	1801	Minor boiler overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	6
Boiler	Boiler Overhaul and Inspections	1801	Minor boiler overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)	0	0	0	0	0	0	1	1	0	0	0	1	1	0	0	4
Nuclear Reactor	Miscellaneous (Reactor)	2900	Reactor overhaul (use for non-specific overhaul only; see page B-CCGT-2)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Steam Turbine	Miscellaneous (Steam Turbine)	4400	Major turbine overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)	1	1	1	1	1	1	1	1	0	1	0	1	1	1	0	12
Steam Turbine	Miscellaneous (Steam Turbine)	4402	Minor turbine overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)	1	1	1	1	1	1	1	1	0	1	0	1	1	1	0	12
Generator	Miscellaneous (Generator)	4830	Major generator overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
Generator	Miscellaneous (Generator)	4831	Minor generator overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
Gas Turbine	Miscellaneous (Gas Turbine)	5260	Major overhaul (use for non-specific overhaul only; see page B-CCGT-2)	1	1	1	1	1	1	0	0	1	0	0	1	1	0	0	9
Jet Engine	Miscellaneous (Jet Engine)	5660	Major overhaul (use for non-specific overhaul only; see page B-CCGT-2)	1	1	1	1	1	1	0	0	1	0	0	1	1	0	0	9
Internal Combustion/Reciprocating Engines	Miscellaneous (Internal Combustion/Reciprocating Engines)	5890	Major overhaul (use for non-specific overhaul only; see Page B-CCGT-2)	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2
Hydro Turbine/Pump	Miscellaneous (Hydro Turbine/Pump)	7200	Major overhaul (use for non-specific overhaul only; see page B-CCGT-2)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2
Total				8	8	8	8	8	8	6	6	4	4	3	10	8	5	3	97

- Use the codes for "External" and "Safety, Regulatory, and Environmental" only when no other system/component cause code applies. For instance, if stack emission limits are exceeded because of a fault in the flue gas scrubber, use a scrubber code. However, if a new limit on emissions is imposed and is exceeded even though the scrubber is functioning properly, then use an environmental code.

Guide for Code Addition and Deactivation

The cause codes are reviewed annually and users are asked to submit suggestions for new cause codes which will get reviewed, and if approved, added.. Sometimes an omission is reported where an existing cause code should apply to more unit types than it does currently, and if approved, it will be added to them. Cause codes no longer in use are deactivated, however they continue to exist in historical records. Deactivated cause codes can be reactivated if ever needed again. There are fifteen unit types and whenever a cause code is approved to be added to one of them the following general rules listed below may also apply. These rules operate on the principle that it is "better to have it and not need it than to need it and not have it" in order to provide for any reasonable potential future cause code usage.

1) If a request for a new Fossil Steam unit type cause code is approved it will also be added to the Fluidized Bed, Miscellaneous, and Multi-boiler/Multi-Turbine unit types. Fluidized Bed units are Fossil Steam units with a different type of boiler, so it may apply. Miscellaneous units are different configurations of the other unit types (except Nuclear) so it may also apply to this unit type. Multi-boiler/Multi-Turbine units are Fossil Steam or Fluidized Bed units with multiple boilers and/or steam turbines so it may also apply to this unit type as well. Fluidized Bed, Miscellaneous, and Multi-boiler/Multi-Turbine unit types can all have equipment that is unique to them, so the reverse, adding specialized cause codes to these unit types, may not always apply to Fossil Steam units. Consideration will also be given to steam cycle components of combined cycle steam units, co-generation steam units, and their block reporting equivalents to see if the new cause codes apply to these steam cycles as well (reference Item 4).

2) If a request for a new Fluidized Bed unit type cause code is approved it will also be added to the Fossil Steam (as long as it is not unique to fluidized bed boilers), Miscellaneous, and Multi-boiler/Multi-Turbine unit types. Fluidized Bed units are Fossil Steam units with a different type of boiler, so it may apply. Miscellaneous units are different configurations of the other unit types (except Nuclear) so it may also apply to this unit type. Multi-boiler/Multi-Turbine units are Fossil Steam or Fluidized Bed units with multiple boilers and/or steam turbines so it may also apply to this unit type as well. Miscellaneous, and Multi-boiler/Multi-Turbine unit types can all have equipment that is unique to them, so the reverse, adding specialized cause codes to these unit types, may not always apply to Fluidized Bed units.

3) If a cause code is added to any unit type other than Nuclear, it will also be added to the Miscellaneous unit types. Miscellaneous units are simply different configurations of the other unit types (except Nuclear) so it may apply to this unit type also.

4) Combined Cycle Gas Turbine and steam units, Co-generation Gas Turbine and steam units, and their Block reporting equivalents are all very similar so anytime a new cause code is approved for addition to any one of these unit types it will be reviewed for addition to all six.

New cause code numbers are assigned using the principle of deductive logic, i.e. reasoning from the general to the specific, within the existing cause code groupings. For example: if a problem exists with a specific boiler tube that is not listed in the Boiler Tube Leak table for Fossil Steam units (Table B08-49) try to find a general cause code in that table that might apply, say 1005 – Generating tubes, and in the request for a new cause code ask for a more specific version of it, such as 1006 – Finned Generating tubes.

COMBINED CYCLE GAS TURBINE UNITS

INDEX TO SYSTEM/COMPONENT/SUB-COMPONENT CAUSE CODE TABLES			
TABLE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**
B01-1	Balance of Plant	Auxiliary Systems	Auxiliary Steam
B01-2	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems
B01-3	Balance of Plant	Auxiliary Systems	Fire Protection System
B01-4	Balance of Plant	Auxiliary Systems	Instrument Air
B01-5	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System
B01-6	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)
B01-7	Balance of Plant	Auxiliary Systems	Open Cooling Water System
B01-8	Balance of Plant	Auxiliary Systems	Seal Air Fans
B01-9	Balance of Plant	Auxiliary Systems	Service Air
B01-10	Balance of Plant	Auxiliary Systems	Service Water (Open System)
B01-11	Balance of Plant	Circulating Water Systems	
B01-12	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators
B01-13	Balance of Plant	Condensate System	Miscellaneous (Condensate System)
B01-14	Balance of Plant	Condensate System	Polishers/Chemical Addition
B01-15	Balance of Plant	Condensate System	Pumps, Piping, and Valves
B01-16	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals
B01-17	Balance of Plant	Condensing System	Condenser Controls
B01-18	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment
B01-19	Balance of Plant	Condensing System	Miscellaneous (Condensing System)
B01-20	Balance of Plant	Condensing System	Vacuum Equipment
B01-21	Balance of Plant	Electrical	
B01-22	Balance of Plant	Extraction Steam	
B01-23	Balance of Plant	Feedwater System	
B01-24	Balance of Plant	Heater Drain Systems	
B01-25	Balance of Plant	Miscellaneous (Balance of Plant)	
B01-26	Balance of Plant	Power Station Switchyard	
B01-27	Balance of Plant	Waste Water (zero discharge) Systems	
B01-28	Expander Turbine	Expander Turbine	
B01-29	External	Catastrophe	
B01-30	External	Economic	
B01-31	External	Fuel Quality	
B01-32	External	Miscellaneous (External)	
B01-33	Gas Turbine	Auxiliary Systems	
B01-34	Gas Turbine	Exhaust Systems	
B01-35	Gas Turbine	Fuel, Ignition, and Combustion Systems	

INDEX TO SYSTEM/COMPONENT/SUB-COMPONENT CAUSE CODE TABLES			
TABLE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**
B01-36	Gas Turbine	Inlet Air System and Compressors	Compressors
B01-37	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters
B01-38	Gas Turbine	Miscellaneous (Gas Turbine)	
B01-39	Gas Turbine	Turbine	
B01-40	Generator	Controls	
B01-41	Generator	Cooling System	
B01-42	Generator	Exciter	
B01-43	Generator	Generator	
B01-44	Generator	Miscellaneous (Generator)	
B01-45	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply
B01-46	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)
B01-47	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems	
B01-48	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Design Limitations	
B01-49	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)
B01-50	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)
B01-51	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures	
B01-52	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections	
B01-53	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation
B01-54	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown
B01-55	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam
B01-56	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators
B01-57	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam
B01-58	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass
B01-59	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)
B01-60	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks	
B01-61	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Water Condition	
B01-62	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)	
B01-63	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems	
B01-64	Inactive States	Inactive States	
B01-65	Jet Engine	Auxiliary Systems	
B01-66	Jet Engine	Exhaust Systems	
B01-67	Jet Engine	Fuel, Ignition, and Combustion Systems	
B01-68	Jet Engine	Inlet Air System and Compressors	Compressors
B01-69	Jet Engine	Inlet Air System and Compressors	Ducts and Filters
B01-70	Jet Engine	Miscellaneous (Jet Engine)	
B01-71	Jet Engine	Turbine	

INDEX TO SYSTEM/COMPONENT/SUB-COMPONENT CAUSE CODE TABLES			
TABLE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**
B01-72	Miscellaneous	Instruments and Controls	
B01-73	Performance	Performance	
B01-74	Personnel or Procedural Errors	Personnel or Procedural Errors	
B01-75	Pollution Control Equipment	CO Reduction	
B01-76	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)	
B01-77	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters
B01-78	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems
B01-79	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems
B01-80	Regulatory, Safety, Environmental	Other Operating Environmental Limitations	
B01-81	Regulatory, Safety, Environmental	Regulatory	
B01-82	Regulatory, Safety, Environmental	Safety	
B01-83	Regulatory, Safety, Environmental	Stack Emission	
B01-84	Steam Turbine	Controls	
B01-85	Steam Turbine	High Pressure Turbine	
B01-86	Steam Turbine	Intermediate Pressure Turbine	
B01-87	Steam Turbine	Low Pressure Turbine	
B01-88	Steam Turbine	Lube Oil	
B01-89	Steam Turbine	Miscellaneous (Steam Turbine)	
B01-90	Steam Turbine	Piping	
B01-91	Steam Turbine	Valves	

BALANCE OF PLANT

TABLE B01-1 Balance of Plant: Auxiliary Systems - Auxiliary Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3830	Auxiliary boiler
CC GT units	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3831	Auxiliary steam piping
CC GT units	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3832	Auxiliary steam valves
CC GT units	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3833	Auxiliary steam controls and instruments
CC GT units	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3834	Auxiliary boiler tube leaks
CC GT units	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3835	Auxiliary boiler burner management system
CC GT units	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3836	Steam transfer to other unit
CC GT units	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3839	Other auxiliary steam problems (also see extraction steam codes 3520 to

TABLE B01-1 Balance of Plant: Auxiliary Systems - Auxiliary Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
					3529; startup bypass codes 0630 to 0660; and soot blower steam code 0870)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-2 Balance of Plant: Auxiliary Systems - Closed Cooling Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3820	Closed cooling water pumps and motors
CC GT units	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3821	Closed cooling water piping
CC GT units	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3822	Closed cooling water valves
CC GT units	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3823	Closed cooling water heat exchangers
CC GT units	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3824	Closed cooling water system fouling
CC GT units	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3825	Closed cooling water instrumentation
CC GT units	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3826	Closed cooling water strainer
CC GT units	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3829	Other closed cooling water system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-3 Balance of Plant: Auxiliary Systems - Fire Protection System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Auxiliary Systems	Fire Protection System	3860	Fire protection system pumps
CC GT units	Balance of Plant	Auxiliary Systems	Fire Protection System	3861	Fire protection system piping
CC GT units	Balance of Plant	Auxiliary Systems	Fire Protection System	3862	Fire protection system valves
CC GT units	Balance of Plant	Auxiliary Systems	Fire Protection System	3863	Fire protection system fouling
CC GT units	Balance of Plant	Auxiliary Systems	Fire Protection System	3864	Fire protection system instrumentation and controls
CC GT units	Balance of Plant	Auxiliary Systems	Fire Protection System	3869	Other fire protection system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-4 Balance of Plant: Auxiliary Systems - Instrument Air					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Auxiliary Systems	Instrument Air	3850	Instrument air compressors

TABLE B01-4 Balance of Plant: Auxiliary Systems - Instrument Air					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Auxiliary Systems	Instrument Air	3851	Instrument air piping
CC GT units	Balance of Plant	Auxiliary Systems	Instrument Air	3852	Instrument air valves
CC GT units	Balance of Plant	Auxiliary Systems	Instrument Air	3853	Instrument air dryers
CC GT units	Balance of Plant	Auxiliary Systems	Instrument Air	3854	N2 backup to instrument air
CC GT units	Balance of Plant	Auxiliary Systems	Instrument Air	3859	Other instrument air problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-5 Balance of Plant: Auxiliary Systems - Low-pressure Gas Compression System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3870	Fuel Gas Compressor and Motors
CC GT units	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3871	Fuel Gas Compressor Piping
CC GT units	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3872	Fuel Gas Compressor Valves
CC GT units	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3873	Fuel Gas Compressor Heat Exchangers
CC GT units	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3874	Fuel Gas Compressor Controls and Instrumentation
CC GT units	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3875	Fuel Gas Compressor Filters
CC GT units	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3876	Fuel Gas Compressor Fire System
CC GT units	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3879	Fuel Gas Compressor - other
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-6 Balance of Plant: Auxiliary Systems - Miscellaneous (Auxiliary Systems)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	3898	Miscellaneous plant auxiliary process and services instrumentation and controls
CC GT units	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	3899	Other miscellaneous auxiliary system problems

TABLE B01-6 Balance of Plant: Auxiliary Systems - Miscellaneous (Auxiliary Systems)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	6299	Other combined cycle block problems (Use other gas turbine problem codes, other steam turbine codes, etc., whenever appropriate.)
CC GT units	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	6399	Other coal gasification equipment problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-7 Balance of Plant: Auxiliary Systems - Open Cooling Water System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3800	Open cooling water pumps and motors
CC GT units	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3801	Open cooling water piping
CC GT units	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3802	Open cooling water valves
CC GT units	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3803	Open cooling water heat exchangers
CC GT units	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3804	Open cooling water system fouling
CC GT units	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3805	Open cooling water system instrumentation
CC GT units	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3806	Open cooling water strainer
CC GT units	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3809	Other open cooling water problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-8 Balance of Plant: Auxiliary Systems - Seal Air Fans					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Auxiliary Systems	Seal Air Fans	3880	Seal air fan
CC GT units	Balance of Plant	Auxiliary Systems	Seal Air Fans	3881	Seal air fan drive - motor
CC GT units	Balance of Plant	Auxiliary Systems	Seal Air Fans	3882	Seal air control dampers and drives
CC GT units	Balance of Plant	Auxiliary Systems	Seal Air Fans	3883	Seal air filters
CC GT units	Balance of Plant	Auxiliary Systems	Seal Air Fans	3889	Other seal air fan problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-9 Balance of Plant: Auxiliary Systems - Service Air					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Auxiliary Systems	Service Air	3840	Service air compressors
CC GT units	Balance of Plant	Auxiliary Systems	Service Air	3841	Service air piping
CC GT units	Balance of Plant	Auxiliary Systems	Service Air	3842	Service air valves
CC GT units	Balance of Plant	Auxiliary Systems	Service Air	3843	Service air dryers
CC GT units	Balance of Plant	Auxiliary Systems	Service Air	3849	Other service air problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-10 Balance of Plant: Auxiliary Systems - Service Water (Open System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3810	Service water pumps and motors
CC GT units	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3811	Service water piping
CC GT units	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3812	Service water valves
CC GT units	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3813	Service water heat exchangers
CC GT units	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3814	Service water system fouling
CC GT units	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3815	Service water strainer
CC GT units	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3819	Other service water problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-11 Balance of Plant: Circulating Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Circulating Water Systems		3210	Circulating water pumps
CC GT units	Balance of Plant	Circulating Water Systems		3211	Circulating water pump motors
CC GT units	Balance of Plant	Circulating Water Systems		3220	Circulating water piping
CC GT units	Balance of Plant	Circulating Water Systems		3221	Circulating water piping fouling
CC GT units	Balance of Plant	Circulating Water Systems		3230	Circulating water valves
CC GT units	Balance of Plant	Circulating Water Systems		3231	Waterbox
CC GT units	Balance of Plant	Circulating Water Systems		3232	Condenser tube cleaning system including debris filter
CC GT units	Balance of Plant	Circulating Water Systems		3233	Circulating water priming system
CC GT units	Balance of Plant	Circulating Water Systems		3235	Cooling tower booster pump
CC GT units	Balance of Plant	Circulating Water Systems		3236	Cooling tower booster motor
CC GT units	Balance of Plant	Circulating Water Systems		3238	Cooling tower fan motors

TABLE B01-11 Balance of Plant: Circulating Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Circulating Water Systems		3239	Cooling tower fan motors - variable speed
CC GT units	Balance of Plant	Circulating Water Systems		3240	Cooling tower fans
CC GT units	Balance of Plant	Circulating Water Systems		3241	Cooling tower efficiency below design
CC GT units	Balance of Plant	Circulating Water Systems		3242	Cooling tower fill damage
CC GT units	Balance of Plant	Circulating Water Systems		3243	Cooling tower icing
CC GT units	Balance of Plant	Circulating Water Systems		3244	Cooling tower fires
CC GT units	Balance of Plant	Circulating Water Systems		3245	Other cooling tower problems
CC GT units	Balance of Plant	Circulating Water Systems		3246	Cooling tower fouling
CC GT units	Balance of Plant	Circulating Water Systems		3247	Cooling tower instrumentation
CC GT units	Balance of Plant	Circulating Water Systems		3248	Cooling Tower Overhaul
CC GT units	Balance of Plant	Circulating Water Systems		3250	Circulating water system instruments and controls
CC GT units	Balance of Plant	Circulating Water Systems		3260	Traveling screens
CC GT units	Balance of Plant	Circulating Water Systems		3261	Traveling screen fouling
CC GT units	Balance of Plant	Circulating Water Systems		3269	Circulating water biological conditions (ie, zebra mussels)
CC GT units	Balance of Plant	Circulating Water Systems		3270	Intake system problems other than traveling screens
CC GT units	Balance of Plant	Circulating Water Systems		3271	Intake grating fouling
CC GT units	Balance of Plant	Circulating Water Systems		3272	Circulating water screenwash system
CC GT units	Balance of Plant	Circulating Water Systems		3273	Debris in circulating water from outside sources (leaves, mud, etc.)
CC GT units	Balance of Plant	Circulating Water Systems		3280	High circulating water temperature (not due to season, tower efficiency below design, or other listed equipment problem)
CC GT units	Balance of Plant	Circulating Water Systems		3281	Circulating water tempering system
CC GT units	Balance of Plant	Circulating Water Systems		3282	Circulating water cooling ponds
CC GT units	Balance of Plant	Circulating Water Systems		3285	Circulating water chemistry
CC GT units	Balance of Plant	Circulating Water Systems		3299	Other circulating water system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-12 Balance of Plant: Condensate System - Low/Intermediate Pressure Heater and Deaerators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3339	LP heater head leaks
CC GT units	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3340	LP heater tube leaks
CC GT units	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3341	Other LP heater - general
CC GT units	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3342	IP heater tube leaks
CC GT units	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3343	Other IP heater - general
CC GT units	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3344	Deaerator (including level control)
CC GT units	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3345	IP heater head leaks
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-13 Balance of Plant: Condensate System - Miscellaneous (Condensate System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3360	Condensate makeup and return (including storage tanks)
CC GT units	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3370	Condensate system controls and instrumentation (not hotwell level, heater level, or deaerator level controls; see codes 3150-3159, 3344, 3502).
CC GT units	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3380	Condensate coolers
CC GT units	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3399	Other miscellaneous condensate system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-14 Balance of Plant: Condensate System - Polishers/Chemical Addition					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Condensate System	Polishers/Chemical Addition	3350	Condensate polishing and filtering systems
CC GT units	Balance of Plant	Condensate System	Polishers/Chemical Addition	3351	Chemical addition systems
CC GT units	Balance of Plant	Condensate System	Polishers/Chemical Addition	3352	Feedwater chemistry (not specific to condenser, polishers, or chemical addition)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-15 Balance of Plant: Condensate System - Pumps, Piping, and Valves					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3300	Condensate water pre-treatment
CC GT units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3310	Condensate/hotwell pumps
CC GT units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3311	Condensate/hotwell pump motor
CC GT units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3312	Condensate booster pump
CC GT units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3313	Condensate booster pump motor
CC GT units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3314	Condensate booster pump motor - variable speed
CC GT units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3315	Condensate booster pump drive (other than 3313 and 3314)
CC GT units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3320	Condensate piping
CC GT units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3330	Condensate valves
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-16 Balance of Plant: Condensing System - Condenser Casing or Shell and Internals					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3120	Tube sheets
CC GT units	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3121	Expansion joint
CC GT units	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3122	Gaskets and seals
CC GT units	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3123	Hot well

TABLE B01-16 Balance of Plant: Condensing System - Condenser Casing or Shell and Internals					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3124	Tube sheet fouling
CC GT units	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3129	Other condenser casing or shell and internal problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-17 Balance of Plant: Condensing System - Condenser Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Condensing System	Condenser Controls	3150	Hot well level controls
CC GT units	Balance of Plant	Condensing System	Condenser Controls	3151	Vacuum pump and air ejector controls
CC GT units	Balance of Plant	Condensing System	Condenser Controls	3152	Air-cooled condenser controls
CC GT units	Balance of Plant	Condensing System	Condenser Controls	3159	Other condensing system controls and instruments
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-18 Balance of Plant: Condensing System - Condenser Tubes and Support Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3110	Condenser tube leaks
CC GT units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3111	Condenser tube fouling shell side
CC GT units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3112	Condenser tube fouling tube side
CC GT units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3113	Condenser tube and water box cleaning (including circulating water flow reversal)
CC GT units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3114	Air-cooled condenser tubes
CC GT units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3115	Air-cooled condenser pumps
CC GT units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3116	Air-cooled condenser fans
CC GT units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3117	Air-cooled condenser fan motors

TABLE B01-18 Balance of Plant: Condensing System - Condenser Tubes and Support Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3118	Other Air-cooled condenser problems
CC GT units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3119	Other condenser tube casing or shell and internal problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-19 Balance of Plant: Condensing System - Miscellaneous (Condensing System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3170	Condenser inspection (use code 3110 to report looking for tube leaks)
CC GT units	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3171	Air-cooled condenser inspections
CC GT units	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3180	Major condenser overhaul
CC GT units	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3185	Water side cathodic protection
CC GT units	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3186	Auxiliary condenser and associated equipment
CC GT units	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3190	Air leakage (for losses not attributable to previously noted equipment related codes)
CC GT units	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3199	Other miscellaneous condensing system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-20 Balance of Plant: Condensing System - Vacuum Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Condensing System	Vacuum Equipment	3130	Air ejectors
CC GT units	Balance of Plant	Condensing System	Vacuum Equipment	3131	Air ejector piping and valves
CC GT units	Balance of Plant	Condensing System	Vacuum Equipment	3132	Inter and after condensers
CC GT units	Balance of Plant	Condensing System	Vacuum Equipment	3133	Vacuum pumps
CC GT units	Balance of Plant	Condensing System	Vacuum Equipment	3134	Vacuum pump piping and valves
CC GT units	Balance of Plant	Condensing System	Vacuum Equipment	3135	Vacuum pump motor and auxiliaries
CC GT units	Balance of Plant	Condensing System	Vacuum Equipment	3139	Other air extraction system problems - general

TABLE B01-20 Balance of Plant: Condensing System - Vacuum Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Condensing System	Vacuum Equipment	3149	Loss of vacuum not attributable to a particular component such as air ejectors or valves, or high back pressure not attributable to high circulating water temperature, or vacuum losses from a known cause.
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-21 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Electrical		3600	Switchyard transformers and associated cooling systems - external (OMC)
CC GT units	Balance of Plant	Electrical		3601	Switchyard transformers and associated cooling systems - external (not OMC)
CC GT units	Balance of Plant	Electrical		3610	Switchyard circuit breakers - external (not OMC)
CC GT units	Balance of Plant	Electrical		3611	Switchyard circuit breakers - external (OMC)
CC GT units	Balance of Plant	Electrical		3612	Switchyard system protection devices - external (OMC)
CC GT units	Balance of Plant	Electrical		3613	Switchyard system protection devices - external (not OMC)
CC GT units	Balance of Plant	Electrical		3618	Other switchyard equipment - external (not OMC)
CC GT units	Balance of Plant	Electrical		3619	Other switchyard equipment - external (OMC)
CC GT units	Balance of Plant	Electrical		3620	Main transformer
CC GT units	Balance of Plant	Electrical		3621	Unit auxiliaries transformer
CC GT units	Balance of Plant	Electrical		3622	Station service startup transformer
CC GT units	Balance of Plant	Electrical		3623	Auxiliary generators
CC GT units	Balance of Plant	Electrical		3624	Auxiliary generator voltage supply system

TABLE B01-21 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Electrical		3629	Other switchyard or high voltage system problems - external
CC GT units	Balance of Plant	Electrical		3630	400-700 volt transformers
CC GT units	Balance of Plant	Electrical		3631	400-700 volt circuit breakers
CC GT units	Balance of Plant	Electrical		3632	400-700 volt conductors and buses
CC GT units	Balance of Plant	Electrical		3633	400-700 volt insulators
CC GT units	Balance of Plant	Electrical		3634	400-700 volt protection devices
CC GT units	Balance of Plant	Electrical		3639	Other 400-700 volt problems
CC GT units	Balance of Plant	Electrical		3640	AC instrument power transformers
CC GT units	Balance of Plant	Electrical		3641	AC Circuit breakers
CC GT units	Balance of Plant	Electrical		3642	AC Conductors and buses
CC GT units	Balance of Plant	Electrical		3643	AC Inverters
CC GT units	Balance of Plant	Electrical		3644	AC Protection devices
CC GT units	Balance of Plant	Electrical		3649	Other AC instrument power problems
CC GT units	Balance of Plant	Electrical		3650	DC instrument power battery chargers
CC GT units	Balance of Plant	Electrical		3651	DC circuit breakers
CC GT units	Balance of Plant	Electrical		3652	DC conductors and buses
CC GT units	Balance of Plant	Electrical		3653	DC protection devices
CC GT units	Balance of Plant	Electrical		3659	Other DC power problems
CC GT units	Balance of Plant	Electrical		3660	4000-7000 volt transformers
CC GT units	Balance of Plant	Electrical		3661	4000-7000 volt circuit breakers
CC GT units	Balance of Plant	Electrical		3662	4000-7000 volt conductors and buses
CC GT units	Balance of Plant	Electrical		3663	4000-7000 volt insulators
CC GT units	Balance of Plant	Electrical		3664	4000-7000 volt protection devices
CC GT units	Balance of Plant	Electrical		3669	Other 4000-7000 volt problems
CC GT units	Balance of Plant	Electrical		3670	12-15kV transformers
CC GT units	Balance of Plant	Electrical		3671	12-15kV circuit breakers
CC GT units	Balance of Plant	Electrical		3672	12-15kV conductors and buses
CC GT units	Balance of Plant	Electrical		3673	12-15kV insulators
CC GT units	Balance of Plant	Electrical		3674	12-15kV protection devices
CC GT units	Balance of Plant	Electrical		3679	Other 12-15kV problems
CC GT units	Balance of Plant	Electrical		3680	Other voltage transformers
CC GT units	Balance of Plant	Electrical		3681	Other voltage circuit breakers
CC GT units	Balance of Plant	Electrical		3682	Other voltage conductors and buses
CC GT units	Balance of Plant	Electrical		3683	Other voltage insulators
CC GT units	Balance of Plant	Electrical		3684	Other voltage protection devices

TABLE B01-21 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Electrical		3689	Other voltage problems
CC GT units	Balance of Plant	Electrical		3690	Station Service Power Distribution System, General
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-22 Balance of Plant: Extraction Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Extraction Steam		3520	HP Extraction steam piping
CC GT units	Balance of Plant	Extraction Steam		3521	HP Extraction steam valves
CC GT units	Balance of Plant	Extraction Steam		3522	HP Extraction steam instruments and controls
CC GT units	Balance of Plant	Extraction Steam		3529	Other HP extraction steam system problems
CC GT units	Balance of Plant	Extraction Steam		3530	IP Extraction steam piping
CC GT units	Balance of Plant	Extraction Steam		3531	IP Extraction steam valves
CC GT units	Balance of Plant	Extraction Steam		3532	IP Extraction steam instruments and controls
CC GT units	Balance of Plant	Extraction Steam		3539	Other IP extraction steam system problems
CC GT units	Balance of Plant	Extraction Steam		3540	LP Extraction steam piping
CC GT units	Balance of Plant	Extraction Steam		3541	LP Extraction steam valves
CC GT units	Balance of Plant	Extraction Steam		3542	LP Extraction steam instruments and controls
CC GT units	Balance of Plant	Extraction Steam		3549	Other LP extraction steam system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-23 Balance of Plant: Feedwater System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Feedwater System		3401	Startup feedwater pump
CC GT units	Balance of Plant	Feedwater System		3402	Startup feedwater pump drives - all types
CC GT units	Balance of Plant	Feedwater System		3407	Feedwater pump suction screens
CC GT units	Balance of Plant	Feedwater System		3408	Feedwater pump drive - local controls

TABLE B01-23 Balance of Plant: Feedwater System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Feedwater System		3409	Feedwater pump drive motor - variable speed
CC GT units	Balance of Plant	Feedwater System		3410	Feedwater pump
CC GT units	Balance of Plant	Feedwater System		3411	Feedwater pump drive - motor
CC GT units	Balance of Plant	Feedwater System		3412	Feedwater pump drive - steam turbine
CC GT units	Balance of Plant	Feedwater System		3413	Feedwater pump coupling and drive shaft
CC GT units	Balance of Plant	Feedwater System		3414	Feedwater pump local controls
CC GT units	Balance of Plant	Feedwater System		3415	Feedwater pump/drive lube oil system
CC GT units	Balance of Plant	Feedwater System		3416	Other feedwater pump problems
CC GT units	Balance of Plant	Feedwater System		3417	Feedwater pump drive - main shaft
CC GT units	Balance of Plant	Feedwater System		3418	Feedwater pump drive - other
CC GT units	Balance of Plant	Feedwater System		3419	Feedwater pump drive - gear
CC GT units	Balance of Plant	Feedwater System		3420	Feedwater piping and supports
CC GT units	Balance of Plant	Feedwater System		3430	Feedwater regulating (boiler level control) valve
CC GT units	Balance of Plant	Feedwater System		3431	Other feedwater valves
CC GT units	Balance of Plant	Feedwater System		3439	HP heater head leaks
CC GT units	Balance of Plant	Feedwater System		3440	High pressure heater tube leaks
CC GT units	Balance of Plant	Feedwater System		3441	Other high pressure heater problems (see condensate system for LP and IP heater codes)
CC GT units	Balance of Plant	Feedwater System		3451	Feedwater booster pump suction screens
CC GT units	Balance of Plant	Feedwater System		3452	Feedwater booster pump drive - local controls
CC GT units	Balance of Plant	Feedwater System		3453	Feedwater booster pump drive motor - variable speed
CC GT units	Balance of Plant	Feedwater System		3454	Feedwater booster pump
CC GT units	Balance of Plant	Feedwater System		3455	Feedwater booster pump drive - motor
CC GT units	Balance of Plant	Feedwater System		3456	Feedwater booster pump drive - steam turbine
CC GT units	Balance of Plant	Feedwater System		3457	Feedwater booster pump coupling and drive shaft

TABLE B01-23 Balance of Plant: Feedwater System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Feedwater System		3458	Feedwater booster pump local controls
CC GT units	Balance of Plant	Feedwater System		3459	Feedwater booster pump/drive lube oil system
CC GT units	Balance of Plant	Feedwater System		3460	Other feedwater booster pump problems
CC GT units	Balance of Plant	Feedwater System		3461	Feedwater booster pump drive - main shaft
CC GT units	Balance of Plant	Feedwater System		3462	Feedwater booster pump drive - other
CC GT units	Balance of Plant	Feedwater System		3463	Feedwater booster pump drive - gear
CC GT units	Balance of Plant	Feedwater System		3499	Other feedwater system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Excluding extraction or drain systems.					

TABLE B01-24 Balance of Plant: Heater Drain Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Heater Drain Systems		3501	Heater drain pumps
CC GT units	Balance of Plant	Heater Drain Systems		3502	Heater level control
CC GT units	Balance of Plant	Heater Drain Systems		3503	Heater drain piping
CC GT units	Balance of Plant	Heater Drain Systems		3504	Heater drain valves
CC GT units	Balance of Plant	Heater Drain Systems		3505	Heater drain pump drive
CC GT units	Balance of Plant	Heater Drain Systems		3509	Other heater drain system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-25 Balance of Plant: Miscellaneous (Balance of Plant)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3950	Process computer
CC GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3960	Thermal derating (thermal efficiency losses in balance of plant when specific cause(s) unknown)
CC GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3970	Distributive Control System (DCS) - process computer
CC GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3971	DCS - data highway

TABLE B01-25 Balance of Plant: Miscellaneous (Balance of Plant)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3972	DCS - hardware problems (including card failure)
CC GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3973	DCS - internal and termination wiring
CC GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3974	DCS - logic problems
CC GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3975	DCS - upgrades
CC GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3979	Other DCS problems
CC GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3980	Programmable Logic Controller (PLC)
CC GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3981	PLC - data highway
CC GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3982	PLC - hardware problems (including card failure)
CC GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3983	PLC - internal and termination wiring
CC GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3984	PLC - logic problems
CC GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3985	PLC - upgrades
CC GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3989	Other PLC problems
CC GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3995	Powerhouse heating and ventilating systems
CC GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3996	Air conditioning systems - rooms and areas
CC GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3998	Balance of plant overhaul/outage
CC GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3999	Other miscellaneous balance of plant problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-26 Balance of Plant: Power Station Switchyard					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Power Station Switchyard		3700	Power Station switchyard (non generating unit equipment)
CC GT units	Balance of Plant	Power Station Switchyard		3710	Transmission line (connected to powerhouse switchyard to 1st Substation)
CC GT units	Balance of Plant	Power Station Switchyard		3720	Transmission equipment at the 1st substation (see code 9300 if applicable)

TABLE B01-26 Balance of Plant: Power Station Switchyard					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Power Station Switchyard		3730	Transmission equipment beyond the 1st substation (see code 9300 if applicable)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-27 Balance of Plant: Waste Water (zero discharge) Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Balance of Plant	Waste Water (zero discharge) Systems		3290	Waste water (zero discharge) tanks, pumps, and motors
CC GT units	Balance of Plant	Waste Water (zero discharge) Systems		3291	Waste water (zero discharge) system fouling
CC GT units	Balance of Plant	Waste Water (zero discharge) Systems		3292	Waste water (zero discharge) piping
CC GT units	Balance of Plant	Waste Water (zero discharge) Systems		3293	Waste water (zero discharge) valves
CC GT units	Balance of Plant	Waste Water (zero discharge) Systems		3294	Waste water (zero discharge) controls and instrumentation
CC GT units	Balance of Plant	Waste Water (zero discharge) Systems		3295	Other waste water (zero discharge) problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

EXPANDER TURBINE

TABLE B01-28 Expander Turbine: Expander Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Expander Turbine	Expander Turbine		7800	Couplings
CC GT units	Expander Turbine	Expander Turbine		7810	Shaft
CC GT units	Expander Turbine	Expander Turbine		7820	Bearings
CC GT units	Expander Turbine	Expander Turbine		7830	Blades
CC GT units	Expander Turbine	Expander Turbine		7840	Discs
CC GT units	Expander Turbine	Expander Turbine		7850	Spacers
CC GT units	Expander Turbine	Expander Turbine		7860	Nozzles/vanes
CC GT units	Expander Turbine	Expander Turbine		7870	Heat shields
CC GT units	Expander Turbine	Expander Turbine		7880	Exhaust diffusers
CC GT units	Expander Turbine	Expander Turbine		7890	Seal oil system and seals

TABLE B01-28 Expander Turbine: Expander Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Expander Turbine	Expander Turbine		7900	Inner casing
CC GT units	Expander Turbine	Expander Turbine		7910	Outer exhaust casing
CC GT units	Expander Turbine	Expander Turbine		7920	Lube oil system
CC GT units	Expander Turbine	Expander Turbine		7930	Controls and instrumentation
CC GT units	Expander Turbine	Expander Turbine		7940	Evactor
CC GT units	Expander Turbine	Expander Turbine		7950	Major overhaul
CC GT units	Expander Turbine	Expander Turbine		7960	Other expander turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

EXTERNAL

Use this set of codes to report events caused by external factors (flood, lightning, etc.); economic factors (lack of fuel, labor strikes, etc.); operator training; and transmission system problems external to the plant.

TABLE B01-29 External: Catastrophe					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	External	Catastrophe		9000	Flood
CC GT units	External	Catastrophe		9001	Drought
CC GT units	External	Catastrophe		9010	Fire including wildfires, not related to a specific component
CC GT units	External	Catastrophe		9020	Lightning
CC GT units	External	Catastrophe		9025	Geomagnetic disturbance
CC GT units	External	Catastrophe		9030	Earthquake
CC GT units	External	Catastrophe		9031	Tornado
CC GT units	External	Catastrophe		9035	Hurricane
CC GT units	External	Catastrophe		9036	Storms (ice, snow, etc)
CC GT units	External	Catastrophe		9040	Other catastrophe
CC GT units	External	Catastrophe		9090	Physical Security Incident
CC GT units	External	Catastrophe		9091	Physical Security Incident (OMC)
CC GT units	External	Catastrophe		9092	Cyber Security Incident
CC GT units	External	Catastrophe		9093	Cyber Security Incident (OMC)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-30 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	External	Economic		0000	Reserve shutdown
CC GT units	External	Economic		9130	Failure of fuel supplier to fulfill contractual obligations or a pre-arranged deal due to physical fuel disruptions or operational impairments (e.g. force majeure on a pipeline or compressor down; making the pipeline incapable of making its firm deliveries.)
CC GT units	External	Economic		9131	Lack of fuel – due to contractual or tariff provisions that allow for service interruption or price fluctuations during peak demand periods.
CC GT units	External	Economic		9134	Fuel conservation
CC GT units	External	Economic		9136	Problems with Primary Fuel for Units with Secondary Fuel Operation
CC GT units	External	Economic		9137	Ground water or other water supply problems
CC GT units	External	Economic		9139	Ground water or other water supply problems (OMC)
CC GT units	External	Economic		9140	Plant modifications to burn different fuel that are not regulatory mandated
CC GT units	External	Economic		9150	Labor strikes company-wide problems or strikes outside the company's jurisdiction such as manufacturers (delaying repairs) or transportation (fuel supply) problems.
CC GT units	External	Economic		9151	Labor strikes direct plant management grievances that result in a walkout or strike are under plant management control.
CC GT units	External	Economic		9160	Other economic problems
CC GT units	External	Economic		9180	Economic (for internal use at plants only)
CC GT units	External	Economic		9181	Economic (for internal use at plants only)

TABLE B01-30 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	External	Economic		9182	Economic (for internal use at plants only)
CC GT units	External	Economic		9183	Economic (for internal use at plants only)
CC GT units	External	Economic		9184	Economic (for internal use at plants only)
CC GT units	External	Economic		9185	Economic (for internal use at plants only)
CC GT units	External	Economic		9186	Economic (for internal use at plants only)
CC GT units	External	Economic		9187	Economic (for internal use at plants only)
CC GT units	External	Economic		9188	Economic (for internal use at plants only)
CC GT units	External	Economic		9189	Economic (for internal use at plants only)
CC GT units	External	Economic		9190	Economic (for internal use at plants only)
CC GT units	External	Economic		9191	Economic (for internal use at plants only)
CC GT units	External	Economic		9192	Economic (for internal use at plants only)
CC GT units	External	Economic		9193	Economic (for internal use at plants only)
CC GT units	External	Economic		9194	Economic (for internal use at plants only)
CC GT units	External	Economic		9195	Economic (for internal use at plants only)
CC GT units	External	Economic		9196	Economic (for internal use at plants only)
CC GT units	External	Economic		9197	Economic (for internal use at plants only)
CC GT units	External	Economic		9198	Economic (for internal use at plants only)
CC GT units	External	Economic		9199	Economic (for internal use at plants only)

TABLE B01-30 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-31 External: Fuel Quality					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	External	Fuel Quality		9200	High ash content (OMC)
CC GT units	External	Fuel Quality		9201	High ash content (not OMC)
CC GT units	External	Fuel Quality		9205	Poor quality natural gas fuel, low heat content
CC GT units	External	Fuel Quality		9220	High sulfur content (OMC)
CC GT units	External	Fuel Quality		9221	High sulfur content (not OMC)
CC GT units	External	Fuel Quality		9230	High vanadium content (OMC)
CC GT units	External	Fuel Quality		9231	High vanadium content (not OMC)
CC GT units	External	Fuel Quality		9240	High sodium content (OMC)
CC GT units	External	Fuel Quality		9241	High sodium content (not OMC)
CC GT units	External	Fuel Quality		9260	Low BTU oil (OMC)
CC GT units	External	Fuel Quality		9261	Low BTU oil (not OMC)
CC GT units	External	Fuel Quality		9290	Other fuel quality problems (OMC)
CC GT units	External	Fuel Quality		9291	Other fuel quality problems (not OMC)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use code 9600 to 9650 if the fuel quality results in excess stack emissions through no fault in the pollution control equipment. Use the appropriate equipment code to report fouling and slagging.					

TABLE B01-32 External: Miscellaneous (External)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	External	Miscellaneous (External)		9300	Transmission system problems other than catastrophes (do not include switchyard problems in this category; see codes 3600 to 3629, 3720 to 3730)
CC GT units	External	Miscellaneous (External)		9310	Operator training
CC GT units	External	Miscellaneous (External)		9320	Other miscellaneous external problems
CC GT units	External	Miscellaneous (External)		9340	Synchronous Condenser Operation
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

GAS TURBINE

TABLE B01-33 Gas Turbine: Auxiliary Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Gas Turbine	Auxiliary Systems		5110	Lube oil system - general
CC GT units	Gas Turbine	Auxiliary Systems		5111	Lube oil pumps
CC GT units	Gas Turbine	Auxiliary Systems		5112	Lube oil coolers
CC GT units	Gas Turbine	Auxiliary Systems		5113	Lube oil valves/piping
CC GT units	Gas Turbine	Auxiliary Systems		5114	Lube oil filters
CC GT units	Gas Turbine	Auxiliary Systems		5115	Oil vapor extractor
CC GT units	Gas Turbine	Auxiliary Systems		5116	Power Augmentation System Equipment
CC GT units	Gas Turbine	Auxiliary Systems		5117	Power augmentation piping
CC GT units	Gas Turbine	Auxiliary Systems		5118	Power augmentation valves
CC GT units	Gas Turbine	Auxiliary Systems		5119	Power augmentation controls
CC GT units	Gas Turbine	Auxiliary Systems		5120	Hydraulic oil system
CC GT units	Gas Turbine	Auxiliary Systems		5121	Hydraulic oil system pumps
CC GT units	Gas Turbine	Auxiliary Systems		5122	Hydraulic oil system piping/valves
CC GT units	Gas Turbine	Auxiliary Systems		5130	Starting system (including motor)
CC GT units	Gas Turbine	Auxiliary Systems		5140	Battery and charger system
CC GT units	Gas Turbine	Auxiliary Systems		5150	Turning gear and motor
CC GT units	Gas Turbine	Auxiliary Systems		5151	Load gear compartment
CC GT units	Gas Turbine	Auxiliary Systems		5160	Cooling and seal air system
CC GT units	Gas Turbine	Auxiliary Systems		5170	Cooling water system
CC GT units	Gas Turbine	Auxiliary Systems		5180	Anti-icing system
CC GT units	Gas Turbine	Auxiliary Systems		5190	Other auxiliary system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-34 Gas Turbine: Exhaust Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Gas Turbine	Exhaust Systems		5100	Chamber
CC GT units	Gas Turbine	Exhaust Systems		5101	Hoods
CC GT units	Gas Turbine	Exhaust Systems		5102	Vanes/nozzles
CC GT units	Gas Turbine	Exhaust Systems		5103	Silencer
CC GT units	Gas Turbine	Exhaust Systems		5104	Cones
CC GT units	Gas Turbine	Exhaust Systems		5105	Diverter Dampers
CC GT units	Gas Turbine	Exhaust Systems		5106	Exhaust Stack

TABLE B01-34 Gas Turbine: Exhaust Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Gas Turbine	Exhaust Systems		5108	High engine exhaust temperature
CC GT units	Gas Turbine	Exhaust Systems		5109	Other exhaust problems (including high exhaust system temperature not attributable to a specific problem)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-35 Gas Turbine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5040	Fuel tanks
CC GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5041	Fuel piping and valves
CC GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5042	Fuel nozzles/vanes
CC GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5043	Fuel filters
CC GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5044	Liquid fuel oil pump
CC GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5046	Liquid fuel oil transfer/forwarding pump
CC GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5047	Liquid fuel purge system
CC GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5048	Gas fuel system including controls and instrumentation
CC GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5049	Other fuel system problems
CC GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5050	Ignition system
CC GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5051	Pilot fuel piping and valves
CC GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5052	Pilot fuel nozzles/vanes
CC GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5053	Pilot fuel filters

TABLE B01-35 Gas Turbine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5054	Water injection system
CC GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5060	Atomizing air system
CC GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5065	NOx water injection system including pump
CC GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5066	NOx steam injection system
CC GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5070	Combustor casing
CC GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5071	Combustor liner
CC GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5072	Combustor caps
CC GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5073	Flame scanners
CC GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5074	Flashback including instrumentation
CC GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5075	Blade path temperature spread
CC GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5079	Other combustor problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-36 Gas Turbine: Inlet Air System and Compressors - Compressors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5010	High pressure shaft
CC GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5011	High pressure bearings
CC GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5012	High pressure blades/buckets
CC GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5013	Compressor casing and bolts
CC GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5014	Compressor diaphragms
CC GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5015	Compressor seals
CC GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5016	High pressure compressor bleed valves
CC GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5017	Low pressure compressor bleed valves

TABLE B01-36 Gas Turbine: Inlet Air System and Compressors - Compressors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5019	Other high pressure problems
CC GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5020	Low pressure shaft
CC GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5021	Low pressure bearings
CC GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5022	Low pressure blades/buckets
CC GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5029	Other low pressure problems
CC GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5030	Supercharging fans
CC GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5035	Compressor washing
CC GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5036	Compressor shaft and bearings for two-shaft machines
CC GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5037	Inlet bleed heat valve
CC GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5039	Other compressor problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-37 Gas Turbine: Inlet Air System and Compressors - Ducts and Filters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5000	Inlet air ducts
CC GT units	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5001	Inlet air vanes/nozzles
CC GT units	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5002	Inlet air filters
CC GT units	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5003	Inlet cone
CC GT units	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5004	Inlet air chillers
CC GT units	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5005	Inlet air evaporative coolers
CC GT units	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5006	Inlet air foggers
CC GT units	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5009	Other inlet air problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-38 Gas Turbine: Miscellaneous (Gas Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5200	Reduction gear
CC GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5201	Load shaft and bearings
CC GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5205	Main coupling between the turbine and generator
CC GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5206	Clutch
CC GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5210	Intercoolers

TABLE B01-38 Gas Turbine: Miscellaneous (Gas Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5220	Regenerators
CC GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5230	Heat shields
CC GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5240	Fire detection and extinguishing system (including hazardous gas detection system)
CC GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5241	Fire in unit
CC GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5245	Gas Turbine Control System - data highway
CC GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5246	Gas Turbine Control System - hardware problems (including card failure)
CC GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5247	Gas Turbine Control System - internal and termination wiring
CC GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5248	Gas Turbine Control System - logic problems
CC GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5249	Gas Turbine Control System - upgrades
CC GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5250	Other controls and instrumentation problems
CC GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5255	Computer
CC GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5260	Major overhaul (use for non-specific overhaul only; see page B-CCGT-2)
CC GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5261	Gas turbine/compressor washing
CC GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5262	Gas turbine exchange
CC GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5269	Combustion Inspection (CI)
CC GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5270	Hot end inspection
CC GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5272	Boroscope inspection
CC GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5274	General unit inspection
CC GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5280	Vibration (not engine) in unit not attributable to bearings or other components
CC GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5285	Gas turbine vibration
CC GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5286	Gas turbine lockout
CC GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5290	Gas turbine performance testing - individual engines (use code 9999 for total unit performance testing)

TABLE B01-38 Gas Turbine: Miscellaneous (Gas Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5292	Turbine Overspeed Trip Test - Gas Turbine
CC GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5295	Synchronous condenser equipment
CC GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5298	Main gas filter
CC GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5299	Other miscellaneous gas turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-39 Gas Turbine: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Gas Turbine	Turbine		5080	High pressure shaft
CC GT units	Gas Turbine	Turbine		5081	High pressure bearings
CC GT units	Gas Turbine	Turbine		5082	High pressure blades/buckets
CC GT units	Gas Turbine	Turbine		5083	High pressure nozzles/vanes
CC GT units	Gas Turbine	Turbine		5084	High pressure casing/expansion joints
CC GT units	Gas Turbine	Turbine		5085	Interstage gas passages - HP
CC GT units	Gas Turbine	Turbine		5086	High pressure shaft seals
CC GT units	Gas Turbine	Turbine		5087	Thrust bearing
CC GT units	Gas Turbine	Turbine		5088	Gas turbine cooling system
CC GT units	Gas Turbine	Turbine		5089	Other high pressure problems
CC GT units	Gas Turbine	Turbine		5090	Low pressure shaft
CC GT units	Gas Turbine	Turbine		5091	Low pressure bearings
CC GT units	Gas Turbine	Turbine		5092	Low pressure blades/buckets
CC GT units	Gas Turbine	Turbine		5093	Low pressure nozzles/vanes
CC GT units	Gas Turbine	Turbine		5094	Low pressure casing/expansion joints
CC GT units	Gas Turbine	Turbine		5095	Interstage gas passages - LP
CC GT units	Gas Turbine	Turbine		5096	Low pressure shaft seals
CC GT units	Gas Turbine	Turbine		5097	Other low pressure problems
CC GT units	Gas Turbine	Turbine		5098	Expansion joints
CC GT units	Gas Turbine	Turbine		5099	HP to LP coupling
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use HP if only one.					

GENERATOR

This set of codes contains the generator, exciter, generator cooling systems, and generator controls. Note the main leads up to and includes the generator output breaker in this set of codes.

TABLE B01-40 Generator: Controls

UNIT TYPE	SYSTEM	COMPONENT	SUB-COMPONENT	CAUSE CODE	DESCRIPTION
CC GT units	Generator	Controls		4700	Generator voltage control
CC GT units	Generator	Controls		4710	Generator metering devices
CC GT units	Generator	Controls		4720	Generator synchronization equipment
CC GT units	Generator	Controls		4730	Generator current and potential transformers
CC GT units	Generator	Controls		4740	Emergency generator trip devices
CC GT units	Generator	Controls		4741	Frequency Trip (81 Relay)
CC GT units	Generator	Controls		4750	Other generator controls and metering problems

Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.

TABLE B01-41 Generator: Cooling System

UNIT TYPE	SYSTEM	COMPONENT	SUB-COMPONENT	CAUSE CODE	DESCRIPTION
CC GT units	Generator	Cooling System		4610	Hydrogen cooling system piping and valves
CC GT units	Generator	Cooling System		4611	Hydrogen coolers
CC GT units	Generator	Cooling System		4612	Hydrogen storage system
CC GT units	Generator	Cooling System		4613	Hydrogen seals
CC GT units	Generator	Cooling System		4619	Other hydrogen system problems
CC GT units	Generator	Cooling System		4620	Air cooling system
CC GT units	Generator	Cooling System		4630	Liquid cooling system
CC GT units	Generator	Cooling System		4640	Seal oil system and seals
CC GT units	Generator	Cooling System		4650	Other cooling system problems

Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Report failures caused by water leaks into generator as codes 4500, 4510, etc.

TABLE B01-42 Generator: Exciter

UNIT TYPE	SYSTEM	COMPONENT	SUB-COMPONENT	CAUSE CODE	DESCRIPTION
CC GT units	Generator	Exciter		4600	Exciter drive - motor

TABLE B01-42 Generator: Exciter					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Generator	Exciter		4601	Exciter field rheostat
CC GT units	Generator	Exciter		4602	Exciter commutator and brushes
CC GT units	Generator	Exciter		4603	Solid state exciter element
CC GT units	Generator	Exciter		4604	Exciter drive - shaft
CC GT units	Generator	Exciter		4605	Exciter transformer
CC GT units	Generator	Exciter		4609	Other exciter problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-43 Generator: Generator					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Generator	Generator		4500	Rotor windings (including damper windings and fan blades on hydro units)
CC GT units	Generator	Generator		4510	Rotor collector rings
CC GT units	Generator	Generator		4511	Rotor, General
CC GT units	Generator	Generator		4512	Retaining Rings
CC GT units	Generator	Generator		4520	Stator windings, bushings, and terminals
CC GT units	Generator	Generator		4530	Stator core iron
CC GT units	Generator	Generator		4535	Stator, General
CC GT units	Generator	Generator		4536	Generator Heaters
CC GT units	Generator	Generator		4540	Brushes and brush rigging
CC GT units	Generator	Generator		4550	Generator bearings and lube oil system (including thrust bearings on hydro units)
CC GT units	Generator	Generator		4551	Generator bearings
CC GT units	Generator	Generator		4552	Generator lube oil system
CC GT units	Generator	Generator		4555	Bearing cooling system
CC GT units	Generator	Generator		4560	Generator vibration (excluding vibration due to failed bearing and other components)
CC GT units	Generator	Generator		4570	Generator casing
CC GT units	Generator	Generator		4580	Generator end bells and bolting
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-44 Generator: Miscellaneous (Generator)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Generator	Miscellaneous (Generator)		4800	Generator main leads
CC GT units	Generator	Miscellaneous (Generator)		4805	Generator Bus Duct Cooling System
CC GT units	Generator	Miscellaneous (Generator)		4810	Generator output breaker
CC GT units	Generator	Miscellaneous (Generator)		4830	Major generator overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)
CC GT units	Generator	Miscellaneous (Generator)		4831	Minor generator overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
CC GT units	Generator	Miscellaneous (Generator)		4840	Inspection
CC GT units	Generator	Miscellaneous (Generator)		4841	Generator doble testing
CC GT units	Generator	Miscellaneous (Generator)		4842	Reactive and capability testing
CC GT units	Generator	Miscellaneous (Generator)		4850	Core monitor alarm
CC GT units	Generator	Miscellaneous (Generator)		4860	Generator neutral grounding equipment
CC GT units	Generator	Miscellaneous (Generator)		4899	Other miscellaneous generator problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

HEAT RECOVERY STEAM GENERATOR (HRSG)

(Waste Heat Boiler)

TABLE B01-45 Heat Recovery Steam Generator (HRSG): HRSG Boiler Air and Gas Systems - Air Supply					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1400	Forced draft fans
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1401	Forced draft fan dampers
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1407	Forced draft fan lubrication system
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1410	Forced draft fan motors
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1411	Forced draft fan motors - variable speed

TABLE B01-45 Heat Recovery Steam Generator (HRSG): HRSG Boiler Air and Gas Systems - Air Supply					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1412	Forced draft fan drives (other than motor)
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1415	Forced draft fan controls
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1420	Other forced draft fan problems
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1456	Induced draft fan dampers
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-46 Heat Recovery Steam Generator (HRSG): HRSG Boiler Air and Gas Systems - Miscellaneous (Boiler Air and Gas Systems)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1590	Stacks (use code 8430 for stack problems due to pollution control equipment)
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1591	Stack damper and linkage
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1592	Stack damper linkage motors
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1599	Other miscellaneous boiler air and gas system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-47 Heat Recovery Steam Generator (HRSG): HRSG Boiler Control Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1700	Feedwater controls (report local controls - feedwater pump, feedwater regulator valve, etc., - with component or system)
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1710	Combustion/steam condition controls (report local controls - burners, pulverizers, etc., - with component or system)

TABLE B01-47 Heat Recovery Steam Generator (HRSG): HRSG Boiler Control Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1720	Desuperheater/attemperator controls
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1730	Boiler explosion or implosion
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1740	Boiler drum gage glasses / level indicator
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1750	Burner management system
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1760	Feedwater instrumentation (not local controls)
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1761	Combustion/Steam condition instrumentation (not local controls)
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1762	Desuperheater/attemperator instrumentation (not local controls)
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1799	Other boiler instrumentation and control problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Iincluding instruments which input to the controls.					

TABLE B01-48 Heat Recovery Steam Generator (HRSG): HRSG Boiler Design Limitations					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Design Limitations		1900	Improper balance between tube sections not due to fouling or plugging
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Design Limitations		1910	Inadequate air not due to equipment problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-49 Heat Recovery Steam Generator (HRSG): HRSG Boiler Fuel Supply - Burners (Duct Burners)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	358	Oil burner piping and valves

TABLE B01-49 Heat Recovery Steam Generator (HRSG): HRSG Boiler Fuel Supply - Burners (Duct Burners)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	359	Gas burner piping and valves
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	360	Burners
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	361	Burner orifices
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	370	Burner instruments and controls (except light off)
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	380	Light off (igniter) systems (including fuel supply)
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	385	Igniters
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	410	Other burner problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-50 Heat Recovery Steam Generator (HRSG): HRSG Boiler Fuel Supply - Oil and Gas Systems (except light off)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	440	Fuel oil pumps (general)
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	441	Fuel oil pumps (burner supply)
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	442	Fuel oil pumps (forwarding/transfer)
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	443	Fuel oil (burner supply) pump drives
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	444	Fuel oil (forwarding/transfer) pump drives
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	450	Fuel oil heaters
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	460	Fuel oil atomizers
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	470	Oil and gas fires

TABLE B01-50 Heat Recovery Steam Generator (HRSG): HRSG Boiler Fuel Supply - Oil and Gas Systems (except light off)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	480	Other oil and gas fuel supply problems (see codes 0360-0410 for burner problems)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-51 Heat Recovery Steam Generator (HRSG): HRSG Boiler Internals and Structures					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		800	Drums and drum internals (single drum only)
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		801	HP Drum (including drum level trips not attributable to other causes)
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		802	IP Drum (including drum level trips not attributable to other causes)
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		803	LP Drum (including drum level trips not attributable to other causes)
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		810	Boiler supports and structures (use code 1320 for tube supports)
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		820	Casing
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		830	Doors
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		840	Refractory and insulation
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		845	Windbox expansion joints
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		847	Other expansion joints
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		848	Inlet panel
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		850	Other internal or structural problems

TABLE B01-51 Heat Recovery Steam Generator (HRSG): HRSG Boiler Internals and Structures					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		855	Drum relief/safety valves (single drum only)
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		856	HP Drum relief/safety valves
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		857	IP Drum relief/safety valves
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		858	LP Drum relief/safety valves
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		859	Tube external fins/membranes
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-52 Heat Recovery Steam Generator (HRSG): HRSG Boiler Overhaul and Inspections					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1800	Major boiler overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1801	Minor boiler overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1810	Other boiler inspections
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1811	Boiler Inspections - problem identification / investigation
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1812	Boiler Inspections - scheduled or routine
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1820	Chemical cleaning/steam blows
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-53 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - Boiler Recirculation					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation	740	Boiler recirculation pumps
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation	741	Boiler recirculation pumps - motors
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation	750	Boiler recirculation piping including downcomers
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation	760	Boiler recirculation valves
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation	770	Other boiler recirculation problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-54 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - Feedwater and Blowdown					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	670	Feedwater piping downstream of feedwater regulating valve
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	680	Feedwater valves (not feedwater regulating valve)
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	690	Other feedwater problems downstream of feedwater regulating valve (use codes 3401 to 3499 for remainder of feedwater system)
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	700	Blowdown system valves
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	710	Blowdown system piping
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	720	Blowdown system controls / instrumentation
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	730	Other blowdown system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-55 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Cold and Hot Reheat Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	540	Hot reheat steam piping up to turbine stop valves
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	541	Cold reheat steam piping up to boiler
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	550	Reheat steam relief/safety valves
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	560	Other hot reheat steam valves (not including turbine stop or intercept valves)
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	561	Other cold reheat steam valves (not including turbine stop or intercept valves)
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	570	Other reheat steam problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-56 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Desuperheaters/Attemperators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6140	HP Desuperheater/attemperator piping - Greater than 600 PSIG.
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6141	HP Desuperheater/attemperator valves
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6142	HP Desuperheater/attemperator spray nozzles
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6143	HP Desuperheater/attemperator drums
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6144	Other HP desuperheater/attemperator problems
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6145	IP Desuperheater/attemperator piping - Between 200-600 PSIG
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6146	IP Desuperheater/attemperator valves
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6147	IP Desuperheater/attemperator spray nozzles

TABLE B01-56 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Desuperheaters/Attemperators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6148	IP Desuperheater/attemperator drums
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6149	Other IP desuperheater/attemperator problems
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6150	LP Desuperheater/attemperator piping - Less than 200 PSIG
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6151	LP Desuperheater/attemperator valves
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6152	LP Desuperheater/attemperator spray nozzles
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6153	LP Desuperheater/attemperator drums
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6154	Other LP desuperheater/attemperator problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-57 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Main Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	500	Main steam piping up to turbine stop valves
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	510	Main steam relief/safety valves off superheater
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	520	Other main steam valves (including vent and drain valves but not including the turbine stop valves)
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	530	Other main steam system problems
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6110	HP steam piping up to turbine stop valves - Greater than 600 PSIG (see 0790 for piping supports)
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6111	HP steam relief/safety valves

TABLE B01-57 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Main Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6112	Other HP steam valves (including vent and drain valves but not including the turbine stop valves)
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6113	Other HP steam system problems
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6114	HP steam isolation/boundary valves
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6120	IP steam piping up to turbine stop valves - Between 200 & 600 PSIG (see 0790 for piping supports)
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6121	IP steam relief/safety valves
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6122	Other IP steam valves (including vent and drain valves but not including the turbine stop valves)
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6123	Other IP steam system problems
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6124	IP steam isolation/boundary valves
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6130	LP steam piping up to turbine stop valves - Less than 200 PSIG (see 0790 for piping supports)
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6131	LP steam relief/safety valves
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6132	Other LP steam valves (including vent and drain valves but not including the turbine stop valves)
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6133	Other LP steam system problems
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6134	Other main steam valves (including vent and drain valves but not including the turbine stop valves)

TABLE B01-57 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Main Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6135	LP steam isolation/boundary valves
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-58 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Startup Bypass					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6160	HP Startup bypass system piping (including drain lines up to heaters or condenser) - Greater than 600 PSIG
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6161	HP Startup bypass system valves
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6162	HP Startup bypass tanks or flash tanks
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6163	Other HP startup bypass system problems
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6164	HP startup bypass instrumentation and controls
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6170	IP Startup bypass system piping (including drain lines up to heaters or condenser) - Between 200-600 PSIG
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6171	IP Startup bypass system valves
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6172	IP Startup bypass tanks or flash tanks
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6173	Other IP startup bypass system problems
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6174	IP startup bypass instrumentation and controls
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6180	LP Startup bypass system piping (including drain lines up to heaters or condenser) - Less than 200 PSIG
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6181	LP Startup bypass system valves

TABLE B01-58 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Startup Bypass					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6182	LP Startup bypass tanks or flash tanks
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6183	Other LP startup bypass system problems
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6184	LP startup bypass instrumentation and controls
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-59 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - Miscellaneous (Piping)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)	775	Economizer piping
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)	780	Headers between tube bundles
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)	782	Headers and caps
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)	790	Pipe hangers, brackets, supports (general)
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)	799	Other miscellaneous piping system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-60 Heat Recovery Steam Generator (HRSG): HRSG Boiler Tube Leaks					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6005	HP Evaporator tubes
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6006	IP Evaporator tubes
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6007	LP Evaporator tubes
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6010	HP superheater
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6011	HP reheater

TABLE B01-60 Heat Recovery Steam Generator (HRSG): HRSG Boiler Tube Leaks					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6012	HP economizer
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6020	IP superheater
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6021	IP reheater
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6022	IP economizer
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6030	LP reheater
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6031	LP superheater
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6032	LP economizer
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6090	Other HRSG tube problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use code 0859 for tube/membrane failures.					

TABLE B01-61 Heat Recovery Steam Generator (HRSG): HRSG Boiler Water Condition					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Water Condition		1850	Boiler water condition (not feedwater water quality)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-62 Heat Recovery Steam Generator (HRSG): Miscellaneous (HRSG Boiler)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		1980	Boiler safety valve test
CC GT units	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		1990	Boiler performance testing (use code 9999 for total unit performance testing)
CC GT units	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		1999	Boiler, miscellaneous

TABLE B01-62 Heat Recovery Steam Generator (HRSG): Miscellaneous (HRSG Boiler)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		6000	Heat recovery steam generator to gas turbine connecting equipment. For additional codes, use Fossil Steam Cause Codes 0010 to 1999.
CC GT units	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		6100	Steam turbine to gas turbine coupling. For additional codes, use Fossil Steam Cause Codes 4000 to 4499.
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use more specific codes - other slagging and fouling problems, other control problems, etc. whenever possible. Describe miscellaneous problems in the verbal description.					

TABLE B01-63 Heat Recovery Steam Generator (HRSG): Miscellaneous HRSG Boiler Tube Problems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1300	Water side fouling
CC GT units	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1305	Fireside cleaning (which requires a full outage) Use code 1200 for cleanings that cause deratings.
CC GT units	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1310	Water side cleaning (acid cleaning)
CC GT units	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1320	Tube supports/attachments
CC GT units	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1330	Slag fall damage
CC GT units	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1340	Tube modifications (including addition and removal of tubes)
CC GT units	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1350	Other miscellaneous boiler tube problems
CC GT units	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1360	Boiler drains system
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

INACTIVE STATES

TABLE B01-64 Inactive States: Inactive States					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Inactive States	Inactive States		2	Inactive Reserve Shutdown
CC GT units	Inactive States	Inactive States		9990	Retired unit
CC GT units	Inactive States	Inactive States		9991	Mothballed unit
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

JET ENGINE

TABLE B01-65 Jet Engine: Auxiliary Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Jet Engine	Auxiliary Systems		5510	Lube oil system
CC GT units	Jet Engine	Auxiliary Systems		5516	Power Augmentation System Equipment
CC GT units	Jet Engine	Auxiliary Systems		5520	Hydraulic oil system
CC GT units	Jet Engine	Auxiliary Systems		5530	Starting system (including motor)
CC GT units	Jet Engine	Auxiliary Systems		5540	Battery and charger system
CC GT units	Jet Engine	Auxiliary Systems		5550	Turning gear and motor
CC GT units	Jet Engine	Auxiliary Systems		5551	Load gear compartment
CC GT units	Jet Engine	Auxiliary Systems		5560	Cooling and seal air system
CC GT units	Jet Engine	Auxiliary Systems		5570	Cooling water system
CC GT units	Jet Engine	Auxiliary Systems		5580	Anti-icing system
CC GT units	Jet Engine	Auxiliary Systems		5590	Other auxiliary system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-66 Jet Engine: Exhaust Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Jet Engine	Exhaust Systems		5500	Chamber
CC GT units	Jet Engine	Exhaust Systems		5501	Hoods
CC GT units	Jet Engine	Exhaust Systems		5502	Vanes/nozzles
CC GT units	Jet Engine	Exhaust Systems		5503	Silencer
CC GT units	Jet Engine	Exhaust Systems		5504	Cones
CC GT units	Jet Engine	Exhaust Systems		5505	Diverter Dampers
CC GT units	Jet Engine	Exhaust Systems		5508	High engine exhaust temperature

TABLE B01-66 Jet Engine: Exhaust Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Jet Engine	Exhaust Systems		5509	Other exhaust problems (including high exhaust temperature not attributable to a specific problem)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-67 Jet Engine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5440	Fuel tanks
CC GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5441	Fuel piping and valves
CC GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5442	Fuel nozzles/vanes
CC GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5443	Fuel filters
CC GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5444	Liquid fuel oil pump
CC GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5445	Liquid fuel oil transfer/forwarding pump
CC GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5446	Liquid fuel purge system
CC GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5447	Gas fuel system including controls and instrumentation
CC GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5449	Other fuel system problems
CC GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5450	Ignition system
CC GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5451	Pilot fuel piping and valves
CC GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5452	Pilot fuel nozzles/vanes
CC GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5453	Pilot fuel filters
CC GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5454	Water injection system

TABLE B01-67 Jet Engine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5455	Fuel nozzle/vane cooling air system
CC GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5460	Atomizing air system
CC GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5470	Combustor casing
CC GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5471	Combustor liner
CC GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5472	Combustor caps
CC GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5473	Flame scanners
CC GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5474	Flashback (including instrumentation)
CC GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5475	Blade path temperature spread
CC GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5479	Other combustor problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-68 Jet Engine: Inlet Air System and Compressors - Compressors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Jet Engine	Inlet Air System and Compressors	Compressors	5410	High pressure shaft
CC GT units	Jet Engine	Inlet Air System and Compressors	Compressors	5411	High pressure bearings
CC GT units	Jet Engine	Inlet Air System and Compressors	Compressors	5412	High pressure blades/buckets
CC GT units	Jet Engine	Inlet Air System and Compressors	Compressors	5413	Other high pressure problems
CC GT units	Jet Engine	Inlet Air System and Compressors	Compressors	5414	Compressor diaphragms/vanes
CC GT units	Jet Engine	Inlet Air System and Compressors	Compressors	5420	Low pressure shaft
CC GT units	Jet Engine	Inlet Air System and Compressors	Compressors	5421	Low pressure bearings
CC GT units	Jet Engine	Inlet Air System and Compressors	Compressors	5422	Low pressure blades/buckets
CC GT units	Jet Engine	Inlet Air System and Compressors	Compressors	5429	Other low pressure problems
CC GT units	Jet Engine	Inlet Air System and Compressors	Compressors	5430	Supercharging fans
CC GT units	Jet Engine	Inlet Air System and Compressors	Compressors	5435	Compressor washing
CC GT units	Jet Engine	Inlet Air System and Compressors	Compressors	5436	Compressor shaft and bearings for two-shaft machines

TABLE B01-68 Jet Engine: Inlet Air System and Compressors - Compressors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Jet Engine	Inlet Air System and Compressors	Compressors	5439	Other compressor problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use HP compressor if only one.					

TABLE B01-69 Jet Engine: Inlet Air System and Compressors - Ducts and Filters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5400	Inlet air ducts
CC GT units	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5401	Inlet air vanes/nozzles
CC GT units	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5402	Inlet air filters
CC GT units	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5403	Inlet and exhaust cones
CC GT units	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5404	Inlet air chillers
CC GT units	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5405	Inlet air evaporative coolers
CC GT units	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5406	Inlet air foggers
CC GT units	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5409	Other inlet air problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use HP compressor if only one.					

TABLE B01-70 Jet Engine: Miscellaneous (Jet Engine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Jet Engine	Miscellaneous (Jet Engine)		5600	Reduction gear
CC GT units	Jet Engine	Miscellaneous (Jet Engine)		5601	Load shaft and bearings
CC GT units	Jet Engine	Miscellaneous (Jet Engine)		5605	Main coupling between the turbine and generator
CC GT units	Jet Engine	Miscellaneous (Jet Engine)		5606	Clutch
CC GT units	Jet Engine	Miscellaneous (Jet Engine)		5610	Intercoolers
CC GT units	Jet Engine	Miscellaneous (Jet Engine)		5620	Regenerators
CC GT units	Jet Engine	Miscellaneous (Jet Engine)		5630	Heat shields
CC GT units	Jet Engine	Miscellaneous (Jet Engine)		5640	Fire detection and extinguishing system
CC GT units	Jet Engine	Miscellaneous (Jet Engine)		5641	Fire in unit
CC GT units	Jet Engine	Miscellaneous (Jet Engine)		5645	Jet Engine Control System - data highway
CC GT units	Jet Engine	Miscellaneous (Jet Engine)		5646	Jet Engine Control System - hardware problems (including card failure)
CC GT units	Jet Engine	Miscellaneous (Jet Engine)		5647	Jet Engine Control System - internal and termination wiring

TABLE B01-70 Jet Engine: Miscellaneous (Jet Engine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Jet Engine	Miscellaneous (Jet Engine)		5648	Jet Engine Control System - logic problems
CC GT units	Jet Engine	Miscellaneous (Jet Engine)		5649	Jet Engine Control System - upgrades
CC GT units	Jet Engine	Miscellaneous (Jet Engine)		5650	Other controls and instrumentation problems
CC GT units	Jet Engine	Miscellaneous (Jet Engine)		5660	Major overhaul (use for non-specific overhaul only; see page B-CCGT-2)
CC GT units	Jet Engine	Miscellaneous (Jet Engine)		5661	Engine/compressor washing
CC GT units	Jet Engine	Miscellaneous (Jet Engine)		5662	Engine exchange
CC GT units	Jet Engine	Miscellaneous (Jet Engine)		5665	Engine shafts and bearings
CC GT units	Jet Engine	Miscellaneous (Jet Engine)		5670	Hot end inspection
CC GT units	Jet Engine	Miscellaneous (Jet Engine)		5672	Boroscope inspection
CC GT units	Jet Engine	Miscellaneous (Jet Engine)		5674	General unit inspection
CC GT units	Jet Engine	Miscellaneous (Jet Engine)		5680	Vibration (not engine) in unit not attributable to bearings or other components
CC GT units	Jet Engine	Miscellaneous (Jet Engine)		5685	Engine vibration
CC GT units	Jet Engine	Miscellaneous (Jet Engine)		5686	Jet engine lockout
CC GT units	Jet Engine	Miscellaneous (Jet Engine)		5690	Engine performance testing - individual engines (use code 9999 for total unit performance testing)
CC GT units	Jet Engine	Miscellaneous (Jet Engine)		5692	Turbine Overspeed Trip Test - Jet Engine
CC GT units	Jet Engine	Miscellaneous (Jet Engine)		5695	Synchronous condenser equipment
CC GT units	Jet Engine	Miscellaneous (Jet Engine)		5699	Other miscellaneous jet engine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-71 Jet Engine: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Jet Engine	Turbine		5480	High pressure shaft
CC GT units	Jet Engine	Turbine		5481	High pressure bearings
CC GT units	Jet Engine	Turbine		5482	High pressure blades/buckets
CC GT units	Jet Engine	Turbine		5483	High pressure nozzles/vanes
CC GT units	Jet Engine	Turbine		5484	High pressure casing/expansion joint

TABLE B01-71 Jet Engine: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Jet Engine	Turbine		5485	Interstage gas passages
CC GT units	Jet Engine	Turbine		5486	High pressure shaft seals
CC GT units	Jet Engine	Turbine		5487	Thrust bearing
CC GT units	Jet Engine	Turbine		5489	Other high pressure problems
CC GT units	Jet Engine	Turbine		5490	Low pressure shaft
CC GT units	Jet Engine	Turbine		5491	Low pressure bearings
CC GT units	Jet Engine	Turbine		5492	Low pressure blades/buckets
CC GT units	Jet Engine	Turbine		5493	Low pressure nozzles/vanes
CC GT units	Jet Engine	Turbine		5494	Low pressure casing/expansion joints
CC GT units	Jet Engine	Turbine		5497	Other low pressure problems
CC GT units	Jet Engine	Turbine		5498	Expansion joints
CC GT units	Jet Engine	Turbine		5499	Shaft seals
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use HP if only one.					

MISCELLANEOUS

TABLE B01-72 Miscellaneous: Instruments and Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Miscellaneous	Instruments and Controls		6200	Combined cycle instruments and controls. (Report instruments and controls specific to the gas turbine, steam turbine, boiler, generator, or balance of plant using the codes for the appropriate piece of equipment.)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

PERFORMANCE

TABLE B01-73 Performance: Performance					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Performance	Performance		9997	NERC Reliability Standard Requirement
CC GT units	Performance	Performance		9998	Black start testing
CC GT units	Performance	Performance		9999	Total unit performance testing (use appropriate codes for individual component testing)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

PERSONNEL OR PROCEDURAL ERRORS

TABLE B01-74 Personnel or Procedural Errors: Personnel or Procedural Errors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Personnel or Procedural Errors	Personnel or Procedural Errors		9900	Operator error
CC GT units	Personnel or Procedural Errors	Personnel or Procedural Errors		9910	Maintenance personnel error
CC GT units	Personnel or Procedural Errors	Personnel or Procedural Errors		9920	Contractor error
CC GT units	Personnel or Procedural Errors	Personnel or Procedural Errors		9930	Operating procedure error
CC GT units	Personnel or Procedural Errors	Personnel or Procedural Errors		9940	Maintenance procedure error
CC GT units	Personnel or Procedural Errors	Personnel or Procedural Errors		9950	Contractor procedure error
CC GT units	Personnel or Procedural Errors	Personnel or Procedural Errors		9960	Staff shortage
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

POLLUTION CONTROL EQUIPMENT

TABLE B01-75 Pollution Control Equipment: CO Reduction					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Pollution Control Equipment	CO Reduction		8840	CO Active catalyst
CC GT units	Pollution Control Equipment	CO Reduction		8841	CO Support materials

TABLE B01-75 Pollution Control Equipment: CO Reduction					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Pollution Control Equipment	CO Reduction		8842	CO Plugging
CC GT units	Pollution Control Equipment	CO Reduction		8845	Other CO reduction problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-76 Pollution Control Equipment: Continuous Emissions Monitoring Systems (CEMS)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8700	CEMS Certification and Recertification
CC GT units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8710	SO2 analyzer problems
CC GT units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8720	NOx analyzer problems
CC GT units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8730	CO analyzer problems
CC GT units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8740	CO2 analyzer problems
CC GT units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8750	O2 analyzer problems
CC GT units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8760	Opacity monitor problems
CC GT units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8770	Flow monitor problems
CC GT units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8780	Data acquisition system problems
CC GT units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8790	Miscellaneous CEMS problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-77 Pollution Control Equipment: NOx Reduction Systems - Catalytic Air Heaters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8830	CAH NOx Active catalyst
CC GT units	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8831	CAH NOx Support materials
CC GT units	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8832	CAH NOx Plugging
CC GT units	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8835	Other CAH problems

TABLE B01-77 Pollution Control Equipment: NOx Reduction Systems - Catalytic Air Heaters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-78 Pollution Control Equipment: NOx Reduction Systems - Selective Catalytic Reduction Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8810	SCR NOx Reactor
CC GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8811	SCR NOx Reagent
CC GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8812	SCR NOx Catalyst
CC GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8813	SCR NOx Injection grid piping/valves
CC GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8814	SCR NOx Catalyst support material
CC GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8815	SCR NOx Soot blowers
CC GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8816	SCR NOx Plugging
CC GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8817	SCR NOx Control system
CC GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8820	SCR NOx Ammonia injection grid piping/valves
CC GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8821	SCR NOx Ammonia tanks, piping and valves (not injection)
CC GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8822	SCR NOx Ammonia air blowers
CC GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8823	SCR NOx Other ammonia system problems
CC GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8825	Other SCR NOx problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-79 Pollution Control Equipment: NOx Reduction Systems - Selective Non-Catalytic Reduction Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8800	SNCR NOx Reagent
CC GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8801	SNCR NOx Carrier gas
CC GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8802	SNCR NOx Control system
CC GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8803	SNCR Performance Testing
CC GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8809	Other SNCR NOx problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use code 0360 for Low NOx Burners.					

REGULATORY, SAFETY, ENVIRONMENTAL

Use these codes only for events not directly attributable to equipment failures. Inspections or testing of certain equipment due to regulation are reported using the appropriate equipment cause codes, and the fact that it was a regulatory requirement noted in the verbal description section.

TABLE B01-80 Regulatory, Safety, Environmental: Other Operating Environmental Limitations					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9660	Thermal discharge limits - fossil and nuclear
CC GT units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9663	Thermal discharge limits - gas turbines
CC GT units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9664	Thermal discharge limits - jet engines
CC GT units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9670	Noise limits (not for personnel safety) - fossil and nuclear
CC GT units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9673	Noise limits (not for personnel safety) - gas turbines
CC GT units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9674	Noise limits (not for personnel safety) - jet engines
CC GT units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9677	Noise limits testing - fossil
CC GT units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9678	Noise limits testing - gas turbines

TABLE B01-80 Regulatory, Safety, Environmental: Other Operating Environmental Limitations					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9679	Noise limits testing - jet engines
CC GT units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9680	Fish kill - fossil and nuclear
CC GT units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9683	Fish kill - gas turbines
CC GT units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9684	Fish kill - jet engines
CC GT units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9690	Other miscellaneous operational environmental limits - fossil and nuclear
CC GT units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9693	Other miscellaneous operational environmental limits - gas turbines
CC GT units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9694	Other miscellaneous operational environmental limits - jet engines
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-81 Regulatory, Safety, Environmental: Regulatory					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Regulatory, Safety, Environmental	Regulatory		9504	Regulatory (environmental) proceedings and hearings - regulatory agency initiated
CC GT units	Regulatory, Safety, Environmental	Regulatory		9506	Regulatory (environmental) proceedings and hearings - intervenor initiated
CC GT units	Regulatory, Safety, Environmental	Regulatory		9510	Plant modifications strictly for compliance with new or changed regulatory requirements (scrubbers, cooling towers, etc.)
CC GT units	Regulatory, Safety, Environmental	Regulatory		9520	Oil spill in Gulf of Mexico (OMC)
CC GT units	Regulatory, Safety, Environmental	Regulatory		9590	Miscellaneous regulatory (this code is primarily intended for use with event contribution code 2 to indicate that a regulatory-related

TABLE B01-81 Regulatory, Safety, Environmental: Regulatory					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
					factor contributed to the primary cause of the event)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-82 Regulatory, Safety, Environmental: Safety					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Regulatory, Safety, Environmental	Safety		9700	OSHA-related retrofit or inspection
CC GT units	Regulatory, Safety, Environmental	Safety		9720	Other safety problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-83 Regulatory, Safety, Environmental: Stack Emission					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Regulatory, Safety, Environmental	Stack Emission		9600	SO2 stack emissions - fossil
CC GT units	Regulatory, Safety, Environmental	Stack Emission		9603	SO2 stack emissions - gas turbines
CC GT units	Regulatory, Safety, Environmental	Stack Emission		9604	SO2 stack emissions - jet engines
CC GT units	Regulatory, Safety, Environmental	Stack Emission		9610	NOx stack emissions - fossil
CC GT units	Regulatory, Safety, Environmental	Stack Emission		9613	NOx stack emissions - gas turbines
CC GT units	Regulatory, Safety, Environmental	Stack Emission		9614	NOx stack emissions - jet engines
CC GT units	Regulatory, Safety, Environmental	Stack Emission		9616	CO stack emissions - fossil
CC GT units	Regulatory, Safety, Environmental	Stack Emission		9620	Particulate stack emissions - fossil
CC GT units	Regulatory, Safety, Environmental	Stack Emission		9623	Particulate stack emissions - gas turbines

TABLE B01-83 Regulatory, Safety, Environmental: Stack Emission					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Regulatory, Safety, Environmental	Stack Emission		9624	Particulate stack emissions - jet engines
CC GT units	Regulatory, Safety, Environmental	Stack Emission		9630	Opacity - fossil
CC GT units	Regulatory, Safety, Environmental	Stack Emission		9633	Opacity - gas turbines
CC GT units	Regulatory, Safety, Environmental	Stack Emission		9634	Opacity - jet engines
CC GT units	Regulatory, Safety, Environmental	Stack Emission		9650	Other stack/exhaust emissions - fossil (use codes 9200 to 9290 if fuel quality causes pollution control equipment problems that result in excess stack emissions)
CC GT units	Regulatory, Safety, Environmental	Stack Emission		9653	Other stack or exhaust emissions - gas turbines (use codes 9200 to 9290 if fuel quality causes pollution control equipment problems that result in excess stack emissions)
CC GT units	Regulatory, Safety, Environmental	Stack Emission		9654	Other stack or exhaust emissions - jet engines (use codes 9200 to 9290 if fuel quality causes pollution control equipment problems that result in excess stack emissions)
CC GT units	Regulatory, Safety, Environmental	Stack Emission		9656	Other stack or exhaust emissions testing - fossil
CC GT units	Regulatory, Safety, Environmental	Stack Emission		9657	Other stack or exhaust emissions testing - gas turbines
CC GT units	Regulatory, Safety, Environmental	Stack Emission		9658	Other stack or exhaust emissions testing - jet engines
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Include exhaust emissions.					

STEAM TURBINE

Besides the turbine, this set includes the steam stop/control valves, turbine control system, and the turbine auxiliaries. The extraction steam codes are contained in the Balance of Plant set.

TABLE B01-84 Steam Turbine: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Steam Turbine	Controls		4290	Hydraulic system pumps
CC GT units	Steam Turbine	Controls		4291	Hydraulic system coolers
CC GT units	Steam Turbine	Controls		4292	Hydraulic system filters
CC GT units	Steam Turbine	Controls		4293	Hydraulic system pipes and valves
CC GT units	Steam Turbine	Controls		4299	Other hydraulic system problems
CC GT units	Steam Turbine	Controls		4300	Turbine supervisory system (use codes 4290 to 4299 for hydraulic oil)
CC GT units	Steam Turbine	Controls		4301	Turbine governing system
CC GT units	Steam Turbine	Controls		4302	Turbine trip devices (including instruments)
CC GT units	Steam Turbine	Controls		4303	Exhaust hood and spray controls
CC GT units	Steam Turbine	Controls		4304	Automatic turbine control systems - mechanical
CC GT units	Steam Turbine	Controls		4305	Automatic turbine control systems - mechanical - hydraulic
CC GT units	Steam Turbine	Controls		4306	Automatic turbine control systems - electro-hydraulic - analog
CC GT units	Steam Turbine	Controls		4307	Automatic turbine control systems - electro-hydraulic - digital
CC GT units	Steam Turbine	Controls		4308	Automatic turbine control systems - digital control and monitoring
CC GT units	Steam Turbine	Controls		4309	Other turbine instrument and control problems
CC GT units	Steam Turbine	Controls		4310	Steam Turbine Control System - data highway
CC GT units	Steam Turbine	Controls		4311	Steam Turbine Control System - hardware problems (including card failure)
CC GT units	Steam Turbine	Controls		4312	Steam Turbine Control System - internal and termination wiring
CC GT units	Steam Turbine	Controls		4313	Steam Turbine Control System - logic problems
CC GT units	Steam Turbine	Controls		4314	Steam Turbine Control System - upgrades
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-85 Steam Turbine: High Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Steam Turbine	High Pressure Turbine		4000	Outer casing
CC GT units	Steam Turbine	High Pressure Turbine		4001	Inner casing
CC GT units	Steam Turbine	High Pressure Turbine		4009	Nozzle bolting
CC GT units	Steam Turbine	High Pressure Turbine		4010	Nozzles and nozzle blocks
CC GT units	Steam Turbine	High Pressure Turbine		4011	Diaphragms
CC GT units	Steam Turbine	High Pressure Turbine		4012	Buckets or blades
CC GT units	Steam Turbine	High Pressure Turbine		4013	Diaphragms unit and shroud type
CC GT units	Steam Turbine	High Pressure Turbine		4014	Bucket or blade fouling
CC GT units	Steam Turbine	High Pressure Turbine		4015	Wheels or spindles
CC GT units	Steam Turbine	High Pressure Turbine		4020	Shaft seals
CC GT units	Steam Turbine	High Pressure Turbine		4021	Dummy rings
CC GT units	Steam Turbine	High Pressure Turbine		4022	Gland rings
CC GT units	Steam Turbine	High Pressure Turbine		4030	Rotor shaft
CC GT units	Steam Turbine	High Pressure Turbine		4040	Bearings
CC GT units	Steam Turbine	High Pressure Turbine		4041	Thrust bearings
CC GT units	Steam Turbine	High Pressure Turbine		4099	Other high pressure turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-86 Steam Turbine: Intermediate Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Steam Turbine	Intermediate Pressure Turbine		4100	Outer casing
CC GT units	Steam Turbine	Intermediate Pressure Turbine		4101	Inner casing
CC GT units	Steam Turbine	Intermediate Pressure Turbine		4109	Nozzle bolting
CC GT units	Steam Turbine	Intermediate Pressure Turbine		4110	Nozzles and nozzle blocks
CC GT units	Steam Turbine	Intermediate Pressure Turbine		4111	Diaphragms
CC GT units	Steam Turbine	Intermediate Pressure Turbine		4112	Buckets or blades
CC GT units	Steam Turbine	Intermediate Pressure Turbine		4113	Bucket or blade fouling
CC GT units	Steam Turbine	Intermediate Pressure Turbine		4115	Wheels or spindles
CC GT units	Steam Turbine	Intermediate Pressure Turbine		4120	Shaft seals
CC GT units	Steam Turbine	Intermediate Pressure Turbine		4121	Dummy rings
CC GT units	Steam Turbine	Intermediate Pressure Turbine		4122	Gland rings
CC GT units	Steam Turbine	Intermediate Pressure Turbine		4130	Rotor shaft
CC GT units	Steam Turbine	Intermediate Pressure Turbine		4140	Bearings

TABLE B01-86 Steam Turbine: Intermediate Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Steam Turbine	Intermediate Pressure Turbine		4141	Thrust bearings
CC GT units	Steam Turbine	Intermediate Pressure Turbine		4199	Other intermediate pressure turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-87 Steam Turbine: Low Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Steam Turbine	Low Pressure Turbine		4200	Outer casing
CC GT units	Steam Turbine	Low Pressure Turbine		4201	Inner casing
CC GT units	Steam Turbine	Low Pressure Turbine		4209	Nozzle bolting
CC GT units	Steam Turbine	Low Pressure Turbine		4210	Nozzles and nozzle blocks
CC GT units	Steam Turbine	Low Pressure Turbine		4211	Diaphragms
CC GT units	Steam Turbine	Low Pressure Turbine		4212	Buckets or blades
CC GT units	Steam Turbine	Low Pressure Turbine		4213	Bucket or blade fouling
CC GT units	Steam Turbine	Low Pressure Turbine		4215	Wheels or spindles
CC GT units	Steam Turbine	Low Pressure Turbine		4220	Shaft seals
CC GT units	Steam Turbine	Low Pressure Turbine		4221	Dummy rings
CC GT units	Steam Turbine	Low Pressure Turbine		4222	Gland rings
CC GT units	Steam Turbine	Low Pressure Turbine		4230	Rotor shaft
CC GT units	Steam Turbine	Low Pressure Turbine		4240	Bearings
CC GT units	Steam Turbine	Low Pressure Turbine		4241	Thrust bearings
CC GT units	Steam Turbine	Low Pressure Turbine		4250	Other low pressure turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-88 Steam Turbine: Lube Oil					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Steam Turbine	Lube Oil		4280	Lube oil pumps
CC GT units	Steam Turbine	Lube Oil		4281	Lube oil coolers
CC GT units	Steam Turbine	Lube Oil		4282	Lube oil conditioners
CC GT units	Steam Turbine	Lube Oil		4283	Lube oil system valves and piping
CC GT units	Steam Turbine	Lube Oil		4284	Lube oil pump drive
CC GT units	Steam Turbine	Lube Oil		4289	Other lube oil system problems

TABLE B01-88 Steam Turbine: Lube Oil					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Do not include bearing failures due to lube oil.					

TABLE B01-89 Steam Turbine: Miscellaneous (Steam Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Steam Turbine	Miscellaneous (Steam Turbine)		4400	Major turbine overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)
CC GT units	Steam Turbine	Miscellaneous (Steam Turbine)		4401	Inspection
CC GT units	Steam Turbine	Miscellaneous (Steam Turbine)		4402	Minor turbine overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
CC GT units	Steam Turbine	Miscellaneous (Steam Turbine)		4410	Turning gear and motor
CC GT units	Steam Turbine	Miscellaneous (Steam Turbine)		4411	Steam turbine gear box (single shaft configuration)
CC GT units	Steam Turbine	Miscellaneous (Steam Turbine)		4412	Steam turbine clutch (single shaft configuration)
CC GT units	Steam Turbine	Miscellaneous (Steam Turbine)		4415	Shaft coupling mechanism
CC GT units	Steam Turbine	Miscellaneous (Steam Turbine)		4420	Vibration of the turbine generator unit that cannot be attributed to a specific cause such as bearings or blades (use this code for balance moves)
CC GT units	Steam Turbine	Miscellaneous (Steam Turbine)		4430	Gland seal system
CC GT units	Steam Turbine	Miscellaneous (Steam Turbine)		4450	Water induction
CC GT units	Steam Turbine	Miscellaneous (Steam Turbine)		4460	Turbine overspeed trip test
CC GT units	Steam Turbine	Miscellaneous (Steam Turbine)		4470	Differential expansion
CC GT units	Steam Turbine	Miscellaneous (Steam Turbine)		4490	Turbine performance testing (use code 9999 for total unit performance testing)
CC GT units	Steam Turbine	Miscellaneous (Steam Turbine)		4499	Other miscellaneous steam turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-90 Steam Turbine: Piping					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Steam Turbine	Piping		4270	Crossover or under piping
CC GT units	Steam Turbine	Piping		4279	Miscellaneous turbine piping
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B01-91 Steam Turbine: Valves					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC GT units	Steam Turbine	Valves		4260	Main stop valves
CC GT units	Steam Turbine	Valves		4261	Control valves
CC GT units	Steam Turbine	Valves		4262	Intercept valves
CC GT units	Steam Turbine	Valves		4263	Reheat stop valves
CC GT units	Steam Turbine	Valves		4264	Combined intercept valves
CC GT units	Steam Turbine	Valves		4265	Miscellaneous drain and vent valves
CC GT units	Steam Turbine	Valves		4266	Main stop valve testing
CC GT units	Steam Turbine	Valves		4267	Control valve testing
CC GT units	Steam Turbine	Valves		4268	Reheat/intercept valve testing
CC GT units	Steam Turbine	Valves		4269	Other turbine valves (including LP steam admission valves)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

Appendix B02: Index to Combined Cycle Steam Turbine Unit Cause Codes

COMBINED CYCLE STEAM TURBINE UNITS

INDEX TO SYSTEM/COMPONENT/SUB-COMPONENT CAUSE CODE TABLES			
TABLE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**
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B02-2	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems
B02-3	Balance of Plant	Auxiliary Systems	Fire Protection System
B02-4	Balance of Plant	Auxiliary Systems	Instrument Air
B02-5	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System
B02-6	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)
B02-7	Balance of Plant	Auxiliary Systems	Open Cooling Water System
B02-8	Balance of Plant	Auxiliary Systems	Seal Air Fans
B02-9	Balance of Plant	Auxiliary Systems	Service Air
B02-10	Balance of Plant	Auxiliary Systems	Service Water (Open System)
B02-11	Balance of Plant	Circulating Water Systems	
B02-12	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators
B02-13	Balance of Plant	Condensate System	Miscellaneous (Condensate System)
B02-14	Balance of Plant	Condensate System	Polishers/Chemical Addition
B02-15	Balance of Plant	Condensate System	Pumps, Piping, and Valves
B02-16	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals
B02-17	Balance of Plant	Condensing System	Condenser Controls
B02-18	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment
B02-19	Balance of Plant	Condensing System	Miscellaneous (Condensing System)
B02-20	Balance of Plant	Condensing System	Vacuum Equipment
B02-21	Balance of Plant	Electrical	
B02-22	Balance of Plant	Extraction Steam	
B02-23	Balance of Plant	Feedwater System	
B02-24	Balance of Plant	Heater Drain Systems	
B02-25	Balance of Plant	Miscellaneous (Balance of Plant)	
B02-26	Balance of Plant	Power Station Switchyard	
B02-27	Balance of Plant	Waste Water (zero discharge) Systems	
B02-28	Expander Turbine	Expander Turbine	
B02-29	External	Catastrophe	
B02-30	External	Economic	
B02-31	External	Fuel Quality	
B02-32	External	Miscellaneous (External)	

INDEX TO SYSTEM/COMPONENT/SUB-COMPONENT CAUSE CODE TABLES			
TABLE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**
B02-33	Gas Turbine	Auxiliary Systems	
B02-34	Gas Turbine	Exhaust Systems	
B02-35	Gas Turbine	Fuel, Ignition, and Combustion Systems	
B02-36	Gas Turbine	Inlet Air System and Compressors	Compressors
B02-37	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters
B02-38	Gas Turbine	Miscellaneous (Gas Turbine)	
B02-39	Gas Turbine	Turbine	
B02-40	Generator	Controls	
B02-41	Generator	Cooling System	
B02-42	Generator	Exciter	
B02-43	Generator	Generator	
B02-44	Generator	Miscellaneous (Generator)	
B02-45	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply
B02-46	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)
B02-47	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems	
B02-48	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Design Limitations	
B02-49	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)
B02-50	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)
B02-51	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures	
B02-52	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections	
B02-53	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation
B02-54	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown
B02-55	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam
B02-56	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators
B02-57	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam
B02-58	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass
B02-59	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)
B02-60	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks	
B02-61	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Water Condition	
B02-62	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)	
B02-63	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems	
B02-64	Inactive States	Inactive States	
B02-65	Jet Engine	Auxiliary Systems	
B02-66	Jet Engine	Exhaust Systems	
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B02-68	Jet Engine	Inlet Air System and Compressors	Compressors

INDEX TO SYSTEM/COMPONENT/SUB-COMPONENT CAUSE CODE TABLES			
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B02-71	Jet Engine	Turbine	
B02-72	Miscellaneous	Instruments and Controls	
B02-73	Performance	Performance	
B02-74	Personnel or Procedural Errors	Personnel or Procedural Errors	
B02-75	Pollution Control Equipment	CO Reduction	
B02-76	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)	
B02-77	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters
B02-78	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems
B02-79	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems
B02-80	Regulatory, Safety, Environmental	Other Operating Environmental Limitations	
B02-81	Regulatory, Safety, Environmental	Regulatory	
B02-82	Regulatory, Safety, Environmental	Safety	
B02-83	Regulatory, Safety, Environmental	Stack Emission	
B02-84	Steam Turbine	Controls	
B02-85	Steam Turbine	High Pressure Turbine	
B02-86	Steam Turbine	Intermediate Pressure Turbine	
B02-87	Steam Turbine	Low Pressure Turbine	
B02-88	Steam Turbine	Lube Oil	
B02-89	Steam Turbine	Miscellaneous (Steam Turbine)	
B02-90	Steam Turbine	Piping	
B02-91	Steam Turbine	Valves	

BALANCE OF PLANT

TABLE B02-1 Balance of Plant: Auxiliary Systems - Auxiliary Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3830	Auxiliary boiler
CC steam units	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3831	Auxiliary steam piping
CC steam units	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3832	Auxiliary steam valves
CC steam units	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3833	Auxiliary steam controls and instruments
CC steam units	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3834	Auxiliary boiler tube leaks
CC steam units	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3835	Auxiliary boiler burner management system

TABLE B02-1 Balance of Plant: Auxiliary Systems - Auxiliary Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3836	Steam transfer to other unit
CC steam units	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3839	Other auxiliary steam problems (also see extraction steam codes 3520 to 3529; startup bypass codes 0630 to 0660; and soot blower steam code 0870)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-2 Balance of Plant: Auxiliary Systems - Closed Cooling Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3820	Closed cooling water pumps and motors
CC steam units	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3821	Closed cooling water piping
CC steam units	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3822	Closed cooling water valves
CC steam units	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3823	Closed cooling water heat exchangers
CC steam units	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3824	Closed cooling water system fouling
CC steam units	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3825	Closed cooling water instrumentation
CC steam units	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3826	Closed cooling water strainer
CC steam units	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3829	Other closed cooling water system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-3 Balance of Plant: Auxiliary Systems - Fire Protection System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Auxiliary Systems	Fire Protection System	3860	Fire protection system pumps
CC steam units	Balance of Plant	Auxiliary Systems	Fire Protection System	3861	Fire protection system piping
CC steam units	Balance of Plant	Auxiliary Systems	Fire Protection System	3862	Fire protection system valves
CC steam units	Balance of Plant	Auxiliary Systems	Fire Protection System	3863	Fire protection system fouling
CC steam units	Balance of Plant	Auxiliary Systems	Fire Protection System	3864	Fire protection system instrumentation and controls
CC steam units	Balance of Plant	Auxiliary Systems	Fire Protection System	3869	Other fire protection system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-4 Balance of Plant: Auxiliary Systems - Instrument Air					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Auxiliary Systems	Instrument Air	3850	Instrument air compressors
CC steam units	Balance of Plant	Auxiliary Systems	Instrument Air	3851	Instrument air piping
CC steam units	Balance of Plant	Auxiliary Systems	Instrument Air	3852	Instrument air valves
CC steam units	Balance of Plant	Auxiliary Systems	Instrument Air	3853	Instrument air dryers
CC steam units	Balance of Plant	Auxiliary Systems	Instrument Air	3854	N2 backup to instrument air
CC steam units	Balance of Plant	Auxiliary Systems	Instrument Air	3859	Other instrument air problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-5 Balance of Plant: Auxiliary Systems - Low-pressure Gas Compression System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3870	Fuel Gas Compressor and Motors
CC steam units	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3871	Fuel Gas Compressor Piping
CC steam units	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3872	Fuel Gas Compressor Valves
CC steam units	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3873	Fuel Gas Compressor Heat Exchangers
CC steam units	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3874	Fuel Gas Compressor Controls and Instrumentation
CC steam units	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3875	Fuel Gas Compressor Filters
CC steam units	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3876	Fuel Gas Compressor Fire System
CC steam units	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3879	Fuel Gas Compressor - other
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-6 Balance of Plant: Auxiliary Systems - Miscellaneous (Auxiliary Systems)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	3898	Miscellaneous plant auxiliary process and services instrumentation and controls

TABLE B02-6 Balance of Plant: Auxiliary Systems - Miscellaneous (Auxiliary Systems)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	3899	Other miscellaneous auxiliary system problems
CC steam units	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	6299	Other combined cycle block problems (Use other gas turbine problem codes, other steam turbine codes, etc., whenever appropriate.)
CC steam units	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	6399	Other coal gasification equipment problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-7 Balance of Plant: Auxiliary Systems - Open Cooling Water System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3800	Open cooling water pumps and motors
CC steam units	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3801	Open cooling water piping
CC steam units	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3802	Open cooling water valves
CC steam units	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3803	Open cooling water heat exchangers
CC steam units	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3804	Open cooling water system fouling
CC steam units	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3805	Open cooling water system instrumentation
CC steam units	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3806	Open cooling water strainer
CC steam units	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3809	Other open cooling water problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-8 Balance of Plant: Auxiliary Systems - Seal Air Fans					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Auxiliary Systems	Seal Air Fans	3880	Seal air fan
CC steam units	Balance of Plant	Auxiliary Systems	Seal Air Fans	3881	Seal air fan drive - motor
CC steam units	Balance of Plant	Auxiliary Systems	Seal Air Fans	3882	Seal air control dampers and drives
CC steam units	Balance of Plant	Auxiliary Systems	Seal Air Fans	3883	Seal air filters
CC steam units	Balance of Plant	Auxiliary Systems	Seal Air Fans	3889	Other seal air fan problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-9 Balance of Plant: Auxiliary Systems - Service Air					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Auxiliary Systems	Service Air	3840	Service air compressors
CC steam units	Balance of Plant	Auxiliary Systems	Service Air	3841	Service air piping
CC steam units	Balance of Plant	Auxiliary Systems	Service Air	3842	Service air valves
CC steam units	Balance of Plant	Auxiliary Systems	Service Air	3843	Service air dryers
CC steam units	Balance of Plant	Auxiliary Systems	Service Air	3849	Other service air problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-10 Balance of Plant: Auxiliary Systems - Service Water (Open System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3810	Service water pumps and motors
CC steam units	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3811	Service water piping
CC steam units	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3812	Service water valves
CC steam units	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3813	Service water heat exchangers
CC steam units	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3814	Service water system fouling
CC steam units	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3815	Service water strainer
CC steam units	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3819	Other service water problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-11 Balance of Plant: Circulating Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Circulating Water Systems		3210	Circulating water pumps
CC steam units	Balance of Plant	Circulating Water Systems		3211	Circulating water pump motors
CC steam units	Balance of Plant	Circulating Water Systems		3220	Circulating water piping
CC steam units	Balance of Plant	Circulating Water Systems		3221	Circulating water piping fouling
CC steam units	Balance of Plant	Circulating Water Systems		3230	Circulating water valves
CC steam units	Balance of Plant	Circulating Water Systems		3231	Waterbox
CC steam units	Balance of Plant	Circulating Water Systems		3232	Condenser tube cleaning system including debris filter
CC steam units	Balance of Plant	Circulating Water Systems		3233	Circulating water priming system
CC steam units	Balance of Plant	Circulating Water Systems		3235	Cooling tower booster pump
CC steam units	Balance of Plant	Circulating Water Systems		3236	Cooling tower booster motor
CC steam units	Balance of Plant	Circulating Water Systems		3238	Cooling tower fan motors

TABLE B02-11 Balance of Plant: Circulating Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Circulating Water Systems		3239	Cooling tower fan motors - variable speed
CC steam units	Balance of Plant	Circulating Water Systems		3240	Cooling tower fans
CC steam units	Balance of Plant	Circulating Water Systems		3241	Cooling tower efficiency below design
CC steam units	Balance of Plant	Circulating Water Systems		3242	Cooling tower fill damage
CC steam units	Balance of Plant	Circulating Water Systems		3243	Cooling tower icing
CC steam units	Balance of Plant	Circulating Water Systems		3244	Cooling tower fires
CC steam units	Balance of Plant	Circulating Water Systems		3245	Other cooling tower problems
CC steam units	Balance of Plant	Circulating Water Systems		3246	Cooling tower fouling
CC steam units	Balance of Plant	Circulating Water Systems		3247	Cooling tower instrumentation
CC steam units	Balance of Plant	Circulating Water Systems		3248	Cooling Tower Overhaul
CC steam units	Balance of Plant	Circulating Water Systems		3250	Circulating water system instruments and controls
CC steam units	Balance of Plant	Circulating Water Systems		3260	Traveling screens
CC steam units	Balance of Plant	Circulating Water Systems		3261	Traveling screen fouling
CC steam units	Balance of Plant	Circulating Water Systems		3269	Circulating water biological conditions (ie, zebra mussels)
CC steam units	Balance of Plant	Circulating Water Systems		3270	Intake system problems other than traveling screens
CC steam units	Balance of Plant	Circulating Water Systems		3271	Intake grating fouling
CC steam units	Balance of Plant	Circulating Water Systems		3272	Circulating water screenwash system
CC steam units	Balance of Plant	Circulating Water Systems		3273	Debris in circulating water from outside sources (leaves, mud, etc.)
CC steam units	Balance of Plant	Circulating Water Systems		3280	High circulating water temperature (not due to season, tower efficiency below design, or other listed equipment problem)
CC steam units	Balance of Plant	Circulating Water Systems		3281	Circulating water tempering system
CC steam units	Balance of Plant	Circulating Water Systems		3282	Circulating water cooling ponds
CC steam units	Balance of Plant	Circulating Water Systems		3285	Circulating water chemistry
CC steam units	Balance of Plant	Circulating Water Systems		3299	Other circulating water system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-12 Balance of Plant: Condensate System - Low/Intermediate Pressure Heater and Deaerators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3339	LP heater head leaks
CC steam units	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3340	LP heater tube leaks
CC steam units	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3341	Other LP heater - general
CC steam units	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3342	IP heater tube leaks
CC steam units	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3343	Other IP heater - general
CC steam units	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3344	Deaerator (including level control)
CC steam units	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3345	IP heater head leaks
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-13 Balance of Plant: Condensate System - Miscellaneous (Condensate System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3360	Condensate makeup and return (including storage tanks)
CC steam units	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3370	Condensate system controls and instrumentation (not hotwell level, heater level, or deaerator level controls; see codes 3150-3159, 3344, 3502).
CC steam units	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3380	Condensate coolers
CC steam units	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3399	Other miscellaneous condensate system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-14 Balance of Plant: Condensate System - Polishers/Chemical Addition					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Condensate System	Polishers/Chemical Addition	3350	Condensate polishing and filtering systems
CC steam units	Balance of Plant	Condensate System	Polishers/Chemical Addition	3351	Chemical addition systems
CC steam units	Balance of Plant	Condensate System	Polishers/Chemical Addition	3352	Feedwater chemistry (not specific to condenser, polishers, or chemical addition)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-15 Balance of Plant: Condensate System - Pumps, Piping, and Valves					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3300	Condensate water pre-treatment
CC steam units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3310	Condensate/hotwell pumps
CC steam units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3311	Condensate/hotwell pump motor
CC steam units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3312	Condensate booster pump
CC steam units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3313	Condensate booster pump motor
CC steam units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3314	Condensate booster pump motor - variable speed
CC steam units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3315	Condensate booster pump drive (other than 3313 and 3314)
CC steam units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3320	Condensate piping
CC steam units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3330	Condensate valves
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-16 Balance of Plant: Condensing System - Condenser Casing or Shell and Internals					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3120	Tube sheets
CC steam units	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3121	Expansion joint
CC steam units	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3122	Gaskets and seals
CC steam units	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3123	Hot well

TABLE B02-16 Balance of Plant: Condensing System - Condenser Casing or Shell and Internals					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3124	Tube sheet fouling
CC steam units	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3129	Other condenser casing or shell and internal problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-17 Balance of Plant: Condensing System - Condenser Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Condensing System	Condenser Controls	3150	Hot well level controls
CC steam units	Balance of Plant	Condensing System	Condenser Controls	3151	Vacuum pump and air ejector controls
CC steam units	Balance of Plant	Condensing System	Condenser Controls	3152	Air-cooled condenser controls
CC steam units	Balance of Plant	Condensing System	Condenser Controls	3159	Other condensing system controls and instruments
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-18 Balance of Plant: Condensing System - Condenser Tubes and Support Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3110	Condenser tube leaks
CC steam units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3111	Condenser tube fouling shell side
CC steam units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3112	Condenser tube fouling tube side
CC steam units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3113	Condenser tube and water box cleaning (including circulating water flow reversal)
CC steam units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3114	Air-cooled condenser tubes
CC steam units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3115	Air-cooled condenser pumps
CC steam units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3116	Air-cooled condenser fans
CC steam units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3117	Air-cooled condenser fan motors

TABLE B02-18 Balance of Plant: Condensing System - Condenser Tubes and Support Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3118	Other Air-cooled condenser problems
CC steam units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3119	Other condenser tube casing or shell and internal problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-19 Balance of Plant: Condensing System - Miscellaneous (Condensing System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3170	Condenser inspection (use code 3110 to report looking for tube leaks)
CC steam units	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3171	Air-cooled condenser inspections
CC steam units	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3180	Major condenser overhaul
CC steam units	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3185	Water side cathodic protection
CC steam units	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3186	Auxiliary condenser and associated equipment
CC steam units	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3190	Air leakage (for losses not attributable to previously noted equipment related codes)
CC steam units	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3199	Other miscellaneous condensing system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-20 Balance of Plant: Condensing System - Vacuum Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Condensing System	Vacuum Equipment	3130	Air ejectors
CC steam units	Balance of Plant	Condensing System	Vacuum Equipment	3131	Air ejector piping and valves
CC steam units	Balance of Plant	Condensing System	Vacuum Equipment	3132	Inter and after condensers
CC steam units	Balance of Plant	Condensing System	Vacuum Equipment	3133	Vacuum pumps
CC steam units	Balance of Plant	Condensing System	Vacuum Equipment	3134	Vacuum pump piping and valves
CC steam units	Balance of Plant	Condensing System	Vacuum Equipment	3135	Vacuum pump motor and auxiliaries
CC steam units	Balance of Plant	Condensing System	Vacuum Equipment	3139	Other air extraction system problems - general

TABLE B02-20 Balance of Plant: Condensing System - Vacuum Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Condensing System	Vacuum Equipment	3149	Loss of vacuum not attributable to a particular component such as air ejectors or valves, or high back pressure not attributable to high circulating water temperature, or vacuum losses from a known cause.
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-21 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Electrical		3600	Switchyard transformers and associated cooling systems - external (OMC)
CC steam units	Balance of Plant	Electrical		3601	Switchyard transformers and associated cooling systems - external (not OMC)
CC steam units	Balance of Plant	Electrical		3610	Switchyard circuit breakers - external (not OMC)
CC steam units	Balance of Plant	Electrical		3611	Switchyard circuit breakers - external (OMC)
CC steam units	Balance of Plant	Electrical		3612	Switchyard system protection devices - external (OMC)
CC steam units	Balance of Plant	Electrical		3613	Switchyard system protection devices - external (not OMC)
CC steam units	Balance of Plant	Electrical		3618	Other switchyard equipment - external (not OMC)
CC steam units	Balance of Plant	Electrical		3619	Other switchyard equipment - external (OMC)
CC steam units	Balance of Plant	Electrical		3620	Main transformer
CC steam units	Balance of Plant	Electrical		3621	Unit auxiliaries transformer
CC steam units	Balance of Plant	Electrical		3622	Station service startup transformer
CC steam units	Balance of Plant	Electrical		3623	Auxiliary generators
CC steam units	Balance of Plant	Electrical		3624	Auxiliary generator voltage supply system

TABLE B02-21 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Electrical		3629	Other switchyard or high voltage system problems - external
CC steam units	Balance of Plant	Electrical		3630	400-700 volt transformers
CC steam units	Balance of Plant	Electrical		3631	400-700 volt circuit breakers
CC steam units	Balance of Plant	Electrical		3632	400-700 volt conductors and buses
CC steam units	Balance of Plant	Electrical		3633	400-700 volt insulators
CC steam units	Balance of Plant	Electrical		3634	400-700 volt protection devices
CC steam units	Balance of Plant	Electrical		3639	Other 400-700 volt problems
CC steam units	Balance of Plant	Electrical		3640	AC instrument power transformers
CC steam units	Balance of Plant	Electrical		3641	AC Circuit breakers
CC steam units	Balance of Plant	Electrical		3642	AC Conductors and buses
CC steam units	Balance of Plant	Electrical		3643	AC Inverters
CC steam units	Balance of Plant	Electrical		3644	AC Protection devices
CC steam units	Balance of Plant	Electrical		3649	Other AC instrument power problems
CC steam units	Balance of Plant	Electrical		3650	DC instrument power battery chargers
CC steam units	Balance of Plant	Electrical		3651	DC circuit breakers
CC steam units	Balance of Plant	Electrical		3652	DC conductors and buses
CC steam units	Balance of Plant	Electrical		3653	DC protection devices
CC steam units	Balance of Plant	Electrical		3659	Other DC power problems
CC steam units	Balance of Plant	Electrical		3660	4000-7000 volt transformers
CC steam units	Balance of Plant	Electrical		3661	4000-7000 volt circuit breakers
CC steam units	Balance of Plant	Electrical		3662	4000-7000 volt conductors and buses
CC steam units	Balance of Plant	Electrical		3663	4000-7000 volt insulators
CC steam units	Balance of Plant	Electrical		3664	4000-7000 volt protection devices
CC steam units	Balance of Plant	Electrical		3669	Other 4000-7000 volt problems
CC steam units	Balance of Plant	Electrical		3670	12-15kV transformers
CC steam units	Balance of Plant	Electrical		3671	12-15kV circuit breakers
CC steam units	Balance of Plant	Electrical		3672	12-15kV conductors and buses
CC steam units	Balance of Plant	Electrical		3673	12-15kV insulators
CC steam units	Balance of Plant	Electrical		3674	12-15kV protection devices
CC steam units	Balance of Plant	Electrical		3679	Other 12-15kV problems
CC steam units	Balance of Plant	Electrical		3680	Other voltage transformers
CC steam units	Balance of Plant	Electrical		3681	Other voltage circuit breakers
CC steam units	Balance of Plant	Electrical		3682	Other voltage conductors and buses
CC steam units	Balance of Plant	Electrical		3683	Other voltage insulators

TABLE B02-21 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Electrical		3684	Other voltage protection devices
CC steam units	Balance of Plant	Electrical		3689	Other voltage problems
CC steam units	Balance of Plant	Electrical		3690	Station Service Power Distribution System, General
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-22 Balance of Plant: Extraction Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Extraction Steam		3520	HP Extraction steam piping
CC steam units	Balance of Plant	Extraction Steam		3521	HP Extraction steam valves
CC steam units	Balance of Plant	Extraction Steam		3522	HP Extraction steam instruments and controls
CC steam units	Balance of Plant	Extraction Steam		3529	Other HP extraction steam system problems
CC steam units	Balance of Plant	Extraction Steam		3530	IP Extraction steam piping
CC steam units	Balance of Plant	Extraction Steam		3531	IP Extraction steam valves
CC steam units	Balance of Plant	Extraction Steam		3532	IP Extraction steam instruments and controls
CC steam units	Balance of Plant	Extraction Steam		3539	Other IP extraction steam system problems
CC steam units	Balance of Plant	Extraction Steam		3540	LP Extraction steam piping
CC steam units	Balance of Plant	Extraction Steam		3541	LP Extraction steam valves
CC steam units	Balance of Plant	Extraction Steam		3542	LP Extraction steam instruments and controls
CC steam units	Balance of Plant	Extraction Steam		3549	Other LP extraction steam system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-23 Balance of Plant: Feedwater System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Feedwater System		3401	Startup feedwater pump
CC steam units	Balance of Plant	Feedwater System		3402	Startup feedwater pump drives - all types

TABLE B02-23 Balance of Plant: Feedwater System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Feedwater System		3407	Feedwater pump suction screens
CC steam units	Balance of Plant	Feedwater System		3408	Feedwater pump drive - local controls
CC steam units	Balance of Plant	Feedwater System		3409	Feedwater pump drive motor - variable speed
CC steam units	Balance of Plant	Feedwater System		3410	Feedwater pump
CC steam units	Balance of Plant	Feedwater System		3411	Feedwater pump drive - motor
CC steam units	Balance of Plant	Feedwater System		3412	Feedwater pump drive - steam turbine
CC steam units	Balance of Plant	Feedwater System		3413	Feedwater pump coupling and drive shaft
CC steam units	Balance of Plant	Feedwater System		3414	Feedwater pump local controls
CC steam units	Balance of Plant	Feedwater System		3415	Feedwater pump/drive lube oil system
CC steam units	Balance of Plant	Feedwater System		3416	Other feedwater pump problems
CC steam units	Balance of Plant	Feedwater System		3417	Feedwater pump drive - main shaft
CC steam units	Balance of Plant	Feedwater System		3418	Feedwater pump drive - other
CC steam units	Balance of Plant	Feedwater System		3419	Feedwater pump drive - gear
CC steam units	Balance of Plant	Feedwater System		3420	Feedwater piping and supports
CC steam units	Balance of Plant	Feedwater System		3430	Feedwater regulating (boiler level control) valve
CC steam units	Balance of Plant	Feedwater System		3431	Other feedwater valves
CC steam units	Balance of Plant	Feedwater System		3439	HP heater head leaks
CC steam units	Balance of Plant	Feedwater System		3440	High pressure heater tube leaks
CC steam units	Balance of Plant	Feedwater System		3441	Other high pressure heater problems (see condensate system for LP and IP heater codes)
CC steam units	Balance of Plant	Feedwater System		3451	Feedwater booster pump suction screens
CC steam units	Balance of Plant	Feedwater System		3452	Feedwater booster pump drive - local controls
CC steam units	Balance of Plant	Feedwater System		3453	Feedwater booster pump drive motor - variable speed
CC steam units	Balance of Plant	Feedwater System		3454	Feedwater booster pump
CC steam units	Balance of Plant	Feedwater System		3455	Feedwater booster pump drive - motor
CC steam units	Balance of Plant	Feedwater System		3456	Feedwater booster pump drive - steam turbine

TABLE B02-23 Balance of Plant: Feedwater System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Feedwater System		3457	Feedwater booster pump coupling and drive shaft
CC steam units	Balance of Plant	Feedwater System		3458	Feedwater booster pump local controls
CC steam units	Balance of Plant	Feedwater System		3459	Feedwater booster pump/drive lube oil system
CC steam units	Balance of Plant	Feedwater System		3460	Other feedwater booster pump problems
CC steam units	Balance of Plant	Feedwater System		3461	Feedwater booster pump drive - main shaft
CC steam units	Balance of Plant	Feedwater System		3462	Feedwater booster pump drive - other
CC steam units	Balance of Plant	Feedwater System		3463	Feedwater booster pump drive - gear
CC steam units	Balance of Plant	Feedwater System		3499	Other feedwater system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Excluding extraction or drain systems.					

TABLE B02-24 Balance of Plant: Heater Drain Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Heater Drain Systems		3501	Heater drain pumps
CC steam units	Balance of Plant	Heater Drain Systems		3502	Heater level control
CC steam units	Balance of Plant	Heater Drain Systems		3503	Heater drain piping
CC steam units	Balance of Plant	Heater Drain Systems		3504	Heater drain valves
CC steam units	Balance of Plant	Heater Drain Systems		3505	Heater drain pump drive
CC steam units	Balance of Plant	Heater Drain Systems		3509	Other heater drain system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-25 Balance of Plant: Miscellaneous (Balance of Plant)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3950	Process computer
CC steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3960	Thermal derating (thermal efficiency losses in balance of plant when specific cause(s) unknown)

TABLE B02-25 Balance of Plant: Miscellaneous (Balance of Plant)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3970	Distributive Control System (DCS) - process computer
CC steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3971	DCS - data highway
CC steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3972	DCS - hardware problems (including card failure)
CC steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3973	DCS - internal and termination wiring
CC steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3974	DCS - logic problems
CC steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3975	DCS - upgrades
CC steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3979	Other DCS problems
CC steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3980	Programmable Logic Controller (PLC)
CC steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3981	PLC - data highway
CC steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3982	PLC - hardware problems (including card failure)
CC steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3983	PLC - internal and termination wiring
CC steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3984	PLC - logic problems
CC steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3985	PLC - upgrades
CC steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3989	Other PLC problems
CC steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3995	Powerhouse heating and ventilating systems
CC steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3996	Air conditioning systems - rooms and areas
CC steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3998	Balance of plant overhaul/outage
CC steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3999	Other miscellaneous balance of plant problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-26 Balance of Plant: Power Station Switchyard					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Power Station Switchyard		3700	Power Station switchyard (non generating unit equipment)
CC steam units	Balance of Plant	Power Station Switchyard		3710	Transmission line (connected to powerhouse switchyard to 1st Substation)

TABLE B02-26 Balance of Plant: Power Station Switchyard					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Power Station Switchyard		3720	Transmission equipment at the 1st substation (see code 9300 if applicable)
CC steam units	Balance of Plant	Power Station Switchyard		3730	Transmission equipment beyond the 1st substation (see code 9300 if applicable)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-27 Balance of Plant: Waste Water (zero discharge) Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Balance of Plant	Waste Water (zero discharge) Systems		3290	Waste water (zero discharge) tanks, pumps, and motors
CC steam units	Balance of Plant	Waste Water (zero discharge) Systems		3291	Waste water (zero discharge) system fouling
CC steam units	Balance of Plant	Waste Water (zero discharge) Systems		3292	Waste water (zero discharge) piping
CC steam units	Balance of Plant	Waste Water (zero discharge) Systems		3293	Waste water (zero discharge) valves
CC steam units	Balance of Plant	Waste Water (zero discharge) Systems		3294	Waste water (zero discharge) controls and instrumentation
CC steam units	Balance of Plant	Waste Water (zero discharge) Systems		3295	Other waste water (zero discharge) problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

EXPANDER TURBINE

TABLE B02-28 Expander Turbine: Expander Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Expander Turbine	Expander Turbine		7800	Couplings
CC steam units	Expander Turbine	Expander Turbine		7810	Shaft
CC steam units	Expander Turbine	Expander Turbine		7820	Bearings
CC steam units	Expander Turbine	Expander Turbine		7830	Blades
CC steam units	Expander Turbine	Expander Turbine		7840	Discs
CC steam units	Expander Turbine	Expander Turbine		7850	Spacers

TABLE B02-28 Expander Turbine: Expander Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Expander Turbine	Expander Turbine		7860	Nozzles/vanes
CC steam units	Expander Turbine	Expander Turbine		7870	Heat shields
CC steam units	Expander Turbine	Expander Turbine		7880	Exhaust diffusers
CC steam units	Expander Turbine	Expander Turbine		7890	Seal oil system and seals
CC steam units	Expander Turbine	Expander Turbine		7900	Inner casing
CC steam units	Expander Turbine	Expander Turbine		7910	Outer exhaust casing
CC steam units	Expander Turbine	Expander Turbine		7920	Lube oil system
CC steam units	Expander Turbine	Expander Turbine		7930	Controls and instrumentation
CC steam units	Expander Turbine	Expander Turbine		7940	Evactor
CC steam units	Expander Turbine	Expander Turbine		7950	Major overhaul
CC steam units	Expander Turbine	Expander Turbine		7960	Other expander turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

EXTERNAL

Use this set of codes to report events caused by external factors (flood, lightning, etc.); economic factors (lack of fuel, labor strikes, etc.); operator training; and transmission system problems external to the plant.

TABLE B02-29 External: Catastrophe					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	External	Catastrophe		9000	Flood
CC steam units	External	Catastrophe		9001	Drought
CC steam units	External	Catastrophe		9010	Fire including wildfires, not related to a specific component
CC steam units	External	Catastrophe		9020	Lightning
CC steam units	External	Catastrophe		9025	Geomagnetic disturbance
CC steam units	External	Catastrophe		9030	Earthquake
CC steam units	External	Catastrophe		9031	Tornado
CC steam units	External	Catastrophe		9035	Hurricane
CC steam units	External	Catastrophe		9036	Storms (ice, snow, etc)
CC steam units	External	Catastrophe		9040	Other catastrophe
CC steam units	External	Catastrophe		9090	Physical Security Incident
CC steam units	External	Catastrophe		9091	Physical Security Incident (OMC)
CC steam units	External	Catastrophe		9092	Cyber Security Incident

TABLE B02-29 External: Catastrophe					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	External	Catastrophe		9093	Cyber Security Incident (OMC)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-30 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	External	Economic		0000	Reserve shutdown
CC steam units	External	Economic		9130	Failure of fuel supplier to fulfill contractual obligations or a pre-arranged deal due to physical fuel disruptions or operational impairments (e.g. force majeure on a pipeline or compressor down; making the pipeline incapable of making its firm deliveries.)
CC steam units	External	Economic		9131	Lack of fuel – due to contractual or tariff provisions that allow for service interruption or price fluctuations during peak demand periods.
CC steam units	External	Economic		9134	Fuel conservation
CC steam units	External	Economic		9136	Problems with Primary Fuel for Units with Secondary Fuel Operation
CC steam units	External	Economic		9137	Ground water or other water supply problems
CC steam units	External	Economic		9139	Ground water or other water supply problems (OMC)
CC steam units	External	Economic		9140	Plant modifications to burn different fuel that are not regulatory mandated
CC steam units	External	Economic		9150	Labor strikes company-wide problems or strikes outside the company's jurisdiction such as manufacturers (delaying repairs) or transportation (fuel supply) problems.
CC steam units	External	Economic		9151	Labor strikes direct plant management grievances that result in a walkout or

TABLE B02-30 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
					strike are under plant management control.
CC steam units	External	Economic		9160	Other economic problems
CC steam units	External	Economic		9180	Economic (for internal use at plants only)
CC steam units	External	Economic		9181	Economic (for internal use at plants only)
CC steam units	External	Economic		9182	Economic (for internal use at plants only)
CC steam units	External	Economic		9183	Economic (for internal use at plants only)
CC steam units	External	Economic		9184	Economic (for internal use at plants only)
CC steam units	External	Economic		9185	Economic (for internal use at plants only)
CC steam units	External	Economic		9186	Economic (for internal use at plants only)
CC steam units	External	Economic		9187	Economic (for internal use at plants only)
CC steam units	External	Economic		9188	Economic (for internal use at plants only)
CC steam units	External	Economic		9189	Economic (for internal use at plants only)
CC steam units	External	Economic		9190	Economic (for internal use at plants only)
CC steam units	External	Economic		9191	Economic (for internal use at plants only)
CC steam units	External	Economic		9192	Economic (for internal use at plants only)
CC steam units	External	Economic		9193	Economic (for internal use at plants only)
CC steam units	External	Economic		9194	Economic (for internal use at plants only)
CC steam units	External	Economic		9195	Economic (for internal use at plants only)

TABLE B02-30 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	External	Economic		9196	Economic (for internal use at plants only)
CC steam units	External	Economic		9197	Economic (for internal use at plants only)
CC steam units	External	Economic		9198	Economic (for internal use at plants only)
CC steam units	External	Economic		9199	Economic (for internal use at plants only)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-31 External: Fuel Quality					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	External	Fuel Quality		9200	High ash content (OMC)
CC steam units	External	Fuel Quality		9201	High ash content (not OMC)
CC steam units	External	Fuel Quality		9205	Poor quality natural gas fuel, low heat content
CC steam units	External	Fuel Quality		9220	High sulfur content (OMC)
CC steam units	External	Fuel Quality		9221	High sulfur content (not OMC)
CC steam units	External	Fuel Quality		9230	High vanadium content (OMC)
CC steam units	External	Fuel Quality		9231	High vanadium content (not OMC)
CC steam units	External	Fuel Quality		9240	High sodium content (OMC)
CC steam units	External	Fuel Quality		9241	High sodium content (not OMC)
CC steam units	External	Fuel Quality		9260	Low BTU oil (OMC)
CC steam units	External	Fuel Quality		9261	Low BTU oil (not OMC)
CC steam units	External	Fuel Quality		9290	Other fuel quality problems (OMC)
CC steam units	External	Fuel Quality		9291	Other fuel quality problems (not OMC)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use code 9600 to 9650 if the fuel quality results in excess stack emissions through no fault in the pollution control equipment. Use the appropriate equipment code to report fouling and slagging.					

TABLE B02-32 External: Miscellaneous (External)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	External	Miscellaneous (External)		9300	Transmission system problems other than catastrophes (do not include switchyard problems in this category; see codes 3600 to 3629, 3720 to 3730)
CC steam units	External	Miscellaneous (External)		9310	Operator training
CC steam units	External	Miscellaneous (External)		9320	Other miscellaneous external problems
CC steam units	External	Miscellaneous (External)		9340	Synchronous Condenser Operation
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

GAS TURBINE

TABLE B02-33 Gas Turbine: Auxiliary Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Gas Turbine	Auxiliary Systems		5110	Lube oil system - general
CC steam units	Gas Turbine	Auxiliary Systems		5111	Lube oil pumps
CC steam units	Gas Turbine	Auxiliary Systems		5112	Lube oil coolers
CC steam units	Gas Turbine	Auxiliary Systems		5113	Lube oil valves/piping
CC steam units	Gas Turbine	Auxiliary Systems		5114	Lube oil filters
CC steam units	Gas Turbine	Auxiliary Systems		5115	Oil vapor extractor
CC steam units	Gas Turbine	Auxiliary Systems		5116	Power Augmentation System Equipment
CC steam units	Gas Turbine	Auxiliary Systems		5117	Power augmentation piping
CC steam units	Gas Turbine	Auxiliary Systems		5118	Power augmentation valves
CC steam units	Gas Turbine	Auxiliary Systems		5119	Power augmentation controls
CC steam units	Gas Turbine	Auxiliary Systems		5120	Hydraulic oil system
CC steam units	Gas Turbine	Auxiliary Systems		5121	Hydraulic oil system pumps
CC steam units	Gas Turbine	Auxiliary Systems		5122	Hydraulic oil system piping/valves
CC steam units	Gas Turbine	Auxiliary Systems		5130	Starting system (including motor)
CC steam units	Gas Turbine	Auxiliary Systems		5140	Battery and charger system
CC steam units	Gas Turbine	Auxiliary Systems		5150	Turning gear and motor
CC steam units	Gas Turbine	Auxiliary Systems		5151	Load gear compartment
CC steam units	Gas Turbine	Auxiliary Systems		5160	Cooling and seal air system
CC steam units	Gas Turbine	Auxiliary Systems		5170	Cooling water system
CC steam units	Gas Turbine	Auxiliary Systems		5180	Anti-icing system
CC steam units	Gas Turbine	Auxiliary Systems		5190	Other auxiliary system problems

TABLE B02-33 Gas Turbine: Auxiliary Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-34 Gas Turbine: Exhaust Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Gas Turbine	Exhaust Systems		5100	Chamber
CC steam units	Gas Turbine	Exhaust Systems		5101	Hoods
CC steam units	Gas Turbine	Exhaust Systems		5102	Vanes/nozzles
CC steam units	Gas Turbine	Exhaust Systems		5103	Silencer
CC steam units	Gas Turbine	Exhaust Systems		5104	Cones
CC steam units	Gas Turbine	Exhaust Systems		5105	Diverter Dampers
CC steam units	Gas Turbine	Exhaust Systems		5106	Exhaust Stack
CC steam units	Gas Turbine	Exhaust Systems		5108	High engine exhaust temperature
CC steam units	Gas Turbine	Exhaust Systems		5109	Other exhaust problems (including high exhaust system temperature not attributable to a specific problem)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-35 Gas Turbine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5040	Fuel tanks
CC steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5041	Fuel piping and valves
CC steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5042	Fuel nozzles/vanes
CC steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5043	Fuel filters
CC steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5044	Liquid fuel oil pump
CC steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5046	Liquid fuel oil transfer/forwarding pump
CC steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5047	Liquid fuel purge system

TABLE B02-35 Gas Turbine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5048	Gas fuel system including controls and instrumentation
CC steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5049	Other fuel system problems
CC steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5050	Ignition system
CC steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5051	Pilot fuel piping and valves
CC steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5052	Pilot fuel nozzles/vanes
CC steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5053	Pilot fuel filters
CC steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5054	Water injection system
CC steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5060	Atomizing air system
CC steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5065	NOx water injection system including pump
CC steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5066	NOx steam injection system
CC steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5070	Combustor casing
CC steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5071	Combustor liner
CC steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5072	Combustor caps
CC steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5073	Flame scanners
CC steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5074	Flashback including instrumentation
CC steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5075	Blade path temperature spread
CC steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5079	Other combustor problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-36 Gas Turbine: Inlet Air System and Compressors - Compressors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5010	High pressure shaft
CC steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5011	High pressure bearings
CC steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5012	High pressure blades/buckets
CC steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5013	Compressor casing and bolts
CC steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5014	Compressor diaphragms
CC steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5015	Compressor seals
CC steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5016	High pressure compressor bleed valves
CC steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5017	Low pressure compressor bleed valves
CC steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5019	Other high pressure problems
CC steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5020	Low pressure shaft
CC steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5021	Low pressure bearings
CC steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5022	Low pressure blades/buckets
CC steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5029	Other low pressure problems
CC steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5030	Supercharging fans
CC steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5035	Compressor washing
CC steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5036	Compressor shaft and bearings for two-shaft machines
CC steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5037	Inlet bleed heat valve
CC steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5039	Other compressor problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-37 Gas Turbine: Inlet Air System and Compressors - Ducts and Filters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5000	Inlet air ducts
CC steam units	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5001	Inlet air vanes/nozzles
CC steam units	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5002	Inlet air filters
CC steam units	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5003	Inlet cone
CC steam units	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5004	Inlet air chillers
CC steam units	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5005	Inlet air evaporative coolers
CC steam units	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5006	Inlet air foggers
CC steam units	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5009	Other inlet air problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-38 Gas Turbine: Miscellaneous (Gas Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5200	Reduction gear
CC steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5201	Load shaft and bearings
CC steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5205	Main coupling between the turbine and generator
CC steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5206	Clutch
CC steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5210	Intercoolers
CC steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5220	Regenerators
CC steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5230	Heat shields
CC steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5240	Fire detection and extinguishing system (including hazardous gas detection system)
CC steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5241	Fire in unit
CC steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5245	Gas Turbine Control System - data highway
CC steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5246	Gas Turbine Control System - hardware problems (including card failure)
CC steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5247	Gas Turbine Control System - internal and termination wiring
CC steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5248	Gas Turbine Control System - logic problems
CC steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5249	Gas Turbine Control System - upgrades
CC steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5250	Other controls and instrumentation problems
CC steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5255	Computer
CC steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5260	Major overhaul (use for non-specific overhaul only; see page B-CCGT-2)
CC steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5261	Gas turbine/compressor washing
CC steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5262	Gas turbine exchange
CC steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5269	Combustion Inspection (CI)
CC steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5270	Hot end inspection
CC steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5272	Boroscope inspection
CC steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5274	General unit inspection
CC steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5280	Vibration (not engine) in unit not attributable to bearings or other components

TABLE B02-38 Gas Turbine: Miscellaneous (Gas Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5285	Gas turbine vibration
CC steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5286	Gas turbine lockout
CC steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5290	Gas turbine performance testing - individual engines (use code 9999 for total unit performance testing)
CC steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5292	Turbine Overspeed Trip Test - Gas Turbine
CC steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5295	Synchronous condenser equipment
CC steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5298	Main gas filter
CC steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5299	Other miscellaneous gas turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-39 Gas Turbine: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Gas Turbine	Turbine		5080	High pressure shaft
CC steam units	Gas Turbine	Turbine		5081	High pressure bearings
CC steam units	Gas Turbine	Turbine		5082	High pressure blades/buckets
CC steam units	Gas Turbine	Turbine		5083	High pressure nozzles/vanes
CC steam units	Gas Turbine	Turbine		5084	High pressure casing/expansion joints
CC steam units	Gas Turbine	Turbine		5085	Interstage gas passages - HP
CC steam units	Gas Turbine	Turbine		5086	High pressure shaft seals
CC steam units	Gas Turbine	Turbine		5087	Thrust bearing
CC steam units	Gas Turbine	Turbine		5088	Gas turbine cooling system
CC steam units	Gas Turbine	Turbine		5089	Other high pressure problems
CC steam units	Gas Turbine	Turbine		5090	Low pressure shaft
CC steam units	Gas Turbine	Turbine		5091	Low pressure bearings
CC steam units	Gas Turbine	Turbine		5092	Low pressure blades/buckets
CC steam units	Gas Turbine	Turbine		5093	Low pressure nozzles/vanes
CC steam units	Gas Turbine	Turbine		5094	Low pressure casing/expansion joints
CC steam units	Gas Turbine	Turbine		5095	Interstage gas passages - LP
CC steam units	Gas Turbine	Turbine		5096	Low pressure shaft seals
CC steam units	Gas Turbine	Turbine		5097	Other low pressure problems
CC steam units	Gas Turbine	Turbine		5098	Expansion joints

TABLE B02-39 Gas Turbine: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Gas Turbine	Turbine		5099	HP to LP coupling
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use HP if only one.					

GENERATOR

This set of codes contains the generator, exciter, generator cooling systems, and generator controls. Note the main leads up to and includes the generator output breaker in this set of codes.

TABLE B02-40 Generator: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Generator	Controls		4700	Generator voltage control
CC steam units	Generator	Controls		4710	Generator metering devices
CC steam units	Generator	Controls		4720	Generator synchronization equipment
CC steam units	Generator	Controls		4730	Generator current and potential transformers
CC steam units	Generator	Controls		4740	Emergency generator trip devices
CC steam units	Generator	Controls		4741	Frequency Trip (81 Relay)
CC steam units	Generator	Controls		4750	Other generator controls and metering problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-41 Generator: Cooling System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Generator	Cooling System		4610	Hydrogen cooling system piping and valves
CC steam units	Generator	Cooling System		4611	Hydrogen coolers
CC steam units	Generator	Cooling System		4612	Hydrogen storage system
CC steam units	Generator	Cooling System		4613	Hydrogen seals
CC steam units	Generator	Cooling System		4619	Other hydrogen system problems
CC steam units	Generator	Cooling System		4620	Air cooling system
CC steam units	Generator	Cooling System		4630	Liquid cooling system
CC steam units	Generator	Cooling System		4640	Seal oil system and seals
CC steam units	Generator	Cooling System		4650	Other cooling system problems

TABLE B02-41 Generator: Cooling System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Report failures caused by water leaks into generator as codes 4500, 4510, etc.					

TABLE B02-42 Generator: Exciter					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Generator	Exciter		4600	Exciter drive - motor
CC steam units	Generator	Exciter		4601	Exciter field rheostat
CC steam units	Generator	Exciter		4602	Exciter commutator and brushes
CC steam units	Generator	Exciter		4603	Solid state exciter element
CC steam units	Generator	Exciter		4604	Exciter drive - shaft
CC steam units	Generator	Exciter		4605	Exciter transformer
CC steam units	Generator	Exciter		4609	Other exciter problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-43 Generator: Generator					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Generator	Generator		4500	Rotor windings (including damper windings and fan blades on hydro units)
CC steam units	Generator	Generator		4510	Rotor collector rings
CC steam units	Generator	Generator		4511	Rotor, General
CC steam units	Generator	Generator		4512	Retaining Rings
CC steam units	Generator	Generator		4520	Stator windings, bushings, and terminals
CC steam units	Generator	Generator		4530	Stator core iron
CC steam units	Generator	Generator		4535	Stator, General
CC steam units	Generator	Generator		4536	Generator Heaters
CC steam units	Generator	Generator		4540	Brushes and brush rigging
CC steam units	Generator	Generator		4550	Generator bearings and lube oil system (including thrust bearings on hydro units)
CC steam units	Generator	Generator		4551	Generator bearings
CC steam units	Generator	Generator		4552	Generator lube oil system

TABLE B02-43 Generator: Generator					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Generator	Generator		4555	Bearing cooling system
CC steam units	Generator	Generator		4560	Generator vibration (excluding vibration due to failed bearing and other components)
CC steam units	Generator	Generator		4570	Generator casing
CC steam units	Generator	Generator		4580	Generator end bells and bolting
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-44 Generator: Miscellaneous (Generator)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Generator	Miscellaneous (Generator)		4800	Generator main leads
CC steam units	Generator	Miscellaneous (Generator)		4805	Generator Bus Duct Cooling System
CC steam units	Generator	Miscellaneous (Generator)		4810	Generator output breaker
CC steam units	Generator	Miscellaneous (Generator)		4830	Major generator overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)
CC steam units	Generator	Miscellaneous (Generator)		4831	Minor generator overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
CC steam units	Generator	Miscellaneous (Generator)		4840	Inspection
CC steam units	Generator	Miscellaneous (Generator)		4841	Generator doble testing
CC steam units	Generator	Miscellaneous (Generator)		4842	Reactive and capability testing
CC steam units	Generator	Miscellaneous (Generator)		4850	Core monitor alarm
CC steam units	Generator	Miscellaneous (Generator)		4860	Generator neutral grounding equipment
CC steam units	Generator	Miscellaneous (Generator)		4899	Other miscellaneous generator problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

HEAT RECOVERY STEAM GENERATOR (HRSG)

(Waste Heat Boiler)

TABLE B02-45 Heat Recovery Steam Generator (HRSG): HRSG Boiler Air and Gas Systems - Air Supply					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1400	Forced draft fans
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1401	Forced draft fan dampers
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1407	Forced draft fan lubrication system
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1410	Forced draft fan motors
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1411	Forced draft fan motors - variable speed
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1412	Forced draft fan drives (other than motor)
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1415	Forced draft fan controls
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1420	Other forced draft fan problems
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1456	Induced draft fan dampers
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-46 Heat Recovery Steam Generator (HRSG): HRSG Boiler Air and Gas Systems - Miscellaneous (Boiler Air and Gas Systems)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1590	Stacks (use code 8430 for stack problems due to pollution control equipment)
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1591	Stack damper and linkage
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1592	Stack damper linkage motors
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1599	Other miscellaneous boiler air and gas system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-47 Heat Recovery Steam Generator (HRSG): HRSG Boiler Control Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1700	Feedwater controls (report local controls - feedwater pump, feedwater regulator valve, etc., - with component or system)
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1710	Combustion/steam condition controls (report local controls - burners, pulverizers, etc., - with component or system)
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1720	Desuperheater/attemperator controls
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1730	Boiler explosion or implosion
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1740	Boiler drum gage glasses / level indicator
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1750	Burner management system
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1760	Feedwater instrumentation (not local controls)
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1761	Combustion/Steam condition instrumentation (not local controls)
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1762	Desuperheater/attemperator instrumentation (not local controls)
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1799	Other boiler instrumentation and control problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Iincluding instruments which input to the controls.					

TABLE B02-48 Heat Recovery Steam Generator (HRSG): HRSG Boiler Design Limitations					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Design Limitations		1900	Improper balance between tube sections not due to fouling or plugging

TABLE B02-48 Heat Recovery Steam Generator (HRSG): HRSG Boiler Design Limitations					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Design Limitations		1910	Inadequate air not due to equipment problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-49 Heat Recovery Steam Generator (HRSG): HRSG Boiler Fuel Supply - Burners (Duct Burners)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	358	Oil burner piping and valves
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	359	Gas burner piping and valves
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	360	Burners
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	361	Burner orifices
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	370	Burner instruments and controls (except light off)
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	380	Light off (igniter) systems (including fuel supply)
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	385	Igniters
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	410	Other burner problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-50 Heat Recovery Steam Generator (HRSG): HRSG Boiler Fuel Supply - Oil and Gas Systems (except light off)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	440	Fuel oil pumps (general)
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	441	Fuel oil pumps (burner supply)
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	442	Fuel oil pumps (forwarding/transfer)
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	443	Fuel oil (burner supply) pump drives

TABLE B02-50 Heat Recovery Steam Generator (HRSG): HRSG Boiler Fuel Supply - Oil and Gas Systems (except light off)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	444	Fuel oil (forwarding/transfer) pump drives
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	450	Fuel oil heaters
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	460	Fuel oil atomizers
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	470	Oil and gas fires
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	480	Other oil and gas fuel supply problems (see codes 0360-0410 for burner problems)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-51 Heat Recovery Steam Generator (HRSG): HRSG Boiler Internals and Structures					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		800	Drums and drum internals (single drum only)
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		801	HP Drum (including drum level trips not attributable to other causes)
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		802	IP Drum (including drum level trips not attributable to other causes)
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		803	LP Drum (including drum level trips not attributable to other causes)
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		810	Boiler supports and structures (use code 1320 for tube supports)
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		820	Casing
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		830	Doors
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		840	Refractory and insulation

TABLE B02-51 Heat Recovery Steam Generator (HRSG): HRSG Boiler Internals and Structures					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		845	Windbox expansion joints
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		847	Other expansion joints
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		848	Inlet panel
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		850	Other internal or structural problems
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		855	Drum relief/safety valves (single drum only)
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		856	HP Drum relief/safety valves
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		857	IP Drum relief/safety valves
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		858	LP Drum relief/safety valves
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		859	Tube external fins/membranes
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-52 Heat Recovery Steam Generator (HRSG): HRSG Boiler Overhaul and Inspections					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1800	Major boiler overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1801	Minor boiler overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1810	Other boiler inspections
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1811	Boiler Inspections - problem identification / investigation

TABLE B02-52 Heat Recovery Steam Generator (HRSG): HRSG Boiler Overhaul and Inspections					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1812	Boiler Inspections - scheduled or routine
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1820	Chemical cleaning/steam blows
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-53 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - Boiler Recirculation					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation	740	Boiler recirculation pumps
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation	741	Boiler recirculation pumps - motors
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation	750	Boiler recirculation piping including downcomers
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation	760	Boiler recirculation valves
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation	770	Other boiler recirculation problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-54 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - Feedwater and Blowdown					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	670	Feedwater piping downstream of feedwater regulating valve
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	680	Feedwater valves (not feedwater regulating valve)
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	690	Other feedwater problems downstream of feedwater regulating valve (use codes 3401 to 3499 for remainder of feedwater system)
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	700	Blowdown system valves

TABLE B02-54 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - Feedwater and Blowdown					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	710	Blowdown system piping
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	720	Blowdown system controls / instrumentation
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	730	Other blowdown system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-55 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Cold and Hot Reheat Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	540	Hot reheat steam piping up to turbine stop valves
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	541	Cold reheat steam piping up to boiler
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	550	Reheat steam relief/safety valves
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	560	Other hot reheat steam valves (not including turbine stop or intercept valves)
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	561	Other cold reheat steam valves (not including turbine stop or intercept valves)
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	570	Other reheat steam problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-56 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Desuperheaters/Attemperators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6140	HP Desuperheater/attemperator piping - Greater than 600 PSIG.
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6141	HP Desuperheater/attemperator valves
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6142	HP Desuperheater/attemperator spray nozzles

TABLE B02-56 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Desuperheaters/Attemperators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6143	HP Desuperheater/attemperator drums
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6144	Other HP desuperheater/attemperator problems
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6145	IP Desuperheater/attemperator piping - Between 200-600 PSIG
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6146	IP Desuperheater/attemperator valves
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6147	IP Desuperheater/attemperator spray nozzles
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6148	IP Desuperheater/attemperator drums
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6149	Other IP desuperheater/attemperator problems
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6150	LP Desuperheater/attemperator piping - Less than 200 PSIG
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6151	LP Desuperheater/attemperator valves
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6152	LP Desuperheater/attemperator spray nozzles
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6153	LP Desuperheater/attemperator drums
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6154	Other LP desuperheater/attemperator problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-57 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Main Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	500	Main steam piping up to turbine stop valves
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	510	Main steam relief/safety valves off superheater

TABLE B02-57 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Main Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	520	Other main steam valves (including vent and drain valves but not including the turbine stop valves)
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	530	Other main steam system problems
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6110	HP steam piping up to turbine stop valves - Greater than 600 PSIG (see 0790 for piping supports)
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6111	HP steam relief/safety valves
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6112	Other HP steam valves (including vent and drain valves but not including the turbine stop valves)
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6113	Other HP steam system problems
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6114	HP steam isolation/boundary valves
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6120	IP steam piping up to turbine stop valves - Between 200 & 600 PSIG (see 0790 for piping supports)
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6121	IP steam relief/safety valves
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6122	Other IP steam valves (including vent and drain valves but not including the turbine stop valves)
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6123	Other IP steam system problems
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6124	IP steam isolation/boundary valves

TABLE B02-57 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Main Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6130	LP steam piping up to turbine stop valves - Less than 200 PSIG (see 0790 for piping supports)
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6131	LP steam relief/safety valves
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6132	Other LP steam valves (including vent and drain valves but not including the turbine stop valves)
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6133	Other LP steam system problems
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6134	Other main steam valves (including vent and drain valves but not including the turbine stop valves)
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6135	LP steam isolation/boundary valves
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-58 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Startup Bypass					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6160	HP Startup bypass system piping (including drain lines up to heaters or condenser) - Greater than 600 PSIG
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6161	HP Startup bypass system valves
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6162	HP Startup bypass tanks or flash tanks
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6163	Other HP startup bypass system problems
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6164	HP startup bypass instrumentation and controls
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6170	IP Startup bypass system piping (including drain lines up to

TABLE B02-58 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Startup Bypass					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
					heaters or condenser) - Between 200-600 PSIG
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6171	IP Startup bypass system valves
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6172	IP Startup bypass tanks or flash tanks
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6173	Other IP startup bypass system problems
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6174	IP startup bypass instrumentation and controls
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6180	LP Startup bypass system piping (including drain lines up to heaters or condenser) - Less than 200 PSIG
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6181	LP Startup bypass system valves
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6182	LP Startup bypass tanks or flash tanks
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6183	Other LP startup bypass system problems
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6184	LP startup bypass instrumentation and controls
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-59 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - Miscellaneous (Piping)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)	775	Economizer piping
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)	780	Headers between tube bundles
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)	782	Headers and caps
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)	790	Pipe hangers, brackets, supports (general)

TABLE B02-59 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - Miscellaneous (Piping)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)	799	Other miscellaneous piping system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-60 Heat Recovery Steam Generator (HRSG): HRSG Boiler Tube Leaks					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6005	HP Evaporator tubes
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6006	IP Evaporator tubes
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6007	LP Evaporator tubes
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6010	HP superheater
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6011	HP reheater
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6012	HP economizer
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6020	IP superheater
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6021	IP reheater
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6022	IP economizer
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6030	LP reheater
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6031	LP superheater
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6032	LP economizer
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6090	Other HRSG tube problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use code 0859 for tube/membrane failures.					

TABLE B02-61 Heat Recovery Steam Generator (HRSG): HRSG Boiler Water Condition					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Water Condition		1850	Boiler water condition (not feedwater water quality)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-62 Heat Recovery Steam Generator (HRSG): Miscellaneous (HRSG Boiler)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		1980	Boiler safety valve test
CC steam units	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		1990	Boiler performance testing (use code 9999 for total unit performance testing)
CC steam units	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		1999	Boiler, miscellaneous
CC steam units	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		6000	Heat recovery steam generator to gas turbine connecting equipment. For additional codes, use Fossil Steam Cause Codes 0010 to 1999.
CC steam units	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		6100	Steam turbine to gas turbine coupling. For additional codes, use Fossil Steam Cause Codes 4000 to 4499.
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use more specific codes - other slagging and fouling problems, other control problems, etc. whenever possible. Describe miscellaneous problems in the verbal description.					

TABLE B02-63 Heat Recovery Steam Generator (HRSG): Miscellaneous HRSG Boiler Tube Problems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1300	Water side fouling
CC steam units	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1305	Fireside cleaning (which requires a full outage) Use code 1200 for cleanings that cause deratings.

TABLE B02-63 Heat Recovery Steam Generator (HRSG): Miscellaneous HRSG Boiler Tube Problems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1310	Water side cleaning (acid cleaning)
CC steam units	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1320	Tube supports/attachments
CC steam units	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1330	Slag fall damage
CC steam units	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1340	Tube modifications (including addition and removal of tubes)
CC steam units	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1350	Other miscellaneous boiler tube problems
CC steam units	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1360	Boiler drains system
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

INACTIVE STATES

TABLE B02-64 Inactive States: Inactive States					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Inactive States	Inactive States		2	Inactive Reserve Shutdown
CC steam units	Inactive States	Inactive States		9990	Retired unit
CC steam units	Inactive States	Inactive States		9991	Mothballed unit
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

JET ENGINE

TABLE B02-65 Jet Engine: Auxiliary Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Jet Engine	Auxiliary Systems		5510	Lube oil system
CC steam units	Jet Engine	Auxiliary Systems		5516	Power Augmentation System Equipment
CC steam units	Jet Engine	Auxiliary Systems		5520	Hydraulic oil system
CC steam units	Jet Engine	Auxiliary Systems		5530	Starting system (including motor)
CC steam units	Jet Engine	Auxiliary Systems		5540	Battery and charger system
CC steam units	Jet Engine	Auxiliary Systems		5550	Turning gear and motor
CC steam units	Jet Engine	Auxiliary Systems		5551	Load gear compartment

TABLE B02-65 Jet Engine: Auxiliary Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Jet Engine	Auxiliary Systems		5560	Cooling and seal air system
CC steam units	Jet Engine	Auxiliary Systems		5570	Cooling water system
CC steam units	Jet Engine	Auxiliary Systems		5580	Anti-icing system
CC steam units	Jet Engine	Auxiliary Systems		5590	Other auxiliary system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-66 Jet Engine: Exhaust Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Jet Engine	Exhaust Systems		5500	Chamber
CC steam units	Jet Engine	Exhaust Systems		5501	Hoods
CC steam units	Jet Engine	Exhaust Systems		5502	Vanes/nozzles
CC steam units	Jet Engine	Exhaust Systems		5503	Silencer
CC steam units	Jet Engine	Exhaust Systems		5504	Cones
CC steam units	Jet Engine	Exhaust Systems		5505	Diverter Dampers
CC steam units	Jet Engine	Exhaust Systems		5508	High engine exhaust temperature
CC steam units	Jet Engine	Exhaust Systems		5509	Other exhaust problems (including high exhaust temperature not attributable to a specific problem)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-67 Jet Engine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5440	Fuel tanks
CC steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5441	Fuel piping and valves
CC steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5442	Fuel nozzles/vanes
CC steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5443	Fuel filters
CC steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5444	Liquid fuel oil pump

TABLE B02-67 Jet Engine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5445	Liquid fuel oil transfer/forwarding pump
CC steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5446	Liquid fuel purge system
CC steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5447	Gas fuel system including controls and instrumentation
CC steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5449	Other fuel system problems
CC steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5450	Ignition system
CC steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5451	Pilot fuel piping and valves
CC steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5452	Pilot fuel nozzles/vanes
CC steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5453	Pilot fuel filters
CC steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5454	Water injection system
CC steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5455	Fuel nozzle/vane cooling air system
CC steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5460	Atomizing air system
CC steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5470	Combustor casing
CC steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5471	Combustor liner
CC steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5472	Combustor caps
CC steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5473	Flame scanners
CC steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5474	Flashback (including instrumentation)
CC steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5475	Blade path temperature spread
CC steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5479	Other combustor problems

TABLE B02-67 Jet Engine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-68 Jet Engine: Inlet Air System and Compressors - Compressors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Jet Engine	Inlet Air System and Compressors	Compressors	5410	High pressure shaft
CC steam units	Jet Engine	Inlet Air System and Compressors	Compressors	5411	High pressure bearings
CC steam units	Jet Engine	Inlet Air System and Compressors	Compressors	5412	High pressure blades/buckets
CC steam units	Jet Engine	Inlet Air System and Compressors	Compressors	5413	Other high pressure problems
CC steam units	Jet Engine	Inlet Air System and Compressors	Compressors	5414	Compressor diaphragms/vanes
CC steam units	Jet Engine	Inlet Air System and Compressors	Compressors	5420	Low pressure shaft
CC steam units	Jet Engine	Inlet Air System and Compressors	Compressors	5421	Low pressure bearings
CC steam units	Jet Engine	Inlet Air System and Compressors	Compressors	5422	Low pressure blades/buckets
CC steam units	Jet Engine	Inlet Air System and Compressors	Compressors	5429	Other low pressure problems
CC steam units	Jet Engine	Inlet Air System and Compressors	Compressors	5430	Supercharging fans
CC steam units	Jet Engine	Inlet Air System and Compressors	Compressors	5435	Compressor washing
CC steam units	Jet Engine	Inlet Air System and Compressors	Compressors	5436	Compressor shaft and bearings for two-shaft machines
CC steam units	Jet Engine	Inlet Air System and Compressors	Compressors	5439	Other compressor problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use HP compressor if only one.					

TABLE B02-69 Jet Engine: Inlet Air System and Compressors - Ducts and Filters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5400	Inlet air ducts
CC steam units	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5401	Inlet air vanes/nozzles
CC steam units	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5402	Inlet air filters
CC steam units	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5403	Inlet and exhaust cones
CC steam units	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5404	Inlet air chillers
CC steam units	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5405	Inlet air evaporative coolers
CC steam units	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5406	Inlet air foggers
CC steam units	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5409	Other inlet air problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use HP compressor if only one.					

TABLE B02-70 Jet Engine: Miscellaneous (Jet Engine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Jet Engine	Miscellaneous (Jet Engine)		5600	Reduction gear
CC steam units	Jet Engine	Miscellaneous (Jet Engine)		5601	Load shaft and bearings
CC steam units	Jet Engine	Miscellaneous (Jet Engine)		5605	Main coupling between the turbine and generator
CC steam units	Jet Engine	Miscellaneous (Jet Engine)		5606	Clutch
CC steam units	Jet Engine	Miscellaneous (Jet Engine)		5610	Intercoolers
CC steam units	Jet Engine	Miscellaneous (Jet Engine)		5620	Regenerators
CC steam units	Jet Engine	Miscellaneous (Jet Engine)		5630	Heat shields
CC steam units	Jet Engine	Miscellaneous (Jet Engine)		5640	Fire detection and extinguishing system
CC steam units	Jet Engine	Miscellaneous (Jet Engine)		5641	Fire in unit
CC steam units	Jet Engine	Miscellaneous (Jet Engine)		5645	Jet Engine Control System - data highway
CC steam units	Jet Engine	Miscellaneous (Jet Engine)		5646	Jet Engine Control System - hardware problems (including card failure)
CC steam units	Jet Engine	Miscellaneous (Jet Engine)		5647	Jet Engine Control System - internal and termination wiring
CC steam units	Jet Engine	Miscellaneous (Jet Engine)		5648	Jet Engine Control System - logic problems
CC steam units	Jet Engine	Miscellaneous (Jet Engine)		5649	Jet Engine Control System - upgrades
CC steam units	Jet Engine	Miscellaneous (Jet Engine)		5650	Other controls and instrumentation problems
CC steam units	Jet Engine	Miscellaneous (Jet Engine)		5660	Major overhaul (use for non-specific overhaul only; see page B-CCGT-2)
CC steam units	Jet Engine	Miscellaneous (Jet Engine)		5661	Engine/compressor washing
CC steam units	Jet Engine	Miscellaneous (Jet Engine)		5662	Engine exchange
CC steam units	Jet Engine	Miscellaneous (Jet Engine)		5665	Engine shafts and bearings
CC steam units	Jet Engine	Miscellaneous (Jet Engine)		5670	Hot end inspection
CC steam units	Jet Engine	Miscellaneous (Jet Engine)		5672	Boroscope inspection
CC steam units	Jet Engine	Miscellaneous (Jet Engine)		5674	General unit inspection
CC steam units	Jet Engine	Miscellaneous (Jet Engine)		5680	Vibration (not engine) in unit not attributable to bearings or other components
CC steam units	Jet Engine	Miscellaneous (Jet Engine)		5685	Engine vibration
CC steam units	Jet Engine	Miscellaneous (Jet Engine)		5686	Jet engine lockout

TABLE B02-70 Jet Engine: Miscellaneous (Jet Engine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Jet Engine	Miscellaneous (Jet Engine)		5690	Engine performance testing - individual engines (use code 9999 for total unit performance testing)
CC steam units	Jet Engine	Miscellaneous (Jet Engine)		5692	Turbine Overspeed Trip Test - Jet Engine
CC steam units	Jet Engine	Miscellaneous (Jet Engine)		5695	Synchronous condenser equipment
CC steam units	Jet Engine	Miscellaneous (Jet Engine)		5699	Other miscellaneous jet engine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-71 Jet Engine: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Jet Engine	Turbine		5480	High pressure shaft
CC steam units	Jet Engine	Turbine		5481	High pressure bearings
CC steam units	Jet Engine	Turbine		5482	High pressure blades/buckets
CC steam units	Jet Engine	Turbine		5483	High pressure nozzles/vanes
CC steam units	Jet Engine	Turbine		5484	High pressure casing/expansion joint
CC steam units	Jet Engine	Turbine		5485	Interstage gas passages
CC steam units	Jet Engine	Turbine		5486	High pressure shaft seals
CC steam units	Jet Engine	Turbine		5487	Thrust bearing
CC steam units	Jet Engine	Turbine		5489	Other high pressure problems
CC steam units	Jet Engine	Turbine		5490	Low pressure shaft
CC steam units	Jet Engine	Turbine		5491	Low pressure bearings
CC steam units	Jet Engine	Turbine		5492	Low pressure blades/buckets
CC steam units	Jet Engine	Turbine		5493	Low pressure nozzles/vanes
CC steam units	Jet Engine	Turbine		5494	Low pressure casing/expansion joints
CC steam units	Jet Engine	Turbine		5497	Other low pressure problems
CC steam units	Jet Engine	Turbine		5498	Expansion joints
CC steam units	Jet Engine	Turbine		5499	Shaft seals
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use HP if only one.					

MISCELLANEOUS

TABLE B02-72 Miscellaneous: Instruments and Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Miscellaneous	Instruments and Controls		6200	Combined cycle instruments and controls. (Report instruments and controls specific to the gas turbine, steam turbine, boiler, generator, or balance of plant using the codes for the appropriate piece of equipment.)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

PERFORMANCE

TABLE B02-73 Performance: Performance					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Performance	Performance		9997	NERC Reliability Standard Requirement
CC steam units	Performance	Performance		9998	Black start testing
CC steam units	Performance	Performance		9999	Total unit performance testing (use appropriate codes for individual component testing)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

PERSONNEL OR PROCEDURAL ERRORS

TABLE B02-74 Personnel or Procedural Errors: Personnel or Procedural Errors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Personnel or Procedural Errors	Personnel or Procedural Errors		9900	Operator error
CC steam units	Personnel or Procedural Errors	Personnel or Procedural Errors		9910	Maintenance personnel error
CC steam units	Personnel or Procedural Errors	Personnel or Procedural Errors		9920	Contractor error
CC steam units	Personnel or Procedural Errors	Personnel or Procedural Errors		9930	Operating procedure error
CC steam units	Personnel or Procedural Errors	Personnel or Procedural Errors		9940	Maintenance procedure error

TABLE B02-74 Personnel or Procedural Errors: Personnel or Procedural Errors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Personnel or Procedural Errors	Personnel or Procedural Errors		9950	Contractor procedure error
CC steam units	Personnel or Procedural Errors	Personnel or Procedural Errors		9960	Staff shortage
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

POLLUTION CONTROL EQUIPMENT

TABLE B02-75 Pollution Control Equipment: CO Reduction					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Pollution Control Equipment	CO Reduction		8840	CO Active catalyst
CC steam units	Pollution Control Equipment	CO Reduction		8841	CO Support materials
CC steam units	Pollution Control Equipment	CO Reduction		8842	CO Plugging
CC steam units	Pollution Control Equipment	CO Reduction		8845	Other CO reduction problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-76 Pollution Control Equipment: Continuous Emissions Monitoring Systems (CEMS)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8700	CEMS Certification and Recertification
CC steam units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8710	SO2 analyzer problems
CC steam units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8720	NOx analyzer problems
CC steam units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8730	CO analyzer problems
CC steam units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8740	CO2 analyzer problems
CC steam units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8750	O2 analyzer problems
CC steam units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8760	Opacity monitor problems
CC steam units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8770	Flow monitor problems

TABLE B02-76 Pollution Control Equipment: Continuous Emissions Monitoring Systems (CEMS)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8780	Data acquisition system problems
CC steam units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8790	Miscellaneous CEMS problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-77 Pollution Control Equipment: NOx Reduction Systems - Catalytic Air Heaters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8830	CAH NOx Active catalyst
CC steam units	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8831	CAH NOx Support materials
CC steam units	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8832	CAH NOx Plugging
CC steam units	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8835	Other CAH problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-78 Pollution Control Equipment: NOx Reduction Systems - Selective Catalytic Reduction Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8810	SCR NOx Reactor
CC steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8811	SCR NOx Reagent
CC steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8812	SCR NOx Catalyst
CC steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8813	SCR NOx Injection grid piping/valves
CC steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8814	SCR NOx Catalyst support material
CC steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8815	SCR NOx Soot blowers
CC steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8816	SCR NOx Plugging
CC steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8817	SCR NOx Control system

TABLE B02-78 Pollution Control Equipment: NOx Reduction Systems - Selective Catalytic Reduction Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8820	SCR NOx Ammonia injection grid piping/valves
CC steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8821	SCR NOx Ammonia tanks, piping and valves (not injection)
CC steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8822	SCR NOx Ammonia air blowers
CC steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8823	SCR NOx Other ammonia system problems
CC steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8825	Other SCR NOx problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-79 Pollution Control Equipment: NOx Reduction Systems - Selective Non-Catalytic Reduction Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8800	SNCR NOx Reagent
CC steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8801	SNCR NOx Carrier gas
CC steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8802	SNCR NOx Control system
CC steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8803	SNCR Performance Testing
CC steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8809	Other SNCR NOx problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use code 0360 for Low NOx Burners.					

REGULATORY, SAFETY, ENVIRONMENTAL

Use these codes only for events not directly attributable to equipment failures. Inspections or testing of certain equipment due to regulation are reported using the appropriate equipment cause codes, and the fact that it was a regulatory requirement noted in the verbal description section.

TABLE B02-80 Regulatory, Safety, Environmental: Other Operating Environmental Limitations					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9660	Thermal discharge limits - fossil and nuclear
CC steam units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9663	Thermal discharge limits - gas turbines
CC steam units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9664	Thermal discharge limits - jet engines
CC steam units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9670	Noise limits (not for personnel safety) - fossil and nuclear
CC steam units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9673	Noise limits (not for personnel safety) - gas turbines
CC steam units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9674	Noise limits (not for personnel safety) - jet engines
CC steam units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9677	Noise limits testing - fossil
CC steam units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9678	Noise limits testing - gas turbines
CC steam units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9679	Noise limits testing - jet engines
CC steam units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9680	Fish kill - fossil and nuclear
CC steam units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9683	Fish kill - gas turbines
CC steam units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9684	Fish kill - jet engines
CC steam units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9690	Other miscellaneous operational environmental limits - fossil and nuclear
CC steam units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9693	Other miscellaneous operational environmental limits - gas turbines
CC steam units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9694	Other miscellaneous operational environmental limits - jet engines
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-81 Regulatory, Safety, Environmental: Regulatory					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Regulatory, Safety, Environmental	Regulatory		9504	Regulatory (environmental) proceedings and hearings - regulatory agency initiated
CC steam units	Regulatory, Safety, Environmental	Regulatory		9506	Regulatory (environmental) proceedings and hearings - intervenor initiated
CC steam units	Regulatory, Safety, Environmental	Regulatory		9510	Plant modifications strictly for compliance with new or changed regulatory requirements (scrubbers, cooling towers, etc.)
CC steam units	Regulatory, Safety, Environmental	Regulatory		9520	Oil spill in Gulf of Mexico (OMC)
CC steam units	Regulatory, Safety, Environmental	Regulatory		9590	Miscellaneous regulatory (this code is primarily intended for use with event contribution code 2 to indicate that a regulatory-related factor contributed to the primary cause of the event)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-82 Regulatory, Safety, Environmental: Safety					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Regulatory, Safety, Environmental	Safety		9700	OSHA-related retrofit or inspection
CC steam units	Regulatory, Safety, Environmental	Safety		9720	Other safety problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-83 Regulatory, Safety, Environmental: Stack Emission					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Regulatory, Safety, Environmental	Stack Emission		9600	SO2 stack emissions - fossil
CC steam units	Regulatory, Safety, Environmental	Stack Emission		9603	SO2 stack emissions - gas turbines

TABLE B02-83 Regulatory, Safety, Environmental: Stack Emission					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Regulatory, Safety, Environmental	Stack Emission		9604	SO2 stack emissions - jet engines
CC steam units	Regulatory, Safety, Environmental	Stack Emission		9610	NOx stack emissions - fossil
CC steam units	Regulatory, Safety, Environmental	Stack Emission		9613	NOx stack emissions - gas turbines
CC steam units	Regulatory, Safety, Environmental	Stack Emission		9614	NOx stack emissions - jet engines
CC steam units	Regulatory, Safety, Environmental	Stack Emission		9616	CO stack emissions - fossil
CC steam units	Regulatory, Safety, Environmental	Stack Emission		9620	Particulate stack emissions - fossil
CC steam units	Regulatory, Safety, Environmental	Stack Emission		9623	Particulate stack emissions - gas turbines
CC steam units	Regulatory, Safety, Environmental	Stack Emission		9624	Particulate stack emissions - jet engines
CC steam units	Regulatory, Safety, Environmental	Stack Emission		9630	Opacity - fossil
CC steam units	Regulatory, Safety, Environmental	Stack Emission		9633	Opacity - gas turbines
CC steam units	Regulatory, Safety, Environmental	Stack Emission		9634	Opacity - jet engines
CC steam units	Regulatory, Safety, Environmental	Stack Emission		9650	Other stack/exhaust emissions - fossil (use codes 9200 to 9290 if fuel quality causes pollution control equipment problems that result in excess stack emissions)
CC steam units	Regulatory, Safety, Environmental	Stack Emission		9653	Other stack or exhaust emissions - gas turbines (use codes 9200 to 9290 if fuel quality causes pollution control equipment problems that result in excess stack emissions)
CC steam units	Regulatory, Safety, Environmental	Stack Emission		9654	Other stack or exhaust emissions - jet engines (use codes 9200 to 9290 if fuel quality causes

TABLE B02-83 Regulatory, Safety, Environmental: Stack Emission					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
					pollution control equipment problems that result in excess stack emissions)
CC steam units	Regulatory, Safety, Environmental	Stack Emission		9656	Other stack or exhaust emissions testing - fossil
CC steam units	Regulatory, Safety, Environmental	Stack Emission		9657	Other stack or exhaust emissions testing - gas turbines
CC steam units	Regulatory, Safety, Environmental	Stack Emission		9658	Other stack or exhaust emissions testing - jet engines
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Include exhaust emissions.					

STEAM TURBINE

Besides the turbine, this set includes the steam stop/control valves, turbine control system, and the turbine auxiliaries. The extraction steam codes are contained in the Balance of Plant set.

TABLE B02-84 Steam Turbine: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Steam Turbine	Controls		4290	Hydraulic system pumps
CC steam units	Steam Turbine	Controls		4291	Hydraulic system coolers
CC steam units	Steam Turbine	Controls		4292	Hydraulic system filters
CC steam units	Steam Turbine	Controls		4293	Hydraulic system pipes and valves
CC steam units	Steam Turbine	Controls		4299	Other hydraulic system problems
CC steam units	Steam Turbine	Controls		4300	Turbine supervisory system (use codes 4290 to 4299 for hydraulic oil)
CC steam units	Steam Turbine	Controls		4301	Turbine governing system
CC steam units	Steam Turbine	Controls		4302	Turbine trip devices (including instruments)
CC steam units	Steam Turbine	Controls		4303	Exhaust hood and spray controls
CC steam units	Steam Turbine	Controls		4304	Automatic turbine control systems - mechanical
CC steam units	Steam Turbine	Controls		4305	Automatic turbine control systems - mechanical - hydraulic
CC steam units	Steam Turbine	Controls		4306	Automatic turbine control systems - electro-hydraulic - analog

TABLE B02-84 Steam Turbine: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Steam Turbine	Controls		4307	Automatic turbine control systems - electro-hydraulic - digital
CC steam units	Steam Turbine	Controls		4308	Automatic turbine control systems - digital control and monitoring
CC steam units	Steam Turbine	Controls		4309	Other turbine instrument and control problems
CC steam units	Steam Turbine	Controls		4310	Steam Turbine Control System - data highway
CC steam units	Steam Turbine	Controls		4311	Steam Turbine Control System - hardware problems (including card failure)
CC steam units	Steam Turbine	Controls		4312	Steam Turbine Control System - internal and termination wiring
CC steam units	Steam Turbine	Controls		4313	Steam Turbine Control System - logic problems
CC steam units	Steam Turbine	Controls		4314	Steam Turbine Control System - upgrades
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-85 Steam Turbine: High Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Steam Turbine	High Pressure Turbine		4000	Outer casing
CC steam units	Steam Turbine	High Pressure Turbine		4001	Inner casing
CC steam units	Steam Turbine	High Pressure Turbine		4009	Nozzle bolting
CC steam units	Steam Turbine	High Pressure Turbine		4010	Nozzles and nozzle blocks
CC steam units	Steam Turbine	High Pressure Turbine		4011	Diaphragms
CC steam units	Steam Turbine	High Pressure Turbine		4012	Buckets or blades
CC steam units	Steam Turbine	High Pressure Turbine		4013	Diaphragms unit and shroud type
CC steam units	Steam Turbine	High Pressure Turbine		4014	Bucket or blade fouling
CC steam units	Steam Turbine	High Pressure Turbine		4015	Wheels or spindles
CC steam units	Steam Turbine	High Pressure Turbine		4020	Shaft seals
CC steam units	Steam Turbine	High Pressure Turbine		4021	Dummy rings
CC steam units	Steam Turbine	High Pressure Turbine		4022	Gland rings
CC steam units	Steam Turbine	High Pressure Turbine		4030	Rotor shaft

TABLE B02-85 Steam Turbine: High Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Steam Turbine	High Pressure Turbine		4040	Bearings
CC steam units	Steam Turbine	High Pressure Turbine		4041	Thrust bearings
CC steam units	Steam Turbine	High Pressure Turbine		4099	Other high pressure turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-86 Steam Turbine: Intermediate Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Steam Turbine	Intermediate Pressure Turbine		4100	Outer casing
CC steam units	Steam Turbine	Intermediate Pressure Turbine		4101	Inner casing
CC steam units	Steam Turbine	Intermediate Pressure Turbine		4109	Nozzle bolting
CC steam units	Steam Turbine	Intermediate Pressure Turbine		4110	Nozzles and nozzle blocks
CC steam units	Steam Turbine	Intermediate Pressure Turbine		4111	Diaphragms
CC steam units	Steam Turbine	Intermediate Pressure Turbine		4112	Buckets or blades
CC steam units	Steam Turbine	Intermediate Pressure Turbine		4113	Bucket or blade fouling
CC steam units	Steam Turbine	Intermediate Pressure Turbine		4115	Wheels or spindles
CC steam units	Steam Turbine	Intermediate Pressure Turbine		4120	Shaft seals
CC steam units	Steam Turbine	Intermediate Pressure Turbine		4121	Dummy rings
CC steam units	Steam Turbine	Intermediate Pressure Turbine		4122	Gland rings
CC steam units	Steam Turbine	Intermediate Pressure Turbine		4130	Rotor shaft
CC steam units	Steam Turbine	Intermediate Pressure Turbine		4140	Bearings
CC steam units	Steam Turbine	Intermediate Pressure Turbine		4141	Thrust bearings
CC steam units	Steam Turbine	Intermediate Pressure Turbine		4199	Other intermediate pressure turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-87 Steam Turbine: Low Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Steam Turbine	Low Pressure Turbine		4200	Outer casing
CC steam units	Steam Turbine	Low Pressure Turbine		4201	Inner casing
CC steam units	Steam Turbine	Low Pressure Turbine		4209	Nozzle bolting
CC steam units	Steam Turbine	Low Pressure Turbine		4210	Nozzles and nozzle blocks
CC steam units	Steam Turbine	Low Pressure Turbine		4211	Diaphragms
CC steam units	Steam Turbine	Low Pressure Turbine		4212	Buckets or blades

TABLE B02-87 Steam Turbine: Low Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Steam Turbine	Low Pressure Turbine		4213	Bucket or blade fouling
CC steam units	Steam Turbine	Low Pressure Turbine		4215	Wheels or spindles
CC steam units	Steam Turbine	Low Pressure Turbine		4220	Shaft seals
CC steam units	Steam Turbine	Low Pressure Turbine		4221	Dummy rings
CC steam units	Steam Turbine	Low Pressure Turbine		4222	Gland rings
CC steam units	Steam Turbine	Low Pressure Turbine		4230	Rotor shaft
CC steam units	Steam Turbine	Low Pressure Turbine		4240	Bearings
CC steam units	Steam Turbine	Low Pressure Turbine		4241	Thrust bearings
CC steam units	Steam Turbine	Low Pressure Turbine		4250	Other low pressure turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-88 Steam Turbine: Lube Oil					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Steam Turbine	Lube Oil		4280	Lube oil pumps
CC steam units	Steam Turbine	Lube Oil		4281	Lube oil coolers
CC steam units	Steam Turbine	Lube Oil		4282	Lube oil conditioners
CC steam units	Steam Turbine	Lube Oil		4283	Lube oil system valves and piping
CC steam units	Steam Turbine	Lube Oil		4284	Lube oil pump drive
CC steam units	Steam Turbine	Lube Oil		4289	Other lube oil system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Do not include bearing failures due to lube oil.					

TABLE B02-89 Steam Turbine: Miscellaneous (Steam Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Steam Turbine	Miscellaneous (Steam Turbine)		4400	Major turbine overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)
CC steam units	Steam Turbine	Miscellaneous (Steam Turbine)		4401	Inspection
CC steam units	Steam Turbine	Miscellaneous (Steam Turbine)		4402	Minor turbine overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
CC steam units	Steam Turbine	Miscellaneous (Steam Turbine)		4410	Turning gear and motor

TABLE B02-89 Steam Turbine: Miscellaneous (Steam Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Steam Turbine	Miscellaneous (Steam Turbine)		4411	Steam turbine gear box (single shaft configuration)
CC steam units	Steam Turbine	Miscellaneous (Steam Turbine)		4412	Steam turbine clutch (single shaft configuration)
CC steam units	Steam Turbine	Miscellaneous (Steam Turbine)		4415	Shaft coupling mechanism
CC steam units	Steam Turbine	Miscellaneous (Steam Turbine)		4420	Vibration of the turbine generator unit that cannot be attributed to a specific cause such as bearings or blades (use this code for balance moves)
CC steam units	Steam Turbine	Miscellaneous (Steam Turbine)		4430	Gland seal system
CC steam units	Steam Turbine	Miscellaneous (Steam Turbine)		4450	Water induction
CC steam units	Steam Turbine	Miscellaneous (Steam Turbine)		4460	Turbine overspeed trip test
CC steam units	Steam Turbine	Miscellaneous (Steam Turbine)		4470	Differential expansion
CC steam units	Steam Turbine	Miscellaneous (Steam Turbine)		4490	Turbine performance testing (use code 9999 for total unit performance testing)
CC steam units	Steam Turbine	Miscellaneous (Steam Turbine)		4499	Other miscellaneous steam turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-90 Steam Turbine: Piping					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Steam Turbine	Piping		4270	Crossover or under piping
CC steam units	Steam Turbine	Piping		4279	Miscellaneous turbine piping
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B02-91 Steam Turbine: Valves					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Steam Turbine	Valves		4260	Main stop valves
CC steam units	Steam Turbine	Valves		4261	Control valves
CC steam units	Steam Turbine	Valves		4262	Intercept valves
CC steam units	Steam Turbine	Valves		4263	Reheat stop valves
CC steam units	Steam Turbine	Valves		4264	Combined intercept valves

TABLE B02-91 Steam Turbine: Valves					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CC steam units	Steam Turbine	Valves		4265	Miscellaneous drain and vent valves
CC steam units	Steam Turbine	Valves		4266	Main stop valve testing
CC steam units	Steam Turbine	Valves		4267	Control valve testing
CC steam units	Steam Turbine	Valves		4268	Reheat/intercept valve testing
CC steam units	Steam Turbine	Valves		4269	Other turbine valves (including LP steam admission valves)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

Appendix B03: Index to Co-Generator Gas Turbine Unit Cause Codes

CO-GENERATOR GAS TURBINE UNITS

INDEX TO SYSTEM/COMPONENT/SUB-COMPONENT CAUSE CODE TABLES			
TABLE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**
B03-1	Balance of Plant	Auxiliary Systems	Auxiliary Steam
B03-2	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems
B03-3	Balance of Plant	Auxiliary Systems	Fire Protection System
B03-4	Balance of Plant	Auxiliary Systems	Instrument Air
B03-5	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System
B03-6	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)
B03-7	Balance of Plant	Auxiliary Systems	Open Cooling Water System
B03-8	Balance of Plant	Auxiliary Systems	Seal Air Fans
B03-9	Balance of Plant	Auxiliary Systems	Service Air
B03-10	Balance of Plant	Auxiliary Systems	Service Water (Open System)
B03-11	Balance of Plant	Circulating Water Systems	
B03-12	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators
B03-13	Balance of Plant	Condensate System	Miscellaneous (Condensate System)
B03-14	Balance of Plant	Condensate System	Polishers/Chemical Addition
B03-15	Balance of Plant	Condensate System	Pumps, Piping, and Valves
B03-16	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals
B03-17	Balance of Plant	Condensing System	Condenser Controls
B03-18	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment
B03-19	Balance of Plant	Condensing System	Miscellaneous (Condensing System)
B03-20	Balance of Plant	Condensing System	Vacuum Equipment
B03-21	Balance of Plant	Electrical	
B03-22	Balance of Plant	Extraction Steam	
B03-23	Balance of Plant	Feedwater System	
B03-24	Balance of Plant	Heater Drain Systems	
B03-25	Balance of Plant	Miscellaneous (Balance of Plant)	
B03-26	Balance of Plant	Power Station Switchyard	
B03-27	Balance of Plant	Waste Water (zero discharge) Systems	
B03-28	Expander Turbine	Expander Turbine	
B03-29	External	Catastrophe	
B03-30	External	Economic	
B03-31	External	Fuel Quality	
B03-32	External	Miscellaneous (External)	

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B03-34	Gas Turbine	Exhaust Systems	
B03-35	Gas Turbine	Fuel, Ignition, and Combustion Systems	
B03-36	Gas Turbine	Inlet Air System and Compressors	Compressors
B03-37	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters
B03-38	Gas Turbine	Miscellaneous (Gas Turbine)	
B03-39	Gas Turbine	Turbine	
B03-40	Generator	Controls	
B03-41	Generator	Cooling System	
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B03-44	Generator	Miscellaneous (Generator)	
B03-45	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply
B03-46	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)
B03-47	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems	
B03-48	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Design Limitations	
B03-49	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)
B03-50	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)
B03-51	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures	
B03-52	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections	
B03-53	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation
B03-54	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown
B03-55	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam
B03-56	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators
B03-57	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam
B03-58	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass
B03-59	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)
B03-60	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks	
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B03-62	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)	
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B03-64	Inactive States	Inactive States	
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INDEX TO SYSTEM/COMPONENT/SUB-COMPONENT CAUSE CODE TABLES			
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B03-70	Jet Engine	Miscellaneous (Jet Engine)	
B03-71	Jet Engine	Turbine	
B03-72	Miscellaneous	Instruments and Controls	
B03-73	Performance	Performance	
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B03-75	Pollution Control Equipment	CO Reduction	
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B03-77	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters
B03-78	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems
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B03-80	Regulatory, Safety, Environmental	Other Operating Environmental Limitations	
B03-81	Regulatory, Safety, Environmental	Regulatory	
B03-82	Regulatory, Safety, Environmental	Safety	
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B03-90	Steam Turbine	Piping	
B03-91	Steam Turbine	Valves	

BALANCE OF PLANT

TABLE B03-1 Balance of Plant: Auxiliary Systems - Auxiliary Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3830	Auxiliary boiler
CoG GT units	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3831	Auxiliary steam piping
CoG GT units	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3832	Auxiliary steam valves
CoG GT units	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3833	Auxiliary steam controls and instruments
CoG GT units	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3834	Auxiliary boiler tube leaks
CoG GT units	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3835	Auxiliary boiler burner management system

TABLE B03-1 Balance of Plant: Auxiliary Systems - Auxiliary Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3836	Steam transfer to other unit
CoG GT units	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3839	Other auxiliary steam problems (also see extraction steam codes 3520 to 3529; startup bypass codes 0630 to 0660; and soot blower steam code 0870)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-2 Balance of Plant: Auxiliary Systems - Closed Cooling Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3820	Closed cooling water pumps and motors
CoG GT units	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3821	Closed cooling water piping
CoG GT units	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3822	Closed cooling water valves
CoG GT units	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3823	Closed cooling water heat exchangers
CoG GT units	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3824	Closed cooling water system fouling
CoG GT units	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3825	Closed cooling water instrumentation
CoG GT units	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3826	Closed cooling water strainer
CoG GT units	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3829	Other closed cooling water system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-3 Balance of Plant: Auxiliary Systems - Fire Protection System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Auxiliary Systems	Fire Protection System	3860	Fire protection system pumps
CoG GT units	Balance of Plant	Auxiliary Systems	Fire Protection System	3861	Fire protection system piping
CoG GT units	Balance of Plant	Auxiliary Systems	Fire Protection System	3862	Fire protection system valves
CoG GT units	Balance of Plant	Auxiliary Systems	Fire Protection System	3863	Fire protection system fouling
CoG GT units	Balance of Plant	Auxiliary Systems	Fire Protection System	3864	Fire protection system instrumentation and controls
CoG GT units	Balance of Plant	Auxiliary Systems	Fire Protection System	3869	Other fire protection system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-4 Balance of Plant: Auxiliary Systems - Instrument Air					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Auxiliary Systems	Instrument Air	3850	Instrument air compressors
CoG GT units	Balance of Plant	Auxiliary Systems	Instrument Air	3851	Instrument air piping
CoG GT units	Balance of Plant	Auxiliary Systems	Instrument Air	3852	Instrument air valves
CoG GT units	Balance of Plant	Auxiliary Systems	Instrument Air	3853	Instrument air dryers
CoG GT units	Balance of Plant	Auxiliary Systems	Instrument Air	3854	N2 backup to instrument air
CoG GT units	Balance of Plant	Auxiliary Systems	Instrument Air	3859	Other instrument air problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-5 Balance of Plant: Auxiliary Systems - Low-pressure Gas Compression System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3870	Fuel Gas Compressor and Motors
CoG GT units	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3871	Fuel Gas Compressor Piping
CoG GT units	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3872	Fuel Gas Compressor Valves
CoG GT units	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3873	Fuel Gas Compressor Heat Exchangers
CoG GT units	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3874	Fuel Gas Compressor Controls and Instrumentation
CoG GT units	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3875	Fuel Gas Compressor Filters
CoG GT units	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3876	Fuel Gas Compressor Fire System
CoG GT units	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3879	Fuel Gas Compressor - other
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-6 Balance of Plant: Auxiliary Systems - Miscellaneous (Auxiliary Systems)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	3898	Miscellaneous plant auxiliary process and services instrumentation and controls

TABLE B03-6 Balance of Plant: Auxiliary Systems - Miscellaneous (Auxiliary Systems)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	3899	Other miscellaneous auxiliary system problems
CoG GT units	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	6299	Other combined cycle block problems (Use other gas turbine problem codes, other steam turbine codes, etc., whenever appropriate.)
CoG GT units	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	6399	Other coal gasification equipment problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-7 Balance of Plant: Auxiliary Systems - Open Cooling Water System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3800	Open cooling water pumps and motors
CoG GT units	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3801	Open cooling water piping
CoG GT units	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3802	Open cooling water valves
CoG GT units	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3803	Open cooling water heat exchangers
CoG GT units	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3804	Open cooling water system fouling
CoG GT units	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3805	Open cooling water system instrumentation
CoG GT units	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3806	Open cooling water strainer
CoG GT units	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3809	Other open cooling water problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-8 Balance of Plant: Auxiliary Systems - Seal Air Fans					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Auxiliary Systems	Seal Air Fans	3880	Seal air fan
CoG GT units	Balance of Plant	Auxiliary Systems	Seal Air Fans	3881	Seal air fan drive - motor
CoG GT units	Balance of Plant	Auxiliary Systems	Seal Air Fans	3882	Seal air control dampers and drives
CoG GT units	Balance of Plant	Auxiliary Systems	Seal Air Fans	3883	Seal air filters
CoG GT units	Balance of Plant	Auxiliary Systems	Seal Air Fans	3889	Other seal air fan problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-9 Balance of Plant: Auxiliary Systems - Service Air					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Auxiliary Systems	Service Air	3840	Service air compressors
CoG GT units	Balance of Plant	Auxiliary Systems	Service Air	3841	Service air piping
CoG GT units	Balance of Plant	Auxiliary Systems	Service Air	3842	Service air valves
CoG GT units	Balance of Plant	Auxiliary Systems	Service Air	3843	Service air dryers
CoG GT units	Balance of Plant	Auxiliary Systems	Service Air	3849	Other service air problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-10 Balance of Plant: Auxiliary Systems - Service Water (Open System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3810	Service water pumps and motors
CoG GT units	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3811	Service water piping
CoG GT units	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3812	Service water valves
CoG GT units	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3813	Service water heat exchangers
CoG GT units	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3814	Service water system fouling
CoG GT units	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3815	Service water strainer
CoG GT units	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3819	Other service water problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-11 Balance of Plant: Circulating Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Circulating Water Systems		3210	Circulating water pumps
CoG GT units	Balance of Plant	Circulating Water Systems		3211	Circulating water pump motors
CoG GT units	Balance of Plant	Circulating Water Systems		3220	Circulating water piping
CoG GT units	Balance of Plant	Circulating Water Systems		3221	Circulating water piping fouling
CoG GT units	Balance of Plant	Circulating Water Systems		3230	Circulating water valves
CoG GT units	Balance of Plant	Circulating Water Systems		3231	Waterbox
CoG GT units	Balance of Plant	Circulating Water Systems		3232	Condenser tube cleaning system including debris filter
CoG GT units	Balance of Plant	Circulating Water Systems		3233	Circulating water priming system
CoG GT units	Balance of Plant	Circulating Water Systems		3235	Cooling tower booster pump
CoG GT units	Balance of Plant	Circulating Water Systems		3236	Cooling tower booster motor
CoG GT units	Balance of Plant	Circulating Water Systems		3238	Cooling tower fan motors

TABLE B03-11 Balance of Plant: Circulating Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Circulating Water Systems		3239	Cooling tower fan motors - variable speed
CoG GT units	Balance of Plant	Circulating Water Systems		3240	Cooling tower fans
CoG GT units	Balance of Plant	Circulating Water Systems		3241	Cooling tower efficiency below design
CoG GT units	Balance of Plant	Circulating Water Systems		3242	Cooling tower fill damage
CoG GT units	Balance of Plant	Circulating Water Systems		3243	Cooling tower icing
CoG GT units	Balance of Plant	Circulating Water Systems		3244	Cooling tower fires
CoG GT units	Balance of Plant	Circulating Water Systems		3245	Other cooling tower problems
CoG GT units	Balance of Plant	Circulating Water Systems		3246	Cooling tower fouling
CoG GT units	Balance of Plant	Circulating Water Systems		3247	Cooling tower instrumentation
CoG GT units	Balance of Plant	Circulating Water Systems		3248	Cooling Tower Overhaul
CoG GT units	Balance of Plant	Circulating Water Systems		3250	Circulating water system instruments and controls
CoG GT units	Balance of Plant	Circulating Water Systems		3260	Traveling screens
CoG GT units	Balance of Plant	Circulating Water Systems		3261	Traveling screen fouling
CoG GT units	Balance of Plant	Circulating Water Systems		3269	Circulating water biological conditions (ie, zebra mussels)
CoG GT units	Balance of Plant	Circulating Water Systems		3270	Intake system problems other than traveling screens
CoG GT units	Balance of Plant	Circulating Water Systems		3271	Intake grating fouling
CoG GT units	Balance of Plant	Circulating Water Systems		3272	Circulating water screenwash system
CoG GT units	Balance of Plant	Circulating Water Systems		3273	Debris in circulating water from outside sources (leaves, mud, etc.)
CoG GT units	Balance of Plant	Circulating Water Systems		3280	High circulating water temperature (not due to season, tower efficiency below design, or other listed equipment problem)
CoG GT units	Balance of Plant	Circulating Water Systems		3281	Circulating water tempering system
CoG GT units	Balance of Plant	Circulating Water Systems		3282	Circulating water cooling ponds
CoG GT units	Balance of Plant	Circulating Water Systems		3285	Circulating water chemistry
CoG GT units	Balance of Plant	Circulating Water Systems		3299	Other circulating water system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-12 Balance of Plant: Condensate System - Low/Intermediate Pressure Heater and Deaerators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3339	LP heater head leaks
CoG GT units	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3340	LP heater tube leaks
CoG GT units	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3341	Other LP heater - general
CoG GT units	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3342	IP heater tube leaks
CoG GT units	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3343	Other IP heater - general
CoG GT units	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3344	Deaerator (including level control)
CoG GT units	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3345	IP heater head leaks
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-13 Balance of Plant: Condensate System - Miscellaneous (Condensate System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3360	Condensate makeup and return (including storage tanks)
CoG GT units	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3370	Condensate system controls and instrumentation (not hotwell level, heater level, or deaerator level controls; see codes 3150-3159, 3344, 3502).
CoG GT units	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3380	Condensate coolers
CoG GT units	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3399	Other miscellaneous condensate system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-14 Balance of Plant: Condensate System - Polishers/Chemical Addition					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Condensate System	Polishers/Chemical Addition	3350	Condensate polishing and filtering systems
CoG GT units	Balance of Plant	Condensate System	Polishers/Chemical Addition	3351	Chemical addition systems
CoG GT units	Balance of Plant	Condensate System	Polishers/Chemical Addition	3352	Feedwater chemistry (not specific to condenser, polishers, or chemical addition)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-15 Balance of Plant: Condensate System - Pumps, Piping, and Valves					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3300	Condensate water pre-treatment
CoG GT units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3310	Condensate/hotwell pumps
CoG GT units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3311	Condensate/hotwell pump motor
CoG GT units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3312	Condensate booster pump
CoG GT units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3313	Condensate booster pump motor
CoG GT units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3314	Condensate booster pump motor - variable speed
CoG GT units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3315	Condensate booster pump drive (other than 3313 and 3314)
CoG GT units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3320	Condensate piping
CoG GT units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3330	Condensate valves
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-16 Balance of Plant: Condensing System - Condenser Casing or Shell and Internals					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3120	Tube sheets
CoG GT units	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3121	Expansion joint
CoG GT units	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3122	Gaskets and seals
CoG GT units	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3123	Hot well

TABLE B03-16 Balance of Plant: Condensing System - Condenser Casing or Shell and Internals					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3124	Tube sheet fouling
CoG GT units	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3129	Other condenser casing or shell and internal problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-17 Balance of Plant: Condensing System - Condenser Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Condensing System	Condenser Controls	3150	Hot well level controls
CoG GT units	Balance of Plant	Condensing System	Condenser Controls	3151	Vacuum pump and air ejector controls
CoG GT units	Balance of Plant	Condensing System	Condenser Controls	3152	Air-cooled condenser controls
CoG GT units	Balance of Plant	Condensing System	Condenser Controls	3159	Other condensing system controls and instruments
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-18 Balance of Plant: Condensing System - Condenser Tubes and Support Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3110	Condenser tube leaks
CoG GT units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3111	Condenser tube fouling shell side
CoG GT units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3112	Condenser tube fouling tube side
CoG GT units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3113	Condenser tube and water box cleaning (including circulating water flow reversal)
CoG GT units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3114	Air-cooled condenser tubes
CoG GT units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3115	Air-cooled condenser pumps
CoG GT units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3116	Air-cooled condenser fans
CoG GT units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3117	Air-cooled condenser fan motors

TABLE B03-18 Balance of Plant: Condensing System - Condenser Tubes and Support Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3118	Other Air-cooled condenser problems
CoG GT units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3119	Other condenser tube casing or shell and internal problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-19 Balance of Plant: Condensing System - Miscellaneous (Condensing System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3170	Condenser inspection (use code 3110 to report looking for tube leaks)
CoG GT units	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3171	Air-cooled condenser inspections
CoG GT units	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3180	Major condenser overhaul
CoG GT units	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3185	Water side cathodic protection
CoG GT units	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3186	Auxiliary condenser and associated equipment
CoG GT units	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3190	Air leakage (for losses not attributable to previously noted equipment related codes)
CoG GT units	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3199	Other miscellaneous condensing system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-20 Balance of Plant: Condensing System - Vacuum Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Condensing System	Vacuum Equipment	3130	Air ejectors
CoG GT units	Balance of Plant	Condensing System	Vacuum Equipment	3131	Air ejector piping and valves
CoG GT units	Balance of Plant	Condensing System	Vacuum Equipment	3132	Inter and after condensers
CoG GT units	Balance of Plant	Condensing System	Vacuum Equipment	3133	Vacuum pumps
CoG GT units	Balance of Plant	Condensing System	Vacuum Equipment	3134	Vacuum pump piping and valves
CoG GT units	Balance of Plant	Condensing System	Vacuum Equipment	3135	Vacuum pump motor and auxiliaries
CoG GT units	Balance of Plant	Condensing System	Vacuum Equipment	3139	Other air extraction system problems - general

TABLE B03-20 Balance of Plant: Condensing System - Vacuum Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Condensing System	Vacuum Equipment	3149	Loss of vacuum not attributable to a particular component such as air ejectors or valves, or high back pressure not attributable to high circulating water temperature, or vacuum losses from a known cause.
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-21 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Electrical		3600	Switchyard transformers and associated cooling systems - external (OMC)
CoG GT units	Balance of Plant	Electrical		3601	Switchyard transformers and associated cooling systems - external (not OMC)
CoG GT units	Balance of Plant	Electrical		3610	Switchyard circuit breakers - external (not OMC)
CoG GT units	Balance of Plant	Electrical		3611	Switchyard circuit breakers - external (OMC)
CoG GT units	Balance of Plant	Electrical		3612	Switchyard system protection devices - external (OMC)
CoG GT units	Balance of Plant	Electrical		3613	Switchyard system protection devices - external (not OMC)
CoG GT units	Balance of Plant	Electrical		3618	Other switchyard equipment - external (not OMC)
CoG GT units	Balance of Plant	Electrical		3619	Other switchyard equipment - external (OMC)
CoG GT units	Balance of Plant	Electrical		3620	Main transformer
CoG GT units	Balance of Plant	Electrical		3621	Unit auxiliaries transformer
CoG GT units	Balance of Plant	Electrical		3622	Station service startup transformer
CoG GT units	Balance of Plant	Electrical		3623	Auxiliary generators
CoG GT units	Balance of Plant	Electrical		3624	Auxiliary generator voltage supply system

TABLE B03-21 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Electrical		3629	Other switchyard or high voltage system problems - external
CoG GT units	Balance of Plant	Electrical		3630	400-700 volt transformers
CoG GT units	Balance of Plant	Electrical		3631	400-700 volt circuit breakers
CoG GT units	Balance of Plant	Electrical		3632	400-700 volt conductors and buses
CoG GT units	Balance of Plant	Electrical		3633	400-700 volt insulators
CoG GT units	Balance of Plant	Electrical		3634	400-700 volt protection devices
CoG GT units	Balance of Plant	Electrical		3639	Other 400-700 volt problems
CoG GT units	Balance of Plant	Electrical		3640	AC instrument power transformers
CoG GT units	Balance of Plant	Electrical		3641	AC Circuit breakers
CoG GT units	Balance of Plant	Electrical		3642	AC Conductors and buses
CoG GT units	Balance of Plant	Electrical		3643	AC Inverters
CoG GT units	Balance of Plant	Electrical		3644	AC Protection devices
CoG GT units	Balance of Plant	Electrical		3649	Other AC instrument power problems
CoG GT units	Balance of Plant	Electrical		3650	DC instrument power battery chargers
CoG GT units	Balance of Plant	Electrical		3651	DC circuit breakers
CoG GT units	Balance of Plant	Electrical		3652	DC conductors and buses
CoG GT units	Balance of Plant	Electrical		3653	DC protection devices
CoG GT units	Balance of Plant	Electrical		3659	Other DC power problems
CoG GT units	Balance of Plant	Electrical		3660	4000-7000 volt transformers
CoG GT units	Balance of Plant	Electrical		3661	4000-7000 volt circuit breakers
CoG GT units	Balance of Plant	Electrical		3662	4000-7000 volt conductors and buses
CoG GT units	Balance of Plant	Electrical		3663	4000-7000 volt insulators
CoG GT units	Balance of Plant	Electrical		3664	4000-7000 volt protection devices
CoG GT units	Balance of Plant	Electrical		3669	Other 4000-7000 volt problems
CoG GT units	Balance of Plant	Electrical		3670	12-15kV transformers
CoG GT units	Balance of Plant	Electrical		3671	12-15kV circuit breakers
CoG GT units	Balance of Plant	Electrical		3672	12-15kV conductors and buses
CoG GT units	Balance of Plant	Electrical		3673	12-15kV insulators
CoG GT units	Balance of Plant	Electrical		3674	12-15kV protection devices
CoG GT units	Balance of Plant	Electrical		3679	Other 12-15kV problems
CoG GT units	Balance of Plant	Electrical		3680	Other voltage transformers
CoG GT units	Balance of Plant	Electrical		3681	Other voltage circuit breakers
CoG GT units	Balance of Plant	Electrical		3682	Other voltage conductors and buses
CoG GT units	Balance of Plant	Electrical		3683	Other voltage insulators

TABLE B03-21 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Electrical		3684	Other voltage protection devices
CoG GT units	Balance of Plant	Electrical		3689	Other voltage problems
CoG GT units	Balance of Plant	Electrical		3690	Station Service Power Distribution System, General
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-22 Balance of Plant: Extraction Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Extraction Steam		3520	HP Extraction steam piping
CoG GT units	Balance of Plant	Extraction Steam		3521	HP Extraction steam valves
CoG GT units	Balance of Plant	Extraction Steam		3522	HP Extraction steam instruments and controls
CoG GT units	Balance of Plant	Extraction Steam		3529	Other HP extraction steam system problems
CoG GT units	Balance of Plant	Extraction Steam		3530	IP Extraction steam piping
CoG GT units	Balance of Plant	Extraction Steam		3531	IP Extraction steam valves
CoG GT units	Balance of Plant	Extraction Steam		3532	IP Extraction steam instruments and controls
CoG GT units	Balance of Plant	Extraction Steam		3539	Other IP extraction steam system problems
CoG GT units	Balance of Plant	Extraction Steam		3540	LP Extraction steam piping
CoG GT units	Balance of Plant	Extraction Steam		3541	LP Extraction steam valves
CoG GT units	Balance of Plant	Extraction Steam		3542	LP Extraction steam instruments and controls
CoG GT units	Balance of Plant	Extraction Steam		3549	Other LP extraction steam system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-23 Balance of Plant: Feedwater System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Feedwater System		3401	Startup feedwater pump
CoG GT units	Balance of Plant	Feedwater System		3402	Startup feedwater pump drives - all types

TABLE B03-23 Balance of Plant: Feedwater System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Feedwater System		3407	Feedwater pump suction screens
CoG GT units	Balance of Plant	Feedwater System		3408	Feedwater pump drive - local controls
CoG GT units	Balance of Plant	Feedwater System		3409	Feedwater pump drive motor - variable speed
CoG GT units	Balance of Plant	Feedwater System		3410	Feedwater pump
CoG GT units	Balance of Plant	Feedwater System		3411	Feedwater pump drive - motor
CoG GT units	Balance of Plant	Feedwater System		3412	Feedwater pump drive - steam turbine
CoG GT units	Balance of Plant	Feedwater System		3413	Feedwater pump coupling and drive shaft
CoG GT units	Balance of Plant	Feedwater System		3414	Feedwater pump local controls
CoG GT units	Balance of Plant	Feedwater System		3415	Feedwater pump/drive lube oil system
CoG GT units	Balance of Plant	Feedwater System		3416	Other feedwater pump problems
CoG GT units	Balance of Plant	Feedwater System		3417	Feedwater pump drive - main shaft
CoG GT units	Balance of Plant	Feedwater System		3418	Feedwater pump drive - other
CoG GT units	Balance of Plant	Feedwater System		3419	Feedwater pump drive - gear
CoG GT units	Balance of Plant	Feedwater System		3420	Feedwater piping and supports
CoG GT units	Balance of Plant	Feedwater System		3430	Feedwater regulating (boiler level control) valve
CoG GT units	Balance of Plant	Feedwater System		3431	Other feedwater valves
CoG GT units	Balance of Plant	Feedwater System		3439	HP heater head leaks
CoG GT units	Balance of Plant	Feedwater System		3440	High pressure heater tube leaks
CoG GT units	Balance of Plant	Feedwater System		3441	Other high pressure heater problems (see condensate system for LP and IP heater codes)
CoG GT units	Balance of Plant	Feedwater System		3451	Feedwater booster pump suction screens
CoG GT units	Balance of Plant	Feedwater System		3452	Feedwater booster pump drive - local controls
CoG GT units	Balance of Plant	Feedwater System		3453	Feedwater booster pump drive motor - variable speed
CoG GT units	Balance of Plant	Feedwater System		3454	Feedwater booster pump
CoG GT units	Balance of Plant	Feedwater System		3455	Feedwater booster pump drive - motor
CoG GT units	Balance of Plant	Feedwater System		3456	Feedwater booster pump drive - steam turbine

TABLE B03-23 Balance of Plant: Feedwater System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Feedwater System		3457	Feedwater booster pump coupling and drive shaft
CoG GT units	Balance of Plant	Feedwater System		3458	Feedwater booster pump local controls
CoG GT units	Balance of Plant	Feedwater System		3459	Feedwater booster pump/drive lube oil system
CoG GT units	Balance of Plant	Feedwater System		3460	Other feedwater booster pump problems
CoG GT units	Balance of Plant	Feedwater System		3461	Feedwater booster pump drive - main shaft
CoG GT units	Balance of Plant	Feedwater System		3462	Feedwater booster pump drive - other
CoG GT units	Balance of Plant	Feedwater System		3463	Feedwater booster pump drive - gear
CoG GT units	Balance of Plant	Feedwater System		3499	Other feedwater system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Excluding extraction or drain systems.					

TABLE B03-24 Balance of Plant: Heater Drain Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Heater Drain Systems		3501	Heater drain pumps
CoG GT units	Balance of Plant	Heater Drain Systems		3502	Heater level control
CoG GT units	Balance of Plant	Heater Drain Systems		3503	Heater drain piping
CoG GT units	Balance of Plant	Heater Drain Systems		3504	Heater drain valves
CoG GT units	Balance of Plant	Heater Drain Systems		3505	Heater drain pump drive
CoG GT units	Balance of Plant	Heater Drain Systems		3509	Other heater drain system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-25 Balance of Plant: Miscellaneous (Balance of Plant)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3950	Process computer
CoG GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3960	Thermal derating (thermal efficiency losses in balance of plant when specific cause(s) unknown)

TABLE B03-25 Balance of Plant: Miscellaneous (Balance of Plant)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3970	Distributive Control System (DCS) - process computer
CoG GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3971	DCS - data highway
CoG GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3972	DCS - hardware problems (including card failure)
CoG GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3973	DCS - internal and termination wiring
CoG GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3974	DCS - logic problems
CoG GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3975	DCS - upgrades
CoG GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3979	Other DCS problems
CoG GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3980	Programmable Logic Controller (PLC)
CoG GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3981	PLC - data highway
CoG GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3982	PLC - hardware problems (including card failure)
CoG GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3983	PLC - internal and termination wiring
CoG GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3984	PLC - logic problems
CoG GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3985	PLC - upgrades
CoG GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3989	Other PLC problems
CoG GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3995	Powerhouse heating and ventilating systems
CoG GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3996	Air conditioning systems - rooms and areas
CoG GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3998	Balance of plant overhaul/outage
CoG GT units	Balance of Plant	Miscellaneous (Balance of Plant)		3999	Other miscellaneous balance of plant problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-26 Balance of Plant: Power Station Switchyard					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Power Station Switchyard		3700	Power Station switchyard (non generating unit equipment)
CoG GT units	Balance of Plant	Power Station Switchyard		3710	Transmission line (connected to powerhouse switchyard to 1st Substation)

TABLE B03-26 Balance of Plant: Power Station Switchyard					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Power Station Switchyard		3720	Transmission equipment at the 1st substation (see code 9300 if applicable)
CoG GT units	Balance of Plant	Power Station Switchyard		3730	Transmission equipment beyond the 1st substation (see code 9300 if applicable)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-27 Balance of Plant: Waste Water (zero discharge) Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Balance of Plant	Waste Water (zero discharge) Systems		3290	Waste water (zero discharge) tanks, pumps, and motors
CoG GT units	Balance of Plant	Waste Water (zero discharge) Systems		3291	Waste water (zero discharge) system fouling
CoG GT units	Balance of Plant	Waste Water (zero discharge) Systems		3292	Waste water (zero discharge) piping
CoG GT units	Balance of Plant	Waste Water (zero discharge) Systems		3293	Waste water (zero discharge) valves
CoG GT units	Balance of Plant	Waste Water (zero discharge) Systems		3294	Waste water (zero discharge) controls and instrumentation
CoG GT units	Balance of Plant	Waste Water (zero discharge) Systems		3295	Other waste water (zero discharge) problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

EXPANDER TURBINE

TABLE B03-28 Expander Turbine: Expander Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Expander Turbine	Expander Turbine		7800	Couplings
CoG GT units	Expander Turbine	Expander Turbine		7810	Shaft
CoG GT units	Expander Turbine	Expander Turbine		7820	Bearings
CoG GT units	Expander Turbine	Expander Turbine		7830	Blades
CoG GT units	Expander Turbine	Expander Turbine		7840	Discs
CoG GT units	Expander Turbine	Expander Turbine		7850	Spacers

TABLE B03-28 Expander Turbine: Expander Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Expander Turbine	Expander Turbine		7860	Nozzles/vanes
CoG GT units	Expander Turbine	Expander Turbine		7870	Heat shields
CoG GT units	Expander Turbine	Expander Turbine		7880	Exhaust diffusers
CoG GT units	Expander Turbine	Expander Turbine		7890	Seal oil system and seals
CoG GT units	Expander Turbine	Expander Turbine		7900	Inner casing
CoG GT units	Expander Turbine	Expander Turbine		7910	Outer exhaust casing
CoG GT units	Expander Turbine	Expander Turbine		7920	Lube oil system
CoG GT units	Expander Turbine	Expander Turbine		7930	Controls and instrumentation
CoG GT units	Expander Turbine	Expander Turbine		7940	Evactor
CoG GT units	Expander Turbine	Expander Turbine		7950	Major overhaul
CoG GT units	Expander Turbine	Expander Turbine		7960	Other expander turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

EXTERNAL

Use this set of codes to report events caused by external factors (flood, lightning, etc.); economic factors (lack of fuel, labor strikes, etc.); operator training; and transmission system problems external to the plant.

TABLE B03-29 External: Catastrophe					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	External	Catastrophe		9000	Flood
CoG GT units	External	Catastrophe		9001	Drought
CoG GT units	External	Catastrophe		9010	Fire including wildfires, not related to a specific component
CoG GT units	External	Catastrophe		9020	Lightning
CoG GT units	External	Catastrophe		9025	Geomagnetic disturbance
CoG GT units	External	Catastrophe		9030	Earthquake
CoG GT units	External	Catastrophe		9031	Tornado
CoG GT units	External	Catastrophe		9035	Hurricane
CoG GT units	External	Catastrophe		9036	Storms (ice, snow, etc)
CoG GT units	External	Catastrophe		9040	Other catastrophe
CoG GT units	External	Catastrophe		9090	Physical Security Incident
CoG GT units	External	Catastrophe		9091	Physical Security Incident (OMC)
CoG GT units	External	Catastrophe		9092	Cyber Security Incident
CoG GT units	External	Catastrophe		9093	Cyber Security Incident (OMC)

TABLE B03-29 External: Catastrophe					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-30 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	External	Economic		0000	Reserve shutdown
CoG GT units	External	Economic		9130	Failure of fuel supplier to fulfill contractual obligations or a pre-arranged deal due to physical fuel disruptions or operational impairments (e.g. force majeure on a pipeline or compressor down; making the pipeline incapable of making its firm deliveries.)
CoG GT units	External	Economic		9131	Lack of fuel – due to contractual or tariff provisions that allow for service interruption or price fluctuations during peak demand periods.
CoG GT units	External	Economic		9134	Fuel conservation
CoG GT units	External	Economic		9136	Problems with Primary Fuel for Units with Secondary Fuel Operation
CoG GT units	External	Economic		9137	Ground water or other water supply problems
CoG GT units	External	Economic		9139	Ground water or other water supply problems (OMC)
CoG GT units	External	Economic		9140	Plant modifications to burn different fuel that are not regulatory mandated
CoG GT units	External	Economic		9150	Labor strikes company-wide problems or strikes outside the company's jurisdiction such as manufacturers (delaying repairs) or transportation (fuel supply) problems.
CoG GT units	External	Economic		9151	Labor strikes direct plant management grievances that result in a walkout or strike are under plant management control.
CoG GT units	External	Economic		9160	Other economic problems

TABLE B03-30 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	External	Economic		9180	Economic (for internal use at plants only)
CoG GT units	External	Economic		9181	Economic (for internal use at plants only)
CoG GT units	External	Economic		9182	Economic (for internal use at plants only)
CoG GT units	External	Economic		9183	Economic (for internal use at plants only)
CoG GT units	External	Economic		9184	Economic (for internal use at plants only)
CoG GT units	External	Economic		9185	Economic (for internal use at plants only)
CoG GT units	External	Economic		9186	Economic (for internal use at plants only)
CoG GT units	External	Economic		9187	Economic (for internal use at plants only)
CoG GT units	External	Economic		9188	Economic (for internal use at plants only)
CoG GT units	External	Economic		9189	Economic (for internal use at plants only)
CoG GT units	External	Economic		9190	Economic (for internal use at plants only)
CoG GT units	External	Economic		9191	Economic (for internal use at plants only)
CoG GT units	External	Economic		9192	Economic (for internal use at plants only)
CoG GT units	External	Economic		9193	Economic (for internal use at plants only)
CoG GT units	External	Economic		9194	Economic (for internal use at plants only)
CoG GT units	External	Economic		9195	Economic (for internal use at plants only)
CoG GT units	External	Economic		9196	Economic (for internal use at plants only)
CoG GT units	External	Economic		9197	Economic (for internal use at plants only)

TABLE B03-30 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	External	Economic		9198	Economic (for internal use at plants only)
CoG GT units	External	Economic		9199	Economic (for internal use at plants only)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-31 External: Fuel Quality					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	External	Fuel Quality		9200	High ash content (OMC)
CoG GT units	External	Fuel Quality		9201	High ash content (not OMC)
CoG GT units	External	Fuel Quality		9205	Poor quality natural gas fuel, low heat content
CoG GT units	External	Fuel Quality		9220	High sulfur content (OMC)
CoG GT units	External	Fuel Quality		9221	High sulfur content (not OMC)
CoG GT units	External	Fuel Quality		9230	High vanadium content (OMC)
CoG GT units	External	Fuel Quality		9231	High vanadium content (not OMC)
CoG GT units	External	Fuel Quality		9240	High sodium content (OMC)
CoG GT units	External	Fuel Quality		9241	High sodium content (not OMC)
CoG GT units	External	Fuel Quality		9260	Low BTU oil (OMC)
CoG GT units	External	Fuel Quality		9261	Low BTU oil (not OMC)
CoG GT units	External	Fuel Quality		9290	Other fuel quality problems (OMC)
CoG GT units	External	Fuel Quality		9291	Other fuel quality problems (not OMC)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use code 9600 to 9650 if the fuel quality results in excess stack emissions through no fault in the pollution control equipment. Use the appropriate equipment code to report fouling and slagging.					

TABLE B03-32 External: Miscellaneous (External)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	External	Miscellaneous (External)		9300	Transmission system problems other than catastrophes (do not include switchyard problems in this category; see codes 3600 to 3629, 3720 to 3730)
CoG GT units	External	Miscellaneous (External)		9310	Operator training

TABLE B03-32 External: Miscellaneous (External)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	External	Miscellaneous (External)		9320	Other miscellaneous external problems
CoG GT units	External	Miscellaneous (External)		9340	Synchronous Condenser Operation
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

GAS TURBINE

TABLE B03-33 Gas Turbine: Auxiliary Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Gas Turbine	Auxiliary Systems		5110	Lube oil system - general
CoG GT units	Gas Turbine	Auxiliary Systems		5111	Lube oil pumps
CoG GT units	Gas Turbine	Auxiliary Systems		5112	Lube oil coolers
CoG GT units	Gas Turbine	Auxiliary Systems		5113	Lube oil valves/piping
CoG GT units	Gas Turbine	Auxiliary Systems		5114	Lube oil filters
CoG GT units	Gas Turbine	Auxiliary Systems		5115	Oil vapor extractor
CoG GT units	Gas Turbine	Auxiliary Systems		5116	Power Augmentation System Equipment
CoG GT units	Gas Turbine	Auxiliary Systems		5117	Power augmentation piping
CoG GT units	Gas Turbine	Auxiliary Systems		5118	Power augmentation valves
CoG GT units	Gas Turbine	Auxiliary Systems		5119	Power augmentation controls
CoG GT units	Gas Turbine	Auxiliary Systems		5120	Hydraulic oil system
CoG GT units	Gas Turbine	Auxiliary Systems		5121	Hydraulic oil system pumps
CoG GT units	Gas Turbine	Auxiliary Systems		5122	Hydraulic oil system piping/valves
CoG GT units	Gas Turbine	Auxiliary Systems		5130	Starting system (including motor)
CoG GT units	Gas Turbine	Auxiliary Systems		5140	Battery and charger system
CoG GT units	Gas Turbine	Auxiliary Systems		5150	Turning gear and motor
CoG GT units	Gas Turbine	Auxiliary Systems		5151	Load gear compartment
CoG GT units	Gas Turbine	Auxiliary Systems		5160	Cooling and seal air system
CoG GT units	Gas Turbine	Auxiliary Systems		5170	Cooling water system
CoG GT units	Gas Turbine	Auxiliary Systems		5180	Anti-icing system
CoG GT units	Gas Turbine	Auxiliary Systems		5190	Other auxiliary system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-34 Gas Turbine: Exhaust Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Gas Turbine	Exhaust Systems		5100	Chamber
CoG GT units	Gas Turbine	Exhaust Systems		5101	Hoods
CoG GT units	Gas Turbine	Exhaust Systems		5102	Vanes/nozzles
CoG GT units	Gas Turbine	Exhaust Systems		5103	Silencer
CoG GT units	Gas Turbine	Exhaust Systems		5104	Cones
CoG GT units	Gas Turbine	Exhaust Systems		5105	Diverter Dampers
CoG GT units	Gas Turbine	Exhaust Systems		5106	Exhaust Stack
CoG GT units	Gas Turbine	Exhaust Systems		5108	High engine exhaust temperature
CoG GT units	Gas Turbine	Exhaust Systems		5109	Other exhaust problems (including high exhaust system temperature not attributable to a specific problem)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-35 Gas Turbine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5040	Fuel tanks
CoG GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5041	Fuel piping and valves
CoG GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5042	Fuel nozzles/vanes
CoG GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5043	Fuel filters
CoG GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5044	Liquid fuel oil pump
CoG GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5046	Liquid fuel oil transfer/forwarding pump
CoG GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5047	Liquid fuel purge system
CoG GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5048	Gas fuel system including controls and instrumentation
CoG GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5049	Other fuel system problems
CoG GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5050	Ignition system

TABLE B03-35 Gas Turbine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5051	Pilot fuel piping and valves
CoG GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5052	Pilot fuel nozzles/vanes
CoG GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5053	Pilot fuel filters
CoG GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5054	Water injection system
CoG GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5060	Atomizing air system
CoG GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5065	NOx water injection system including pump
CoG GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5066	NOx steam injection system
CoG GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5070	Combustor casing
CoG GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5071	Combustor liner
CoG GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5072	Combustor caps
CoG GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5073	Flame scanners
CoG GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5074	Flashback including instrumentation
CoG GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5075	Blade path temperature spread
CoG GT units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5079	Other combustor problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-36 Gas Turbine: Inlet Air System and Compressors - Compressors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5010	High pressure shaft
CoG GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5011	High pressure bearings
CoG GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5012	High pressure blades/buckets

TABLE B03-36 Gas Turbine: Inlet Air System and Compressors - Compressors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5013	Compressor casing and bolts
CoG GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5014	Compressor diaphragms
CoG GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5015	Compressor seals
CoG GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5016	High pressure compressor bleed valves
CoG GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5017	Low pressure compressor bleed valves
CoG GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5019	Other high pressure problems
CoG GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5020	Low pressure shaft
CoG GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5021	Low pressure bearings
CoG GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5022	Low pressure blades/buckets
CoG GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5029	Other low pressure problems
CoG GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5030	Supercharging fans
CoG GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5035	Compressor washing
CoG GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5036	Compressor shaft and bearings for two-shaft machines
CoG GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5037	Inlet bleed heat valve
CoG GT units	Gas Turbine	Inlet Air System and Compressors	Compressors	5039	Other compressor problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-37 Gas Turbine: Inlet Air System and Compressors - Ducts and Filters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5000	Inlet air ducts
CoG GT units	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5001	Inlet air vanes/nozzles
CoG GT units	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5002	Inlet air filters
CoG GT units	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5003	Inlet cone
CoG GT units	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5004	Inlet air chillers
CoG GT units	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5005	Inlet air evaporative coolers
CoG GT units	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5006	Inlet air foggers
CoG GT units	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5009	Other inlet air problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-38 Gas Turbine: Miscellaneous (Gas Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5200	Reduction gear
CoG GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5201	Load shaft and bearings
CoG GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5205	Main coupling between the turbine and generator
CoG GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5206	Clutch
CoG GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5210	Intercoolers
CoG GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5220	Regenerators
CoG GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5230	Heat shields
CoG GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5240	Fire detection and extinguishing system (including hazardous gas detection system)
CoG GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5241	Fire in unit
CoG GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5245	Gas Turbine Control System - data highway
CoG GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5246	Gas Turbine Control System - hardware problems (including card failure)
CoG GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5247	Gas Turbine Control System - internal and termination wiring
CoG GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5248	Gas Turbine Control System - logic problems
CoG GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5249	Gas Turbine Control System - upgrades
CoG GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5250	Other controls and instrumentation problems
CoG GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5255	Computer
CoG GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5260	Major overhaul (use for non-specific overhaul only; see page B-CCGT-2)
CoG GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5261	Gas turbine/compressor washing
CoG GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5262	Gas turbine exchange
CoG GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5269	Combustion Inspection (CI)
CoG GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5270	Hot end inspection
CoG GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5272	Boroscope inspection
CoG GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5274	General unit inspection
CoG GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5280	Vibration (not engine) in unit not attributable to bearings or other components

TABLE B03-38 Gas Turbine: Miscellaneous (Gas Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5285	Gas turbine vibration
CoG GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5286	Gas turbine lockout
CoG GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5290	Gas turbine performance testing - individual engines (use code 9999 for total unit performance testing)
CoG GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5292	Turbine Overspeed Trip Test - Gas Turbine
CoG GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5295	Synchronous condenser equipment
CoG GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5298	Main gas filter
CoG GT units	Gas Turbine	Miscellaneous (Gas Turbine)		5299	Other miscellaneous gas turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-39 Gas Turbine: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Gas Turbine	Turbine		5080	High pressure shaft
CoG GT units	Gas Turbine	Turbine		5081	High pressure bearings
CoG GT units	Gas Turbine	Turbine		5082	High pressure blades/buckets
CoG GT units	Gas Turbine	Turbine		5083	High pressure nozzles/vanes
CoG GT units	Gas Turbine	Turbine		5084	High pressure casing/expansion joints
CoG GT units	Gas Turbine	Turbine		5085	Interstage gas passages - HP
CoG GT units	Gas Turbine	Turbine		5086	High pressure shaft seals
CoG GT units	Gas Turbine	Turbine		5087	Thrust bearing
CoG GT units	Gas Turbine	Turbine		5088	Gas turbine cooling system
CoG GT units	Gas Turbine	Turbine		5089	Other high pressure problems
CoG GT units	Gas Turbine	Turbine		5090	Low pressure shaft
CoG GT units	Gas Turbine	Turbine		5091	Low pressure bearings
CoG GT units	Gas Turbine	Turbine		5092	Low pressure blades/buckets
CoG GT units	Gas Turbine	Turbine		5093	Low pressure nozzles/vanes
CoG GT units	Gas Turbine	Turbine		5094	Low pressure casing/expansion joints
CoG GT units	Gas Turbine	Turbine		5095	Interstage gas passages - LP
CoG GT units	Gas Turbine	Turbine		5096	Low pressure shaft seals
CoG GT units	Gas Turbine	Turbine		5097	Other low pressure problems
CoG GT units	Gas Turbine	Turbine		5098	Expansion joints

TABLE B03-39 Gas Turbine: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Gas Turbine	Turbine		5099	HP to LP coupling
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use HP if only one.					

GENERATOR

This set of codes contains the generator, exciter, generator cooling systems, and generator controls. Note the main leads up to and includes the generator output breaker in this set of codes.

TABLE B03-40 Generator: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Generator	Controls		4700	Generator voltage control
CoG GT units	Generator	Controls		4710	Generator metering devices
CoG GT units	Generator	Controls		4720	Generator synchronization equipment
CoG GT units	Generator	Controls		4730	Generator current and potential transformers
CoG GT units	Generator	Controls		4740	Emergency generator trip devices
CoG GT units	Generator	Controls		4741	Frequency Trip (81 Relay)
CoG GT units	Generator	Controls		4750	Other generator controls and metering problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-41 Generator: Cooling System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Generator	Cooling System		4610	Hydrogen cooling system piping and valves
CoG GT units	Generator	Cooling System		4611	Hydrogen coolers
CoG GT units	Generator	Cooling System		4612	Hydrogen storage system
CoG GT units	Generator	Cooling System		4613	Hydrogen seals
CoG GT units	Generator	Cooling System		4619	Other hydrogen system problems
CoG GT units	Generator	Cooling System		4620	Air cooling system
CoG GT units	Generator	Cooling System		4630	Liquid cooling system
CoG GT units	Generator	Cooling System		4640	Seal oil system and seals
CoG GT units	Generator	Cooling System		4650	Other cooling system problems

TABLE B03-41 Generator: Cooling System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Report failures caused by water leaks into generator as codes 4500, 4510, etc.					

TABLE B03-42 Generator: Exciter					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Generator	Exciter		4600	Exciter drive - motor
CoG GT units	Generator	Exciter		4601	Exciter field rheostat
CoG GT units	Generator	Exciter		4602	Exciter commutator and brushes
CoG GT units	Generator	Exciter		4603	Solid state exciter element
CoG GT units	Generator	Exciter		4604	Exciter drive - shaft
CoG GT units	Generator	Exciter		4605	Exciter transformer
CoG GT units	Generator	Exciter		4609	Other exciter problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-43 Generator: Generator					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Generator	Generator		4500	Rotor windings (including damper windings and fan blades on hydro units)
CoG GT units	Generator	Generator		4510	Rotor collector rings
CoG GT units	Generator	Generator		4511	Rotor, General
CoG GT units	Generator	Generator		4512	Retaining Rings
CoG GT units	Generator	Generator		4520	Stator windings, bushings, and terminals
CoG GT units	Generator	Generator		4530	Stator core iron
CoG GT units	Generator	Generator		4535	Stator, General
CoG GT units	Generator	Generator		4536	Generator Heaters
CoG GT units	Generator	Generator		4540	Brushes and brush rigging
CoG GT units	Generator	Generator		4550	Generator bearings and lube oil system (including thrust bearings on hydro units)
CoG GT units	Generator	Generator		4551	Generator bearings
CoG GT units	Generator	Generator		4552	Generator lube oil system

TABLE B03-43 Generator: Generator					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Generator	Generator		4555	Bearing cooling system
CoG GT units	Generator	Generator		4560	Generator vibration (excluding vibration due to failed bearing and other components)
CoG GT units	Generator	Generator		4570	Generator casing
CoG GT units	Generator	Generator		4580	Generator end bells and bolting
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-44 Generator: Miscellaneous (Generator)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Generator	Miscellaneous (Generator)		4800	Generator main leads
CoG GT units	Generator	Miscellaneous (Generator)		4805	Generator Bus Duct Cooling System
CoG GT units	Generator	Miscellaneous (Generator)		4810	Generator output breaker
CoG GT units	Generator	Miscellaneous (Generator)		4830	Major generator overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)
CoG GT units	Generator	Miscellaneous (Generator)		4831	Minor generator overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
CoG GT units	Generator	Miscellaneous (Generator)		4840	Inspection
CoG GT units	Generator	Miscellaneous (Generator)		4841	Generator doble testing
CoG GT units	Generator	Miscellaneous (Generator)		4842	Reactive and capability testing
CoG GT units	Generator	Miscellaneous (Generator)		4850	Core monitor alarm
CoG GT units	Generator	Miscellaneous (Generator)		4860	Generator neutral grounding equipment
CoG GT units	Generator	Miscellaneous (Generator)		4899	Other miscellaneous generator problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

HEAT RECOVERY STEAM GENERATOR (HRSG)

(Waste Heat Boiler)

TABLE B03-45 Heat Recovery Steam Generator (HRSG): HRSG Boiler Air and Gas Systems - Air Supply					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1400	Forced draft fans
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1401	Forced draft fan dampers
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1407	Forced draft fan lubrication system
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1410	Forced draft fan motors
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1411	Forced draft fan motors - variable speed
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1412	Forced draft fan drives (other than motor)
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1415	Forced draft fan controls
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1420	Other forced draft fan problems
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1456	Induced draft fan dampers
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-46 Heat Recovery Steam Generator (HRSG): HRSG Boiler Air and Gas Systems - Miscellaneous (Boiler Air and Gas Systems)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1590	Stacks (use code 8430 for stack problems due to pollution control equipment)
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1591	Stack damper and linkage
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1592	Stack damper linkage motors
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1599	Other miscellaneous boiler air and gas system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-50 Heat Recovery Steam Generator (HRSG): HRSG Boiler Fuel Supply - Oil and Gas Systems (except light off)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	440	Fuel oil pumps (general)
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	441	Fuel oil pumps (burner supply)
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	442	Fuel oil pumps (forwarding/transfer)
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	443	Fuel oil (burner supply) pump drives
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	444	Fuel oil (forwarding/transfer) pump drives
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	450	Fuel oil heaters
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	460	Fuel oil atomizers
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	470	Oil and gas fires
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	480	Other oil and gas fuel supply problems (see codes 0360-0410 for burner problems)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-51 Heat Recovery Steam Generator (HRSG): HRSG Boiler Internals and Structures					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		800	Drums and drum internals (single drum only)
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		801	HP Drum (including drum level trips not attributable to other causes)
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		802	IP Drum (including drum level trips not attributable to other causes)
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		803	LP Drum (including drum level trips not attributable to other causes)

TABLE B03-51 Heat Recovery Steam Generator (HRSG): HRSG Boiler Internals and Structures					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		810	Boiler supports and structures (use code 1320 for tube supports)
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		820	Casing
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		830	Doors
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		840	Refractory and insulation
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		845	Windbox expansion joints
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		847	Other expansion joints
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		848	Inlet panel
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		850	Other internal or structural problems
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		855	Drum relief/safety valves (single drum only)
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		856	HP Drum relief/safety valves
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		857	IP Drum relief/safety valves
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		858	LP Drum relief/safety valves
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		859	Tube external fins/membranes
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-52 Heat Recovery Steam Generator (HRSG): HRSG Boiler Overhaul and Inspections					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1800	Major boiler overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)

TABLE B03-52 Heat Recovery Steam Generator (HRSG): HRSG Boiler Overhaul and Inspections					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1801	Minor boiler overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1810	Other boiler inspections
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1811	Boiler Inspections - problem identification / investigation
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1812	Boiler Inspections - scheduled or routine
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1820	Chemical cleaning/steam blows
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-53 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - Boiler Recirculation					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation	740	Boiler recirculation pumps
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation	741	Boiler recirculation pumps - motors
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation	750	Boiler recirculation piping including downcomers
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation	760	Boiler recirculation valves
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation	770	Other boiler recirculation problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-54 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - Feedwater and Blowdown					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	670	Feedwater piping downstream of feedwater regulating valve
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	680	Feedwater valves (not feedwater regulating valve)

TABLE B03-54 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - Feedwater and Blowdown					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	690	Other feedwater problems downstream of feedwater regulating valve (use codes 3401 to 3499 for remainder of feedwater system)
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	700	Blowdown system valves
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	710	Blowdown system piping
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	720	Blowdown system controls / instrumentation
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	730	Other blowdown system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-55 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Cold and Hot Reheat Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	540	Hot reheat steam piping up to turbine stop valves
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	541	Cold reheat steam piping up to boiler
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	550	Reheat steam relief/safety valves
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	560	Other hot reheat steam valves (not including turbine stop or intercept valves)
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	561	Other cold reheat steam valves (not including turbine stop or intercept valves)
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	570	Other reheat steam problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-56 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Desuperheaters/Attemperators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6140	HP Desuperheater/attemperator piping - Greater than 600 PSIG.
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6141	HP Desuperheater/attemperator valves
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6142	HP Desuperheater/attemperator spray nozzles
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6143	HP Desuperheater/attemperator drums
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6144	Other HP desuperheater/attemperator problems
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6145	IP Desuperheater/attemperator piping - Between 200-600 PSIG
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6146	IP Desuperheater/attemperator valves
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6147	IP Desuperheater/attemperator spray nozzles
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6148	IP Desuperheater/attemperator drums
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6149	Other IP desuperheater/attemperator problems
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6150	LP Desuperheater/attemperator piping - Less than 200 PSIG
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6151	LP Desuperheater/attemperator valves
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6152	LP Desuperheater/attemperator spray nozzles
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6153	LP Desuperheater/attemperator drums
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6154	Other LP desuperheater/attemperator problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-57 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Main Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	500	Main steam piping up to turbine stop valves
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	510	Main steam relief/safety valves off superheater
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	520	Other main steam valves (including vent and drain valves but not including the turbine stop valves)
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	530	Other main steam system problems
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6110	HP steam piping up to turbine stop valves - Greater than 600 PSIG (see 0790 for piping supports)
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6111	HP steam relief/safety valves
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6112	Other HP steam valves (including vent and drain valves but not including the turbine stop valves)
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6113	Other HP steam system problems
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6114	HP steam isolation/boundary valves
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6120	IP steam piping up to turbine stop valves - Between 200 & 600 PSIG (see 0790 for piping supports)
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6121	IP steam relief/safety valves
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6122	Other IP steam valves (including vent and drain valves but not including the turbine stop valves)
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6123	Other IP steam system problems

TABLE B03-57 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Main Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6124	IP steam isolation/boundary valves
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6130	LP steam piping up to turbine stop valves - Less than 200 PSIG (see 0790 for piping supports)
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6131	LP steam relief/safety valves
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6132	Other LP steam valves (including vent and drain valves but not including the turbine stop valves)
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6133	Other LP steam system problems
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6134	Other main steam valves (including vent and drain valves but not including the turbine stop valves)
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6135	LP steam isolation/boundary valves
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-58 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Startup Bypass					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6160	HP Startup bypass system piping (including drain lines up to heaters or condenser) - Greater than 600 PSIG
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6161	HP Startup bypass system valves
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6162	HP Startup bypass tanks or flash tanks
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6163	Other HP startup bypass system problems
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6164	HP startup bypass instrumentation and controls

TABLE B03-58 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Startup Bypass					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6170	IP Startup bypass system piping (including drain lines up to heaters or condenser) - Between 200-600 PSIG
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6171	IP Startup bypass system valves
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6172	IP Startup bypass tanks or flash tanks
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6173	Other IP startup bypass system problems
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6174	IP startup bypass instrumentation and controls
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6180	LP Startup bypass system piping (including drain lines up to heaters or condenser) - Less than 200 PSIG
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6181	LP Startup bypass system valves
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6182	LP Startup bypass tanks or flash tanks
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6183	Other LP startup bypass system problems
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6184	LP startup bypass instrumentation and controls
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-59 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - Miscellaneous (Piping)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)	775	Economizer piping
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)	780	Headers between tube bundles
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)	782	Headers and caps

TABLE B03-59 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - Miscellaneous (Piping)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)	790	Pipe hangers, brackets, supports (general)
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)	799	Other miscellaneous piping system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-60 Heat Recovery Steam Generator (HRSG): HRSG Boiler Tube Leaks					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6005	HP Evaporator tubes
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6006	IP Evaporator tubes
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6007	LP Evaporator tubes
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6010	HP superheater
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6011	HP reheater
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6012	HP economizer
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6020	IP superheater
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6021	IP reheater
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6022	IP economizer
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6030	LP reheater
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6031	LP superheater
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6032	LP economizer
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6090	Other HRSG tube problems

TABLE B03-60 Heat Recovery Steam Generator (HRSG): HRSG Boiler Tube Leaks					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use code 0859 for tube/membrane failures.					

TABLE B03-61 Heat Recovery Steam Generator (HRSG): HRSG Boiler Water Condition					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Water Condition		1850	Boiler water condition (not feedwater water quality)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-62 Heat Recovery Steam Generator (HRSG): Miscellaneous (HRSG Boiler)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		1980	Boiler safety valve test
CoG GT units	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		1990	Boiler performance testing (use code 9999 for total unit performance testing)
CoG GT units	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		1999	Boiler, miscellaneous
CoG GT units	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		6000	Heat recovery steam generator to gas turbine connecting equipment. For additional codes, use Fossil Steam Cause Codes 0010 to 1999.
CoG GT units	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		6100	Steam turbine to gas turbine coupling. For additional codes, use Fossil Steam Cause Codes 4000 to 4499.
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use more specific codes - other slagging and fouling problems, other control problems, etc. whenever possible. Describe miscellaneous problems in the verbal description.					

TABLE B03-63 Heat Recovery Steam Generator (HRSG): Miscellaneous HRSG Boiler Tube Problems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1300	Water side fouling
CoG GT units	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1305	Fireside cleaning (which requires a full outage) Use code 1200 for cleanings that cause deratings.
CoG GT units	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1310	Water side cleaning (acid cleaning)
CoG GT units	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1320	Tube supports/attachments
CoG GT units	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1330	Slag fall damage
CoG GT units	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1340	Tube modifications (including addition and removal of tubes)
CoG GT units	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1350	Other miscellaneous boiler tube problems
CoG GT units	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1360	Boiler drains system
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

INACTIVE STATES

TABLE B03-64 Inactive States: Inactive States					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Inactive States	Inactive States		2	Inactive Reserve Shutdown
CoG GT units	Inactive States	Inactive States		9990	Retired unit
CoG GT units	Inactive States	Inactive States		9991	Mothballed unit
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

JET ENGINE

TABLE B03-65 Jet Engine: Auxiliary Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Jet Engine	Auxiliary Systems		5510	Lube oil system
CoG GT units	Jet Engine	Auxiliary Systems		5516	Power Augmentation System Equipment

TABLE B03-65 Jet Engine: Auxiliary Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Jet Engine	Auxiliary Systems		5520	Hydraulic oil system
CoG GT units	Jet Engine	Auxiliary Systems		5530	Starting system (including motor)
CoG GT units	Jet Engine	Auxiliary Systems		5540	Battery and charger system
CoG GT units	Jet Engine	Auxiliary Systems		5550	Turning gear and motor
CoG GT units	Jet Engine	Auxiliary Systems		5551	Load gear compartment
CoG GT units	Jet Engine	Auxiliary Systems		5560	Cooling and seal air system
CoG GT units	Jet Engine	Auxiliary Systems		5570	Cooling water system
CoG GT units	Jet Engine	Auxiliary Systems		5580	Anti-icing system
CoG GT units	Jet Engine	Auxiliary Systems		5590	Other auxiliary system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-66 Jet Engine: Exhaust Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Jet Engine	Exhaust Systems		5500	Chamber
CoG GT units	Jet Engine	Exhaust Systems		5501	Hoods
CoG GT units	Jet Engine	Exhaust Systems		5502	Vanes/nozzles
CoG GT units	Jet Engine	Exhaust Systems		5503	Silencer
CoG GT units	Jet Engine	Exhaust Systems		5504	Cones
CoG GT units	Jet Engine	Exhaust Systems		5505	Diverter Dampers
CoG GT units	Jet Engine	Exhaust Systems		5508	High engine exhaust temperature
CoG GT units	Jet Engine	Exhaust Systems		5509	Other exhaust problems (including high exhaust temperature not attributable to a specific problem)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-67 Jet Engine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5440	Fuel tanks
CoG GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5441	Fuel piping and valves
CoG GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5442	Fuel nozzles/vanes

TABLE B03-67 Jet Engine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5443	Fuel filters
CoG GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5444	Liquid fuel oil pump
CoG GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5445	Liquid fuel oil transfer/forwarding pump
CoG GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5446	Liquid fuel purge system
CoG GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5447	Gas fuel system including controls and instrumentation
CoG GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5449	Other fuel system problems
CoG GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5450	Ignition system
CoG GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5451	Pilot fuel piping and valves
CoG GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5452	Pilot fuel nozzles/vanes
CoG GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5453	Pilot fuel filters
CoG GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5454	Water injection system
CoG GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5455	Fuel nozzle/vane cooling air system
CoG GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5460	Atomizing air system
CoG GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5470	Combustor casing
CoG GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5471	Combustor liner
CoG GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5472	Combustor caps
CoG GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5473	Flame scanners
CoG GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5474	Flashback (including instrumentation)

TABLE B03-67 Jet Engine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5475	Blade path temperature spread
CoG GT units	Jet Engine	Fuel, Ignition, and Combustion Systems		5479	Other combustor problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-68 Jet Engine: Inlet Air System and Compressors - Compressors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Jet Engine	Inlet Air System and Compressors	Compressors	5410	High pressure shaft
CoG GT units	Jet Engine	Inlet Air System and Compressors	Compressors	5411	High pressure bearings
CoG GT units	Jet Engine	Inlet Air System and Compressors	Compressors	5412	High pressure blades/buckets
CoG GT units	Jet Engine	Inlet Air System and Compressors	Compressors	5413	Other high pressure problems
CoG GT units	Jet Engine	Inlet Air System and Compressors	Compressors	5414	Compressor diaphragms/vanes
CoG GT units	Jet Engine	Inlet Air System and Compressors	Compressors	5420	Low pressure shaft
CoG GT units	Jet Engine	Inlet Air System and Compressors	Compressors	5421	Low pressure bearings
CoG GT units	Jet Engine	Inlet Air System and Compressors	Compressors	5422	Low pressure blades/buckets
CoG GT units	Jet Engine	Inlet Air System and Compressors	Compressors	5429	Other low pressure problems
CoG GT units	Jet Engine	Inlet Air System and Compressors	Compressors	5430	Supercharging fans
CoG GT units	Jet Engine	Inlet Air System and Compressors	Compressors	5435	Compressor washing
CoG GT units	Jet Engine	Inlet Air System and Compressors	Compressors	5436	Compressor shaft and bearings for two-shaft machines
CoG GT units	Jet Engine	Inlet Air System and Compressors	Compressors	5439	Other compressor problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use HP compressor if only one.					

TABLE B03-69 Jet Engine: Inlet Air System and Compressors - Ducts and Filters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5400	Inlet air ducts
CoG GT units	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5401	Inlet air vanes/nozzles
CoG GT units	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5402	Inlet air filters
CoG GT units	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5403	Inlet and exhaust cones
CoG GT units	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5404	Inlet air chillers
CoG GT units	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5405	Inlet air evaporative coolers
CoG GT units	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5406	Inlet air foggers

TABLE B03-69 Jet Engine: Inlet Air System and Compressors - Ducts and Filters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5409	Other inlet air problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use HP compressor if only one.					

TABLE B03-70 Jet Engine: Miscellaneous (Jet Engine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Jet Engine	Miscellaneous (Jet Engine)		5600	Reduction gear
CoG GT units	Jet Engine	Miscellaneous (Jet Engine)		5601	Load shaft and bearings
CoG GT units	Jet Engine	Miscellaneous (Jet Engine)		5605	Main coupling between the turbine and generator
CoG GT units	Jet Engine	Miscellaneous (Jet Engine)		5606	Clutch
CoG GT units	Jet Engine	Miscellaneous (Jet Engine)		5610	Intercoolers
CoG GT units	Jet Engine	Miscellaneous (Jet Engine)		5620	Regenerators
CoG GT units	Jet Engine	Miscellaneous (Jet Engine)		5630	Heat shields
CoG GT units	Jet Engine	Miscellaneous (Jet Engine)		5640	Fire detection and extinguishing system
CoG GT units	Jet Engine	Miscellaneous (Jet Engine)		5641	Fire in unit
CoG GT units	Jet Engine	Miscellaneous (Jet Engine)		5645	Jet Engine Control System - data highway
CoG GT units	Jet Engine	Miscellaneous (Jet Engine)		5646	Jet Engine Control System - hardware problems (including card failure)
CoG GT units	Jet Engine	Miscellaneous (Jet Engine)		5647	Jet Engine Control System - internal and termination wiring
CoG GT units	Jet Engine	Miscellaneous (Jet Engine)		5648	Jet Engine Control System - logic problems
CoG GT units	Jet Engine	Miscellaneous (Jet Engine)		5649	Jet Engine Control System - upgrades
CoG GT units	Jet Engine	Miscellaneous (Jet Engine)		5650	Other controls and instrumentation problems
CoG GT units	Jet Engine	Miscellaneous (Jet Engine)		5660	Major overhaul (use for non-specific overhaul only; see page B-CCGT-2)
CoG GT units	Jet Engine	Miscellaneous (Jet Engine)		5661	Engine/compressor washing
CoG GT units	Jet Engine	Miscellaneous (Jet Engine)		5662	Engine exchange
CoG GT units	Jet Engine	Miscellaneous (Jet Engine)		5665	Engine shafts and bearings
CoG GT units	Jet Engine	Miscellaneous (Jet Engine)		5670	Hot end inspection
CoG GT units	Jet Engine	Miscellaneous (Jet Engine)		5672	Boroscope inspection

TABLE B03-70 Jet Engine: Miscellaneous (Jet Engine)					
CoG GT units	Jet Engine	Miscellaneous (Jet Engine)		5674	General unit inspection
CoG GT units	Jet Engine	Miscellaneous (Jet Engine)		5680	Vibration (not engine) in unit not attributable to bearings or other components
CoG GT units	Jet Engine	Miscellaneous (Jet Engine)		5685	Engine vibration
CoG GT units	Jet Engine	Miscellaneous (Jet Engine)		5686	Jet engine lockout
CoG GT units	Jet Engine	Miscellaneous (Jet Engine)		5690	Engine performance testing - individual engines (use code 9999 for total unit performance testing)
CoG GT units	Jet Engine	Miscellaneous (Jet Engine)		5692	Turbine Overspeed Trip Test - Jet Engine
CoG GT units	Jet Engine	Miscellaneous (Jet Engine)		5695	Synchronous condenser equipment
CoG GT units	Jet Engine	Miscellaneous (Jet Engine)		5699	Other miscellaneous jet engine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-71 Jet Engine: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Jet Engine	Turbine		5480	High pressure shaft
CoG GT units	Jet Engine	Turbine		5481	High pressure bearings
CoG GT units	Jet Engine	Turbine		5482	High pressure blades/buckets
CoG GT units	Jet Engine	Turbine		5483	High pressure nozzles/vanes
CoG GT units	Jet Engine	Turbine		5484	High pressure casing/expansion joint
CoG GT units	Jet Engine	Turbine		5485	Interstage gas passages
CoG GT units	Jet Engine	Turbine		5486	High pressure shaft seals
CoG GT units	Jet Engine	Turbine		5487	Thrust bearing
CoG GT units	Jet Engine	Turbine		5489	Other high pressure problems
CoG GT units	Jet Engine	Turbine		5490	Low pressure shaft
CoG GT units	Jet Engine	Turbine		5491	Low pressure bearings
CoG GT units	Jet Engine	Turbine		5492	Low pressure blades/buckets
CoG GT units	Jet Engine	Turbine		5493	Low pressure nozzles/vanes
CoG GT units	Jet Engine	Turbine		5494	Low pressure casing/expansion joints
CoG GT units	Jet Engine	Turbine		5497	Other low pressure problems
CoG GT units	Jet Engine	Turbine		5498	Expansion joints
CoG GT units	Jet Engine	Turbine		5499	Shaft seals
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use HP if only one.					

MISCELLANEOUS

TABLE B03-72 Miscellaneous: Instruments and Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Miscellaneous	Instruments and Controls		6200	Combined cycle instruments and controls. (Report instruments and controls specific to the gas turbine, steam turbine, boiler, generator, or balance of plant using the codes for the appropriate piece of equipment.)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

PERFORMANCE

TABLE B03-73 Performance: Performance					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Performance	Performance		9997	NERC Reliability Standard Requirement
CoG GT units	Performance	Performance		9998	Black start testing
CoG GT units	Performance	Performance		9999	Total unit performance testing (use appropriate codes for individual component testing)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

PERSONNEL OR PROCEDURAL ERRORS

TABLE B03-74 Personnel or Procedural Errors: Personnel or Procedural Errors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Personnel or Procedural Errors	Personnel or Procedural Errors		9900	Operator error
CoG GT units	Personnel or Procedural Errors	Personnel or Procedural Errors		9910	Maintenance personnel error
CoG GT units	Personnel or Procedural Errors	Personnel or Procedural Errors		9920	Contractor error
CoG GT units	Personnel or Procedural Errors	Personnel or Procedural Errors		9930	Operating procedure error
CoG GT units	Personnel or Procedural Errors	Personnel or Procedural Errors		9940	Maintenance procedure error

TABLE B03-74 Personnel or Procedural Errors: Personnel or Procedural Errors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Personnel or Procedural Errors	Personnel or Procedural Errors		9950	Contractor procedure error
CoG GT units	Personnel or Procedural Errors	Personnel or Procedural Errors		9960	Staff shortage
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

POLLUTION CONTROL EQUIPMENT

TABLE B03-75 Pollution Control Equipment: CO Reduction					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Pollution Control Equipment	CO Reduction		8840	CO Active catalyst
CoG GT units	Pollution Control Equipment	CO Reduction		8841	CO Support materials
CoG GT units	Pollution Control Equipment	CO Reduction		8842	CO Plugging
CoG GT units	Pollution Control Equipment	CO Reduction		8845	Other CO reduction problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-76 Pollution Control Equipment: Continuous Emissions Monitoring Systems (CEMS)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8700	CEMS Certification and Recertification
CoG GT units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8710	SO2 analyzer problems
CoG GT units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8720	NOx analyzer problems
CoG GT units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8730	CO analyzer problems
CoG GT units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8740	CO2 analyzer problems
CoG GT units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8750	O2 analyzer problems
CoG GT units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8760	Opacity monitor problems
CoG GT units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8770	Flow monitor problems
CoG GT units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8780	Data acquisition system problems
CoG GT units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8790	Miscellaneous CEMS problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-77 Pollution Control Equipment: NOx Reduction Systems - Catalytic Air Heaters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8830	CAH NOx Active catalyst
CoG GT units	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8831	CAH NOx Support materials
CoG GT units	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8832	CAH NOx Plugging
CoG GT units	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8835	Other CAH problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-78 Pollution Control Equipment: NOx Reduction Systems - Selective Catalytic Reduction Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8810	SCR NOx Reactor
CoG GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8811	SCR NOx Reagent
CoG GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8812	SCR NOx Catalyst
CoG GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8813	SCR NOx Injection grid piping/valves
CoG GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8814	SCR NOx Catalyst support material
CoG GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8815	SCR NOx Soot blowers
CoG GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8816	SCR NOx Plugging
CoG GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8817	SCR NOx Control system
CoG GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8820	SCR NOx Ammonia injection grid piping/valves
CoG GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8821	SCR NOx Ammonia tanks, piping and valves (not injection)
CoG GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8822	SCR NOx Ammonia air blowers
CoG GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8823	SCR NOx Other ammonia system problems
CoG GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8825	Other SCR NOx problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-79 Pollution Control Equipment: NOx Reduction Systems - Selective Non-Catalytic Reduction Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8800	SNCR NOx Reagent

TABLE B03-79 Pollution Control Equipment: NOx Reduction Systems - Selective Non-Catalytic Reduction Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8801	SNCR NOx Carrier gas
CoG GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8802	SNCR NOx Control system
CoG GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8803	SNCR Performance Testing
CoG GT units	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8809	Other SNCR NOx problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use code 0360 for Low NOx Burners.					

REGULATORY, SAFETY, ENVIRONMENTAL

Use these codes only for events not directly attributable to equipment failures. Inspections or testing of certain equipment due to regulation are reported using the appropriate equipment cause codes, and the fact that it was a regulatory requirement noted in the verbal description section.

TABLE B03-80 Regulatory, Safety, Environmental: Other Operating Environmental Limitations					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9660	Thermal discharge limits - fossil and nuclear
CoG GT units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9663	Thermal discharge limits - gas turbines
CoG GT units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9664	Thermal discharge limits - jet engines
CoG GT units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9670	Noise limits (not for personnel safety) - fossil and nuclear
CoG GT units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9673	Noise limits (not for personnel safety) - gas turbines
CoG GT units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9674	Noise limits (not for personnel safety) - jet engines
CoG GT units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9677	Noise limits testing - fossil
CoG GT units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9678	Noise limits testing - gas turbines
CoG GT units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9679	Noise limits testing - jet engines
CoG GT units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9680	Fish kill - fossil and nuclear

TABLE B03-80 Regulatory, Safety, Environmental: Other Operating Environmental Limitations					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9683	Fish kill - gas turbines
CoG GT units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9684	Fish kill - jet engines
CoG GT units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9690	Other miscellaneous operational environmental limits - fossil and nuclear
CoG GT units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9693	Other miscellaneous operational environmental limits - gas turbines
CoG GT units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9694	Other miscellaneous operational environmental limits - jet engines
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-81 Regulatory, Safety, Environmental: Regulatory					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Regulatory, Safety, Environmental	Regulatory		9504	Regulatory (environmental) proceedings and hearings - regulatory agency initiated
CoG GT units	Regulatory, Safety, Environmental	Regulatory		9506	Regulatory (environmental) proceedings and hearings - intervenor initiated
CoG GT units	Regulatory, Safety, Environmental	Regulatory		9510	Plant modifications strictly for compliance with new or changed regulatory requirements (scrubbers, cooling towers, etc.)
CoG GT units	Regulatory, Safety, Environmental	Regulatory		9520	Oil spill in Gulf of Mexico (OMC)
CoG GT units	Regulatory, Safety, Environmental	Regulatory		9590	Miscellaneous regulatory (this code is primarily intended for use with event contribution code 2 to indicate that a regulatory-related factor contributed to the primary cause of the event)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-82 Regulatory, Safety, Environmental: Safety					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Regulatory, Safety, Environmental	Safety		9700	OSHA-related retrofit or inspection
CoG GT units	Regulatory, Safety, Environmental	Safety		9720	Other safety problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-83 Regulatory, Safety, Environmental: Stack Emission					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Regulatory, Safety, Environmental	Stack Emission		9600	SO2 stack emissions - fossil
CoG GT units	Regulatory, Safety, Environmental	Stack Emission		9603	SO2 stack emissions - gas turbines
CoG GT units	Regulatory, Safety, Environmental	Stack Emission		9604	SO2 stack emissions - jet engines
CoG GT units	Regulatory, Safety, Environmental	Stack Emission		9610	NOx stack emissions - fossil
CoG GT units	Regulatory, Safety, Environmental	Stack Emission		9613	NOx stack emissions - gas turbines
CoG GT units	Regulatory, Safety, Environmental	Stack Emission		9614	NOx stack emissions - jet engines
CoG GT units	Regulatory, Safety, Environmental	Stack Emission		9616	CO stack emissions - fossil
CoG GT units	Regulatory, Safety, Environmental	Stack Emission		9620	Particulate stack emissions - fossil
CoG GT units	Regulatory, Safety, Environmental	Stack Emission		9623	Particulate stack emissions - gas turbines
CoG GT units	Regulatory, Safety, Environmental	Stack Emission		9624	Particulate stack emissions - jet engines
CoG GT units	Regulatory, Safety, Environmental	Stack Emission		9630	Opacity - fossil
CoG GT units	Regulatory, Safety, Environmental	Stack Emission		9633	Opacity - gas turbines
CoG GT units	Regulatory, Safety, Environmental	Stack Emission		9634	Opacity - jet engines

TABLE B03-83 Regulatory, Safety, Environmental: Stack Emission					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Regulatory, Safety, Environmental	Stack Emission		9650	Other stack/exhaust emissions - fossil (use codes 9200 to 9290 if fuel quality causes pollution control equipment problems that result in excess stack emissions)
CoG GT units	Regulatory, Safety, Environmental	Stack Emission		9653	Other stack or exhaust emissions - gas turbines (use codes 9200 to 9290 if fuel quality causes pollution control equipment problems that result in excess stack emissions)
CoG GT units	Regulatory, Safety, Environmental	Stack Emission		9654	Other stack or exhaust emissions - jet engines (use codes 9200 to 9290 if fuel quality causes pollution control equipment problems that result in excess stack emissions)
CoG GT units	Regulatory, Safety, Environmental	Stack Emission		9656	Other stack or exhaust emissions testing - fossil
CoG GT units	Regulatory, Safety, Environmental	Stack Emission		9657	Other stack or exhaust emissions testing - gas turbines
CoG GT units	Regulatory, Safety, Environmental	Stack Emission		9658	Other stack or exhaust emissions testing - jet engines
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Include exhaust emissions.					

STEAM TURBINE

Besides the turbine, this set includes the steam stop/control valves, turbine control system, and the turbine auxiliaries. The extraction steam codes are contained in the Balance of Plant set.

TABLE B03-84 Steam Turbine: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Steam Turbine	Controls		4290	Hydraulic system pumps
CoG GT units	Steam Turbine	Controls		4291	Hydraulic system coolers
CoG GT units	Steam Turbine	Controls		4292	Hydraulic system filters
CoG GT units	Steam Turbine	Controls		4293	Hydraulic system pipes and valves

TABLE B03-84 Steam Turbine: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Steam Turbine	Controls		4299	Other hydraulic system problems
CoG GT units	Steam Turbine	Controls		4300	Turbine supervisory system (use codes 4290 to 4299 for hydraulic oil)
CoG GT units	Steam Turbine	Controls		4301	Turbine governing system
CoG GT units	Steam Turbine	Controls		4302	Turbine trip devices (including instruments)
CoG GT units	Steam Turbine	Controls		4303	Exhaust hood and spray controls
CoG GT units	Steam Turbine	Controls		4304	Automatic turbine control systems - mechanical
CoG GT units	Steam Turbine	Controls		4305	Automatic turbine control systems - mechanical - hydraulic
CoG GT units	Steam Turbine	Controls		4306	Automatic turbine control systems - electro-hydraulic - analog
CoG GT units	Steam Turbine	Controls		4307	Automatic turbine control systems - electro-hydraulic - digital
CoG GT units	Steam Turbine	Controls		4308	Automatic turbine control systems - digital control and monitoring
CoG GT units	Steam Turbine	Controls		4309	Other turbine instrument and control problems
CoG GT units	Steam Turbine	Controls		4310	Steam Turbine Control System - data highway
CoG GT units	Steam Turbine	Controls		4311	Steam Turbine Control System - hardware problems (including card failure)
CoG GT units	Steam Turbine	Controls		4312	Steam Turbine Control System - internal and termination wiring
CoG GT units	Steam Turbine	Controls		4313	Steam Turbine Control System - logic problems
CoG GT units	Steam Turbine	Controls		4314	Steam Turbine Control System - upgrades
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-85 Steam Turbine: High Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Steam Turbine	High Pressure Turbine		4000	Outer casing

TABLE B03-85 Steam Turbine: High Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Steam Turbine	High Pressure Turbine		4001	Inner casing
CoG GT units	Steam Turbine	High Pressure Turbine		4009	Nozzle bolting
CoG GT units	Steam Turbine	High Pressure Turbine		4010	Nozzles and nozzle blocks
CoG GT units	Steam Turbine	High Pressure Turbine		4011	Diaphragms
CoG GT units	Steam Turbine	High Pressure Turbine		4012	Buckets or blades
CoG GT units	Steam Turbine	High Pressure Turbine		4013	Diaphragms unit and shroud type
CoG GT units	Steam Turbine	High Pressure Turbine		4014	Bucket or blade fouling
CoG GT units	Steam Turbine	High Pressure Turbine		4015	Wheels or spindles
CoG GT units	Steam Turbine	High Pressure Turbine		4020	Shaft seals
CoG GT units	Steam Turbine	High Pressure Turbine		4021	Dummy rings
CoG GT units	Steam Turbine	High Pressure Turbine		4022	Gland rings
CoG GT units	Steam Turbine	High Pressure Turbine		4030	Rotor shaft
CoG GT units	Steam Turbine	High Pressure Turbine		4040	Bearings
CoG GT units	Steam Turbine	High Pressure Turbine		4041	Thrust bearings
CoG GT units	Steam Turbine	High Pressure Turbine		4099	Other high pressure turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-86 Steam Turbine: Intermediate Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Steam Turbine	Intermediate Pressure Turbine		4100	Outer casing
CoG GT units	Steam Turbine	Intermediate Pressure Turbine		4101	Inner casing
CoG GT units	Steam Turbine	Intermediate Pressure Turbine		4109	Nozzle bolting
CoG GT units	Steam Turbine	Intermediate Pressure Turbine		4110	Nozzles and nozzle blocks
CoG GT units	Steam Turbine	Intermediate Pressure Turbine		4111	Diaphragms
CoG GT units	Steam Turbine	Intermediate Pressure Turbine		4112	Buckets or blades
CoG GT units	Steam Turbine	Intermediate Pressure Turbine		4113	Bucket or blade fouling
CoG GT units	Steam Turbine	Intermediate Pressure Turbine		4115	Wheels or spindles
CoG GT units	Steam Turbine	Intermediate Pressure Turbine		4120	Shaft seals
CoG GT units	Steam Turbine	Intermediate Pressure Turbine		4121	Dummy rings
CoG GT units	Steam Turbine	Intermediate Pressure Turbine		4122	Gland rings
CoG GT units	Steam Turbine	Intermediate Pressure Turbine		4130	Rotor shaft
CoG GT units	Steam Turbine	Intermediate Pressure Turbine		4140	Bearings
CoG GT units	Steam Turbine	Intermediate Pressure Turbine		4141	Thrust bearings

TABLE B03-86 Steam Turbine: Intermediate Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Steam Turbine	Intermediate Pressure Turbine		4199	Other intermediate pressure turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-87 Steam Turbine: Low Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Steam Turbine	Low Pressure Turbine		4200	Outer casing
CoG GT units	Steam Turbine	Low Pressure Turbine		4201	Inner casing
CoG GT units	Steam Turbine	Low Pressure Turbine		4209	Nozzle bolting
CoG GT units	Steam Turbine	Low Pressure Turbine		4210	Nozzles and nozzle blocks
CoG GT units	Steam Turbine	Low Pressure Turbine		4211	Diaphragms
CoG GT units	Steam Turbine	Low Pressure Turbine		4212	Buckets or blades
CoG GT units	Steam Turbine	Low Pressure Turbine		4213	Bucket or blade fouling
CoG GT units	Steam Turbine	Low Pressure Turbine		4215	Wheels or spindles
CoG GT units	Steam Turbine	Low Pressure Turbine		4220	Shaft seals
CoG GT units	Steam Turbine	Low Pressure Turbine		4221	Dummy rings
CoG GT units	Steam Turbine	Low Pressure Turbine		4222	Gland rings
CoG GT units	Steam Turbine	Low Pressure Turbine		4230	Rotor shaft
CoG GT units	Steam Turbine	Low Pressure Turbine		4240	Bearings
CoG GT units	Steam Turbine	Low Pressure Turbine		4241	Thrust bearings
CoG GT units	Steam Turbine	Low Pressure Turbine		4250	Other low pressure turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-88 Steam Turbine: Lube Oil					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Steam Turbine	Lube Oil		4280	Lube oil pumps
CoG GT units	Steam Turbine	Lube Oil		4281	Lube oil coolers
CoG GT units	Steam Turbine	Lube Oil		4282	Lube oil conditioners
CoG GT units	Steam Turbine	Lube Oil		4283	Lube oil system valves and piping
CoG GT units	Steam Turbine	Lube Oil		4284	Lube oil pump drive
CoG GT units	Steam Turbine	Lube Oil		4289	Other lube oil system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Do not include bearing failures due to lube oil.					

TABLE B03-89 Steam Turbine: Miscellaneous (Steam Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Steam Turbine	Miscellaneous (Steam Turbine)		4400	Major turbine overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)
CoG GT units	Steam Turbine	Miscellaneous (Steam Turbine)		4401	Inspection
CoG GT units	Steam Turbine	Miscellaneous (Steam Turbine)		4402	Minor turbine overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
CoG GT units	Steam Turbine	Miscellaneous (Steam Turbine)		4410	Turning gear and motor
CoG GT units	Steam Turbine	Miscellaneous (Steam Turbine)		4411	Steam turbine gear box (single shaft configuration)
CoG GT units	Steam Turbine	Miscellaneous (Steam Turbine)		4412	Steam turbine clutch (single shaft configuration)
CoG GT units	Steam Turbine	Miscellaneous (Steam Turbine)		4415	Shaft coupling mechanism
CoG GT units	Steam Turbine	Miscellaneous (Steam Turbine)		4420	Vibration of the turbine generator unit that cannot be attributed to a specific cause such as bearings or blades (use this code for balance moves)
CoG GT units	Steam Turbine	Miscellaneous (Steam Turbine)		4430	Gland seal system
CoG GT units	Steam Turbine	Miscellaneous (Steam Turbine)		4450	Water induction
CoG GT units	Steam Turbine	Miscellaneous (Steam Turbine)		4460	Turbine overspeed trip test
CoG GT units	Steam Turbine	Miscellaneous (Steam Turbine)		4470	Differential expansion
CoG GT units	Steam Turbine	Miscellaneous (Steam Turbine)		4490	Turbine performance testing (use code 9999 for total unit performance testing)
CoG GT units	Steam Turbine	Miscellaneous (Steam Turbine)		4499	Other miscellaneous steam turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-90 Steam Turbine: Piping					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Steam Turbine	Piping		4270	Crossover or under piping
CoG GT units	Steam Turbine	Piping		4279	Miscellaneous turbine piping
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B03-91 Steam Turbine: Valves					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG GT units	Steam Turbine	Valves		4260	Main stop valves
CoG GT units	Steam Turbine	Valves		4261	Control valves
CoG GT units	Steam Turbine	Valves		4262	Intercept valves
CoG GT units	Steam Turbine	Valves		4263	Reheat stop valves
CoG GT units	Steam Turbine	Valves		4264	Combined intercept valves
CoG GT units	Steam Turbine	Valves		4265	Miscellaneous drain and vent valves
CoG GT units	Steam Turbine	Valves		4266	Main stop valve testing
CoG GT units	Steam Turbine	Valves		4267	Control valve testing
CoG GT units	Steam Turbine	Valves		4268	Reheat/intercept valve testing
CoG GT units	Steam Turbine	Valves		4269	Other turbine valves (including LP steam admission valves)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

Appendix B04: Index to Co-Generator Steam Turbine Unit Cause Codes

CO-GENERATOR STEAM TURBINE UNITS

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B04-2	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems
B04-3	Balance of Plant	Auxiliary Systems	Fire Protection System
B04-4	Balance of Plant	Auxiliary Systems	Instrument Air
B04-5	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System
B04-6	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)
B04-7	Balance of Plant	Auxiliary Systems	Open Cooling Water System
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B04-9	Balance of Plant	Auxiliary Systems	Service Air
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B04-11	Balance of Plant	Circulating Water Systems	
B04-12	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators
B04-13	Balance of Plant	Condensate System	Miscellaneous (Condensate System)
B04-14	Balance of Plant	Condensate System	Polishers/Chemical Addition
B04-15	Balance of Plant	Condensate System	Pumps, Piping, and Valves
B04-16	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals
B04-17	Balance of Plant	Condensing System	Condenser Controls
B04-18	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment
B04-19	Balance of Plant	Condensing System	Miscellaneous (Condensing System)
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B04-22	Balance of Plant	Extraction Steam	
B04-23	Balance of Plant	Feedwater System	
B04-24	Balance of Plant	Heater Drain Systems	
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B04-26	Balance of Plant	Power Station Switchyard	
B04-27	Balance of Plant	Waste Water (zero discharge) Systems	
B04-28	Expander Turbine	Expander Turbine	
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INDEX TO SYSTEM/COMPONENT/SUB-COMPONENT CAUSE CODE TABLES			
TABLE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**
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B04-34	Gas Turbine	Exhaust Systems	
B04-35	Gas Turbine	Fuel, Ignition, and Combustion Systems	
B04-36	Gas Turbine	Inlet Air System and Compressors	Compressors
B04-37	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters
B04-38	Gas Turbine	Miscellaneous (Gas Turbine)	
B04-39	Gas Turbine	Turbine	
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B04-45	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply
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B04-49	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)
B04-50	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)
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B04-62	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)	
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B04-64	Inactive States	Inactive States	
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INDEX TO SYSTEM/COMPONENT/SUB-COMPONENT CAUSE CODE TABLES			
TABLE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**
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B04-69	Jet Engine	Inlet Air System and Compressors	Ducts and Filters
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B04-75	Pollution Control Equipment	CO Reduction	
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B04-77	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters
B04-78	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems
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B04-81	Regulatory, Safety, Environmental	Regulatory	
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B04-83	Regulatory, Safety, Environmental	Stack Emission	
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B04-89	Steam Turbine	Miscellaneous (Steam Turbine)	
B04-90	Steam Turbine	Piping	
B04-91	Steam Turbine	Valves	

BALANCE OF PLANT

TABLE B04-1 Balance of Plant: Auxiliary Systems - Auxiliary Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3830	Auxiliary boiler
CoG steam units	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3831	Auxiliary steam piping
CoG steam units	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3832	Auxiliary steam valves
CoG steam units	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3833	Auxiliary steam controls and instruments
CoG steam units	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3834	Auxiliary boiler tube leaks
CoG steam units	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3835	Auxiliary boiler burner management system

TABLE B04-1 Balance of Plant: Auxiliary Systems - Auxiliary Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3836	Steam transfer to other unit
CoG steam units	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3839	Other auxiliary steam problems (also see extraction steam codes 3520 to 3529; startup bypass codes 0630 to 0660; and soot blower steam code 0870)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-2 Balance of Plant: Auxiliary Systems - Closed Cooling Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3820	Closed cooling water pumps and motors
CoG steam units	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3821	Closed cooling water piping
CoG steam units	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3822	Closed cooling water valves
CoG steam units	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3823	Closed cooling water heat exchangers
CoG steam units	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3824	Closed cooling water system fouling
CoG steam units	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3825	Closed cooling water instrumentation
CoG steam units	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3826	Closed cooling water strainer
CoG steam units	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3829	Other closed cooling water system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-3 Balance of Plant: Auxiliary Systems - Fire Protection System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Auxiliary Systems	Fire Protection System	3860	Fire protection system pumps
CoG steam units	Balance of Plant	Auxiliary Systems	Fire Protection System	3861	Fire protection system piping
CoG steam units	Balance of Plant	Auxiliary Systems	Fire Protection System	3862	Fire protection system valves
CoG steam units	Balance of Plant	Auxiliary Systems	Fire Protection System	3863	Fire protection system fouling
CoG steam units	Balance of Plant	Auxiliary Systems	Fire Protection System	3864	Fire protection system instrumentation and controls
CoG steam units	Balance of Plant	Auxiliary Systems	Fire Protection System	3869	Other fire protection system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-4 Balance of Plant: Auxiliary Systems - Instrument Air					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Auxiliary Systems	Instrument Air	3850	Instrument air compressors
CoG steam units	Balance of Plant	Auxiliary Systems	Instrument Air	3851	Instrument air piping
CoG steam units	Balance of Plant	Auxiliary Systems	Instrument Air	3852	Instrument air valves
CoG steam units	Balance of Plant	Auxiliary Systems	Instrument Air	3853	Instrument air dryers
CoG steam units	Balance of Plant	Auxiliary Systems	Instrument Air	3854	N2 backup to instrument air
CoG steam units	Balance of Plant	Auxiliary Systems	Instrument Air	3859	Other instrument air problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-5 Balance of Plant: Auxiliary Systems - Low-pressure Gas Compression System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3870	Fuel Gas Compressor and Motors
CoG steam units	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3871	Fuel Gas Compressor Piping
CoG steam units	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3872	Fuel Gas Compressor Valves
CoG steam units	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3873	Fuel Gas Compressor Heat Exchangers
CoG steam units	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3874	Fuel Gas Compressor Controls and Instrumentation
CoG steam units	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3875	Fuel Gas Compressor Filters
CoG steam units	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3876	Fuel Gas Compressor Fire System
CoG steam units	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3879	Fuel Gas Compressor - other
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-6 Balance of Plant: Auxiliary Systems - Miscellaneous (Auxiliary Systems)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	3898	Miscellaneous plant auxiliary process and services instrumentation and controls

TABLE B04-6 Balance of Plant: Auxiliary Systems - Miscellaneous (Auxiliary Systems)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	3899	Other miscellaneous auxiliary system problems
CoG steam units	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	6299	Other combined cycle block problems (Use other gas turbine problem codes, other steam turbine codes, etc., whenever appropriate.)
CoG steam units	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	6399	Other coal gasification equipment problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-7 Balance of Plant: Auxiliary Systems - Open Cooling Water System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3800	Open cooling water pumps and motors
CoG steam units	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3801	Open cooling water piping
CoG steam units	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3802	Open cooling water valves
CoG steam units	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3803	Open cooling water heat exchangers
CoG steam units	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3804	Open cooling water system fouling
CoG steam units	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3805	Open cooling water system instrumentation
CoG steam units	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3806	Open cooling water strainer
CoG steam units	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3809	Other open cooling water problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-8 Balance of Plant: Auxiliary Systems - Seal Air Fans					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Auxiliary Systems	Seal Air Fans	3880	Seal air fan
CoG steam units	Balance of Plant	Auxiliary Systems	Seal Air Fans	3881	Seal air fan drive - motor
CoG steam units	Balance of Plant	Auxiliary Systems	Seal Air Fans	3882	Seal air control dampers and drives
CoG steam units	Balance of Plant	Auxiliary Systems	Seal Air Fans	3883	Seal air filters
CoG steam units	Balance of Plant	Auxiliary Systems	Seal Air Fans	3889	Other seal air fan problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-9 Balance of Plant: Auxiliary Systems - Service Air					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Auxiliary Systems	Service Air	3840	Service air compressors
CoG steam units	Balance of Plant	Auxiliary Systems	Service Air	3841	Service air piping
CoG steam units	Balance of Plant	Auxiliary Systems	Service Air	3842	Service air valves
CoG steam units	Balance of Plant	Auxiliary Systems	Service Air	3843	Service air dryers
CoG steam units	Balance of Plant	Auxiliary Systems	Service Air	3849	Other service air problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-10 Balance of Plant: Auxiliary Systems - Service Water (Open System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3810	Service water pumps and motors
CoG steam units	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3811	Service water piping
CoG steam units	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3812	Service water valves
CoG steam units	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3813	Service water heat exchangers
CoG steam units	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3814	Service water system fouling
CoG steam units	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3815	Service water strainer
CoG steam units	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3819	Other service water problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-11 Balance of Plant: Circulating Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Circulating Water Systems		3210	Circulating water pumps
CoG steam units	Balance of Plant	Circulating Water Systems		3211	Circulating water pump motors
CoG steam units	Balance of Plant	Circulating Water Systems		3220	Circulating water piping
CoG steam units	Balance of Plant	Circulating Water Systems		3221	Circulating water piping fouling
CoG steam units	Balance of Plant	Circulating Water Systems		3230	Circulating water valves
CoG steam units	Balance of Plant	Circulating Water Systems		3231	Waterbox
CoG steam units	Balance of Plant	Circulating Water Systems		3232	Condenser tube cleaning system including debris filter
CoG steam units	Balance of Plant	Circulating Water Systems		3233	Circulating water priming system
CoG steam units	Balance of Plant	Circulating Water Systems		3235	Cooling tower booster pump
CoG steam units	Balance of Plant	Circulating Water Systems		3236	Cooling tower booster motor
CoG steam units	Balance of Plant	Circulating Water Systems		3238	Cooling tower fan motors
CoG steam units	Balance of Plant	Circulating Water Systems		3239	Cooling tower fan motors - variable speed

TABLE B04-11 Balance of Plant: Circulating Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Circulating Water Systems		3240	Cooling tower fans
CoG steam units	Balance of Plant	Circulating Water Systems		3241	Cooling tower efficiency below design
CoG steam units	Balance of Plant	Circulating Water Systems		3242	Cooling tower fill damage
CoG steam units	Balance of Plant	Circulating Water Systems		3243	Cooling tower icing
CoG steam units	Balance of Plant	Circulating Water Systems		3244	Cooling tower fires
CoG steam units	Balance of Plant	Circulating Water Systems		3245	Other cooling tower problems
CoG steam units	Balance of Plant	Circulating Water Systems		3246	Cooling tower fouling
CoG steam units	Balance of Plant	Circulating Water Systems		3247	Cooling tower instrumentation
CoG steam units	Balance of Plant	Circulating Water Systems		3248	Cooling Tower Overhaul
CoG steam units	Balance of Plant	Circulating Water Systems		3250	Circulating water system instruments and controls
CoG steam units	Balance of Plant	Circulating Water Systems		3260	Traveling screens
CoG steam units	Balance of Plant	Circulating Water Systems		3261	Traveling screen fouling
CoG steam units	Balance of Plant	Circulating Water Systems		3269	Circulating water biological conditions (ie, zebra mussels)
CoG steam units	Balance of Plant	Circulating Water Systems		3270	Intake system problems other than traveling screens
CoG steam units	Balance of Plant	Circulating Water Systems		3271	Intake grating fouling
CoG steam units	Balance of Plant	Circulating Water Systems		3272	Circulating water screenwash system
CoG steam units	Balance of Plant	Circulating Water Systems		3273	Debris in circulating water from outside sources (leaves, mud, etc.)
CoG steam units	Balance of Plant	Circulating Water Systems		3280	High circulating water temperature (not due to season, tower efficiency below design, or other listed equipment problem)
CoG steam units	Balance of Plant	Circulating Water Systems		3281	Circulating water tempering system
CoG steam units	Balance of Plant	Circulating Water Systems		3282	Circulating water cooling ponds
CoG steam units	Balance of Plant	Circulating Water Systems		3285	Circulating water chemistry
CoG steam units	Balance of Plant	Circulating Water Systems		3299	Other circulating water system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-12 Balance of Plant: Condensate System - Low/Intermediate Pressure Heater and Deaerators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3339	LP heater head leaks

TABLE B04-12 Balance of Plant: Condensate System - Low/Intermediate Pressure Heater and Deaerators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3340	LP heater tube leaks
CoG steam units	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3341	Other LP heater - general
CoG steam units	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3342	IP heater tube leaks
CoG steam units	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3343	Other IP heater - general
CoG steam units	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3344	Deaerator (including level control)
CoG steam units	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3345	IP heater head leaks
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-13 Balance of Plant: Condensate System - Miscellaneous (Condensate System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3360	Condensate makeup and return (including storage tanks)
CoG steam units	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3370	Condensate system controls and instrumentation (not hotwell level, heater level, or deaerator level controls; see codes 3150-3159, 3344, 3502).
CoG steam units	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3380	Condensate coolers
CoG steam units	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3399	Other miscellaneous condensate system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-14 Balance of Plant: Condensate System - Polishers/Chemical Addition					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Condensate System	Polishers/Chemical Addition	3350	Condensate polishing and filtering systems
CoG steam units	Balance of Plant	Condensate System	Polishers/Chemical Addition	3351	Chemical addition systems
CoG steam units	Balance of Plant	Condensate System	Polishers/Chemical Addition	3352	Feedwater chemistry (not specific to condenser, polishers, or chemical addition)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-15 Balance of Plant: Condensate System - Pumps, Piping, and Valves					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3300	Condensate water pre-treatment
CoG steam units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3310	Condensate/hotwell pumps
CoG steam units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3311	Condensate/hotwell pump motor
CoG steam units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3312	Condensate booster pump
CoG steam units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3313	Condensate booster pump motor
CoG steam units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3314	Condensate booster pump motor - variable speed
CoG steam units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3315	Condensate booster pump drive (other than 3313 and 3314)
CoG steam units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3320	Condensate piping
CoG steam units	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3330	Condensate valves
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-16 Balance of Plant: Condensing System - Condenser Casing or Shell and Internals					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3120	Tube sheets
CoG steam units	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3121	Expansion joint
CoG steam units	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3122	Gaskets and seals
CoG steam units	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3123	Hot well
CoG steam units	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3124	Tube sheet fouling
CoG steam units	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3129	Other condenser casing or shell and internal problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-17 Balance of Plant: Condensing System - Condenser Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Condensing System	Condenser Controls	3150	Hot well level controls

TABLE B04-17 Balance of Plant: Condensing System - Condenser Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Condensing System	Condenser Controls	3151	Vacuum pump and air ejector controls
CoG steam units	Balance of Plant	Condensing System	Condenser Controls	3152	Air-cooled condenser controls
CoG steam units	Balance of Plant	Condensing System	Condenser Controls	3159	Other condensing system controls and instruments
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-18 Balance of Plant: Condensing System - Condenser Tubes and Support Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3110	Condenser tube leaks
CoG steam units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3111	Condenser tube fouling shell side
CoG steam units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3112	Condenser tube fouling tube side
CoG steam units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3113	Condenser tube and water box cleaning (including circulating water flow reversal)
CoG steam units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3114	Air-cooled condenser tubes
CoG steam units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3115	Air-cooled condenser pumps
CoG steam units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3116	Air-cooled condenser fans
CoG steam units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3117	Air-cooled condenser fan motors
CoG steam units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3118	Other Air-cooled condenser problems
CoG steam units	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3119	Other condenser tube casing or shell and internal problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-19 Balance of Plant: Condensing System - Miscellaneous (Condensing System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3170	Condenser inspection (use code 3110 to report looking for tube leaks)

TABLE B04-19 Balance of Plant: Condensing System - Miscellaneous (Condensing System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3171	Air-cooled condenser inspections
CoG steam units	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3180	Major condenser overhaul
CoG steam units	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3185	Water side cathodic protection
CoG steam units	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3186	Auxiliary condenser and associated equipment
CoG steam units	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3190	Air leakage (for losses not attributable to previously noted equipment related codes)
CoG steam units	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3199	Other miscellaneous condensing system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-20 Balance of Plant: Condensing System - Vacuum Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Condensing System	Vacuum Equipment	3130	Air ejectors
CoG steam units	Balance of Plant	Condensing System	Vacuum Equipment	3131	Air ejector piping and valves
CoG steam units	Balance of Plant	Condensing System	Vacuum Equipment	3132	Inter and after condensers
CoG steam units	Balance of Plant	Condensing System	Vacuum Equipment	3133	Vacuum pumps
CoG steam units	Balance of Plant	Condensing System	Vacuum Equipment	3134	Vacuum pump piping and valves
CoG steam units	Balance of Plant	Condensing System	Vacuum Equipment	3135	Vacuum pump motor and auxiliaries
CoG steam units	Balance of Plant	Condensing System	Vacuum Equipment	3139	Other air extraction system problems - general
CoG steam units	Balance of Plant	Condensing System	Vacuum Equipment	3149	Loss of vacuum not attributable to a particular component such as air ejectors or valves, or high back pressure not attributable to high circulating water temperature, or vacuum losses from a known cause.
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-21 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Electrical		3600	Switchyard transformers and associated cooling systems - external (OMC)
CoG steam units	Balance of Plant	Electrical		3601	Switchyard transformers and associated cooling systems - external (not OMC)
CoG steam units	Balance of Plant	Electrical		3610	Switchyard circuit breakers - external (not OMC)
CoG steam units	Balance of Plant	Electrical		3611	Switchyard circuit breakers - external (OMC)
CoG steam units	Balance of Plant	Electrical		3612	Switchyard system protection devices - external (OMC)
CoG steam units	Balance of Plant	Electrical		3613	Switchyard system protection devices - external (not OMC)
CoG steam units	Balance of Plant	Electrical		3618	Other switchyard equipment - external (not OMC)
CoG steam units	Balance of Plant	Electrical		3619	Other switchyard equipment - external (OMC)
CoG steam units	Balance of Plant	Electrical		3620	Main transformer
CoG steam units	Balance of Plant	Electrical		3621	Unit auxiliaries transformer
CoG steam units	Balance of Plant	Electrical		3622	Station service startup transformer
CoG steam units	Balance of Plant	Electrical		3623	Auxiliary generators
CoG steam units	Balance of Plant	Electrical		3624	Auxiliary generator voltage supply system
CoG steam units	Balance of Plant	Electrical		3629	Other switchyard or high voltage system problems - external
CoG steam units	Balance of Plant	Electrical		3630	400-700 volt transformers
CoG steam units	Balance of Plant	Electrical		3631	400-700 volt circuit breakers
CoG steam units	Balance of Plant	Electrical		3632	400-700 volt conductors and buses
CoG steam units	Balance of Plant	Electrical		3633	400-700 volt insulators
CoG steam units	Balance of Plant	Electrical		3634	400-700 volt protection devices
CoG steam units	Balance of Plant	Electrical		3639	Other 400-700 volt problems
CoG steam units	Balance of Plant	Electrical		3640	AC instrument power transformers
CoG steam units	Balance of Plant	Electrical		3641	AC Circuit breakers
CoG steam units	Balance of Plant	Electrical		3642	AC Conductors and buses

TABLE B04-21 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Electrical		3643	AC Inverters
CoG steam units	Balance of Plant	Electrical		3644	AC Protection devices
CoG steam units	Balance of Plant	Electrical		3649	Other AC instrument power problems
CoG steam units	Balance of Plant	Electrical		3650	DC instrument power battery chargers
CoG steam units	Balance of Plant	Electrical		3651	DC circuit breakers
CoG steam units	Balance of Plant	Electrical		3652	DC conductors and buses
CoG steam units	Balance of Plant	Electrical		3653	DC protection devices
CoG steam units	Balance of Plant	Electrical		3659	Other DC power problems
CoG steam units	Balance of Plant	Electrical		3660	4000-7000 volt transformers
CoG steam units	Balance of Plant	Electrical		3661	4000-7000 volt circuit breakers
CoG steam units	Balance of Plant	Electrical		3662	4000-7000 volt conductors and buses
CoG steam units	Balance of Plant	Electrical		3663	4000-7000 volt insulators
CoG steam units	Balance of Plant	Electrical		3664	4000-7000 volt protection devices
CoG steam units	Balance of Plant	Electrical		3669	Other 4000-7000 volt problems
CoG steam units	Balance of Plant	Electrical		3670	12-15kV transformers
CoG steam units	Balance of Plant	Electrical		3671	12-15kV circuit breakers
CoG steam units	Balance of Plant	Electrical		3672	12-15kV conductors and buses
CoG steam units	Balance of Plant	Electrical		3673	12-15kV insulators
CoG steam units	Balance of Plant	Electrical		3674	12-15kV protection devices
CoG steam units	Balance of Plant	Electrical		3679	Other 12-15kV problems
CoG steam units	Balance of Plant	Electrical		3680	Other voltage transformers
CoG steam units	Balance of Plant	Electrical		3681	Other voltage circuit breakers
CoG steam units	Balance of Plant	Electrical		3682	Other voltage conductors and buses
CoG steam units	Balance of Plant	Electrical		3683	Other voltage insulators
CoG steam units	Balance of Plant	Electrical		3684	Other voltage protection devices
CoG steam units	Balance of Plant	Electrical		3689	Other voltage problems
CoG steam units	Balance of Plant	Electrical		3690	Station Service Power Distribution System, General
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-22 Balance of Plant: Extraction Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Extraction Steam		3520	HP Extraction steam piping
CoG steam units	Balance of Plant	Extraction Steam		3521	HP Extraction steam valves

TABLE B04-22 Balance of Plant: Extraction Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Extraction Steam		3522	HP Extraction steam instruments and controls
CoG steam units	Balance of Plant	Extraction Steam		3529	Other HP extraction steam system problems
CoG steam units	Balance of Plant	Extraction Steam		3530	IP Extraction steam piping
CoG steam units	Balance of Plant	Extraction Steam		3531	IP Extraction steam valves
CoG steam units	Balance of Plant	Extraction Steam		3532	IP Extraction steam instruments and controls
CoG steam units	Balance of Plant	Extraction Steam		3539	Other IP extraction steam system problems
CoG steam units	Balance of Plant	Extraction Steam		3540	LP Extraction steam piping
CoG steam units	Balance of Plant	Extraction Steam		3541	LP Extraction steam valves
CoG steam units	Balance of Plant	Extraction Steam		3542	LP Extraction steam instruments and controls
CoG steam units	Balance of Plant	Extraction Steam		3549	Other LP extraction steam system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-23 Balance of Plant: Feedwater System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Feedwater System		3401	Startup feedwater pump
CoG steam units	Balance of Plant	Feedwater System		3402	Startup feedwater pump drives - all types
CoG steam units	Balance of Plant	Feedwater System		3407	Feedwater pump suction screens
CoG steam units	Balance of Plant	Feedwater System		3408	Feedwater pump drive - local controls
CoG steam units	Balance of Plant	Feedwater System		3409	Feedwater pump drive motor - variable speed
CoG steam units	Balance of Plant	Feedwater System		3410	Feedwater pump
CoG steam units	Balance of Plant	Feedwater System		3411	Feedwater pump drive - motor
CoG steam units	Balance of Plant	Feedwater System		3412	Feedwater pump drive - steam turbine
CoG steam units	Balance of Plant	Feedwater System		3413	Feedwater pump coupling and drive shaft
CoG steam units	Balance of Plant	Feedwater System		3414	Feedwater pump local controls
CoG steam units	Balance of Plant	Feedwater System		3415	Feedwater pump/drive lube oil system

TABLE B04-23 Balance of Plant: Feedwater System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Feedwater System		3416	Other feedwater pump problems
CoG steam units	Balance of Plant	Feedwater System		3417	Feedwater pump drive - main shaft
CoG steam units	Balance of Plant	Feedwater System		3418	Feedwater pump drive - other
CoG steam units	Balance of Plant	Feedwater System		3419	Feedwater pump drive - gear
CoG steam units	Balance of Plant	Feedwater System		3420	Feedwater piping and supports
CoG steam units	Balance of Plant	Feedwater System		3430	Feedwater regulating (boiler level control) valve
CoG steam units	Balance of Plant	Feedwater System		3431	Other feedwater valves
CoG steam units	Balance of Plant	Feedwater System		3439	HP heater head leaks
CoG steam units	Balance of Plant	Feedwater System		3440	High pressure heater tube leaks
CoG steam units	Balance of Plant	Feedwater System		3441	Other high pressure heater problems (see condensate system for LP and IP heater codes)
CoG steam units	Balance of Plant	Feedwater System		3451	Feedwater booster pump suction screens
CoG steam units	Balance of Plant	Feedwater System		3452	Feedwater booster pump drive - local controls
CoG steam units	Balance of Plant	Feedwater System		3453	Feedwater booster pump drive motor - variable speed
CoG steam units	Balance of Plant	Feedwater System		3454	Feedwater booster pump
CoG steam units	Balance of Plant	Feedwater System		3455	Feedwater booster pump drive - motor
CoG steam units	Balance of Plant	Feedwater System		3456	Feedwater booster pump drive - steam turbine
CoG steam units	Balance of Plant	Feedwater System		3457	Feedwater booster pump coupling and drive shaft
CoG steam units	Balance of Plant	Feedwater System		3458	Feedwater booster pump local controls
CoG steam units	Balance of Plant	Feedwater System		3459	Feedwater booster pump/drive lube oil system
CoG steam units	Balance of Plant	Feedwater System		3460	Other feedwater booster pump problems
CoG steam units	Balance of Plant	Feedwater System		3461	Feedwater booster pump drive - main shaft
CoG steam units	Balance of Plant	Feedwater System		3462	Feedwater booster pump drive - other
CoG steam units	Balance of Plant	Feedwater System		3463	Feedwater booster pump drive - gear

TABLE B04-23 Balance of Plant: Feedwater System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Feedwater System		3499	Other feedwater system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Excluding extraction or drain systems.					

TABLE B04-24 Balance of Plant: Heater Drain Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Heater Drain Systems		3501	Heater drain pumps
CoG steam units	Balance of Plant	Heater Drain Systems		3502	Heater level control
CoG steam units	Balance of Plant	Heater Drain Systems		3503	Heater drain piping
CoG steam units	Balance of Plant	Heater Drain Systems		3504	Heater drain valves
CoG steam units	Balance of Plant	Heater Drain Systems		3505	Heater drain pump drive
CoG steam units	Balance of Plant	Heater Drain Systems		3509	Other heater drain system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-25 Balance of Plant: Miscellaneous (Balance of Plant)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3950	Process computer
CoG steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3960	Thermal derating (thermal efficiency losses in balance of plant when specific cause(s) unknown)
CoG steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3970	Distributive Control System (DCS) - process computer
CoG steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3971	DCS - data highway
CoG steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3972	DCS - hardware problems (including card failure)
CoG steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3973	DCS - internal and termination wiring
CoG steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3974	DCS - logic problems
CoG steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3975	DCS - upgrades
CoG steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3979	Other DCS problems
CoG steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3980	Programmable Logic Controller (PLC)
CoG steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3981	PLC - data highway
CoG steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3982	PLC - hardware problems (including card failure)

TABLE B04-25 Balance of Plant: Miscellaneous (Balance of Plant)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3983	PLC - internal and termination wiring
CoG steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3984	PLC - logic problems
CoG steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3985	PLC - upgrades
CoG steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3989	Other PLC problems
CoG steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3995	Powerhouse heating and ventilating systems
CoG steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3996	Air conditioning systems - rooms and areas
CoG steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3998	Balance of plant overhaul/outage
CoG steam units	Balance of Plant	Miscellaneous (Balance of Plant)		3999	Other miscellaneous balance of plant problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-26 Balance of Plant: Power Station Switchyard					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Power Station Switchyard		3700	Power Station switchyard (non generating unit equipment)
CoG steam units	Balance of Plant	Power Station Switchyard		3710	Transmission line (connected to powerhouse switchyard to 1st Substation)
CoG steam units	Balance of Plant	Power Station Switchyard		3720	Transmission equipment at the 1st substation (see code 9300 if applicable)
CoG steam units	Balance of Plant	Power Station Switchyard		3730	Transmission equipment beyond the 1st substation (see code 9300 if applicable)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-27 Balance of Plant: Waste Water (zero discharge) Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Waste Water (zero discharge) Systems		3290	Waste water (zero discharge) tanks, pumps, and motors
CoG steam units	Balance of Plant	Waste Water (zero discharge) Systems		3291	Waste water (zero discharge) system fouling

TABLE B04-27 Balance of Plant: Waste Water (zero discharge) Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Balance of Plant	Waste Water (zero discharge) Systems		3292	Waste water (zero discharge) piping
CoG steam units	Balance of Plant	Waste Water (zero discharge) Systems		3293	Waste water (zero discharge) valves
CoG steam units	Balance of Plant	Waste Water (zero discharge) Systems		3294	Waste water (zero discharge) controls and instrumentation
CoG steam units	Balance of Plant	Waste Water (zero discharge) Systems		3295	Other waste water (zero discharge) problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

EXPANDER TURBINE

TABLE B04-28 Expander Turbine: Expander Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Expander Turbine	Expander Turbine		7800	Couplings
CoG steam units	Expander Turbine	Expander Turbine		7810	Shaft
CoG steam units	Expander Turbine	Expander Turbine		7820	Bearings
CoG steam units	Expander Turbine	Expander Turbine		7830	Blades
CoG steam units	Expander Turbine	Expander Turbine		7840	Discs
CoG steam units	Expander Turbine	Expander Turbine		7850	Spacers
CoG steam units	Expander Turbine	Expander Turbine		7860	Nozzles/vanes
CoG steam units	Expander Turbine	Expander Turbine		7870	Heat shields
CoG steam units	Expander Turbine	Expander Turbine		7880	Exhaust diffusers
CoG steam units	Expander Turbine	Expander Turbine		7890	Seal oil system and seals
CoG steam units	Expander Turbine	Expander Turbine		7900	Inner casing
CoG steam units	Expander Turbine	Expander Turbine		7910	Outer exhaust casing
CoG steam units	Expander Turbine	Expander Turbine		7920	Lube oil system
CoG steam units	Expander Turbine	Expander Turbine		7930	Controls and instrumentation
CoG steam units	Expander Turbine	Expander Turbine		7940	Evactor
CoG steam units	Expander Turbine	Expander Turbine		7950	Major overhaul
CoG steam units	Expander Turbine	Expander Turbine		7960	Other expander turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

EXTERNAL

Use this set of codes to report events caused by external factors (flood, lightning, etc.); economic factors (lack of fuel, labor strikes, etc.); operator training; and transmission system problems external to the plant.

TABLE B04-29 External: Catastrophe					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	External	Catastrophe		9000	Flood
CoG steam units	External	Catastrophe		9001	Drought
CoG steam units	External	Catastrophe		9010	Fire including wildfires, not related to a specific component
CoG steam units	External	Catastrophe		9020	Lightning
CoG steam units	External	Catastrophe		9025	Geomagnetic disturbance
CoG steam units	External	Catastrophe		9030	Earthquake
CoG steam units	External	Catastrophe		9031	Tornado
CoG steam units	External	Catastrophe		9035	Hurricane
CoG steam units	External	Catastrophe		9036	Storms (ice, snow, etc)
CoG steam units	External	Catastrophe		9040	Other catastrophe
CoG steam units	External	Catastrophe		9090	Physical Security Incident
CoG steam units	External	Catastrophe		9091	Physical Security Incident (OMC)
CoG steam units	External	Catastrophe		9092	Cyber Security Incident
CoG steam units	External	Catastrophe		9093	Cyber Security Incident (OMC)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-30 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	External	Economic		0000	Reserve shutdown
CoG steam units	External	Economic		9130	Failure of fuel supplier to fulfill contractual obligations or a pre-arranged deal due to physical fuel disruptions or operational impairments (e.g. force majeure on a pipeline or compressor down; making the pipeline incapable of making its firm deliveries.)
CoG steam units	External	Economic		9131	Lack of fuel – due to contractual or tariff provisions that allow for service interruption or price fluctuations during peak demand periods.
CoG steam units	External	Economic		9134	Fuel conservation

TABLE B04-30 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	External	Economic		9136	Problems with Primary Fuel for Units with Secondary Fuel Operation
CoG steam units	External	Economic		9137	Ground water or other water supply problems
CoG steam units	External	Economic		9139	Ground water or other water supply problems(OMC)
CoG steam units	External	Economic		9140	Plant modifications to burn different fuel that are not regulatory mandated
CoG steam units	External	Economic		9150	Labor strikes company-wide problems or strikes outside the company's jurisdiction such as manufacturers (delaying repairs) or transportation (fuel supply) problems.
CoG steam units	External	Economic		9151	Labor strikes direct plant management grievances that result in a walkout or strike are under plant management control.
CoG steam units	External	Economic		9160	Other economic problems
CoG steam units	External	Economic		9180	Economic (for internal use at plants only)
CoG steam units	External	Economic		9181	Economic (for internal use at plants only)
CoG steam units	External	Economic		9182	Economic (for internal use at plants only)
CoG steam units	External	Economic		9183	Economic (for internal use at plants only)
CoG steam units	External	Economic		9184	Economic (for internal use at plants only)
CoG steam units	External	Economic		9185	Economic (for internal use at plants only)
CoG steam units	External	Economic		9186	Economic (for internal use at plants only)
CoG steam units	External	Economic		9187	Economic (for internal use at plants only)
CoG steam units	External	Economic		9188	Economic (for internal use at plants only)

TABLE B04-30 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	External	Economic		9189	Economic (for internal use at plants only)
CoG steam units	External	Economic		9190	Economic (for internal use at plants only)
CoG steam units	External	Economic		9191	Economic (for internal use at plants only)
CoG steam units	External	Economic		9192	Economic (for internal use at plants only)
CoG steam units	External	Economic		9193	Economic (for internal use at plants only)
CoG steam units	External	Economic		9194	Economic (for internal use at plants only)
CoG steam units	External	Economic		9195	Economic (for internal use at plants only)
CoG steam units	External	Economic		9196	Economic (for internal use at plants only)
CoG steam units	External	Economic		9197	Economic (for internal use at plants only)
CoG steam units	External	Economic		9198	Economic (for internal use at plants only)
CoG steam units	External	Economic		9199	Economic (for internal use at plants only)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-31 External: Fuel Quality					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	External	Fuel Quality		9200	High ash content (OMC)
CoG steam units	External	Fuel Quality		9201	High ash content (not OMC)
CoG steam units	External	Fuel Quality		9205	Poor quality natural gas fuel, low heat content
CoG steam units	External	Fuel Quality		9220	High sulfur content (OMC)
CoG steam units	External	Fuel Quality		9221	High sulfur content (not OMC)
CoG steam units	External	Fuel Quality		9230	High vanadium content (OMC)
CoG steam units	External	Fuel Quality		9231	High vanadium content (not OMC)
CoG steam units	External	Fuel Quality		9240	High sodium content (OMC)

TABLE B04-31 External: Fuel Quality					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	External	Fuel Quality		9241	High sodium content (not OMC)
CoG steam units	External	Fuel Quality		9260	Low BTU oil (OMC)
CoG steam units	External	Fuel Quality		9261	Low BTU oil (not OMC)
CoG steam units	External	Fuel Quality		9290	Other fuel quality problems (OMC)
CoG steam units	External	Fuel Quality		9291	Other fuel quality problems (not OMC)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use code 9600 to 9650 if the fuel quality results in excess stack emissions through no fault in the pollution control equipment. Use the appropriate equipment code to report fouling and slagging.					

TABLE B04-32 External: Miscellaneous (External)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	External	Miscellaneous (External)		9300	Transmission system problems other than catastrophes (do not include switchyard problems in this category; see codes 3600 to 3629, 3720 to 3730)
CoG steam units	External	Miscellaneous (External)		9310	Operator training
CoG steam units	External	Miscellaneous (External)		9320	Other miscellaneous external problems
CoG steam units	External	Miscellaneous (External)		9340	Synchronous Condenser Operation
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

GAS TURBINE

TABLE B04-33 Gas Turbine: Auxiliary Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Gas Turbine	Auxiliary Systems		5110	Lube oil system - general
CoG steam units	Gas Turbine	Auxiliary Systems		5111	Lube oil pumps
CoG steam units	Gas Turbine	Auxiliary Systems		5112	Lube oil coolers
CoG steam units	Gas Turbine	Auxiliary Systems		5113	Lube oil valves/piping
CoG steam units	Gas Turbine	Auxiliary Systems		5114	Lube oil filters
CoG steam units	Gas Turbine	Auxiliary Systems		5115	Oil vapor extractor
CoG steam units	Gas Turbine	Auxiliary Systems		5116	Power Augmentation System Equipment
CoG steam units	Gas Turbine	Auxiliary Systems		5117	Power augmentation piping
CoG steam units	Gas Turbine	Auxiliary Systems		5118	Power augmentation valves

TABLE B04-33 Gas Turbine: Auxiliary Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Gas Turbine	Auxiliary Systems		5119	Power augmentation controls
CoG steam units	Gas Turbine	Auxiliary Systems		5120	Hydraulic oil system
CoG steam units	Gas Turbine	Auxiliary Systems		5121	Hydraulic oil system pumps
CoG steam units	Gas Turbine	Auxiliary Systems		5122	Hydraulic oil system piping/valves
CoG steam units	Gas Turbine	Auxiliary Systems		5130	Starting system (including motor)
CoG steam units	Gas Turbine	Auxiliary Systems		5140	Battery and charger system
CoG steam units	Gas Turbine	Auxiliary Systems		5150	Turning gear and motor
CoG steam units	Gas Turbine	Auxiliary Systems		5151	Load gear compartment
CoG steam units	Gas Turbine	Auxiliary Systems		5160	Cooling and seal air system
CoG steam units	Gas Turbine	Auxiliary Systems		5170	Cooling water system
CoG steam units	Gas Turbine	Auxiliary Systems		5180	Anti-icing system
CoG steam units	Gas Turbine	Auxiliary Systems		5190	Other auxiliary system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-34 Gas Turbine: Exhaust Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Gas Turbine	Exhaust Systems		5100	Chamber
CoG steam units	Gas Turbine	Exhaust Systems		5101	Hoods
CoG steam units	Gas Turbine	Exhaust Systems		5102	Vanes/nozzles
CoG steam units	Gas Turbine	Exhaust Systems		5103	Silencer
CoG steam units	Gas Turbine	Exhaust Systems		5104	Cones
CoG steam units	Gas Turbine	Exhaust Systems		5105	Diverter Dampers
CoG steam units	Gas Turbine	Exhaust Systems		5106	Exhaust Stack
CoG steam units	Gas Turbine	Exhaust Systems		5108	High engine exhaust temperature
CoG steam units	Gas Turbine	Exhaust Systems		5109	Other exhaust problems (including high exhaust system temperature not attributable to a specific problem)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-35 Gas Turbine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5040	Fuel tanks

TABLE B04-35 Gas Turbine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5041	Fuel piping and valves
CoG steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5042	Fuel nozzles/vanes
CoG steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5043	Fuel filters
CoG steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5044	Liquid fuel oil pump
CoG steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5046	Liquid fuel oil transfer/forwarding pump
CoG steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5047	Liquid fuel purge system
CoG steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5048	Gas fuel system including controls and instrumentation
CoG steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5049	Other fuel system problems
CoG steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5050	Ignition system
CoG steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5051	Pilot fuel piping and valves
CoG steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5052	Pilot fuel nozzles/vanes
CoG steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5053	Pilot fuel filters
CoG steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5054	Water injection system
CoG steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5060	Atomizing air system
CoG steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5065	NOx water injection system including pump
CoG steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5066	NOx steam injection system
CoG steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5070	Combustor casing
CoG steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5071	Combustor liner

TABLE B04-35 Gas Turbine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5072	Combustor caps
CoG steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5073	Flame scanners
CoG steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5074	Flashback including instrumentation
CoG steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5075	Blade path temperature spread
CoG steam units	Gas Turbine	Fuel, Ignition, and Combustion Systems		5079	Other combustor problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-36 Gas Turbine: Inlet Air System and Compressors - Compressors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5010	High pressure shaft
CoG steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5011	High pressure bearings
CoG steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5012	High pressure blades/buckets
CoG steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5013	Compressor casing and bolts
CoG steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5014	Compressor diaphragms
CoG steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5015	Compressor seals
CoG steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5016	High pressure compressor bleed valves
CoG steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5017	Low pressure compressor bleed valves
CoG steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5019	Other high pressure problems
CoG steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5020	Low pressure shaft
CoG steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5021	Low pressure bearings
CoG steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5022	Low pressure blades/buckets
CoG steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5029	Other low pressure problems
CoG steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5030	Supercharging fans
CoG steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5035	Compressor washing
CoG steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5036	Compressor shaft and bearings for two-shaft machines
CoG steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5037	Inlet bleed heat valve
CoG steam units	Gas Turbine	Inlet Air System and Compressors	Compressors	5039	Other compressor problems

TABLE B04-36 Gas Turbine: Inlet Air System and Compressors - Compressors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-37 Gas Turbine: Inlet Air System and Compressors - Ducts and Filters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5000	Inlet air ducts
CoG steam units	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5001	Inlet air vanes/nozzles
CoG steam units	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5002	Inlet air filters
CoG steam units	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5003	Inlet cone
CoG steam units	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5004	Inlet air chillers
CoG steam units	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5005	Inlet air evaporative coolers
CoG steam units	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5006	Inlet air foggers
CoG steam units	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5009	Other inlet air problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-38 Gas Turbine: Miscellaneous (Gas Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5200	Reduction gear
CoG steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5201	Load shaft and bearings
CoG steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5205	Main coupling between the turbine and generator
CoG steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5206	Clutch
CoG steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5210	Intercoolers
CoG steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5220	Regenerators
CoG steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5230	Heat shields
CoG steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5240	Fire detection and extinguishing system (including hazardous gas detection system)
CoG steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5241	Fire in unit
CoG steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5245	Gas Turbine Control System - data highway
CoG steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5246	Gas Turbine Control System - hardware problems (including card failure)

TABLE B04-38 Gas Turbine: Miscellaneous (Gas Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5247	Gas Turbine Control System - internal and termination wiring
CoG steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5248	Gas Turbine Control System - logic problems
CoG steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5249	Gas Turbine Control System - upgrades
CoG steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5250	Other controls and instrumentation problems
CoG steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5255	Computer
CoG steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5260	Major overhaul (use for non-specific overhaul only; see page B-CCGT-2)
CoG steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5261	Gas turbine/compressor washing
CoG steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5262	Gas turbine exchange
CoG steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5269	Combustion Inspection (CI)
CoG steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5270	Hot end inspection
CoG steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5272	Borescope inspection
CoG steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5274	General unit inspection
CoG steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5280	Vibration (not engine) in unit not attributable to bearings or other components
CoG steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5285	Gas turbine vibration
CoG steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5286	Gas turbine lockout
CoG steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5290	Gas turbine performance testing - individual engines (use code 9999 for total unit performance testing)
CoG steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5292	Turbine Overspeed Trip Test - Gas Turbine
CoG steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5295	Synchronous condenser equipment
CoG steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5298	Main gas filter
CoG steam units	Gas Turbine	Miscellaneous (Gas Turbine)		5299	Other miscellaneous gas turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-39 Gas Turbine: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Gas Turbine	Turbine		5080	High pressure shaft
CoG steam units	Gas Turbine	Turbine		5081	High pressure bearings
CoG steam units	Gas Turbine	Turbine		5082	High pressure blades/buckets
CoG steam units	Gas Turbine	Turbine		5083	High pressure nozzles/vanes
CoG steam units	Gas Turbine	Turbine		5084	High pressure casing/expansion joints
CoG steam units	Gas Turbine	Turbine		5085	Interstage gas passages - HP
CoG steam units	Gas Turbine	Turbine		5086	High pressure shaft seals
CoG steam units	Gas Turbine	Turbine		5087	Thrust bearing
CoG steam units	Gas Turbine	Turbine		5088	Gas turbine cooling system
CoG steam units	Gas Turbine	Turbine		5089	Other high pressure problems
CoG steam units	Gas Turbine	Turbine		5090	Low pressure shaft
CoG steam units	Gas Turbine	Turbine		5091	Low pressure bearings
CoG steam units	Gas Turbine	Turbine		5092	Low pressure blades/buckets
CoG steam units	Gas Turbine	Turbine		5093	Low pressure nozzles/vanes
CoG steam units	Gas Turbine	Turbine		5094	Low pressure casing/expansion joints
CoG steam units	Gas Turbine	Turbine		5095	Interstage gas passages - LP
CoG steam units	Gas Turbine	Turbine		5096	Low pressure shaft seals
CoG steam units	Gas Turbine	Turbine		5097	Other low pressure problems
CoG steam units	Gas Turbine	Turbine		5098	Expansion joints
CoG steam units	Gas Turbine	Turbine		5099	HP to LP coupling
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use HP if only one.					

GENERATOR

This set of codes contains the generator, exciter, generator cooling systems, and generator controls. Note the main leads up to and includes the generator output breaker in this set of codes.

TABLE B04-40 Generator: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Generator	Controls		4700	Generator voltage control
CoG steam units	Generator	Controls		4710	Generator metering devices
CoG steam units	Generator	Controls		4720	Generator synchronization equipment
CoG steam units	Generator	Controls		4730	Generator current and potential transformers
CoG steam units	Generator	Controls		4740	Emergency generator trip devices

TABLE B04-40 Generator: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Generator	Controls		4741	Frequency Trip (81 Relay)
CoG steam units	Generator	Controls		4750	Other generator controls and metering problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-41 Generator: Cooling System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Generator	Cooling System		4610	Hydrogen cooling system piping and valves
CoG steam units	Generator	Cooling System		4611	Hydrogen coolers
CoG steam units	Generator	Cooling System		4612	Hydrogen storage system
CoG steam units	Generator	Cooling System		4613	Hydrogen seals
CoG steam units	Generator	Cooling System		4619	Other hydrogen system problems
CoG steam units	Generator	Cooling System		4620	Air cooling system
CoG steam units	Generator	Cooling System		4630	Liquid cooling system
CoG steam units	Generator	Cooling System		4640	Seal oil system and seals
CoG steam units	Generator	Cooling System		4650	Other cooling system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Report failures caused by water leaks into generator as codes 4500, 4510, etc.					

TABLE B04-42 Generator: Exciter					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Generator	Exciter		4600	Exciter drive - motor
CoG steam units	Generator	Exciter		4601	Exciter field rheostat
CoG steam units	Generator	Exciter		4602	Exciter commutator and brushes
CoG steam units	Generator	Exciter		4603	Solid state exciter element
CoG steam units	Generator	Exciter		4604	Exciter drive - shaft
CoG steam units	Generator	Exciter		4605	Exciter transformer
CoG steam units	Generator	Exciter		4609	Other exciter problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-43 Generator: Generator					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Generator	Generator		4500	Rotor windings (including damper windings and fan blades on hydro units)
CoG steam units	Generator	Generator		4510	Rotor collector rings
CoG steam units	Generator	Generator		4511	Rotor, General
CoG steam units	Generator	Generator		4512	Retaining Rings
CoG steam units	Generator	Generator		4520	Stator windings, bushings, and terminals
CoG steam units	Generator	Generator		4530	Stator core iron
CoG steam units	Generator	Generator		4535	Stator, General
CoG steam units	Generator	Generator		4536	Generator Heaters
CoG steam units	Generator	Generator		4540	Brushes and brush rigging
CoG steam units	Generator	Generator		4550	Generator bearings and lube oil system (including thrust bearings on hydro units)
CoG steam units	Generator	Generator		4551	Generator bearings
CoG steam units	Generator	Generator		4552	Generator lube oil system
CoG steam units	Generator	Generator		4555	Bearing cooling system
CoG steam units	Generator	Generator		4560	Generator vibration (excluding vibration due to failed bearing and other components)
CoG steam units	Generator	Generator		4570	Generator casing
CoG steam units	Generator	Generator		4580	Generator end bells and bolting
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-44 Generator: Miscellaneous (Generator)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Generator	Miscellaneous (Generator)		4800	Generator main leads
CoG steam units	Generator	Miscellaneous (Generator)		4805	Generator Bus Duct Cooling System
CoG steam units	Generator	Miscellaneous (Generator)		4810	Generator output breaker
CoG steam units	Generator	Miscellaneous (Generator)		4830	Major generator overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)

TABLE B04-44 Generator: Miscellaneous (Generator)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Generator	Miscellaneous (Generator)		4831	Minor generator overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
CoG steam units	Generator	Miscellaneous (Generator)		4840	Inspection
CoG steam units	Generator	Miscellaneous (Generator)		4841	Generator doble testing
CoG steam units	Generator	Miscellaneous (Generator)		4842	Reactive and capability testing
CoG steam units	Generator	Miscellaneous (Generator)		4850	Core monitor alarm
CoG steam units	Generator	Miscellaneous (Generator)		4860	Generator neutral grounding equipment
CoG steam units	Generator	Miscellaneous (Generator)		4899	Other miscellaneous generator problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

HEAT RECOVERY STEAM GENERATOR (HRSG)

(Waste Heat Boiler)

TABLE B04-45 Heat Recovery Steam Generator (HRSG): HRSG Boiler Air and Gas Systems - Air Supply					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1400	Forced draft fans
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1401	Forced draft fan dampers
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1407	Forced draft fan lubrication system
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1410	Forced draft fan motors
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1411	Forced draft fan motors - variable speed
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1412	Forced draft fan drives (other than motor)
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1415	Forced draft fan controls
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1420	Other forced draft fan problems

CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1456	Induced draft fan dampers
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-46 Heat Recovery Steam Generator (HRSG): HRSG Boiler Air and Gas Systems - Miscellaneous (Boiler Air and Gas Systems)

UNIT TYPE	SYSTEM	COMPONENT	SUB-COMPONENT	CAUSE CODE	DESCRIPTION
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1590	Stacks (use code 8430 for stack problems due to pollution control equipment)
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1591	Stack damper and linkage
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1592	Stack damper linkage motors
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1599	Other miscellaneous boiler air and gas system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-47 Heat Recovery Steam Generator (HRSG): HRSG Boiler Control Systems

UNIT TYPE	SYSTEM	COMPONENT	SUB-COMPONENT	CAUSE CODE	DESCRIPTION
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1700	Feedwater controls (report local controls - feedwater pump, feedwater regulator valve, etc., - with component or system)
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1710	Combustion/steam condition controls (report local controls - burners, pulverizers, etc., - with component or system)
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1720	Desuperheater/attemperator controls
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1730	Boiler explosion or implosion
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1740	Boiler drum gage glasses / level indicator
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1750	Burner management system
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1760	Feedwater instrumentation (not local controls)

TABLE B04-47 Heat Recovery Steam Generator (HRSG): HRSG Boiler Control Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1761	Combustion/Steam condition instrumentation (not local controls)
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1762	Desuperheater/attemperator instrumentation (not local controls)
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1799	Other boiler instrumentation and control problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Iincluding instruments which input to the controls.					

TABLE B04-48 Heat Recovery Steam Generator (HRSG): HRSG Boiler Design Limitations					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Design Limitations		1900	Improper balance between tube sections not due to fouling or plugging
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Design Limitations		1910	Inadequate air not due to equipment problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-49 Heat Recovery Steam Generator (HRSG): HRSG Boiler Fuel Supply - Burners (Duct Burners)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	358	Oil burner piping and valves
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	359	Gas burner piping and valves
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	360	Burners
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	361	Burner orifices
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	370	Burner instruments and controls (except light off)
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	380	Light off (igniter) systems (including fuel supply)

TABLE B04-49 Heat Recovery Steam Generator (HRSG): HRSG Boiler Fuel Supply - Burners (Duct Burners)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	385	Igniters
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	410	Other burner problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-50 Heat Recovery Steam Generator (HRSG): HRSG Boiler Fuel Supply - Oil and Gas Systems (except light off)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	440	Fuel oil pumps (general)
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	441	Fuel oil pumps (burner supply)
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	442	Fuel oil pumps (forwarding/transfer)
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	443	Fuel oil (burner supply) pump drives
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	444	Fuel oil (forwarding/transfer) pump drives
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	450	Fuel oil heaters
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	460	Fuel oil atomizers
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	470	Oil and gas fires
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	480	Other oil and gas fuel supply problems (see codes 0360-0410 for burner problems)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-51 Heat Recovery Steam Generator (HRSG): HRSG Boiler Internals and Structures					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		800	Drums and drum internals (single drum only)

TABLE B04-51 Heat Recovery Steam Generator (HRSG): HRSG Boiler Internals and Structures					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		801	HP Drum (including drum level trips not attributable to other causes)
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		802	IP Drum (including drum level trips not attributable to other causes)
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		803	LP Drum (including drum level trips not attributable to other causes)
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		810	Boiler supports and structures (use code 1320 for tube supports)
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		820	Casing
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		830	Doors
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		840	Refractory and insulation
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		845	Windbox expansion joints
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		847	Other expansion joints
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		848	Inlet panel
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		850	Other internal or structural problems
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		855	Drum relief/safety valves (single drum only)
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		856	HP Drum relief/safety valves
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		857	IP Drum relief/safety valves
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		858	LP Drum relief/safety valves
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		859	Tube external fins/membranes

TABLE B04-51 Heat Recovery Steam Generator (HRSG): HRSG Boiler Internals and Structures					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-52 Heat Recovery Steam Generator (HRSG): HRSG Boiler Overhaul and Inspections					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1800	Major boiler overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1801	Minor boiler overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1810	Other boiler inspections
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1811	Boiler Inspections - problem identification / investigation
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1812	Boiler Inspections - scheduled or routine
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1820	Chemical cleaning/steam blows
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-53 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - Boiler Recirculation					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation	740	Boiler recirculation pumps
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation	741	Boiler recirculation pumps - motors
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation	750	Boiler recirculation piping including downcomers
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation	760	Boiler recirculation valves
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation	770	Other boiler recirculation problems

TABLE B04-53 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - Boiler Recirculation					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-54 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - Feedwater and Blowdown					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	670	Feedwater piping downstream of feedwater regulating valve
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	680	Feedwater valves (not feedwater regulating valve)
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	690	Other feedwater problems downstream of feedwater regulating valve (use codes 3401 to 3499 for remainder of feedwater system)
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	700	Blowdown system valves
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	710	Blowdown system piping
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	720	Blowdown system controls / instrumentation
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	730	Other blowdown system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-55 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Cold and Hot Reheat Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	540	Hot reheat steam piping up to turbine stop valves
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	541	Cold reheat steam piping up to boiler
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	550	Reheat steam relief/safety valves
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	560	Other hot reheat steam valves (not including turbine stop or intercept valves)

TABLE B04-55 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Cold and Hot Reheat Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	561	Other cold reheat steam valves (not including turbine stop or intercept valves)
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	570	Other reheat steam problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-56 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Desuperheaters/Attemperators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6140	HP Desuperheater/attemperator piping - Greater than 600 PSIG.
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6141	HP Desuperheater/attemperator valves
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6142	HP Desuperheater/attemperator spray nozzles
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6143	HP Desuperheater/attemperator drums
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6144	Other HP desuperheater/attemperator problems
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6145	IP Desuperheater/attemperator piping - Between 200-600 PSIG
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6146	IP Desuperheater/attemperator valves
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6147	IP Desuperheater/attemperator spray nozzles
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6148	IP Desuperheater/attemperator drums
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6149	Other IP desuperheater/attemperator problems
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6150	LP Desuperheater/attemperator piping - Less than 200 PSIG
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6151	LP Desuperheater/attemperator valves

TABLE B04-56 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Desuperheaters/Attemperators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6152	LP Desuperheater/attemperator spray nozzles
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6153	LP Desuperheater/attemperator drums
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6154	Other LP desuperheater/attemperator problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-57 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Main Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	500	Main steam piping up to turbine stop valves
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	510	Main steam relief/safety valves off superheater
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	520	Other main steam valves (including vent and drain valves but not including the turbine stop valves)
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	530	Other main steam system problems
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6110	HP steam piping up to turbine stop valves - Greater than 600 PSIG (see 0790 for piping supports)
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6111	HP steam relief/safety valves
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6112	Other HP steam valves (including vent and drain valves but not including the turbine stop valves)
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6113	Other HP steam system problems
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6114	HP steam isolation/boundary valves

TABLE B04-57 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Main Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6120	IP steam piping up to turbine stop valves - Between 200 & 600 PSIG (see 0790 for piping supports)
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6121	IP steam relief/safety valves
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6122	Other IP steam valves (including vent and drain valves but not including the turbine stop valves)
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6123	Other IP steam system problems
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6124	IP steam isolation/boundary valves
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6130	LP steam piping up to turbine stop valves - Less than 200 PSIG (see 0790 for piping supports)
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6131	LP steam relief/safety valves
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6132	Other LP steam valves (including vent and drain valves but not including the turbine stop valves)
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6133	Other LP steam system problems
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6134	Other main steam valves (including vent and drain valves but not including the turbine stop valves)
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6135	LP steam isolation/boundary valves
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-58 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Startup Bypass					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6160	HP Startup bypass system piping (including drain lines up to heaters or condenser) - Greater than 600 PSIG
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6161	HP Startup bypass system valves
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6162	HP Startup bypass tanks or flash tanks
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6163	Other HP startup bypass system problems
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6164	HP startup bypass instrumentation and controls
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6170	IP Startup bypass system piping (including drain lines up to heaters or condenser) - Between 200-600 PSIG
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6171	IP Startup bypass system valves
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6172	IP Startup bypass tanks or flash tanks
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6173	Other IP startup bypass system problems
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6174	IP startup bypass instrumentation and controls
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6180	LP Startup bypass system piping (including drain lines up to heaters or condenser) - Less than 200 PSIG
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6181	LP Startup bypass system valves
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6182	LP Startup bypass tanks or flash tanks
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6183	Other LP startup bypass system problems
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6184	LP startup bypass instrumentation and controls

TABLE B04-58 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Startup Bypass					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-59 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - Miscellaneous (Piping)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)	775	Economizer piping
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)	780	Headers between tube bundles
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)	782	Headers and caps
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)	790	Pipe hangers, brackets, supports (general)
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)	799	Other miscellaneous piping system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-60 Heat Recovery Steam Generator (HRSG): HRSG Boiler Tube Leaks					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6005	HP Evaporator tubes
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6006	IP Evaporator tubes
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6007	LP Evaporator tubes
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6010	HP superheater
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6011	HP reheater
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6012	HP economizer
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6020	IP superheater
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6021	IP reheater

TABLE B04-60 Heat Recovery Steam Generator (HRSG): HRSG Boiler Tube Leaks					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6022	IP economizer
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6030	LP reheater
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6031	LP superheater
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6032	LP economizer
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6090	Other HRSG tube problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use code 0859 for tube/membrane failures.					

TABLE B04-61 Heat Recovery Steam Generator (HRSG): HRSG Boiler Water Condition					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Water Condition		1850	Boiler water condition (not feedwater water quality)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-62 Heat Recovery Steam Generator (HRSG): Miscellaneous (HRSG Boiler)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		1980	Boiler safety valve test
CoG steam units	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		1990	Boiler performance testing (use code 9999 for total unit performance testing)
CoG steam units	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		1999	Boiler, miscellaneous
CoG steam units	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		6000	Heat recovery steam generator to gas turbine connecting equipment. For additional codes, use Fossil Steam Cause Codes 0010 to 1999.

TABLE B04-62 Heat Recovery Steam Generator (HRSG): Miscellaneous (HRSG Boiler)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		6100	Steam turbine to gas turbine coupling. For additional codes, use Fossil Steam Cause Codes 4000 to 4499.
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use more specific codes - other slagging and fouling problems, other control problems, etc. whenever possible. Describe miscellaneous problems in the verbal description.					

TABLE B04-63 Heat Recovery Steam Generator (HRSG): Miscellaneous HRSG Boiler Tube Problems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1300	Water side fouling
CoG steam units	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1305	Fireside cleaning (which requires a full outage) Use code 1200 for cleanings that cause deratings.
CoG steam units	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1310	Water side cleaning (acid cleaning)
CoG steam units	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1320	Tube supports/attachments
CoG steam units	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1330	Slag fall damage
CoG steam units	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1340	Tube modifications (including addition and removal of tubes)
CoG steam units	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1350	Other miscellaneous boiler tube problems
CoG steam units	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1360	Boiler drains system
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

INACTIVE STATES

TABLE B04-64 Inactive States: Inactive States					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Inactive States	Inactive States		2	Inactive Reserve Shutdown
CoG steam units	Inactive States	Inactive States		9990	Retired unit

TABLE B04-64 Inactive States: Inactive States					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Inactive States	Inactive States		9991	Mothballed unit
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

JET ENGINE

TABLE B04-65 Jet Engine: Auxiliary Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Jet Engine	Auxiliary Systems		5510	Lube oil system
CoG steam units	Jet Engine	Auxiliary Systems		5516	Power Augmentation System Equipment
CoG steam units	Jet Engine	Auxiliary Systems		5520	Hydraulic oil system
CoG steam units	Jet Engine	Auxiliary Systems		5530	Starting system (including motor)
CoG steam units	Jet Engine	Auxiliary Systems		5540	Battery and charger system
CoG steam units	Jet Engine	Auxiliary Systems		5550	Turning gear and motor
CoG steam units	Jet Engine	Auxiliary Systems		5551	Load gear compartment
CoG steam units	Jet Engine	Auxiliary Systems		5560	Cooling and seal air system
CoG steam units	Jet Engine	Auxiliary Systems		5570	Cooling water system
CoG steam units	Jet Engine	Auxiliary Systems		5580	Anti-icing system
CoG steam units	Jet Engine	Auxiliary Systems		5590	Other auxiliary system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-66 Jet Engine: Exhaust Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Jet Engine	Exhaust Systems		5500	Chamber
CoG steam units	Jet Engine	Exhaust Systems		5501	Hoods
CoG steam units	Jet Engine	Exhaust Systems		5502	Vanes/nozzles
CoG steam units	Jet Engine	Exhaust Systems		5503	Silencer
CoG steam units	Jet Engine	Exhaust Systems		5504	Cones
CoG steam units	Jet Engine	Exhaust Systems		5505	Diverter Dampers
CoG steam units	Jet Engine	Exhaust Systems		5508	High engine exhaust temperature
CoG steam units	Jet Engine	Exhaust Systems		5509	Other exhaust problems (including high exhaust temperature not attributable to a specific problem)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-67 Jet Engine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5440	Fuel tanks
CoG steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5441	Fuel piping and valves
CoG steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5442	Fuel nozzles/vanes
CoG steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5443	Fuel filters
CoG steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5444	Liquid fuel oil pump
CoG steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5445	Liquid fuel oil transfer/forwarding pump
CoG steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5446	Liquid fuel purge system
CoG steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5447	Gas fuel system including controls and instrumentation
CoG steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5449	Other fuel system problems
CoG steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5450	Ignition system
CoG steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5451	Pilot fuel piping and valves
CoG steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5452	Pilot fuel nozzles/vanes
CoG steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5453	Pilot fuel filters
CoG steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5454	Water injection system
CoG steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5455	Fuel nozzle/vane cooling air system
CoG steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5460	Atomizing air system
CoG steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5470	Combustor casing

TABLE B04-67 Jet Engine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5471	Combustor liner
CoG steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5472	Combustor caps
CoG steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5473	Flame scanners
CoG steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5474	Flashback (including instrumentation)
CoG steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5475	Blade path temperature spread
CoG steam units	Jet Engine	Fuel, Ignition, and Combustion Systems		5479	Other combustor problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-68 Jet Engine: Inlet Air System and Compressors - Compressors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Jet Engine	Inlet Air System and Compressors	Compressors	5410	High pressure shaft
CoG steam units	Jet Engine	Inlet Air System and Compressors	Compressors	5411	High pressure bearings
CoG steam units	Jet Engine	Inlet Air System and Compressors	Compressors	5412	High pressure blades/buckets
CoG steam units	Jet Engine	Inlet Air System and Compressors	Compressors	5413	Other high pressure problems
CoG steam units	Jet Engine	Inlet Air System and Compressors	Compressors	5414	Compressor diaphragms/vanes
CoG steam units	Jet Engine	Inlet Air System and Compressors	Compressors	5420	Low pressure shaft
CoG steam units	Jet Engine	Inlet Air System and Compressors	Compressors	5421	Low pressure bearings
CoG steam units	Jet Engine	Inlet Air System and Compressors	Compressors	5422	Low pressure blades/buckets
CoG steam units	Jet Engine	Inlet Air System and Compressors	Compressors	5429	Other low pressure problems
CoG steam units	Jet Engine	Inlet Air System and Compressors	Compressors	5430	Supercharging fans
CoG steam units	Jet Engine	Inlet Air System and Compressors	Compressors	5435	Compressor washing
CoG steam units	Jet Engine	Inlet Air System and Compressors	Compressors	5436	Compressor shaft and bearings for two-shaft machines
CoG steam units	Jet Engine	Inlet Air System and Compressors	Compressors	5439	Other compressor problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use HP compressor if only one.					

TABLE B04-69 Jet Engine: Inlet Air System and Compressors - Ducts and Filters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5400	Inlet air ducts
CoG steam units	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5401	Inlet air vanes/nozzles
CoG steam units	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5402	Inlet air filters
CoG steam units	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5403	Inlet and exhaust cones
CoG steam units	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5404	Inlet air chillers
CoG steam units	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5405	Inlet air evaporative coolers
CoG steam units	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5406	Inlet air foggers
CoG steam units	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5409	Other inlet air problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use HP compressor if only one.					

TABLE B04-70 Jet Engine: Miscellaneous (Jet Engine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Jet Engine	Miscellaneous (Jet Engine)		5600	Reduction gear
CoG steam units	Jet Engine	Miscellaneous (Jet Engine)		5601	Load shaft and bearings
CoG steam units	Jet Engine	Miscellaneous (Jet Engine)		5605	Main coupling between the turbine and generator
CoG steam units	Jet Engine	Miscellaneous (Jet Engine)		5606	Clutch
CoG steam units	Jet Engine	Miscellaneous (Jet Engine)		5610	Intercoolers
CoG steam units	Jet Engine	Miscellaneous (Jet Engine)		5620	Regenerators
CoG steam units	Jet Engine	Miscellaneous (Jet Engine)		5630	Heat shields
CoG steam units	Jet Engine	Miscellaneous (Jet Engine)		5640	Fire detection and extinguishing system
CoG steam units	Jet Engine	Miscellaneous (Jet Engine)		5641	Fire in unit
CoG steam units	Jet Engine	Miscellaneous (Jet Engine)		5645	Jet Engine Control System - data highway
CoG steam units	Jet Engine	Miscellaneous (Jet Engine)		5646	Jet Engine Control System - hardware problems (including card failure)
CoG steam units	Jet Engine	Miscellaneous (Jet Engine)		5647	Jet Engine Control System - internal and termination wiring
CoG steam units	Jet Engine	Miscellaneous (Jet Engine)		5648	Jet Engine Control System - logic problems
CoG steam units	Jet Engine	Miscellaneous (Jet Engine)		5649	Jet Engine Control System - upgrades
CoG steam units	Jet Engine	Miscellaneous (Jet Engine)		5650	Other controls and instrumentation problems

TABLE B04-70 Jet Engine: Miscellaneous (Jet Engine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Jet Engine	Miscellaneous (Jet Engine)		5660	Major overhaul (use for non-specific overhaul only; see page B-CCGT-2)
CoG steam units	Jet Engine	Miscellaneous (Jet Engine)		5661	Engine/compressor washing
CoG steam units	Jet Engine	Miscellaneous (Jet Engine)		5662	Engine exchange
CoG steam units	Jet Engine	Miscellaneous (Jet Engine)		5665	Engine shafts and bearings
CoG steam units	Jet Engine	Miscellaneous (Jet Engine)		5670	Hot end inspection
CoG steam units	Jet Engine	Miscellaneous (Jet Engine)		5672	Boroscope inspection
CoG steam units	Jet Engine	Miscellaneous (Jet Engine)		5674	General unit inspection
CoG steam units	Jet Engine	Miscellaneous (Jet Engine)		5680	Vibration (not engine) in unit not attributable to bearings or other components
CoG steam units	Jet Engine	Miscellaneous (Jet Engine)		5685	Engine vibration
CoG steam units	Jet Engine	Miscellaneous (Jet Engine)		5686	Jet engine lockout
CoG steam units	Jet Engine	Miscellaneous (Jet Engine)		5690	Engine performance testing - individual engines (use code 9999 for total unit performance testing)
CoG steam units	Jet Engine	Miscellaneous (Jet Engine)		5692	Turbine Overspeed Trip Test - Jet Engine
CoG steam units	Jet Engine	Miscellaneous (Jet Engine)		5695	Synchronous condenser equipment
CoG steam units	Jet Engine	Miscellaneous (Jet Engine)		5699	Other miscellaneous jet engine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-71 Jet Engine: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Jet Engine	Turbine		5480	High pressure shaft
CoG steam units	Jet Engine	Turbine		5481	High pressure bearings
CoG steam units	Jet Engine	Turbine		5482	High pressure blades/buckets
CoG steam units	Jet Engine	Turbine		5483	High pressure nozzles/vanes
CoG steam units	Jet Engine	Turbine		5484	High pressure casing/expansion joint
CoG steam units	Jet Engine	Turbine		5485	Interstage gas passages
CoG steam units	Jet Engine	Turbine		5486	High pressure shaft seals
CoG steam units	Jet Engine	Turbine		5487	Thrust bearing
CoG steam units	Jet Engine	Turbine		5489	Other high pressure problems

TABLE B04-71 Jet Engine: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Jet Engine	Turbine		5490	Low pressure shaft
CoG steam units	Jet Engine	Turbine		5491	Low pressure bearings
CoG steam units	Jet Engine	Turbine		5492	Low pressure blades/buckets
CoG steam units	Jet Engine	Turbine		5493	Low pressure nozzles/vanes
CoG steam units	Jet Engine	Turbine		5494	Low pressure casing/expansion joints
CoG steam units	Jet Engine	Turbine		5497	Other low pressure problems
CoG steam units	Jet Engine	Turbine		5498	Expansion joints
CoG steam units	Jet Engine	Turbine		5499	Shaft seals
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use HP if only one.					

MISCELLANEOUS

TABLE B04-72 Miscellaneous: Instruments and Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Miscellaneous	Instruments and Controls		6200	Combined cycle instruments and controls. (Report instruments and controls specific to the gas turbine, steam turbine, boiler, generator, or balance of plant using the codes for the appropriate piece of equipment.)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

PERFORMANCE

TABLE B04-73 Performance: Performance					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Performance	Performance		9997	NERC Reliability Standard Requirement
CoG steam units	Performance	Performance		9998	Black start testing
CoG steam units	Performance	Performance		9999	Total unit performance testing (use appropriate codes for individual component testing)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

PERSONNEL OR PROCEDURAL ERRORS

TABLE B04-74 Personnel or Procedural Errors: Personnel or Procedural Errors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Personnel or Procedural Errors	Personnel or Procedural Errors		9900	Operator error
CoG steam units	Personnel or Procedural Errors	Personnel or Procedural Errors		9910	Maintenance personnel error
CoG steam units	Personnel or Procedural Errors	Personnel or Procedural Errors		9920	Contractor error
CoG steam units	Personnel or Procedural Errors	Personnel or Procedural Errors		9930	Operating procedure error
CoG steam units	Personnel or Procedural Errors	Personnel or Procedural Errors		9940	Maintenance procedure error
CoG steam units	Personnel or Procedural Errors	Personnel or Procedural Errors		9950	Contractor procedure error
CoG steam units	Personnel or Procedural Errors	Personnel or Procedural Errors		9960	Staff shortage
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

POLLUTION CONTROL EQUIPMENT

TABLE B04-75 Pollution Control Equipment: CO Reduction					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Pollution Control Equipment	CO Reduction		8840	CO Active catalyst
CoG steam units	Pollution Control Equipment	CO Reduction		8841	CO Support materials
CoG steam units	Pollution Control Equipment	CO Reduction		8842	CO Plugging
CoG steam units	Pollution Control Equipment	CO Reduction		8845	Other CO reduction problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-76 Pollution Control Equipment: Continuous Emissions Monitoring Systems (CEMS)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8700	CEMS Certification and Recertification

TABLE B04-76 Pollution Control Equipment: Continuous Emissions Monitoring Systems (CEMS)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8710	SO2 analyzer problems
CoG steam units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8720	NOx analyzer problems
CoG steam units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8730	CO analyzer problems
CoG steam units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8740	CO2 analyzer problems
CoG steam units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8750	O2 analyzer problems
CoG steam units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8760	Opacity monitor problems
CoG steam units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8770	Flow monitor problems
CoG steam units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8780	Data acquisition system problems
CoG steam units	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8790	Miscellaneous CEMS problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-77 Pollution Control Equipment: NOx Reduction Systems - Catalytic Air Heaters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8830	CAH NOx Active catalyst
CoG steam units	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8831	CAH NOx Support materials
CoG steam units	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8832	CAH NOx Plugging
CoG steam units	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8835	Other CAH problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-78 Pollution Control Equipment: NOx Reduction Systems - Selective Catalytic Reduction Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8810	SCR NOx Reactor

TABLE B04-78 Pollution Control Equipment: NOx Reduction Systems - Selective Catalytic Reduction Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8811	SCR NOx Reagent
CoG steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8812	SCR NOx Catalyst
CoG steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8813	SCR NOx Injection grid piping/valves
CoG steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8814	SCR NOx Catalyst support material
CoG steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8815	SCR NOx Soot blowers
CoG steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8816	SCR NOx Plugging
CoG steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8817	SCR NOx Control system
CoG steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8820	SCR NOx Ammonia injection grid piping/valves
CoG steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8821	SCR NOx Ammonia tanks, piping and valves (not injection)
CoG steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8822	SCR NOx Ammonia air blowers
CoG steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8823	SCR NOx Other ammonia system problems
CoG steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8825	Other SCR NOx problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-79 Pollution Control Equipment: NOx Reduction Systems - Selective Non-Catalytic Reduction Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8800	SNCR NOx Reagent
CoG steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8801	SNCR NOx Carrier gas
CoG steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8802	SNCR NOx Control system

TABLE B04-79 Pollution Control Equipment: NOx Reduction Systems - Selective Non-Catalytic Reduction Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8803	SNCR Performance Testing
CoG steam units	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8809	Other SNCR NOx problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use code 0360 for Low NOx Burners.					

REGULATORY, SAFETY, ENVIRONMENTAL

Use these codes only for events not directly attributable to equipment failures. Inspections or testing of certain equipment due to regulation are reported using the appropriate equipment cause codes, and the fact that it was a regulatory requirement noted in the verbal description section.

TABLE B04-80 Regulatory, Safety, Environmental: Other Operating Environmental Limitations					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9660	Thermal discharge limits - fossil and nuclear
CoG steam units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9663	Thermal discharge limits - gas turbines
CoG steam units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9664	Thermal discharge limits - jet engines
CoG steam units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9670	Noise limits (not for personnel safety) - fossil and nuclear
CoG steam units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9673	Noise limits (not for personnel safety) - gas turbines
CoG steam units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9674	Noise limits (not for personnel safety) - jet engines
CoG steam units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9677	Noise limits testing - fossil
CoG steam units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9678	Noise limits testing - gas turbines
CoG steam units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9679	Noise limits testing - jet engines
CoG steam units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9680	Fish kill - fossil and nuclear

TABLE B04-80 Regulatory, Safety, Environmental: Other Operating Environmental Limitations					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9683	Fish kill - gas turbines
CoG steam units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9684	Fish kill - jet engines
CoG steam units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9690	Other miscellaneous operational environmental limits - fossil and nuclear
CoG steam units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9693	Other miscellaneous operational environmental limits - gas turbines
CoG steam units	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9694	Other miscellaneous operational environmental limits - jet engines
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-81 Regulatory, Safety, Environmental: Regulatory					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Regulatory, Safety, Environmental	Regulatory		9504	Regulatory (environmental) proceedings and hearings - regulatory agency initiated
CoG steam units	Regulatory, Safety, Environmental	Regulatory		9506	Regulatory (environmental) proceedings and hearings - intervenor initiated
CoG steam units	Regulatory, Safety, Environmental	Regulatory		9510	Plant modifications strictly for compliance with new or changed regulatory requirements (scrubbers, cooling towers, etc.)
CoG steam units	Regulatory, Safety, Environmental	Regulatory		9520	Oil spill in Gulf of Mexico (OMC)
CoG steam units	Regulatory, Safety, Environmental	Regulatory		9590	Miscellaneous regulatory (this code is primarily intended for use with event contribution code 2 to indicate that a regulatory-related factor contributed to the primary cause of the event)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-82 Regulatory, Safety, Environmental: Safety					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Regulatory, Safety, Environmental	Safety		9700	OSHA-related retrofit or inspection
CoG steam units	Regulatory, Safety, Environmental	Safety		9720	Other safety problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-83 Regulatory, Safety, Environmental: Stack Emission					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Regulatory, Safety, Environmental	Stack Emission		9600	SO2 stack emissions - fossil
CoG steam units	Regulatory, Safety, Environmental	Stack Emission		9603	SO2 stack emissions - gas turbines
CoG steam units	Regulatory, Safety, Environmental	Stack Emission		9604	SO2 stack emissions - jet engines
CoG steam units	Regulatory, Safety, Environmental	Stack Emission		9610	NOx stack emissions - fossil
CoG steam units	Regulatory, Safety, Environmental	Stack Emission		9613	NOx stack emissions - gas turbines
CoG steam units	Regulatory, Safety, Environmental	Stack Emission		9614	NOx stack emissions - jet engines
CoG steam units	Regulatory, Safety, Environmental	Stack Emission		9616	CO stack emissions - fossil
CoG steam units	Regulatory, Safety, Environmental	Stack Emission		9620	Particulate stack emissions - fossil
CoG steam units	Regulatory, Safety, Environmental	Stack Emission		9623	Particulate stack emissions - gas turbines
CoG steam units	Regulatory, Safety, Environmental	Stack Emission		9624	Particulate stack emissions - jet engines
CoG steam units	Regulatory, Safety, Environmental	Stack Emission		9630	Opacity - fossil
CoG steam units	Regulatory, Safety, Environmental	Stack Emission		9633	Opacity - gas turbines
CoG steam units	Regulatory, Safety, Environmental	Stack Emission		9634	Opacity - jet engines

TABLE B04-83 Regulatory, Safety, Environmental: Stack Emission					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Regulatory, Safety, Environmental	Stack Emission		9650	Other stack/exhaust emissions - fossil (use codes 9200 to 9290 if fuel quality causes pollution control equipment problems that result in excess stack emissions)
CoG steam units	Regulatory, Safety, Environmental	Stack Emission		9653	Other stack or exhaust emissions - gas turbines (use codes 9200 to 9290 if fuel quality causes pollution control equipment problems that result in excess stack emissions)
CoG steam units	Regulatory, Safety, Environmental	Stack Emission		9654	Other stack or exhaust emissions - jet engines (use codes 9200 to 9290 if fuel quality causes pollution control equipment problems that result in excess stack emissions)
CoG steam units	Regulatory, Safety, Environmental	Stack Emission		9656	Other stack or exhaust emissions testing - fossil
CoG steam units	Regulatory, Safety, Environmental	Stack Emission		9657	Other stack or exhaust emissions testing - gas turbines
CoG steam units	Regulatory, Safety, Environmental	Stack Emission		9658	Other stack or exhaust emissions testing - jet engines
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Include exhaust emissions.					

STEAM TURBINE

Besides the turbine, this set includes the steam stop/control valves, turbine control system, and the turbine auxiliaries. The extraction steam codes are contained in the Balance of Plant set.

TABLE B04-84 Steam Turbine: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Steam Turbine	Controls		4290	Hydraulic system pumps
CoG steam units	Steam Turbine	Controls		4291	Hydraulic system coolers
CoG steam units	Steam Turbine	Controls		4292	Hydraulic system filters
CoG steam units	Steam Turbine	Controls		4293	Hydraulic system pipes and valves

TABLE B04-84 Steam Turbine: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Steam Turbine	Controls		4299	Other hydraulic system problems
CoG steam units	Steam Turbine	Controls		4300	Turbine supervisory system (use codes 4290 to 4299 for hydraulic oil)
CoG steam units	Steam Turbine	Controls		4301	Turbine governing system
CoG steam units	Steam Turbine	Controls		4302	Turbine trip devices (including instruments)
CoG steam units	Steam Turbine	Controls		4303	Exhaust hood and spray controls
CoG steam units	Steam Turbine	Controls		4304	Automatic turbine control systems - mechanical
CoG steam units	Steam Turbine	Controls		4305	Automatic turbine control systems - mechanical - hydraulic
CoG steam units	Steam Turbine	Controls		4306	Automatic turbine control systems - electro-hydraulic - analog
CoG steam units	Steam Turbine	Controls		4307	Automatic turbine control systems - electro-hydraulic - digital
CoG steam units	Steam Turbine	Controls		4308	Automatic turbine control systems - digital control and monitoring
CoG steam units	Steam Turbine	Controls		4309	Other turbine instrument and control problems
CoG steam units	Steam Turbine	Controls		4310	Steam Turbine Control System - data highway
CoG steam units	Steam Turbine	Controls		4311	Steam Turbine Control System - hardware problems (including card failure)
CoG steam units	Steam Turbine	Controls		4312	Steam Turbine Control System - internal and termination wiring
CoG steam units	Steam Turbine	Controls		4313	Steam Turbine Control System - logic problems
CoG steam units	Steam Turbine	Controls		4314	Steam Turbine Control System - upgrades
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-85 Steam Turbine: High Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Steam Turbine	High Pressure Turbine		4000	Outer casing

TABLE B04-85 Steam Turbine: High Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Steam Turbine	High Pressure Turbine		4001	Inner casing
CoG steam units	Steam Turbine	High Pressure Turbine		4009	Nozzle bolting
CoG steam units	Steam Turbine	High Pressure Turbine		4010	Nozzles and nozzle blocks
CoG steam units	Steam Turbine	High Pressure Turbine		4011	Diaphragms
CoG steam units	Steam Turbine	High Pressure Turbine		4012	Buckets or blades
CoG steam units	Steam Turbine	High Pressure Turbine		4013	Diaphragms unit and shroud type
CoG steam units	Steam Turbine	High Pressure Turbine		4014	Bucket or blade fouling
CoG steam units	Steam Turbine	High Pressure Turbine		4015	Wheels or spindles
CoG steam units	Steam Turbine	High Pressure Turbine		4020	Shaft seals
CoG steam units	Steam Turbine	High Pressure Turbine		4021	Dummy rings
CoG steam units	Steam Turbine	High Pressure Turbine		4022	Gland rings
CoG steam units	Steam Turbine	High Pressure Turbine		4030	Rotor shaft
CoG steam units	Steam Turbine	High Pressure Turbine		4040	Bearings
CoG steam units	Steam Turbine	High Pressure Turbine		4041	Thrust bearings
CoG steam units	Steam Turbine	High Pressure Turbine		4099	Other high pressure turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-86 Steam Turbine: Intermediate Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Steam Turbine	Intermediate Pressure Turbine		4100	Outer casing
CoG steam units	Steam Turbine	Intermediate Pressure Turbine		4101	Inner casing
CoG steam units	Steam Turbine	Intermediate Pressure Turbine		4109	Nozzle bolting
CoG steam units	Steam Turbine	Intermediate Pressure Turbine		4110	Nozzles and nozzle blocks
CoG steam units	Steam Turbine	Intermediate Pressure Turbine		4111	Diaphragms
CoG steam units	Steam Turbine	Intermediate Pressure Turbine		4112	Buckets or blades
CoG steam units	Steam Turbine	Intermediate Pressure Turbine		4113	Bucket or blade fouling
CoG steam units	Steam Turbine	Intermediate Pressure Turbine		4115	Wheels or spindles
CoG steam units	Steam Turbine	Intermediate Pressure Turbine		4120	Shaft seals
CoG steam units	Steam Turbine	Intermediate Pressure Turbine		4121	Dummy rings
CoG steam units	Steam Turbine	Intermediate Pressure Turbine		4122	Gland rings
CoG steam units	Steam Turbine	Intermediate Pressure Turbine		4130	Rotor shaft
CoG steam units	Steam Turbine	Intermediate Pressure Turbine		4140	Bearings
CoG steam units	Steam Turbine	Intermediate Pressure Turbine		4141	Thrust bearings

TABLE B04-86 Steam Turbine: Intermediate Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Steam Turbine	Intermediate Pressure Turbine		4199	Other intermediate pressure turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-87 Steam Turbine: Low Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Steam Turbine	Low Pressure Turbine		4200	Outer casing
CoG steam units	Steam Turbine	Low Pressure Turbine		4201	Inner casing
CoG steam units	Steam Turbine	Low Pressure Turbine		4209	Nozzle bolting
CoG steam units	Steam Turbine	Low Pressure Turbine		4210	Nozzles and nozzle blocks
CoG steam units	Steam Turbine	Low Pressure Turbine		4211	Diaphragms
CoG steam units	Steam Turbine	Low Pressure Turbine		4212	Buckets or blades
CoG steam units	Steam Turbine	Low Pressure Turbine		4213	Bucket or blade fouling
CoG steam units	Steam Turbine	Low Pressure Turbine		4215	Wheels or spindles
CoG steam units	Steam Turbine	Low Pressure Turbine		4220	Shaft seals
CoG steam units	Steam Turbine	Low Pressure Turbine		4221	Dummy rings
CoG steam units	Steam Turbine	Low Pressure Turbine		4222	Gland rings
CoG steam units	Steam Turbine	Low Pressure Turbine		4230	Rotor shaft
CoG steam units	Steam Turbine	Low Pressure Turbine		4240	Bearings
CoG steam units	Steam Turbine	Low Pressure Turbine		4241	Thrust bearings
CoG steam units	Steam Turbine	Low Pressure Turbine		4250	Other low pressure turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-88 Steam Turbine: Lube Oil					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Steam Turbine	Lube Oil		4280	Lube oil pumps
CoG steam units	Steam Turbine	Lube Oil		4281	Lube oil coolers
CoG steam units	Steam Turbine	Lube Oil		4282	Lube oil conditioners
CoG steam units	Steam Turbine	Lube Oil		4283	Lube oil system valves and piping
CoG steam units	Steam Turbine	Lube Oil		4284	Lube oil pump drive
CoG steam units	Steam Turbine	Lube Oil		4289	Other lube oil system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Do not include bearing failures due to lube oil.					

TABLE B04-89 Steam Turbine: Miscellaneous (Steam Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Steam Turbine	Miscellaneous (Steam Turbine)		4400	Major turbine overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)
CoG steam units	Steam Turbine	Miscellaneous (Steam Turbine)		4401	Inspection
CoG steam units	Steam Turbine	Miscellaneous (Steam Turbine)		4402	Minor turbine overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
CoG steam units	Steam Turbine	Miscellaneous (Steam Turbine)		4410	Turning gear and motor
CoG steam units	Steam Turbine	Miscellaneous (Steam Turbine)		4411	Steam turbine gear box (single shaft configuration)
CoG steam units	Steam Turbine	Miscellaneous (Steam Turbine)		4412	Steam turbine clutch (single shaft configuration)
CoG steam units	Steam Turbine	Miscellaneous (Steam Turbine)		4415	Shaft coupling mechanism
CoG steam units	Steam Turbine	Miscellaneous (Steam Turbine)		4420	Vibration of the turbine generator unit that cannot be attributed to a specific cause such as bearings or blades (use this code for balance moves)
CoG steam units	Steam Turbine	Miscellaneous (Steam Turbine)		4430	Gland seal system
CoG steam units	Steam Turbine	Miscellaneous (Steam Turbine)		4450	Water induction
CoG steam units	Steam Turbine	Miscellaneous (Steam Turbine)		4460	Turbine overspeed trip test
CoG steam units	Steam Turbine	Miscellaneous (Steam Turbine)		4470	Differential expansion
CoG steam units	Steam Turbine	Miscellaneous (Steam Turbine)		4490	Turbine performance testing (use code 9999 for total unit performance testing)
CoG steam units	Steam Turbine	Miscellaneous (Steam Turbine)		4499	Other miscellaneous steam turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-90 Steam Turbine: Piping					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Steam Turbine	Piping		4270	Crossover or under piping
CoG steam units	Steam Turbine	Piping		4279	Miscellaneous turbine piping
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B04-91 Steam Turbine: Valves					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
CoG steam units	Steam Turbine	Valves		4260	Main stop valves
CoG steam units	Steam Turbine	Valves		4261	Control valves
CoG steam units	Steam Turbine	Valves		4262	Intercept valves
CoG steam units	Steam Turbine	Valves		4263	Reheat stop valves
CoG steam units	Steam Turbine	Valves		4264	Combined intercept valves
CoG steam units	Steam Turbine	Valves		4265	Miscellaneous drain and vent valves
CoG steam units	Steam Turbine	Valves		4266	Main stop valve testing
CoG steam units	Steam Turbine	Valves		4267	Control valve testing
CoG steam units	Steam Turbine	Valves		4268	Reheat/intercept valve testing
CoG steam units	Steam Turbine	Valves		4269	Other turbine valves (including LP steam admission valves)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

Appendix B05: Index To Co-Generator Block Unit Cause Codes

COGENERATOR BLOCK UNITS

INDEX TO SYSTEM/COMPONENT/SUB-COMPONENT CAUSE CODE TABLES			
TABLE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**
B05-1	Balance of Plant	Auxiliary Systems	Auxiliary Steam
B05-2	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems
B05-3	Balance of Plant	Auxiliary Systems	Fire Protection System
B05-4	Balance of Plant	Auxiliary Systems	Instrument Air
B05-5	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System
B05-6	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)
B05-7	Balance of Plant	Auxiliary Systems	Open Cooling Water System
B05-8	Balance of Plant	Auxiliary Systems	Seal Air Fans
B05-9	Balance of Plant	Auxiliary Systems	Service Air
B05-10	Balance of Plant	Auxiliary Systems	Service Water (Open System)
B05-11	Balance of Plant	Circulating Water Systems	
B05-12	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators
B05-13	Balance of Plant	Condensate System	Miscellaneous (Condensate System)
B05-14	Balance of Plant	Condensate System	Polishers/Chemical Addition
B05-15	Balance of Plant	Condensate System	Pumps, Piping, and Valves
B05-16	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals
B05-17	Balance of Plant	Condensing System	Condenser Controls
B05-18	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment
B05-19	Balance of Plant	Condensing System	Miscellaneous (Condensing System)
B05-20	Balance of Plant	Condensing System	Vacuum Equipment
B05-21	Balance of Plant	Electrical	
B05-22	Balance of Plant	Extraction Steam	
B05-23	Balance of Plant	Feedwater System	
B05-24	Balance of Plant	Heater Drain Systems	
B05-25	Balance of Plant	Miscellaneous (Balance of Plant)	
B05-26	Balance of Plant	Power Station Switchyard	
B05-27	Balance of Plant	Waste Water (zero discharge) Systems	
B05-28	Expander Turbine	Expander Turbine	
B05-29	External	Catastrophe	
B05-30	External	Economic	
B05-31	External	Fuel Quality	
B05-32	External	Miscellaneous (External)	
B05-33	Gas Turbine	Auxiliary Systems	

INDEX TO SYSTEM/COMPONENT/SUB-COMPONENT CAUSE CODE TABLES			
TABLE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**
B05-34	Gas Turbine	Exhaust Systems	
B05-35	Gas Turbine	Fuel, Ignition, and Combustion Systems	
B05-36	Gas Turbine	Inlet Air System and Compressors	Compressors
B05-37	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters
B05-38	Gas Turbine	Miscellaneous (Gas Turbine)	
B05-39	Gas Turbine	Turbine	
B05-40	Generator	Controls	
B05-41	Generator	Cooling System	
B05-42	Generator	Exciter	
B05-43	Generator	Generator	
B05-44	Generator	Miscellaneous (Generator)	
B05-45	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply
B05-46	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)
B05-47	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems	
B05-48	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Design Limitations	
B05-49	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)
B05-50	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)
B05-51	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures	
B05-52	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections	
B05-53	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation
B05-54	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown
B05-55	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam
B05-56	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators
B05-57	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam
B05-58	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass
B05-59	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)
B05-60	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks	
B05-61	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Water Condition	
B05-62	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)	
B05-63	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems	
B05-64	Inactive States	Inactive States	
B05-65	Jet Engine	Auxiliary Systems	
B05-66	Jet Engine	Exhaust Systems	
B05-67	Jet Engine	Fuel, Ignition, and Combustion Systems	
B05-68	Jet Engine	Inlet Air System and Compressors	Compressors
B05-69	Jet Engine	Inlet Air System and Compressors	Ducts and Filters
B05-70	Jet Engine	Miscellaneous (Jet Engine)	

INDEX TO SYSTEM/COMPONENT/SUB-COMPONENT CAUSE CODE TABLES			
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B05-73	Performance	Performance	
B05-74	Personnel or Procedural Errors	Personnel or Procedural Errors	
B05-75	Pollution Control Equipment	CO Reduction	
B05-76	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)	
B05-77	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters
B05-78	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems
B05-79	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems
B05-80	Regulatory, Safety, Environmental	Other Operating Environmental Limitations	
B05-81	Regulatory, Safety, Environmental	Regulatory	
B05-82	Regulatory, Safety, Environmental	Safety	
B05-83	Regulatory, Safety, Environmental	Stack Emission	
B05-84	Steam Turbine	Controls	
B05-85	Steam Turbine	High Pressure Turbine	
B05-86	Steam Turbine	Intermediate Pressure Turbine	
B05-87	Steam Turbine	Low Pressure Turbine	
B05-88	Steam Turbine	Lube Oil	
B05-89	Steam Turbine	Miscellaneous (Steam Turbine)	
B05-90	Steam Turbine	Piping	
B05-91	Steam Turbine	Valves	

BALANCE OF PLANT

TABLE B05-1 Balance of Plant: Auxiliary Systems - Auxiliary Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3830	Auxiliary boiler
Co-generator Block	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3831	Auxiliary steam piping
Co-generator Block	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3832	Auxiliary steam valves
Co-generator Block	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3833	Auxiliary steam controls and instruments
Co-generator Block	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3834	Auxiliary boiler tube leaks
Co-generator Block	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3835	Auxiliary boiler burner management system
Co-generator Block	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3836	Steam transfer to other unit

TABLE B05-1 Balance of Plant: Auxiliary Systems - Auxiliary Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3839	Other auxiliary steam problems (also see extraction steam codes 3520 to 3529; startup bypass codes 0630 to 0660; and soot blower steam code 0870)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-20 Balance of Plant: Condensing System - Vacuum Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Balance of Plant	Condensing System	Vacuum Equipment	3130	Air ejectors
Co-generator Block	Balance of Plant	Condensing System	Vacuum Equipment	3131	Air ejector piping and valves
Co-generator Block	Balance of Plant	Condensing System	Vacuum Equipment	3132	Inter and after condensers
Co-generator Block	Balance of Plant	Condensing System	Vacuum Equipment	3133	Vacuum pumps
Co-generator Block	Balance of Plant	Condensing System	Vacuum Equipment	3134	Vacuum pump piping and valves
Co-generator Block	Balance of Plant	Condensing System	Vacuum Equipment	3135	Vacuum pump motor and auxiliaries
Co-generator Block	Balance of Plant	Condensing System	Vacuum Equipment	3139	Other air extraction system problems - general
Co-generator Block	Balance of Plant	Condensing System	Vacuum Equipment	3149	Loss of vacuum not attributable to a particular component such as air ejectors or valves, or high back pressure not attributable to high circulating water temperature, or vacuum losses from a known cause.
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-21 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Balance of Plant	Electrical		3600	Switchyard transformers and associated cooling systems - external (OMC)
Co-generator Block	Balance of Plant	Electrical		3601	Switchyard transformers and associated cooling systems - external (not OMC)

TABLE B05-21 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Balance of Plant	Electrical		3610	Switchyard circuit breakers - external (not OMC)
Co-generator Block	Balance of Plant	Electrical		3611	Switchyard circuit breakers - external (OMC)
Co-generator Block	Balance of Plant	Electrical		3612	Switchyard system protection devices - external (OMC)
Co-generator Block	Balance of Plant	Electrical		3613	Switchyard system protection devices - external (not OMC)
Co-generator Block	Balance of Plant	Electrical		3618	Other switchyard equipment - external (not OMC)
Co-generator Block	Balance of Plant	Electrical		3619	Other switchyard equipment - external (OMC)
Co-generator Block	Balance of Plant	Electrical		3620	Main transformer
Co-generator Block	Balance of Plant	Electrical		3621	Unit auxiliaries transformer
Co-generator Block	Balance of Plant	Electrical		3622	Station service startup transformer
Co-generator Block	Balance of Plant	Electrical		3623	Auxiliary generators
Co-generator Block	Balance of Plant	Electrical		3624	Auxiliary generator voltage supply system
Co-generator Block	Balance of Plant	Electrical		3629	Other switchyard or high voltage system problems - external
Co-generator Block	Balance of Plant	Electrical		3630	400-700 volt transformers
Co-generator Block	Balance of Plant	Electrical		3631	400-700 volt circuit breakers
Co-generator Block	Balance of Plant	Electrical		3632	400-700 volt conductors and buses
Co-generator Block	Balance of Plant	Electrical		3633	400-700 volt insulators
Co-generator Block	Balance of Plant	Electrical		3634	400-700 volt protection devices
Co-generator Block	Balance of Plant	Electrical		3639	Other 400-700 volt problems
Co-generator Block	Balance of Plant	Electrical		3640	AC instrument power transformers
Co-generator Block	Balance of Plant	Electrical		3641	AC Circuit breakers
Co-generator Block	Balance of Plant	Electrical		3642	AC Conductors and buses
Co-generator Block	Balance of Plant	Electrical		3643	AC Inverters
Co-generator Block	Balance of Plant	Electrical		3644	AC Protection devices
Co-generator Block	Balance of Plant	Electrical		3649	Other AC instrument power problems
Co-generator Block	Balance of Plant	Electrical		3650	DC instrument power battery chargers
Co-generator Block	Balance of Plant	Electrical		3651	DC circuit breakers
Co-generator Block	Balance of Plant	Electrical		3652	DC conductors and buses

TABLE B05-21 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Balance of Plant	Electrical		3653	DC protection devices
Co-generator Block	Balance of Plant	Electrical		3659	Other DC power problems
Co-generator Block	Balance of Plant	Electrical		3660	4000-7000 volt transformers
Co-generator Block	Balance of Plant	Electrical		3661	4000-7000 volt circuit breakers
Co-generator Block	Balance of Plant	Electrical		3662	4000-7000 volt conductors and buses
Co-generator Block	Balance of Plant	Electrical		3663	4000-7000 volt insulators
Co-generator Block	Balance of Plant	Electrical		3664	4000-7000 volt protection devices
Co-generator Block	Balance of Plant	Electrical		3669	Other 4000-7000 volt problems
Co-generator Block	Balance of Plant	Electrical		3670	12-15kV transformers
Co-generator Block	Balance of Plant	Electrical		3671	12-15kV circuit breakers
Co-generator Block	Balance of Plant	Electrical		3672	12-15kV conductors and buses
Co-generator Block	Balance of Plant	Electrical		3673	12-15kV insulators
Co-generator Block	Balance of Plant	Electrical		3674	12-15kV protection devices
Co-generator Block	Balance of Plant	Electrical		3679	Other 12-15kV problems
Co-generator Block	Balance of Plant	Electrical		3680	Other voltage transformers
Co-generator Block	Balance of Plant	Electrical		3681	Other voltage circuit breakers
Co-generator Block	Balance of Plant	Electrical		3682	Other voltage conductors and buses
Co-generator Block	Balance of Plant	Electrical		3683	Other voltage insulators
Co-generator Block	Balance of Plant	Electrical		3684	Other voltage protection devices
Co-generator Block	Balance of Plant	Electrical		3689	Other voltage problems
Co-generator Block	Balance of Plant	Electrical		3690	Station Service Power Distribution System, General
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-22 Balance of Plant: Extraction Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Balance of Plant	Extraction Steam		3520	HP Extraction steam piping
Co-generator Block	Balance of Plant	Extraction Steam		3521	HP Extraction steam valves
Co-generator Block	Balance of Plant	Extraction Steam		3522	HP Extraction steam instruments and controls
Co-generator Block	Balance of Plant	Extraction Steam		3529	Other HP extraction steam system problems
Co-generator Block	Balance of Plant	Extraction Steam		3530	IP Extraction steam piping
Co-generator Block	Balance of Plant	Extraction Steam		3531	IP Extraction steam valves

TABLE B05-22 Balance of Plant: Extraction Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Balance of Plant	Extraction Steam		3532	IP Extraction steam instruments and controls
Co-generator Block	Balance of Plant	Extraction Steam		3539	Other IP extraction steam system problems
Co-generator Block	Balance of Plant	Extraction Steam		3540	LP Extraction steam piping
Co-generator Block	Balance of Plant	Extraction Steam		3541	LP Extraction steam valves
Co-generator Block	Balance of Plant	Extraction Steam		3542	LP Extraction steam instruments and controls
Co-generator Block	Balance of Plant	Extraction Steam		3549	Other LP extraction steam system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-23 Balance of Plant: Feedwater System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Balance of Plant	Feedwater System		3401	Startup feedwater pump
Co-generator Block	Balance of Plant	Feedwater System		3402	Startup feedwater pump drives - all types
Co-generator Block	Balance of Plant	Feedwater System		3407	Feedwater pump suction screens
Co-generator Block	Balance of Plant	Feedwater System		3408	Feedwater pump drive - local controls
Co-generator Block	Balance of Plant	Feedwater System		3409	Feedwater pump drive motor - variable speed
Co-generator Block	Balance of Plant	Feedwater System		3410	Feedwater pump
Co-generator Block	Balance of Plant	Feedwater System		3411	Feedwater pump drive - motor
Co-generator Block	Balance of Plant	Feedwater System		3412	Feedwater pump drive - steam turbine
Co-generator Block	Balance of Plant	Feedwater System		3413	Feedwater pump coupling and drive shaft
Co-generator Block	Balance of Plant	Feedwater System		3414	Feedwater pump local controls
Co-generator Block	Balance of Plant	Feedwater System		3415	Feedwater pump/drive lube oil system
Co-generator Block	Balance of Plant	Feedwater System		3416	Other feedwater pump problems
Co-generator Block	Balance of Plant	Feedwater System		3417	Feedwater pump drive - main shaft
Co-generator Block	Balance of Plant	Feedwater System		3418	Feedwater pump drive - other
Co-generator Block	Balance of Plant	Feedwater System		3419	Feedwater pump drive - gear
Co-generator Block	Balance of Plant	Feedwater System		3420	Feedwater piping and supports

TABLE B05-23 Balance of Plant: Feedwater System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Balance of Plant	Feedwater System		3430	Feedwater regulating (boiler level control) valve
Co-generator Block	Balance of Plant	Feedwater System		3431	Other feedwater valves
Co-generator Block	Balance of Plant	Feedwater System		3439	HP heater head leaks
Co-generator Block	Balance of Plant	Feedwater System		3440	High pressure heater tube leaks
Co-generator Block	Balance of Plant	Feedwater System		3441	Other high pressure heater problems (see condensate system for LP and IP heater codes)
Co-generator Block	Balance of Plant	Feedwater System		3451	Feedwater booster pump suction screens
Co-generator Block	Balance of Plant	Feedwater System		3452	Feedwater booster pump drive - local controls
Co-generator Block	Balance of Plant	Feedwater System		3453	Feedwater booster pump drive motor - variable speed
Co-generator Block	Balance of Plant	Feedwater System		3454	Feedwater booster pump
Co-generator Block	Balance of Plant	Feedwater System		3455	Feedwater booster pump drive - motor
Co-generator Block	Balance of Plant	Feedwater System		3456	Feedwater booster pump drive - steam turbine
Co-generator Block	Balance of Plant	Feedwater System		3457	Feedwater booster pump coupling and drive shaft
Co-generator Block	Balance of Plant	Feedwater System		3458	Feedwater booster pump local controls
Co-generator Block	Balance of Plant	Feedwater System		3459	Feedwater booster pump/drive lube oil system
Co-generator Block	Balance of Plant	Feedwater System		3460	Other feedwater booster pump problems
Co-generator Block	Balance of Plant	Feedwater System		3461	Feedwater booster pump drive - main shaft
Co-generator Block	Balance of Plant	Feedwater System		3462	Feedwater booster pump drive - other
Co-generator Block	Balance of Plant	Feedwater System		3463	Feedwater booster pump drive - gear
Co-generator Block	Balance of Plant	Feedwater System		3499	Other feedwater system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Excluding extraction or drain systems.					

TABLE B05-24 Balance of Plant: Heater Drain Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Balance of Plant	Heater Drain Systems		3501	Heater drain pumps
Co-generator Block	Balance of Plant	Heater Drain Systems		3502	Heater level control
Co-generator Block	Balance of Plant	Heater Drain Systems		3503	Heater drain piping
Co-generator Block	Balance of Plant	Heater Drain Systems		3504	Heater drain valves
Co-generator Block	Balance of Plant	Heater Drain Systems		3505	Heater drain pump drive
Co-generator Block	Balance of Plant	Heater Drain Systems		3509	Other heater drain system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-25 Balance of Plant: Miscellaneous (Balance of Plant)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Balance of Plant	Miscellaneous (Balance of Plant)		3950	Process computer
Co-generator Block	Balance of Plant	Miscellaneous (Balance of Plant)		3960	Thermal derating (thermal efficiency losses in balance of plant when specific cause(s) unknown)
Co-generator Block	Balance of Plant	Miscellaneous (Balance of Plant)		3970	Distributive Control System (DCS) - process computer
Co-generator Block	Balance of Plant	Miscellaneous (Balance of Plant)		3971	DCS - data highway
Co-generator Block	Balance of Plant	Miscellaneous (Balance of Plant)		3972	DCS - hardware problems (including card failure)
Co-generator Block	Balance of Plant	Miscellaneous (Balance of Plant)		3973	DCS - internal and termination wiring
Co-generator Block	Balance of Plant	Miscellaneous (Balance of Plant)		3974	DCS - logic problems
Co-generator Block	Balance of Plant	Miscellaneous (Balance of Plant)		3975	DCS - upgrades
Co-generator Block	Balance of Plant	Miscellaneous (Balance of Plant)		3979	Other DCS problems
Co-generator Block	Balance of Plant	Miscellaneous (Balance of Plant)		3980	Programmable Logic Controller (PLC)
Co-generator Block	Balance of Plant	Miscellaneous (Balance of Plant)		3981	PLC - data highway
Co-generator Block	Balance of Plant	Miscellaneous (Balance of Plant)		3982	PLC - hardware problems (including card failure)
Co-generator Block	Balance of Plant	Miscellaneous (Balance of Plant)		3983	PLC - internal and termination wiring
Co-generator Block	Balance of Plant	Miscellaneous (Balance of Plant)		3984	PLC - logic problems
Co-generator Block	Balance of Plant	Miscellaneous (Balance of Plant)		3985	PLC - upgrades
Co-generator Block	Balance of Plant	Miscellaneous (Balance of Plant)		3989	Other PLC problems
Co-generator Block	Balance of Plant	Miscellaneous (Balance of Plant)		3995	Powerhouse heating and ventilating systems

TABLE B05-25 Balance of Plant: Miscellaneous (Balance of Plant)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Balance of Plant	Miscellaneous (Balance of Plant)		3996	Air conditioning systems - rooms and areas
Co-generator Block	Balance of Plant	Miscellaneous (Balance of Plant)		3998	Balance of plant overhaul/outage
Co-generator Block	Balance of Plant	Miscellaneous (Balance of Plant)		3999	Other miscellaneous balance of plant problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-26 Balance of Plant: Power Station Switchyard					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Balance of Plant	Power Station Switchyard		3700	Power Station switchyard (non generating unit equipment)
Co-generator Block	Balance of Plant	Power Station Switchyard		3710	Transmission line (connected to powerhouse switchyard to 1st Substation)
Co-generator Block	Balance of Plant	Power Station Switchyard		3720	Transmission equipment at the 1st substation (see code 9300 if applicable)
Co-generator Block	Balance of Plant	Power Station Switchyard		3730	Transmission equipment beyond the 1st substation (see code 9300 if applicable)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-27 Balance of Plant: Waste Water (zero discharge) Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Balance of Plant	Waste Water (zero discharge) Systems		3290	Waste water (zero discharge) tanks, pumps, and motors
Co-generator Block	Balance of Plant	Waste Water (zero discharge) Systems		3291	Waste water (zero discharge) system fouling
Co-generator Block	Balance of Plant	Waste Water (zero discharge) Systems		3292	Waste water (zero discharge) piping
Co-generator Block	Balance of Plant	Waste Water (zero discharge) Systems		3293	Waste water (zero discharge) valves
Co-generator Block	Balance of Plant	Waste Water (zero discharge) Systems		3294	Waste water (zero discharge) controls and instrumentation

TABLE B05-27 Balance of Plant: Waste Water (zero discharge) Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Balance of Plant	Waste Water (zero discharge) Systems		3295	Other waste water (zero discharge) problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

EXPANDER TURBINE

TABLE B05-28 Expander Turbine: Expander Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Expander Turbine	Expander Turbine		7800	Couplings
Co-generator Block	Expander Turbine	Expander Turbine		7810	Shaft
Co-generator Block	Expander Turbine	Expander Turbine		7820	Bearings
Co-generator Block	Expander Turbine	Expander Turbine		7830	Blades
Co-generator Block	Expander Turbine	Expander Turbine		7840	Discs
Co-generator Block	Expander Turbine	Expander Turbine		7850	Spacers
Co-generator Block	Expander Turbine	Expander Turbine		7860	Nozzles/vanes
Co-generator Block	Expander Turbine	Expander Turbine		7870	Heat shields
Co-generator Block	Expander Turbine	Expander Turbine		7880	Exhaust diffusers
Co-generator Block	Expander Turbine	Expander Turbine		7890	Seal oil system and seals
Co-generator Block	Expander Turbine	Expander Turbine		7900	Inner casing
Co-generator Block	Expander Turbine	Expander Turbine		7910	Outer exhaust casing
Co-generator Block	Expander Turbine	Expander Turbine		7920	Lube oil system
Co-generator Block	Expander Turbine	Expander Turbine		7930	Controls and instrumentation
Co-generator Block	Expander Turbine	Expander Turbine		7940	Evactor
Co-generator Block	Expander Turbine	Expander Turbine		7950	Major overhaul
Co-generator Block	Expander Turbine	Expander Turbine		7960	Other expander turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

EXTERNAL

Use this set of codes to report events caused by external factors (flood, lightning, etc.); economic factors (lack of fuel, labor strikes, etc.); operator training; and transmission system problems external to the plant.

TABLE B05-29 External: Catastrophe					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	External	Catastrophe		9000	Flood
Co-generator Block	External	Catastrophe		9001	Drought
Co-generator Block	External	Catastrophe		9010	Fire including wildfires, not related to a specific component
Co-generator Block	External	Catastrophe		9020	Lightning
Co-generator Block	External	Catastrophe		9025	Geomagnetic disturbance
Co-generator Block	External	Catastrophe		9030	Earthquake
Co-generator Block	External	Catastrophe		9031	Tornado
Co-generator Block	External	Catastrophe		9035	Hurricane
Co-generator Block	External	Catastrophe		9036	Storms (ice, snow, etc)
Co-generator Block	External	Catastrophe		9040	Other catastrophe
Co-generator Block	External	Catastrophe		9090	Physical Security Incident
Co-generator Block	External	Catastrophe		9091	Physical Security Incident (OMC)
Co-generator Block	External	Catastrophe		9092	Cyber Security Incident
Co-generator Block	External	Catastrophe		9093	Cyber Security Incident (OMC)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-30 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	External	Economic		0000	Reserve shutdown
Co-generator Block	External	Economic		9130	Failure of fuel supplier to fulfill contractual obligations or a pre-arranged deal due to physical fuel disruptions or operational impairments (e.g. force majeure on a pipeline or compressor down; making the pipeline incapable of making its firm deliveries.)
Co-generator Block	External	Economic		9131	Lack of fuel – due to contractual or tariff provisions that allow for service interruption or price fluctuations during peak demand periods.
Co-generator Block	External	Economic		9134	Fuel conservation
Co-generator Block	External	Economic		9136	Problems with Primary Fuel for Units with Secondary Fuel Operation

TABLE B05-30 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	External	Economic		9137	Ground water or other water supply problems
Co-generator Block	External	Economic		9139	Ground water or other water supply problems(OMC)
Co-generator Block	External	Economic		9140	Plant modifications to burn different fuel that are not regulatory mandated
Co-generator Block	External	Economic		9150	Labor strikes company-wide problems or strikes outside the company's jurisdiction such as manufacturers (delaying repairs) or transportation (fuel supply) problems.
Co-generator Block	External	Economic		9151	Labor strikes direct plant management grievances that result in a walkout or strike are under plant management control.
Co-generator Block	External	Economic		9160	Other economic problems
Co-generator Block	External	Economic		9180	Economic (for internal use at plants only)
Co-generator Block	External	Economic		9181	Economic (for internal use at plants only)
Co-generator Block	External	Economic		9182	Economic (for internal use at plants only)
Co-generator Block	External	Economic		9183	Economic (for internal use at plants only)
Co-generator Block	External	Economic		9184	Economic (for internal use at plants only)
Co-generator Block	External	Economic		9185	Economic (for internal use at plants only)
Co-generator Block	External	Economic		9186	Economic (for internal use at plants only)
Co-generator Block	External	Economic		9187	Economic (for internal use at plants only)
Co-generator Block	External	Economic		9188	Economic (for internal use at plants only)
Co-generator Block	External	Economic		9189	Economic (for internal use at plants only)

TABLE B05-30 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	External	Economic		9190	Economic (for internal use at plants only)
Co-generator Block	External	Economic		9191	Economic (for internal use at plants only)
Co-generator Block	External	Economic		9192	Economic (for internal use at plants only)
Co-generator Block	External	Economic		9193	Economic (for internal use at plants only)
Co-generator Block	External	Economic		9194	Economic (for internal use at plants only)
Co-generator Block	External	Economic		9195	Economic (for internal use at plants only)
Co-generator Block	External	Economic		9196	Economic (for internal use at plants only)
Co-generator Block	External	Economic		9197	Economic (for internal use at plants only)
Co-generator Block	External	Economic		9198	Economic (for internal use at plants only)
Co-generator Block	External	Economic		9199	Economic (for internal use at plants only)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-31 External: Fuel Quality					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	External	Fuel Quality		9200	High ash content (OMC)
Co-generator Block	External	Fuel Quality		9201	High ash content (not OMC)
Co-generator Block	External	Fuel Quality		9205	Poor quality natural gas fuel, low heat content
Co-generator Block	External	Fuel Quality		9220	High sulfur content (OMC)
Co-generator Block	External	Fuel Quality		9221	High sulfur content (not OMC)
Co-generator Block	External	Fuel Quality		9230	High vanadium content (OMC)
Co-generator Block	External	Fuel Quality		9231	High vanadium content (not OMC)
Co-generator Block	External	Fuel Quality		9240	High sodium content (OMC)
Co-generator Block	External	Fuel Quality		9241	High sodium content (not OMC)

TABLE B05-31 External: Fuel Quality					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	External	Fuel Quality		9260	Low BTU oil (OMC)
Co-generator Block	External	Fuel Quality		9261	Low BTU oil (not OMC)
Co-generator Block	External	Fuel Quality		9290	Other fuel quality problems (OMC)
Co-generator Block	External	Fuel Quality		9291	Other fuel quality problems (not OMC)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use code 9600 to 9650 if the fuel quality results in excess stack emissions through no fault in the pollution control equipment. Use the appropriate equipment code to report fouling and slagging.					

TABLE B05-32 External: Miscellaneous (External)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	External	Miscellaneous (External)		9300	Transmission system problems other than catastrophes (do not include switchyard problems in this category; see codes 3600 to 3629, 3720 to 3730)
Co-generator Block	External	Miscellaneous (External)		9310	Operator training
Co-generator Block	External	Miscellaneous (External)		9320	Other miscellaneous external problems
Co-generator Block	External	Miscellaneous (External)		9340	Synchronous Condenser Operation
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

GAS TURBINE

TABLE B05-33 Gas Turbine: Auxiliary Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Gas Turbine	Auxiliary Systems		5110	Lube oil system - general
Co-generator Block	Gas Turbine	Auxiliary Systems		5111	Lube oil pumps
Co-generator Block	Gas Turbine	Auxiliary Systems		5112	Lube oil coolers
Co-generator Block	Gas Turbine	Auxiliary Systems		5113	Lube oil valves/piping
Co-generator Block	Gas Turbine	Auxiliary Systems		5114	Lube oil filters
Co-generator Block	Gas Turbine	Auxiliary Systems		5115	Oil vapor extractor
Co-generator Block	Gas Turbine	Auxiliary Systems		5116	Power Augmentation System Equipment
Co-generator Block	Gas Turbine	Auxiliary Systems		5117	Power augmentation piping
Co-generator Block	Gas Turbine	Auxiliary Systems		5118	Power augmentation valves

TABLE B05-33 Gas Turbine: Auxiliary Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Gas Turbine	Auxiliary Systems		5119	Power augmentation controls
Co-generator Block	Gas Turbine	Auxiliary Systems		5120	Hydraulic oil system
Co-generator Block	Gas Turbine	Auxiliary Systems		5121	Hydraulic oil system pumps
Co-generator Block	Gas Turbine	Auxiliary Systems		5122	Hydraulic oil system piping/valves
Co-generator Block	Gas Turbine	Auxiliary Systems		5130	Starting system (including motor)
Co-generator Block	Gas Turbine	Auxiliary Systems		5140	Battery and charger system
Co-generator Block	Gas Turbine	Auxiliary Systems		5150	Turning gear and motor
Co-generator Block	Gas Turbine	Auxiliary Systems		5151	Load gear compartment
Co-generator Block	Gas Turbine	Auxiliary Systems		5160	Cooling and seal air system
Co-generator Block	Gas Turbine	Auxiliary Systems		5170	Cooling water system
Co-generator Block	Gas Turbine	Auxiliary Systems		5180	Anti-icing system
Co-generator Block	Gas Turbine	Auxiliary Systems		5190	Other auxiliary system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-34 Gas Turbine: Exhaust Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Gas Turbine	Exhaust Systems		5100	Chamber
Co-generator Block	Gas Turbine	Exhaust Systems		5101	Hoods
Co-generator Block	Gas Turbine	Exhaust Systems		5102	Vanes/nozzles
Co-generator Block	Gas Turbine	Exhaust Systems		5103	Silencer
Co-generator Block	Gas Turbine	Exhaust Systems		5104	Cones
Co-generator Block	Gas Turbine	Exhaust Systems		5105	Diverter Dampers
Co-generator Block	Gas Turbine	Exhaust Systems		5106	Exhaust Stack
Co-generator Block	Gas Turbine	Exhaust Systems		5108	High engine exhaust temperature
Co-generator Block	Gas Turbine	Exhaust Systems		5109	Other exhaust problems (including high exhaust system temperature not attributable to a specific problem)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-35 Gas Turbine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5040	Fuel tanks

TABLE B05-35 Gas Turbine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5041	Fuel piping and valves
Co-generator Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5042	Fuel nozzles/vanes
Co-generator Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5043	Fuel filters
Co-generator Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5044	Liquid fuel oil pump
Co-generator Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5046	Liquid fuel oil transfer/forwarding pump
Co-generator Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5047	Liquid fuel purge system
Co-generator Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5048	Gas fuel system including controls and instrumentation
Co-generator Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5049	Other fuel system problems
Co-generator Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5050	Ignition system
Co-generator Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5051	Pilot fuel piping and valves
Co-generator Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5052	Pilot fuel nozzles/vanes
Co-generator Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5053	Pilot fuel filters
Co-generator Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5054	Water injection system
Co-generator Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5060	Atomizing air system
Co-generator Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5065	NOx water injection system including pump
Co-generator Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5066	NOx steam injection system
Co-generator Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5070	Combustor casing
Co-generator Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5071	Combustor liner

TABLE B05-35 Gas Turbine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5072	Combustor caps
Co-generator Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5073	Flame scanners
Co-generator Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5074	Flashback including instrumentation
Co-generator Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5075	Blade path temperature spread
Co-generator Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5079	Other combustor problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-36 Gas Turbine: Inlet Air System and Compressors - Compressors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5010	High pressure shaft
Co-generator Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5011	High pressure bearings
Co-generator Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5012	High pressure blades/buckets
Co-generator Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5013	Compressor casing and bolts
Co-generator Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5014	Compressor diaphragms
Co-generator Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5015	Compressor seals
Co-generator Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5016	High pressure compressor bleed valves
Co-generator Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5017	Low pressure compressor bleed valves
Co-generator Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5019	Other high pressure problems
Co-generator Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5020	Low pressure shaft
Co-generator Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5021	Low pressure bearings
Co-generator Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5022	Low pressure blades/buckets
Co-generator Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5029	Other low pressure problems
Co-generator Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5030	Supercharging fans
Co-generator Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5035	Compressor washing
Co-generator Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5036	Compressor shaft and bearings for two-shaft machines
Co-generator Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5037	Inlet bleed heat valve
Co-generator Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5039	Other compressor problems

TABLE B05-36 Gas Turbine: Inlet Air System and Compressors - Compressors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-37 Gas Turbine: Inlet Air System and Compressors - Ducts and Filters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5000	Inlet air ducts
Co-generator Block	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5001	Inlet air vanes/nozzles
Co-generator Block	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5002	Inlet air filters
Co-generator Block	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5003	Inlet cone
Co-generator Block	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5004	Inlet air chillers
Co-generator Block	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5005	Inlet air evaporative coolers
Co-generator Block	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5006	Inlet air foggers
Co-generator Block	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5009	Other inlet air problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-38 Gas Turbine: Miscellaneous (Gas Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Gas Turbine	Miscellaneous (Gas Turbine)		5200	Reduction gear
Co-generator Block	Gas Turbine	Miscellaneous (Gas Turbine)		5201	Load shaft and bearings
Co-generator Block	Gas Turbine	Miscellaneous (Gas Turbine)		5205	Main coupling between the turbine and generator
Co-generator Block	Gas Turbine	Miscellaneous (Gas Turbine)		5206	Clutch
Co-generator Block	Gas Turbine	Miscellaneous (Gas Turbine)		5210	Intercoolers
Co-generator Block	Gas Turbine	Miscellaneous (Gas Turbine)		5220	Regenerators
Co-generator Block	Gas Turbine	Miscellaneous (Gas Turbine)		5230	Heat shields
Co-generator Block	Gas Turbine	Miscellaneous (Gas Turbine)		5240	Fire detection and extinguishing system (including hazardous gas detection system)
Co-generator Block	Gas Turbine	Miscellaneous (Gas Turbine)		5241	Fire in unit
Co-generator Block	Gas Turbine	Miscellaneous (Gas Turbine)		5245	Gas Turbine Control System - data highway
Co-generator Block	Gas Turbine	Miscellaneous (Gas Turbine)		5246	Gas Turbine Control System - hardware problems (including card failure)

TABLE B05-38 Gas Turbine: Miscellaneous (Gas Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Gas Turbine	Miscellaneous (Gas Turbine)		5247	Gas Turbine Control System - internal and termination wiring
Co-generator Block	Gas Turbine	Miscellaneous (Gas Turbine)		5248	Gas Turbine Control System - logic problems
Co-generator Block	Gas Turbine	Miscellaneous (Gas Turbine)		5249	Gas Turbine Control System - upgrades
Co-generator Block	Gas Turbine	Miscellaneous (Gas Turbine)		5250	Other controls and instrumentation problems
Co-generator Block	Gas Turbine	Miscellaneous (Gas Turbine)		5255	Computer
Co-generator Block	Gas Turbine	Miscellaneous (Gas Turbine)		5260	Major overhaul (use for non-specific overhaul only; see page B-CCGT-2)
Co-generator Block	Gas Turbine	Miscellaneous (Gas Turbine)		5261	Gas turbine/compressor washing
Co-generator Block	Gas Turbine	Miscellaneous (Gas Turbine)		5262	Gas turbine exchange
Co-generator Block	Gas Turbine	Miscellaneous (Gas Turbine)		5269	Combustion Inspection (CI)
Co-generator Block	Gas Turbine	Miscellaneous (Gas Turbine)		5270	Hot end inspection
Co-generator Block	Gas Turbine	Miscellaneous (Gas Turbine)		5272	Boroscope inspection
Co-generator Block	Gas Turbine	Miscellaneous (Gas Turbine)		5274	General unit inspection
Co-generator Block	Gas Turbine	Miscellaneous (Gas Turbine)		5280	Vibration (not engine) in unit not attributable to bearings or other components
Co-generator Block	Gas Turbine	Miscellaneous (Gas Turbine)		5285	Gas turbine vibration
Co-generator Block	Gas Turbine	Miscellaneous (Gas Turbine)		5286	Gas turbine lockout
Co-generator Block	Gas Turbine	Miscellaneous (Gas Turbine)		5290	Gas turbine performance testing - individual engines (use code 9999 for total unit performance testing)
Co-generator Block	Gas Turbine	Miscellaneous (Gas Turbine)		5292	Turbine Overspeed Trip Test - Gas Turbine
Co-generator Block	Gas Turbine	Miscellaneous (Gas Turbine)		5295	Synchronous condenser equipment
Co-generator Block	Gas Turbine	Miscellaneous (Gas Turbine)		5298	Main gas filter
Co-generator Block	Gas Turbine	Miscellaneous (Gas Turbine)		5299	Other miscellaneous gas turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-39 Gas Turbine: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Gas Turbine	Turbine		5080	High pressure shaft
Co-generator Block	Gas Turbine	Turbine		5081	High pressure bearings
Co-generator Block	Gas Turbine	Turbine		5082	High pressure blades/buckets
Co-generator Block	Gas Turbine	Turbine		5083	High pressure nozzles/vanes
Co-generator Block	Gas Turbine	Turbine		5084	High pressure casing/expansion joints
Co-generator Block	Gas Turbine	Turbine		5085	Interstage gas passages - HP
Co-generator Block	Gas Turbine	Turbine		5086	High pressure shaft seals
Co-generator Block	Gas Turbine	Turbine		5087	Thrust bearing
Co-generator Block	Gas Turbine	Turbine		5088	Gas turbine cooling system
Co-generator Block	Gas Turbine	Turbine		5089	Other high pressure problems
Co-generator Block	Gas Turbine	Turbine		5090	Low pressure shaft
Co-generator Block	Gas Turbine	Turbine		5091	Low pressure bearings
Co-generator Block	Gas Turbine	Turbine		5092	Low pressure blades/buckets
Co-generator Block	Gas Turbine	Turbine		5093	Low pressure nozzles/vanes
Co-generator Block	Gas Turbine	Turbine		5094	Low pressure casing/expansion joints
Co-generator Block	Gas Turbine	Turbine		5095	Interstage gas passages - LP
Co-generator Block	Gas Turbine	Turbine		5096	Low pressure shaft seals
Co-generator Block	Gas Turbine	Turbine		5097	Other low pressure problems
Co-generator Block	Gas Turbine	Turbine		5098	Expansion joints
Co-generator Block	Gas Turbine	Turbine		5099	HP to LP coupling
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use HP if only one.					

GENERATOR

This set of codes contains the generator, exciter, generator cooling systems, and generator controls. Note the main leads up to and includes the generator output breaker in this set of codes.

TABLE B05-40 Generator: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Generator	Controls		4700	Generator voltage control
Co-generator Block	Generator	Controls		4710	Generator metering devices
Co-generator Block	Generator	Controls		4720	Generator synchronization equipment
Co-generator Block	Generator	Controls		4730	Generator current and potential transformers
Co-generator Block	Generator	Controls		4740	Emergency generator trip devices

TABLE B05-40 Generator: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Generator	Controls		4741	Frequency Trip (81 Relay)
Co-generator Block	Generator	Controls		4750	Other generator controls and metering problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-41 Generator: Cooling System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Generator	Cooling System		4610	Hydrogen cooling system piping and valves
Co-generator Block	Generator	Cooling System		4611	Hydrogen coolers
Co-generator Block	Generator	Cooling System		4612	Hydrogen storage system
Co-generator Block	Generator	Cooling System		4613	Hydrogen seals
Co-generator Block	Generator	Cooling System		4619	Other hydrogen system problems
Co-generator Block	Generator	Cooling System		4620	Air cooling system
Co-generator Block	Generator	Cooling System		4630	Liquid cooling system
Co-generator Block	Generator	Cooling System		4640	Seal oil system and seals
Co-generator Block	Generator	Cooling System		4650	Other cooling system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Report failures caused by water leaks into generator as codes 4500, 4510, etc.					

TABLE B05-42 Generator: Exciter					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Generator	Exciter		4600	Exciter drive - motor
Co-generator Block	Generator	Exciter		4601	Exciter field rheostat
Co-generator Block	Generator	Exciter		4602	Exciter commutator and brushes
Co-generator Block	Generator	Exciter		4603	Solid state exciter element
Co-generator Block	Generator	Exciter		4604	Exciter drive - shaft
Co-generator Block	Generator	Exciter		4605	Exciter transformer
Co-generator Block	Generator	Exciter		4609	Other exciter problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-43 Generator: Generator					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Generator	Generator		4500	Rotor windings (including damper windings and fan blades on hydro units)
Co-generator Block	Generator	Generator		4510	Rotor collector rings
Co-generator Block	Generator	Generator		4511	Rotor, General
Co-generator Block	Generator	Generator		4512	Retaining Rings
Co-generator Block	Generator	Generator		4520	Stator windings, bushings, and terminals
Co-generator Block	Generator	Generator		4530	Stator core iron
Co-generator Block	Generator	Generator		4535	Stator, General
Co-generator Block	Generator	Generator		4536	Generator Heaters
Co-generator Block	Generator	Generator		4540	Brushes and brush rigging
Co-generator Block	Generator	Generator		4550	Generator bearings and lube oil system (including thrust bearings on hydro units)
Co-generator Block	Generator	Generator		4551	Generator bearings
Co-generator Block	Generator	Generator		4552	Generator lube oil system
Co-generator Block	Generator	Generator		4555	Bearing cooling system
Co-generator Block	Generator	Generator		4560	Generator vibration (excluding vibration due to failed bearing and other components)
Co-generator Block	Generator	Generator		4570	Generator casing
Co-generator Block	Generator	Generator		4580	Generator end bells and bolting
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-44 Generator: Miscellaneous (Generator)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Generator	Miscellaneous (Generator)		4800	Generator main leads
Co-generator Block	Generator	Miscellaneous (Generator)		4805	Generator Bus Duct Cooling System
Co-generator Block	Generator	Miscellaneous (Generator)		4810	Generator output breaker
Co-generator Block	Generator	Miscellaneous (Generator)		4830	Major generator overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)

TABLE B05-44 Generator: Miscellaneous (Generator)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Generator	Miscellaneous (Generator)		4831	Minor generator overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
Co-generator Block	Generator	Miscellaneous (Generator)		4840	Inspection
Co-generator Block	Generator	Miscellaneous (Generator)		4841	Generator doble testing
Co-generator Block	Generator	Miscellaneous (Generator)		4842	Reactive and capability testing
Co-generator Block	Generator	Miscellaneous (Generator)		4850	Core monitor alarm
Co-generator Block	Generator	Miscellaneous (Generator)		4860	Generator neutral grounding equipment
Co-generator Block	Generator	Miscellaneous (Generator)		4899	Other miscellaneous generator problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

HEAT RECOVERY STEAM GENERATOR (HRSG)

(Waste Heat Boiler)

TABLE B05-45 Heat Recovery Steam Generator (HRSG): HRSG Boiler Air and Gas Systems - Air Supply					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1400	Forced draft fans
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1401	Forced draft fan dampers
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1407	Forced draft fan lubrication system
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1410	Forced draft fan motors
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1411	Forced draft fan motors - variable speed
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1412	Forced draft fan drives (other than motor)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1415	Forced draft fan controls
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1420	Other forced draft fan problems

TABLE B05-45 Heat Recovery Steam Generator (HRSG): HRSG Boiler Air and Gas Systems - Air Supply					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1430	Air supply ducts from FD fan
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1431	Air supply dampers from FD fan
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1432	Air supply duct expansion joints
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1440	Air supply dampers
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1450	Other air supply problems
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1456	Induced draft fan dampers
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1536	Flue gas recirculating fan dampers
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-46 Heat Recovery Steam Generator (HRSG): HRSG Boiler Air and Gas Systems - Miscellaneous (Boiler Air and Gas Systems)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1590	Stacks (use code 8430 for stack problems due to pollution control equipment)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1591	Stack damper and linkage
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1592	Stack damper linkage motors
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1599	Other miscellaneous boiler air and gas system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-47 Heat Recovery Steam Generator (HRSG): HRSG Boiler Control Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1700	Feedwater controls (report local controls - feedwater pump,

TABLE B05-47 Heat Recovery Steam Generator (HRSG): HRSG Boiler Control Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
					feedwater regulator valve, etc., - with component or system)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1710	Combustion/steam condition controls (report local controls - burners, pulverizers, etc., - with component or system)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1720	Desuperheater/attemperator controls
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1730	Boiler explosion or implosion
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1740	Boiler drum gage glasses / level indicator
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1750	Burner management system
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1760	Feedwater instrumentation (not local controls)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1761	Combustion/Steam condition instrumentation (not local controls)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1762	Desuperheater/attemperator instrumentation (not local controls)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1799	Other boiler instrumentation and control problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Iincluding instruments which input to the controls.					

TABLE B05-48 Heat Recovery Steam Generator (HRSG): HRSG Boiler Design Limitations					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Design Limitations		1900	Improper balance between tube sections not due to fouling or plugging
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Design Limitations		1910	Inadequate air not due to equipment problems

TABLE B05-48 Heat Recovery Steam Generator (HRSG): HRSG Boiler Design Limitations					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-49 Heat Recovery Steam Generator (HRSG): HRSG Boiler Fuel Supply - Burners (Duct Burners)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	358	Oil burner piping and valves
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	359	Gas burner piping and valves
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	360	Burners
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	361	Burner orifices
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	370	Burner instruments and controls (except light off)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	380	Light off (igniter) systems (including fuel supply)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	385	Igniters
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	410	Other burner problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-50 Heat Recovery Steam Generator (HRSG): HRSG Boiler Fuel Supply - Oil and Gas Systems (except light off)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	440	Fuel oil pumps (general)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	441	Fuel oil pumps (burner supply)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	442	Fuel oil pumps (forwarding/transfer)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	443	Fuel oil (burner supply) pump drives
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	444	Fuel oil (forwarding/transfer) pump drives

TABLE B05-50 Heat Recovery Steam Generator (HRSG): HRSG Boiler Fuel Supply - Oil and Gas Systems (except light off)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	450	Fuel oil heaters
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	460	Fuel oil atomizers
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	470	Oil and gas fires
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	480	Other oil and gas fuel supply problems (see codes 0360-0410 for burner problems)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-51 Heat Recovery Steam Generator (HRSG): HRSG Boiler Internals and Structures					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		800	Drums and drum internals (single drum only)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		801	HP Drum (including drum level trips not attributable to other causes)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		802	IP Drum (including drum level trips not attributable to other causes)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		803	LP Drum (including drum level trips not attributable to other causes)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		810	Boiler supports and structures (use code 1320 for tube supports)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		820	Casing
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		830	Doors
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		840	Refractory and insulation
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		845	Windbox expansion joints

TABLE B05-51 Heat Recovery Steam Generator (HRSG): HRSG Boiler Internals and Structures					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		847	Other expansion joints
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		848	Inlet panel
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		850	Other internal or structural problems
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		855	Drum relief/safety valves (single drum only)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		856	HP Drum relief/safety valves
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		857	IP Drum relief/safety valves
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		858	LP Drum relief/safety valves
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		859	Tube external fins/membranes
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-52 Heat Recovery Steam Generator (HRSG): HRSG Boiler Overhaul and Inspections					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1800	Major boiler overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1801	Minor boiler overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1810	Other boiler inspections
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1811	Boiler Inspections - problem identification / investigation
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1812	Boiler Inspections - scheduled or routine

TABLE B05-52 Heat Recovery Steam Generator (HRSG): HRSG Boiler Overhaul and Inspections					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1820	Chemical cleaning/steam blows
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-53 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - Boiler Recirculation					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation	740	Boiler recirculation pumps
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation	741	Boiler recirculation pumps - motors
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation	750	Boiler recirculation piping including downcomers
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation	760	Boiler recirculation valves
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation	770	Other boiler recirculation problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-54 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - Feedwater and Blowdown					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	670	Feedwater piping downstream of feedwater regulating valve
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	680	Feedwater valves (not feedwater regulating valve)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	690	Other feedwater problems downstream of feedwater regulating valve (use codes 3401 to 3499 for remainder of feedwater system)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	700	Blowdown system valves
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	710	Blowdown system piping

TABLE B05-54 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - Feedwater and Blowdown					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	720	Blowdown system controls / instrumentation
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	730	Other blowdown system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-55 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Cold and Hot Reheat Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	540	Hot reheat steam piping up to turbine stop valves
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	541	Cold reheat steam piping up to boiler
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	550	Reheat steam relief/safety valves
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	560	Other hot reheat steam valves (not including turbine stop or intercept valves)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	561	Other cold reheat steam valves (not including turbine stop or intercept valves)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	570	Other reheat steam problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-56 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Desuperheaters/Attemperators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6140	HP Desuperheater/attemperator piping - Greater than 600 PSIG.
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6141	HP Desuperheater/attemperator valves
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6142	HP Desuperheater/attemperator spray nozzles
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6143	HP Desuperheater/attemperator drums

TABLE B05-56 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Desuperheaters/Attemperators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6144	Other HP desuperheater/attemperator problems
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6145	IP Desuperheater/attemperator piping - Between 200-600 PSIG
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6146	IP Desuperheater/attemperator valves
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6147	IP Desuperheater/attemperator spray nozzles
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6148	IP Desuperheater/attemperator drums
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6149	Other IP desuperheater/attemperator problems
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6150	LP Desuperheater/attemperator piping - Less than 200 PSIG
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6151	LP Desuperheater/attemperator valves
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6152	LP Desuperheater/attemperator spray nozzles
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6153	LP Desuperheater/attemperator drums
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6154	Other LP desuperheater/attemperator problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-57 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Main Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	500	Main steam piping up to turbine stop valves
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	510	Main steam relief/safety valves off superheater
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	520	Other main steam valves (including vent and drain valves

TABLE B05-57 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Main Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
					but not including the turbine stop valves)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	530	Other main steam system problems
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6110	HP steam piping up to turbine stop valves - Greater than 600 PSIG (see 0790 for piping supports)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6111	HP steam relief/safety valves
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6112	Other HP steam valves (including vent and drain valves but not including the turbine stop valves)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6113	Other HP steam system problems
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6114	HP steam isolation/boundary valves
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6120	IP steam piping up to turbine stop valves - Between 200 & 600 PSIG (see 0790 for piping supports)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6121	IP steam relief/safety valves
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6122	Other IP steam valves (including vent and drain valves but not including the turbine stop valves)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6123	Other IP steam system problems
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6124	IP steam isolation/boundary valves
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6130	LP steam piping up to turbine stop valves - Less than 200 PSIG (see 0790 for piping supports)

TABLE B05-57 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Main Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6131	LP steam relief/safety valves
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6132	Other LP steam valves (including vent and drain valves but not including the turbine stop valves)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6133	Other LP steam system problems
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6134	Other main steam valves (including vent and drain valves but not including the turbine stop valves)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6135	LP steam isolation/boundary valves
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-58 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Startup Bypass					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6160	HP Startup bypass system piping (including drain lines up to heaters or condenser) - Greater than 600 PSIG
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6161	HP Startup bypass system valves
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6162	HP Startup bypass tanks or flash tanks
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6163	Other HP startup bypass system problems
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6164	HP startup bypass instrumentation and controls
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6170	IP Startup bypass system piping (including drain lines up to heaters or condenser) - Between 200-600 PSIG

TABLE B05-58 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Startup Bypass					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6171	IP Startup bypass system valves
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6172	IP Startup bypass tanks or flash tanks
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6173	Other IP startup bypass system problems
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6174	IP startup bypass instrumentation and controls
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6180	LP Startup bypass system piping (including drain lines up to heaters or condenser) - Less than 200 PSIG
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6181	LP Startup bypass system valves
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6182	LP Startup bypass tanks or flash tanks
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6183	Other LP startup bypass system problems
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6184	LP startup bypass instrumentation and controls
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-59 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - Miscellaneous (Piping)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)	775	Economizer piping
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)	780	Headers between tube bundles
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)	782	Headers and caps
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)	790	Pipe hangers, brackets, supports (general)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)	799	Other miscellaneous piping system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-60 Heat Recovery Steam Generator (HRSG): HRSG Boiler Tube Leaks					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6005	HP Evaporator tubes
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6006	IP Evaporator tubes
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6007	LP Evaporator tubes
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6010	HP superheater
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6011	HP reheater
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6012	HP economizer
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6020	IP superheater
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6021	IP reheater
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6022	IP economizer
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6030	LP reheater
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6031	LP superheater
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6032	LP economizer
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6090	Other HRSG tube problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use code 0859 for tube/membrane failures.					

TABLE B05-61 Heat Recovery Steam Generator (HRSG): HRSG Boiler Water Condition					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Water Condition		1850	Boiler water condition (not feedwater water quality)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-62 Heat Recovery Steam Generator (HRSG): Miscellaneous (HRSG Boiler)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		1980	Boiler safety valve test
Co-generator Block	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		1990	Boiler performance testing (use code 9999 for total unit performance testing)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		1999	Boiler, miscellaneous
Co-generator Block	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		6000	Heat recovery steam generator to gas turbine connecting equipment. For additional codes, use Fossil Steam Cause Codes 0010 to 1999.
Co-generator Block	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		6100	Steam turbine to gas turbine coupling. For additional codes, use Fossil Steam Cause Codes 4000 to 4499.
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use more specific codes - other slagging and fouling problems, other control problems, etc. whenever possible. Describe miscellaneous problems in the verbal description.					

TABLE B05-63 Heat Recovery Steam Generator (HRSG): Miscellaneous HRSG Boiler Tube Problems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1300	Water side fouling
Co-generator Block	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1305	Fireside cleaning (which requires a full outage) Use code 1200 for cleanings that cause deratings.
Co-generator Block	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1310	Water side cleaning (acid cleaning)
Co-generator Block	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1320	Tube supports/attachments
Co-generator Block	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1330	Slag fall damage
Co-generator Block	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1340	Tube modifications (including addition and removal of tubes)

TABLE B05-63 Heat Recovery Steam Generator (HRSG): Miscellaneous HRSG Boiler Tube Problems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1350	Other miscellaneous boiler tube problems
Co-generator Block	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1360	Boiler drains system
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

INACTIVE STATES

TABLE B05-64 Inactive States: Inactive States					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Inactive States	Inactive States		2	Inactive Reserve Shutdown
Co-generator Block	Inactive States	Inactive States		9990	Retired unit
Co-generator Block	Inactive States	Inactive States		9991	Mothballed unit
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

JET ENGINE

TABLE B05-65 Jet Engine: Auxiliary Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Jet Engine	Auxiliary Systems		5510	Lube oil system
Co-generator Block	Jet Engine	Auxiliary Systems		5516	Power Augmentation System Equipment
Co-generator Block	Jet Engine	Auxiliary Systems		5520	Hydraulic oil system
Co-generator Block	Jet Engine	Auxiliary Systems		5530	Starting system (including motor)
Co-generator Block	Jet Engine	Auxiliary Systems		5540	Battery and charger system
Co-generator Block	Jet Engine	Auxiliary Systems		5550	Turning gear and motor
Co-generator Block	Jet Engine	Auxiliary Systems		5551	Load gear compartment
Co-generator Block	Jet Engine	Auxiliary Systems		5560	Cooling and seal air system
Co-generator Block	Jet Engine	Auxiliary Systems		5570	Cooling water system
Co-generator Block	Jet Engine	Auxiliary Systems		5580	Anti-icing system
Co-generator Block	Jet Engine	Auxiliary Systems		5590	Other auxiliary system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-66 Jet Engine: Exhaust Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Jet Engine	Exhaust Systems		5500	Chamber
Co-generator Block	Jet Engine	Exhaust Systems		5501	Hoods
Co-generator Block	Jet Engine	Exhaust Systems		5502	Vanes/nozzles
Co-generator Block	Jet Engine	Exhaust Systems		5503	Silencer
Co-generator Block	Jet Engine	Exhaust Systems		5504	Cones
Co-generator Block	Jet Engine	Exhaust Systems		5505	Diverter Dampers
Co-generator Block	Jet Engine	Exhaust Systems		5508	High engine exhaust temperature
Co-generator Block	Jet Engine	Exhaust Systems		5509	Other exhaust problems (including high exhaust temperature not attributable to a specific problem)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-67 Jet Engine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5440	Fuel tanks
Co-generator Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5441	Fuel piping and valves
Co-generator Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5442	Fuel nozzles/vanes
Co-generator Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5443	Fuel filters
Co-generator Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5444	Liquid fuel oil pump
Co-generator Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5445	Liquid fuel oil transfer/forwarding pump
Co-generator Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5446	Liquid fuel purge system
Co-generator Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5447	Gas fuel system including controls and instrumentation
Co-generator Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5449	Other fuel system problems
Co-generator Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5450	Ignition system

TABLE B05-67 Jet Engine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5451	Pilot fuel piping and valves
Co-generator Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5452	Pilot fuel nozzles/vanes
Co-generator Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5453	Pilot fuel filters
Co-generator Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5454	Water injection system
Co-generator Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5455	Fuel nozzle/vane cooling air system
Co-generator Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5460	Atomizing air system
Co-generator Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5470	Combustor casing
Co-generator Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5471	Combustor liner
Co-generator Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5472	Combustor caps
Co-generator Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5473	Flame scanners
Co-generator Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5474	Flashback (including instrumentation)
Co-generator Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5475	Blade path temperature spread
Co-generator Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5479	Other combustor problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-68 Jet Engine: Inlet Air System and Compressors - Compressors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Jet Engine	Inlet Air System and Compressors	Compressors	5410	High pressure shaft
Co-generator Block	Jet Engine	Inlet Air System and Compressors	Compressors	5411	High pressure bearings
Co-generator Block	Jet Engine	Inlet Air System and Compressors	Compressors	5412	High pressure blades/buckets
Co-generator Block	Jet Engine	Inlet Air System and Compressors	Compressors	5413	Other high pressure problems
Co-generator Block	Jet Engine	Inlet Air System and Compressors	Compressors	5414	Compressor diaphragms/vanes

TABLE B05-68 Jet Engine: Inlet Air System and Compressors - Compressors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Jet Engine	Inlet Air System and Compressors	Compressors	5420	Low pressure shaft
Co-generator Block	Jet Engine	Inlet Air System and Compressors	Compressors	5421	Low pressure bearings
Co-generator Block	Jet Engine	Inlet Air System and Compressors	Compressors	5422	Low pressure blades/buckets
Co-generator Block	Jet Engine	Inlet Air System and Compressors	Compressors	5429	Other low pressure problems
Co-generator Block	Jet Engine	Inlet Air System and Compressors	Compressors	5430	Supercharging fans
Co-generator Block	Jet Engine	Inlet Air System and Compressors	Compressors	5435	Compressor washing
Co-generator Block	Jet Engine	Inlet Air System and Compressors	Compressors	5436	Compressor shaft and bearings for two-shaft machines
Co-generator Block	Jet Engine	Inlet Air System and Compressors	Compressors	5439	Other compressor problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use HP compressor if only one.					

TABLE B05-69 Jet Engine: Inlet Air System and Compressors - Ducts and Filters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5400	Inlet air ducts
Co-generator Block	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5401	Inlet air vanes/nozzles
Co-generator Block	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5402	Inlet air filters
Co-generator Block	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5403	Inlet and exhaust cones
Co-generator Block	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5404	Inlet air chillers
Co-generator Block	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5405	Inlet air evaporative coolers
Co-generator Block	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5406	Inlet air foggers
Co-generator Block	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5409	Other inlet air problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use HP compressor if only one.					

TABLE B05-70 Jet Engine: Miscellaneous (Jet Engine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Jet Engine	Miscellaneous (Jet Engine)		5600	Reduction gear
Co-generator Block	Jet Engine	Miscellaneous (Jet Engine)		5601	Load shaft and bearings
Co-generator Block	Jet Engine	Miscellaneous (Jet Engine)		5605	Main coupling between the turbine and generator
Co-generator Block	Jet Engine	Miscellaneous (Jet Engine)		5606	Clutch
Co-generator Block	Jet Engine	Miscellaneous (Jet Engine)		5610	Intercoolers
Co-generator Block	Jet Engine	Miscellaneous (Jet Engine)		5620	Regenerators
Co-generator Block	Jet Engine	Miscellaneous (Jet Engine)		5630	Heat shields

TABLE B05-70 Jet Engine: Miscellaneous (Jet Engine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Jet Engine	Miscellaneous (Jet Engine)		5640	Fire detection and extinguishing system
Co-generator Block	Jet Engine	Miscellaneous (Jet Engine)		5641	Fire in unit
Co-generator Block	Jet Engine	Miscellaneous (Jet Engine)		5645	Jet Engine Control System - data highway
Co-generator Block	Jet Engine	Miscellaneous (Jet Engine)		5646	Jet Engine Control System - hardware problems (including card failure)
Co-generator Block	Jet Engine	Miscellaneous (Jet Engine)		5647	Jet Engine Control System - internal and termination wiring
Co-generator Block	Jet Engine	Miscellaneous (Jet Engine)		5648	Jet Engine Control System - logic problems
Co-generator Block	Jet Engine	Miscellaneous (Jet Engine)		5649	Jet Engine Control System - upgrades
Co-generator Block	Jet Engine	Miscellaneous (Jet Engine)		5650	Other controls and instrumentation problems
Co-generator Block	Jet Engine	Miscellaneous (Jet Engine)		5660	Major overhaul (use for non-specific overhaul only; see page B-CCGT-2)
Co-generator Block	Jet Engine	Miscellaneous (Jet Engine)		5661	Engine/compressor washing
Co-generator Block	Jet Engine	Miscellaneous (Jet Engine)		5662	Engine exchange
Co-generator Block	Jet Engine	Miscellaneous (Jet Engine)		5665	Engine shafts and bearings
Co-generator Block	Jet Engine	Miscellaneous (Jet Engine)		5670	Hot end inspection
Co-generator Block	Jet Engine	Miscellaneous (Jet Engine)		5672	Boroscope inspection
Co-generator Block	Jet Engine	Miscellaneous (Jet Engine)		5674	General unit inspection
Co-generator Block	Jet Engine	Miscellaneous (Jet Engine)		5680	Vibration (not engine) in unit not attributable to bearings or other components
Co-generator Block	Jet Engine	Miscellaneous (Jet Engine)		5685	Engine vibration
Co-generator Block	Jet Engine	Miscellaneous (Jet Engine)		5686	Jet engine lockout
Co-generator Block	Jet Engine	Miscellaneous (Jet Engine)		5690	Engine performance testing - individual engines (use code 9999 for total unit performance testing)
Co-generator Block	Jet Engine	Miscellaneous (Jet Engine)		5692	Turbine Overspeed Trip Test - Jet Engine
Co-generator Block	Jet Engine	Miscellaneous (Jet Engine)		5695	Synchronous condenser equipment
Co-generator Block	Jet Engine	Miscellaneous (Jet Engine)		5699	Other miscellaneous jet engine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-71 Jet Engine: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Jet Engine	Turbine		5480	High pressure shaft
Co-generator Block	Jet Engine	Turbine		5481	High pressure bearings
Co-generator Block	Jet Engine	Turbine		5482	High pressure blades/buckets
Co-generator Block	Jet Engine	Turbine		5483	High pressure nozzles/vanes
Co-generator Block	Jet Engine	Turbine		5484	High pressure casing/expansion joint
Co-generator Block	Jet Engine	Turbine		5485	Interstage gas passages
Co-generator Block	Jet Engine	Turbine		5486	High pressure shaft seals
Co-generator Block	Jet Engine	Turbine		5487	Thrust bearing
Co-generator Block	Jet Engine	Turbine		5489	Other high pressure problems
Co-generator Block	Jet Engine	Turbine		5490	Low pressure shaft
Co-generator Block	Jet Engine	Turbine		5491	Low pressure bearings
Co-generator Block	Jet Engine	Turbine		5492	Low pressure blades/buckets
Co-generator Block	Jet Engine	Turbine		5493	Low pressure nozzles/vanes
Co-generator Block	Jet Engine	Turbine		5494	Low pressure casing/expansion joints
Co-generator Block	Jet Engine	Turbine		5497	Other low pressure problems
Co-generator Block	Jet Engine	Turbine		5498	Expansion joints
Co-generator Block	Jet Engine	Turbine		5499	Shaft seals
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use HP if only one.					

MISCELLANEOUS

TABLE B05-72 Miscellaneous: Instruments and Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Miscellaneous	Instruments and Controls		6200	Combined cycle instruments and controls. (Report instruments and controls specific to the gas turbine, steam turbine, boiler, generator, or balance of plant using the codes for the appropriate piece of equipment.)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

PERFORMANCE

TABLE B05-73 Performance: Performance					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Performance	Performance		9997	NERC Reliability Standard Requirement
Co-generator Block	Performance	Performance		9998	Black start testing
Co-generator Block	Performance	Performance		9999	Total unit performance testing (use appropriate codes for individual component testing)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

PERSONNEL OR PROCEDURAL ERRORS

TABLE B05-74 Personnel or Procedural Errors: Personnel or Procedural Errors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Personnel or Procedural Errors	Personnel or Procedural Errors		9900	Operator error
Co-generator Block	Personnel or Procedural Errors	Personnel or Procedural Errors		9910	Maintenance personnel error
Co-generator Block	Personnel or Procedural Errors	Personnel or Procedural Errors		9920	Contractor error
Co-generator Block	Personnel or Procedural Errors	Personnel or Procedural Errors		9930	Operating procedure error
Co-generator Block	Personnel or Procedural Errors	Personnel or Procedural Errors		9940	Maintenance procedure error
Co-generator Block	Personnel or Procedural Errors	Personnel or Procedural Errors		9950	Contractor procedure error
Co-generator Block	Personnel or Procedural Errors	Personnel or Procedural Errors		9960	Staff shortage
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

POLLUTION CONTROL EQUIPMENT

TABLE B05-75 Pollution Control Equipment: CO Reduction					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Pollution Control Equipment	CO Reduction		8840	CO Active catalyst
Co-generator Block	Pollution Control Equipment	CO Reduction		8841	CO Support materials
Co-generator Block	Pollution Control Equipment	CO Reduction		8842	CO Plugging
Co-generator Block	Pollution Control Equipment	CO Reduction		8845	Other CO reduction problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-76 Pollution Control Equipment: Continuous Emissions Monitoring Systems (CEMS)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8700	CEMS Certification and Recertification
Co-generator Block	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8710	SO2 analyzer problems
Co-generator Block	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8720	NOx analyzer problems
Co-generator Block	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8730	CO analyzer problems
Co-generator Block	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8740	CO2 analyzer problems
Co-generator Block	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8750	O2 analyzer problems
Co-generator Block	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8760	Opacity monitor problems
Co-generator Block	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8770	Flow monitor problems
Co-generator Block	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8780	Data acquisition system problems
Co-generator Block	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8790	Miscellaneous CEMS problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-77 Pollution Control Equipment: NOx Reduction Systems - Catalytic Air Heaters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8830	CAH NOx Active catalyst
Co-generator Block	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8831	CAH NOx Support materials
Co-generator Block	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8832	CAH NOx Plugging
Co-generator Block	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8835	Other CAH problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-78 Pollution Control Equipment: NOx Reduction Systems - Selective Catalytic Reduction Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8810	SCR NOx Reactor
Co-generator Block	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8811	SCR NOx Reagent
Co-generator Block	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8812	SCR NOx Catalyst
Co-generator Block	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8813	SCR NOx Injection grid piping/valves
Co-generator Block	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8814	SCR NOx Catalyst support material
Co-generator Block	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8815	SCR NOx Soot blowers
Co-generator Block	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8816	SCR NOx Plugging
Co-generator Block	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8817	SCR NOx Control system
Co-generator Block	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8820	SCR NOx Ammonia injection grid piping/valves
Co-generator Block	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8821	SCR NOx Ammonia tanks, piping and valves (not injection)
Co-generator Block	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8822	SCR NOx Ammonia air blowers

TABLE B05-78 Pollution Control Equipment: NOx Reduction Systems - Selective Catalytic Reduction Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8823	SCR NOx Other ammonia system problems
Co-generator Block	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8825	Other SCR NOx problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-79 Pollution Control Equipment: NOx Reduction Systems - Selective Non-Catalytic Reduction Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8800	SNCR NOx Reagent
Co-generator Block	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8801	SNCR NOx Carrier gas
Co-generator Block	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8802	SNCR NOx Control system
Co-generator Block	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8803	SNCR Performance Testing
Co-generator Block	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8809	Other SNCR NOx problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use code 0360 for Low NOx Burners.					

REGULATORY, SAFETY, ENVIRONMENTAL

Use these codes only for events not directly attributable to equipment failures. Inspections or testing of certain equipment due to regulation are reported using the appropriate equipment cause codes, and the fact that it was a regulatory requirement noted in the verbal description section.

TABLE B05-80 Regulatory, Safety, Environmental: Other Operating Environmental Limitations					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9660	Thermal discharge limits - fossil and nuclear
Co-generator Block	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9663	Thermal discharge limits - gas turbines
Co-generator Block	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9664	Thermal discharge limits - jet engines

TABLE B05-80 Regulatory, Safety, Environmental: Other Operating Environmental Limitations					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9670	Noise limits (not for personnel safety) - fossil and nuclear
Co-generator Block	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9673	Noise limits (not for personnel safety) - gas turbines
Co-generator Block	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9674	Noise limits (not for personnel safety) - jet engines
Co-generator Block	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9677	Noise limits testing - fossil
Co-generator Block	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9678	Noise limits testing - gas turbines
Co-generator Block	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9679	Noise limits testing - jet engines
Co-generator Block	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9680	Fish kill - fossil and nuclear
Co-generator Block	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9683	Fish kill - gas turbines
Co-generator Block	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9684	Fish kill - jet engines
Co-generator Block	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9690	Other miscellaneous operational environmental limits - fossil and nuclear
Co-generator Block	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9693	Other miscellaneous operational environmental limits - gas turbines
Co-generator Block	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9694	Other miscellaneous operational environmental limits - jet engines
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-81 Regulatory, Safety, Environmental: Regulatory					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Regulatory, Safety, Environmental	Regulatory		9504	Regulatory (environmental) proceedings and hearings - regulatory agency initiated

TABLE B05-81 Regulatory, Safety, Environmental: Regulatory					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Regulatory, Safety, Environmental	Regulatory		9506	Regulatory (environmental) proceedings and hearings - intervenor initiated
Co-generator Block	Regulatory, Safety, Environmental	Regulatory		9510	Plant modifications strictly for compliance with new or changed regulatory requirements (scrubbers, cooling towers, etc.)
Co-generator Block	Regulatory, Safety, Environmental	Regulatory		9520	Oil spill in Gulf of Mexico (OMC)
Co-generator Block	Regulatory, Safety, Environmental	Regulatory		9590	Miscellaneous regulatory (this code is primarily intended for use with event contribution code 2 to indicate that a regulatory-related factor contributed to the primary cause of the event)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-82 Regulatory, Safety, Environmental: Safety					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Regulatory, Safety, Environmental	Safety		9700	OSHA-related retrofit or inspection
Co-generator Block	Regulatory, Safety, Environmental	Safety		9720	Other safety problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-83 Regulatory, Safety, Environmental: Stack Emission					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Regulatory, Safety, Environmental	Stack Emission		9600	SO2 stack emissions - fossil
Co-generator Block	Regulatory, Safety, Environmental	Stack Emission		9603	SO2 stack emissions - gas turbines
Co-generator Block	Regulatory, Safety, Environmental	Stack Emission		9604	SO2 stack emissions - jet engines

TABLE B05-83 Regulatory, Safety, Environmental: Stack Emission					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Regulatory, Safety, Environmental	Stack Emission		9610	NOx stack emissions - fossil
Co-generator Block	Regulatory, Safety, Environmental	Stack Emission		9613	NOx stack emissions - gas turbines
Co-generator Block	Regulatory, Safety, Environmental	Stack Emission		9614	NOx stack emissions - jet engines
Co-generator Block	Regulatory, Safety, Environmental	Stack Emission		9616	CO stack emissions - fossil
Co-generator Block	Regulatory, Safety, Environmental	Stack Emission		9620	Particulate stack emissions - fossil
Co-generator Block	Regulatory, Safety, Environmental	Stack Emission		9623	Particulate stack emissions - gas turbines
Co-generator Block	Regulatory, Safety, Environmental	Stack Emission		9624	Particulate stack emissions - jet engines
Co-generator Block	Regulatory, Safety, Environmental	Stack Emission		9630	Opacity - fossil
Co-generator Block	Regulatory, Safety, Environmental	Stack Emission		9633	Opacity - gas turbines
Co-generator Block	Regulatory, Safety, Environmental	Stack Emission		9634	Opacity - jet engines
Co-generator Block	Regulatory, Safety, Environmental	Stack Emission		9650	Other stack/exhaust emissions - fossil (use codes 9200 to 9290 if fuel quality causes pollution control equipment problems that result in excess stack emissions)
Co-generator Block	Regulatory, Safety, Environmental	Stack Emission		9653	Other stack or exhaust emissions - gas turbines (use codes 9200 to 9290 if fuel quality causes pollution control equipment problems that result in excess stack emissions)
Co-generator Block	Regulatory, Safety, Environmental	Stack Emission		9654	Other stack or exhaust emissions - jet engines (use codes 9200 to 9290 if fuel quality causes pollution control equipment

TABLE B05-83 Regulatory, Safety, Environmental: Stack Emission					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
					problems that result in excess stack emissions)
Co-generator Block	Regulatory, Safety, Environmental	Stack Emission		9656	Other stack or exhaust emissions testing - fossil
Co-generator Block	Regulatory, Safety, Environmental	Stack Emission		9657	Other stack or exhaust emissions testing - gas turbines
Co-generator Block	Regulatory, Safety, Environmental	Stack Emission		9658	Other stack or exhaust emissions testing - jet engines
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Include exhaust emissions.					

STEAM TURBINE

Besides the turbine, this set includes the steam stop/control valves, turbine control system, and the turbine auxiliaries. The extraction steam codes are contained in the Balance of Plant set.

TABLE B05-84 Steam Turbine: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Steam Turbine	Controls		4290	Hydraulic system pumps
Co-generator Block	Steam Turbine	Controls		4291	Hydraulic system coolers
Co-generator Block	Steam Turbine	Controls		4292	Hydraulic system filters
Co-generator Block	Steam Turbine	Controls		4293	Hydraulic system pipes and valves
Co-generator Block	Steam Turbine	Controls		4299	Other hydraulic system problems
Co-generator Block	Steam Turbine	Controls		4300	Turbine supervisory system (use codes 4290 to 4299 for hydraulic oil)
Co-generator Block	Steam Turbine	Controls		4301	Turbine governing system
Co-generator Block	Steam Turbine	Controls		4302	Turbine trip devices (including instruments)
Co-generator Block	Steam Turbine	Controls		4303	Exhaust hood and spray controls
Co-generator Block	Steam Turbine	Controls		4304	Automatic turbine control systems - mechanical
Co-generator Block	Steam Turbine	Controls		4305	Automatic turbine control systems - mechanical - hydraulic
Co-generator Block	Steam Turbine	Controls		4306	Automatic turbine control systems - electro-hydraulic - analog

TABLE B05-84 Steam Turbine: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Steam Turbine	Controls		4307	Automatic turbine control systems - electro-hydraulic - digital
Co-generator Block	Steam Turbine	Controls		4308	Automatic turbine control systems - digital control and monitoring
Co-generator Block	Steam Turbine	Controls		4309	Other turbine instrument and control problems
Co-generator Block	Steam Turbine	Controls		4310	Steam Turbine Control System - data highway
Co-generator Block	Steam Turbine	Controls		4311	Steam Turbine Control System - hardware problems (including card failure)
Co-generator Block	Steam Turbine	Controls		4312	Steam Turbine Control System - internal and termination wiring
Co-generator Block	Steam Turbine	Controls		4313	Steam Turbine Control System - logic problems
Co-generator Block	Steam Turbine	Controls		4314	Steam Turbine Control System - upgrades
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-85 Steam Turbine: High Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Steam Turbine	High Pressure Turbine		4000	Outer casing
Co-generator Block	Steam Turbine	High Pressure Turbine		4001	Inner casing
Co-generator Block	Steam Turbine	High Pressure Turbine		4009	Nozzle bolting
Co-generator Block	Steam Turbine	High Pressure Turbine		4010	Nozzles and nozzle blocks
Co-generator Block	Steam Turbine	High Pressure Turbine		4011	Diaphragms
Co-generator Block	Steam Turbine	High Pressure Turbine		4012	Buckets or blades
Co-generator Block	Steam Turbine	High Pressure Turbine		4013	Diaphragms unit and shroud type
Co-generator Block	Steam Turbine	High Pressure Turbine		4014	Bucket or blade fouling
Co-generator Block	Steam Turbine	High Pressure Turbine		4015	Wheels or spindles
Co-generator Block	Steam Turbine	High Pressure Turbine		4020	Shaft seals
Co-generator Block	Steam Turbine	High Pressure Turbine		4021	Dummy rings
Co-generator Block	Steam Turbine	High Pressure Turbine		4022	Gland rings
Co-generator Block	Steam Turbine	High Pressure Turbine		4030	Rotor shaft

TABLE B05-85 Steam Turbine: High Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Steam Turbine	High Pressure Turbine		4040	Bearings
Co-generator Block	Steam Turbine	High Pressure Turbine		4041	Thrust bearings
Co-generator Block	Steam Turbine	High Pressure Turbine		4099	Other high pressure turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-86 Steam Turbine: Intermediate Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Steam Turbine	Intermediate Pressure Turbine		4100	Outer casing
Co-generator Block	Steam Turbine	Intermediate Pressure Turbine		4101	Inner casing
Co-generator Block	Steam Turbine	Intermediate Pressure Turbine		4109	Nozzle bolting
Co-generator Block	Steam Turbine	Intermediate Pressure Turbine		4110	Nozzles and nozzle blocks
Co-generator Block	Steam Turbine	Intermediate Pressure Turbine		4111	Diaphragms
Co-generator Block	Steam Turbine	Intermediate Pressure Turbine		4112	Buckets or blades
Co-generator Block	Steam Turbine	Intermediate Pressure Turbine		4113	Bucket or blade fouling
Co-generator Block	Steam Turbine	Intermediate Pressure Turbine		4115	Wheels or spindles
Co-generator Block	Steam Turbine	Intermediate Pressure Turbine		4120	Shaft seals
Co-generator Block	Steam Turbine	Intermediate Pressure Turbine		4121	Dummy rings
Co-generator Block	Steam Turbine	Intermediate Pressure Turbine		4122	Gland rings
Co-generator Block	Steam Turbine	Intermediate Pressure Turbine		4130	Rotor shaft
Co-generator Block	Steam Turbine	Intermediate Pressure Turbine		4140	Bearings
Co-generator Block	Steam Turbine	Intermediate Pressure Turbine		4141	Thrust bearings
Co-generator Block	Steam Turbine	Intermediate Pressure Turbine		4199	Other intermediate pressure turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-87 Steam Turbine: Low Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Steam Turbine	Low Pressure Turbine		4200	Outer casing
Co-generator Block	Steam Turbine	Low Pressure Turbine		4201	Inner casing
Co-generator Block	Steam Turbine	Low Pressure Turbine		4209	Nozzle bolting
Co-generator Block	Steam Turbine	Low Pressure Turbine		4210	Nozzles and nozzle blocks
Co-generator Block	Steam Turbine	Low Pressure Turbine		4211	Diaphragms
Co-generator Block	Steam Turbine	Low Pressure Turbine		4212	Buckets or blades

TABLE B05-87 Steam Turbine: Low Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Steam Turbine	Low Pressure Turbine		4213	Bucket or blade fouling
Co-generator Block	Steam Turbine	Low Pressure Turbine		4215	Wheels or spindles
Co-generator Block	Steam Turbine	Low Pressure Turbine		4220	Shaft seals
Co-generator Block	Steam Turbine	Low Pressure Turbine		4221	Dummy rings
Co-generator Block	Steam Turbine	Low Pressure Turbine		4222	Gland rings
Co-generator Block	Steam Turbine	Low Pressure Turbine		4230	Rotor shaft
Co-generator Block	Steam Turbine	Low Pressure Turbine		4240	Bearings
Co-generator Block	Steam Turbine	Low Pressure Turbine		4241	Thrust bearings
Co-generator Block	Steam Turbine	Low Pressure Turbine		4250	Other low pressure turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-88 Steam Turbine: Lube Oil					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Steam Turbine	Lube Oil		4280	Lube oil pumps
Co-generator Block	Steam Turbine	Lube Oil		4281	Lube oil coolers
Co-generator Block	Steam Turbine	Lube Oil		4282	Lube oil conditioners
Co-generator Block	Steam Turbine	Lube Oil		4283	Lube oil system valves and piping
Co-generator Block	Steam Turbine	Lube Oil		4284	Lube oil pump drive
Co-generator Block	Steam Turbine	Lube Oil		4289	Other lube oil system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Do not include bearing failures due to lube oil.					

TABLE B05-89 Steam Turbine: Miscellaneous (Steam Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Steam Turbine	Miscellaneous (Steam Turbine)		4400	Major turbine overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)
Co-generator Block	Steam Turbine	Miscellaneous (Steam Turbine)		4401	Inspection
Co-generator Block	Steam Turbine	Miscellaneous (Steam Turbine)		4402	Minor turbine overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
Co-generator Block	Steam Turbine	Miscellaneous (Steam Turbine)		4410	Turning gear and motor

TABLE B05-89 Steam Turbine: Miscellaneous (Steam Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Steam Turbine	Miscellaneous (Steam Turbine)		4411	Steam turbine gear box (single shaft configuration)
Co-generator Block	Steam Turbine	Miscellaneous (Steam Turbine)		4412	Steam turbine clutch (single shaft configuration)
Co-generator Block	Steam Turbine	Miscellaneous (Steam Turbine)		4415	Shaft coupling mechanism
Co-generator Block	Steam Turbine	Miscellaneous (Steam Turbine)		4420	Vibration of the turbine generator unit that cannot be attributed to a specific cause such as bearings or blades (use this code for balance moves)
Co-generator Block	Steam Turbine	Miscellaneous (Steam Turbine)		4430	Gland seal system
Co-generator Block	Steam Turbine	Miscellaneous (Steam Turbine)		4450	Water induction
Co-generator Block	Steam Turbine	Miscellaneous (Steam Turbine)		4460	Turbine overspeed trip test
Co-generator Block	Steam Turbine	Miscellaneous (Steam Turbine)		4470	Differential expansion
Co-generator Block	Steam Turbine	Miscellaneous (Steam Turbine)		4490	Turbine performance testing (use code 9999 for total unit performance testing)
Co-generator Block	Steam Turbine	Miscellaneous (Steam Turbine)		4499	Other miscellaneous steam turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-90 Steam Turbine: Piping					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Steam Turbine	Piping		4270	Crossover or under piping
Co-generator Block	Steam Turbine	Piping		4279	Miscellaneous turbine piping
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B05-91 Steam Turbine: Valves					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Steam Turbine	Valves		4260	Main stop valves
Co-generator Block	Steam Turbine	Valves		4261	Control valves
Co-generator Block	Steam Turbine	Valves		4262	Intercept valves
Co-generator Block	Steam Turbine	Valves		4263	Reheat stop valves
Co-generator Block	Steam Turbine	Valves		4264	Combined intercept valves

TABLE B05-91 Steam Turbine: Valves					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Co-generator Block	Steam Turbine	Valves		4265	Miscellaneous drain and vent valves
Co-generator Block	Steam Turbine	Valves		4266	Main stop valve testing
Co-generator Block	Steam Turbine	Valves		4267	Control valve testing
Co-generator Block	Steam Turbine	Valves		4268	Reheat/intercept valve testing
Co-generator Block	Steam Turbine	Valves		4269	Other turbine valves (including LP steam admission valves)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

Appendix B06: Index To Combined Cycle Unit Cause Codes

COMBINED CYCLE BLOCK UNITS

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B06-2	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems
B06-3	Balance of Plant	Auxiliary Systems	Fire Protection System
B06-4	Balance of Plant	Auxiliary Systems	Instrument Air
B06-5	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System
B06-6	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)
B06-7	Balance of Plant	Auxiliary Systems	Open Cooling Water System
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B06-10	Balance of Plant	Auxiliary Systems	Service Water (Open System)
B06-11	Balance of Plant	Circulating Water Systems	
B06-12	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators
B06-13	Balance of Plant	Condensate System	Miscellaneous (Condensate System)
B06-14	Balance of Plant	Condensate System	Polishers/Chemical Addition
B06-15	Balance of Plant	Condensate System	Pumps, Piping, and Valves
B06-16	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals
B06-17	Balance of Plant	Condensing System	Condenser Controls
B06-18	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment
B06-19	Balance of Plant	Condensing System	Miscellaneous (Condensing System)
B06-20	Balance of Plant	Condensing System	Vacuum Equipment
B06-21	Balance of Plant	Electrical	
B06-22	Balance of Plant	Extraction Steam	
B06-23	Balance of Plant	Feedwater System	
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B06-26	Balance of Plant	Power Station Switchyard	
B06-27	Balance of Plant	Waste Water (zero discharge) Systems	
B06-28	Expander Turbine	Expander Turbine	
B06-29	External	Catastrophe	
B06-30	External	Economic	
B06-31	External	Fuel Quality	
B06-32	External	Miscellaneous (External)	

INDEX TO SYSTEM/COMPONENT/SUB-COMPONENT CAUSE CODE TABLES			
TABLE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**
B06-33	Gas Turbine	Auxiliary Systems	
B06-34	Gas Turbine	Exhaust Systems	
B06-35	Gas Turbine	Fuel, Ignition, and Combustion Systems	
B06-36	Gas Turbine	Inlet Air System and Compressors	Compressors
B06-37	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters
B06-38	Gas Turbine	Miscellaneous (Gas Turbine)	
B06-39	Gas Turbine	Turbine	
B06-40	Generator	Controls	
B06-41	Generator	Cooling System	
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B06-44	Generator	Miscellaneous (Generator)	
B06-45	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply
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B06-47	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems	
B06-48	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Design Limitations	
B06-49	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)
B06-50	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)
B06-51	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures	
B06-52	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections	
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B06-55	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam
B06-56	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators
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INDEX TO SYSTEM/COMPONENT/SUB-COMPONENT CAUSE CODE TABLES			
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B06-76	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)	
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B06-78	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems
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B06-84	Steam Turbine	Controls	
B06-85	Steam Turbine	High Pressure Turbine	
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B06-87	Steam Turbine	Low Pressure Turbine	
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B06-89	Steam Turbine	Miscellaneous (Steam Turbine)	
B06-90	Steam Turbine	Piping	
B06-91	Steam Turbine	Valves	

BALANCE OF PLANT

TABLE B06-1 Balance of Plant: Auxiliary Systems - Auxiliary Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3830	Auxiliary boiler
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3831	Auxiliary steam piping
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3832	Auxiliary steam valves

TABLE B06-1 Balance of Plant: Auxiliary Systems - Auxiliary Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3833	Auxiliary steam controls and instruments
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3834	Auxiliary boiler tube leaks
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3835	Auxiliary boiler burner management system
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3836	Steam transfer to other unit
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3839	Other auxiliary steam problems (also see extraction steam codes 3520 to 3529; startup bypass codes 0630 to 0660; and soot blower steam code 0870)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-2 Balance of Plant: Auxiliary Systems - Closed Cooling Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3820	Closed cooling water pumps and motors
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3821	Closed cooling water piping
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3822	Closed cooling water valves
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3823	Closed cooling water heat exchangers
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3824	Closed cooling water system fouling
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3825	Closed cooling water instrumentation
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3826	Closed cooling water strainer
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3829	Other closed cooling water system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-3 Balance of Plant: Auxiliary Systems - Fire Protection System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Fire Protection System	3860	Fire protection system pumps
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Fire Protection System	3861	Fire protection system piping
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Fire Protection System	3862	Fire protection system valves
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Fire Protection System	3863	Fire protection system fouling
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Fire Protection System	3864	Fire protection system instrumentation and controls
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Fire Protection System	3869	Other fire protection system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-4 Balance of Plant: Auxiliary Systems - Instrument Air					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Instrument Air	3850	Instrument air compressors
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Instrument Air	3851	Instrument air piping
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Instrument Air	3852	Instrument air valves
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Instrument Air	3853	Instrument air dryers
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Instrument Air	3854	N2 backup to instrument air
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Instrument Air	3859	Other instrument air problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-5 Balance of Plant: Auxiliary Systems - Low-pressure Gas Compression System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3870	Fuel Gas Compressor and Motors

TABLE B06-5 Balance of Plant: Auxiliary Systems - Low-pressure Gas Compression System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3871	Fuel Gas Compressor Piping
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3872	Fuel Gas Compressor Valves
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3873	Fuel Gas Compressor Heat Exchangers
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3874	Fuel Gas Compressor Controls and Instrumentation
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3875	Fuel Gas Compressor Filters
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3876	Fuel Gas Compressor Fire System
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3879	Fuel Gas Compressor - other
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-6 Balance of Plant: Auxiliary Systems - Miscellaneous (Auxiliary Systems)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	3898	Miscellaneous plant auxiliary process and services instrumentation and controls
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	3899	Other miscellaneous auxiliary system problems
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	6299	Other combined cycle block problems (Use other gas turbine problem codes, other steam turbine codes, etc., whenever appropriate.)
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	6399	Other coal gasification equipment problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-7 Balance of Plant: Auxiliary Systems - Open Cooling Water System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3800	Open cooling water pumps and motors
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3801	Open cooling water piping
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3802	Open cooling water valves
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3803	Open cooling water heat exchangers
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3804	Open cooling water system fouling
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3805	Open cooling water system instrumentation
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3806	Open cooling water strainer
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3809	Other open cooling water problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-8 Balance of Plant: Auxiliary Systems - Seal Air Fans					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Seal Air Fans	3880	Seal air fan
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Seal Air Fans	3881	Seal air fan drive - motor
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Seal Air Fans	3882	Seal air control dampers and drives
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Seal Air Fans	3883	Seal air filters
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Seal Air Fans	3889	Other seal air fan problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-9 Balance of Plant: Auxiliary Systems - Service Air					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Service Air	3840	Service air compressors
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Service Air	3841	Service air piping
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Service Air	3842	Service air valves
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Service Air	3843	Service air dryers
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Service Air	3849	Other service air problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-10 Balance of Plant: Auxiliary Systems - Service Water (Open System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3810	Service water pumps and motors
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3811	Service water piping
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3812	Service water valves
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3813	Service water heat exchangers
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3814	Service water system fouling
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3815	Service water strainer
Combined Cycle Block	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3819	Other service water problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-11 Balance of Plant: Circulating Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3210	Circulating water pumps

TABLE B06-11 Balance of Plant: Circulating Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3211	Circulating water pump motors
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3220	Circulating water piping
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3221	Circulating water piping fouling
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3230	Circulating water valves
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3231	Waterbox
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3232	Condenser tube cleaning system including debris filter
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3233	Circulating water priming system
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3235	Cooling tower booster pump
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3236	Cooling tower booster motor
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3238	Cooling tower fan motors
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3239	Cooling tower fan motors - variable speed
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3240	Cooling tower fans
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3241	Cooling tower efficiency below design
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3242	Cooling tower fill damage
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3243	Cooling tower icing
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3244	Cooling tower fires
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3245	Other cooling tower problems
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3246	Cooling tower fouling

TABLE B06-11 Balance of Plant: Circulating Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3247	Cooling tower instrumentation
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3248	Cooling Tower Overhaul
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3250	Circulating water system instruments and controls
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3260	Traveling screens
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3261	Traveling screen fouling
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3269	Circulating water biological conditions (ie, zebra mussels)
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3270	Intake system problems other than traveling screens
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3271	Intake grating fouling
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3272	Circulating water screenwash system
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3273	Debris in circulating water from outside sources (leaves, mud, etc.)
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3280	High circulating water temperature (not due to season, tower efficiency below design, or other listed equipment problem)
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3281	Circulating water tempering system
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3282	Circulating water cooling ponds
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3285	Circulating water chemistry
Combined Cycle Block	Balance of Plant	Circulating Water Systems		3299	Other circulating water system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-12 Balance of Plant: Condensate System - Low/Intermediate Pressure Heater and Deaerators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3339	LP heater head leaks
Combined Cycle Block	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3340	LP heater tube leaks
Combined Cycle Block	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3341	Other LP heater - general
Combined Cycle Block	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3342	IP heater tube leaks
Combined Cycle Block	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3343	Other IP heater - general
Combined Cycle Block	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3344	Deaerator (including level control)
Combined Cycle Block	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3345	IP heater head leaks
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-13 Balance of Plant: Condensate System - Miscellaneous (Condensate System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3360	Condensate makeup and return (including storage tanks)
Combined Cycle Block	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3370	Condensate system controls and instrumentation (not hotwell level, heater level, or deaerator level controls; see codes 3150-3159, 3344, 3502).
Combined Cycle Block	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3380	Condensate coolers
Combined Cycle Block	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3399	Other miscellaneous condensate system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-14 Balance of Plant: Condensate System - Polishers/Chemical Addition					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Condensate System	Polishers/Chemical Addition	3350	Condensate polishing and filtering systems
Combined Cycle Block	Balance of Plant	Condensate System	Polishers/Chemical Addition	3351	Chemical addition systems
Combined Cycle Block	Balance of Plant	Condensate System	Polishers/Chemical Addition	3352	Feedwater chemistry (not specific to condenser, polishers, or chemical addition)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-15 Balance of Plant: Condensate System - Pumps, Piping, and Valves					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3300	Condensate water pre-treatment
Combined Cycle Block	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3310	Condensate/hotwell pumps
Combined Cycle Block	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3311	Condensate/hotwell pump motor
Combined Cycle Block	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3312	Condensate booster pump
Combined Cycle Block	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3313	Condensate booster pump motor
Combined Cycle Block	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3314	Condensate booster pump motor - variable speed
Combined Cycle Block	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3315	Condensate booster pump drive (other than 3313 and 3314)
Combined Cycle Block	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3320	Condensate piping
Combined Cycle Block	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3330	Condensate valves
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-16 Balance of Plant: Condensing System - Condenser Casing or Shell and Internals					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3120	Tube sheets
Combined Cycle Block	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3121	Expansion joint
Combined Cycle Block	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3122	Gaskets and seals
Combined Cycle Block	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3123	Hot well
Combined Cycle Block	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3124	Tube sheet fouling
Combined Cycle Block	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3129	Other condenser casing or shell and internal problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-17 Balance of Plant: Condensing System - Condenser Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Condensing System	Condenser Controls	3150	Hot well level controls
Combined Cycle Block	Balance of Plant	Condensing System	Condenser Controls	3151	Vacuum pump and air ejector controls
Combined Cycle Block	Balance of Plant	Condensing System	Condenser Controls	3152	Air-cooled condenser controls
Combined Cycle Block	Balance of Plant	Condensing System	Condenser Controls	3159	Other condensing system controls and instruments
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-18 Balance of Plant: Condensing System - Condenser Tubes and Support Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3110	Condenser tube leaks
Combined Cycle Block	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3111	Condenser tube fouling shell side
Combined Cycle Block	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3112	Condenser tube fouling tube side

TABLE B06-18 Balance of Plant: Condensing System - Condenser Tubes and Support Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3113	Condenser tube and water box cleaning (including circulating water flow reversal)
Combined Cycle Block	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3114	Air-cooled condenser tubes
Combined Cycle Block	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3115	Air-cooled condenser pumps
Combined Cycle Block	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3116	Air-cooled condenser fans
Combined Cycle Block	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3117	Air-cooled condenser fan motors
Combined Cycle Block	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3118	Other Air-cooled condenser problems
Combined Cycle Block	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3119	Other condenser tube casing or shell and internal problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-20 Balance of Plant: Condensing System - Vacuum Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Condensing System	Vacuum Equipment	3130	Air ejectors
Combined Cycle Block	Balance of Plant	Condensing System	Vacuum Equipment	3131	Air ejector piping and valves
Combined Cycle Block	Balance of Plant	Condensing System	Vacuum Equipment	3132	Inter and after condensers
Combined Cycle Block	Balance of Plant	Condensing System	Vacuum Equipment	3133	Vacuum pumps
Combined Cycle Block	Balance of Plant	Condensing System	Vacuum Equipment	3134	Vacuum pump piping and valves
Combined Cycle Block	Balance of Plant	Condensing System	Vacuum Equipment	3135	Vacuum pump motor and auxiliaries
Combined Cycle Block	Balance of Plant	Condensing System	Vacuum Equipment	3139	Other air extraction system problems - general

TABLE B06-20 Balance of Plant: Condensing System - Vacuum Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Condensing System	Vacuum Equipment	3149	Loss of vacuum not attributable to a particular component such as air ejectors or valves, or high back pressure not attributable to high circulating water temperature, or vacuum losses from a known cause.
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-21 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Electrical		3600	Switchyard transformers and associated cooling systems - external (OMC)
Combined Cycle Block	Balance of Plant	Electrical		3601	Switchyard transformers and associated cooling systems - external (not OMC)
Combined Cycle Block	Balance of Plant	Electrical		3610	Switchyard circuit breakers - external (not OMC)
Combined Cycle Block	Balance of Plant	Electrical		3611	Switchyard circuit breakers - external (OMC)
Combined Cycle Block	Balance of Plant	Electrical		3612	Switchyard system protection devices - external (OMC)
Combined Cycle Block	Balance of Plant	Electrical		3613	Switchyard system protection devices - external (not OMC)
Combined Cycle Block	Balance of Plant	Electrical		3618	Other switchyard equipment - external (not OMC)
Combined Cycle Block	Balance of Plant	Electrical		3619	Other switchyard equipment - external (OMC)
Combined Cycle Block	Balance of Plant	Electrical		3620	Main transformer
Combined Cycle Block	Balance of Plant	Electrical		3621	Unit auxiliaries transformer
Combined Cycle Block	Balance of Plant	Electrical		3622	Station service startup transformer

TABLE B06-21 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Electrical		3623	Auxiliary generators
Combined Cycle Block	Balance of Plant	Electrical		3624	Auxiliary generator voltage supply system
Combined Cycle Block	Balance of Plant	Electrical		3629	Other switchyard or high voltage system problems - external
Combined Cycle Block	Balance of Plant	Electrical		3630	400-700 volt transformers
Combined Cycle Block	Balance of Plant	Electrical		3631	400-700 volt circuit breakers
Combined Cycle Block	Balance of Plant	Electrical		3632	400-700 volt conductors and buses
Combined Cycle Block	Balance of Plant	Electrical		3633	400-700 volt insulators
Combined Cycle Block	Balance of Plant	Electrical		3634	400-700 volt protection devices
Combined Cycle Block	Balance of Plant	Electrical		3639	Other 400-700 volt problems
Combined Cycle Block	Balance of Plant	Electrical		3640	AC instrument power transformers
Combined Cycle Block	Balance of Plant	Electrical		3641	AC Circuit breakers
Combined Cycle Block	Balance of Plant	Electrical		3642	AC Conductors and buses
Combined Cycle Block	Balance of Plant	Electrical		3643	AC Inverters
Combined Cycle Block	Balance of Plant	Electrical		3644	AC Protection devices
Combined Cycle Block	Balance of Plant	Electrical		3649	Other AC instrument power problems
Combined Cycle Block	Balance of Plant	Electrical		3650	DC instrument power battery chargers
Combined Cycle Block	Balance of Plant	Electrical		3651	DC circuit breakers
Combined Cycle Block	Balance of Plant	Electrical		3652	DC conductors and buses

TABLE B06-21 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Electrical		3653	DC protection devices
Combined Cycle Block	Balance of Plant	Electrical		3659	Other DC power problems
Combined Cycle Block	Balance of Plant	Electrical		3660	4000-7000 volt transformers
Combined Cycle Block	Balance of Plant	Electrical		3661	4000-7000 volt circuit breakers
Combined Cycle Block	Balance of Plant	Electrical		3662	4000-7000 volt conductors and buses
Combined Cycle Block	Balance of Plant	Electrical		3663	4000-7000 volt insulators
Combined Cycle Block	Balance of Plant	Electrical		3664	4000-7000 volt protection devices
Combined Cycle Block	Balance of Plant	Electrical		3669	Other 4000-7000 volt problems
Combined Cycle Block	Balance of Plant	Electrical		3670	12-15kV transformers
Combined Cycle Block	Balance of Plant	Electrical		3671	12-15kV circuit breakers
Combined Cycle Block	Balance of Plant	Electrical		3672	12-15kV conductors and buses
Combined Cycle Block	Balance of Plant	Electrical		3673	12-15kV insulators
Combined Cycle Block	Balance of Plant	Electrical		3674	12-15kV protection devices
Combined Cycle Block	Balance of Plant	Electrical		3679	Other 12-15kV problems
Combined Cycle Block	Balance of Plant	Electrical		3680	Other voltage transformers
Combined Cycle Block	Balance of Plant	Electrical		3681	Other voltage circuit breakers
Combined Cycle Block	Balance of Plant	Electrical		3682	Other voltage conductors and buses
Combined Cycle Block	Balance of Plant	Electrical		3683	Other voltage insulators

TABLE B06-21 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Electrical		3684	Other voltage protection devices
Combined Cycle Block	Balance of Plant	Electrical		3689	Other voltage problems
Combined Cycle Block	Balance of Plant	Electrical		3690	Station Service Power Distribution System, General
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-22 Balance of Plant: Extraction Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Extraction Steam		3520	HP Extraction steam piping
Combined Cycle Block	Balance of Plant	Extraction Steam		3521	HP Extraction steam valves
Combined Cycle Block	Balance of Plant	Extraction Steam		3522	HP Extraction steam instruments and controls
Combined Cycle Block	Balance of Plant	Extraction Steam		3529	Other HP extraction steam system problems
Combined Cycle Block	Balance of Plant	Extraction Steam		3530	IP Extraction steam piping
Combined Cycle Block	Balance of Plant	Extraction Steam		3531	IP Extraction steam valves
Combined Cycle Block	Balance of Plant	Extraction Steam		3532	IP Extraction steam instruments and controls
Combined Cycle Block	Balance of Plant	Extraction Steam		3539	Other IP extraction steam system problems
Combined Cycle Block	Balance of Plant	Extraction Steam		3540	LP Extraction steam piping
Combined Cycle Block	Balance of Plant	Extraction Steam		3541	LP Extraction steam valves
Combined Cycle Block	Balance of Plant	Extraction Steam		3542	LP Extraction steam instruments and controls
Combined Cycle Block	Balance of Plant	Extraction Steam		3549	Other LP extraction steam system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-23 Balance of Plant: Feedwater System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Feedwater System		3401	Startup feedwater pump
Combined Cycle Block	Balance of Plant	Feedwater System		3402	Startup feedwater pump drives - all types
Combined Cycle Block	Balance of Plant	Feedwater System		3407	Feedwater pump suction screens
Combined Cycle Block	Balance of Plant	Feedwater System		3408	Feedwater pump drive - local controls
Combined Cycle Block	Balance of Plant	Feedwater System		3409	Feedwater pump drive motor - variable speed
Combined Cycle Block	Balance of Plant	Feedwater System		3410	Feedwater pump
Combined Cycle Block	Balance of Plant	Feedwater System		3411	Feedwater pump drive - motor
Combined Cycle Block	Balance of Plant	Feedwater System		3412	Feedwater pump drive - steam turbine
Combined Cycle Block	Balance of Plant	Feedwater System		3413	Feedwater pump coupling and drive shaft
Combined Cycle Block	Balance of Plant	Feedwater System		3414	Feedwater pump local controls
Combined Cycle Block	Balance of Plant	Feedwater System		3415	Feedwater pump/drive lube oil system
Combined Cycle Block	Balance of Plant	Feedwater System		3416	Other feedwater pump problems
Combined Cycle Block	Balance of Plant	Feedwater System		3417	Feedwater pump drive - main shaft
Combined Cycle Block	Balance of Plant	Feedwater System		3418	Feedwater pump drive - other
Combined Cycle Block	Balance of Plant	Feedwater System		3419	Feedwater pump drive - gear
Combined Cycle Block	Balance of Plant	Feedwater System		3420	Feedwater piping and supports
Combined Cycle Block	Balance of Plant	Feedwater System		3430	Feedwater regulating (boiler level control) valve

TABLE B06-23 Balance of Plant: Feedwater System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Feedwater System		3431	Other feedwater valves
Combined Cycle Block	Balance of Plant	Feedwater System		3439	HP heater head leaks
Combined Cycle Block	Balance of Plant	Feedwater System		3440	High pressure heater tube leaks
Combined Cycle Block	Balance of Plant	Feedwater System		3441	Other high pressure heater problems (see condensate system for LP and IP heater codes)
Combined Cycle Block	Balance of Plant	Feedwater System		3451	Feedwater booster pump suction screens
Combined Cycle Block	Balance of Plant	Feedwater System		3452	Feedwater booster pump drive - local controls
Combined Cycle Block	Balance of Plant	Feedwater System		3453	Feedwater booster pump drive motor - variable speed
Combined Cycle Block	Balance of Plant	Feedwater System		3454	Feedwater booster pump
Combined Cycle Block	Balance of Plant	Feedwater System		3455	Feedwater booster pump drive - motor
Combined Cycle Block	Balance of Plant	Feedwater System		3456	Feedwater booster pump drive - steam turbine
Combined Cycle Block	Balance of Plant	Feedwater System		3457	Feedwater booster pump coupling and drive shaft
Combined Cycle Block	Balance of Plant	Feedwater System		3458	Feedwater booster pump local controls
Combined Cycle Block	Balance of Plant	Feedwater System		3459	Feedwater booster pump/drive lube oil system
Combined Cycle Block	Balance of Plant	Feedwater System		3460	Other feedwater booster pump problems
Combined Cycle Block	Balance of Plant	Feedwater System		3461	Feedwater booster pump drive - main shaft
Combined Cycle Block	Balance of Plant	Feedwater System		3462	Feedwater booster pump drive - other
Combined Cycle Block	Balance of Plant	Feedwater System		3463	Feedwater booster pump drive - gear

TABLE B06-23 Balance of Plant: Feedwater System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Feedwater System		3499	Other feedwater system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Excluding extraction or drain systems.					

TABLE B06-24 Balance of Plant: Heater Drain Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Heater Drain Systems		3501	Heater drain pumps
Combined Cycle Block	Balance of Plant	Heater Drain Systems		3502	Heater level control
Combined Cycle Block	Balance of Plant	Heater Drain Systems		3503	Heater drain piping
Combined Cycle Block	Balance of Plant	Heater Drain Systems		3504	Heater drain valves
Combined Cycle Block	Balance of Plant	Heater Drain Systems		3505	Heater drain pump drive
Combined Cycle Block	Balance of Plant	Heater Drain Systems		3509	Other heater drain system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-25 Balance of Plant: Miscellaneous (Balance of Plant)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Miscellaneous (Balance of Plant)		3950	Process computer
Combined Cycle Block	Balance of Plant	Miscellaneous (Balance of Plant)		3960	Thermal derating (thermal efficiency losses in balance of plant when specific cause(s) unknown)
Combined Cycle Block	Balance of Plant	Miscellaneous (Balance of Plant)		3970	Distributive Control System (DCS) - process computer
Combined Cycle Block	Balance of Plant	Miscellaneous (Balance of Plant)		3971	DCS - data highway
Combined Cycle Block	Balance of Plant	Miscellaneous (Balance of Plant)		3972	DCS - hardware problems (including card failure)

TABLE B06-25 Balance of Plant: Miscellaneous (Balance of Plant)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Miscellaneous (Balance of Plant)		3973	DCS - internal and termination wiring
Combined Cycle Block	Balance of Plant	Miscellaneous (Balance of Plant)		3974	DCS - logic problems
Combined Cycle Block	Balance of Plant	Miscellaneous (Balance of Plant)		3975	DCS - upgrades
Combined Cycle Block	Balance of Plant	Miscellaneous (Balance of Plant)		3979	Other DCS problems
Combined Cycle Block	Balance of Plant	Miscellaneous (Balance of Plant)		3980	Programmable Logic Controller (PLC)
Combined Cycle Block	Balance of Plant	Miscellaneous (Balance of Plant)		3981	PLC - data highway
Combined Cycle Block	Balance of Plant	Miscellaneous (Balance of Plant)		3982	PLC - hardware problems (including card failure)
Combined Cycle Block	Balance of Plant	Miscellaneous (Balance of Plant)		3983	PLC - internal and termination wiring
Combined Cycle Block	Balance of Plant	Miscellaneous (Balance of Plant)		3984	PLC - logic problems
Combined Cycle Block	Balance of Plant	Miscellaneous (Balance of Plant)		3985	PLC - upgrades
Combined Cycle Block	Balance of Plant	Miscellaneous (Balance of Plant)		3989	Other PLC problems
Combined Cycle Block	Balance of Plant	Miscellaneous (Balance of Plant)		3995	Powerhouse heating and ventilating systems
Combined Cycle Block	Balance of Plant	Miscellaneous (Balance of Plant)		3996	Air conditioning systems - rooms and areas
Combined Cycle Block	Balance of Plant	Miscellaneous (Balance of Plant)		3998	Balance of plant overhaul/outage
Combined Cycle Block	Balance of Plant	Miscellaneous (Balance of Plant)		3999	Other miscellaneous balance of plant problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-26 Balance of Plant: Power Station Switchyard					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Power Station Switchyard		3700	Power Station switchyard (non generating unit equipment)
Combined Cycle Block	Balance of Plant	Power Station Switchyard		3710	Transmission line (connected to powerhouse switchyard to 1st Substation)
Combined Cycle Block	Balance of Plant	Power Station Switchyard		3720	Transmission equipment at the 1st substation (see code 9300 if applicable)
Combined Cycle Block	Balance of Plant	Power Station Switchyard		3730	Transmission equipment beyond the 1st substation (see code 9300 if applicable)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-27 Balance of Plant: Waste Water (zero discharge) Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Balance of Plant	Waste Water (zero discharge) Systems		3290	Waste water (zero discharge) tanks, pumps, and motors
Combined Cycle Block	Balance of Plant	Waste Water (zero discharge) Systems		3291	Waste water (zero discharge) system fouling
Combined Cycle Block	Balance of Plant	Waste Water (zero discharge) Systems		3292	Waste water (zero discharge) piping
Combined Cycle Block	Balance of Plant	Waste Water (zero discharge) Systems		3293	Waste water (zero discharge) valves
Combined Cycle Block	Balance of Plant	Waste Water (zero discharge) Systems		3294	Waste water (zero discharge) controls and instrumentation
Combined Cycle Block	Balance of Plant	Waste Water (zero discharge) Systems		3295	Other waste water (zero discharge) problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

EXPANDER TURBINE

TABLE B06-28 Expander Turbine: Expander Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Expander Turbine	Expander Turbine		7800	Couplings
Combined Cycle Block	Expander Turbine	Expander Turbine		7810	Shaft
Combined Cycle Block	Expander Turbine	Expander Turbine		7820	Bearings
Combined Cycle Block	Expander Turbine	Expander Turbine		7830	Blades
Combined Cycle Block	Expander Turbine	Expander Turbine		7840	Discs
Combined Cycle Block	Expander Turbine	Expander Turbine		7850	Spacers
Combined Cycle Block	Expander Turbine	Expander Turbine		7860	Nozzles/vanes
Combined Cycle Block	Expander Turbine	Expander Turbine		7870	Heat shields
Combined Cycle Block	Expander Turbine	Expander Turbine		7880	Exhaust diffusers
Combined Cycle Block	Expander Turbine	Expander Turbine		7890	Seal oil system and seals
Combined Cycle Block	Expander Turbine	Expander Turbine		7900	Inner casing
Combined Cycle Block	Expander Turbine	Expander Turbine		7910	Outer exhaust casing
Combined Cycle Block	Expander Turbine	Expander Turbine		7920	Lube oil system
Combined Cycle Block	Expander Turbine	Expander Turbine		7930	Controls and instrumentation
Combined Cycle Block	Expander Turbine	Expander Turbine		7940	Evactor
Combined Cycle Block	Expander Turbine	Expander Turbine		7950	Major overhaul
Combined Cycle Block	Expander Turbine	Expander Turbine		7960	Other expander turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

EXTERNAL

Use this set of codes to report events caused by external factors (flood, lightning, etc.); economic factors (lack of fuel, labor strikes, etc.); operator training; and transmission system problems external to the plant.

TABLE B06-29 External: Catastrophe					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	External	Catastrophe		9000	Flood
Combined Cycle Block	External	Catastrophe		9001	Drought
Combined Cycle Block	External	Catastrophe		9010	Fire including wildfires, not related to a specific component
Combined Cycle Block	External	Catastrophe		9020	Lightning

TABLE B06-29 External: Catastrophe					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	External	Catastrophe		9025	Geomagnetic disturbance
Combined Cycle Block	External	Catastrophe		9030	Earthquake
Combined Cycle Block	External	Catastrophe		9031	Tornado
Combined Cycle Block	External	Catastrophe		9035	Hurricane
Combined Cycle Block	External	Catastrophe		9036	Storms (ice, snow, etc)
Combined Cycle Block	External	Catastrophe		9040	Other catastrophe
Combined Cycle Block	External	Catastrophe		9090	Physical Security Incident
Combined Cycle Block	External	Catastrophe		9091	Physical Security Incident (OMC)
Combined Cycle Block	External	Catastrophe		9092	Cyber Security Incident
Combined Cycle Block	External	Catastrophe		9093	Cyber Security Incident (OMC)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-30 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	External	Economic		0000	Reserve shutdown
Combined Cycle Block	External	Economic		9130	Failure of fuel supplier to fulfill contractual obligations or a pre-arranged deal due to physical fuel disruptions or operational impairments (e.g. force majeure on a pipeline or compressor down; making the pipeline incapable of making its firm deliveries.)

TABLE B06-30 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	External	Economic		9131	Lack of fuel – due to contractual or tariff provisions that allow for service interruption or price fluctuations during peak demand periods.
Combined Cycle Block	External	Economic		9134	Fuel conservation
Combined Cycle Block	External	Economic		9136	Problems with Primary Fuel for Units with Secondary Fuel Operation
Combined Cycle Block	External	Economic		9137	Ground water or other water supply problems
Combined Cycle Block	External	Economic		9139	Ground water or other water supply problems(OMC)
Combined Cycle Block	External	Economic		9140	Plant modifications to burn different fuel that are not regulatory mandated
Combined Cycle Block	External	Economic		9150	Labor strikes company-wide problems or strikes outside the company's jurisdiction such as manufacturers (delaying repairs) or transportation (fuel supply) problems.
Combined Cycle Block	External	Economic		9151	Labor strikes direct plant management grievances that result in a walkout or strike are under plant management control.
Combined Cycle Block	External	Economic		9160	Other economic problems
Combined Cycle Block	External	Economic		9180	Economic (for internal use at plants only)
Combined Cycle Block	External	Economic		9181	Economic (for internal use at plants only)
Combined Cycle Block	External	Economic		9182	Economic (for internal use at plants only)
Combined Cycle Block	External	Economic		9183	Economic (for internal use at plants only)
Combined Cycle Block	External	Economic		9184	Economic (for internal use at plants only)

TABLE B06-30 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	External	Economic		9185	Economic (for internal use at plants only)
Combined Cycle Block	External	Economic		9186	Economic (for internal use at plants only)
Combined Cycle Block	External	Economic		9187	Economic (for internal use at plants only)
Combined Cycle Block	External	Economic		9188	Economic (for internal use at plants only)
Combined Cycle Block	External	Economic		9189	Economic (for internal use at plants only)
Combined Cycle Block	External	Economic		9190	Economic (for internal use at plants only)
Combined Cycle Block	External	Economic		9191	Economic (for internal use at plants only)
Combined Cycle Block	External	Economic		9192	Economic (for internal use at plants only)
Combined Cycle Block	External	Economic		9193	Economic (for internal use at plants only)
Combined Cycle Block	External	Economic		9194	Economic (for internal use at plants only)
Combined Cycle Block	External	Economic		9195	Economic (for internal use at plants only)
Combined Cycle Block	External	Economic		9196	Economic (for internal use at plants only)
Combined Cycle Block	External	Economic		9197	Economic (for internal use at plants only)
Combined Cycle Block	External	Economic		9198	Economic (for internal use at plants only)
Combined Cycle Block	External	Economic		9199	Economic (for internal use at plants only)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-31 External: Fuel Quality					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	External	Fuel Quality		9200	High ash content (OMC)
Combined Cycle Block	External	Fuel Quality		9201	High ash content (not OMC)
Combined Cycle Block	External	Fuel Quality		9205	Poor quality natural gas fuel, low heat content
Combined Cycle Block	External	Fuel Quality		9220	High sulfur content (OMC)
Combined Cycle Block	External	Fuel Quality		9221	High sulfur content (not OMC)
Combined Cycle Block	External	Fuel Quality		9230	High vanadium content (OMC)
Combined Cycle Block	External	Fuel Quality		9231	High vanadium content (not OMC)
Combined Cycle Block	External	Fuel Quality		9240	High sodium content (OMC)
Combined Cycle Block	External	Fuel Quality		9241	High sodium content (not OMC)
Combined Cycle Block	External	Fuel Quality		9260	Low BTU oil (OMC)
Combined Cycle Block	External	Fuel Quality		9261	Low BTU oil (not OMC)
Combined Cycle Block	External	Fuel Quality		9290	Other fuel quality problems (OMC)
Combined Cycle Block	External	Fuel Quality		9291	Other fuel quality problems (not OMC)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use code 9600 to 9650 if the fuel quality results in excess stack emissions through no fault in the pollution control equipment. Use the appropriate equipment code to report fouling and slagging.					

TABLE B06-32 External: Miscellaneous (External)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	External	Miscellaneous (External)		9300	Transmission system problems other than catastrophes (do not include

TABLE B06-32 External: Miscellaneous (External)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
					switchyard problems in this category; see codes 3600 to 3629, 3720 to 3730)
Combined Cycle Block	External	Miscellaneous (External)		9310	Operator training
Combined Cycle Block	External	Miscellaneous (External)		9320	Other miscellaneous external problems
Combined Cycle Block	External	Miscellaneous (External)		9340	Synchronous Condenser Operation
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

GAS TURBINE

TABLE B06-33 Gas Turbine: Auxiliary Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Gas Turbine	Auxiliary Systems		5110	Lube oil system - general
Combined Cycle Block	Gas Turbine	Auxiliary Systems		5111	Lube oil pumps
Combined Cycle Block	Gas Turbine	Auxiliary Systems		5112	Lube oil coolers
Combined Cycle Block	Gas Turbine	Auxiliary Systems		5113	Lube oil valves/piping
Combined Cycle Block	Gas Turbine	Auxiliary Systems		5114	Lube oil filters
Combined Cycle Block	Gas Turbine	Auxiliary Systems		5115	Oil vapor extractor
Combined Cycle Block	Gas Turbine	Auxiliary Systems		5116	Power Augmentation System Equipment
Combined Cycle Block	Gas Turbine	Auxiliary Systems		5117	Power augmentation piping
Combined Cycle Block	Gas Turbine	Auxiliary Systems		5118	Power augmentation valves
Combined Cycle Block	Gas Turbine	Auxiliary Systems		5119	Power augmentation controls

TABLE B06-33 Gas Turbine: Auxiliary Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Gas Turbine	Auxiliary Systems		5120	Hydraulic oil system
Combined Cycle Block	Gas Turbine	Auxiliary Systems		5121	Hydraulic oil system pumps
Combined Cycle Block	Gas Turbine	Auxiliary Systems		5122	Hydraulic oil system piping/valves
Combined Cycle Block	Gas Turbine	Auxiliary Systems		5130	Starting system (including motor)
Combined Cycle Block	Gas Turbine	Auxiliary Systems		5140	Battery and charger system
Combined Cycle Block	Gas Turbine	Auxiliary Systems		5150	Turning gear and motor
Combined Cycle Block	Gas Turbine	Auxiliary Systems		5151	Load gear compartment
Combined Cycle Block	Gas Turbine	Auxiliary Systems		5160	Cooling and seal air system
Combined Cycle Block	Gas Turbine	Auxiliary Systems		5170	Cooling water system
Combined Cycle Block	Gas Turbine	Auxiliary Systems		5180	Anti-icing system
Combined Cycle Block	Gas Turbine	Auxiliary Systems		5190	Other auxiliary system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-34 Gas Turbine: Exhaust Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Gas Turbine	Exhaust Systems		5100	Chamber
Combined Cycle Block	Gas Turbine	Exhaust Systems		5101	Hoods
Combined Cycle Block	Gas Turbine	Exhaust Systems		5102	Vanes/nozzles
Combined Cycle Block	Gas Turbine	Exhaust Systems		5103	Silencer

TABLE B06-34 Gas Turbine: Exhaust Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Gas Turbine	Exhaust Systems		5104	Cones
Combined Cycle Block	Gas Turbine	Exhaust Systems		5105	Diverter Dampers
Combined Cycle Block	Gas Turbine	Exhaust Systems		5106	Exhaust Stack
Combined Cycle Block	Gas Turbine	Exhaust Systems		5108	High engine exhaust temperature
Combined Cycle Block	Gas Turbine	Exhaust Systems		5109	Other exhaust problems (including high exhaust system temperature not attributable to a specific problem)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-35 Gas Turbine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5040	Fuel tanks
Combined Cycle Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5041	Fuel piping and valves
Combined Cycle Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5042	Fuel nozzles/vanes
Combined Cycle Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5043	Fuel filters
Combined Cycle Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5044	Liquid fuel oil pump
Combined Cycle Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5046	Liquid fuel oil transfer/forwarding pump
Combined Cycle Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5047	Liquid fuel purge system
Combined Cycle Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5048	Gas fuel system including controls and instrumentation
Combined Cycle Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5049	Other fuel system problems
Combined Cycle Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5050	Ignition system

TABLE B06-35 Gas Turbine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5051	Pilot fuel piping and valves
Combined Cycle Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5052	Pilot fuel nozzles/vanes
Combined Cycle Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5053	Pilot fuel filters
Combined Cycle Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5054	Water injection system
Combined Cycle Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5060	Atomizing air system
Combined Cycle Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5065	NOx water injection system including pump
Combined Cycle Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5066	NOx steam injection system
Combined Cycle Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5070	Combustor casing
Combined Cycle Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5071	Combustor liner
Combined Cycle Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5072	Combustor caps
Combined Cycle Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5073	Flame scanners
Combined Cycle Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5074	Flashback including instrumentation
Combined Cycle Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5075	Blade path temperature spread
Combined Cycle Block	Gas Turbine	Fuel, Ignition, and Combustion Systems		5079	Other combustor problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-36 Gas Turbine: Inlet Air System and Compressors - Compressors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5010	High pressure shaft

TABLE B06-36 Gas Turbine: Inlet Air System and Compressors - Compressors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5011	High pressure bearings
Combined Cycle Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5012	High pressure blades/buckets
Combined Cycle Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5013	Compressor casing and bolts
Combined Cycle Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5014	Compressor diaphragms
Combined Cycle Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5015	Compressor seals
Combined Cycle Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5016	High pressure compressor bleed valves
Combined Cycle Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5017	Low pressure compressor bleed valves
Combined Cycle Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5019	Other high pressure problems
Combined Cycle Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5020	Low pressure shaft
Combined Cycle Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5021	Low pressure bearings
Combined Cycle Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5022	Low pressure blades/buckets
Combined Cycle Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5029	Other low pressure problems
Combined Cycle Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5030	Supercharging fans
Combined Cycle Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5035	Compressor washing
Combined Cycle Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5036	Compressor shaft and bearings for two-shaft machines
Combined Cycle Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5037	Inlet bleed heat valve
Combined Cycle Block	Gas Turbine	Inlet Air System and Compressors	Compressors	5039	Other compressor problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-37 Gas Turbine: Inlet Air System and Compressors - Ducts and Filters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5000	Inlet air ducts
Combined Cycle Block	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5001	Inlet air vanes/nozzles
Combined Cycle Block	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5002	Inlet air filters
Combined Cycle Block	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5003	Inlet cone
Combined Cycle Block	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5004	Inlet air chillers
Combined Cycle Block	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5005	Inlet air evaporative coolers
Combined Cycle Block	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5006	Inlet air foggers
Combined Cycle Block	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5009	Other inlet air problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-38 Gas Turbine: Miscellaneous (Gas Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Gas Turbine	Miscellaneous (Gas Turbine)		5200	Reduction gear
Combined Cycle Block	Gas Turbine	Miscellaneous (Gas Turbine)		5201	Load shaft and bearings
Combined Cycle Block	Gas Turbine	Miscellaneous (Gas Turbine)		5205	Main coupling between the turbine and generator
Combined Cycle Block	Gas Turbine	Miscellaneous (Gas Turbine)		5206	Clutch
Combined Cycle Block	Gas Turbine	Miscellaneous (Gas Turbine)		5210	Intercoolers
Combined Cycle Block	Gas Turbine	Miscellaneous (Gas Turbine)		5220	Regenerators
Combined Cycle Block	Gas Turbine	Miscellaneous (Gas Turbine)		5230	Heat shields

TABLE B06-38 Gas Turbine: Miscellaneous (Gas Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Gas Turbine	Miscellaneous (Gas Turbine)		5240	Fire detection and extinguishing system (including hazardous gas detection system)
Combined Cycle Block	Gas Turbine	Miscellaneous (Gas Turbine)		5241	Fire in unit
Combined Cycle Block	Gas Turbine	Miscellaneous (Gas Turbine)		5245	Gas Turbine Control System - data highway
Combined Cycle Block	Gas Turbine	Miscellaneous (Gas Turbine)		5246	Gas Turbine Control System - hardware problems (including card failure)
Combined Cycle Block	Gas Turbine	Miscellaneous (Gas Turbine)		5247	Gas Turbine Control System - internal and termination wiring
Combined Cycle Block	Gas Turbine	Miscellaneous (Gas Turbine)		5248	Gas Turbine Control System - logic problems
Combined Cycle Block	Gas Turbine	Miscellaneous (Gas Turbine)		5249	Gas Turbine Control System - upgrades
Combined Cycle Block	Gas Turbine	Miscellaneous (Gas Turbine)		5250	Other controls and instrumentation problems
Combined Cycle Block	Gas Turbine	Miscellaneous (Gas Turbine)		5255	Computer
Combined Cycle Block	Gas Turbine	Miscellaneous (Gas Turbine)		5260	Major overhaul (use for non-specific overhaul only; see page B-CCGT-2)
Combined Cycle Block	Gas Turbine	Miscellaneous (Gas Turbine)		5261	Gas turbine/compressor washing
Combined Cycle Block	Gas Turbine	Miscellaneous (Gas Turbine)		5262	Gas turbine exchange
Combined Cycle Block	Gas Turbine	Miscellaneous (Gas Turbine)		5269	Combustion Inspection (CI)
Combined Cycle Block	Gas Turbine	Miscellaneous (Gas Turbine)		5270	Hot end inspection
Combined Cycle Block	Gas Turbine	Miscellaneous (Gas Turbine)		5272	Boroscope inspection
Combined Cycle Block	Gas Turbine	Miscellaneous (Gas Turbine)		5274	General unit inspection

TABLE B06-38 Gas Turbine: Miscellaneous (Gas Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Gas Turbine	Miscellaneous (Gas Turbine)		5280	Vibration (not engine) in unit not attributable to bearings or other components
Combined Cycle Block	Gas Turbine	Miscellaneous (Gas Turbine)		5285	Gas turbine vibration
Combined Cycle Block	Gas Turbine	Miscellaneous (Gas Turbine)		5286	Gas turbine lockout
Combined Cycle Block	Gas Turbine	Miscellaneous (Gas Turbine)		5290	Gas turbine performance testing - individual engines (use code 9999 for total unit performance testing)
Combined Cycle Block	Gas Turbine	Miscellaneous (Gas Turbine)		5292	Turbine Overspeed Trip Test - Gas Turbine
Combined Cycle Block	Gas Turbine	Miscellaneous (Gas Turbine)		5295	Synchronous condenser equipment
Combined Cycle Block	Gas Turbine	Miscellaneous (Gas Turbine)		5298	Main gas filter
Combined Cycle Block	Gas Turbine	Miscellaneous (Gas Turbine)		5299	Other miscellaneous gas turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-39 Gas Turbine: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Gas Turbine	Turbine		5080	High pressure shaft
Combined Cycle Block	Gas Turbine	Turbine		5081	High pressure bearings
Combined Cycle Block	Gas Turbine	Turbine		5082	High pressure blades/buckets
Combined Cycle Block	Gas Turbine	Turbine		5083	High pressure nozzles/vanes
Combined Cycle Block	Gas Turbine	Turbine		5084	High pressure casing/expansion joints
Combined Cycle Block	Gas Turbine	Turbine		5085	Interstage gas passages - HP

TABLE B06-39 Gas Turbine: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Gas Turbine	Turbine		5086	High pressure shaft seals
Combined Cycle Block	Gas Turbine	Turbine		5087	Thrust bearing
Combined Cycle Block	Gas Turbine	Turbine		5088	Gas turbine cooling system
Combined Cycle Block	Gas Turbine	Turbine		5089	Other high pressure problems
Combined Cycle Block	Gas Turbine	Turbine		5090	Low pressure shaft
Combined Cycle Block	Gas Turbine	Turbine		5091	Low pressure bearings
Combined Cycle Block	Gas Turbine	Turbine		5092	Low pressure blades/buckets
Combined Cycle Block	Gas Turbine	Turbine		5093	Low pressure nozzles/vanes
Combined Cycle Block	Gas Turbine	Turbine		5094	Low pressure casing/expansion joints
Combined Cycle Block	Gas Turbine	Turbine		5095	Interstage gas passages - LP
Combined Cycle Block	Gas Turbine	Turbine		5096	Low pressure shaft seals
Combined Cycle Block	Gas Turbine	Turbine		5097	Other low pressure problems
Combined Cycle Block	Gas Turbine	Turbine		5098	Expansion joints
Combined Cycle Block	Gas Turbine	Turbine		5099	HP to LP coupling
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use HP if only one.					

GENERATOR

This set of codes contains the generator, exciter, generator cooling systems, and generator controls. Note the main leads up to and includes the generator output breaker in this set of codes.

TABLE B06-40 Generator: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Generator	Controls		4700	Generator voltage control
Combined Cycle Block	Generator	Controls		4710	Generator metering devices
Combined Cycle Block	Generator	Controls		4720	Generator synchronization equipment
Combined Cycle Block	Generator	Controls		4730	Generator current and potential transformers
Combined Cycle Block	Generator	Controls		4740	Emergency generator trip devices
Combined Cycle Block	Generator	Controls		4741	Frequency Trip (81 Relay)
Combined Cycle Block	Generator	Controls		4750	Other generator controls and metering problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-41 Generator: Cooling System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Generator	Cooling System		4610	Hydrogen cooling system piping and valves
Combined Cycle Block	Generator	Cooling System		4611	Hydrogen coolers
Combined Cycle Block	Generator	Cooling System		4612	Hydrogen storage system
Combined Cycle Block	Generator	Cooling System		4613	Hydrogen seals
Combined Cycle Block	Generator	Cooling System		4619	Other hydrogen system problems
Combined Cycle Block	Generator	Cooling System		4620	Air cooling system
Combined Cycle Block	Generator	Cooling System		4630	Liquid cooling system
Combined Cycle Block	Generator	Cooling System		4640	Seal oil system and seals

TABLE B06-41 Generator: Cooling System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Generator	Cooling System		4650	Other cooling system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Report failures caused by water leaks into generator as codes 4500, 4510, etc.					

TABLE B06-42 Generator: Exciter					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Generator	Exciter		4600	Exciter drive - motor
Combined Cycle Block	Generator	Exciter		4601	Exciter field rheostat
Combined Cycle Block	Generator	Exciter		4602	Exciter commutator and brushes
Combined Cycle Block	Generator	Exciter		4603	Solid state exciter element
Combined Cycle Block	Generator	Exciter		4604	Exciter drive - shaft
Combined Cycle Block	Generator	Exciter		4605	Exciter transformer
Combined Cycle Block	Generator	Exciter		4609	Other exciter problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-43 Generator: Generator					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Generator	Generator		4500	Rotor windings (including damper windings and fan blades on hydro units)
Combined Cycle Block	Generator	Generator		4510	Rotor collector rings
Combined Cycle Block	Generator	Generator		4511	Rotor, General
Combined Cycle Block	Generator	Generator		4512	Retaining Rings

TABLE B06-43 Generator: Generator					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Generator	Generator		4520	Stator windings, bushings, and terminals
Combined Cycle Block	Generator	Generator		4530	Stator core iron
Combined Cycle Block	Generator	Generator		4535	Stator, General
Combined Cycle Block	Generator	Generator		4536	Generator Heaters
Combined Cycle Block	Generator	Generator		4540	Brushes and brush rigging
Combined Cycle Block	Generator	Generator		4550	Generator bearings and lube oil system (including thrust bearings on hydro units)
Combined Cycle Block	Generator	Generator		4551	Generator bearings
Combined Cycle Block	Generator	Generator		4552	Generator lube oil system
Combined Cycle Block	Generator	Generator		4555	Bearing cooling system
Combined Cycle Block	Generator	Generator		4560	Generator vibration (excluding vibration due to failed bearing and other components)
Combined Cycle Block	Generator	Generator		4570	Generator casing
Combined Cycle Block	Generator	Generator		4580	Generator end bells and bolting
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-44 Generator: Miscellaneous (Generator)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Generator	Miscellaneous (Generator)		4800	Generator main leads
Combined Cycle Block	Generator	Miscellaneous (Generator)		4805	Generator Bus Duct Cooling System

TABLE B06-44 Generator: Miscellaneous (Generator)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Generator	Miscellaneous (Generator)		4810	Generator output breaker
Combined Cycle Block	Generator	Miscellaneous (Generator)		4830	Major generator overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)
Combined Cycle Block	Generator	Miscellaneous (Generator)		4831	Minor generator overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
Combined Cycle Block	Generator	Miscellaneous (Generator)		4840	Inspection
Combined Cycle Block	Generator	Miscellaneous (Generator)		4841	Generator doble testing
Combined Cycle Block	Generator	Miscellaneous (Generator)		4842	Reactive and capability testing
Combined Cycle Block	Generator	Miscellaneous (Generator)		4850	Core monitor alarm
Combined Cycle Block	Generator	Miscellaneous (Generator)		4860	Generator neutral grounding equipment
Combined Cycle Block	Generator	Miscellaneous (Generator)		4899	Other miscellaneous generator problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

HEAT RECOVERY STEAM GENERATOR (HRSG) (Waste Heat Boiler)

TABLE B06-45 Heat Recovery Steam Generator (HRSG): HRSG Boiler Air and Gas Systems - Air Supply					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1400	Forced draft fans
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1401	Forced draft fan dampers
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1407	Forced draft fan lubrication system

TABLE B06-45 Heat Recovery Steam Generator (HRSG): HRSG Boiler Air and Gas Systems - Air Supply					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1410	Forced draft fan motors
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1411	Forced draft fan motors - variable speed
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1412	Forced draft fan drives (other than motor)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1415	Forced draft fan controls
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1420	Other forced draft fan problems
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1430	Air supply ducts from FD fan
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1431	Air supply dampers from FD fan
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1432	Air supply duct expansion joints
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1440	Air supply dampers
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1450	Other air supply problems
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1456	Induced draft fan dampers
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1536	Flue gas recirculating fan dampers
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-46 Heat Recovery Steam Generator (HRSG): HRSG Boiler Air and Gas Systems - Miscellaneous (Boiler Air and Gas Systems)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1590	Stacks (use code 8430 for stack problems due to pollution control equipment)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1591	Stack damper and linkage
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1592	Stack damper linkage motors

TABLE B06-46 Heat Recovery Steam Generator (HRSG): HRSG Boiler Air and Gas Systems - Miscellaneous (Boiler Air and Gas Systems)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1599	Other miscellaneous boiler air and gas system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-47 Heat Recovery Steam Generator (HRSG): HRSG Boiler Control Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1700	Feedwater controls (report local controls - feedwater pump, feedwater regulator valve, etc., - with component or system)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1710	Combustion/steam condition controls (report local controls - burners, pulverizers, etc., - with component or system)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1720	Desuperheater/attemperator controls
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1730	Boiler explosion or implosion
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1740	Boiler drum gage glasses / level indicator
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1750	Burner management system
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1760	Feedwater instrumentation (not local controls)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1761	Combustion/Steam condition instrumentation (not local controls)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1762	Desuperheater/attemperator instrumentation (not local controls)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1799	Other boiler instrumentation and control problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Iincluding instruments which input to the controls.					

TABLE B06-48 Heat Recovery Steam Generator (HRSG): HRSG Boiler Design Limitations					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Design Limitations		1900	Improper balance between tube sections not due to fouling or plugging
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Design Limitations		1910	Inadequate air not due to equipment problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-49 Heat Recovery Steam Generator (HRSG): HRSG Boiler Fuel Supply - Burners (Duct Burners)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	358	Oil burner piping and valves
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	359	Gas burner piping and valves
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	360	Burners
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	361	Burner orifices
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	370	Burner instruments and controls (except light off)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	380	Light off (igniter) systems (including fuel supply)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	385	Igniters
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	410	Other burner problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-50 Heat Recovery Steam Generator (HRSG): HRSG Boiler Fuel Supply - Oil and Gas Systems (except light off)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	440	Fuel oil pumps (general)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	441	Fuel oil pumps (burner supply)

TABLE B06-50 Heat Recovery Steam Generator (HRSG): HRSG Boiler Fuel Supply - Oil and Gas Systems (except light off)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	442	Fuel oil pumps (forwarding/transfer)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	443	Fuel oil (burner supply) pump drives
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	444	Fuel oil (forwarding/transfer) pump drives
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	450	Fuel oil heaters
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	460	Fuel oil atomizers
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	470	Oil and gas fires
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	480	Other oil and gas fuel supply problems (see codes 0360-0410 for burner problems)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-51 Heat Recovery Steam Generator (HRSG): HRSG Boiler Internals and Structures					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		800	Drums and drum internals (single drum only)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		801	HP Drum (including drum level trips not attributable to other causes)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		802	IP Drum (including drum level trips not attributable to other causes)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		803	LP Drum (including drum level trips not attributable to other causes)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		810	Boiler supports and structures (use code 1320 for tube supports)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		820	Casing

TABLE B06-51 Heat Recovery Steam Generator (HRSG): HRSG Boiler Internals and Structures					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		830	Doors
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		840	Refractory and insulation
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		845	Windbox expansion joints
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		847	Other expansion joints
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		848	Inlet panel
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		850	Other internal or structural problems
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		855	Drum relief/safety valves (single drum only)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		856	HP Drum relief/safety valves
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		857	IP Drum relief/safety valves
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		858	LP Drum relief/safety valves
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		859	Tube external fins/membranes
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-52 Heat Recovery Steam Generator (HRSG): HRSG Boiler Overhaul and Inspections					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1800	Major boiler overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1801	Minor boiler overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)

TABLE B06-52 Heat Recovery Steam Generator (HRSG): HRSG Boiler Overhaul and Inspections					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1810	Other boiler inspections
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1811	Boiler Inspections - problem identification / investigation
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1812	Boiler Inspections - scheduled or routine
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1820	Chemical cleaning/steam blows
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-53 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - Boiler Recirculation					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation	740	Boiler recirculation pumps
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation	741	Boiler recirculation pumps - motors
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation	750	Boiler recirculation piping including downcomers
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation	760	Boiler recirculation valves
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation	770	Other boiler recirculation problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-54 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - Feedwater and Blowdown					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	670	Feedwater piping downstream of feedwater regulating valve
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	680	Feedwater valves (not feedwater regulating valve)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	690	Other feedwater problems downstream of feedwater regulating valve (use codes 3401

TABLE B06-54 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - Feedwater and Blowdown					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
					to 3499 for remainder of feedwater system)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	700	Blowdown system valves
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	710	Blowdown system piping
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	720	Blowdown system controls / instrumentation
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	730	Other blowdown system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-55 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Cold and Hot Reheat Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	540	Hot reheat steam piping up to turbine stop valves
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	541	Cold reheat steam piping up to boiler
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	550	Reheat steam relief/safety valves
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	560	Other hot reheat steam valves (not including turbine stop or intercept valves)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	561	Other cold reheat steam valves (not including turbine stop or intercept valves)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	570	Other reheat steam problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-56 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Desuperheaters/Attemperators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6140	HP Desuperheater/attemperator piping - Greater than 600 PSIG.
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6141	HP Desuperheater/attemperator valves
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6142	HP Desuperheater/attemperator spray nozzles
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6143	HP Desuperheater/attemperator drums
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6144	Other HP desuperheater/attemperator problems
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6145	IP Desuperheater/attemperator piping - Between 200-600 PSIG
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6146	IP Desuperheater/attemperator valves
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6147	IP Desuperheater/attemperator spray nozzles
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6148	IP Desuperheater/attemperator drums
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6149	Other IP desuperheater/attemperator problems
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6150	LP Desuperheater/attemperator piping - Less than 200 PSIG
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6151	LP Desuperheater/attemperator valves
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6152	LP Desuperheater/attemperator spray nozzles
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6153	LP Desuperheater/attemperator drums
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6154	Other LP desuperheater/attemperator problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-57 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Main Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	500	Main steam piping up to turbine stop valves
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	510	Main steam relief/safety valves off superheater
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	520	Other main steam valves (including vent and drain valves but not including the turbine stop valves)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	530	Other main steam system problems
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6110	HP steam piping up to turbine stop valves - Greater than 600 PSIG (see 0790 for piping supports)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6111	HP steam relief/safety valves
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6112	Other HP steam valves (including vent and drain valves but not including the turbine stop valves)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6113	Other HP steam system problems
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6114	HP steam isolation/boundary valves
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6120	IP steam piping up to turbine stop valves - Between 200 & 600 PSIG (see 0790 for piping supports)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6121	IP steam relief/safety valves
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6122	Other IP steam valves (including vent and drain valves but not including the turbine stop valves)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6123	Other IP steam system problems

TABLE B06-57 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Main Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6124	IP steam isolation/boundary valves
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6130	LP steam piping up to turbine stop valves - Less than 200 PSIG (see 0790 for piping supports)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6131	LP steam relief/safety valves
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6132	Other LP steam valves (including vent and drain valves but not including the turbine stop valves)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6133	Other LP steam system problems
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6134	Other main steam valves (including vent and drain valves but not including the turbine stop valves)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6135	LP steam isolation/boundary valves
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-58 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Startup Bypass					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6160	HP Startup bypass system piping (including drain lines up to heaters or condenser) - Greater than 600 PSIG
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6161	HP Startup bypass system valves
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6162	HP Startup bypass tanks or flash tanks
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6163	Other HP startup bypass system problems
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6164	HP startup bypass instrumentation and controls

TABLE B06-58 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Startup Bypass					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6170	IP Startup bypass system piping (including drain lines up to heaters or condenser) - Between 200-600 PSIG
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6171	IP Startup bypass system valves
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6172	IP Startup bypass tanks or flash tanks
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6173	Other IP startup bypass system problems
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6174	IP startup bypass instrumentation and controls
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6180	LP Startup bypass system piping (including drain lines up to heaters or condenser) - Less than 200 PSIG
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6181	LP Startup bypass system valves
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6182	LP Startup bypass tanks or flash tanks
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6183	Other LP startup bypass system problems
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6184	LP startup bypass instrumentation and controls
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-59 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - Miscellaneous (Piping)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)	775	Economizer piping
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)	780	Headers between tube bundles
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)	782	Headers and caps

TABLE B06-59 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - Miscellaneous (Piping)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)	790	Pipe hangers, brackets, supports (general)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)	799	Other miscellaneous piping system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-60 Heat Recovery Steam Generator (HRSG): HRSG Boiler Tube Leaks					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6005	HP Evaporator tubes
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6006	IP Evaporator tubes
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6007	LP Evaporator tubes
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6010	HP superheater
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6011	HP reheater
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6012	HP economizer
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6020	IP superheater
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6021	IP reheater
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6022	IP economizer
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6030	LP reheater
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6031	LP superheater
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6032	LP economizer
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6090	Other HRSG tube problems

TABLE B06-60 Heat Recovery Steam Generator (HRSG): HRSG Boiler Tube Leaks					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use code 0859 for tube/membrane failures.					

TABLE B06-61 Heat Recovery Steam Generator (HRSG): HRSG Boiler Water Condition					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Water Condition		1850	Boiler water condition (not feedwater water quality)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-62 Heat Recovery Steam Generator (HRSG): Miscellaneous (HRSG Boiler)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		1980	Boiler safety valve test
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		1990	Boiler performance testing (use code 9999 for total unit performance testing)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		1999	Boiler, miscellaneous
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		6000	Heat recovery steam generator to gas turbine connecting equipment. For additional codes, use Fossil Steam Cause Codes 0010 to 1999.
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		6100	Steam turbine to gas turbine coupling. For additional codes, use Fossil Steam Cause Codes 4000 to 4499.
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use more specific codes - other slagging and fouling problems, other control problems, etc. whenever possible. Describe miscellaneous problems in the verbal description.					

TABLE B06-63 Heat Recovery Steam Generator (HRSG): Miscellaneous HRSG Boiler Tube Problems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1300	Water side fouling
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1305	Fireside cleaning (which requires a full outage) Use code 1200 for cleanings that cause deratings.
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1310	Water side cleaning (acid cleaning)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1320	Tube supports/attachments
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1330	Slag fall damage
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1340	Tube modifications (including addition and removal of tubes)
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1350	Other miscellaneous boiler tube problems
Combined Cycle Block	Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1360	Boiler drains system
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

INACTIVE STATES

TABLE B06-64 Inactive States: Inactive States					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Inactive States	Inactive States		2	Inactive Reserve Shutdown
Combined Cycle Block	Inactive States	Inactive States		9990	Retired unit
Combined Cycle Block	Inactive States	Inactive States		9991	Mothballed unit
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

JET ENGINE

TABLE B06-65 Jet Engine: Auxiliary Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Jet Engine	Auxiliary Systems		5510	Lube oil system
Combined Cycle Block	Jet Engine	Auxiliary Systems		5516	Power Augmentation System Equipment
Combined Cycle Block	Jet Engine	Auxiliary Systems		5520	Hydraulic oil system
Combined Cycle Block	Jet Engine	Auxiliary Systems		5530	Starting system (including motor)
Combined Cycle Block	Jet Engine	Auxiliary Systems		5540	Battery and charger system
Combined Cycle Block	Jet Engine	Auxiliary Systems		5550	Turning gear and motor
Combined Cycle Block	Jet Engine	Auxiliary Systems		5551	Load gear compartment
Combined Cycle Block	Jet Engine	Auxiliary Systems		5560	Cooling and seal air system
Combined Cycle Block	Jet Engine	Auxiliary Systems		5570	Cooling water system
Combined Cycle Block	Jet Engine	Auxiliary Systems		5580	Anti-icing system
Combined Cycle Block	Jet Engine	Auxiliary Systems		5590	Other auxiliary system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-66 Jet Engine: Exhaust Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Jet Engine	Exhaust Systems		5500	Chamber
Combined Cycle Block	Jet Engine	Exhaust Systems		5501	Hoods
Combined Cycle Block	Jet Engine	Exhaust Systems		5502	Vanes/nozzles

TABLE B06-66 Jet Engine: Exhaust Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Jet Engine	Exhaust Systems		5503	Silencer
Combined Cycle Block	Jet Engine	Exhaust Systems		5504	Cones
Combined Cycle Block	Jet Engine	Exhaust Systems		5505	Diverter Dampers
Combined Cycle Block	Jet Engine	Exhaust Systems		5508	High engine exhaust temperature
Combined Cycle Block	Jet Engine	Exhaust Systems		5509	Other exhaust problems (including high exhaust temperature not attributable to a specific problem)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-67 Jet Engine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5440	Fuel tanks
Combined Cycle Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5441	Fuel piping and valves
Combined Cycle Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5442	Fuel nozzles/vanes
Combined Cycle Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5443	Fuel filters
Combined Cycle Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5444	Liquid fuel oil pump
Combined Cycle Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5445	Liquid fuel oil transfer/forwarding pump
Combined Cycle Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5446	Liquid fuel purge system
Combined Cycle Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5447	Gas fuel system including controls and instrumentation
Combined Cycle Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5449	Other fuel system problems
Combined Cycle Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5450	Ignition system

TABLE B06-67 Jet Engine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5451	Pilot fuel piping and valves
Combined Cycle Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5452	Pilot fuel nozzles/vanes
Combined Cycle Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5453	Pilot fuel filters
Combined Cycle Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5454	Water injection system
Combined Cycle Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5455	Fuel nozzle/vane cooling air system
Combined Cycle Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5460	Atomizing air system
Combined Cycle Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5470	Combustor casing
Combined Cycle Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5471	Combustor liner
Combined Cycle Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5472	Combustor caps
Combined Cycle Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5473	Flame scanners
Combined Cycle Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5474	Flashback (including instrumentation)
Combined Cycle Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5475	Blade path temperature spread
Combined Cycle Block	Jet Engine	Fuel, Ignition, and Combustion Systems		5479	Other combustor problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-68 Jet Engine: Inlet Air System and Compressors - Compressors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Jet Engine	Inlet Air System and Compressors	Compressors	5410	High pressure shaft
Combined Cycle Block	Jet Engine	Inlet Air System and Compressors	Compressors	5411	High pressure bearings

TABLE B06-68 Jet Engine: Inlet Air System and Compressors - Compressors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Jet Engine	Inlet Air System and Compressors	Compressors	5412	High pressure blades/buckets
Combined Cycle Block	Jet Engine	Inlet Air System and Compressors	Compressors	5413	Other high pressure problems
Combined Cycle Block	Jet Engine	Inlet Air System and Compressors	Compressors	5414	Compressor diaphragms/vanes
Combined Cycle Block	Jet Engine	Inlet Air System and Compressors	Compressors	5420	Low pressure shaft
Combined Cycle Block	Jet Engine	Inlet Air System and Compressors	Compressors	5421	Low pressure bearings
Combined Cycle Block	Jet Engine	Inlet Air System and Compressors	Compressors	5422	Low pressure blades/buckets
Combined Cycle Block	Jet Engine	Inlet Air System and Compressors	Compressors	5429	Other low pressure problems
Combined Cycle Block	Jet Engine	Inlet Air System and Compressors	Compressors	5430	Supercharging fans
Combined Cycle Block	Jet Engine	Inlet Air System and Compressors	Compressors	5435	Compressor washing
Combined Cycle Block	Jet Engine	Inlet Air System and Compressors	Compressors	5436	Compressor shaft and bearings for two-shaft machines
Combined Cycle Block	Jet Engine	Inlet Air System and Compressors	Compressors	5439	Other compressor problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use HP compressor if only one.					

TABLE B06-69 Jet Engine: Inlet Air System and Compressors - Ducts and Filters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5400	Inlet air ducts
Combined Cycle Block	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5401	Inlet air vanes/nozzles
Combined Cycle Block	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5402	Inlet air filters
Combined Cycle Block	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5403	Inlet and exhaust cones

TABLE B06-69 Jet Engine: Inlet Air System and Compressors - Ducts and Filters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5404	Inlet air chillers
Combined Cycle Block	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5405	Inlet air evaporative coolers
Combined Cycle Block	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5406	Inlet air foggers
Combined Cycle Block	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5409	Other inlet air problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use HP compressor if only one.					

TABLE B06-70 Jet Engine: Miscellaneous (Jet Engine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Jet Engine	Miscellaneous (Jet Engine)		5600	Reduction gear
Combined Cycle Block	Jet Engine	Miscellaneous (Jet Engine)		5601	Load shaft and bearings
Combined Cycle Block	Jet Engine	Miscellaneous (Jet Engine)		5605	Main coupling between the turbine and generator
Combined Cycle Block	Jet Engine	Miscellaneous (Jet Engine)		5606	Clutch
Combined Cycle Block	Jet Engine	Miscellaneous (Jet Engine)		5610	Intercoolers
Combined Cycle Block	Jet Engine	Miscellaneous (Jet Engine)		5620	Regenerators
Combined Cycle Block	Jet Engine	Miscellaneous (Jet Engine)		5630	Heat shields
Combined Cycle Block	Jet Engine	Miscellaneous (Jet Engine)		5640	Fire detection and extinguishing system
Combined Cycle Block	Jet Engine	Miscellaneous (Jet Engine)		5641	Fire in unit
Combined Cycle Block	Jet Engine	Miscellaneous (Jet Engine)		5645	Jet Engine Control System - data highway
Combined Cycle Block	Jet Engine	Miscellaneous (Jet Engine)		5646	Jet Engine Control System - hardware problems (including card failure)

TABLE B06-70 Jet Engine: Miscellaneous (Jet Engine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Jet Engine	Miscellaneous (Jet Engine)		5647	Jet Engine Control System - internal and termination wiring
Combined Cycle Block	Jet Engine	Miscellaneous (Jet Engine)		5648	Jet Engine Control System - logic problems
Combined Cycle Block	Jet Engine	Miscellaneous (Jet Engine)		5649	Jet Engine Control System - upgrades
Combined Cycle Block	Jet Engine	Miscellaneous (Jet Engine)		5650	Other controls and instrumentation problems
Combined Cycle Block	Jet Engine	Miscellaneous (Jet Engine)		5660	Major overhaul (use for non-specific overhaul only; see page B-CCGT-2)
Combined Cycle Block	Jet Engine	Miscellaneous (Jet Engine)		5661	Engine/compressor washing
Combined Cycle Block	Jet Engine	Miscellaneous (Jet Engine)		5662	Engine exchange
Combined Cycle Block	Jet Engine	Miscellaneous (Jet Engine)		5665	Engine shafts and bearings
Combined Cycle Block	Jet Engine	Miscellaneous (Jet Engine)		5670	Hot end inspection
Combined Cycle Block	Jet Engine	Miscellaneous (Jet Engine)		5672	Boroscope inspection
Combined Cycle Block	Jet Engine	Miscellaneous (Jet Engine)		5674	General unit inspection
Combined Cycle Block	Jet Engine	Miscellaneous (Jet Engine)		5680	Vibration (not engine) in unit not attributable to bearings or other components
Combined Cycle Block	Jet Engine	Miscellaneous (Jet Engine)		5685	Engine vibration
Combined Cycle Block	Jet Engine	Miscellaneous (Jet Engine)		5686	Jet engine lockout
Combined Cycle Block	Jet Engine	Miscellaneous (Jet Engine)		5690	Engine performance testing - individual engines (use code 9999 for total unit performance testing)
Combined Cycle Block	Jet Engine	Miscellaneous (Jet Engine)		5692	Turbine Overspeed Trip Test - Jet Engine
Combined Cycle Block	Jet Engine	Miscellaneous (Jet Engine)		5695	Synchronous condenser equipment

TABLE B06-70 Jet Engine: Miscellaneous (Jet Engine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Jet Engine	Miscellaneous (Jet Engine)		5699	Other miscellaneous jet engine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-71 Jet Engine: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Jet Engine	Turbine		5480	High pressure shaft
Combined Cycle Block	Jet Engine	Turbine		5481	High pressure bearings
Combined Cycle Block	Jet Engine	Turbine		5482	High pressure blades/buckets
Combined Cycle Block	Jet Engine	Turbine		5483	High pressure nozzles/vanes
Combined Cycle Block	Jet Engine	Turbine		5484	High pressure casing/expansion joint
Combined Cycle Block	Jet Engine	Turbine		5485	Interstage gas passages
Combined Cycle Block	Jet Engine	Turbine		5486	High pressure shaft seals
Combined Cycle Block	Jet Engine	Turbine		5487	Thrust bearing
Combined Cycle Block	Jet Engine	Turbine		5489	Other high pressure problems
Combined Cycle Block	Jet Engine	Turbine		5490	Low pressure shaft
Combined Cycle Block	Jet Engine	Turbine		5491	Low pressure bearings
Combined Cycle Block	Jet Engine	Turbine		5492	Low pressure blades/buckets
Combined Cycle Block	Jet Engine	Turbine		5493	Low pressure nozzles/vanes
Combined Cycle Block	Jet Engine	Turbine		5494	Low pressure casing/expansion joints

TABLE B06-71 Jet Engine: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Jet Engine	Turbine		5497	Other low pressure problems
Combined Cycle Block	Jet Engine	Turbine		5498	Expansion joints
Combined Cycle Block	Jet Engine	Turbine		5499	Shaft seals
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use HP if only one.					

MISCELLANEOUS

TABLE B06-72 Miscellaneous: Instruments and Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Miscellaneous	Instruments and Controls		6200	Combined cycle instruments and controls. (Report instruments and controls specific to the gas turbine, steam turbine, boiler, generator, or balance of plant using the codes for the appropriate piece of equipment.)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

PERFORMANCE

TABLE B06-73 Performance: Performance					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Performance	Performance		9997	NERC Reliability Standard Requirement
Combined Cycle Block	Performance	Performance		9998	Black start testing
Combined Cycle Block	Performance	Performance		9999	Total unit performance testing (use appropriate codes for individual component testing)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

PERSONNEL OR PROCEDURAL ERRORS

TABLE B06-74 Personnel or Procedural Errors: Personnel or Procedural Errors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Personnel or Procedural Errors	Personnel or Procedural Errors		9900	Operator error
Combined Cycle Block	Personnel or Procedural Errors	Personnel or Procedural Errors		9910	Maintenance personnel error
Combined Cycle Block	Personnel or Procedural Errors	Personnel or Procedural Errors		9920	Contractor error
Combined Cycle Block	Personnel or Procedural Errors	Personnel or Procedural Errors		9930	Operating procedure error
Combined Cycle Block	Personnel or Procedural Errors	Personnel or Procedural Errors		9940	Maintenance procedure error
Combined Cycle Block	Personnel or Procedural Errors	Personnel or Procedural Errors		9950	Contractor procedure error
Combined Cycle Block	Personnel or Procedural Errors	Personnel or Procedural Errors		9960	Staff shortage
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

POLLUTION CONTROL EQUIPMENT

TABLE B06-75 Pollution Control Equipment: CO Reduction					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Pollution Control Equipment	CO Reduction		8840	CO Active catalyst
Combined Cycle Block	Pollution Control Equipment	CO Reduction		8841	CO Support materials
Combined Cycle Block	Pollution Control Equipment	CO Reduction		8842	CO Plugging
Combined Cycle Block	Pollution Control Equipment	CO Reduction		8845	Other CO reduction problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-76 Pollution Control Equipment: Continuous Emissions Monitoring Systems (CEMS)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8700	CEMS Certification and Recertification
Combined Cycle Block	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8710	SO2 analyzer problems
Combined Cycle Block	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8720	NOx analyzer problems
Combined Cycle Block	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8730	CO analyzer problems
Combined Cycle Block	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8740	CO2 analyzer problems
Combined Cycle Block	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8750	O2 analyzer problems
Combined Cycle Block	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8760	Opacity monitor problems
Combined Cycle Block	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8770	Flow monitor problems
Combined Cycle Block	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8780	Data acquisition system problems
Combined Cycle Block	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8790	Miscellaneous CEMS problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-77 Pollution Control Equipment: NOx Reduction Systems - Catalytic Air Heaters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8830	CAH NOx Active catalyst
Combined Cycle Block	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8831	CAH NOx Support materials
Combined Cycle Block	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8832	CAH NOx Plugging
Combined Cycle Block	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8835	Other CAH problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-78 Pollution Control Equipment: NOx Reduction Systems - Selective Catalytic Reduction Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8810	SCR NOx Reactor
Combined Cycle Block	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8811	SCR NOx Reagent
Combined Cycle Block	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8812	SCR NOx Catalyst
Combined Cycle Block	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8813	SCR NOx Injection grid piping/valves
Combined Cycle Block	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8814	SCR NOx Catalyst support material
Combined Cycle Block	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8815	SCR NOx Soot blowers
Combined Cycle Block	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8816	SCR NOx Plugging
Combined Cycle Block	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8817	SCR NOx Control system
Combined Cycle Block	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8820	SCR NOx Ammonia injection grid piping/valves
Combined Cycle Block	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8821	SCR NOx Ammonia tanks, piping and valves (not injection)
Combined Cycle Block	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8822	SCR NOx Ammonia air blowers
Combined Cycle Block	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8823	SCR NOx Other ammonia system problems
Combined Cycle Block	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8825	Other SCR NOx problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-79 Pollution Control Equipment: NOx Reduction Systems - Selective Non-Catalytic Reduction Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8800	SNCR NOx Reagent

TABLE B06-79 Pollution Control Equipment: NOx Reduction Systems - Selective Non-Catalytic Reduction Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8801	SNCR NOx Carrier gas
Combined Cycle Block	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8802	SNCR NOx Control system
Combined Cycle Block	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8803	SNCR Performance Testing
Combined Cycle Block	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8809	Other SNCR NOx problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Use code 0360 for Low NOx Burners.					

REGULATORY, SAFETY, ENVIRONMENTAL

Use these codes only for events not directly attributable to equipment failures. Inspections or testing of certain equipment due to regulation are reported using the appropriate equipment cause codes, and the fact that it was a regulatory requirement noted in the verbal description section.

TABLE B06-80 Regulatory, Safety, Environmental: Other Operating Environmental Limitations					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9660	Thermal discharge limits - fossil and nuclear
Combined Cycle Block	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9663	Thermal discharge limits - gas turbines
Combined Cycle Block	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9664	Thermal discharge limits - jet engines
Combined Cycle Block	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9670	Noise limits (not for personnel safety) - fossil and nuclear
Combined Cycle Block	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9673	Noise limits (not for personnel safety) - gas turbines
Combined Cycle Block	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9674	Noise limits (not for personnel safety) - jet engines
Combined Cycle Block	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9677	Noise limits testing - fossil
Combined Cycle Block	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9678	Noise limits testing - gas turbines

TABLE B06-80 Regulatory, Safety, Environmental: Other Operating Environmental Limitations					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9679	Noise limits testing - jet engines
Combined Cycle Block	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9680	Fish kill - fossil and nuclear
Combined Cycle Block	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9683	Fish kill - gas turbines
Combined Cycle Block	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9684	Fish kill - jet engines
Combined Cycle Block	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9690	Other miscellaneous operational environmental limits - fossil and nuclear
Combined Cycle Block	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9693	Other miscellaneous operational environmental limits - gas turbines
Combined Cycle Block	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9694	Other miscellaneous operational environmental limits - jet engines
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-81 Regulatory, Safety, Environmental: Regulatory					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Regulatory, Safety, Environmental	Regulatory		9504	Regulatory (environmental) proceedings and hearings - regulatory agency initiated
Combined Cycle Block	Regulatory, Safety, Environmental	Regulatory		9506	Regulatory (environmental) proceedings and hearings - intervenor initiated
Combined Cycle Block	Regulatory, Safety, Environmental	Regulatory		9510	Plant modifications strictly for compliance with new or changed regulatory requirements (scrubbers, cooling towers, etc.)
Combined Cycle Block	Regulatory, Safety, Environmental	Regulatory		9520	Oil spill in Gulf of Mexico (OMC)

TABLE B06-81 Regulatory, Safety, Environmental: Regulatory					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Regulatory, Safety, Environmental	Regulatory		9590	Miscellaneous regulatory (this code is primarily intended for use with event contribution code 2 to indicate that a regulatory-related factor contributed to the primary cause of the event)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-82 Regulatory, Safety, Environmental: Safety					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Regulatory, Safety, Environmental	Safety		9700	OSHA-related retrofit or inspection
Combined Cycle Block	Regulatory, Safety, Environmental	Safety		9720	Other safety problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-83 Regulatory, Safety, Environmental: Stack Emission					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Regulatory, Safety, Environmental	Stack Emission		9600	SO2 stack emissions - fossil
Combined Cycle Block	Regulatory, Safety, Environmental	Stack Emission		9603	SO2 stack emissions - gas turbines
Combined Cycle Block	Regulatory, Safety, Environmental	Stack Emission		9604	SO2 stack emissions - jet engines
Combined Cycle Block	Regulatory, Safety, Environmental	Stack Emission		9610	NOx stack emissions - fossil
Combined Cycle Block	Regulatory, Safety, Environmental	Stack Emission		9613	NOx stack emissions - gas turbines
Combined Cycle Block	Regulatory, Safety, Environmental	Stack Emission		9614	NOx stack emissions - jet engines
Combined Cycle Block	Regulatory, Safety, Environmental	Stack Emission		9616	CO stack emissions - fossil
Combined Cycle Block	Regulatory, Safety, Environmental	Stack Emission		9620	Particulate stack emissions - fossil

TABLE B06-83 Regulatory, Safety, Environmental: Stack Emission					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Regulatory, Safety, Environmental	Stack Emission		9623	Particulate stack emissions - gas turbines
Combined Cycle Block	Regulatory, Safety, Environmental	Stack Emission		9624	Particulate stack emissions - jet engines
Combined Cycle Block	Regulatory, Safety, Environmental	Stack Emission		9630	Opacity - fossil
Combined Cycle Block	Regulatory, Safety, Environmental	Stack Emission		9633	Opacity - gas turbines
Combined Cycle Block	Regulatory, Safety, Environmental	Stack Emission		9634	Opacity - jet engines
Combined Cycle Block	Regulatory, Safety, Environmental	Stack Emission		9650	Other stack/exhaust emissions - fossil (use codes 9200 to 9290 if fuel quality causes pollution control equipment problems that result in excess stack emissions)
Combined Cycle Block	Regulatory, Safety, Environmental	Stack Emission		9653	Other stack or exhaust emissions - gas turbines (use codes 9200 to 9290 if fuel quality causes pollution control equipment problems that result in excess stack emissions)
Combined Cycle Block	Regulatory, Safety, Environmental	Stack Emission		9654	Other stack or exhaust emissions - jet engines (use codes 9200 to 9290 if fuel quality causes pollution control equipment problems that result in excess stack emissions)
Combined Cycle Block	Regulatory, Safety, Environmental	Stack Emission		9656	Other stack or exhaust emissions testing - fossil
Combined Cycle Block	Regulatory, Safety, Environmental	Stack Emission		9657	Other stack or exhaust emissions testing - gas turbines
Combined Cycle Block	Regulatory, Safety, Environmental	Stack Emission		9658	Other stack or exhaust emissions testing - jet engines
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Include exhaust emissions.					

STEAM TURBINE

Besides the turbine, this set includes the steam stop/control valves, turbine control system, and the turbine auxiliaries. The extraction steam codes are contained in the Balance of Plant set.

TABLE B06-84 Steam Turbine: Controls

UNIT TYPE	SYSTEM	COMPONENT	SUB-COMPONENT	CAUSE CODE	DESCRIPTION
Combined Cycle Block	Steam Turbine	Controls		4290	Hydraulic system pumps
Combined Cycle Block	Steam Turbine	Controls		4291	Hydraulic system coolers
Combined Cycle Block	Steam Turbine	Controls		4292	Hydraulic system filters
Combined Cycle Block	Steam Turbine	Controls		4293	Hydraulic system pipes and valves
Combined Cycle Block	Steam Turbine	Controls		4299	Other hydraulic system problems
Combined Cycle Block	Steam Turbine	Controls		4300	Turbine supervisory system (use codes 4290 to 4299 for hydraulic oil)
Combined Cycle Block	Steam Turbine	Controls		4301	Turbine governing system
Combined Cycle Block	Steam Turbine	Controls		4302	Turbine trip devices (including instruments)
Combined Cycle Block	Steam Turbine	Controls		4303	Exhaust hood and spray controls
Combined Cycle Block	Steam Turbine	Controls		4304	Automatic turbine control systems - mechanical
Combined Cycle Block	Steam Turbine	Controls		4305	Automatic turbine control systems - mechanical - hydraulic
Combined Cycle Block	Steam Turbine	Controls		4306	Automatic turbine control systems - electro-hydraulic - analog
Combined Cycle Block	Steam Turbine	Controls		4307	Automatic turbine control systems - electro-hydraulic - digital
Combined Cycle Block	Steam Turbine	Controls		4308	Automatic turbine control systems - digital control and monitoring
Combined Cycle Block	Steam Turbine	Controls		4309	Other turbine instrument and control problems
Combined Cycle Block	Steam Turbine	Controls		4310	Steam Turbine Control System - data highway

TABLE B06-84 Steam Turbine: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Steam Turbine	Controls		4311	Steam Turbine Control System - hardware problems (including card failure)
Combined Cycle Block	Steam Turbine	Controls		4312	Steam Turbine Control System - internal and termination wiring
Combined Cycle Block	Steam Turbine	Controls		4313	Steam Turbine Control System - logic problems
Combined Cycle Block	Steam Turbine	Controls		4314	Steam Turbine Control System - upgrades
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-85 Steam Turbine: High Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Steam Turbine	High Pressure Turbine		4000	Outer casing
Combined Cycle Block	Steam Turbine	High Pressure Turbine		4001	Inner casing
Combined Cycle Block	Steam Turbine	High Pressure Turbine		4009	Nozzle bolting
Combined Cycle Block	Steam Turbine	High Pressure Turbine		4010	Nozzles and nozzle blocks
Combined Cycle Block	Steam Turbine	High Pressure Turbine		4011	Diaphragms
Combined Cycle Block	Steam Turbine	High Pressure Turbine		4012	Buckets or blades
Combined Cycle Block	Steam Turbine	High Pressure Turbine		4013	Diaphragms unit and shroud type
Combined Cycle Block	Steam Turbine	High Pressure Turbine		4014	Bucket or blade fouling
Combined Cycle Block	Steam Turbine	High Pressure Turbine		4015	Wheels or spindles
Combined Cycle Block	Steam Turbine	High Pressure Turbine		4020	Shaft seals
Combined Cycle Block	Steam Turbine	High Pressure Turbine		4021	Dummy rings

TABLE B06-85 Steam Turbine: High Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Steam Turbine	High Pressure Turbine		4022	Gland rings
Combined Cycle Block	Steam Turbine	High Pressure Turbine		4030	Rotor shaft
Combined Cycle Block	Steam Turbine	High Pressure Turbine		4040	Bearings
Combined Cycle Block	Steam Turbine	High Pressure Turbine		4041	Thrust bearings
Combined Cycle Block	Steam Turbine	High Pressure Turbine		4099	Other high pressure turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-86 Steam Turbine: Intermediate Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Steam Turbine	Intermediate Pressure Turbine		4100	Outer casing
Combined Cycle Block	Steam Turbine	Intermediate Pressure Turbine		4101	Inner casing
Combined Cycle Block	Steam Turbine	Intermediate Pressure Turbine		4109	Nozzle bolting
Combined Cycle Block	Steam Turbine	Intermediate Pressure Turbine		4110	Nozzles and nozzle blocks
Combined Cycle Block	Steam Turbine	Intermediate Pressure Turbine		4111	Diaphragms
Combined Cycle Block	Steam Turbine	Intermediate Pressure Turbine		4112	Buckets or blades
Combined Cycle Block	Steam Turbine	Intermediate Pressure Turbine		4113	Bucket or blade fouling
Combined Cycle Block	Steam Turbine	Intermediate Pressure Turbine		4115	Wheels or spindles
Combined Cycle Block	Steam Turbine	Intermediate Pressure Turbine		4120	Shaft seals
Combined Cycle Block	Steam Turbine	Intermediate Pressure Turbine		4121	Dummy rings

TABLE B06-86 Steam Turbine: Intermediate Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Steam Turbine	Intermediate Pressure Turbine		4122	Gland rings
Combined Cycle Block	Steam Turbine	Intermediate Pressure Turbine		4130	Rotor shaft
Combined Cycle Block	Steam Turbine	Intermediate Pressure Turbine		4140	Bearings
Combined Cycle Block	Steam Turbine	Intermediate Pressure Turbine		4141	Thrust bearings
Combined Cycle Block	Steam Turbine	Intermediate Pressure Turbine		4199	Other intermediate pressure turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-87 Steam Turbine: Low Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Steam Turbine	Low Pressure Turbine		4200	Outer casing
Combined Cycle Block	Steam Turbine	Low Pressure Turbine		4201	Inner casing
Combined Cycle Block	Steam Turbine	Low Pressure Turbine		4209	Nozzle bolting
Combined Cycle Block	Steam Turbine	Low Pressure Turbine		4210	Nozzles and nozzle blocks
Combined Cycle Block	Steam Turbine	Low Pressure Turbine		4211	Diaphragms
Combined Cycle Block	Steam Turbine	Low Pressure Turbine		4212	Buckets or blades
Combined Cycle Block	Steam Turbine	Low Pressure Turbine		4213	Bucket or blade fouling
Combined Cycle Block	Steam Turbine	Low Pressure Turbine		4215	Wheels or spindles
Combined Cycle Block	Steam Turbine	Low Pressure Turbine		4220	Shaft seals
Combined Cycle Block	Steam Turbine	Low Pressure Turbine		4221	Dummy rings

TABLE B06-87 Steam Turbine: Low Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Steam Turbine	Low Pressure Turbine		4222	Gland rings
Combined Cycle Block	Steam Turbine	Low Pressure Turbine		4230	Rotor shaft
Combined Cycle Block	Steam Turbine	Low Pressure Turbine		4240	Bearings
Combined Cycle Block	Steam Turbine	Low Pressure Turbine		4241	Thrust bearings
Combined Cycle Block	Steam Turbine	Low Pressure Turbine		4250	Other low pressure turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-88 Steam Turbine: Lube Oil					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Steam Turbine	Lube Oil		4280	Lube oil pumps
Combined Cycle Block	Steam Turbine	Lube Oil		4281	Lube oil coolers
Combined Cycle Block	Steam Turbine	Lube Oil		4282	Lube oil conditioners
Combined Cycle Block	Steam Turbine	Lube Oil		4283	Lube oil system valves and piping
Combined Cycle Block	Steam Turbine	Lube Oil		4284	Lube oil pump drive
Combined Cycle Block	Steam Turbine	Lube Oil		4289	Other lube oil system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899. 2) Do not include bearing failures due to lube oil.					

TABLE B06-89 Steam Turbine: Miscellaneous (Steam Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Steam Turbine	Miscellaneous (Steam Turbine)		4400	Major turbine overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)

TABLE B06-89 Steam Turbine: Miscellaneous (Steam Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Steam Turbine	Miscellaneous (Steam Turbine)		4401	Inspection
Combined Cycle Block	Steam Turbine	Miscellaneous (Steam Turbine)		4402	Minor turbine overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
Combined Cycle Block	Steam Turbine	Miscellaneous (Steam Turbine)		4410	Turning gear and motor
Combined Cycle Block	Steam Turbine	Miscellaneous (Steam Turbine)		4411	Steam turbine gear box (single shaft configuration)
Combined Cycle Block	Steam Turbine	Miscellaneous (Steam Turbine)		4412	Steam turbine clutch (single shaft configuration)
Combined Cycle Block	Steam Turbine	Miscellaneous (Steam Turbine)		4415	Shaft coupling mechanism
Combined Cycle Block	Steam Turbine	Miscellaneous (Steam Turbine)		4420	Vibration of the turbine generator unit that cannot be attributed to a specific cause such as bearings or blades (use this code for balance moves)
Combined Cycle Block	Steam Turbine	Miscellaneous (Steam Turbine)		4430	Gland seal system
Combined Cycle Block	Steam Turbine	Miscellaneous (Steam Turbine)		4450	Water induction
Combined Cycle Block	Steam Turbine	Miscellaneous (Steam Turbine)		4460	Turbine overspeed trip test
Combined Cycle Block	Steam Turbine	Miscellaneous (Steam Turbine)		4470	Differential expansion
Combined Cycle Block	Steam Turbine	Miscellaneous (Steam Turbine)		4490	Turbine performance testing (use code 9999 for total unit performance testing)
Combined Cycle Block	Steam Turbine	Miscellaneous (Steam Turbine)		4499	Other miscellaneous steam turbine problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-90 Steam Turbine: Piping					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Steam Turbine	Piping		4270	Crossover or under piping
Combined Cycle Block	Steam Turbine	Piping		4279	Miscellaneous turbine piping
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B06-91 Steam Turbine: Valves					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Combined Cycle Block	Steam Turbine	Valves		4260	Main stop valves
Combined Cycle Block	Steam Turbine	Valves		4261	Control valves
Combined Cycle Block	Steam Turbine	Valves		4262	Intercept valves
Combined Cycle Block	Steam Turbine	Valves		4263	Reheat stop valves
Combined Cycle Block	Steam Turbine	Valves		4264	Combined intercept valves
Combined Cycle Block	Steam Turbine	Valves		4265	Miscellaneous drain and vent valves
Combined Cycle Block	Steam Turbine	Valves		4266	Main stop valve testing
Combined Cycle Block	Steam Turbine	Valves		4267	Control valve testing
Combined Cycle Block	Steam Turbine	Valves		4268	Reheat/intercept valve testing
Combined Cycle Block	Steam Turbine	Valves		4269	Other turbine valves (including LP steam admission valves)
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

Appendix B07: Index To Fluidized Bed Combustion Unit Cause Codes

FLUIDIZED BED COMBUSTION UNITS

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B07-2	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems
B07-3	Balance of Plant	Auxiliary Systems	Fire Protection System
B07-4	Balance of Plant	Auxiliary Systems	Instrument Air
B07-5	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System
B07-6	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)
B07-7	Balance of Plant	Auxiliary Systems	Open Cooling Water System
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B07-9	Balance of Plant	Auxiliary Systems	Service Air
B07-10	Balance of Plant	Auxiliary Systems	Service Water (Open System)
B07-11	Balance of Plant	Circulating Water Systems	
B07-12	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators
B07-13	Balance of Plant	Condensate System	Miscellaneous (Condensate System)
B07-14	Balance of Plant	Condensate System	Polishers/Chemical Addition
B07-15	Balance of Plant	Condensate System	Pumps, Piping, and Valves
B07-16	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals
B07-17	Balance of Plant	Condensing System	Condenser Controls
B07-18	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment
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B07-20	Balance of Plant	Condensing System	Vacuum Equipment
B07-21	Balance of Plant	Electrical	
B07-22	Balance of Plant	Extraction Steam	
B07-23	Balance of Plant	Feedwater System	
B07-24	Balance of Plant	Heater Drain Systems	
B07-25	Balance of Plant	Miscellaneous (Balance of Plant)	
B07-26	Balance of Plant	Power Station Switchyard	
B07-27	Balance of Plant	Waste Water (zero discharge) Systems	
B07-28	Boiler	Bed Material Preparation System (FBC only)	
B07-29	Boiler	Bed Material Removal System	
B07-30	Boiler	Bed Solids Recirculation	
B07-31	Boiler	Boiler Air and Gas Systems	Air Supply
B07-32	Boiler	Boiler Air and Gas Systems	Flue Gas
B07-33	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation

INDEX TO SYSTEM/COMPONENT/SUB-COMPONENT CAUSE CODE TABLES			
TABLE	SYSTEM	COMPONENT	SUB-COMPONENT
B07-34	Boiler	Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)
B07-35	Boiler	Boiler Control Systems	
B07-36	Boiler	Boiler Design Limitations	
B07-37	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners
B07-38	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Cyclone
B07-39	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)
B07-40	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts
B07-41	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers
B07-42	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)
B07-43	Boiler	Boiler Internals and Structures	
B07-44	Boiler	Boiler Overhaul and Inspections	
B07-45	Boiler	Boiler Piping System	Boiler Recirculation
B07-46	Boiler	Boiler Piping System	Cold and Hot Reheat Steam
B07-47	Boiler	Boiler Piping System	Desuperheaters/Attemperators
B07-48	Boiler	Boiler Piping System	Feedwater and Blowdown
B07-49	Boiler	Boiler Piping System	Main Steam
B07-50	Boiler	Boiler Piping System	Miscellaneous (Piping)
B07-51	Boiler	Boiler Piping System	Startup Bypass
B07-52	Boiler	Boiler Tube Fireside Slagging or Fouling	
B07-53	Boiler	Boiler Tube Leaks	
B07-54	Boiler	Boiler Water Condition	
B07-55	Boiler	External Fluidized Bed Heat Exchanger	
B07-56	Boiler	Miscellaneous (Boiler)	
B07-57	Boiler	Miscellaneous Boiler Tube Problems	
B07-58	Boiler	Slag and Ash Removal	
B07-59	Boiler	Sorbent Supply (FBC only)	Sorbent Feed Equipment from Bunkers to Boiler (FBC only)
B07-60	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)
B07-61	External	Catastrophe	
B07-62	External	Economic	
B07-63	External	Fuel Quality	
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INDEX TO SYSTEM/COMPONENT/SUB-COMPONENT CAUSE CODE TABLES			
TABLE	SYSTEM	COMPONENT	SUB-COMPONENT
B07-69	Generator	Miscellaneous (Generator)	
B07-70	Inactive States	Inactive States	
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B07-73	Pollution Control Equipment	CO Reduction	
B07-74	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)	
B07-75	Pollution Control Equipment	Dry Scrubbers	Dry Scrubber
B07-76	Pollution Control Equipment	Dry Scrubbers	Miscellaneous (Dry Scrubber)
B07-77	Pollution Control Equipment	Dry Scrubbers	Piping, Ducting, and Dampers
B07-78	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply
B07-79	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery
B07-80	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)	
B07-81	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters
B07-82	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems
B07-83	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems
B07-84	Pollution Control Equipment	Precipitators	
B07-85	Pollution Control Equipment	Wet Scrubbers	Chemical Supply
B07-86	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)
B07-87	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans
B07-88	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery
B07-89	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber
B07-90	Regulatory, Safety, Environmental	Other Operating Environmental Limitations	
B07-91	Regulatory, Safety, Environmental	Regulatory	
B07-92	Regulatory, Safety, Environmental	Safety	
B07-93	Regulatory, Safety, Environmental	Stack Emission	
B07-94	Steam Turbine	Controls	
B07-95	Steam Turbine	High Pressure Turbine	
B07-96	Steam Turbine	Intermediate Pressure Turbine	
B07-97	Steam Turbine	Low Pressure Turbine	
B07-98	Steam Turbine	Lube Oil	
B07-99	Steam Turbine	Miscellaneous (Steam Turbine)	
B07-100	Steam Turbine	Piping	
B07-101	Steam Turbine	Valves	

BALANCE OF PLANT

TABLE B07-1 Balance of Plant: Auxiliary Systems - Auxiliary Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3830	Auxiliary boiler
Fluidized Bed	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3831	Auxiliary steam piping
Fluidized Bed	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3832	Auxiliary steam valves
Fluidized Bed	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3833	Auxiliary steam controls and instruments
Fluidized Bed	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3834	Auxiliary boiler tube leaks
Fluidized Bed	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3835	Auxiliary boiler burner management system
Fluidized Bed	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3836	Steam transfer to other unit
Fluidized Bed	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3839	Other auxiliary steam problems (also see extraction steam codes 3520 to 3529; startup bypass codes 0630 to 0660; and soot blower steam code 0870)
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-2 Balance of Plant: Auxiliary Systems - Closed Cooling Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3820	Closed cooling water pumps and motors
Fluidized Bed	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3821	Closed cooling water piping
Fluidized Bed	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3822	Closed cooling water valves
Fluidized Bed	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3823	Closed cooling water heat exchangers
Fluidized Bed	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3824	Closed cooling water system fouling
Fluidized Bed	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3825	Closed cooling water instrumentation
Fluidized Bed	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3826	Closed cooling water strainer
Fluidized Bed	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3829	Other closed cooling water system problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-3 Balance of Plant: Auxiliary Systems - Fire Protection System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Auxiliary Systems	Fire Protection System	3860	Fire protection system pumps

TABLE B07-3 Balance of Plant: Auxiliary Systems - Fire Protection System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Auxiliary Systems	Fire Protection System	3861	Fire protection system piping
Fluidized Bed	Balance of Plant	Auxiliary Systems	Fire Protection System	3862	Fire protection system valves
Fluidized Bed	Balance of Plant	Auxiliary Systems	Fire Protection System	3863	Fire protection system fouling
Fluidized Bed	Balance of Plant	Auxiliary Systems	Fire Protection System	3864	Fire protection system instrumentation and controls
Fluidized Bed	Balance of Plant	Auxiliary Systems	Fire Protection System	3869	Other fire protection system problems
Notes: 1) For use with Gas Turbine Codes 300-399 or 700-799, Steam Turbine Codes 100-199, and Block Identifier Codes 800-899.					

TABLE B07-4 Balance of Plant: Auxiliary Systems - Instrument Air					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Auxiliary Systems	Instrument Air	3850	Instrument air compressors
Fluidized Bed	Balance of Plant	Auxiliary Systems	Instrument Air	3851	Instrument air piping
Fluidized Bed	Balance of Plant	Auxiliary Systems	Instrument Air	3852	Instrument air valves
Fluidized Bed	Balance of Plant	Auxiliary Systems	Instrument Air	3853	Instrument air dryers
Fluidized Bed	Balance of Plant	Auxiliary Systems	Instrument Air	3854	N2 backup to instrument air
Fluidized Bed	Balance of Plant	Auxiliary Systems	Instrument Air	3859	Other instrument air problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-5 Balance of Plant: Auxiliary Systems - Low-pressure Gas Compression System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3870	Fuel Gas Compressor and Motors
Fluidized Bed	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3871	Fuel Gas Compressor Piping
Fluidized Bed	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3872	Fuel Gas Compressor Valves
Fluidized Bed	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3873	Fuel Gas Compressor Heat Exchangers
Fluidized Bed	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3874	Fuel Gas Compressor Controls and Instrumentation
Fluidized Bed	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3875	Fuel Gas Compressor Filters
Fluidized Bed	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3876	Fuel Gas Compressor Fire System

TABLE B07-5 Balance of Plant: Auxiliary Systems - Low-pressure Gas Compression System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3879	Fuel Gas Compressor - other
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-6 Balance of Plant: Auxiliary Systems - Miscellaneous (Auxiliary Systems)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	3898	Miscellaneous plant auxiliary process and services instrumentation and controls
Fluidized Bed	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	3899	Other miscellaneous auxiliary system problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-7 Balance of Plant: Auxiliary Systems - Open Cooling Water System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3800	Open cooling water pumps and motors
Fluidized Bed	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3801	Open cooling water piping
Fluidized Bed	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3802	Open cooling water valves
Fluidized Bed	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3803	Open cooling water heat exchangers
Fluidized Bed	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3804	Open cooling water system fouling
Fluidized Bed	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3805	Open cooling water system instrumentation
Fluidized Bed	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3806	Open cooling water strainer
Fluidized Bed	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3809	Other open cooling water problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-8 Balance of Plant: Auxiliary Systems - Seal Air Fans					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Auxiliary Systems	Seal Air Fans	3880	Seal air fan
Fluidized Bed	Balance of Plant	Auxiliary Systems	Seal Air Fans	3881	Seal air fan drive - motor
Fluidized Bed	Balance of Plant	Auxiliary Systems	Seal Air Fans	3882	Seal air control dampers and drives
Fluidized Bed	Balance of Plant	Auxiliary Systems	Seal Air Fans	3883	Seal air filters

TABLE B07-8 Balance of Plant: Auxiliary Systems - Seal Air Fans					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Auxiliary Systems	Seal Air Fans	3889	Other seal air fan problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-9 Balance of Plant: Auxiliary Systems - Service Air					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Auxiliary Systems	Service Air	3840	Service air compressors
Fluidized Bed	Balance of Plant	Auxiliary Systems	Service Air	3841	Service air piping
Fluidized Bed	Balance of Plant	Auxiliary Systems	Service Air	3842	Service air valves
Fluidized Bed	Balance of Plant	Auxiliary Systems	Service Air	3843	Service air dryers
Fluidized Bed	Balance of Plant	Auxiliary Systems	Service Air	3844	Soot blowing air compressor and system
Fluidized Bed	Balance of Plant	Auxiliary Systems	Service Air	3849	Other service air problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-10 Balance of Plant: Auxiliary Systems - Service Water (Open System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3810	Service water pumps and motors
Fluidized Bed	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3811	Service water piping
Fluidized Bed	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3812	Service water valves
Fluidized Bed	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3813	Service water heat exchangers
Fluidized Bed	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3814	Service water system fouling
Fluidized Bed	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3815	Service water strainer
Fluidized Bed	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3819	Other service water problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-11 Balance of Plant: Circulating Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Circulating Water Systems		3210	Circulating water pumps
Fluidized Bed	Balance of Plant	Circulating Water Systems		3211	Circulating water pump motors
Fluidized Bed	Balance of Plant	Circulating Water Systems		3220	Circulating water piping
Fluidized Bed	Balance of Plant	Circulating Water Systems		3221	Circulating water piping fouling
Fluidized Bed	Balance of Plant	Circulating Water Systems		3230	Circulating water valves
Fluidized Bed	Balance of Plant	Circulating Water Systems		3231	Waterbox

TABLE B07-11 Balance of Plant: Circulating Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Circulating Water Systems		3232	Condenser tube cleaning system including debris filter
Fluidized Bed	Balance of Plant	Circulating Water Systems		3233	Circulating water priming system
Fluidized Bed	Balance of Plant	Circulating Water Systems		3235	Cooling tower booster pump
Fluidized Bed	Balance of Plant	Circulating Water Systems		3236	Cooling tower booster motor
Fluidized Bed	Balance of Plant	Circulating Water Systems		3238	Cooling tower fan motors
Fluidized Bed	Balance of Plant	Circulating Water Systems		3239	Cooling tower fan motors - variable speed
Fluidized Bed	Balance of Plant	Circulating Water Systems		3240	Cooling tower fans
Fluidized Bed	Balance of Plant	Circulating Water Systems		3241	Cooling tower efficiency below design
Fluidized Bed	Balance of Plant	Circulating Water Systems		3242	Cooling tower fill damage
Fluidized Bed	Balance of Plant	Circulating Water Systems		3243	Cooling tower icing
Fluidized Bed	Balance of Plant	Circulating Water Systems		3244	Cooling tower fires
Fluidized Bed	Balance of Plant	Circulating Water Systems		3245	Other cooling tower problems
Fluidized Bed	Balance of Plant	Circulating Water Systems		3246	Cooling tower fouling
Fluidized Bed	Balance of Plant	Circulating Water Systems		3247	Cooling tower instrumentation
Fluidized Bed	Balance of Plant	Circulating Water Systems		3248	Cooling Tower Overhaul
Fluidized Bed	Balance of Plant	Circulating Water Systems		3250	Circulating water system instruments and controls
Fluidized Bed	Balance of Plant	Circulating Water Systems		3260	Traveling screens
Fluidized Bed	Balance of Plant	Circulating Water Systems		3261	Traveling screen fouling
Fluidized Bed	Balance of Plant	Circulating Water Systems		3269	Circulating water biological conditions (ie, zebra mussels)
Fluidized Bed	Balance of Plant	Circulating Water Systems		3270	Intake system problems other than traveling screens
Fluidized Bed	Balance of Plant	Circulating Water Systems		3271	Intake grating fouling
Fluidized Bed	Balance of Plant	Circulating Water Systems		3272	Circulating water screenwash system
Fluidized Bed	Balance of Plant	Circulating Water Systems		3273	Debris in circulating water from outside sources (leaves, mud, etc.)
Fluidized Bed	Balance of Plant	Circulating Water Systems		3274	Ice blockages at intake structures including frazil ice, sheets, blocks of ice, etc.
Fluidized Bed	Balance of Plant	Circulating Water Systems		3280	High circulating water temperature (not due to season, tower efficiency

TABLE B07-11 Balance of Plant: Circulating Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
					below design, or other listed equipment problem)
Fluidized Bed	Balance of Plant	Circulating Water Systems		3281	Circulating water tempering system
Fluidized Bed	Balance of Plant	Circulating Water Systems		3282	Circulating water cooling ponds
Fluidized Bed	Balance of Plant	Circulating Water Systems		3285	Circulating water chemistry
Fluidized Bed	Balance of Plant	Circulating Water Systems		3299	Other circulating water system problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-12 Balance of Plant: Condensate System - Low/Intermediate Pressure Heater and Deaerators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3339	LP heater head leaks
Fluidized Bed	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3340	LP heater tube leaks
Fluidized Bed	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3341	Other LP heater - general
Fluidized Bed	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3342	IP heater tube leaks
Fluidized Bed	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3343	Other IP heater - general
Fluidized Bed	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3344	Deaerator (including level control)
Fluidized Bed	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3345	IP heater head leaks
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-13 Balance of Plant: Condensate System - Miscellaneous (Condensate System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3360	Condensate makeup and return (including storage tanks)
Fluidized Bed	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3370	Condensate system controls and instrumentation (not hotwell level,

TABLE B07-13 Balance of Plant: Condensate System - Miscellaneous (Condensate System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
					heater level, or deaerator level controls; see codes 3150-3159, 3344, 3502).
Fluidized Bed	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3380	Condensate coolers
Fluidized Bed	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3399	Other miscellaneous condensate system problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-14 Balance of Plant: Condensate System - Polishers/Chemical Addition					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Condensate System	Polishers/Chemical Addition	3350	Condensate polishing and filtering systems
Fluidized Bed	Balance of Plant	Condensate System	Polishers/Chemical Addition	3351	Chemical addition systems
Fluidized Bed	Balance of Plant	Condensate System	Polishers/Chemical Addition	3352	Feedwater chemistry (not specific to condenser, polishers, or chemical addition)
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-15 Balance of Plant: Condensate System - Pumps, Piping, and Valves					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3300	Condensate water pre-treatment
Fluidized Bed	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3310	Condensate/hotwell pumps
Fluidized Bed	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3311	Condensate/hotwell pump motor
Fluidized Bed	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3312	Condensate booster pump
Fluidized Bed	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3313	Condensate booster pump motor
Fluidized Bed	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3314	Condensate booster pump motor - variable speed
Fluidized Bed	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3315	Condensate booster pump drive (other than 3313 and 3314)
Fluidized Bed	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3320	Condensate piping
Fluidized Bed	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3330	Condensate valves
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-16 Balance of Plant: Condensing System - Condenser Casing or Shell and Internals					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3120	Tube sheets
Fluidized Bed	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3121	Expansion joint
Fluidized Bed	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3122	Gaskets and seals
Fluidized Bed	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3123	Hot well
Fluidized Bed	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3124	Tube sheet fouling
Fluidized Bed	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3129	Other condenser casing or shell and internal problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-17 Balance of Plant: Condensing System - Condenser Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Condensing System	Condenser Controls	3150	Hot well level controls
Fluidized Bed	Balance of Plant	Condensing System	Condenser Controls	3151	Vacuum pump and air ejector controls
Fluidized Bed	Balance of Plant	Condensing System	Condenser Controls	3152	Air-cooled condenser controls
Fluidized Bed	Balance of Plant	Condensing System	Condenser Controls	3159	Other condensing system controls and instruments
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-18 Balance of Plant: Condensing System - Condenser Tubes and Support Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3110	Condenser tube leaks
Fluidized Bed	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3111	Condenser tube fouling shell side
Fluidized Bed	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3112	Condenser tube fouling tube side
Fluidized Bed	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3113	Condenser tube and water box cleaning (including circulating water flow reversal)

TABLE B07-18 Balance of Plant: Condensing System - Condenser Tubes and Support Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3114	Air-cooled condenser tubes
Fluidized Bed	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3115	Air-cooled condenser pumps
Fluidized Bed	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3116	Air-cooled condenser fans
Fluidized Bed	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3117	Air-cooled condenser fan motors
Fluidized Bed	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3118	Other Air-cooled condenser problems
Fluidized Bed	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3119	Other condenser tube casing or shell and internal problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-19 Balance of Plant: Condensing System - Miscellaneous (Condensing System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3170	Condenser inspection (use code 3110 to report looking for tube leaks)
Fluidized Bed	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3171	Air-cooled condenser inspections
Fluidized Bed	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3180	Major condenser overhaul
Fluidized Bed	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3185	Water side cathodic protection
Fluidized Bed	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3186	Auxiliary condenser and associated equipment
Fluidized Bed	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3190	Air leakage (for losses not attributable to previously noted equipment related codes)
Fluidized Bed	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3199	Other miscellaneous condensing system problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-20 Balance of Plant: Condensing System - Vacuum Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Condensing System	Vacuum Equipment	3130	Air ejectors
Fluidized Bed	Balance of Plant	Condensing System	Vacuum Equipment	3131	Air ejector piping and valves

TABLE B07-20 Balance of Plant: Condensing System - Vacuum Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Condensing System	Vacuum Equipment	3132	Inter and after condensers
Fluidized Bed	Balance of Plant	Condensing System	Vacuum Equipment	3133	Vacuum pumps
Fluidized Bed	Balance of Plant	Condensing System	Vacuum Equipment	3134	Vacuum pump piping and valves
Fluidized Bed	Balance of Plant	Condensing System	Vacuum Equipment	3135	Vacuum pump motor and auxiliaries
Fluidized Bed	Balance of Plant	Condensing System	Vacuum Equipment	3139	Other air extraction system problems - general
Fluidized Bed	Balance of Plant	Condensing System	Vacuum Equipment	3149	Loss of vacuum not attributable to a particular component such as air ejectors or valves, or high back pressure not attributable to high circulating water temperature, or vacuum losses from a known cause.
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-21 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Electrical		3600	Switchyard transformers and associated cooling systems - external (OMC)
Fluidized Bed	Balance of Plant	Electrical		3601	Switchyard transformers and associated cooling systems - external (not OMC)
Fluidized Bed	Balance of Plant	Electrical		3610	Switchyard circuit breakers - external (not OMC)
Fluidized Bed	Balance of Plant	Electrical		3611	Switchyard circuit breakers - external (OMC)
Fluidized Bed	Balance of Plant	Electrical		3612	Switchyard system protection devices - external (OMC)
Fluidized Bed	Balance of Plant	Electrical		3613	Switchyard system protection devices - external (not OMC)
Fluidized Bed	Balance of Plant	Electrical		3618	Other switchyard equipment - external (not OMC)
Fluidized Bed	Balance of Plant	Electrical		3619	Other switchyard equipment - external (OMC)

TABLE B07-21 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Electrical		3620	Main transformer
Fluidized Bed	Balance of Plant	Electrical		3621	Unit auxiliaries transformer
Fluidized Bed	Balance of Plant	Electrical		3622	Station service startup transformer
Fluidized Bed	Balance of Plant	Electrical		3623	Auxiliary generators
Fluidized Bed	Balance of Plant	Electrical		3624	Auxiliary generator voltage supply system
Fluidized Bed	Balance of Plant	Electrical		3629	Other switchyard or high voltage system problems - external
Fluidized Bed	Balance of Plant	Electrical		3630	400-700 volt transformers
Fluidized Bed	Balance of Plant	Electrical		3631	400-700 volt circuit breakers
Fluidized Bed	Balance of Plant	Electrical		3632	400-700 volt conductors and buses
Fluidized Bed	Balance of Plant	Electrical		3633	400-700 volt insulators
Fluidized Bed	Balance of Plant	Electrical		3634	400-700 volt protection devices
Fluidized Bed	Balance of Plant	Electrical		3639	Other 400-700 volt problems
Fluidized Bed	Balance of Plant	Electrical		3640	AC instrument power transformers
Fluidized Bed	Balance of Plant	Electrical		3641	AC Circuit breakers
Fluidized Bed	Balance of Plant	Electrical		3642	AC Conductors and buses
Fluidized Bed	Balance of Plant	Electrical		3643	AC Inverters
Fluidized Bed	Balance of Plant	Electrical		3644	AC Protection devices
Fluidized Bed	Balance of Plant	Electrical		3649	Other AC instrument power problems
Fluidized Bed	Balance of Plant	Electrical		3650	DC instrument power battery chargers
Fluidized Bed	Balance of Plant	Electrical		3651	DC circuit breakers
Fluidized Bed	Balance of Plant	Electrical		3652	DC conductors and buses
Fluidized Bed	Balance of Plant	Electrical		3653	DC protection devices
Fluidized Bed	Balance of Plant	Electrical		3659	Other DC power problems
Fluidized Bed	Balance of Plant	Electrical		3660	4000-7000 volt transformers
Fluidized Bed	Balance of Plant	Electrical		3661	4000-7000 volt circuit breakers
Fluidized Bed	Balance of Plant	Electrical		3662	4000-7000 volt conductors and buses
Fluidized Bed	Balance of Plant	Electrical		3663	4000-7000 volt insulators
Fluidized Bed	Balance of Plant	Electrical		3664	4000-7000 volt protection devices
Fluidized Bed	Balance of Plant	Electrical		3669	Other 4000-7000 volt problems
Fluidized Bed	Balance of Plant	Electrical		3670	12-15kV transformers
Fluidized Bed	Balance of Plant	Electrical		3671	12-15kV circuit breakers
Fluidized Bed	Balance of Plant	Electrical		3672	12-15kV conductors and buses
Fluidized Bed	Balance of Plant	Electrical		3673	12-15kV insulators

TABLE B07-21 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Electrical		3674	12-15kV protection devices
Fluidized Bed	Balance of Plant	Electrical		3679	Other 12-15kV problems
Fluidized Bed	Balance of Plant	Electrical		3680	Other voltage transformers
Fluidized Bed	Balance of Plant	Electrical		3681	Other voltage circuit breakers
Fluidized Bed	Balance of Plant	Electrical		3682	Other voltage conductors and buses
Fluidized Bed	Balance of Plant	Electrical		3683	Other voltage insulators
Fluidized Bed	Balance of Plant	Electrical		3684	Other voltage protection devices
Fluidized Bed	Balance of Plant	Electrical		3689	Other voltage problems
Fluidized Bed	Balance of Plant	Electrical		3690	Station Service Power Distribution System, General
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-22 Balance of Plant: Extraction Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Extraction Steam		3520	HP Extraction steam piping
Fluidized Bed	Balance of Plant	Extraction Steam		3521	HP Extraction steam valves
Fluidized Bed	Balance of Plant	Extraction Steam		3522	HP Extraction steam instruments and controls
Fluidized Bed	Balance of Plant	Extraction Steam		3529	Other HP extraction steam system problems
Fluidized Bed	Balance of Plant	Extraction Steam		3530	IP Extraction steam piping
Fluidized Bed	Balance of Plant	Extraction Steam		3531	IP Extraction steam valves
Fluidized Bed	Balance of Plant	Extraction Steam		3532	IP Extraction steam instruments and controls
Fluidized Bed	Balance of Plant	Extraction Steam		3539	Other IP extraction steam system problems
Fluidized Bed	Balance of Plant	Extraction Steam		3540	LP Extraction steam piping
Fluidized Bed	Balance of Plant	Extraction Steam		3541	LP Extraction steam valves
Fluidized Bed	Balance of Plant	Extraction Steam		3542	LP Extraction steam instruments and controls
Fluidized Bed	Balance of Plant	Extraction Steam		3549	Other LP extraction steam system problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-23 Balance of Plant: Feedwater System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Feedwater System		3401	Startup feedwater pump
Fluidized Bed	Balance of Plant	Feedwater System		3402	Startup feedwater pump drives - all types
Fluidized Bed	Balance of Plant	Feedwater System		3407	Feedwater pump suction screens
Fluidized Bed	Balance of Plant	Feedwater System		3408	Feedwater pump drive - local controls
Fluidized Bed	Balance of Plant	Feedwater System		3409	Feedwater pump drive motor - variable speed
Fluidized Bed	Balance of Plant	Feedwater System		3410	Feedwater pump
Fluidized Bed	Balance of Plant	Feedwater System		3411	Feedwater pump drive - motor
Fluidized Bed	Balance of Plant	Feedwater System		3412	Feedwater pump drive - steam turbine
Fluidized Bed	Balance of Plant	Feedwater System		3413	Feedwater pump coupling and drive shaft
Fluidized Bed	Balance of Plant	Feedwater System		3414	Feedwater pump local controls
Fluidized Bed	Balance of Plant	Feedwater System		3415	Feedwater pump/drive lube oil system
Fluidized Bed	Balance of Plant	Feedwater System		3416	Other feedwater pump problems
Fluidized Bed	Balance of Plant	Feedwater System		3417	Feedwater pump drive - main shaft
Fluidized Bed	Balance of Plant	Feedwater System		3418	Feedwater pump drive - other
Fluidized Bed	Balance of Plant	Feedwater System		3419	Feedwater pump drive - gear
Fluidized Bed	Balance of Plant	Feedwater System		3420	Feedwater piping and supports
Fluidized Bed	Balance of Plant	Feedwater System		3430	Feedwater regulating (boiler level control) valve
Fluidized Bed	Balance of Plant	Feedwater System		3431	Other feedwater valves
Fluidized Bed	Balance of Plant	Feedwater System		3439	HP heater head leaks
Fluidized Bed	Balance of Plant	Feedwater System		3440	High pressure heater tube leaks
Fluidized Bed	Balance of Plant	Feedwater System		3441	Other high pressure heater problems (see condensate system for LP and IP heater codes)
Fluidized Bed	Balance of Plant	Feedwater System		3451	Feedwater booster pump suction screens
Fluidized Bed	Balance of Plant	Feedwater System		3452	Feedwater booster pump drive - local controls
Fluidized Bed	Balance of Plant	Feedwater System		3453	Feedwater booster pump drive motor - variable speed
Fluidized Bed	Balance of Plant	Feedwater System		3454	Feedwater booster pump
Fluidized Bed	Balance of Plant	Feedwater System		3455	Feedwater booster pump drive - motor

TABLE B07-23 Balance of Plant: Feedwater System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Feedwater System		3456	Feedwater booster pump drive - steam turbine
Fluidized Bed	Balance of Plant	Feedwater System		3457	Feedwater booster pump coupling and drive shaft
Fluidized Bed	Balance of Plant	Feedwater System		3458	Feedwater booster pump local controls
Fluidized Bed	Balance of Plant	Feedwater System		3459	Feedwater booster pump/drive lube oil system
Fluidized Bed	Balance of Plant	Feedwater System		3460	Other feedwater booster pump problems
Fluidized Bed	Balance of Plant	Feedwater System		3461	Feedwater booster pump drive - main shaft
Fluidized Bed	Balance of Plant	Feedwater System		3462	Feedwater booster pump drive - other
Fluidized Bed	Balance of Plant	Feedwater System		3463	Feedwater booster pump drive - gear
Fluidized Bed	Balance of Plant	Feedwater System		3499	Other feedwater system problems
Notes: 1) For use with Unit Codes 650-699. 2) Excluding extraction or drain systems.					

TABLE B07-24 Balance of Plant: Heater Drain Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Heater Drain Systems		3501	Heater drain pumps
Fluidized Bed	Balance of Plant	Heater Drain Systems		3502	Heater level control
Fluidized Bed	Balance of Plant	Heater Drain Systems		3503	Heater drain piping
Fluidized Bed	Balance of Plant	Heater Drain Systems		3504	Heater drain valves
Fluidized Bed	Balance of Plant	Heater Drain Systems		3505	Heater drain pump drive
Fluidized Bed	Balance of Plant	Heater Drain Systems		3509	Other heater drain system problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-25 Balance of Plant: Miscellaneous (Balance of Plant)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Miscellaneous (Balance of Plant)		3950	Process computer
Fluidized Bed	Balance of Plant	Miscellaneous (Balance of Plant)		3960	Thermal derating (thermal efficiency losses in balance of plant when specific cause(s) unknown)

TABLE B07-25 Balance of Plant: Miscellaneous (Balance of Plant)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Miscellaneous (Balance of Plant)		3970	Distributive Control System (DCS) - process computer
Fluidized Bed	Balance of Plant	Miscellaneous (Balance of Plant)		3971	DCS - data highway
Fluidized Bed	Balance of Plant	Miscellaneous (Balance of Plant)		3972	DCS - hardware problems (including card failure)
Fluidized Bed	Balance of Plant	Miscellaneous (Balance of Plant)		3973	DCS - internal and termination wiring
Fluidized Bed	Balance of Plant	Miscellaneous (Balance of Plant)		3974	DCS - logic problems
Fluidized Bed	Balance of Plant	Miscellaneous (Balance of Plant)		3975	DCS - upgrades
Fluidized Bed	Balance of Plant	Miscellaneous (Balance of Plant)		3979	Other DCS problems
Fluidized Bed	Balance of Plant	Miscellaneous (Balance of Plant)		3980	Programmable Logic Controller (PLC)
Fluidized Bed	Balance of Plant	Miscellaneous (Balance of Plant)		3981	PLC - data highway
Fluidized Bed	Balance of Plant	Miscellaneous (Balance of Plant)		3982	PLC - hardware problems (including card failure)
Fluidized Bed	Balance of Plant	Miscellaneous (Balance of Plant)		3983	PLC - internal and termination wiring
Fluidized Bed	Balance of Plant	Miscellaneous (Balance of Plant)		3984	PLC - logic problems
Fluidized Bed	Balance of Plant	Miscellaneous (Balance of Plant)		3985	PLC - upgrades
Fluidized Bed	Balance of Plant	Miscellaneous (Balance of Plant)		3989	Other PLC problems
Fluidized Bed	Balance of Plant	Miscellaneous (Balance of Plant)		3995	Powerhouse heating and ventilating systems
Fluidized Bed	Balance of Plant	Miscellaneous (Balance of Plant)		3996	Air conditioning systems - rooms and areas
Fluidized Bed	Balance of Plant	Miscellaneous (Balance of Plant)		3998	Balance of plant overhaul/outage
Fluidized Bed	Balance of Plant	Miscellaneous (Balance of Plant)		3999	Other miscellaneous balance of plant problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-26 Balance of Plant: Power Station Switchyard					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Power Station Switchyard		3700	Power Station switchyard (non generating unit equipment)
Fluidized Bed	Balance of Plant	Power Station Switchyard		3710	Transmission line (connected to powerhouse switchyard to 1st Substation)

TABLE B07-26 Balance of Plant: Power Station Switchyard					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Power Station Switchyard		3720	Transmission equipment at the 1st substation (see code 9300 if applicable)
Fluidized Bed	Balance of Plant	Power Station Switchyard		3730	Transmission equipment beyond the 1st substation (see code 9300 if applicable)
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-27 Balance of Plant: Waste Water (zero discharge) Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Balance of Plant	Waste Water (zero discharge) Systems		3290	Waste water (zero discharge) tanks, pumps, and motors
Fluidized Bed	Balance of Plant	Waste Water (zero discharge) Systems		3291	Waste water (zero discharge) system fouling
Fluidized Bed	Balance of Plant	Waste Water (zero discharge) Systems		3292	Waste water (zero discharge) piping
Fluidized Bed	Balance of Plant	Waste Water (zero discharge) Systems		3293	Waste water (zero discharge) valves
Fluidized Bed	Balance of Plant	Waste Water (zero discharge) Systems		3294	Waste water (zero discharge) controls and instrumentation
Fluidized Bed	Balance of Plant	Waste Water (zero discharge) Systems		3295	Other waste water (zero discharge) problems
Notes: 1) For use with Unit Codes 650-699.					

BOILER

This set of codes contains the following:

- Boiler.
- Boiler internals (tubes, refractory, supports, etc.) .
- All the fuel handling, storage fuel preparation, and burning equipment.
- The forced/induced draft air system.
- Slag and ash removal except for particulate and gas cleanup. These latter items are covered under pollution control equipment.

- The main steam and reheat steam systems up to but not including the turbine stop or isolation valves.
- The feedwater system downstream of the final valve prior to entry into the economizer or boiler.
- Boiler blowdown systems.
- The startup bypass system including drains up to the heaters or condenser.
- Boiler water chemistry problems not due to problems in the condensate/feedwater system, the chemical addition system, or the demineralizer/polisher system.
- The instruments and controls associated with the above equipment.

TABLE B07-28 Boiler: Bed Material Preparation System (FBC only)

UNIT TYPE	SYSTEM	COMPONENT	SUB-COMPONENT	CAUSE CODE	DESCRIPTION
Fluidized Bed	Boiler	Bed Material Preparation System (FBC only)		160	Bed material tanks/hoppers
Fluidized Bed	Boiler	Bed Material Preparation System (FBC only)		162	Bed material conveyors
Fluidized Bed	Boiler	Bed Material Preparation System (FBC only)		163	Bed material feeders
Fluidized Bed	Boiler	Bed Material Preparation System (FBC only)		164	Bed material feeder motors
Fluidized Bed	Boiler	Bed Material Preparation System (FBC only)		165	Bed material crushers
Fluidized Bed	Boiler	Bed Material Preparation System (FBC only)		166	Bed material crusher motors
Fluidized Bed	Boiler	Bed Material Preparation System (FBC only)		167	Bed material screens
Fluidized Bed	Boiler	Bed Material Preparation System (FBC only)		168	Bed material blowers/fans
Fluidized Bed	Boiler	Bed Material Preparation System (FBC only)		169	Bed material blower/fan motors
Fluidized Bed	Boiler	Bed Material Preparation System (FBC only)		170	Bed material cyclone
Fluidized Bed	Boiler	Bed Material Preparation System (FBC only)		171	Bed material baghouse
Fluidized Bed	Boiler	Bed Material Preparation System (FBC only)		172	Bed material drying equipment
Fluidized Bed	Boiler	Bed Material Preparation System (FBC only)		173	Bed material pneumatic transport system including piping and valves
Fluidized Bed	Boiler	Bed Material Preparation System (FBC only)		174	Other bed material handling equipment

Notes: 1) For use with Unit Codes 650-699.

TABLE B07-29 Boiler: Bed Material Removal System

UNIT TYPE	SYSTEM	COMPONENT	SUB-COMPONENT	CAUSE CODE	DESCRIPTION
Fluidized Bed	Boiler	Bed Material Removal System		930	Bed material coolers
Fluidized Bed	Boiler	Bed Material Removal System		931	Bed material transport piping/valves
Fluidized Bed	Boiler	Bed Material Removal System		932	Bed material transport tanks/hoppers

TABLE B07-29 Boiler: Bed Material Removal System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Bed Material Removal System		933	Bed material fans/blowers
Fluidized Bed	Boiler	Bed Material Removal System		934	Bed material fan/blower motors
Fluidized Bed	Boiler	Bed Material Removal System		935	Bed material disposal conditioner
Fluidized Bed	Boiler	Bed Material Removal System		936	Bed material conveyors
Fluidized Bed	Boiler	Bed Material Removal System		937	Bed material mechanical separators and baghouse
Fluidized Bed	Boiler	Bed Material Removal System		950	Other bed material system problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-30 Boiler: Bed Solids Recirculation					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Bed Solids Recirculation		951	Char reinjection feeders
Fluidized Bed	Boiler	Bed Solids Recirculation		952	Char reinjection piping/valves
Fluidized Bed	Boiler	Bed Solids Recirculation		953	Char reinjection controls
Fluidized Bed	Boiler	Bed Solids Recirculation		959	Other char reinjection equipment problems
Fluidized Bed	Boiler	Bed Solids Recirculation		960	Char transport piping and valves
Fluidized Bed	Boiler	Bed Solids Recirculation		961	Char transfer tanks/hoppers
Fluidized Bed	Boiler	Bed Solids Recirculation		962	Char conditioner
Fluidized Bed	Boiler	Bed Solids Recirculation		969	Other char equipment problems
Fluidized Bed	Boiler	Bed Solids Recirculation		970	Flue gas-solids separator
Fluidized Bed	Boiler	Bed Solids Recirculation		971	Flue gas-solids separator piping and valves
Fluidized Bed	Boiler	Bed Solids Recirculation		972	Flue gas-solids separator controls
Fluidized Bed	Boiler	Bed Solids Recirculation		973	Flue gas-solids separator refractory
Fluidized Bed	Boiler	Bed Solids Recirculation		980	High pressure loop seal recirculation fans/blowers
Fluidized Bed	Boiler	Bed Solids Recirculation		981	High pressure loop seal recirculation fan/blower motors
Fluidized Bed	Boiler	Bed Solids Recirculation		982	High pressure loop seal recirculation fan/blower controls

TABLE B07-30 Boiler: Bed Solids Recirculation					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Bed Solids Recirculation		989	Other bed solids recirculation problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-31 Boiler: Boiler Air and Gas Systems - Air Supply					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Air Supply	1400	Forced draft fans*
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Air Supply	1401	Forced draft fan dampers
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Air Supply	1407	Forced draft fan lubrication system*
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Air Supply	1410	Forced draft fan motors*
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Air Supply	1411	Forced draft fan motors - variable speed*
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Air Supply	1412	Forced draft fan drives (other than motor)*
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Air Supply	1413	Forced draft fan couplings
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Air Supply	1415	Forced draft fan controls*
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Air Supply	1420	Other forced draft fan problems*
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Air Supply	1421	Secondary air fans/blowers
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Air Supply	1422	Secondary air fan/blower motors - single speed
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Air Supply	1423	Secondary air fan/blower motors - variable speed
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Air Supply	1424	Secondary air fan/blower controls
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Air Supply	1430	Air supply ducts from FD fan
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Air Supply	1431	Air supply dampers from FD fan
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Air Supply	1432	Air supply duct expansion joints
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Air Supply	1440	Air supply dampers
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Air Supply	1450	Other air supply problems
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Air Supply	1451	Fluidized Air Fan (FBC Only)

TABLE B07-31 Boiler: Boiler Air and Gas Systems - Air Supply					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Notes: 1) For use with Unit Codes 650-699. 2) Excluding burner pipes, wind boxes, primary air, or pulverize exhausters. 3) * For FBC units, this is the same as primary air fans and their motors.					

TABLE B07-32 Boiler: Boiler Air and Gas Systems - Flue Gas					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Flue Gas	1455	Induced draft fans
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Flue Gas	1456	Induced draft fan dampers
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Flue Gas	1457	Induced draft fan lubrication systems
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Flue Gas	1460	Induced draft fan fouling
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Flue Gas	1470	Induced draft fan motors and drives
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Flue Gas	1471	Induced draft fan motors - variable speed
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Flue Gas	1472	Inducted draft fan coupling
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Flue Gas	1475	Induced draft fan controls
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Flue Gas	1476	Induced draft fan speed changer
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Flue Gas	1480	Other induced draft fan problems
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Flue Gas	1487	Air heater (tubular)
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Flue Gas	1488	Air heater (regenerative)
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Flue Gas	1489	Air heater (heat pipe, plate-type)
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Flue Gas	1492	Air heater fouling (tubular)
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Flue Gas	1493	Air heater fouling (regenerative)
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Flue Gas	1495	Other air heater fouling (heat pipe, plate-type)
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Flue Gas	1500	Air heater soot blowers
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Flue Gas	1510	Flue gas ducts (except recirculation)
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Flue Gas	1512	Flue gas expansion joints
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Flue Gas	1520	Flue gas dampers (except recirculation)

TABLE B07-32 Boiler: Boiler Air and Gas Systems - Flue Gas					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Flue Gas	1530	Other flue gas problems
Notes: 1) For use with Unit Codes 650-699. 2) Excluding burner pipes, wind boxes, primary air, or pulverize exhausters.					

TABLE B07-33 Boiler: Boiler Air and Gas Systems - Flue Gas Recirculation					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1535	Flue gas recirculating fan
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1536	Flue gas recirculating fan dampers
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1537	Flue gas recirculating fan lubrication systems
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1540	Flue gas recirculation fan fouling
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1550	Flue gas recirculation fan motors
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1555	Flue gas recirculation fan controls
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1560	Other flue gas recirculation fan problems
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1570	Flue gas recirculation ducts
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1572	Flue gas recirculation duct expansion joints
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1580	Flue gas recirculation dampers
Notes: 1) For use with Unit Codes 650-699. 2) Excluding burner pipes, wind boxes, primary air, or pulverize exhausters.					

TABLE B07-34 Boiler: Boiler Air and Gas Systems - Miscellaneous (Boiler Air and Gas Systems)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1590	Stacks (use code 8430 for stack problems due to pollution control equipment)
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1591	Stack damper and linkage
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1592	Stack damper linkage motors

TABLE B07-34 Boiler: Boiler Air and Gas Systems - Miscellaneous (Boiler Air and Gas Systems)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1599	Other miscellaneous boiler air and gas system problems
Notes: 1) For use with Unit Codes 650-699. 2) Excluding burner pipes, wind boxes, primary air, or pulverize exhausters.					

TABLE B07-35 Boiler: Boiler Control Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Control Systems		1700	Feedwater controls (report local controls - feedwater pump, feedwater regulator valve, etc., - with component or system)
Fluidized Bed	Boiler	Boiler Control Systems		1710	Combustion/steam condition controls (report local controls - burners, pulverizers, etc., - with component or system)
Fluidized Bed	Boiler	Boiler Control Systems		1720	Desuperheater/attemperator controls
Fluidized Bed	Boiler	Boiler Control Systems		1730	Boiler explosion or implosion
Fluidized Bed	Boiler	Boiler Control Systems		1740	Boiler drum gage glasses / level indicator
Fluidized Bed	Boiler	Boiler Control Systems		1741	Furnace and water gauge television auxiliary system
Fluidized Bed	Boiler	Boiler Control Systems		1750	Burner management system
Fluidized Bed	Boiler	Boiler Control Systems		1760	Feedwater instrumentation (not local controls)
Fluidized Bed	Boiler	Boiler Control Systems		1761	Combustion/Steam condition instrumentation (not local controls)
Fluidized Bed	Boiler	Boiler Control Systems		1762	Desuperheater/attemperator instrumentation (not local controls)

TABLE B07-35 Boiler: Boiler Control Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Control Systems		1799	Other boiler instrumentation and control problems
Notes: 1) For use with Unit Codes 650-699. 2) Including instruments that input to the controls.					

TABLE B07-36 Boiler: Boiler Design Limitations					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Design Limitations		1900	Improper balance between tube sections not due to fouling or plugging
Fluidized Bed	Boiler	Boiler Design Limitations		1910	Inadequate air not due to equipment problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-37 Boiler: Boiler Fuel Supply from Bunkers to Boiler - Burners					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	358	Oil burner piping and valves
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	359	Gas burner piping and valves
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	360	Burners
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	361	Burner orifices
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	362	Burner tilts
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	365	Bed warmup burners (FBC only)
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	366	Duct burners (FBC only)

TABLE B07-37 Boiler: Boiler Fuel Supply from Bunkers to Boiler - Burners					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	370	Burner instruments and controls (except light off)
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	375	Burner instruments and controls (FBC light-off system)
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	380	Light off (igniter) systems (including fuel supply)
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	385	Igniters
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	390	Burner wind boxes and dampers
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	400	Burner wind box fires
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	410	Other burner problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-38 Boiler: Boiler Fuel Supply from Bunkers to Boiler - Cyclone					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Cyclone	415	Cyclone feeders
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Cyclone	420	Cyclone crusher
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Cyclone	425	Cyclone dampers
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Cyclone	426	Cyclone air ducts
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Cyclone	430	Cyclone furnace
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Cyclone	435	Other cyclone problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-39 Boiler: Boiler Fuel Supply from Bunkers to Boiler - Oil and Gas Systems (except light off)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	440	Fuel oil pumps (general)
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	441	Fuel oil pumps (burner supply)
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	442	Fuel oil pumps (forwarding/transfer)
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	443	Fuel oil (burner supply) pump drives
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	444	Fuel oil (forwarding/transfer) pump drives
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	450	Fuel oil heaters
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	460	Fuel oil atomizers
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	470	Oil and gas fires
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	475	Fuel lance (FBC only)
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	480	Other oil and gas fuel supply problems (see codes 0360-0410 for burner problems)
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-40 Boiler: Boiler Fuel Supply from Bunkers to Boiler - Pulverizers, Primary Air Fans, and Associated Ducts					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	200	Pulverizer exhauster fan (for indirect firing)
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	205	Pulverizer exhauster fan drive

TABLE B07-40 Boiler: Boiler Fuel Supply from Bunkers to Boiler - Pulverizers, Primary Air Fans, and Associated Ducts					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	210	Pulverizer heater (for indirect firing)
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	220	Pulverizer system cyclone separator
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	230	Pulverizer bag filter
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	240	Pulverized coal bin
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	250	Pulverizer feeders
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	253	Pulverizer feeder motor
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	255	Pulverizer feeder coal scales
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	256	Seal air system (air to pulverizers)
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	260	Primary air fan
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	262	Primary air fan lube oil system
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	263	Primary air fan drives
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	264	Other primary air fan problems
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	265	Primary air heater
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	266	Primary air heater fouling
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	267	Primary air flow instrumentation
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	270	Primary air duct and dampers

TABLE B07-40 Boiler: Boiler Fuel Supply from Bunkers to Boiler - Pulverizers, Primary Air Fans, and Associated Ducts					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	280	Pulverizer fires
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	290	Pulverizer reduced capacity due to wear
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	300	Pulverizer motors and drives
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	310	Pulverizer mills
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	312	Pulverizer mill classifiers
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	313	Pulverizer mill trunnion seals
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	314	Pulverizer mill ball charger hopper (ball mills only)
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	315	Pulverizer mill coal level controls
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	320	Foreign object in Pulverizers mill
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	325	Pulverizer skidding
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	330	Pulverizer coal leak (pulverizers only)
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	331	Pulverizer system coal leaks (other than pulverizers, see code 0330)
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	335	Pulverizer lube oil system
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	338	Pulverizer control systems (temperature and pressure)
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	340	Other pulverizer problems
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	344	Pulverizer inspection

TABLE B07-40 Boiler: Boiler Fuel Supply from Bunkers to Boiler - Pulverizers, Primary Air Fans, and Associated Ducts					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	345	Pulverizer overhaul
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	346	Pulverizer pyrite removal system
Fluidized Bed	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	350	Pulverized fuel and air piping (from pulverizer to wind box) (see code 0898 for pulverizer reject system problems)
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-41 Boiler: Boiler Fuel Supply to Bunker - Coal Handling Equipment up Through Bunkers					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	10	Thaw shed failure or fire
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	20	Coal car dumpers, shakers, and unloaders
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	22	Unloading/receiving hopper (train/truck)
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	24	Rotary plow
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	26	Dust suppression system
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	28	Dust collection system
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	30	Coal conveyors and feeders
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	35	Metal detector/collector (including magnetic separator)
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	40	Coal elevators

TABLE B07-41 Boiler: Boiler Fuel Supply to Bunker - Coal Handling Equipment up Through Bunkers					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	50	Coal storage fires
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	60	Coal crushers including motors
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	70	Coal samplers
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	75	Storage silos/hoppers
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	80	Stackers/reclaimers
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	84	Coal conveyor scales storage coal pile
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	85	Bunker feeder coal scales
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	90	Bunker fires
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	95	Bunker flow problems
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	100	Bunker gates
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	105	Bunker structures
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	106	Coal drying system (see additional codes 0125-0127)
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	107	Screen (prior to bunkers)
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	110	Other coal fuel supply problems up through bunkers
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	125	Coal crusher dryer hammers (see code 0106)
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	126	Coal crusher lube oil system (see code 0106)

TABLE B07-41 Boiler: Boiler Fuel Supply to Bunker - Coal Handling Equipment up Through Bunkers					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	127	Other coal crusher dryer problems (see code 0106)
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-42 Boiler: Boiler Fuel Supply to Bunker - Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	111	Solid fuel feeder conveyors
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	112	Solid fuel feed tanks/hoppers
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	113	Solid fuel tank/hopper fires
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	114	Solid fuel volumetric feeder
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	115	Solid fuel gravimetric feeder
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	116	Solid fuel feeder motors
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	117	Solid fuel pneumatic transport system including piping and valves
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	118	Solid fuel drying system including screens
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	119	Solid fuel crushers
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	120	Solid fuel crusher motors
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	121	Other solid fuel feed problems
Fluidized Bed	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	129	Other coal processing system problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-43 Boiler: Boiler Internals and Structures					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Internals and Structures		800	Drums and drum internals (single drum only)
Fluidized Bed	Boiler	Boiler Internals and Structures		810	Boiler supports and structures (use code 1320 for tube supports)
Fluidized Bed	Boiler	Boiler Internals and Structures		811	Convection pass enclosure (FBC only)
Fluidized Bed	Boiler	Boiler Internals and Structures		812	Distribution plate (FBC only)
Fluidized Bed	Boiler	Boiler Internals and Structures		813	Lower furnace (in-bed) tube supports (FBC only)
Fluidized Bed	Boiler	Boiler Internals and Structures		814	In-bed bubble caps (FBC only)
Fluidized Bed	Boiler	Boiler Internals and Structures		820	Casing
Fluidized Bed	Boiler	Boiler Internals and Structures		830	Doors
Fluidized Bed	Boiler	Boiler Internals and Structures		840	Refractory and insulation
Fluidized Bed	Boiler	Boiler Internals and Structures		845	Windbox expansion joints
Fluidized Bed	Boiler	Boiler Internals and Structures		846	Convection pass expansion joints (FBC only)
Fluidized Bed	Boiler	Boiler Internals and Structures		847	Other expansion joints
Fluidized Bed	Boiler	Boiler Internals and Structures		850	Other internal or structural problems
Fluidized Bed	Boiler	Boiler Internals and Structures		855	Drum relief/safety valves (single drum only)
Fluidized Bed	Boiler	Boiler Internals and Structures		859	Tube external fins/membranes
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-44 Boiler: Boiler Overhaul and Inspections					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Overhaul and Inspections		1800	Major boiler overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)

TABLE B07-44 Boiler: Boiler Overhaul and Inspections					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Overhaul and Inspections		1801	Minor boiler overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
Fluidized Bed	Boiler	Boiler Overhaul and Inspections		1810	Other boiler inspections
Fluidized Bed	Boiler	Boiler Overhaul and Inspections		1811	Boiler Inspections - problem identification / investigation
Fluidized Bed	Boiler	Boiler Overhaul and Inspections		1812	Boiler Inspections - scheduled or routine
Fluidized Bed	Boiler	Boiler Overhaul and Inspections		1820	Chemical cleaning/steam blows
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-45 Boiler: Boiler Piping System - Boiler Recirculation					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Piping System	Boiler Recirculation	740	Boiler recirculation pumps
Fluidized Bed	Boiler	Boiler Piping System	Boiler Recirculation	741	Boiler recirculation pumps - motors
Fluidized Bed	Boiler	Boiler Piping System	Boiler Recirculation	750	Boiler recirculation piping including downcomers
Fluidized Bed	Boiler	Boiler Piping System	Boiler Recirculation	760	Boiler recirculation valves
Fluidized Bed	Boiler	Boiler Piping System	Boiler Recirculation	770	Other boiler recirculation problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-46 Boiler: Boiler Piping System - Cold and Hot Reheat Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Piping System	Cold and Hot Reheat Steam	540	Hot reheat steam piping up to turbine stop valves
Fluidized Bed	Boiler	Boiler Piping System	Cold and Hot Reheat Steam	541	Cold reheat steam piping up to boiler
Fluidized Bed	Boiler	Boiler Piping System	Cold and Hot Reheat Steam	550	Reheat steam relief/safety valves

TABLE B07-46 Boiler: Boiler Piping System - Cold and Hot Reheat Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Piping System	Cold and Hot Reheat Steam	560	Other hot reheat steam valves (not including turbine stop or intercept valves)
Fluidized Bed	Boiler	Boiler Piping System	Cold and Hot Reheat Steam	561	Other cold reheat steam valves (not including turbine stop or intercept valves)
Fluidized Bed	Boiler	Boiler Piping System	Cold and Hot Reheat Steam	570	Other reheat steam problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-47 Boiler: Boiler Piping System - Desuperheaters/Attemperators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Piping System	Desuperheaters/Attemperators	580	Desuperheater/attemperator piping
Fluidized Bed	Boiler	Boiler Piping System	Desuperheaters/Attemperators	590	Desuperheater/attemperator valves
Fluidized Bed	Boiler	Boiler Piping System	Desuperheaters/Attemperators	600	Desuperheater/attemperator spray nozzles
Fluidized Bed	Boiler	Boiler Piping System	Desuperheaters/Attemperators	610	Desuperheater/attemperator drums
Fluidized Bed	Boiler	Boiler Piping System	Desuperheaters/Attemperators	620	Other desuperheater/attemperator problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-48 Boiler: Boiler Piping System - Feedwater and Blowdown					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Piping System	Feedwater and Blowdown	670	Feedwater piping downstream of feedwater regulating valve
Fluidized Bed	Boiler	Boiler Piping System	Feedwater and Blowdown	680	Feedwater valves (not feedwater regulating valve)

TABLE B07-48 Boiler: Boiler Piping System - Feedwater and Blowdown					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Piping System	Feedwater and Blowdown	690	Other feedwater problems downstream of feedwater regulating valve (use codes 3401 to 3499 for remainder of feedwater system)
Fluidized Bed	Boiler	Boiler Piping System	Feedwater and Blowdown	700	Blowdown system valves
Fluidized Bed	Boiler	Boiler Piping System	Feedwater and Blowdown	710	Blowdown system piping
Fluidized Bed	Boiler	Boiler Piping System	Feedwater and Blowdown	720	Blowdown system controls / instrumentation
Fluidized Bed	Boiler	Boiler Piping System	Feedwater and Blowdown	730	Other blowdown system problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-49 Boiler: Boiler Piping System - Main Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Piping System	Main Steam	500	Main steam piping up to turbine stop valves
Fluidized Bed	Boiler	Boiler Piping System	Main Steam	510	Main steam relief/safety valves off superheater
Fluidized Bed	Boiler	Boiler Piping System	Main Steam	520	Other main steam valves (including vent and drain valves but not including the turbine stop valves)
Fluidized Bed	Boiler	Boiler Piping System	Main Steam	530	Other main steam system problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-50 Boiler: Boiler Piping System - Miscellaneous (Piping)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Piping System	Miscellaneous (Piping)	775	Economizer piping
Fluidized Bed	Boiler	Boiler Piping System	Miscellaneous (Piping)	780	Headers between tube bundles
Fluidized Bed	Boiler	Boiler Piping System	Miscellaneous (Piping)	782	Headers and caps

TABLE B07-50 Boiler: Boiler Piping System - Miscellaneous (Piping)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Piping System	Miscellaneous (Piping)	790	Pipe hangers, brackets, supports (general)
Fluidized Bed	Boiler	Boiler Piping System	Miscellaneous (Piping)	799	Other miscellaneous piping system problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-51 Boiler: Boiler Piping System - Startup Bypass					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Piping System	Startup Bypass	630	Startup bypass system piping (including drain lines up to heaters or condenser)
Fluidized Bed	Boiler	Boiler Piping System	Startup Bypass	640	Startup bypass system valves
Fluidized Bed	Boiler	Boiler Piping System	Startup Bypass	650	Startup bypass tanks or flash tanks
Fluidized Bed	Boiler	Boiler Piping System	Startup Bypass	655	Steam by-pass system instrumentation and controls
Fluidized Bed	Boiler	Boiler Piping System	Startup Bypass	660	Other startup bypass system problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-52 Boiler: Boiler Tube Fireside Slagging or Fouling					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Tube Fireside Slagging or Fouling		1100	Waterwall (Furnace wall)
Fluidized Bed	Boiler	Boiler Tube Fireside Slagging or Fouling		1105	Generating tubes
Fluidized Bed	Boiler	Boiler Tube Fireside Slagging or Fouling		1110	Cyclone Furnace (in cyclone area only)
Fluidized Bed	Boiler	Boiler Tube Fireside Slagging or Fouling		1120	Convection Pass Wall
Fluidized Bed	Boiler	Boiler Tube Fireside Slagging or Fouling		1130	Boiler screen, wing wall, or slag screen (water tubes only)
Fluidized Bed	Boiler	Boiler Tube Fireside Slagging or Fouling		1140	First superheater
Fluidized Bed	Boiler	Boiler Tube Fireside Slagging or Fouling		1150	Second superheater

TABLE B07-52 Boiler: Boiler Tube Fireside Slagging or Fouling					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Tube Fireside Slagging or Fouling		1160	First reheater
Fluidized Bed	Boiler	Boiler Tube Fireside Slagging or Fouling		1170	Second reheater
Fluidized Bed	Boiler	Boiler Tube Fireside Slagging or Fouling		1180	Economizer
Fluidized Bed	Boiler	Boiler Tube Fireside Slagging or Fouling		1190	Other tube slagging or fouling
Fluidized Bed	Boiler	Boiler Tube Fireside Slagging or Fouling		1191	Bed agglomeration (FBC only)
Fluidized Bed	Boiler	Boiler Tube Fireside Slagging or Fouling		1200	Operation at reduced power to avoid slagging or fouling (use codes 1100 to 1190 to report power reductions for slag accumulation or slag removal)
Notes: 1) For use with Unit Codes 650-699. 2) Use codes 0860 and 0870 for fouling or slagging due to unavailability of soot blowers or their air or steam supply.					

TABLE B07-53 Boiler: Boiler Tube Leaks					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Tube Leaks		1000	Waterwall (Furnace wall)
Fluidized Bed	Boiler	Boiler Tube Leaks		1005	Generating tubes
Fluidized Bed	Boiler	Boiler Tube Leaks		1006	In-bed reheat tubes (FBC only - includes external heat exchangers)
Fluidized Bed	Boiler	Boiler Tube Leaks		1010	Cyclone furnace (in cyclone area only)
Fluidized Bed	Boiler	Boiler Tube Leaks		1020	Convection pass wall (water tubes only)
Fluidized Bed	Boiler	Boiler Tube Leaks		1030	Boiler screen, wing wall, or slag screen (water tubes only)
Fluidized Bed	Boiler	Boiler Tube Leaks		1035	Platen superheater
Fluidized Bed	Boiler	Boiler Tube Leaks		1040	First superheater
Fluidized Bed	Boiler	Boiler Tube Leaks		1045	In-bed superheater tubes (FBC only - includes external heat exchangers)
Fluidized Bed	Boiler	Boiler Tube Leaks		1050	Second superheater

TABLE B07-53 Boiler: Boiler Tube Leaks					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Tube Leaks		1055	External superheater link tubing
Fluidized Bed	Boiler	Boiler Tube Leaks		1060	First reheater
Fluidized Bed	Boiler	Boiler Tube Leaks		1070	Second reheater
Fluidized Bed	Boiler	Boiler Tube Leaks		1075	External reheater link tubing
Fluidized Bed	Boiler	Boiler Tube Leaks		1080	Economizer
Fluidized Bed	Boiler	Boiler Tube Leaks		1085	In-bed evaporative tubes (FBC only - includes external heat exchangers)
Fluidized Bed	Boiler	Boiler Tube Leaks		1090	Other boiler tube leaks
Notes: 1) For use with Unit Codes 650-699. 2) Use code 0859 for tube/membrane failures.					

TABLE B07-54 Boiler: Boiler Water Condition					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Boiler Water Condition		1850	Boiler water condition (not feedwater water quality)
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-55 Boiler: External Fluidized Bed Heat Exchanger					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	External Fluidized Bed Heat Exchanger		990	Refractory
Fluidized Bed	Boiler	External Fluidized Bed Heat Exchanger		991	Tube leaks
Fluidized Bed	Boiler	External Fluidized Bed Heat Exchanger		992	Tube supports
Fluidized Bed	Boiler	External Fluidized Bed Heat Exchanger		999	Other heat exchanger problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-56 Boiler: Miscellaneous (Boiler)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Miscellaneous (Boiler)		1980	Boiler safety valve test

TABLE B07-56 Boiler: Miscellaneous (Boiler)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Miscellaneous (Boiler)		1990	Boiler performance testing (use code 9999 for total unit performance testing)
Fluidized Bed	Boiler	Miscellaneous (Boiler)		1999	Boiler, miscellaneous
Notes: 1) For use with Unit Codes 650-699. 2) Use more specific codes - other slagging and fouling problems, other control problems, etc. - whenever possible. Describe miscellaneous problems in the verbal description.					

TABLE B07-57 Boiler: Miscellaneous Boiler Tube Problems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Miscellaneous Boiler Tube Problems		1300	Water side fouling
Fluidized Bed	Boiler	Miscellaneous Boiler Tube Problems		1305	Fireside cleaning (which requires a full outage) Use code 1200 for cleanings that cause deratings.
Fluidized Bed	Boiler	Miscellaneous Boiler Tube Problems		1310	Water side cleaning (acid cleaning)
Fluidized Bed	Boiler	Miscellaneous Boiler Tube Problems		1320	Tube supports/attachments
Fluidized Bed	Boiler	Miscellaneous Boiler Tube Problems		1330	Slag fall damage
Fluidized Bed	Boiler	Miscellaneous Boiler Tube Problems		1340	Tube modifications (including addition and removal of tubes)
Fluidized Bed	Boiler	Miscellaneous Boiler Tube Problems		1350	Other miscellaneous boiler tube problems
Fluidized Bed	Boiler	Miscellaneous Boiler Tube Problems		1360	Boiler drains system
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-58 Boiler: Slag and Ash Removal					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Slag and Ash Removal		860	Soot blowers - air (see code 3844 for air delivery system)
Fluidized Bed	Boiler	Slag and Ash Removal		870	Soot blowers - steam
Fluidized Bed	Boiler	Slag and Ash Removal		871	Soot blowers - sonic
Fluidized Bed	Boiler	Slag and Ash Removal		872	Soot blowers - water

TABLE B07-58 Boiler: Slag and Ash Removal					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Slag and Ash Removal		873	Soot blower drives
Fluidized Bed	Boiler	Slag and Ash Removal		876	Soot blower controls
Fluidized Bed	Boiler	Slag and Ash Removal		880	Fly Ash Removal System (not precipitators, scrubbers, mechanical collectors, or baghouses)
Fluidized Bed	Boiler	Slag and Ash Removal		885	Fly ash Removal System - wet transport
Fluidized Bed	Boiler	Slag and Ash Removal		890	Bottom ash systems (wet or dry)
Fluidized Bed	Boiler	Slag and Ash Removal		891	Bottom ash hoppers (including gates)
Fluidized Bed	Boiler	Slag and Ash Removal		892	Bottom ash clinker grinders
Fluidized Bed	Boiler	Slag and Ash Removal		893	Bottom ash water pumps and motors
Fluidized Bed	Boiler	Slag and Ash Removal		894	Bottom ash piping and valves
Fluidized Bed	Boiler	Slag and Ash Removal		895	Ashpit trouble
Fluidized Bed	Boiler	Slag and Ash Removal		896	Bottom ash dewatering bin system, instruments and controls
Fluidized Bed	Boiler	Slag and Ash Removal		897	Bottom ash rotary (drag chain type) conveyor and motor
Fluidized Bed	Boiler	Slag and Ash Removal		898	Bottom ash pyrite hopper (pulverizer reject) system
Fluidized Bed	Boiler	Slag and Ash Removal		899	Bottom ash controls and instrumentation
Fluidized Bed	Boiler	Slag and Ash Removal		900	Slag tap (cyclone furnace)
Fluidized Bed	Boiler	Slag and Ash Removal		910	Slag tap (other than cyclone furnace)
Fluidized Bed	Boiler	Slag and Ash Removal		920	Other slag and ash removal problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-59 Boiler: Sorbent Supply (FBC only) - Sorbent Feed Equipment from Bunkers to Boiler (FBC only)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Sorbent Supply (FBC only)	Sorbent Feed Equipment from Bunkers to Boiler (FBC only)	150	Sorbent feed conveyors
Fluidized Bed	Boiler	Sorbent Supply (FBC only)	Sorbent Feed Equipment from Bunkers to Boiler (FBC only)	151	Sorbent feed tanks/hoppers
Fluidized Bed	Boiler	Sorbent Supply (FBC only)	Sorbent Feed Equipment from Bunkers to Boiler (FBC only)	152	Sorbent feed volumetric feeder
Fluidized Bed	Boiler	Sorbent Supply (FBC only)	Sorbent Feed Equipment from Bunkers to Boiler (FBC only)	153	Sorbent feed gravimetric feeder
Fluidized Bed	Boiler	Sorbent Supply (FBC only)	Sorbent Feed Equipment from Bunkers to Boiler (FBC only)	154	Sorbent feed feeder motors
Fluidized Bed	Boiler	Sorbent Supply (FBC only)	Sorbent Feed Equipment from Bunkers to Boiler (FBC only)	155	Sorbent feed pneumatic transport system including piping and valves
Fluidized Bed	Boiler	Sorbent Supply (FBC only)	Sorbent Feed Equipment from Bunkers to Boiler (FBC only)	156	Other sorbent feed problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-60 Boiler: Sorbent Supply (FBC only) - Sorbent Handling System up Through Bunkers (FBC only)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	130	Sorbent handling tanks/hoppers
Fluidized Bed	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	131	Sorbent handling conveyors
Fluidized Bed	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	132	Sorbent handling feeders
Fluidized Bed	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	133	Sorbent handling feeder motors
Fluidized Bed	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	134	Sorbent handling crushers
Fluidized Bed	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	135	Sorbent handling crusher motors
Fluidized Bed	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	136	Sorbent handling blowers/fans

TABLE B07-60 Boiler: Sorbent Supply (FBC only) - Sorbent Handling System up Through Bunkers (FBC only)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	137	Sorbent handling blower/fan motors
Fluidized Bed	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	138	Sorbent handling baghouse
Fluidized Bed	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	139	Sorbent handling drying equipment
Fluidized Bed	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	140	Sorbent handling screens
Fluidized Bed	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	141	Other sorbent handling equipment problems
Notes: 1) For use with Unit Codes 650-699.					

EXTERNAL

Use this set of codes to report events caused by external factors (flood, lightning, etc.); economic factors (lack of fuel, labor strikes, etc.); operator training; and transmission system problems external to the plant.

TABLE B07-61 External: Catastrophe					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	External	Catastrophe		9000	Flood
Fluidized Bed	External	Catastrophe		9001	Drought
Fluidized Bed	External	Catastrophe		9010	Fire including wildfires, not related to a specific component
Fluidized Bed	External	Catastrophe		9020	Lightning
Fluidized Bed	External	Catastrophe		9025	Geomagnetic disturbance
Fluidized Bed	External	Catastrophe		9030	Earthquake
Fluidized Bed	External	Catastrophe		9031	Tornado
Fluidized Bed	External	Catastrophe		9035	Hurricane
Fluidized Bed	External	Catastrophe		9036	Storms (ice, snow, etc)
Fluidized Bed	External	Catastrophe		9040	Other catastrophe
Fluidized Bed	External	Catastrophe		9090	Physical Security Incident
Fluidized Bed	External	Catastrophe		9091	Physical Security Incident (OMC)
Fluidized Bed	External	Catastrophe		9092	Cyber Security Incident
Fluidized Bed	External	Catastrophe		9093	Cyber Security Incident (OMC)
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-62 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	External	Economic		0000	Reserve shutdown
Fluidized Bed	External	Economic		9130	Failure of fuel supplier to fulfill contractual obligations or a pre-arranged deal due to physical fuel disruptions or operational impairments (e.g. force majeure on a pipeline or compressor down; making the pipeline incapable of making its firm deliveries.)
Fluidized Bed	External	Economic		9131	Lack of fuel – due to contractual or tariff provisions that allow for service interruption or price fluctuations during peak demand periods.
Fluidized Bed	External	Economic		9132	Wet Fuel - Biomass
Fluidized Bed	External	Economic		9134	Fuel conservation
Fluidized Bed	External	Economic		9136	Problems with Primary Fuel for Units with Secondary Fuel Operation
Fluidized Bed	External	Economic		9137	Ground water or other water supply problems
Fluidized Bed	External	Economic		9139	Ground water or other water supply problems(OMC)
Fluidized Bed	External	Economic		9140	Plant modifications to burn different fuel that are not regulatory mandated
Fluidized Bed	External	Economic		9150	Labor strikes company-wide problems or strikes outside the company's jurisdiction such as manufacturers (delaying repairs) or transportation (fuel supply) problems.
Fluidized Bed	External	Economic		9151	Labor strikes direct plant management grievances that result in a walkout or strike are under plant management control.
Fluidized Bed	External	Economic		9160	Other economic problems
Fluidized Bed	External	Economic		9180	Economic (for internal use at plants only)

TABLE B07-62 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	External	Economic		9181	Economic (for internal use at plants only)
Fluidized Bed	External	Economic		9182	Economic (for internal use at plants only)
Fluidized Bed	External	Economic		9183	Economic (for internal use at plants only)
Fluidized Bed	External	Economic		9184	Economic (for internal use at plants only)
Fluidized Bed	External	Economic		9185	Economic (for internal use at plants only)
Fluidized Bed	External	Economic		9186	Economic (for internal use at plants only)
Fluidized Bed	External	Economic		9187	Economic (for internal use at plants only)
Fluidized Bed	External	Economic		9188	Economic (for internal use at plants only)
Fluidized Bed	External	Economic		9189	Economic (for internal use at plants only)
Fluidized Bed	External	Economic		9190	Economic (for internal use at plants only)
Fluidized Bed	External	Economic		9191	Economic (for internal use at plants only)
Fluidized Bed	External	Economic		9192	Economic (for internal use at plants only)
Fluidized Bed	External	Economic		9193	Economic (for internal use at plants only)
Fluidized Bed	External	Economic		9194	Economic (for internal use at plants only)
Fluidized Bed	External	Economic		9195	Economic (for internal use at plants only)
Fluidized Bed	External	Economic		9196	Economic (for internal use at plants only)
Fluidized Bed	External	Economic		9197	Economic (for internal use at plants only)
Fluidized Bed	External	Economic		9198	Economic (for internal use at plants only)

TABLE B07-62 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	External	Economic		9199	Economic (for internal use at plants only)
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-63 External: Fuel Quality					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	External	Fuel Quality		9200	High ash content (OMC)
Fluidized Bed	External	Fuel Quality		9201	High ash content (not OMC)
Fluidized Bed	External	Fuel Quality		9205	Poor quality natural gas fuel, low heat content
Fluidized Bed	External	Fuel Quality		9210	Low grindability (OMC)
Fluidized Bed	External	Fuel Quality		9211	Low grindability (not OMC)
Fluidized Bed	External	Fuel Quality		9220	High sulfur content (OMC)
Fluidized Bed	External	Fuel Quality		9221	High sulfur content (not OMC)
Fluidized Bed	External	Fuel Quality		9230	High vanadium content (OMC)
Fluidized Bed	External	Fuel Quality		9231	High vanadium content (not OMC)
Fluidized Bed	External	Fuel Quality		9240	High sodium content (OMC)
Fluidized Bed	External	Fuel Quality		9241	High sodium content (not OMC)
Fluidized Bed	External	Fuel Quality		9250	Low BTU coal (OMC)
Fluidized Bed	External	Fuel Quality		9251	Low BTU coal (not OMC)
Fluidized Bed	External	Fuel Quality		9260	Low BTU oil (OMC)
Fluidized Bed	External	Fuel Quality		9261	Low BTU oil (not OMC)
Fluidized Bed	External	Fuel Quality		9270	Wet coal (OMC)
Fluidized Bed	External	Fuel Quality		9271	Wet coal (not OMC)
Fluidized Bed	External	Fuel Quality		9272	Wet Fuel (other than coal)
Fluidized Bed	External	Fuel Quality		9280	Frozen coal (OMC)
Fluidized Bed	External	Fuel Quality		9281	Frozen coal (not OMC)
Fluidized Bed	External	Fuel Quality		9290	Other fuel quality problems (OMC)
Fluidized Bed	External	Fuel Quality		9291	Other fuel quality problems (not OMC)
Notes: 1) For use with Unit Codes 650-699. 2) Use code 9600 to 9650 if the fuel quality results in excess stack emissions through no fault in the pollution control equipment. Use the appropriate equipment code to report fouling and slagging.					

TABLE B07-64 External: Miscellaneous (External)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	External	Miscellaneous (External)		9300	Transmission system problems other than catastrophes (do not include switchyard problems in this category; see codes 3600 to 3629, 3720 to 3730)
Fluidized Bed	External	Miscellaneous (External)		9305	Ash disposal problem
Fluidized Bed	External	Miscellaneous (External)		9310	Operator training
Fluidized Bed	External	Miscellaneous (External)		9320	Other miscellaneous external problems
Fluidized Bed	External	Miscellaneous (External)		9340	Synchronous Condenser Operation
Notes: 1) For use with Unit Codes 650-699.					

GENERATOR

This set of codes contains the generator, exciter, generator cooling systems, and generator controls. Note the main leads up to and includes the generator output breaker in this set of codes.

TABLE B07-65 Generator: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Generator	Controls		4700	Generator voltage control
Fluidized Bed	Generator	Controls		4710	Generator metering devices
Fluidized Bed	Generator	Controls		4720	Generator synchronization equipment
Fluidized Bed	Generator	Controls		4730	Generator current and potential transformers
Fluidized Bed	Generator	Controls		4740	Emergency generator trip devices
Fluidized Bed	Generator	Controls		4741	Freuqncy Trip (81 Relay)
Fluidized Bed	Generator	Controls		4750	Other generator controls and metering problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-66 Generator: Cooling System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Generator	Cooling System		4610	Hydrogen cooling system piping and valves
Fluidized Bed	Generator	Cooling System		4611	Hydrogen coolers
Fluidized Bed	Generator	Cooling System		4612	Hydrogen storage system
Fluidized Bed	Generator	Cooling System		4613	Hydrogen seals

TABLE B07-66 Generator: Cooling System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Generator	Cooling System		4619	Other hydrogen system problems
Fluidized Bed	Generator	Cooling System		4620	Air cooling system
Fluidized Bed	Generator	Cooling System		4630	Liquid cooling system
Fluidized Bed	Generator	Cooling System		4640	Seal oil system and seals
Fluidized Bed	Generator	Cooling System		4650	Other cooling system problems
Notes: 1) For use with Unit Codes 650-699. 2) Report failures caused by water leaks into generator as codes 4500, 4510, etc.					

TABLE B07-67 Generator: Exciter					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Generator	Exciter		4600	Exciter drive - motor
Fluidized Bed	Generator	Exciter		4601	Exciter field rheostat
Fluidized Bed	Generator	Exciter		4602	Exciter commutator and brushes
Fluidized Bed	Generator	Exciter		4603	Solid state exciter element
Fluidized Bed	Generator	Exciter		4604	Exciter drive - shaft
Fluidized Bed	Generator	Exciter		4605	Exciter transformer
Fluidized Bed	Generator	Exciter		4609	Other exciter problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-68 Generator: Generator					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Generator	Generator		4500	Rotor windings (including damper windings and fan blades on hydro units)
Fluidized Bed	Generator	Generator		4510	Rotor collector rings
Fluidized Bed	Generator	Generator		4511	Rotor, General
Fluidized Bed	Generator	Generator		4512	Retaining Rings
Fluidized Bed	Generator	Generator		4520	Stator windings, bushings, and terminals
Fluidized Bed	Generator	Generator		4530	Stator core iron
Fluidized Bed	Generator	Generator		4535	Stator, General
Fluidized Bed	Generator	Generator		4536	Generator Heaters
Fluidized Bed	Generator	Generator		4540	Brushes and brush rigging
Fluidized Bed	Generator	Generator		4550	Generator bearings and lube oil system (including thrust bearings on hydro units)
Fluidized Bed	Generator	Generator		4551	Generator bearings
Fluidized Bed	Generator	Generator		4552	Generator lube oil system

TABLE B07-68 Generator: Generator					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Generator	Generator		4555	Bearing cooling system
Fluidized Bed	Generator	Generator		4560	Generator vibration (excluding vibration due to failed bearing and other components)
Fluidized Bed	Generator	Generator		4570	Generator casing
Fluidized Bed	Generator	Generator		4580	Generator end bells and bolting
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-69 Generator: Miscellaneous (Generator)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Generator	Miscellaneous (Generator)		4800	Generator main leads
Fluidized Bed	Generator	Miscellaneous (Generator)		4805	Generator Bus Duct Cooling System
Fluidized Bed	Generator	Miscellaneous (Generator)		4810	Generator output breaker
Fluidized Bed	Generator	Miscellaneous (Generator)		4830	Major overhaul (720 hrs or longer) (use for non-specific overhaul only; see page B-CCGT-2)
Fluidized Bed	Generator	Miscellaneous (Generator)		4831	Minor generator overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
Fluidized Bed	Generator	Miscellaneous (Generator)		4840	Inspection
Fluidized Bed	Generator	Miscellaneous (Generator)		4841	Generator doble testing
Fluidized Bed	Generator	Miscellaneous (Generator)		4842	Reactive and capability testing
Fluidized Bed	Generator	Miscellaneous (Generator)		4850	Core monitor alarm
Fluidized Bed	Generator	Miscellaneous (Generator)		4860	Generator neutral grounding equipment
Fluidized Bed	Generator	Miscellaneous (Generator)		4899	Other miscellaneous generator problems
Notes: 1) For use with Unit Codes 650-699.					

INACTIVE STATES

TABLE B07-70 Inactive States: Inactive States					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Inactive States	Inactive States		2	Inactive Reserve Shutdown
Fluidized Bed	Inactive States	Inactive States		9990	Retired unit

TABLE B07-70 Inactive States: Inactive States					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Inactive States	Inactive States		9991	Mothballed unit
Notes: 1) For use with Unit Codes 650-699.					

PERFORMANCE

TABLE B07-71 Performance: Performance					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Performance	Performance		9997	NERC Reliability Standard Requirement
Fluidized Bed	Performance	Performance		9998	Black start testing
Fluidized Bed	Performance	Performance		9999	Total unit performance testing (use appropriate codes for individual component testing)
Notes: 1) For use with Unit Codes 650-699.					

PERSONNEL OR PROCEDURAL ERRORS

TABLE B07-72 Personnel or Procedural Errors: Personnel or Procedural Errors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Personnel or Procedural Errors	Personnel or Procedural Errors		9900	Operator error
Fluidized Bed	Personnel or Procedural Errors	Personnel or Procedural Errors		9910	Maintenance personnel error
Fluidized Bed	Personnel or Procedural Errors	Personnel or Procedural Errors		9920	Contractor error
Fluidized Bed	Personnel or Procedural Errors	Personnel or Procedural Errors		9930	Operating procedure error
Fluidized Bed	Personnel or Procedural Errors	Personnel or Procedural Errors		9940	Maintenance procedure error
Fluidized Bed	Personnel or Procedural Errors	Personnel or Procedural Errors		9950	Contractor procedure error
Fluidized Bed	Personnel or Procedural Errors	Personnel or Procedural Errors		9960	Staff shortage
Notes: 1) For use with Unit Codes 650-699.					

POLLUTION CONTROL EQUIPMENT

Use this set of codes to report problems with flue gas desulphurization equipment and stack gas particulate removal equipment. If outages or deratings occur due to reasons other than equipment problems, use the set of codes for Regulatory, Safety, Environmental stack emission limits. Use code 9510 for outages or deratings required to install pollution control equipment. Use codes 9600 to 9650 only when the pollution control equipment problems are not responsible for exceeding emission limits

TABLE B07-73 Pollution Control Equipment: CO Reduction

UNIT TYPE	SYSTEM	COMPONENT	SUB-COMPONENT	CAUSE CODE	DESCRIPTION
Fluidized Bed	Pollution Control Equipment	CO Reduction		8840	CO Active catalyst
Fluidized Bed	Pollution Control Equipment	CO Reduction		8841	CO Support materials
Fluidized Bed	Pollution Control Equipment	CO Reduction		8842	CO Plugging
Fluidized Bed	Pollution Control Equipment	CO Reduction		8845	Other CO reduction problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-74 Pollution Control Equipment: Continuous Emissions Monitoring Systems (CEMS)

UNIT TYPE	SYSTEM	COMPONENT	SUB-COMPONENT	CAUSE CODE	DESCRIPTION
Fluidized Bed	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8700	CEMS Certification and Recertification
Fluidized Bed	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8710	SO2 analyzer problems
Fluidized Bed	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8720	NOx analyzer problems
Fluidized Bed	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8730	CO analyzer problems
Fluidized Bed	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8740	CO2 analyzer problems
Fluidized Bed	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8750	O2 analyzer problems
Fluidized Bed	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8760	Opacity monitor problems
Fluidized Bed	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8770	Flow monitor problems
Fluidized Bed	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8780	Data acquisition system problems

TABLE B07-74 Pollution Control Equipment: Continuous Emissions Monitoring Systems (CEMS)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8790	Miscellaneous CEMS problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-75 Pollution Control Equipment: Dry Scrubbers - Dry Scrubber					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Dry Scrubber	8528	Dry scrubber instruments and controls
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Dry Scrubber	8529	Gas dispersers
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Dry Scrubber	8530	Spray towers
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Dry Scrubber	8531	Spray machine/atomizer
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Dry Scrubber	8532	Spray machine/atomizer motors
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Dry Scrubber	8533	Spray machine/atomizer lubrication systems
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Dry Scrubber	8534	Spray machine/atomizer vibration problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-76 Pollution Control Equipment: Dry Scrubbers - Miscellaneous (Dry Scrubber)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Miscellaneous (Dry Scrubber)	8544	Mechanical failures
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Miscellaneous (Dry Scrubber)	8545	Electrical failures
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Miscellaneous (Dry Scrubber)	8546	Major overhaul
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Miscellaneous (Dry Scrubber)	8547	Inspection
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Miscellaneous (Dry Scrubber)	8548	Testing

TABLE B07-76 Pollution Control Equipment: Dry Scrubbers - Miscellaneous (Dry Scrubber)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Miscellaneous (Dry Scrubber)	8549	Other dry scrubber problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-77 Pollution Control Equipment: Dry Scrubbers - Piping, Ducting, and Dampers					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Piping, Ducting, and Dampers	8522	Piping
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Piping, Ducting, and Dampers	8523	Valves
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Piping, Ducting, and Dampers	8524	Strainers or filters
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Piping, Ducting, and Dampers	8525	Ducting
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Piping, Ducting, and Dampers	8526	Dampers
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Piping, Ducting, and Dampers	8527	Other piping, ducting, and damper problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-78 Pollution Control Equipment: Dry Scrubbers - Reagent\Slurry Supply					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8500	Slurry storage and feed tanks
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8501	Reagent storage, feed bins, and conveyors
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8502	Weigh feeders
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8503	Screw conveyors
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8504	Mills/slakers
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8505	Scalping screens

TABLE B07-78 Pollution Control Equipment: Dry Scrubbers - Reagent\Slurry Supply					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8506	Slurry pipelines
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8507	Reagent uploading and transfer systems
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8508	Reagent unavailability
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8510	Slurry mixers and agitators
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8520	Slurry transfer pumps and motors
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8521	Reagent/slurry problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-79 Pollution Control Equipment: Dry Scrubbers - Waste Disposal and Recovery					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8535	Fly ash conveyors
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8536	Bucket elevators
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8537	Weigh hoppers
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8538	Recycle storage and feed tanks including agitators
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8539	Recycle slurry transfer pumps
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8540	Waste disposal
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8541	Recycle feed bins
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8542	Recycle feed bins aeration systems
Fluidized Bed	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8543	Powder coolers
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-80 Pollution Control Equipment: Miscellaneous (Pollution Control Equipment)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8565	Electrostatic Precipitator rebuild/overhaul
Fluidized Bed	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8600	Flue gas additives (furnace injection)
Fluidized Bed	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8601	SO3 mitigation
Fluidized Bed	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8620	Mercury Abatement Equipment
Fluidized Bed	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8650	Baghouse systems, general
Fluidized Bed	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8651	Bag failures and rebagging
Fluidized Bed	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8652	Shakers and rappers
Fluidized Bed	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8653	Inflation and deflation fans and motors
Fluidized Bed	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8654	Baghouse booster fans and motors
Fluidized Bed	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8655	Structural duct work and dampers
Fluidized Bed	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8656	Controls and instrumentation
Fluidized Bed	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8657	Ash handling system and hoppers
Fluidized Bed	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8658	Slurry system from precipitators
Fluidized Bed	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8670	Emission monitors (other than CEMS)
Fluidized Bed	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8699	Other miscellaneous pollution control equipment problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-81 Pollution Control Equipment: NOx Reduction Systems - Catalytic Air Heaters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8830	CAH NOx Active catalyst
Fluidized Bed	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8831	CAH NOx Support materials
Fluidized Bed	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8832	CAH NOx Plugging
Fluidized Bed	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8835	Other CAH problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-82 Pollution Control Equipment: NOx Reduction Systems - Selective Catalytic Reduction Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8810	SCR NOx Reactor
Fluidized Bed	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8811	SCR NOx Reagent
Fluidized Bed	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8812	SCR NOx Catalyst
Fluidized Bed	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8813	SCR NOx Injection grid piping/valves
Fluidized Bed	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8814	SCR NOx Catalyst support material
Fluidized Bed	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8815	SCR NOx Soot blowers
Fluidized Bed	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8816	SCR NOx Plugging
Fluidized Bed	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8817	SCR NOx Control system
Fluidized Bed	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8820	SCR NOx Ammonia injection grid piping/valves
Fluidized Bed	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8821	SCR NOx Ammonia tanks, piping and valves (not injection)
Fluidized Bed	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8822	SCR NOx Ammonia air blowers

TABLE B07-82 Pollution Control Equipment: NOx Reduction Systems - Selective Catalytic Reduction Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8823	SCR NOx Other ammonia system problems
Fluidized Bed	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8825	Other SCR NOx problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-83 Pollution Control Equipment: NOx Reduction Systems - Selective Non-Catalytic Reduction Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8800	SNCR NOx Reagent
Fluidized Bed	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8801	SNCR NOx Carrier gas
Fluidized Bed	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8802	SNCR NOx Control system
Fluidized Bed	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8803	SNCR Performance Testing
Fluidized Bed	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8809	Other SNCR NOx problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-84 Pollution Control Equipment: Precipitators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Pollution Control Equipment	Precipitators		8550	Electrostatic precipitator fouling
Fluidized Bed	Pollution Control Equipment	Precipitators		8551	Electrostatic precipitator field out of service
Fluidized Bed	Pollution Control Equipment	Precipitators		8560	Electrostatic precipitator problems
Fluidized Bed	Pollution Control Equipment	Precipitators		8570	Mechanical precipitator fouling
Fluidized Bed	Pollution Control Equipment	Precipitators		8580	Mechanical precipitator problems

TABLE B07-84 Pollution Control Equipment: Precipitators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Pollution Control Equipment	Precipitators		8590	Other precipitator problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-85 Pollution Control Equipment: Wet Scrubbers - Chemical Supply					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8000	Chemical feed storage, mill feeders, and conveyors
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8002	Screw conveyors
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8003	Bucket elevators
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8006	Weigh feeders
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8010	Crushers/mills
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8020	Mill slurry tanks supply problems
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8030	Classifiers
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8040	Slurry transfer pumps and motors
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8050	Chemical unavailability
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8099	Other chemical supply problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-86 Pollution Control Equipment: Wet Scrubbers - Miscellaneous (Wet Scrubber)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8400	Scrubber gas discharge reheaters - general
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8402	Scrubber gas discharge reheaters - vibration

TABLE B07-86 Pollution Control Equipment: Wet Scrubbers - Miscellaneous (Wet Scrubber)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8404	Scrubber gas discharge reheaters - tube leaks
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8406	Scrubber gas discharge reheaters - ducts
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8410	Scrubber instruments and controls
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8415	Liquid level controls
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8420	Heat tracer
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8425	Miscellaneous mechanical failures
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8426	Miscellaneous electrical failures
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8430	Stack damage related to scrubber system
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8440	Major overhaul
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8450	Inspection
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8460	Testing
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8470	SO2 monitor
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8499	Other miscellaneous wet scrubber problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-87 Pollution Control Equipment: Wet Scrubbers - Piping, Ducting, Dampers, and Fans					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8200	Piping
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8210	Valves

TABLE B07-87 Pollution Control Equipment: Wet Scrubbers - Piping, Ducting, Dampers, and Fans					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8220	Strainers or filters
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8225	Drain pots
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8230	Ducting
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8235	Demister
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8240	Bypass dampers
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8250	Dampers other than bypass
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8260	Scrubber booster I.D. fan (fan specific to the scrubber)
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8261	Scrubber booster I.D. fan drive
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8262	Scrubber booster I.D. fan vibration (fan specific to the scrubber)
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8264	Scrubber booster I.D. fan blades (fan specific to the scrubber)
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8270	Scrubber booster F.D. fan (fan specific to the scrubber)
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8271	Scrubber booster F.D. fan drive
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8272	Scrubber booster F.D. fan vibration (fan specific to the scrubber)
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8274	Scrubber booster F.D. fan blades (fan specific to the scrubber)
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8280	Reagent feed piping
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8290	Demister wash piping assembly
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8299	Other piping, ducting, damper, and fan problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-88 Pollution Control Equipment: Wet Scrubbers - Waste Disposal and Recovery					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8300	Waste disposal/recovery tanks
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8310	Waste disposal/recovery pumps
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8320	Waste disposal ponds
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8325	Ash disposal problems
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8330	Dewatering equipment (thickener, centrifuge, etc.)
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8335	Dryers
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8340	Centrifuge/vacuum filter
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8345	Calciners
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8349	Other waste disposal and recovery problems
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8399	Solids conveying and mixing system problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-89 Pollution Control Equipment: Wet Scrubbers - Wet Scrubber					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8100	Scrubber/absorber tower or module
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8110	Spray nozzles
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8115	Disc scrubber throats
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8120	Spray pumps and motors
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8125	Scrubber recycle (liquid) pumps

TABLE B07-89 Pollution Control Equipment: Wet Scrubbers - Wet Scrubber					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8127	Scrubber recycle (liquid) pump motors
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8130	Recirculation tanks including agitators
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8140	Reaction tanks including agitators
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8150	Tubes
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8160	Mist eliminators/demisters and washdown
Fluidized Bed	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8199	Other scrubber problems
Notes: 1) For use with Unit Codes 650-699.					

REGULATORY, SAFETY, ENVIRONMENTAL

Use these codes only for events not directly attributable to equipment failures. Inspections or testing of certain equipment due to regulation are reported using the appropriate equipment cause codes, and the fact that it was a regulatory requirement noted in the verbal description section.

TABLE B07-90 Regulatory, Safety, Environmental: Other Operating Environmental Limitations					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9660	Thermal discharge limits - fossil and nuclear
Fluidized Bed	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9670	Noise limits (not for personnel safety) – fossil and nuclear
Fluidized Bed	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9677	Noise limits testing - fossil
Fluidized Bed	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9680	Fish kill - fossil and nuclear
Fluidized Bed	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9690	Other miscellaneous operational environmental limits - fossil and nuclear
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-91 Regulatory, Safety, Environmental: Regulatory					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Regulatory, Safety, Environmental	Regulatory		9504	Regulatory (environmental) proceedings and hearings - regulatory agency initiated
Fluidized Bed	Regulatory, Safety, Environmental	Regulatory		9506	Regulatory (environmental) proceedings and hearings - intervenor initiated
Fluidized Bed	Regulatory, Safety, Environmental	Regulatory		9510	Plant modifications strictly for compliance with new or changed regulatory requirements (scrubbers, cooling towers, etc.)
Fluidized Bed	Regulatory, Safety, Environmental	Regulatory		9520	Oil spill in Gulf of Mexico (OMC)
Fluidized Bed	Regulatory, Safety, Environmental	Regulatory		9590	Miscellaneous regulatory (this code is primarily intended for use with event contribution code 2 to indicate that a regulatory-related factor contributed to the primary cause of the event)
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-92 Regulatory, Safety, Environmental: Safety					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Regulatory, Safety, Environmental	Safety		9700	OSHA-related retrofit or inspection
Fluidized Bed	Regulatory, Safety, Environmental	Safety		9720	Other safety problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-93 Regulatory, Safety, Environmental: Stack Emission					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Regulatory, Safety, Environmental	Stack Emission		9600	SO2 stack emissions - fossil
Fluidized Bed	Regulatory, Safety, Environmental	Stack Emission		9610	NOx stack emissions - fossil

TABLE B07-93 Regulatory, Safety, Environmental: Stack Emission					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Regulatory, Safety, Environmental	Stack Emission		9616	CO stack emissions - fossil
Fluidized Bed	Regulatory, Safety, Environmental	Stack Emission		9620	Particulate stack emissions - fossil
Fluidized Bed	Regulatory, Safety, Environmental	Stack Emission		9630	Opacity - fossil
Fluidized Bed	Regulatory, Safety, Environmental	Stack Emission		9650	Other stack/exhaust emissions - fossil (use codes 9200 to 9290 if fuel quality causes pollution control equipment problems that result in excess stack emissions)
Fluidized Bed	Regulatory, Safety, Environmental	Stack Emission		9656	Other stack or exhaust emissions testing - fossil
Notes: 1) For use with Unit Codes 650-699. 2) Include exhaust emissions.					

STEAM TURBINE

Besides the turbine, this set includes the steam stop/control valves, turbine control system, and the turbine auxiliaries. The extraction steam codes are contained in the Balance of Plant set.

TABLE B07-94 Steam Turbine: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Steam Turbine	Controls		4290	Hydraulic system pumps
Fluidized Bed	Steam Turbine	Controls		4291	Hydraulic system coolers
Fluidized Bed	Steam Turbine	Controls		4292	Hydraulic system filters
Fluidized Bed	Steam Turbine	Controls		4293	Hydraulic system pipes and valves
Fluidized Bed	Steam Turbine	Controls		4299	Other hydraulic system problems
Fluidized Bed	Steam Turbine	Controls		4300	Turbine supervisory system (use codes 4290 to 4299 for hydraulic oil)
Fluidized Bed	Steam Turbine	Controls		4301	Turbine governing system
Fluidized Bed	Steam Turbine	Controls		4302	Turbine trip devices (including instruments)
Fluidized Bed	Steam Turbine	Controls		4303	Exhaust hood and spray controls
Fluidized Bed	Steam Turbine	Controls		4304	Automatic turbine control systems - mechanical

TABLE B07-94 Steam Turbine: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Steam Turbine	Controls		4305	Automatic turbine control systems - mechanical - hydraulic
Fluidized Bed	Steam Turbine	Controls		4306	Automatic turbine control systems - electro- hydraulic - analog
Fluidized Bed	Steam Turbine	Controls		4307	Automatic turbine control systems - electro- hydraulic - digital
Fluidized Bed	Steam Turbine	Controls		4308	Automatic turbine control systems - digital control and monitoring
Fluidized Bed	Steam Turbine	Controls		4309	Other turbine instrument and control problems
Fluidized Bed	Steam Turbine	Controls		4310	Steam Turbine Control System - data highway
Fluidized Bed	Steam Turbine	Controls		4311	Steam Turbine Control System - hardware problems (including card failure)
Fluidized Bed	Steam Turbine	Controls		4312	Steam Turbine Control System - internal and termination wiring
Fluidized Bed	Steam Turbine	Controls		4313	Steam Turbine Control System - logic problems
Fluidized Bed	Steam Turbine	Controls		4314	Steam Turbine Control System - upgrades
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-95 Steam Turbine: High Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Steam Turbine	High Pressure Turbine		4000	Outer casing
Fluidized Bed	Steam Turbine	High Pressure Turbine		4001	Inner casing
Fluidized Bed	Steam Turbine	High Pressure Turbine		4009	Nozzle bolting
Fluidized Bed	Steam Turbine	High Pressure Turbine		4010	Nozzles and nozzle blocks
Fluidized Bed	Steam Turbine	High Pressure Turbine		4011	Diaphragms
Fluidized Bed	Steam Turbine	High Pressure Turbine		4012	Buckets or blades
Fluidized Bed	Steam Turbine	High Pressure Turbine		4013	Diaphragms unit and shroud type
Fluidized Bed	Steam Turbine	High Pressure Turbine		4014	Bucket or blade fouling
Fluidized Bed	Steam Turbine	High Pressure Turbine		4015	Wheels or spindles
Fluidized Bed	Steam Turbine	High Pressure Turbine		4020	Shaft seals
Fluidized Bed	Steam Turbine	High Pressure Turbine		4021	Dummy rings

TABLE B07-95 Steam Turbine: High Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Steam Turbine	High Pressure Turbine		4022	Gland rings
Fluidized Bed	Steam Turbine	High Pressure Turbine		4030	Rotor shaft
Fluidized Bed	Steam Turbine	High Pressure Turbine		4040	Bearings
Fluidized Bed	Steam Turbine	High Pressure Turbine		4041	Thrust bearings
Fluidized Bed	Steam Turbine	High Pressure Turbine		4099	Other high pressure turbine problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-96 Steam Turbine: Intermediate Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Steam Turbine	Intermediate Pressure Turbine		4100	Outer casing
Fluidized Bed	Steam Turbine	Intermediate Pressure Turbine		4101	Inner casing
Fluidized Bed	Steam Turbine	Intermediate Pressure Turbine		4109	Nozzle bolting
Fluidized Bed	Steam Turbine	Intermediate Pressure Turbine		4110	Nozzles and nozzle blocks
Fluidized Bed	Steam Turbine	Intermediate Pressure Turbine		4111	Diaphragms
Fluidized Bed	Steam Turbine	Intermediate Pressure Turbine		4112	Buckets or blades
Fluidized Bed	Steam Turbine	Intermediate Pressure Turbine		4113	Bucket or blade fouling
Fluidized Bed	Steam Turbine	Intermediate Pressure Turbine		4115	Wheels or spindles
Fluidized Bed	Steam Turbine	Intermediate Pressure Turbine		4120	Shaft seals
Fluidized Bed	Steam Turbine	Intermediate Pressure Turbine		4121	Dummy rings
Fluidized Bed	Steam Turbine	Intermediate Pressure Turbine		4122	Gland rings
Fluidized Bed	Steam Turbine	Intermediate Pressure Turbine		4130	Rotor shaft
Fluidized Bed	Steam Turbine	Intermediate Pressure Turbine		4140	Bearings
Fluidized Bed	Steam Turbine	Intermediate Pressure Turbine		4141	Thrust bearings
Fluidized Bed	Steam Turbine	Intermediate Pressure Turbine		4199	Other intermediate pressure turbine problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-97 Steam Turbine: Low Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Steam Turbine	Low Pressure Turbine		4200	Outer casing
Fluidized Bed	Steam Turbine	Low Pressure Turbine		4201	Inner casing
Fluidized Bed	Steam Turbine	Low Pressure Turbine		4209	Nozzle bolting
Fluidized Bed	Steam Turbine	Low Pressure Turbine		4210	Nozzles and nozzle blocks
Fluidized Bed	Steam Turbine	Low Pressure Turbine		4211	Diaphragms

TABLE B07-97 Steam Turbine: Low Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Steam Turbine	Low Pressure Turbine		4212	Buckets or blades
Fluidized Bed	Steam Turbine	Low Pressure Turbine		4213	Bucket or blade fouling
Fluidized Bed	Steam Turbine	Low Pressure Turbine		4215	Wheels or spindles
Fluidized Bed	Steam Turbine	Low Pressure Turbine		4220	Shaft seals
Fluidized Bed	Steam Turbine	Low Pressure Turbine		4221	Dummy rings
Fluidized Bed	Steam Turbine	Low Pressure Turbine		4222	Gland rings
Fluidized Bed	Steam Turbine	Low Pressure Turbine		4230	Rotor shaft
Fluidized Bed	Steam Turbine	Low Pressure Turbine		4240	Bearings
Fluidized Bed	Steam Turbine	Low Pressure Turbine		4241	Thrust bearings
Fluidized Bed	Steam Turbine	Low Pressure Turbine		4250	Other low pressure turbine problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-98 Steam Turbine: Lube Oil					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Steam Turbine	Lube Oil		4280	Lube oil pumps
Fluidized Bed	Steam Turbine	Lube Oil		4281	Lube oil coolers
Fluidized Bed	Steam Turbine	Lube Oil		4282	Lube oil conditioners
Fluidized Bed	Steam Turbine	Lube Oil		4283	Lube oil system valves and piping
Fluidized Bed	Steam Turbine	Lube Oil		4284	Lube oil pump drive
Fluidized Bed	Steam Turbine	Lube Oil		4289	Other lube oil system problems
Notes: 1) For use with Unit Codes 650-699. 2) Do not include bearing failures due to lube oil.					

TABLE B07-99 Steam Turbine: Miscellaneous (Steam Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Steam Turbine	Miscellaneous (Steam Turbine)		4400	Major turbine overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)
Fluidized Bed	Steam Turbine	Miscellaneous (Steam Turbine)		4401	Inspection
Fluidized Bed	Steam Turbine	Miscellaneous (Steam Turbine)		4402	Minor turbine overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
Fluidized Bed	Steam Turbine	Miscellaneous (Steam Turbine)		4410	Turning gear and motor
Fluidized Bed	Steam Turbine	Miscellaneous (Steam Turbine)		4411	Steam turbine gear box (single shaft configuration)

TABLE B07-99 Steam Turbine: Miscellaneous (Steam Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Steam Turbine	Miscellaneous (Steam Turbine)		4412	Steam turbine clutch (single shaft configuration)
Fluidized Bed	Steam Turbine	Miscellaneous (Steam Turbine)		4415	Shaft coupling mechanism
Fluidized Bed	Steam Turbine	Miscellaneous (Steam Turbine)		4420	Vibration of the turbine generator unit that cannot be attributed to a specific cause such as bearings or blades (use this code for balance moves)
Fluidized Bed	Steam Turbine	Miscellaneous (Steam Turbine)		4430	Gland seal system
Fluidized Bed	Steam Turbine	Miscellaneous (Steam Turbine)		4450	Water induction
Fluidized Bed	Steam Turbine	Miscellaneous (Steam Turbine)		4460	Turbine overspeed trip test
Fluidized Bed	Steam Turbine	Miscellaneous (Steam Turbine)		4470	Differential expansion
Fluidized Bed	Steam Turbine	Miscellaneous (Steam Turbine)		4490	Turbine performance testing (use code 9999 for total unit performance testing)
Fluidized Bed	Steam Turbine	Miscellaneous (Steam Turbine)		4499	Other miscellaneous steam turbine problems
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-100 Steam Turbine: Piping					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Steam Turbine	Piping		4270	Crossover or under piping
Fluidized Bed	Steam Turbine	Piping		4279	Miscellaneous turbine piping
Notes: 1) For use with Unit Codes 650-699.					

TABLE B07-101 Steam Turbine: Valves					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Steam Turbine	Valves		4260	Main stop valves
Fluidized Bed	Steam Turbine	Valves		4261	Control valves
Fluidized Bed	Steam Turbine	Valves		4262	Intercept valves
Fluidized Bed	Steam Turbine	Valves		4263	Reheat stop valves
Fluidized Bed	Steam Turbine	Valves		4264	Combined intercept valves
Fluidized Bed	Steam Turbine	Valves		4265	Miscellaneous drain and vent valves
Fluidized Bed	Steam Turbine	Valves		4266	Main stop valve testing
Fluidized Bed	Steam Turbine	Valves		4267	Control valve testing
Fluidized Bed	Steam Turbine	Valves		4268	Reheat/intercept valve testing

TABLE B07-101 Steam Turbine: Valves					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fluidized Bed	Steam Turbine	Valves		4269	Other turbine valves (including LP steam admission valves)
Notes: 1) For use with Unit Codes 650-699.					

Appendix B08: Index To Fossil-Steam Unit Cause Codes

FOSSIL-STEAM UNITS

INDEX TO SYSTEM/COMPONENT/SUB-COMPONENT CAUSE CODE TABLES			
TABLE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**
B08-1	Balance of Plant	Auxiliary Systems	Auxiliary Steam
B08-2	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems
B08-3	Balance of Plant	Auxiliary Systems	Fire Protection System
B08-4	Balance of Plant	Auxiliary Systems	Instrument Air
B08-5	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System
B08-6	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)
B08-7	Balance of Plant	Auxiliary Systems	Open Cooling Water System
B08-8	Balance of Plant	Auxiliary Systems	Seal Air Fans
B08-9	Balance of Plant	Auxiliary Systems	Service Air
B08-10	Balance of Plant	Auxiliary Systems	Service Water (Open System)
B08-11	Balance of Plant	Circulating Water Systems	
B08-12	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators
B08-13	Balance of Plant	Condensate System	Miscellaneous (Condensate System)
B08-14	Balance of Plant	Condensate System	Polishers/Chemical Addition
B08-15	Balance of Plant	Condensate System	Pumps, Piping, and Valves
B08-16	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals
B08-17	Balance of Plant	Condensing System	Condenser Controls
B08-18	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment
B08-19	Balance of Plant	Condensing System	Miscellaneous (Condensing System)
B08-20	Balance of Plant	Condensing System	Vacuum Equipment
B08-21	Balance of Plant	Electrical	
B08-22	Balance of Plant	Extraction Steam	
B08-23	Balance of Plant	Feedwater System	
B08-24	Balance of Plant	Heater Drain Systems	
B08-25	Balance of Plant	Miscellaneous (Balance of Plant)	
B08-26	Balance of Plant	Power Station Switchyard	
B08-27	Balance of Plant	Waste Water (zero discharge) Systems	
B08-28	Boiler	Boiler Air and Gas Systems	Air Supply
B08-29	Boiler	Boiler Air and Gas Systems	Flue Gas
B08-30	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation
B08-31	Boiler	Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)
B08-32	Boiler	Boiler Control Systems	

INDEX TO SYSTEM/COMPONENT/SUB-COMPONENT CAUSE CODE TABLES			
TABLE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**
B08-33	Boiler	Boiler Design Limitations	
B08-34	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners
B08-35	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Cyclone
B08-36	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)
B08-37	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts
B08-38	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers
B08-39	Boiler	Boiler Internals and Structures	
B08-40	Boiler	Boiler Overhaul and Inspections	
B08-41	Boiler	Boiler Piping System	Boiler Recirculation
B08-42	Boiler	Boiler Piping System	Cold and Hot Reheat Steam
B08-43	Boiler	Boiler Piping System	Desuperheaters/Attemperators
B08-44	Boiler	Boiler Piping System	Feedwater and Blowdown
B08-45	Boiler	Boiler Piping System	Main Steam
B08-46	Boiler	Boiler Piping System	Miscellaneous (Piping)
B08-47	Boiler	Boiler Piping System	Startup Bypass
B08-48	Boiler	Boiler Tube Fireside Slagging or Fouling	
B08-49	Boiler	Boiler Tube Leaks	
B08-50	Boiler	Boiler Water Condition	
B08-51	Boiler	Miscellaneous (Boiler)	
B08-52	Boiler	Miscellaneous Boiler Tube Problems	
B08-53	Boiler	Slag and Ash Removal	
B08-54	External	Catastrophe	
B08-55	External	Economic	
B08-56	External	Fuel Quality	
B08-57	External	Miscellaneous (External)	
B08-58	Generator	Controls	
B08-59	Generator	Cooling System	
B08-60	Generator	Exciter	
B08-61	Generator	Generator	
B08-62	Generator	Miscellaneous (Generator)	
B08-63	Inactive States	Inactive States	
B08-64	Performance	Performance	
B08-65	Personnel or Procedural Errors	Personnel or Procedural Errors	
B08-66	Pollution Control Equipment	CO Reduction	
B08-67	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)	
B08-68	Pollution Control Equipment	Dry Scrubbers	Dry Scrubber

INDEX TO SYSTEM/COMPONENT/SUB-COMPONENT CAUSE CODE TABLES			
TABLE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**
B08-69	Pollution Control Equipment	Dry Scrubbers	Miscellaneous (Dry Scrubber)
B08-70	Pollution Control Equipment	Dry Scrubbers	Piping, Ducting, and Dampers
B08-71	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply
B08-72	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery
B08-73	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)	
B08-74	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters
B08-75	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems
B08-76	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems
B08-77	Pollution Control Equipment	Precipitators	
B08-78	Pollution Control Equipment	Wet Scrubbers	Chemical Supply
B08-79	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)
B08-80	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans
B08-81	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery
B08-82	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber
B08-83	Regulatory, Safety, Environmental	Other Operating Environmental Limitations	
B08-84	Regulatory, Safety, Environmental	Regulatory	
B08-85	Regulatory, Safety, Environmental	Safety	
B08-86	Regulatory, Safety, Environmental	Stack Emission	
B08-87	Steam Turbine	Controls	
B08-88	Steam Turbine	High Pressure Turbine	
B08-89	Steam Turbine	Intermediate Pressure Turbine	
B08-90	Steam Turbine	Low Pressure Turbine	
B08-91	Steam Turbine	Lube Oil	
B08-92	Steam Turbine	Miscellaneous (Steam Turbine)	
B08-93	Steam Turbine	Piping	
B08-94	Steam Turbine	Valves	

BALANCE OF PLANT

TABLE B08-1 Balance of Plant: Auxiliary Systems - Auxiliary Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3830	Auxiliary boiler
Fossil-Steam	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3831	Auxiliary steam piping

TABLE B08-1 Balance of Plant: Auxiliary Systems - Auxiliary Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3832	Auxiliary steam valves
Fossil-Steam	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3833	Auxiliary steam controls and instruments
Fossil-Steam	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3834	Auxiliary boiler tube leaks
Fossil-Steam	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3835	Auxiliary boiler burner management system
Fossil-Steam	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3836	Steam transfer to other unit
Fossil-Steam	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3839	Other auxiliary steam problems (also see extraction steam codes 3520 to 3529; startup bypass codes 0630 to 0660; and soot blower steam code 0870)
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-2 Balance of Plant: Auxiliary Systems - Closed Cooling Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3820	Closed cooling water pumps and motors
Fossil-Steam	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3821	Closed cooling water piping
Fossil-Steam	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3822	Closed cooling water valves
Fossil-Steam	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3823	Closed cooling water heat exchangers
Fossil-Steam	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3824	Closed cooling water system fouling
Fossil-Steam	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3825	Closed cooling water instrumentation
Fossil-Steam	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3826	Closed cooling water strainer
Fossil-Steam	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3829	Other closed cooling water system problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-3 Balance of Plant: Auxiliary Systems - Fire Protection System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Auxiliary Systems	Fire Protection System	3860	Fire protection system pumps
Fossil-Steam	Balance of Plant	Auxiliary Systems	Fire Protection System	3861	Fire protection system piping
Fossil-Steam	Balance of Plant	Auxiliary Systems	Fire Protection System	3862	Fire protection system valves
Fossil-Steam	Balance of Plant	Auxiliary Systems	Fire Protection System	3863	Fire protection system fouling
Fossil-Steam	Balance of Plant	Auxiliary Systems	Fire Protection System	3864	Fire protection system instrumentation and controls
Fossil-Steam	Balance of Plant	Auxiliary Systems	Fire Protection System	3869	Other fire protection system problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-4 Balance of Plant: Auxiliary Systems - Instrument Air					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Auxiliary Systems	Instrument Air	3850	Instrument air compressors
Fossil-Steam	Balance of Plant	Auxiliary Systems	Instrument Air	3851	Instrument air piping
Fossil-Steam	Balance of Plant	Auxiliary Systems	Instrument Air	3852	Instrument air valves
Fossil-Steam	Balance of Plant	Auxiliary Systems	Instrument Air	3853	Instrument air dryers
Fossil-Steam	Balance of Plant	Auxiliary Systems	Instrument Air	3854	N2 backup to instrument air
Fossil-Steam	Balance of Plant	Auxiliary Systems	Instrument Air	3859	Other instrument air problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-5 Balance of Plant: Auxiliary Systems - Low-pressure Gas Compression System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3870	Fuel Gas Compressor and Motors
Fossil-Steam	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3871	Fuel Gas Compressor Piping
Fossil-Steam	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3872	Fuel Gas Compressor Valves
Fossil-Steam	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3873	Fuel Gas Compressor Heat Exchangers
Fossil-Steam	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3874	Fuel Gas Compressor Controls and Instrumentation
Fossil-Steam	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3875	Fuel Gas Compressor Filters
Fossil-Steam	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3876	Fuel Gas Compressor Fire System
Fossil-Steam	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3879	Fuel Gas Compressor - other
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-6 Balance of Plant: Auxiliary Systems - Miscellaneous (Auxiliary Systems)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	3898	Miscellaneous plant auxiliary process and services instrumentation and controls
Fossil-Steam	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	3899	Other miscellaneous auxiliary system problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-7 Balance of Plant: Auxiliary Systems - Open Cooling Water System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3800	Open cooling water pumps and motors
Fossil-Steam	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3801	Open cooling water piping
Fossil-Steam	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3802	Open cooling water valves

TABLE B08-7 Balance of Plant: Auxiliary Systems - Open Cooling Water System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3803	Open cooling water heat exchangers
Fossil-Steam	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3804	Open cooling water system fouling
Fossil-Steam	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3805	Open cooling water system instrumentation
Fossil-Steam	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3806	Open cooling water strainer
Fossil-Steam	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3809	Other open cooling water problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-8 Balance of Plant: Auxiliary Systems - Seal Air Fans					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Auxiliary Systems	Seal Air Fans	3880	Seal air fan
Fossil-Steam	Balance of Plant	Auxiliary Systems	Seal Air Fans	3881	Seal air fan drive - motor
Fossil-Steam	Balance of Plant	Auxiliary Systems	Seal Air Fans	3882	Seal air control dampers and drives
Fossil-Steam	Balance of Plant	Auxiliary Systems	Seal Air Fans	3883	Seal air filters
Fossil-Steam	Balance of Plant	Auxiliary Systems	Seal Air Fans	3889	Other seal air fan problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-9 Balance of Plant: Auxiliary Systems - Service Air					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Auxiliary Systems	Service Air	3840	Service air compressors
Fossil-Steam	Balance of Plant	Auxiliary Systems	Service Air	3841	Service air piping
Fossil-Steam	Balance of Plant	Auxiliary Systems	Service Air	3842	Service air valves

TABLE B08-9 Balance of Plant: Auxiliary Systems - Service Air					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Auxiliary Systems	Service Air	3843	Service air dryers
Fossil-Steam	Balance of Plant	Auxiliary Systems	Service Air	3844	Soot blowing air compressor and system
Fossil-Steam	Balance of Plant	Auxiliary Systems	Service Air	3849	Other service air problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-10 Balance of Plant: Auxiliary Systems - Service Water (Open System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3810	Service water pumps and motors
Fossil-Steam	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3811	Service water piping
Fossil-Steam	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3812	Service water valves
Fossil-Steam	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3813	Service water heat exchangers
Fossil-Steam	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3814	Service water system fouling
Fossil-Steam	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3815	Service water strainer
Fossil-Steam	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3819	Other service water problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-11 Balance of Plant: Circulating Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Circulating Water Systems		3210	Circulating water pumps
Fossil-Steam	Balance of Plant	Circulating Water Systems		3211	Circulating water pump motors
Fossil-Steam	Balance of Plant	Circulating Water Systems		3220	Circulating water piping

TABLE B08-11 Balance of Plant: Circulating Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Circulating Water Systems		3221	Circulating water piping fouling
Fossil-Steam	Balance of Plant	Circulating Water Systems		3230	Circulating water valves
Fossil-Steam	Balance of Plant	Circulating Water Systems		3231	Waterbox
Fossil-Steam	Balance of Plant	Circulating Water Systems		3232	Condenser tube cleaning system including debris filter
Fossil-Steam	Balance of Plant	Circulating Water Systems		3233	Circulating water priming system
Fossil-Steam	Balance of Plant	Circulating Water Systems		3235	Cooling tower booster pump
Fossil-Steam	Balance of Plant	Circulating Water Systems		3236	Cooling tower booster motor
Fossil-Steam	Balance of Plant	Circulating Water Systems		3238	Cooling tower fan motors
Fossil-Steam	Balance of Plant	Circulating Water Systems		3239	Cooling tower fan motors - variable speed
Fossil-Steam	Balance of Plant	Circulating Water Systems		3240	Cooling tower fans
Fossil-Steam	Balance of Plant	Circulating Water Systems		3241	Cooling tower efficiency below design
Fossil-Steam	Balance of Plant	Circulating Water Systems		3242	Cooling tower fill damage
Fossil-Steam	Balance of Plant	Circulating Water Systems		3243	Cooling tower icing
Fossil-Steam	Balance of Plant	Circulating Water Systems		3244	Cooling tower fires
Fossil-Steam	Balance of Plant	Circulating Water Systems		3245	Other cooling tower problems
Fossil-Steam	Balance of Plant	Circulating Water Systems		3246	Cooling tower fouling
Fossil-Steam	Balance of Plant	Circulating Water Systems		3247	Cooling tower instrumentation
Fossil-Steam	Balance of Plant	Circulating Water Systems		3248	Cooling Tower Overhaul

TABLE B08-11 Balance of Plant: Circulating Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Circulating Water Systems		3250	Circulating water system instruments and controls
Fossil-Steam	Balance of Plant	Circulating Water Systems		3260	Traveling screens
Fossil-Steam	Balance of Plant	Circulating Water Systems		3261	Traveling screen fouling
Fossil-Steam	Balance of Plant	Circulating Water Systems		3269	Circulating water biological conditions (ie, zebra mussels)
Fossil-Steam	Balance of Plant	Circulating Water Systems		3270	Intake system problems other than traveling screens
Fossil-Steam	Balance of Plant	Circulating Water Systems		3271	Intake grating fouling
Fossil-Steam	Balance of Plant	Circulating Water Systems		3272	Circulating water screenwash system
Fossil-Steam	Balance of Plant	Circulating Water Systems		3273	Debris in circulating water from outside sources (leaves, mud, etc.)
Fossil-Steam	Balance of Plant	Circulating Water Systems		3274	Ice blockages at intake structures including frazil ice, sheets, blocks of ice, etc.
Fossil-Steam	Balance of Plant	Circulating Water Systems		3280	High circulating water temperature (not due to season, tower efficiency below design, or other listed equipment problem)
Fossil-Steam	Balance of Plant	Circulating Water Systems		3281	Circulating water tempering system
Fossil-Steam	Balance of Plant	Circulating Water Systems		3282	Circulating water cooling ponds
Fossil-Steam	Balance of Plant	Circulating Water Systems		3285	Circulating water chemistry
Fossil-Steam	Balance of Plant	Circulating Water Systems		3299	Other circulating water system problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-12 Balance of Plant: Condensate System - Low/Intermediate Pressure Heater and Deaerators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3339	LP heater head leaks

TABLE B08-12 Balance of Plant: Condensate System - Low/Intermediate Pressure Heater and Deaerators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3340	LP heater tube leaks
Fossil-Steam	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3341	Other LP heater - general
Fossil-Steam	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3342	IP heater tube leaks
Fossil-Steam	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3343	Other IP heater - general
Fossil-Steam	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3344	Deaerator (including level control)
Fossil-Steam	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3345	IP heater head leaks
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-13 Balance of Plant: Condensate System - Miscellaneous (Condensate System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3360	Condensate makeup and return (including storage tanks)
Fossil-Steam	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3370	Condensate system controls and instrumentation (not hotwell level, heater level, or deaerator level controls; see codes 3150-3159, 3344, 3502).
Fossil-Steam	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3380	Condensate coolers
Fossil-Steam	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3399	Other miscellaneous condensate system problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-14 Balance of Plant: Condensate System - Polishers/Chemical Addition					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Condensate System	Polishers/Chemical Addition	3350	Condensate polishing and filtering systems
Fossil-Steam	Balance of Plant	Condensate System	Polishers/Chemical Addition	3351	Chemical addition systems

TABLE B08-14 Balance of Plant: Condensate System - Polishers/Chemical Addition					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Condensate System	Polishers/Chemical Addition	3352	Feedwater chemistry (not specific to condenser, polishers, or chemical addition)
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-15 Balance of Plant: Condensate System - Pumps, Piping, and Valves					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3300	Condensate water pre-treatment
Fossil-Steam	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3310	Condensate/hotwell pumps
Fossil-Steam	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3311	Condensate/hotwell pump motor
Fossil-Steam	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3312	Condensate booster pump
Fossil-Steam	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3313	Condensate booster pump motor
Fossil-Steam	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3314	Condensate booster pump motor - variable speed
Fossil-Steam	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3315	Condensate booster pump drive (other than 3313 and 3314)
Fossil-Steam	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3320	Condensate piping
Fossil-Steam	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3330	Condensate valves
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-16 Balance of Plant: Condensing System - Condenser Casing or Shell and Internals					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3120	Tube sheets
Fossil-Steam	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3121	Expansion joint

TABLE B08-16 Balance of Plant: Condensing System - Condenser Casing or Shell and Internals					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3122	Gaskets and seals
Fossil-Steam	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3123	Hot well
Fossil-Steam	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3124	Tube sheet fouling
Fossil-Steam	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3129	Other condenser casing or shell and internal problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-17 Balance of Plant: Condensing System - Condenser Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Condensing System	Condenser Controls	3150	Hot well level controls
Fossil-Steam	Balance of Plant	Condensing System	Condenser Controls	3151	Vacuum pump and air ejector controls
Fossil-Steam	Balance of Plant	Condensing System	Condenser Controls	3152	Air-cooled condenser controls
Fossil-Steam	Balance of Plant	Condensing System	Condenser Controls	3159	Other condensing system controls and instruments
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-18 Balance of Plant: Condensing System - Condenser Tubes and Support Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3110	Condenser tube leaks
Fossil-Steam	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3111	Condenser tube fouling shell side
Fossil-Steam	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3112	Condenser tube fouling tube side
Fossil-Steam	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3113	Condenser tube and water box cleaning (including circulating water flow reversal)
Fossil-Steam	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3114	Air-cooled condenser tubes

TABLE B08-18 Balance of Plant: Condensing System - Condenser Tubes and Support Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3115	Air-cooled condenser pumps
Fossil-Steam	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3116	Air-cooled condenser fans
Fossil-Steam	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3117	Air-cooled condenser fan motors
Fossil-Steam	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3118	Other Air-cooled condenser problems
Fossil-Steam	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3119	Other condenser tube casing or shell and internal problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-19 Balance of Plant: Condensing System - Miscellaneous (Condensing System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3170	Condenser inspection (use code 3110 to report looking for tube leaks)
Fossil-Steam	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3171	Air-cooled condenser inspections
Fossil-Steam	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3180	Major condenser overhaul
Fossil-Steam	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3185	Water side cathodic protection
Fossil-Steam	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3186	Auxiliary condenser and associated equipment
Fossil-Steam	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3190	Air leakage (for losses not attributable to previously noted equipment related codes)
Fossil-Steam	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3199	Other miscellaneous condensing system problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-20 Balance of Plant: Condensing System - Vacuum Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Condensing System	Vacuum Equipment	3130	Air ejectors
Fossil-Steam	Balance of Plant	Condensing System	Vacuum Equipment	3131	Air ejector piping and valves
Fossil-Steam	Balance of Plant	Condensing System	Vacuum Equipment	3132	Inter and after condensers
Fossil-Steam	Balance of Plant	Condensing System	Vacuum Equipment	3133	Vacuum pumps
Fossil-Steam	Balance of Plant	Condensing System	Vacuum Equipment	3134	Vacuum pump piping and valves
Fossil-Steam	Balance of Plant	Condensing System	Vacuum Equipment	3135	Vacuum pump motor and auxiliaries
Fossil-Steam	Balance of Plant	Condensing System	Vacuum Equipment	3139	Other air extraction system problems - general
Fossil-Steam	Balance of Plant	Condensing System	Vacuum Equipment	3149	Loss of vacuum not attributable to a particular component such as air ejectors or valves, or high back pressure not attributable to high circulating water temperature, or vacuum losses from a known cause.
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-21 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Electrical		3600	Switchyard transformers and associated cooling systems - external (OMC)
Fossil-Steam	Balance of Plant	Electrical		3601	Switchyard transformers and associated cooling systems - external (not OMC)
Fossil-Steam	Balance of Plant	Electrical		3610	Switchyard circuit breakers - external (not OMC)
Fossil-Steam	Balance of Plant	Electrical		3611	Switchyard circuit breakers - external (OMC)
Fossil-Steam	Balance of Plant	Electrical		3612	Switchyard system protection devices - external (OMC)
Fossil-Steam	Balance of Plant	Electrical		3613	Switchyard system protection devices - external (not OMC)

TABLE B08-21 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Electrical		3618	Other switchyard equipment - external (not OMC)
Fossil-Steam	Balance of Plant	Electrical		3619	Other switchyard equipment - external (OMC)
Fossil-Steam	Balance of Plant	Electrical		3620	Main transformer
Fossil-Steam	Balance of Plant	Electrical		3621	Unit auxiliaries transformer
Fossil-Steam	Balance of Plant	Electrical		3622	Station service startup transformer
Fossil-Steam	Balance of Plant	Electrical		3623	Auxiliary generators
Fossil-Steam	Balance of Plant	Electrical		3624	Auxiliary generator voltage supply system
Fossil-Steam	Balance of Plant	Electrical		3629	Other switchyard or high voltage system problems - external
Fossil-Steam	Balance of Plant	Electrical		3630	400-700 volt transformers
Fossil-Steam	Balance of Plant	Electrical		3631	400-700 volt circuit breakers
Fossil-Steam	Balance of Plant	Electrical		3632	400-700 volt conductors and buses
Fossil-Steam	Balance of Plant	Electrical		3633	400-700 volt insulators
Fossil-Steam	Balance of Plant	Electrical		3634	400-700 volt protection devices
Fossil-Steam	Balance of Plant	Electrical		3639	Other 400-700 volt problems
Fossil-Steam	Balance of Plant	Electrical		3640	AC instrument power transformers
Fossil-Steam	Balance of Plant	Electrical		3641	AC Circuit breakers
Fossil-Steam	Balance of Plant	Electrical		3642	AC Conductors and buses
Fossil-Steam	Balance of Plant	Electrical		3643	AC Inverters

TABLE B08-21 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Electrical		3644	AC Protection devices
Fossil-Steam	Balance of Plant	Electrical		3649	Other AC instrument power problems
Fossil-Steam	Balance of Plant	Electrical		3650	DC instrument power battery chargers
Fossil-Steam	Balance of Plant	Electrical		3651	DC circuit breakers
Fossil-Steam	Balance of Plant	Electrical		3652	DC conductors and buses
Fossil-Steam	Balance of Plant	Electrical		3653	DC protection devices
Fossil-Steam	Balance of Plant	Electrical		3659	Other DC power problems
Fossil-Steam	Balance of Plant	Electrical		3660	4000-7000 volt transformers
Fossil-Steam	Balance of Plant	Electrical		3661	4000-7000 volt circuit breakers
Fossil-Steam	Balance of Plant	Electrical		3662	4000-7000 volt conductors and buses
Fossil-Steam	Balance of Plant	Electrical		3663	4000-7000 volt insulators
Fossil-Steam	Balance of Plant	Electrical		3664	4000-7000 volt protection devices
Fossil-Steam	Balance of Plant	Electrical		3669	Other 4000-7000 volt problems
Fossil-Steam	Balance of Plant	Electrical		3670	12-15kV transformers
Fossil-Steam	Balance of Plant	Electrical		3671	12-15kV circuit breakers
Fossil-Steam	Balance of Plant	Electrical		3672	12-15kV conductors and buses
Fossil-Steam	Balance of Plant	Electrical		3673	12-15kV insulators
Fossil-Steam	Balance of Plant	Electrical		3674	12-15kV protection devices

TABLE B08-21 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Electrical		3679	Other 12-15kV problems
Fossil-Steam	Balance of Plant	Electrical		3680	Other voltage transformers
Fossil-Steam	Balance of Plant	Electrical		3681	Other voltage circuit breakers
Fossil-Steam	Balance of Plant	Electrical		3682	Other voltage conductors and buses
Fossil-Steam	Balance of Plant	Electrical		3683	Other voltage insulators
Fossil-Steam	Balance of Plant	Electrical		3684	Other voltage protection devices
Fossil-Steam	Balance of Plant	Electrical		3689	Other voltage problems
Fossil-Steam	Balance of Plant	Electrical		3690	Station Service Power Distribution System, General
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-22 Balance of Plant: Extraction Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Extraction Steam		3520	HP Extraction steam piping
Fossil-Steam	Balance of Plant	Extraction Steam		3521	HP Extraction steam valves
Fossil-Steam	Balance of Plant	Extraction Steam		3522	HP Extraction steam instruments and controls
Fossil-Steam	Balance of Plant	Extraction Steam		3529	Other HP extraction steam system problems
Fossil-Steam	Balance of Plant	Extraction Steam		3530	IP Extraction steam piping
Fossil-Steam	Balance of Plant	Extraction Steam		3531	IP Extraction steam valves
Fossil-Steam	Balance of Plant	Extraction Steam		3532	IP Extraction steam instruments and controls

TABLE B08-22 Balance of Plant: Extraction Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Extraction Steam		3539	Other IP extraction steam system problems
Fossil-Steam	Balance of Plant	Extraction Steam		3540	LP Extraction steam piping
Fossil-Steam	Balance of Plant	Extraction Steam		3541	LP Extraction steam valves
Fossil-Steam	Balance of Plant	Extraction Steam		3542	LP Extraction steam instruments and controls
Fossil-Steam	Balance of Plant	Extraction Steam		3549	Other LP extraction steam system problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-23 Balance of Plant: Feedwater System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Feedwater System		3401	Startup feedwater pump
Fossil-Steam	Balance of Plant	Feedwater System		3402	Startup feedwater pump drives - all types
Fossil-Steam	Balance of Plant	Feedwater System		3407	Feedwater pump suction screens
Fossil-Steam	Balance of Plant	Feedwater System		3408	Feedwater pump drive - local controls
Fossil-Steam	Balance of Plant	Feedwater System		3409	Feedwater pump drive motor - variable speed
Fossil-Steam	Balance of Plant	Feedwater System		3410	Feedwater pump
Fossil-Steam	Balance of Plant	Feedwater System		3411	Feedwater pump drive - motor
Fossil-Steam	Balance of Plant	Feedwater System		3412	Feedwater pump drive - steam turbine
Fossil-Steam	Balance of Plant	Feedwater System		3413	Feedwater pump coupling and drive shaft
Fossil-Steam	Balance of Plant	Feedwater System		3414	Feedwater pump local controls

TABLE B08-23 Balance of Plant: Feedwater System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Feedwater System		3415	Feedwater pump/drive lube oil system
Fossil-Steam	Balance of Plant	Feedwater System		3416	Other feedwater pump problems
Fossil-Steam	Balance of Plant	Feedwater System		3417	Feedwater pump drive - main shaft
Fossil-Steam	Balance of Plant	Feedwater System		3418	Feedwater pump drive - other
Fossil-Steam	Balance of Plant	Feedwater System		3419	Feedwater pump drive - gear
Fossil-Steam	Balance of Plant	Feedwater System		3420	Feedwater piping and supports
Fossil-Steam	Balance of Plant	Feedwater System		3430	Feedwater regulating (boiler level control) valve
Fossil-Steam	Balance of Plant	Feedwater System		3431	Other feedwater valves
Fossil-Steam	Balance of Plant	Feedwater System		3439	HP heater head leaks
Fossil-Steam	Balance of Plant	Feedwater System		3440	High pressure heater tube leaks
Fossil-Steam	Balance of Plant	Feedwater System		3441	Other high pressure heater problems (see condensate system for LP and IP heater codes)
Fossil-Steam	Balance of Plant	Feedwater System		3451	Feedwater booster pump suction screens
Fossil-Steam	Balance of Plant	Feedwater System		3452	Feedwater booster pump drive - local controls
Fossil-Steam	Balance of Plant	Feedwater System		3453	Feedwater booster pump drive motor - variable speed
Fossil-Steam	Balance of Plant	Feedwater System		3454	Feedwater booster pump
Fossil-Steam	Balance of Plant	Feedwater System		3455	Feedwater booster pump drive - motor
Fossil-Steam	Balance of Plant	Feedwater System		3456	Feedwater booster pump drive - steam turbine

TABLE B08-23 Balance of Plant: Feedwater System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Feedwater System		3457	Feedwater booster pump coupling and drive shaft
Fossil-Steam	Balance of Plant	Feedwater System		3458	Feedwater booster pump local controls
Fossil-Steam	Balance of Plant	Feedwater System		3459	Feedwater booster pump/drive lube oil system
Fossil-Steam	Balance of Plant	Feedwater System		3460	Other feedwater booster pump problems
Fossil-Steam	Balance of Plant	Feedwater System		3461	Feedwater booster pump drive - main shaft
Fossil-Steam	Balance of Plant	Feedwater System		3462	Feedwater booster pump drive - other
Fossil-Steam	Balance of Plant	Feedwater System		3463	Feedwater booster pump drive - gear
Fossil-Steam	Balance of Plant	Feedwater System		3499	Other feedwater system problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-24 Balance of Plant: Heater Drain Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Heater Drain Systems		3501	Heater drain pumps
Fossil-Steam	Balance of Plant	Heater Drain Systems		3502	Heater level control
Fossil-Steam	Balance of Plant	Heater Drain Systems		3503	Heater drain piping
Fossil-Steam	Balance of Plant	Heater Drain Systems		3504	Heater drain valves
Fossil-Steam	Balance of Plant	Heater Drain Systems		3505	Heater drain pump drive
Fossil-Steam	Balance of Plant	Heater Drain Systems		3509	Other heater drain system problems
Notes: 1) For use with Unit Codes 100-199 and 600-649. 2) Excluding extraction or drain systems.					

TABLE B08-25 Balance of Plant: Miscellaneous (Balance of Plant)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Miscellaneous (Balance of Plant)		3950	Process computer
Fossil-Steam	Balance of Plant	Miscellaneous (Balance of Plant)		3960	Thermal derating (thermal efficiency losses in balance of plant when specific cause(s) unknown)
Fossil-Steam	Balance of Plant	Miscellaneous (Balance of Plant)		3970	Distributive Control System (DCS) - process computer
Fossil-Steam	Balance of Plant	Miscellaneous (Balance of Plant)		3971	DCS - data highway
Fossil-Steam	Balance of Plant	Miscellaneous (Balance of Plant)		3972	DCS - hardware problems (including card failure)
Fossil-Steam	Balance of Plant	Miscellaneous (Balance of Plant)		3973	DCS - internal and termination wiring
Fossil-Steam	Balance of Plant	Miscellaneous (Balance of Plant)		3974	DCS - logic problems
Fossil-Steam	Balance of Plant	Miscellaneous (Balance of Plant)		3975	DCS - upgrades
Fossil-Steam	Balance of Plant	Miscellaneous (Balance of Plant)		3979	Other DCS problems
Fossil-Steam	Balance of Plant	Miscellaneous (Balance of Plant)		3980	Programmable Logic Controller (PLC)
Fossil-Steam	Balance of Plant	Miscellaneous (Balance of Plant)		3981	PLC - data highway
Fossil-Steam	Balance of Plant	Miscellaneous (Balance of Plant)		3982	PLC - hardware problems (including card failure)
Fossil-Steam	Balance of Plant	Miscellaneous (Balance of Plant)		3983	PLC - internal and termination wiring
Fossil-Steam	Balance of Plant	Miscellaneous (Balance of Plant)		3984	PLC - logic problems
Fossil-Steam	Balance of Plant	Miscellaneous (Balance of Plant)		3985	PLC - upgrades
Fossil-Steam	Balance of Plant	Miscellaneous (Balance of Plant)		3989	Other PLC problems
Fossil-Steam	Balance of Plant	Miscellaneous (Balance of Plant)		3995	Powerhouse heating and ventilating systems

TABLE B08-25 Balance of Plant: Miscellaneous (Balance of Plant)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Miscellaneous (Balance of Plant)		3996	Air conditioning systems - rooms and areas
Fossil-Steam	Balance of Plant	Miscellaneous (Balance of Plant)		3998	Balance of plant overhaul/outage
Fossil-Steam	Balance of Plant	Miscellaneous (Balance of Plant)		3999	Other miscellaneous balance of plant problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-26 Balance of Plant: Power Station Switchyard					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Power Station Switchyard		3700	Power Station switchyard (non generating unit equipment)
Fossil-Steam	Balance of Plant	Power Station Switchyard		3710	Transmission line (connected to powerhouse switchyard to 1st Substation)
Fossil-Steam	Balance of Plant	Power Station Switchyard		3720	Transmission equipment at the 1st substation (see code 9300 if applicable)
Fossil-Steam	Balance of Plant	Power Station Switchyard		3730	Transmission equipment beyond the 1st substation (see code 9300 if applicable)
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-27 Balance of Plant: Waste Water (zero discharge) Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Waste Water (zero discharge) Systems		3290	Waste water (zero discharge) tanks, pumps, and motors
Fossil-Steam	Balance of Plant	Waste Water (zero discharge) Systems		3291	Waste water (zero discharge) system fouling
Fossil-Steam	Balance of Plant	Waste Water (zero discharge) Systems		3292	Waste water (zero discharge) piping
Fossil-Steam	Balance of Plant	Waste Water (zero discharge) Systems		3293	Waste water (zero discharge) valves
Fossil-Steam	Balance of Plant	Waste Water (zero discharge) Systems		3294	Waste water (zero discharge) controls and instrumentation

TABLE B08-27 Balance of Plant: Waste Water (zero discharge) Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Balance of Plant	Waste Water (zero discharge) Systems		3295	Other waste water (zero discharge) problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

BOILER

This set of codes contains the following:

- Boiler
- Boiler internals (tubes, refractory, supports, etc.)
- All the fuel handling, storage, preparation, and burning equipment.
- The forced/induced draft air system.
- Slag and ash removal except for particulate and gas cleanup. These latter items are covered under pollution control equipment.
- The main steam and reheat steam systems up to but not including the turbine stop or isolation valves.
- The feedwater system downstream of the final valve prior to entry into the economizer or boiler.
- Boiler blowdown systems.
- The startup bypass system including drains up to the heaters or condenser.
- Boiler water chemistry problems not due to problems in the condensate/feedwater system, the chemical addition system, or the demineralizer/polisher system.
- The instruments and controls associated with the above equipment.

TABLE B08-28 Boiler: Boiler Air and Gas Systems - Air Supply					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Air Supply	1400	Forced draft fans
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Air Supply	1401	Forced draft fan dampers
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Air Supply	1407	Forced draft fan lubrication system
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Air Supply	1410	Forced draft fan motors
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Air Supply	1411	Forced draft fan motors - variable speed
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Air Supply	1412	Forced draft fan drives (other than motor)
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Air Supply	1413	Forced draft fan couplings

TABLE B08-28 Boiler: Boiler Air and Gas Systems - Air Supply					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Air Supply	1415	Forced draft fan controls
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Air Supply	1420	Other forced draft fan problems
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Air Supply	1421	Secondary air fans/blowers
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Air Supply	1422	Secondary air fan/blower motors - single speed
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Air Supply	1423	Secondary air fan/blower motors - variable speed
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Air Supply	1424	Secondary air fan/blower controls
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Air Supply	1430	Air supply ducts from FD fan
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Air Supply	1431	Air supply dampers from FD fan
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Air Supply	1432	Air supply duct expansion joints
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Air Supply	1440	Air supply dampers
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Air Supply	1450	Other air supply problems
Notes: 1) For use with Unit Codes 100-199 and 600-649. 2) Excluding burner pipes, wind boxes, primary air, or pulverizer exhausters.					

TABLE B08-29 Boiler: Boiler Air and Gas Systems - Flue Gas					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Flue Gas	1455	Induced draft fans
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Flue Gas	1456	Induced draft fan dampers
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Flue Gas	1457	Induced draft fan lubrication systems
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Flue Gas	1460	Induced draft fan fouling
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Flue Gas	1470	Induced draft fan motors and drives
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Flue Gas	1471	Induced draft fan motors - variable speed
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Flue Gas	1472	Inducted draft fan coupling
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Flue Gas	1475	Induced draft fan controls
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Flue Gas	1476	Induced draft fan speed changer
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Flue Gas	1480	Other induced draft fan problems
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Flue Gas	1487	Air heater (tubular)
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Flue Gas	1488	Air heater (regenerative)
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Flue Gas	1489	Air heater (heat pipe, plate-type)
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Flue Gas	1492	Air heater fouling (tubular)
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Flue Gas	1493	Air heater fouling (regenerative)
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Flue Gas	1495	Other air heater fouling (heat pipe, plate-type)

TABLE B08-29 Boiler: Boiler Air and Gas Systems - Flue Gas					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Flue Gas	1500	Air heater soot blowers
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Flue Gas	1510	Flue gas ducts (except recirculation)
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Flue Gas	1512	Flue gas expansion joints
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Flue Gas	1520	Flue gas dampers (except recirculation)
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Flue Gas	1530	Other flue gas problems
Notes: 1) For use with Unit Codes 100-199 and 600-649. 2) Excluding burner pipes, wind boxes, primary air, or pulverizer exhausters.					

TABLE B08-30 Boiler: Boiler Air and Gas Systems - Flue Gas Recirculation					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1535	Flue gas recirculating fan
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1536	Flue gas recirculating fan dampers
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1537	Flue gas recirculating fan lubrication systems
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1540	Flue gas recirculation fan fouling
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1550	Flue gas recirculation fan motors
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1555	Flue gas recirculation fan controls
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1560	Other flue gas recirculation fan problems
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1570	Flue gas recirculation ducts
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1572	Flue gas recirculation duct expansion joints
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1580	Flue gas recirculation dampers
Notes: 1) For use with Unit Codes 100-199 and 600-649. 2) Excluding burner pipes, wind boxes, primary air, or pulverizer exhausters.					

TABLE B08-31 Boiler: Boiler Air and Gas Systems - Miscellaneous (Boiler Air and Gas Systems)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1590	Stacks (use code 8430 for stack problems due to pollution control equipment)
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1591	Stack damper and linkage
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1592	Stack damper linkage motors

TABLE B08-31 Boiler: Boiler Air and Gas Systems - Miscellaneous (Boiler Air and Gas Systems)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1599	Other miscellaneous boiler air and gas system problems
Notes: 1) For use with Unit Codes 100-199 and 600-649. 2) Excluding burner pipes, wind boxes, primary air, or pulverizer exhausters.					

TABLE B08-32 Boiler: Boiler Control Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Control Systems		1700	Feedwater controls (report local controls - feedwater pump, feedwater regulator valve, etc., - with component or system)
Fossil-Steam	Boiler	Boiler Control Systems		1710	Combustion/steam condition controls (report local controls - burners, pulverizers, etc., - with component or system)
Fossil-Steam	Boiler	Boiler Control Systems		1720	Desuperheater/attemperator controls
Fossil-Steam	Boiler	Boiler Control Systems		1730	Boiler explosion or implosion
Fossil-Steam	Boiler	Boiler Control Systems		1740	Boiler drum gage glasses / level indicator
Fossil-Steam	Boiler	Boiler Control Systems		1741	Furnace and water gauge television auxiliary system
Fossil-Steam	Boiler	Boiler Control Systems		1750	Burner management system
Fossil-Steam	Boiler	Boiler Control Systems		1760	Feedwater instrumentation (not local controls)
Fossil-Steam	Boiler	Boiler Control Systems		1761	Combustion/Steam condition instrumentation (not local controls)
Fossil-Steam	Boiler	Boiler Control Systems		1762	Desuperheater/attemperator instrumentation (not local controls)
Fossil-Steam	Boiler	Boiler Control Systems		1799	Other boiler instrumentation and control problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-33 Boiler: Boiler Design Limitations					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Design Limitations		1900	Improper balance between tube sections not due to fouling or plugging

TABLE B08-33 Boiler: Boiler Design Limitations					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Design Limitations		1910	Inadequate air not due to equipment problems
Notes: 1) For use with Unit Codes 100-199 and 600-649. 2) Including instruments which input to the controls.					

TABLE B08-34 Boiler: Boiler Fuel Supply from Bunkers to Boiler - Burners					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	358	Oil burner piping and valves
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	359	Gas burner piping and valves
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	360	Burners
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	361	Burner orifices
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	362	Burner tilts
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	370	Burner instruments and controls (except light off)
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	380	Light off (igniter) systems (including fuel supply)
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	385	Igniters
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	390	Burner wind boxes and dampers
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	400	Burner wind box fires
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	410	Other burner problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-35 Boiler: Boiler Fuel Supply from Bunkers to Boiler - Cyclone					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Cyclone	415	Cyclone feeders
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Cyclone	420	Cyclone crusher
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Cyclone	425	Cyclone dampers
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Cyclone	426	Cyclone air ducts
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Cyclone	430	Cyclone furnace
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Cyclone	435	Other cyclone problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-36 Boiler: Boiler Fuel Supply from Bunkers to Boiler - Oil and Gas Systems (except light off)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	440	Fuel oil pumps (general)
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	441	Fuel oil pumps (burner supply)
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	442	Fuel oil pumps (forwarding/transfer)
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	443	Fuel oil (burner supply) pump drives
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	444	Fuel oil (forwarding/transfer) pump drives
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	450	Fuel oil heaters
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	460	Fuel oil atomizers
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	470	Oil and gas fires

TABLE B08-36 Boiler: Boiler Fuel Supply from Bunkers to Boiler - Oil and Gas Systems (except light off)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	480	Other oil and gas fuel supply problems (see codes 0360-0410 for burner problems)
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-37 Boiler: Boiler Fuel Supply from Bunkers to Boiler - Pulverizers, Primary Air Fans, and Associated Ducts					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	200	Pulverizer exhauster fan (for indirect firing)
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	205	Pulverizer exhauster fan drive
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	210	Pulverizer heater (for indirect firing)
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	220	Pulverizer system cyclone separator
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	230	Pulverizer bag filter
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	240	Pulverized coal bin
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	250	Pulverizer feeders
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	253	Pulverizer feeder motor
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	255	Pulverizer feeder coal scales
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	256	Seal air system (air to pulverizers)
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	257	Coal Crusher/dryer between feeder and pulverizer
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	260	Primary air fan
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	262	Primary air fan lube oil system
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	263	Primary air fan drives

TABLE B08-37 Boiler: Boiler Fuel Supply from Bunkers to Boiler - Pulverizers, Primary Air Fans, and Associated Ducts					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	264	Other primary air fan problems
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	265	Primary air heater
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	266	Primary air heater fouling
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	267	Primary air flow instrumentation
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	270	Primary air duct and dampers
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	280	Pulverizer fires
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	290	Pulverizer reduced capacity due to wear
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	300	Pulverizer motors and drives
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	310	Pulverizer mills
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	312	Pulverizer mill classifiers
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	313	Pulverizer mill trunnion seals
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	314	Pulverizer mill ball charger hopper (ball mills only)
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	315	Pulverizer mill coal level controls
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	320	Foreign object in Pulverizers mill
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	325	Pulverizer skidding
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	330	Pulverizer coal leak (pulverizers only)
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	331	Pulverizer system coal leaks (other than pulverizers, see code 0330)
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	335	Pulverizer lube oil system

TABLE B08-37 Boiler: Boiler Fuel Supply from Bunkers to Boiler - Pulverizers, Primary Air Fans, and Associated Ducts					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	338	Pulverizer control systems (temperature and pressure)
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	339	Pulverizer System Puff
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	340	Other pulverizer problems
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	341	Pulverizer deluge system
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	342	Pulverizer inert system
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	344	Pulverizer inspection
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	345	Pulverizer overhaul
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	346	Pulverizer pyrite removal system
Fossil-Steam	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	350	Pulverized fuel and air piping (from pulverizer to wind box) (see code 0898 for pulverizer reject system problems)
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-38 Boiler: Boiler Fuel Supply to Bunker - Coal Handling Equipment up Through Bunkers					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	10	Thaw shed failure or fire
Fossil-Steam	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	20	Coal car dumpers, shakers, and unloaders
Fossil-Steam	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	22	Unloading/receiving hopper (train/truck)
Fossil-Steam	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	24	Rotary plow
Fossil-Steam	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	26	Dust suppression system
Fossil-Steam	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	28	Dust collection system

TABLE B08-38 Boiler: Boiler Fuel Supply to Bunker - Coal Handling Equipment up Through Bunkers					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	30	Coal conveyors and feeders
Fossil-Steam	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	35	Metal detector/collector (including magnetic separator)
Fossil-Steam	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	40	Coal elevators
Fossil-Steam	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	50	Coal storage fires
Fossil-Steam	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	60	Coal crushers including motors
Fossil-Steam	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	70	Coal samplers
Fossil-Steam	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	75	Storage silos/hoppers
Fossil-Steam	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	80	Stackers/reclaimers
Fossil-Steam	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	84	Coal conveyor scales storage coal pile
Fossil-Steam	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	85	Bunker feeder coal scales
Fossil-Steam	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	90	Bunker fires
Fossil-Steam	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	95	Bunker flow problems
Fossil-Steam	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	100	Bunker gates
Fossil-Steam	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	105	Bunker structures
Fossil-Steam	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	106	Coal drying system (see additional codes 0125-0127)
Fossil-Steam	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	107	Screen (prior to bunkers)
Fossil-Steam	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	110	Other coal fuel supply problems up through bunkers
Fossil-Steam	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	125	Coal crusher dryer hammers (see code 0106)

TABLE B08-38 Boiler: Boiler Fuel Supply to Bunker - Coal Handling Equipment up Through Bunkers					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	126	Coal crusher lube oil system (see code 0106)
Fossil-Steam	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	127	Other coal crusher dryer problems (see code 0106)
Fossil-Steam	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	129	Other coal processing system problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-39 Boiler: Boiler Internals and Structures					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Internals and Structures		800	Drums and drum internals (single drum only)
Fossil-Steam	Boiler	Boiler Internals and Structures		810	Boiler supports and structures (use code 1320 for tube supports)
Fossil-Steam	Boiler	Boiler Internals and Structures		820	Casing
Fossil-Steam	Boiler	Boiler Internals and Structures		830	Doors
Fossil-Steam	Boiler	Boiler Internals and Structures		840	Refractory and insulation
Fossil-Steam	Boiler	Boiler Internals and Structures		845	Windbox expansion joints
Fossil-Steam	Boiler	Boiler Internals and Structures		847	Other expansion joints
Fossil-Steam	Boiler	Boiler Internals and Structures		850	Other internal or structural problems
Fossil-Steam	Boiler	Boiler Internals and Structures		855	Drum relief/safety valves (single drum only)
Fossil-Steam	Boiler	Boiler Internals and Structures		859	Tube external fins/membranes
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-40 Boiler: Boiler Overhaul and Inspections					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Overhaul and Inspections		1800	Major boiler overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)
Fossil-Steam	Boiler	Boiler Overhaul and Inspections		1801	Minor boiler overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)

TABLE B08-40 Boiler: Boiler Overhaul and Inspections					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Overhaul and Inspections		1810	Other boiler inspections
Fossil-Steam	Boiler	Boiler Overhaul and Inspections		1811	Boiler Inspections - problem identification / investigation
Fossil-Steam	Boiler	Boiler Overhaul and Inspections		1812	Boiler Inspections - scheduled or routine
Fossil-Steam	Boiler	Boiler Overhaul and Inspections		1820	Chemical cleaning/steam blows
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-41 Boiler: Boiler Piping System - Boiler Recirculation					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Piping System	Boiler Recirculation	740	Boiler recirculation pumps
Fossil-Steam	Boiler	Boiler Piping System	Boiler Recirculation	741	Boiler recirculation pumps - motors
Fossil-Steam	Boiler	Boiler Piping System	Boiler Recirculation	742	Boiler recirculation pumps - motors - cooling system
Fossil-Steam	Boiler	Boiler Piping System	Boiler Recirculation	750	Boiler recirculation piping including downcomers
Fossil-Steam	Boiler	Boiler Piping System	Boiler Recirculation	760	Boiler recirculation valves
Fossil-Steam	Boiler	Boiler Piping System	Boiler Recirculation	770	Other boiler recirculation problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-42 Boiler: Boiler Piping System - Cold and Hot Reheat Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Piping System	Cold and Hot Reheat Steam	540	Hot reheat steam piping up to turbine stop valves
Fossil-Steam	Boiler	Boiler Piping System	Cold and Hot Reheat Steam	541	Cold reheat steam piping up to boiler
Fossil-Steam	Boiler	Boiler Piping System	Cold and Hot Reheat Steam	550	Reheat steam relief/safety valves
Fossil-Steam	Boiler	Boiler Piping System	Cold and Hot Reheat Steam	560	Other hot reheat steam valves (not including turbine stop or intercept valves)
Fossil-Steam	Boiler	Boiler Piping System	Cold and Hot Reheat Steam	561	Other cold reheat steam valves (not including turbine stop or intercept valves)
Fossil-Steam	Boiler	Boiler Piping System	Cold and Hot Reheat Steam	570	Other reheat steam problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-43 Boiler: Boiler Piping System - Desuperheaters/Attemperators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Piping System	Desuperheaters/Attemperators	580	Desuperheater/attemperator piping
Fossil-Steam	Boiler	Boiler Piping System	Desuperheaters/Attemperators	590	Desuperheater/attemperator valves
Fossil-Steam	Boiler	Boiler Piping System	Desuperheaters/Attemperators	600	Desuperheater/attemperator spray nozzles
Fossil-Steam	Boiler	Boiler Piping System	Desuperheaters/Attemperators	610	Desuperheater/attemperator drums
Fossil-Steam	Boiler	Boiler Piping System	Desuperheaters/Attemperators	620	Other desuperheater/attemperator problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-44 Boiler: Boiler Piping System - Feedwater and Blowdown					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Piping System	Feedwater and Blowdown	670	Feedwater piping downstream of feedwater regulating valve
Fossil-Steam	Boiler	Boiler Piping System	Feedwater and Blowdown	680	Feedwater valves (not feedwater regulating valve)
Fossil-Steam	Boiler	Boiler Piping System	Feedwater and Blowdown	690	Other feedwater problems downstream of feedwater regulating valve (use codes 3401 to 3499 for remainder of feedwater system)
Fossil-Steam	Boiler	Boiler Piping System	Feedwater and Blowdown	700	Blowdown system valves
Fossil-Steam	Boiler	Boiler Piping System	Feedwater and Blowdown	710	Blowdown system piping
Fossil-Steam	Boiler	Boiler Piping System	Feedwater and Blowdown	720	Blowdown system controls / instrumentation
Fossil-Steam	Boiler	Boiler Piping System	Feedwater and Blowdown	730	Other blowdown system problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-45 Boiler: Boiler Piping System - Main Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Piping System	Main Steam	500	Main steam piping up to turbine stop valves
Fossil-Steam	Boiler	Boiler Piping System	Main Steam	510	Main steam relief/safety valves off superheater

TABLE B08-45 Boiler: Boiler Piping System - Main Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Piping System	Main Steam	520	Other main steam valves (including vent and drain valves but not including the turbine stop valves)
Fossil-Steam	Boiler	Boiler Piping System	Main Steam	530	Other main steam system problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-46 Boiler: Boiler Piping System - Miscellaneous (Piping)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Piping System	Miscellaneous (Piping)	775	Economizer piping
Fossil-Steam	Boiler	Boiler Piping System	Miscellaneous (Piping)	780	Headers between tube bundles
Fossil-Steam	Boiler	Boiler Piping System	Miscellaneous (Piping)	782	Headers and caps
Fossil-Steam	Boiler	Boiler Piping System	Miscellaneous (Piping)	790	Pipe hangers, brackets, supports (general)
Fossil-Steam	Boiler	Boiler Piping System	Miscellaneous (Piping)	799	Other miscellaneous piping system problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-47 Boiler: Boiler Piping System - Startup Bypass					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Piping System	Startup Bypass	630	Startup bypass system piping (including drain lines up to heaters or condenser)
Fossil-Steam	Boiler	Boiler Piping System	Startup Bypass	640	Startup bypass system valves
Fossil-Steam	Boiler	Boiler Piping System	Startup Bypass	650	Startup bypass tanks or flash tanks
Fossil-Steam	Boiler	Boiler Piping System	Startup Bypass	655	Steam by-pass system instrumentation and controls
Fossil-Steam	Boiler	Boiler Piping System	Startup Bypass	660	Other startup bypass system problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-48 Boiler: Boiler Tube Fireside Slagging or Fouling					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Tube Fireside Slagging or Fouling		1100	Waterwall (Furnace wall)

TABLE B08-48 Boiler: Boiler Tube Fireside Slagging or Fouling					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Tube Fireside Slagging or Fouling		1103	Steam generating tubes between steam drum and mud drum
Fossil-Steam	Boiler	Boiler Tube Fireside Slagging or Fouling		1105	Generating tubes
Fossil-Steam	Boiler	Boiler Tube Fireside Slagging or Fouling		1110	Cyclone Furnace (in cyclone area only)
Fossil-Steam	Boiler	Boiler Tube Fireside Slagging or Fouling		1120	Convection Pass Wall
Fossil-Steam	Boiler	Boiler Tube Fireside Slagging or Fouling		1130	Boiler screen, wing wall, or slag screen (water tubes only)
Fossil-Steam	Boiler	Boiler Tube Fireside Slagging or Fouling		1140	First superheater
Fossil-Steam	Boiler	Boiler Tube Fireside Slagging or Fouling		1150	Second superheater
Fossil-Steam	Boiler	Boiler Tube Fireside Slagging or Fouling		1160	First reheater
Fossil-Steam	Boiler	Boiler Tube Fireside Slagging or Fouling		1170	Second reheater
Fossil-Steam	Boiler	Boiler Tube Fireside Slagging or Fouling		1180	Economizer
Fossil-Steam	Boiler	Boiler Tube Fireside Slagging or Fouling		1190	Other tube slagging or fouling
Fossil-Steam	Boiler	Boiler Tube Fireside Slagging or Fouling		1200	Operation at reduced power to avoid slagging or fouling (use codes 1100 to 1190 to report power reductions for slag accumulation or slag removal)
Fossil-Steam	Boiler	Boiler Tube Fireside Slagging or Fouling		1210	Operation at reduced power to avoid slagging or fouling on waterwalls (Furnace walls) (use codes 1100-1190 to report power reductions for slag accumulation or slag removal)
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-49 Boiler: Boiler Tube Leaks					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Tube Leaks		1000	Waterwall (Furnace wall)
Fossil-Steam	Boiler	Boiler Tube Leaks		1003	Steam generating tubes between steam drum and mud drum
Fossil-Steam	Boiler	Boiler Tube Leaks		1005	Generating tubes
Fossil-Steam	Boiler	Boiler Tube Leaks		1010	Cyclone furnace (in cyclone area only)
Fossil-Steam	Boiler	Boiler Tube Leaks		1020	Convection pass wall (water tubes only)
Fossil-Steam	Boiler	Boiler Tube Leaks		1030	Boiler screen, wing wall, or slag screen (water tubes only)
Fossil-Steam	Boiler	Boiler Tube Leaks		1035	Platen superheater
Fossil-Steam	Boiler	Boiler Tube Leaks		1040	First superheater
Fossil-Steam	Boiler	Boiler Tube Leaks		1050	Second superheater
Fossil-Steam	Boiler	Boiler Tube Leaks		1055	External superheater link tubing
Fossil-Steam	Boiler	Boiler Tube Leaks		1060	First reheater
Fossil-Steam	Boiler	Boiler Tube Leaks		1070	Second reheater
Fossil-Steam	Boiler	Boiler Tube Leaks		1075	External reheater link tubing
Fossil-Steam	Boiler	Boiler Tube Leaks		1080	Economizer
Fossil-Steam	Boiler	Boiler Tube Leaks		1090	Other boiler tube leaks
Notes: 1) For use with Unit Codes 100-199 and 600-649. 2) Use codes 860 and 870 for fouling or slagging due to unavailability of soot blowers or their air or steam supply.					

TABLE B08-50 Boiler: Boiler Water Condition					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Boiler Water Condition		1850	Boiler water condition (not feedwater water quality)
Notes: 1) For use with Unit Codes 100-199 and 600-649. 2) Use code 859 for tube/membrane failures.					

TABLE B08-51 Boiler: Miscellaneous (Boiler)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Miscellaneous (Boiler)		1980	Boiler safety valve test
Fossil-Steam	Boiler	Miscellaneous (Boiler)		1990	Boiler performance testing (use code 9999 for total unit performance testing)

TABLE B08-51 Boiler: Miscellaneous (Boiler)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Miscellaneous (Boiler)		1999	Boiler, miscellaneous
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-52 Boiler: Miscellaneous Boiler Tube Problems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Miscellaneous Boiler Tube Problems		1300	Water side fouling
Fossil-Steam	Boiler	Miscellaneous Boiler Tube Problems		1305	Fireside cleaning (which requires a full outage) Use code 1200 for cleanings that cause deratings.
Fossil-Steam	Boiler	Miscellaneous Boiler Tube Problems		1310	Water side cleaning (acid cleaning)
Fossil-Steam	Boiler	Miscellaneous Boiler Tube Problems		1320	Tube supports/attachments
Fossil-Steam	Boiler	Miscellaneous Boiler Tube Problems		1330	Slag fall damage
Fossil-Steam	Boiler	Miscellaneous Boiler Tube Problems		1340	Tube modifications (including addition and removal of tubes)
Fossil-Steam	Boiler	Miscellaneous Boiler Tube Problems		1350	Other miscellaneous boiler tube problems
Fossil-Steam	Boiler	Miscellaneous Boiler Tube Problems		1360	Boiler drains system
Notes: 1) For use with Unit Codes 100-199 and 600-649. 2) Use more specific codes - other slagging and fouling problems, other control problems, etc. - whenever possible. Describe miscellaneous problems in the verbal description.					

TABLE B08-53 Boiler: Slag and Ash Removal					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Slag and Ash Removal		860	Soot blowers - air (see code 3844 for air delivery system)
Fossil-Steam	Boiler	Slag and Ash Removal		870	Soot blowers - steam
Fossil-Steam	Boiler	Slag and Ash Removal		871	Soot blowers - sonic
Fossil-Steam	Boiler	Slag and Ash Removal		872	Soot blowers - water
Fossil-Steam	Boiler	Slag and Ash Removal		873	Soot blower drives
Fossil-Steam	Boiler	Slag and Ash Removal		876	Soot blower controls
Fossil-Steam	Boiler	Slag and Ash Removal		880	Fly Ash Removal System (not precipitators, scrubbers, mechanical collectors, or baghouses)
Fossil-Steam	Boiler	Slag and Ash Removal		885	Fly ash Removal System - wet transport

TABLE B08-53 Boiler: Slag and Ash Removal					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Boiler	Slag and Ash Removal		890	Bottom ash systems (wet or dry)
Fossil-Steam	Boiler	Slag and Ash Removal		891	Bottom ash hoppers (including gates)
Fossil-Steam	Boiler	Slag and Ash Removal		892	Bottom ash clinker grinders
Fossil-Steam	Boiler	Slag and Ash Removal		893	Bottom ash water pumps and motors
Fossil-Steam	Boiler	Slag and Ash Removal		894	Bottom ash piping and valves
Fossil-Steam	Boiler	Slag and Ash Removal		895	Ashpit trouble
Fossil-Steam	Boiler	Slag and Ash Removal		896	Bottom ash dewatering bin system, instruments and controls
Fossil-Steam	Boiler	Slag and Ash Removal		897	Bottom ash rotary (drag chain type) conveyor and motor
Fossil-Steam	Boiler	Slag and Ash Removal		898	Bottom ash pyrite hopper (pulverizer reject) system
Fossil-Steam	Boiler	Slag and Ash Removal		899	Bottom ash controls and instrumentation
Fossil-Steam	Boiler	Slag and Ash Removal		900	Slag tap (cyclone furnace)
Fossil-Steam	Boiler	Slag and Ash Removal		910	Slag tap (other than cyclone furnace)
Fossil-Steam	Boiler	Slag and Ash Removal		920	Other slag and ash removal problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

EXTERNAL

Use this set of codes to report events caused by external factors (flood, lightning, etc.); economic factors (lack of fuel, labor strikes, etc.); operator training; and transmission system problems external to the plant.

TABLE B08-54 External: Catastrophe					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	External	Catastrophe		9000	Flood
Fossil-Steam	External	Catastrophe		9001	Drought
Fossil-Steam	External	Catastrophe		9010	Fire including wildfires, not related to a specific component
Fossil-Steam	External	Catastrophe		9020	Lightning
Fossil-Steam	External	Catastrophe		9025	Geomagnetic disturbance
Fossil-Steam	External	Catastrophe		9030	Earthquake
Fossil-Steam	External	Catastrophe		9031	Tornado
Fossil-Steam	External	Catastrophe		9035	Hurricane
Fossil-Steam	External	Catastrophe		9036	Storms (ice, snow, etc)

TABLE B08-54 External: Catastrophe					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	External	Catastrophe		9040	Other catastrophe
Fossil-Steam	External	Catastrophe		9090	Physical Security Incident
Fossil-Steam	External	Catastrophe		9091	Physical Security Incident (OMC)
Fossil-Steam	External	Catastrophe		9092	Cyber Security Incident
Fossil-Steam	External	Catastrophe		9093	Cyber Security Incident (OMC)
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-55 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	External	Economic		0000	Reserve shutdown
Fossil-Steam	External	Economic		9130	Failure of fuel supplier to fulfill contractual obligations or a pre-arranged deal due to physical fuel disruptions or operational impairments (e.g. force majeure on a pipeline or compressor down; making the pipeline incapable of making its firm deliveries.)
Fossil-Steam	External	Economic		9131	Lack of fuel – due to contractual or tariff provisions that allow for service interruption or price fluctuations during peak demand periods.
Fossil-Steam	External	Economic		9132	Wet Fuel - Biomass
Fossil-Steam	External	Economic		9134	Fuel conservation
Fossil-Steam	External	Economic		9136	Problems with Primary Fuel for Units with Secondary Fuel Operation
Fossil-Steam	External	Economic		9137	Ground water or other water supply problems
Fossil-Steam	External	Economic		9139	Ground water or other water supply problems(OMC)
Fossil-Steam	External	Economic		9140	Plant modifications to burn different fuel that are not regulatory mandated
Fossil-Steam	External	Economic		9150	Labor strikes company-wide problems or strikes outside the company's jurisdiction such as manufacturers (delaying repairs) or transportation (fuel supply) problems.

TABLE B08-55 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	External	Economic		9151	Labor strikes direct plant management grievances that result in a walkout or strike are under plant management control.
Fossil-Steam	External	Economic		9160	Other economic problems
Fossil-Steam	External	Economic		9180	Economic (for internal use at plants only)
Fossil-Steam	External	Economic		9181	Economic (for internal use at plants only)
Fossil-Steam	External	Economic		9182	Economic (for internal use at plants only)
Fossil-Steam	External	Economic		9183	Economic (for internal use at plants only)
Fossil-Steam	External	Economic		9184	Economic (for internal use at plants only)
Fossil-Steam	External	Economic		9185	Economic (for internal use at plants only)
Fossil-Steam	External	Economic		9186	Economic (for internal use at plants only)
Fossil-Steam	External	Economic		9187	Economic (for internal use at plants only)
Fossil-Steam	External	Economic		9188	Economic (for internal use at plants only)
Fossil-Steam	External	Economic		9189	Economic (for internal use at plants only)
Fossil-Steam	External	Economic		9190	Economic (for internal use at plants only)
Fossil-Steam	External	Economic		9191	Economic (for internal use at plants only)
Fossil-Steam	External	Economic		9192	Economic (for internal use at plants only)
Fossil-Steam	External	Economic		9193	Economic (for internal use at plants only)
Fossil-Steam	External	Economic		9194	Economic (for internal use at plants only)
Fossil-Steam	External	Economic		9195	Economic (for internal use at plants only)
Fossil-Steam	External	Economic		9196	Economic (for internal use at plants only)
Fossil-Steam	External	Economic		9197	Economic (for internal use at plants only)
Fossil-Steam	External	Economic		9198	Economic (for internal use at plants only)
Fossil-Steam	External	Economic		9199	Economic (for internal use at plants only)
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-56 External: Fuel Quality					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	External	Fuel Quality		9200	High ash content (OMC)
Fossil-Steam	External	Fuel Quality		9201	High ash content (not OMC)
Fossil-Steam	External	Fuel Quality		9205	Poor quality natural gas fuel, low heat content
Fossil-Steam	External	Fuel Quality		9210	Low grindability (OMC)
Fossil-Steam	External	Fuel Quality		9211	Low grindability (not OMC)

TABLE B08-56 External: Fuel Quality					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	External	Fuel Quality		9220	High sulfur content (OMC)
Fossil-Steam	External	Fuel Quality		9221	High sulfur content (not OMC)
Fossil-Steam	External	Fuel Quality		9230	High vanadium content (OMC)
Fossil-Steam	External	Fuel Quality		9231	High vanadium content (not OMC)
Fossil-Steam	External	Fuel Quality		9240	High sodium content (OMC)
Fossil-Steam	External	Fuel Quality		9241	High sodium content (not OMC)
Fossil-Steam	External	Fuel Quality		9250	Low BTU coal (OMC)
Fossil-Steam	External	Fuel Quality		9251	Low BTU coal (not OMC)
Fossil-Steam	External	Fuel Quality		9260	Low BTU oil (OMC)
Fossil-Steam	External	Fuel Quality		9261	Low BTU oil (not OMC)
Fossil-Steam	External	Fuel Quality		9270	Wet coal (OMC)
Fossil-Steam	External	Fuel Quality		9271	Wet coal (not OMC)
Fossil-Steam	External	Fuel Quality		9280	Frozen coal (OMC)
Fossil-Steam	External	Fuel Quality		9281	Frozen coal (not OMC)
Fossil-Steam	External	Fuel Quality		9290	Other fuel quality problems (OMC)
Fossil-Steam	External	Fuel Quality		9291	Other fuel quality problems (not OMC)
Notes: 1) For use with Unit Codes 100-199 and 600-649. 2) Use code 9600 to 9650 if the fuel quality results in excess stack emissions through no fault in the pollution control equipment. Use the appropriate equipment code to report fouling and slagging.					

TABLE B08-57 External: Miscellaneous (External)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	External	Miscellaneous (External)		9300	Transmission system problems other than catastrophes (do not include switchyard problems in this category; see codes 3600 to 3629, 3720 to 3730)
Fossil-Steam	External	Miscellaneous (External)		9305	Ash disposal problem
Fossil-Steam	External	Miscellaneous (External)		9310	Operator training
Fossil-Steam	External	Miscellaneous (External)		9320	Other miscellaneous external problems
Fossil-Steam	External	Miscellaneous (External)		9340	Synchronous Condenser Operation
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

GENERATOR

This set of codes contains the generator, exciter, generator cooling systems, and generator controls. Note the main leads up to and includes the generator output breaker in this set of codes.

TABLE B08-58 Generator: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Generator	Controls		4700	Generator voltage control
Fossil-Steam	Generator	Controls		4710	Generator metering devices
Fossil-Steam	Generator	Controls		4720	Generator synchronization equipment
Fossil-Steam	Generator	Controls		4730	Generator current and potential transformers
Fossil-Steam	Generator	Controls		4740	Emergency generator trip devices
Fossil-Steam	Generator	Controls		4741	Frequency Trip (81 Relay)
Fossil-Steam	Generator	Controls		4750	Other generator controls and metering problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-59 Generator: Cooling System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Generator	Cooling System		4610	Hydrogen cooling system piping and valves
Fossil-Steam	Generator	Cooling System		4611	Hydrogen coolers
Fossil-Steam	Generator	Cooling System		4612	Hydrogen storage system
Fossil-Steam	Generator	Cooling System		4613	Hydrogen seals
Fossil-Steam	Generator	Cooling System		4619	Other hydrogen system problems
Fossil-Steam	Generator	Cooling System		4620	Air cooling system
Fossil-Steam	Generator	Cooling System		4630	Liquid cooling system
Fossil-Steam	Generator	Cooling System		4640	Seal oil system and seals
Fossil-Steam	Generator	Cooling System		4650	Other cooling system problems
Notes: 1) For use with Unit Codes 100-199 and 600-649. 2) Report failures caused by water leaks into generator as codes 4500, 4510, etc.					

TABLE B08-60 Generator: Exciter					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Generator	Exciter		4600	Exciter drive - motor
Fossil-Steam	Generator	Exciter		4601	Exciter field rheostat
Fossil-Steam	Generator	Exciter		4602	Exciter commutator and brushes
Fossil-Steam	Generator	Exciter		4603	Solid state exciter element
Fossil-Steam	Generator	Exciter		4604	Exciter drive - shaft
Fossil-Steam	Generator	Exciter		4605	Exciter transformer
Fossil-Steam	Generator	Exciter		4609	Other exciter problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-61 Generator: Generator					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Generator	Generator		4500	Rotor windings (including damper windings and fan blades on hydro units)
Fossil-Steam	Generator	Generator		4510	Rotor collector rings
Fossil-Steam	Generator	Generator		4511	Rotor, General
Fossil-Steam	Generator	Generator		4512	Retaining Rings
Fossil-Steam	Generator	Generator		4520	Stator windings, bushings, and terminals
Fossil-Steam	Generator	Generator		4530	Stator core iron
Fossil-Steam	Generator	Generator		4535	Stator, General
Fossil-Steam	Generator	Generator		4536	Generator Heaters
Fossil-Steam	Generator	Generator		4540	Brushes and brush rigging
Fossil-Steam	Generator	Generator		4550	Generator bearings and lube oil system (including thrust bearings on hydro units)
Fossil-Steam	Generator	Generator		4551	Generator bearings
Fossil-Steam	Generator	Generator		4552	Generator lube oil system
Fossil-Steam	Generator	Generator		4555	Bearing cooling system
Fossil-Steam	Generator	Generator		4560	Generator vibration (excluding vibration due to failed bearing and other components)
Fossil-Steam	Generator	Generator		4570	Generator casing
Fossil-Steam	Generator	Generator		4580	Generator end bells and bolting
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-62 Generator: Miscellaneous (Generator)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Generator	Miscellaneous (Generator)		4800	Generator main leads
Fossil-Steam	Generator	Miscellaneous (Generator)		4805	Generator Bus Duct Cooling System
Fossil-Steam	Generator	Miscellaneous (Generator)		4810	Generator output breaker
Fossil-Steam	Generator	Miscellaneous (Generator)		4830	Major generator overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)
Fossil-Steam	Generator	Miscellaneous (Generator)		4831	Minor generator overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
Fossil-Steam	Generator	Miscellaneous (Generator)		4840	Inspection
Fossil-Steam	Generator	Miscellaneous (Generator)		4841	Generator doble testing
Fossil-Steam	Generator	Miscellaneous (Generator)		4842	Reactive and capability testing
Fossil-Steam	Generator	Miscellaneous (Generator)		4850	Core monitor alarm
Fossil-Steam	Generator	Miscellaneous (Generator)		4860	Generator neutral grounding equipment
Fossil-Steam	Generator	Miscellaneous (Generator)		4899	Other miscellaneous generator problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

INACTIVE STATES

TABLE B08-63 Inactive States: Inactive States					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Inactive States	Inactive States		2	Inactive Reserve Shutdown
Fossil-Steam	Inactive States	Inactive States		9990	Retired unit
Fossil-Steam	Inactive States	Inactive States		9991	Mothballed unit
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

PERFORMANCE

TABLE B08-64 Performance: Performance					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Performance	Performance		9997	NERC Reliability Standard Requirement
Fossil-Steam	Performance	Performance		9998	Black start testing
Fossil-Steam	Performance	Performance		9999	Total unit performance testing (use appropriate codes for individual component testing)
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

PERSONNEL OR PROCEDURAL ERRORS

TABLE B08-65 Personnel or Procedural Errors: Personnel or Procedural Errors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Personnel or Procedural Errors	Personnel or Procedural Errors		9900	Operator error
Fossil-Steam	Personnel or Procedural Errors	Personnel or Procedural Errors		9910	Maintenance personnel error
Fossil-Steam	Personnel or Procedural Errors	Personnel or Procedural Errors		9920	Contractor error
Fossil-Steam	Personnel or Procedural Errors	Personnel or Procedural Errors		9930	Operating procedure error
Fossil-Steam	Personnel or Procedural Errors	Personnel or Procedural Errors		9940	Maintenance procedure error
Fossil-Steam	Personnel or Procedural Errors	Personnel or Procedural Errors		9950	Contractor procedure error

TABLE B08-65 Personnel or Procedural Errors: Personnel or Procedural Errors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Personnel or Procedural Errors	Personnel or Procedural Errors		9960	Staff shortage
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

POLLUTION CONTROL EQUIPMENT

Use this set of codes to report problems with flue gas desulphurization equipment and stack gas particulate removal equipment. If outages or deratings occur due to reasons other than equipment problems, use the set of codes for Regulatory, Safety, Environmental stack emission limits.

TABLE B08-66 Pollution Control Equipment: CO Reduction					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Pollution Control Equipment	CO Reduction		8840	CO Active catalyst
Fossil-Steam	Pollution Control Equipment	CO Reduction		8841	CO Support materials
Fossil-Steam	Pollution Control Equipment	CO Reduction		8842	CO Plugging
Fossil-Steam	Pollution Control Equipment	CO Reduction		8845	Other CO reduction problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-67 Pollution Control Equipment: Continuous Emissions Monitoring Systems (CEMS)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8700	CEMS Certification and Recertification
Fossil-Steam	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8710	SO2 analyzer problems
Fossil-Steam	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8720	NOx analyzer problems
Fossil-Steam	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8730	CO analyzer problems
Fossil-Steam	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8740	CO2 analyzer problems

TABLE B08-67 Pollution Control Equipment: Continuous Emissions Monitoring Systems (CEMS)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8750	O2 analyzer problems
Fossil-Steam	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8760	Opacity monitor problems
Fossil-Steam	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8770	Flow monitor problems
Fossil-Steam	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8780	Data acquisition system problems
Fossil-Steam	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8790	Miscellaneous CEMS problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-68 Pollution Control Equipment: Dry Scrubbers - Dry Scrubber					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Dry Scrubber	8528	Dry scrubber instruments and controls
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Dry Scrubber	8529	Gas dispersers
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Dry Scrubber	8530	Spray towers
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Dry Scrubber	8531	Spray machine/atomizer
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Dry Scrubber	8532	Spray machine/atomizer motors
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Dry Scrubber	8533	Spray machine/atomizer lubrication systems
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Dry Scrubber	8534	Spray machine/atomizer vibration problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-69 Pollution Control Equipment: Dry Scrubbers - Miscellaneous (Dry Scrubber)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Miscellaneous (Dry Scrubber)	8544	Mechanical failures

TABLE B08-69 Pollution Control Equipment: Dry Scrubbers - Miscellaneous (Dry Scrubber)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Miscellaneous (Dry Scrubber)	8545	Electrical failures
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Miscellaneous (Dry Scrubber)	8546	Major overhaul
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Miscellaneous (Dry Scrubber)	8547	Inspection
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Miscellaneous (Dry Scrubber)	8548	Testing
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Miscellaneous (Dry Scrubber)	8549	Other dry scrubber problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-70 Pollution Control Equipment: Dry Scrubbers - Piping, Ducting, and Dampers					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Piping, Ducting, and Dampers	8522	Piping
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Piping, Ducting, and Dampers	8523	Valves
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Piping, Ducting, and Dampers	8524	Strainers or filters
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Piping, Ducting, and Dampers	8525	Ducting
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Piping, Ducting, and Dampers	8526	Dampers
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Piping, Ducting, and Dampers	8527	Other piping, ducting, and damper problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-71 Pollution Control Equipment: Dry Scrubbers - Reagent\Slurry Supply					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8500	Slurry storage and feed tanks
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8501	Reagent storage, feed bins, and conveyors

TABLE B08-71 Pollution Control Equipment: Dry Scrubbers - Reagent\Slurry Supply					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8502	Weigh feeders
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8503	Screw conveyors
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8504	Mills/slakers
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8505	Scalping screens
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8506	Slurry pipelines
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8507	Reagent uploading and transfer systems
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8508	Reagent unavailability
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8510	Slurry mixers and agitators
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8520	Slurry transfer pumps and motors
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8521	Reagent/slurry problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-72 Pollution Control Equipment: Dry Scrubbers - Waste Disposal and Recovery					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8535	Fly ash conveyors
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8536	Bucket elevators
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8537	Weigh hoppers
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8538	Recycle storage and feed tanks including agitators
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8539	Recycle slurry transfer pumps

TABLE B08-72 Pollution Control Equipment: Dry Scrubbers - Waste Disposal and Recovery					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8540	Waste disposal
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8541	Recycle feed bins
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8542	Recycle feed bins aeration systems
Fossil-Steam	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8543	Powder coolers
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-73 Pollution Control Equipment: Miscellaneous (Pollution Control Equipment)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8565	Electrostatic Precipitator rebuild/overhaul
Fossil-Steam	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8600	Flue gas additives (furnace injection)
Fossil-Steam	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8601	SO3 mitigation
Fossil-Steam	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8620	Mercury Abatement Equipment
Fossil-Steam	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8650	Baghouse systems, general
Fossil-Steam	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8651	Bag failures and rebagging
Fossil-Steam	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8652	Shakers and rappers
Fossil-Steam	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8653	Inflation and deflation fans and motors
Fossil-Steam	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8654	Baghouse booster fans and motors
Fossil-Steam	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8655	Structural duct work and dampers
Fossil-Steam	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8656	Controls and instrumentation

TABLE B08-73 Pollution Control Equipment: Miscellaneous (Pollution Control Equipment)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8657	Ash handling system and hoppers
Fossil-Steam	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8658	Slurry system from precipitators
Fossil-Steam	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8670	Emission monitors (other than CEMS)
Fossil-Steam	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8699	Other miscellaneous pollution control equipment problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-74 Pollution Control Equipment: NOx Reduction Systems - Catalytic Air Heaters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8830	CAH NOx Active catalyst
Fossil-Steam	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8831	CAH NOx Support materials
Fossil-Steam	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8832	CAH NOx Plugging
Fossil-Steam	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8835	Other CAH problems
Notes: 1) For use with Unit Codes 100-199 and 600-649. 2) Use code 360 for Low NOx Burners.					

TABLE B08-75 Pollution Control Equipment: NOx Reduction Systems - Selective Catalytic Reduction Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8810	SCR NOx Reactor
Fossil-Steam	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8811	SCR NOx Reagent
Fossil-Steam	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8812	SCR NOx Catalyst
Fossil-Steam	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8813	SCR NOx Injection grid piping/valves
Fossil-Steam	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8814	SCR NOx Catalyst support material

TABLE B08-75 Pollution Control Equipment: NOx Reduction Systems - Selective Catalytic Reduction Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8815	SCR NOx Soot blowers
Fossil-Steam	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8816	SCR NOx Plugging
Fossil-Steam	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8817	SCR NOx Control system
Fossil-Steam	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8820	SCR NOx Ammonia injection grid piping/valves
Fossil-Steam	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8821	SCR NOx Ammonia tanks, piping and valves (not injection)
Fossil-Steam	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8822	SCR NOx Ammonia air blowers
Fossil-Steam	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8823	SCR NOx Other ammonia system problems
Fossil-Steam	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8825	Other SCR NOx problems
Notes: 1) For use with Unit Codes 100-199 and 600-649. 2) Use code 360 for Low NOx Burners.					

TABLE B08-76 Pollution Control Equipment: NOx Reduction Systems - Selective Non-Catalytic Reduction Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8800	SNCR NOx Reagent
Fossil-Steam	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8801	SNCR NOx Carrier gas
Fossil-Steam	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8802	SNCR NOx Control system
Fossil-Steam	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8803	SNCR Performance Testing
Fossil-Steam	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8809	Other SNCR NOx problems
Notes: 1) For use with Unit Codes 100-199 and 600-649. 2) Use code 360 for Low NOx Burners.					

TABLE B08-77 Pollution Control Equipment: Precipitators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Pollution Control Equipment	Precipitators		8550	Electrostatic precipitator fouling
Fossil-Steam	Pollution Control Equipment	Precipitators		8551	Electrostatic precipitator field out of service
Fossil-Steam	Pollution Control Equipment	Precipitators		8560	Electrostatic precipitator problems
Fossil-Steam	Pollution Control Equipment	Precipitators		8570	Mechanical precipitator fouling
Fossil-Steam	Pollution Control Equipment	Precipitators		8580	Mechanical precipitator problems
Fossil-Steam	Pollution Control Equipment	Precipitators		8590	Other precipitator problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-78 Pollution Control Equipment: Wet Scrubbers - Chemical Supply					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8000	Chemical feed storage, mill feeders, and conveyors
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8002	Screw conveyors
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8003	Bucket elevators
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8006	Weigh feeders
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8010	Crushers/mills
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8020	Mill slurry tanks supply problems
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8030	Classifiers
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8040	Slurry transfer pumps and motors
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8050	Chemical unavailability

TABLE B08-78 Pollution Control Equipment: Wet Scrubbers - Chemical Supply					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8099	Other chemical supply problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-79 Pollution Control Equipment: Wet Scrubbers - Miscellaneous (Wet Scrubber)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8400	Scrubber gas discharge reheaters - general
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8402	Scrubber gas discharge reheaters - vibration
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8404	Scrubber gas discharge reheaters - tube leaks
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8406	Scrubber gas discharge reheaters - ducts
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8410	Scrubber instruments and controls
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8415	Liquid level controls
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8420	Heat tracer
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8425	Miscellaneous mechanical failures
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8426	Miscellaneous electrical failures
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8430	Stack damage related to scrubber system
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8440	Major overhaul
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8450	Inspection
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8460	Testing
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8470	SO2 monitor

TABLE B08-79 Pollution Control Equipment: Wet Scrubbers - Miscellaneous (Wet Scrubber)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8499	Other miscellaneous wet scrubber problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-80 Pollution Control Equipment: Wet Scrubbers - Piping, Ducting, Dampers, and Fans					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8200	Piping
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8210	Valves
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8220	Strainers or filters
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8225	Drain pots
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8230	Ducting
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8235	Demister
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8240	Bypass dampers
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8250	Dampers other than bypass
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8260	Scrubber booster I.D. fan (fan specific to the scrubber)
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8261	Scrubber booster I.D. fan drive
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8262	Scrubber booster I.D. fan vibration (fan specific to the scrubber)
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8264	Scrubber booster I.D. fan blades (fan specific to the scrubber)
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8265	Scrubber booster I.D. fan dampers
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8270	Scrubber booster F.D. fan (fan specific to the scrubber)

TABLE B08-80 Pollution Control Equipment: Wet Scrubbers - Piping, Ducting, Dampers, and Fans					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8271	Scrubber booster F.D. fan drive
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8272	Scrubber booster F.D. fan vibration (fan specific to the scrubber)
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8274	Scrubber booster F.D. fan blades (fan specific to the scrubber)
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8275	Scrubber booster F.D. fan dampers
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8280	Reagent feed piping
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8290	Demister wash piping assembly
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8299	Other piping, ducting, damper, and fan problems
Notes: 1) For use with Unit Codes 100-199 and 600-649. 2) Use code 9510 for outages or deratings required to install pollution control equipment. Use codes 9600 to 9650 only when the pollution control equipment problems are not responsible for exceeding emission limits.					

TABLE B08-81 Pollution Control Equipment: Wet Scrubbers - Waste Disposal and Recovery					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8300	Waste disposal/recovery tanks
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8310	Waste disposal/recovery pumps
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8320	Waste disposal ponds
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8325	Ash disposal problems
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8330	Dewatering equipment (thickener, centrifuge, etc.)
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8335	Dryers
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8340	Centrifuge/vacuum filter
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8345	Calciners

TABLE B08-81 Pollution Control Equipment: Wet Scrubbers - Waste Disposal and Recovery					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8349	Other waste disposal and recovery problems
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8399	Solids conveying and mixing system problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-82 Pollution Control Equipment: Wet Scrubbers - Wet Scrubber					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8100	Scrubber/absorber tower or module
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8110	Spray nozzles
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8115	Disc scrubber throats
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8120	Spray pumps and motors
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8125	Scrubber recycle (liquid) pumps
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8127	Scrubber recycle (liquid) pump motors
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8130	Recirculation tanks including agitators
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8140	Reaction tanks including agitators
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8150	Tubes
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8160	Mist eliminators/demisters and washdown
Fossil-Steam	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8199	Other scrubber problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

REGULATORY, SAFETY, ENVIRONMENTAL

Use these codes only for events not directly attributable to equipment failures. Inspections or testing of certain equipment due to regulation are reported using the appropriate equipment cause codes, and the fact that it was a regulatory requirement noted in the verbal description section.

TABLE B08-83 Regulatory, Safety, Environmental: Other Operating Environmental Limitations

UNIT TYPE	SYSTEM	COMPONENT	SUB-COMPONENT	CAUSE CODE	DESCRIPTION
Fossil-Steam	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9660	Thermal discharge limits - fossil and nuclear
Fossil-Steam	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9670	Noise limits (not for personnel safety) – fossil and nuclear
Fossil-Steam	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9677	Noise limits testing - fossil
Fossil-Steam	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9680	Fish kill - fossil and nuclear
Fossil-Steam	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9690	Other miscellaneous operational environmental limits - fossil and nuclear
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-84 Regulatory, Safety, Environmental: Regulatory

UNIT TYPE	SYSTEM	COMPONENT	SUB-COMPONENT	CAUSE CODE	DESCRIPTION
Fossil-Steam	Regulatory, Safety, Environmental	Regulatory		9504	Regulatory (environmental) proceedings and hearings - regulatory agency initiated
Fossil-Steam	Regulatory, Safety, Environmental	Regulatory		9506	Regulatory (environmental) proceedings and hearings - intervenor initiated
Fossil-Steam	Regulatory, Safety, Environmental	Regulatory		9510	Plant modifications strictly for compliance with new or changed regulatory requirements (scrubbers, cooling towers, etc.)
Fossil-Steam	Regulatory, Safety, Environmental	Regulatory		9520	Oil spill in Gulf of Mexico (OMC)
Fossil-Steam	Regulatory, Safety, Environmental	Regulatory		9590	Miscellaneous regulatory (this code is primarily intended for use with event contribution code 2 to indicate that a regulatory-related

TABLE B08-84 Regulatory, Safety, Environmental: Regulatory					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
					factor contributed to the primary cause of the event)
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-85 Regulatory, Safety, Environmental: Safety					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Regulatory, Safety, Environmental	Safety		9700	OSHA-related retrofit or inspection
Fossil-Steam	Regulatory, Safety, Environmental	Safety		9720	Other safety problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-86 Regulatory, Safety, Environmental: Stack Emission					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Regulatory, Safety, Environmental	Stack Emission		9600	SO2 stack emissions - fossil
Fossil-Steam	Regulatory, Safety, Environmental	Stack Emission		9610	NOx stack emissions - fossil
Fossil-Steam	Regulatory, Safety, Environmental	Stack Emission		9616	CO stack emissions - fossil
Fossil-Steam	Regulatory, Safety, Environmental	Stack Emission		9620	Particulate stack emissions - fossil
Fossil-Steam	Regulatory, Safety, Environmental	Stack Emission		9630	Opacity - fossil
Fossil-Steam	Regulatory, Safety, Environmental	Stack Emission		9650	Other stack/exhaust emissions - fossil (use codes 9200 to 9290 if fuel quality causes pollution control equipment problems that result in excess stack emissions)
Fossil-Steam	Regulatory, Safety, Environmental	Stack Emission		9656	Other stack or exhaust emissions testing - fossil
Notes: 1) For use with Unit Codes 100-199 and 600-649. 2) Include exhaust emissions.					

STEAM TURBINE

Besides the turbine, this set includes the steam stop/control valves, turbine control system, and the turbine auxiliaries. The extraction steam codes are contained in the Balance of Plant set.

TABLE B08-87 Steam Turbine: Controls

UNIT TYPE	SYSTEM	COMPONENT	SUB-COMPONENT	CAUSE CODE	DESCRIPTION
Fossil-Steam	Steam Turbine	Controls		4290	Hydraulic system pumps
Fossil-Steam	Steam Turbine	Controls		4291	Hydraulic system coolers
Fossil-Steam	Steam Turbine	Controls		4292	Hydraulic system filters
Fossil-Steam	Steam Turbine	Controls		4293	Hydraulic system pipes and valves
Fossil-Steam	Steam Turbine	Controls		4299	Other hydraulic system problems
Fossil-Steam	Steam Turbine	Controls		4300	Turbine supervisory system (use codes 4290 to 4299 for hydraulic oil)
Fossil-Steam	Steam Turbine	Controls		4301	Turbine governing system
Fossil-Steam	Steam Turbine	Controls		4302	Turbine trip devices (including instruments)
Fossil-Steam	Steam Turbine	Controls		4303	Exhaust hood and spray controls
Fossil-Steam	Steam Turbine	Controls		4304	Automatic turbine control systems - mechanical
Fossil-Steam	Steam Turbine	Controls		4305	Automatic turbine control systems - mechanical - hydraulic
Fossil-Steam	Steam Turbine	Controls		4306	Automatic turbine control systems - electro-hydraulic - analog
Fossil-Steam	Steam Turbine	Controls		4307	Automatic turbine control systems - electro- hydraulic - digital
Fossil-Steam	Steam Turbine	Controls		4308	Automatic turbine control systems - digital control and monitoring
Fossil-Steam	Steam Turbine	Controls		4309	Other turbine instrument and control problems
Fossil-Steam	Steam Turbine	Controls		4310	Steam Turbine Control System - data highway
Fossil-Steam	Steam Turbine	Controls		4311	Steam Turbine Control System - hardware problems (including card failure)
Fossil-Steam	Steam Turbine	Controls		4312	Steam Turbine Control System - internal and termination wiring

TABLE B08-87 Steam Turbine: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Steam Turbine	Controls		4313	Steam Turbine Control System - logic problems
Fossil-Steam	Steam Turbine	Controls		4314	Steam Turbine Control System - upgrades
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-88 Steam Turbine: High Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Steam Turbine	High Pressure Turbine		4000	Outer casing
Fossil-Steam	Steam Turbine	High Pressure Turbine		4001	Inner casing
Fossil-Steam	Steam Turbine	High Pressure Turbine		4009	Nozzle bolting
Fossil-Steam	Steam Turbine	High Pressure Turbine		4010	Nozzles and nozzle blocks
Fossil-Steam	Steam Turbine	High Pressure Turbine		4011	Diaphragms
Fossil-Steam	Steam Turbine	High Pressure Turbine		4012	Buckets or blades
Fossil-Steam	Steam Turbine	High Pressure Turbine		4013	Diaphragms unit and shroud type
Fossil-Steam	Steam Turbine	High Pressure Turbine		4014	Bucket or blade fouling
Fossil-Steam	Steam Turbine	High Pressure Turbine		4015	Wheels or spindles
Fossil-Steam	Steam Turbine	High Pressure Turbine		4020	Shaft seals
Fossil-Steam	Steam Turbine	High Pressure Turbine		4021	Dummy rings
Fossil-Steam	Steam Turbine	High Pressure Turbine		4022	Gland rings
Fossil-Steam	Steam Turbine	High Pressure Turbine		4030	Rotor shaft
Fossil-Steam	Steam Turbine	High Pressure Turbine		4040	Bearings
Fossil-Steam	Steam Turbine	High Pressure Turbine		4041	Thrust bearings
Fossil-Steam	Steam Turbine	High Pressure Turbine		4099	Other high pressure turbine problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-89 Steam Turbine: Intermediate Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Steam Turbine	Intermediate Pressure Turbine		4100	Outer casing
Fossil-Steam	Steam Turbine	Intermediate Pressure Turbine		4101	Inner casing
Fossil-Steam	Steam Turbine	Intermediate Pressure Turbine		4109	Nozzle bolting
Fossil-Steam	Steam Turbine	Intermediate Pressure Turbine		4110	Nozzles and nozzle blocks
Fossil-Steam	Steam Turbine	Intermediate Pressure Turbine		4111	Diaphragms

TABLE B08-89 Steam Turbine: Intermediate Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Steam Turbine	Intermediate Pressure Turbine		4112	Buckets or blades
Fossil-Steam	Steam Turbine	Intermediate Pressure Turbine		4113	Bucket or blade fouling
Fossil-Steam	Steam Turbine	Intermediate Pressure Turbine		4115	Wheels or spindles
Fossil-Steam	Steam Turbine	Intermediate Pressure Turbine		4120	Shaft seals
Fossil-Steam	Steam Turbine	Intermediate Pressure Turbine		4121	Dummy rings
Fossil-Steam	Steam Turbine	Intermediate Pressure Turbine		4122	Gland rings
Fossil-Steam	Steam Turbine	Intermediate Pressure Turbine		4130	Rotor shaft
Fossil-Steam	Steam Turbine	Intermediate Pressure Turbine		4140	Bearings
Fossil-Steam	Steam Turbine	Intermediate Pressure Turbine		4141	Thrust bearings
Fossil-Steam	Steam Turbine	Intermediate Pressure Turbine		4199	Other intermediate pressure turbine problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-90 Steam Turbine: Low Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Steam Turbine	Low Pressure Turbine		4200	Outer casing
Fossil-Steam	Steam Turbine	Low Pressure Turbine		4201	Inner casing
Fossil-Steam	Steam Turbine	Low Pressure Turbine		4209	Nozzle bolting
Fossil-Steam	Steam Turbine	Low Pressure Turbine		4210	Nozzles and nozzle blocks
Fossil-Steam	Steam Turbine	Low Pressure Turbine		4211	Diaphragms
Fossil-Steam	Steam Turbine	Low Pressure Turbine		4212	Buckets or blades
Fossil-Steam	Steam Turbine	Low Pressure Turbine		4213	Bucket or blade fouling
Fossil-Steam	Steam Turbine	Low Pressure Turbine		4215	Wheels or spindles
Fossil-Steam	Steam Turbine	Low Pressure Turbine		4220	Shaft seals
Fossil-Steam	Steam Turbine	Low Pressure Turbine		4221	Dummy rings
Fossil-Steam	Steam Turbine	Low Pressure Turbine		4222	Gland rings
Fossil-Steam	Steam Turbine	Low Pressure Turbine		4230	Rotor shaft
Fossil-Steam	Steam Turbine	Low Pressure Turbine		4240	Bearings
Fossil-Steam	Steam Turbine	Low Pressure Turbine		4241	Thrust bearings
Fossil-Steam	Steam Turbine	Low Pressure Turbine		4250	Other low pressure turbine problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-91 Steam Turbine: Lube Oil					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Steam Turbine	Lube Oil		4280	Lube oil pumps
Fossil-Steam	Steam Turbine	Lube Oil		4281	Lube oil coolers
Fossil-Steam	Steam Turbine	Lube Oil		4282	Lube oil conditioners
Fossil-Steam	Steam Turbine	Lube Oil		4283	Lube oil system valves and piping
Fossil-Steam	Steam Turbine	Lube Oil		4284	Lube oil pump drive
Fossil-Steam	Steam Turbine	Lube Oil		4289	Other lube oil system problems
Notes: 1) For use with Unit Codes 100-199 and 600-649. 2) Do not include bearing failures due to lube oil.					

TABLE B08-92 Steam Turbine: Miscellaneous (Steam Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Steam Turbine	Miscellaneous (Steam Turbine)		4400	Major turbine overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)
Fossil-Steam	Steam Turbine	Miscellaneous (Steam Turbine)		4401	Inspection
Fossil-Steam	Steam Turbine	Miscellaneous (Steam Turbine)		4402	Minor turbine overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
Fossil-Steam	Steam Turbine	Miscellaneous (Steam Turbine)		4410	Turning gear and motor
Fossil-Steam	Steam Turbine	Miscellaneous (Steam Turbine)		4411	Steam turbine gear box (single shaft configuration)
Fossil-Steam	Steam Turbine	Miscellaneous (Steam Turbine)		4412	Steam turbine clutch (single shaft configuration)
Fossil-Steam	Steam Turbine	Miscellaneous (Steam Turbine)		4415	Shaft coupling mechanism
Fossil-Steam	Steam Turbine	Miscellaneous (Steam Turbine)		4420	Vibration of the turbine generator unit that cannot be attributed to a specific cause such as bearings or blades (use this code for balance moves)
Fossil-Steam	Steam Turbine	Miscellaneous (Steam Turbine)		4430	Gland seal system
Fossil-Steam	Steam Turbine	Miscellaneous (Steam Turbine)		4450	Water induction
Fossil-Steam	Steam Turbine	Miscellaneous (Steam Turbine)		4460	Turbine overspeed trip test
Fossil-Steam	Steam Turbine	Miscellaneous (Steam Turbine)		4470	Differential expansion
Fossil-Steam	Steam Turbine	Miscellaneous (Steam Turbine)		4490	Turbine performance testing (use code 9999 for total unit performance testing)

TABLE B08-92 Steam Turbine: Miscellaneous (Steam Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Steam Turbine	Miscellaneous (Steam Turbine)		4499	Other miscellaneous steam turbine problems
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-93 Steam Turbine: Piping					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Steam Turbine	Piping		4270	Crossover or under piping
Fossil-Steam	Steam Turbine	Piping		4279	Miscellaneous turbine piping
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

TABLE B08-94 Steam Turbine: Valves					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Fossil-Steam	Steam Turbine	Valves		4260	Main stop valves
Fossil-Steam	Steam Turbine	Valves		4261	Control valves
Fossil-Steam	Steam Turbine	Valves		4262	Intercept valves
Fossil-Steam	Steam Turbine	Valves		4263	Reheat stop valves
Fossil-Steam	Steam Turbine	Valves		4264	Combined intercept valves
Fossil-Steam	Steam Turbine	Valves		4265	Miscellaneous drain and vent valves
Fossil-Steam	Steam Turbine	Valves		4266	Main stop valve testing
Fossil-Steam	Steam Turbine	Valves		4267	Control valve testing
Fossil-Steam	Steam Turbine	Valves		4268	Reheat/intercept valve testing
Fossil-Steam	Steam Turbine	Valves		4269	Other turbine valves (including LP steam admission valves)
Notes: 1) For use with Unit Codes 100-199 and 600-649.					

Appendix B09: Index To Gas Turbine/Jet Engine Unit Cause Codes

GAS TURBINE/JET ENGINE UNITS

INDEX TO SYSTEM/COMPONENT/SUB-COMPONENT CAUSE CODE TABLES			
TABLE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**
B09-1	Balance of Plant	Auxiliary Systems	Auxiliary Steam
B09-2	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems
B09-3	Balance of Plant	Auxiliary Systems	Fire Protection System
B09-4	Balance of Plant	Auxiliary Systems	Instrument Air
B09-5	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System
B09-6	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)
B09-7	Balance of Plant	Auxiliary Systems	Service Air
B09-8	Balance of Plant	Auxiliary Systems	Service Water (Open System)
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B09-10	Balance of Plant	Miscellaneous (Balance of Plant)	
B09-11	Balance of Plant	Power Station Switchyard	
B09-12	Expander Turbine	Expander Turbine	
B09-13	External	Catastrophe	
B09-14	External	Economic	
B09-15	External	Fuel Quality	
B09-16	External	Miscellaneous (External)	
B09-17	Gas Turbine	Auxiliary Systems	
B09-18	Gas Turbine	Exhaust Systems	
B09-19	Gas Turbine	Fuel, Ignition, and Combustion Systems	
B09-20	Gas Turbine	Inlet Air System and Compressors	Compressors
B09-21	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters
B09-22	Gas Turbine	Miscellaneous (Gas Turbine)	
B09-23	Gas Turbine	Turbine	
B09-24	Generator	Controls	
B09-25	Generator	Cooling System	
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B09-27	Generator	Generator	
B09-28	Generator	Miscellaneous (Generator)	
B09-29	Inactive States	Inactive States	
B09-30	Jet Engine	Auxiliary Systems	
B09-31	Jet Engine	Exhaust Systems	
B09-32	Jet Engine	Fuel, Ignition, and Combustion Systems	

INDEX TO SYSTEM/COMPONENT/SUB-COMPONENT CAUSE CODE TABLES			
TABLE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**
B09-33	Jet Engine	Inlet Air System and Compressors	Compressors
B09-34	Jet Engine	Inlet Air System and Compressors	Ducts and Filters
B09-35	Jet Engine	Miscellaneous (Jet Engine)	
B09-36	Jet Engine	Turbine	
B09-37	Performance	Performance	
B09-38	Personnel or Procedural Errors	Personnel or Procedural Errors	
B09-39	Pollution Control Equipment	CO Reduction	
B09-40	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)	
B09-41	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)	
B09-42	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters
B09-43	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems
B09-44	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems
B09-45	Regulatory, Safety, Environmental	Other Operating Environmental Limitations	
B09-46	Regulatory, Safety, Environmental	Regulatory	
B09-47	Regulatory, Safety, Environmental	Safety	
B09-48	Regulatory, Safety, Environmental	Stack Emission	

BALANCE OF PLANT

TABLE B09-1 Balance of Plant: Auxiliary Systems - Auxiliary Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3830	Auxiliary boiler
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3831	Auxiliary steam piping
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3832	Auxiliary steam valves
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3833	Auxiliary steam controls and instruments
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3834	Auxiliary boiler tube leaks
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3839	Other auxiliary steam problems
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

TABLE B09-2 Balance of Plant: Auxiliary Systems - Closed Cooling Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3820	Closed cooling water pumps and motors
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3821	Closed cooling water piping
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3822	Closed cooling water valves
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3823	Closed cooling water heat exchangers
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3824	Closed cooling water system fouling
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3829	Other closed cooling water system problems
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

TABLE B09-3 Balance of Plant: Auxiliary Systems - Fire Protection System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Fire Protection System	3860	Fire protection system pumps
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Fire Protection System	3861	Fire protection system piping
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Fire Protection System	3862	Fire protection system valves
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Fire Protection System	3863	Fire protection system fouling
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Fire Protection System	3864	Fire protection system instrumentation and controls
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Fire Protection System	3869	Other fire protection system problems
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

TABLE B09-4 Balance of Plant: Auxiliary Systems - Instrument Air					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Instrument Air	3850	Instrument air compressors

TABLE B09-4 Balance of Plant: Auxiliary Systems - Instrument Air					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Instrument Air	3851	Instrument air piping
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Instrument Air	3852	Instrument air valves
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Instrument Air	3853	Instrument air dryers
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Instrument Air	3854	N2 backup to instrument air
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Instrument Air	3859	Other instrument air problems
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

TABLE B09-5 Balance of Plant: Auxiliary Systems - Low-pressure Gas Compression System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3870	Fuel Gas Compressor and Motors
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3871	Fuel Gas Compressor Piping
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3872	Fuel Gas Compressor Valves
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3873	Fuel Gas Compressor Heat Exchangers
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3874	Fuel Gas Compressor Controls and Instrumentation
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3875	Fuel Gas Compressor Filters
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3876	Fuel Gas Compressor Fire System
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3879	Fuel Gas Compressor - other
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

TABLE B09-6 Balance of Plant: Auxiliary Systems - Miscellaneous (Auxiliary Systems)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	3898	Miscellaneous plant auxiliary process and services instrumentation and controls
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	3899	Other miscellaneous auxiliary system problems
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

TABLE B09-7 Balance of Plant: Auxiliary Systems - Service Air					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Service Air	3840	Service air compressors
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Service Air	3841	Service air piping
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Service Air	3842	Service air valves
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Service Air	3843	Service air dryers
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Service Air	3849	Other service air problems
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

TABLE B09-8 Balance of Plant: Auxiliary Systems - Service Water (Open System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3810	Service water pumps and motors
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3811	Service water piping
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3812	Service water valves
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3813	Service water heat exchangers
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3814	Service water system fouling

TABLE B09-8 Balance of Plant: Auxiliary Systems - Service Water (Open System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3819	Other service water problems
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

TABLE B09-9 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3600	Switchyard transformers and associated cooling systems - external (OMC)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3601	Switchyard transformers and associated cooling systems - external (not OMC)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3610	Switchyard circuit breakers - external (not OMC)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3611	Switchyard circuit breakers - external (OMC)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3612	Switchyard system protection devices - external (OMC)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3613	Switchyard system protection devices - external (not OMC)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3618	Other switchyard equipment - external (not OMC)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3619	Other switchyard equipment - external (OMC)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3620	Main transformer
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3621	Unit auxiliaries transformer
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3622	Station service startup transformer
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3623	Auxiliary generators
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3624	Auxiliary generator voltage supply system

TABLE B09-9 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3629	Other switchyard or high voltage system problems - external
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3630	400-700 volt transformers
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3631	400-700 volt circuit breakers
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3632	400-700 volt conductors and buses
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3633	400-700 volt insulators
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3634	400-700 volt protection devices
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3639	Other 400-700 volt problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3640	AC instrument power transformers
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3641	AC Circuit breakers
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3642	AC Conductors and buses
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3643	AC Inverters
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3644	AC Protection devices
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3649	Other AC instrument power problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3650	DC instrument power battery chargers
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3651	DC circuit breakers
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3652	DC conductors and buses
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3653	DC protection devices
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3659	Other DC power problems

TABLE B09-9 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3660	4000-7000 volt transformers
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3661	4000-7000 volt circuit breakers
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3662	4000-7000 volt conductors and buses
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3663	4000-7000 volt insulators
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3664	4000-7000 volt protection devices
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3669	Other 4000-7000 volt problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3670	12-15kV transformers
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3671	12-15kV circuit breakers
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3672	12-15kV conductors and buses
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3673	12-15kV insulators
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3674	12-15kV protection devices
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3679	Other 12-15kV problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3680	Other voltage transformers
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3681	Other voltage circuit breakers
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3682	Other voltage conductors and buses
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3683	Other voltage insulators
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3684	Other voltage protection devices
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3689	Other voltage problems

TABLE B09-9 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Electrical		3690	Station Service Power Distribution System, General
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

TABLE B09-10 Balance of Plant: Miscellaneous (Balance of Plant)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Miscellaneous (Balance of Plant)		3950	Process computer
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Miscellaneous (Balance of Plant)		3960	Thermal derating (thermal efficiency losses in balance of plant when specific cause(s) unknown)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Miscellaneous (Balance of Plant)		3970	Distributive Control System (DCS) - process computer
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Miscellaneous (Balance of Plant)		3971	DCS - data highway
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Miscellaneous (Balance of Plant)		3972	DCS - hardware problems (including card failure)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Miscellaneous (Balance of Plant)		3973	DCS - internal and termination wiring
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Miscellaneous (Balance of Plant)		3974	DCS - logic problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Miscellaneous (Balance of Plant)		3975	DCS - upgrades
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Miscellaneous (Balance of Plant)		3979	Other DCS problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Miscellaneous (Balance of Plant)		3980	Programmable Logic Controller (PLC)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Miscellaneous (Balance of Plant)		3981	PLC - data highway
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Miscellaneous (Balance of Plant)		3982	PLC - hardware problems (including card failure)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Miscellaneous (Balance of Plant)		3983	PLC - internal and termination wiring

TABLE B09-10 Balance of Plant: Miscellaneous (Balance of Plant)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Miscellaneous (Balance of Plant)		3984	PLC - logic problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Miscellaneous (Balance of Plant)		3985	PLC - upgrades
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Miscellaneous (Balance of Plant)		3989	Other PLC problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Miscellaneous (Balance of Plant)		3995	Powerhouse heating and ventilating systems
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Miscellaneous (Balance of Plant)		3996	Air conditioning systems - rooms and areas
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Miscellaneous (Balance of Plant)		3998	Balance of plant overhaul/outage
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Miscellaneous (Balance of Plant)		3999	Other miscellaneous balance of plant problems
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

TABLE B09-11 Balance of Plant: Power Station Switchyard					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Power Station Switchyard		3700	Power Station switchyard (non generating unit equipment)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Power Station Switchyard		3710	Transmission line (connected to powerhouse switchyard to 1st Substation)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Power Station Switchyard		3720	Transmission equipment at the 1st substation (see code 9300 if applicable)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Balance of Plant	Power Station Switchyard		3730	Transmission equipment beyond the 1st substation (see code 9300 if applicable)
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

EXPANDER TURBINE

TABLE B09-12 Expander Turbine: Expander Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Expander Turbine	Expander Turbine		7800	Couplings
Gas Turbine/Jet Engine (Simple Cycle Operation)	Expander Turbine	Expander Turbine		7810	Shaft
Gas Turbine/Jet Engine (Simple Cycle Operation)	Expander Turbine	Expander Turbine		7820	Bearings
Gas Turbine/Jet Engine (Simple Cycle Operation)	Expander Turbine	Expander Turbine		7830	Blades
Gas Turbine/Jet Engine (Simple Cycle Operation)	Expander Turbine	Expander Turbine		7840	Discs
Gas Turbine/Jet Engine (Simple Cycle Operation)	Expander Turbine	Expander Turbine		7850	Spacers
Gas Turbine/Jet Engine (Simple Cycle Operation)	Expander Turbine	Expander Turbine		7860	Nozzles/vanes
Gas Turbine/Jet Engine (Simple Cycle Operation)	Expander Turbine	Expander Turbine		7870	Heat shields
Gas Turbine/Jet Engine (Simple Cycle Operation)	Expander Turbine	Expander Turbine		7880	Exhaust diffusers
Gas Turbine/Jet Engine (Simple Cycle Operation)	Expander Turbine	Expander Turbine		7890	Seal oil system and seals
Gas Turbine/Jet Engine (Simple Cycle Operation)	Expander Turbine	Expander Turbine		7900	Inner casing
Gas Turbine/Jet Engine (Simple Cycle Operation)	Expander Turbine	Expander Turbine		7910	Outer exhaust casing
Gas Turbine/Jet Engine (Simple Cycle Operation)	Expander Turbine	Expander Turbine		7920	Lube oil system
Gas Turbine/Jet Engine (Simple Cycle Operation)	Expander Turbine	Expander Turbine		7930	Controls and instrumentation
Gas Turbine/Jet Engine (Simple Cycle Operation)	Expander Turbine	Expander Turbine		7940	Evactor
Gas Turbine/Jet Engine (Simple Cycle Operation)	Expander Turbine	Expander Turbine		7950	Major overhaul
Gas Turbine/Jet Engine (Simple Cycle Operation)	Expander Turbine	Expander Turbine		7960	Other expander turbine problems
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

EXTERNAL

Use this set of codes to report events caused by external factors (flood, lightning, etc.); economic factors (lack of fuel, labor strikes, etc.); operator training; and transmission system problems external to the plant.

TABLE B09-13 External: Catastrophe					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Catastrophe		9000	Flood
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Catastrophe		9001	Drought
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Catastrophe		9010	Fire including wildfires, not related to a specific component
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Catastrophe		9020	Lightning
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Catastrophe		9025	Geomagnetic disturbance
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Catastrophe		9030	Earthquake
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Catastrophe		9031	Tornado
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Catastrophe		9035	Hurricane
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Catastrophe		9036	Storms (ice, snow, etc)
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Catastrophe		9040	Other catastrophe
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Catastrophe		9090	Physical Security Incident
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Catastrophe		9091	Physical Security Incident (OMC)
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Catastrophe		9092	Cyber Security Incident
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Catastrophe		9093	Cyber Security Incident (OMC)
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

TABLE B09-14 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Economic		0000	Reserve shutdown
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Economic		9130	Failure of fuel supplier to fulfill contractual obligations or a pre-arranged deal due to physical fuel disruptions or operational impairments (e.g. force majeure on a pipeline or compressor down; making the pipeline incapable of making its firm deliveries.)
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Economic		9131	Lack of fuel – due to contractual or tariff provisions that allow for service interruption or price fluctuations during peak demand periods.
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Economic		9134	Fuel conservation
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Economic		9136	Problems with Primary Fuel for Units with Secondary Fuel Operation
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Economic		9137	Ground water or other water supply problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Economic		9139	Ground water or other water supply problems(OMC)
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Economic		9140	Plant modifications to burn different fuel that are not regulatory mandated
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Economic		9150	Labor strikes company-wide problems or strikes outside the company's jurisdiction such as manufacturers (delaying repairs) or transportation (fuel supply) problems.
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Economic		9151	Labor strikes direct plant management grievances that

TABLE B09-14 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
					result in a walkout or strike are under plant management control.
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Economic		9160	Other economic problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Economic		9180	Economic (for internal use at plants only)
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Economic		9181	Economic (for internal use at plants only)
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Economic		9182	Economic (for internal use at plants only)
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Economic		9183	Economic (for internal use at plants only)
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Economic		9184	Economic (for internal use at plants only)
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Economic		9185	Economic (for internal use at plants only)
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Economic		9186	Economic (for internal use at plants only)
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Economic		9187	Economic (for internal use at plants only)
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Economic		9188	Economic (for internal use at plants only)
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Economic		9189	Economic (for internal use at plants only)
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Economic		9190	Economic (for internal use at plants only)
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Economic		9191	Economic (for internal use at plants only)
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Economic		9192	Economic (for internal use at plants only)
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Economic		9193	Economic (for internal use at plants only)
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Economic		9194	Economic (for internal use at plants only)

TABLE B09-14 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Economic		9195	Economic (for internal use at plants only)
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Economic		9196	Economic (for internal use at plants only)
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Economic		9197	Economic (for internal use at plants only)
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Economic		9198	Economic (for internal use at plants only)
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Economic		9199	Economic (for internal use at plants only)
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

TABLE B09-15 External: Fuel Quality					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Fuel Quality		9200	High ash content (OMC)
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Fuel Quality		9201	High ash content (not OMC)
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Fuel Quality		9205	Poor quality natural gas fuel, low heat content
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Fuel Quality		9220	High sulfur content (OMC)
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Fuel Quality		9221	High sulfur content (not OMC)
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Fuel Quality		9230	High vanadium content (OMC)
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Fuel Quality		9231	High vanadium content (not OMC)
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Fuel Quality		9240	High sodium content (OMC)
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Fuel Quality		9241	High sodium content (not OMC)
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Fuel Quality		9260	Low BTU oil (OMC)

TABLE B09-15 External: Fuel Quality					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Fuel Quality		9261	Low BTU oil (not OMC)
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Fuel Quality		9290	Other fuel quality problems (OMC)
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Fuel Quality		9291	Other fuel quality problems (not OMC)
Notes: 1) For use with Unit Codes 300–399 and 700–799. 2) Use code 9603 to 9653 (Gas Turbine) or 9604 to 9654 (Jet Engine) if the fuel quality results in excess stack emissions through no fault in the pollution control equipment. Use the appropriate equipment code to report fouling and slagging.					

TABLE B09-16 External: Miscellaneous (External)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Miscellaneous (External)		9300	Transmission system problems other than catastrophes (do not include switchyard problems in this category; see codes 3600 to 3629, 3720 to 3730)
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Miscellaneous (External)		9310	Operator training
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Miscellaneous (External)		9320	Other miscellaneous external problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	External	Miscellaneous (External)		9340	Synchronous Condenser Operation
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

GAS TURBINE

TABLE B09-17 Gas Turbine: Auxiliary Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Auxiliary Systems		5110	Lube oil system - general
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Auxiliary Systems		5111	Lube oil pumps
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Auxiliary Systems		5112	Lube oil coolers

TABLE B09-17 Gas Turbine: Auxiliary Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Auxiliary Systems		5113	Lube oil valves/piping
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Auxiliary Systems		5114	Lube oil filters
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Auxiliary Systems		5115	Oil vapor extractor
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Auxiliary Systems		5116	Power Augmentation System Equipment
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Auxiliary Systems		5117	Power augmentation piping
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Auxiliary Systems		5118	Power augmentation valves
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Auxiliary Systems		5119	Power augmentation controls
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Auxiliary Systems		5120	Hydraulic oil system
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Auxiliary Systems		5121	Hydraulic oil system pumps
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Auxiliary Systems		5122	Hydraulic oil system piping/valves
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Auxiliary Systems		5130	Starting system (including motor)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Auxiliary Systems		5140	Battery and charger system
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Auxiliary Systems		5150	Turning gear and motor
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Auxiliary Systems		5151	Load gear compartment
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Auxiliary Systems		5160	Cooling and seal air system
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Auxiliary Systems		5170	Cooling water system
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Auxiliary Systems		5180	Anti-icing system
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Auxiliary Systems		5190	Other auxiliary system problems

TABLE B09-17 Gas Turbine: Auxiliary Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

TABLE B09-18 Gas Turbine: Exhaust Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Exhaust Systems		5100	Chamber
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Exhaust Systems		5101	Hoods
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Exhaust Systems		5102	Vanes/nozzles
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Exhaust Systems		5103	Silencer
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Exhaust Systems		5104	Cones
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Exhaust Systems		5105	Diverter Dampers
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Exhaust Systems		5106	Exhaust Stack
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Exhaust Systems		5108	High engine exhaust temperature
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Exhaust Systems		5109	Other exhaust problems (including high exhaust system temperature not attributable to a specific problem)
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

TABLE B09-19 Gas Turbine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Fuel, Ignition, and Combustion Systems		5040	Fuel tanks
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Fuel, Ignition, and Combustion Systems		5041	Fuel piping and valves
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Fuel, Ignition, and Combustion Systems		5042	Fuel nozzles/vanes

TABLE B09-19 Gas Turbine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Fuel, Ignition, and Combustion Systems		5043	Fuel filters
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Fuel, Ignition, and Combustion Systems		5044	Liquid fuel oil pump
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Fuel, Ignition, and Combustion Systems		5046	Liquid fuel oil transfer/forwarding pump
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Fuel, Ignition, and Combustion Systems		5047	Liquid fuel purge system
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Fuel, Ignition, and Combustion Systems		5048	Gas fuel system including controls and instrumentation
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Fuel, Ignition, and Combustion Systems		5049	Other fuel system problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Fuel, Ignition, and Combustion Systems		5050	Ignition system
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Fuel, Ignition, and Combustion Systems		5051	Pilot fuel piping and valves
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Fuel, Ignition, and Combustion Systems		5052	Pilot fuel nozzles/vanes
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Fuel, Ignition, and Combustion Systems		5053	Pilot fuel filters
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Fuel, Ignition, and Combustion Systems		5054	Water injection system
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Fuel, Ignition, and Combustion Systems		5060	Atomizing air system
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Fuel, Ignition, and Combustion Systems		5065	NOx water injection system including pump
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Fuel, Ignition, and Combustion Systems		5066	NOx steam injection system
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Fuel, Ignition, and Combustion Systems		5070	Combustor casing
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Fuel, Ignition, and Combustion Systems		5071	Combustor liner
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Fuel, Ignition, and Combustion Systems		5072	Combustor caps
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Fuel, Ignition, and Combustion Systems		5073	Flame scanners

TABLE B09-19 Gas Turbine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Fuel, Ignition, and Combustion Systems		5074	Flashback including instrumentation
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Fuel, Ignition, and Combustion Systems		5075	Blade path temperature spread
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Fuel, Ignition, and Combustion Systems		5079	Other combustor problems
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

TABLE B09-20 Gas Turbine: Inlet Air System and Compressors - Compressors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Inlet Air System and Compressors	Compressors	5010	High pressure shaft
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Inlet Air System and Compressors	Compressors	5011	High pressure bearings
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Inlet Air System and Compressors	Compressors	5012	High pressure blades/buckets
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Inlet Air System and Compressors	Compressors	5013	Compressor casing and bolts
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Inlet Air System and Compressors	Compressors	5014	Compressor diaphragms
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Inlet Air System and Compressors	Compressors	5015	Compressor seals
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Inlet Air System and Compressors	Compressors	5016	High pressure compressor bleed valves
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Inlet Air System and Compressors	Compressors	5017	Low pressure compressor bleed valves
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Inlet Air System and Compressors	Compressors	5019	Other high pressure problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Inlet Air System and Compressors	Compressors	5020	Low pressure shaft
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Inlet Air System and Compressors	Compressors	5021	Low pressure bearings
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Inlet Air System and Compressors	Compressors	5022	Low pressure blades/buckets

TABLE B09-20 Gas Turbine: Inlet Air System and Compressors - Compressors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Inlet Air System and Compressors	Compressors	5029	Other low pressure problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Inlet Air System and Compressors	Compressors	5030	Supercharging fans
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Inlet Air System and Compressors	Compressors	5035	Compressor washing
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Inlet Air System and Compressors	Compressors	5036	Compressor shaft and bearings for two-shaft machines
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Inlet Air System and Compressors	Compressors	5037	Inlet bleed heat valve
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Inlet Air System and Compressors	Compressors	5039	Other compressor problems
Notes: 1) For use with Unit Codes 300–399 and 700–799. 2) Use HP compressor if only one.					

TABLE B09-21 Gas Turbine: Inlet Air System and Compressors - Ducts and Filters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5000	Inlet air ducts
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5001	Inlet air vanes/nozzles
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5002	Inlet air filters
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5003	Inlet cone
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5004	Inlet air chillers
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5005	Inlet air evaporative coolers
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5006	Inlet air foggers
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5009	Other inlet air problems
Notes: 1) For use with Unit Codes 300–399 and 700–799. 2) Use HP compressor if only one.					

TABLE B09-22 Gas Turbine: Miscellaneous (Gas Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Miscellaneous (Gas Turbine)		5200	Reduction gear
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Miscellaneous (Gas Turbine)		5201	Load shaft and bearings
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Miscellaneous (Gas Turbine)		5205	Main coupling between the turbine and generator
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Miscellaneous (Gas Turbine)		5206	Clutch
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Miscellaneous (Gas Turbine)		5210	Intercoolers
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Miscellaneous (Gas Turbine)		5220	Regenerators
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Miscellaneous (Gas Turbine)		5230	Heat shields
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Miscellaneous (Gas Turbine)		5240	Fire detection and extinguishing system (including hazardous gas detection system)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Miscellaneous (Gas Turbine)		5241	Fire in unit
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Miscellaneous (Gas Turbine)		5245	Gas Turbine Control System - data highway
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Miscellaneous (Gas Turbine)		5246	Gas Turbine Control System - hardware problems (including card failure)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Miscellaneous (Gas Turbine)		5247	Gas Turbine Control System - internal and termination wiring
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Miscellaneous (Gas Turbine)		5248	Gas Turbine Control System - logic problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Miscellaneous (Gas Turbine)		5249	Gas Turbine Control System - upgrades
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Miscellaneous (Gas Turbine)		5250	Other controls and instrumentation problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Miscellaneous (Gas Turbine)		5255	Computer

TABLE B09-22 Gas Turbine: Miscellaneous (Gas Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Miscellaneous (Gas Turbine)		5260	Major overhaul (use for non-specific overhaul only; see page B-CCGT-2)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Miscellaneous (Gas Turbine)		5261	Gas turbine/compressor washing
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Miscellaneous (Gas Turbine)		5262	Gas turbine exchange
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Miscellaneous (Gas Turbine)		5269	Combustion Inspection (CI)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Miscellaneous (Gas Turbine)		5270	Hot end inspection
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Miscellaneous (Gas Turbine)		5272	Boroscope inspection
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Miscellaneous (Gas Turbine)		5274	General unit inspection
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Miscellaneous (Gas Turbine)		5280	Vibration (not engine) in unit not attributable to bearings or other components
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Miscellaneous (Gas Turbine)		5285	Gas turbine vibration
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Miscellaneous (Gas Turbine)		5286	Gas turbine lockout
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Miscellaneous (Gas Turbine)		5290	Gas turbine performance testing - individual engines (use code 9999 for total unit performance testing)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Miscellaneous (Gas Turbine)		5292	Turbine Overspeed Trip Test - Gas Turbine
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Miscellaneous (Gas Turbine)		5295	Synchronous condenser equipment
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Miscellaneous (Gas Turbine)		5298	Main gas filter
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Miscellaneous (Gas Turbine)		5299	Other miscellaneous gas turbine problems
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

TABLE B09-23 Gas Turbine: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Turbine		5080	High pressure shaft
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Turbine		5081	High pressure bearings
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Turbine		5082	High pressure blades/buckets
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Turbine		5083	High pressure nozzles/vanes
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Turbine		5084	High pressure casing/expansion joints
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Turbine		5085	Interstage gas passages - HP
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Turbine		5086	High pressure shaft seals
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Turbine		5087	Thrust bearing
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Turbine		5088	Gas turbine cooling system
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Turbine		5089	Other high pressure problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Turbine		5090	Low pressure shaft
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Turbine		5091	Low pressure bearings
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Turbine		5092	Low pressure blades/buckets
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Turbine		5093	Low pressure nozzles/vanes
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Turbine		5094	Low pressure casing/expansion joints
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Turbine		5095	Interstage gas passages - LP
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Turbine		5096	Low pressure shaft seals
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Turbine		5097	Other low pressure problems

TABLE B09-23 Gas Turbine: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Turbine		5098	Expansion joints
Gas Turbine/Jet Engine (Simple Cycle Operation)	Gas Turbine	Turbine		5099	HP to LP coupling
Notes: 1) For use with Unit Codes 300–399 and 700–799. 2) Use HP if only one.					

GENERATOR

This set of codes contains the generator, exciter, generator cooling systems, and generator controls. Note the main leads up to and includes the generator output breaker in this set of codes.

TABLE B09-24 Generator: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Controls		4700	Generator voltage control
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Controls		4710	Generator metering devices
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Controls		4720	Generator synchronization equipment
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Controls		4730	Generator current and potential transformers
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Controls		4740	Emergency generator trip devices
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Controls		4741	Frequency Trip (81 Relay)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Controls		4750	Other generator controls and metering problems
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

TABLE B09-25 Generator: Cooling System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Cooling System		4610	Hydrogen cooling system piping and valves

TABLE B09-25 Generator: Cooling System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Cooling System		4611	Hydrogen coolers
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Cooling System		4612	Hydrogen storage system
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Cooling System		4613	Hydrogen seals
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Cooling System		4619	Other hydrogen system problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Cooling System		4620	Air cooling system
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Cooling System		4630	Liquid cooling system
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Cooling System		4640	Seal oil system and seals
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Cooling System		4650	Other cooling system problems
Notes: 1) For use with Unit Codes 300–399 and 700–799. 2) Report failures caused by water leaks into generator as codes 4500, 4510, etc.					

TABLE B09-26 Generator: Exciter					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Exciter		4600	Exciter drive - motor
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Exciter		4601	Exciter field rheostat
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Exciter		4602	Exciter commutator and brushes
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Exciter		4603	Solid state exciter element
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Exciter		4604	Exciter drive - shaft
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Exciter		4605	Exciter transformer
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Exciter		4609	Other exciter problems
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

TABLE B09-27 Generator: Generator					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Generator		4500	Rotor windings (including damper windings and fan blades on hydro units)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Generator		4510	Rotor collector rings
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Generator		4511	Rotor, General
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Generator		4512	Retaining Rings
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Generator		4520	Stator windings, bushings, and terminals
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Generator		4530	Stator core iron
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Generator		4535	Stator, General
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Generator		4536	Generator Heaters
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Generator		4540	Brushes and brush rigging
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Generator		4550	Generator bearings and lube oil system (including thrust bearings on hydro units)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Generator		4551	Generator bearings
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Generator		4552	Generator lube oil system
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Generator		4555	Bearing cooling system
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Generator		4560	Generator vibration (excluding vibration due to failed bearing and other components)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Generator		4570	Generator casing
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Generator		4580	Generator end bells and bolting

TABLE B09-27 Generator: Generator					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Generator		4590	Generator brakes
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

TABLE B09-28 Generator: Miscellaneous (Generator)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Miscellaneous (Generator)		4800	Generator main leads
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Miscellaneous (Generator)		4805	Generator Bus Duct Cooling System
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Miscellaneous (Generator)		4810	Generator output breaker
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Miscellaneous (Generator)		4830	Major generator overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Miscellaneous (Generator)		4831	Minor generator overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Miscellaneous (Generator)		4840	Inspection
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Miscellaneous (Generator)		4841	Generator doble testing
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Miscellaneous (Generator)		4842	Reactive and capability testing
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Miscellaneous (Generator)		4850	Core monitor alarm
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Miscellaneous (Generator)		4860	Generator neutral grounding equipment
Gas Turbine/Jet Engine (Simple Cycle Operation)	Generator	Miscellaneous (Generator)		4899	Other miscellaneous generator problems
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

INACTIVE STATES

TABLE B09-29 Inactive States: Inactive States					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Inactive States	Inactive States		2	Inactive Reserve Shutdown
Gas Turbine/Jet Engine (Simple Cycle Operation)	Inactive States	Inactive States		9990	Retired unit
Gas Turbine/Jet Engine (Simple Cycle Operation)	Inactive States	Inactive States		9991	Mothballed unit
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

JET ENGINE

TABLE B09-30 Jet Engine: Auxiliary Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Auxiliary Systems		5510	Lube oil system
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Auxiliary Systems		5516	Power Augmentation System Equipment
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Auxiliary Systems		5520	Hydraulic oil system
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Auxiliary Systems		5530	Starting system (including motor)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Auxiliary Systems		5540	Battery and charger system
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Auxiliary Systems		5550	Turning gear and motor
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Auxiliary Systems		5551	Load gear compartment
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Auxiliary Systems		5560	Cooling and seal air system
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Auxiliary Systems		5570	Cooling water system
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Auxiliary Systems		5580	Anti-icing system

TABLE B09-30 Jet Engine: Auxiliary Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Auxiliary Systems		5590	Other auxiliary system problems
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

TABLE B09-31 Jet Engine: Exhaust Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Exhaust Systems		5500	Chamber
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Exhaust Systems		5501	Hoods
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Exhaust Systems		5502	Vanes/nozzles
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Exhaust Systems		5503	Silencer
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Exhaust Systems		5504	Cones
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Exhaust Systems		5505	Diverter Dampers
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Exhaust Systems		5508	High engine exhaust temperature
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Exhaust Systems		5509	Other exhaust problems (including high exhaust temperature not attributable to a specific problem)
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

TABLE B09-32 Jet Engine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Fuel, Ignition, and Combustion Systems		5440	Fuel tanks
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Fuel, Ignition, and Combustion Systems		5441	Fuel piping and valves
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Fuel, Ignition, and Combustion Systems		5442	Fuel nozzles/vanes

TABLE B09-32 Jet Engine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Fuel, Ignition, and Combustion Systems		5443	Fuel filters
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Fuel, Ignition, and Combustion Systems		5444	Liquid fuel oil pump
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Fuel, Ignition, and Combustion Systems		5445	Liquid fuel oil transfer/forwarding pump
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Fuel, Ignition, and Combustion Systems		5446	Liquid fuel purge system
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Fuel, Ignition, and Combustion Systems		5447	Gas fuel system including controls and instrumentation
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Fuel, Ignition, and Combustion Systems		5449	Other fuel system problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Fuel, Ignition, and Combustion Systems		5450	Ignition system
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Fuel, Ignition, and Combustion Systems		5451	Pilot fuel piping and valves
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Fuel, Ignition, and Combustion Systems		5452	Pilot fuel nozzles/vanes
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Fuel, Ignition, and Combustion Systems		5453	Pilot fuel filters
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Fuel, Ignition, and Combustion Systems		5454	Water injection system
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Fuel, Ignition, and Combustion Systems		5455	Fuel nozzle/vane cooling air system
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Fuel, Ignition, and Combustion Systems		5460	Atomizing air system
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Fuel, Ignition, and Combustion Systems		5470	Combustor casing
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Fuel, Ignition, and Combustion Systems		5471	Combustor liner
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Fuel, Ignition, and Combustion Systems		5472	Combustor caps
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Fuel, Ignition, and Combustion Systems		5473	Flame scanners
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Fuel, Ignition, and Combustion Systems		5474	Flashback (including instrumentation)

TABLE B09-32 Jet Engine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Fuel, Ignition, and Combustion Systems		5475	Blade path temperature spread
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Fuel, Ignition, and Combustion Systems		5479	Other combustor problems
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

TABLE B09-33 Jet Engine: Inlet Air System and Compressors - Compressors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Inlet Air System and Compressors	Compressors	5410	High pressure shaft
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Inlet Air System and Compressors	Compressors	5411	High pressure bearings
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Inlet Air System and Compressors	Compressors	5412	High pressure blades/buckets
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Inlet Air System and Compressors	Compressors	5413	Other high pressure problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Inlet Air System and Compressors	Compressors	5414	Compressor diaphragms/vanes
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Inlet Air System and Compressors	Compressors	5420	Low pressure shaft
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Inlet Air System and Compressors	Compressors	5421	Low pressure bearings
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Inlet Air System and Compressors	Compressors	5422	Low pressure blades/buckets
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Inlet Air System and Compressors	Compressors	5429	Other low pressure problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Inlet Air System and Compressors	Compressors	5430	Supercharging fans
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Inlet Air System and Compressors	Compressors	5435	Compressor washing
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Inlet Air System and Compressors	Compressors	5436	Compressor shaft and bearings for two-shaft machines
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Inlet Air System and Compressors	Compressors	5439	Other compressor problems
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

TABLE B09-34 Jet Engine: Inlet Air System and Compressors - Ducts and Filters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5400	Inlet air ducts
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5401	Inlet air vanes/nozzles
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5402	Inlet air filters
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5403	Inlet and exhaust cones
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5404	Inlet air chillers
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5405	Inlet air evaporative coolers
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5406	Inlet air foggers
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5409	Other inlet air problems
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

TABLE B09-35 Jet Engine: Miscellaneous (Jet Engine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Miscellaneous (Jet Engine)		5600	Reduction gear
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Miscellaneous (Jet Engine)		5601	Load shaft and bearings
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Miscellaneous (Jet Engine)		5605	Main coupling between the turbine and generator
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Miscellaneous (Jet Engine)		5606	Clutch
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Miscellaneous (Jet Engine)		5610	Intercoolers
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Miscellaneous (Jet Engine)		5620	Regenerators
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Miscellaneous (Jet Engine)		5630	Heat shields

TABLE B09-35 Jet Engine: Miscellaneous (Jet Engine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Miscellaneous (Jet Engine)		5640	Fire detection and extinguishing system
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Miscellaneous (Jet Engine)		5641	Fire in unit
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Miscellaneous (Jet Engine)		5645	Jet Engine Control System - data highway
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Miscellaneous (Jet Engine)		5646	Jet Engine Control System - hardware problems (including card failure)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Miscellaneous (Jet Engine)		5647	Jet Engine Control System - internal and termination wiring
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Miscellaneous (Jet Engine)		5648	Jet Engine Control System - logic problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Miscellaneous (Jet Engine)		5649	Jet Engine Control System - upgrades
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Miscellaneous (Jet Engine)		5650	Other controls and instrumentation problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Miscellaneous (Jet Engine)		5660	Major overhaul (use for non-specific overhaul only; see page B-CCGT-2)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Miscellaneous (Jet Engine)		5661	Engine/compressor washing
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Miscellaneous (Jet Engine)		5662	Engine exchange
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Miscellaneous (Jet Engine)		5665	Engine shafts and bearings
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Miscellaneous (Jet Engine)		5670	Hot end inspection
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Miscellaneous (Jet Engine)		5672	Boroscope inspection
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Miscellaneous (Jet Engine)		5674	General unit inspection
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Miscellaneous (Jet Engine)		5680	Vibration (not engine) in unit not attributable to bearings or other components

TABLE B09-35 Jet Engine: Miscellaneous (Jet Engine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Miscellaneous (Jet Engine)		5685	Engine vibration
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Miscellaneous (Jet Engine)		5686	Jet engine lockout
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Miscellaneous (Jet Engine)		5690	Engine performance testing - individual engines (use code 9999 for total unit performance testing)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Miscellaneous (Jet Engine)		5692	Turbine Overspeed Trip Test - Jet Engine
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Miscellaneous (Jet Engine)		5695	Synchronous condenser equipment
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Miscellaneous (Jet Engine)		5699	Other miscellaneous jet engine problems
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

TABLE B09-36 Jet Engine: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Turbine		5480	High pressure shaft
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Turbine		5481	High pressure bearings
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Turbine		5482	High pressure blades/buckets
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Turbine		5483	High pressure nozzles/vanes
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Turbine		5484	High pressure casing/expansion joint
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Turbine		5485	Interstage gas passages
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Turbine		5486	High pressure shaft seals
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Turbine		5487	Thrust bearing

TABLE B09-36 Jet Engine: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Turbine		5489	Other high pressure problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Turbine		5490	Low pressure shaft
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Turbine		5491	Low pressure bearings
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Turbine		5492	Low pressure blades/buckets
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Turbine		5493	Low pressure nozzles/vanes
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Turbine		5494	Low pressure casing/expansion joints
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Turbine		5497	Other low pressure problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Turbine		5498	Expansion joints
Gas Turbine/Jet Engine (Simple Cycle Operation)	Jet Engine	Turbine		5499	Shaft seals
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

PERFORMANCE

TABLE B09-37 Performance: Performance					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Performance	Performance		9997	NERC Reliability Standard Requirement
Gas Turbine/Jet Engine (Simple Cycle Operation)	Performance	Performance		9998	Black start testing
Gas Turbine/Jet Engine (Simple Cycle Operation)	Performance	Performance		9999	Total unit performance testing (use appropriate codes for individual component testing)
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

PERSONNEL OR PROCEDURAL ERRORS

TABLE B09-38 Personnel or Procedural Errors: Personnel or Procedural Errors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Personnel or Procedural Errors	Personnel or Procedural Errors		9900	Operator error
Gas Turbine/Jet Engine (Simple Cycle Operation)	Personnel or Procedural Errors	Personnel or Procedural Errors		9910	Maintenance personnel error
Gas Turbine/Jet Engine (Simple Cycle Operation)	Personnel or Procedural Errors	Personnel or Procedural Errors		9920	Contractor error
Gas Turbine/Jet Engine (Simple Cycle Operation)	Personnel or Procedural Errors	Personnel or Procedural Errors		9930	Operating procedure error
Gas Turbine/Jet Engine (Simple Cycle Operation)	Personnel or Procedural Errors	Personnel or Procedural Errors		9940	Maintenance procedure error
Gas Turbine/Jet Engine (Simple Cycle Operation)	Personnel or Procedural Errors	Personnel or Procedural Errors		9950	Contractor procedure error
Gas Turbine/Jet Engine (Simple Cycle Operation)	Personnel or Procedural Errors	Personnel or Procedural Errors		9960	Staff shortage
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

POLLUTION CONTROL EQUIPMENT

TABLE B09-39 Pollution Control Equipment: CO Reduction					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	CO Reduction		8840	CO Active catalyst
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	CO Reduction		8841	CO Support materials
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	CO Reduction		8842	CO Plugging
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	CO Reduction		8845	Other CO reduction problems
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

TABLE B09-40 Pollution Control Equipment: Continuous Emissions Monitoring Systems (CEMS)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8700	CEMS Certification and Recertification
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8710	SO2 analyzer problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8720	NOx analyzer problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8730	CO analyzer problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8740	CO2 analyzer problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8750	O2 analyzer problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8760	Opacity monitor problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8770	Flow monitor problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8780	Data acquisition system problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8790	Miscellaneous CEMS problems
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

TABLE B09-41 Pollution Control Equipment: Miscellaneous (Pollution Control Equipment)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8656	Controls and instrumentation
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

TABLE B09-42 Pollution Control Equipment: NOx Reduction Systems - Catalytic Air Heaters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8830	CAH NOx Active catalyst
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8831	CAH NOx Support materials
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8832	CAH NOx Plugging
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8835	Other CAH problems
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

TABLE B09-43 Pollution Control Equipment: NOx Reduction Systems - Selective Catalytic Reduction Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8810	SCR NOx Reactor
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8811	SCR NOx Reagent
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8812	SCR NOx Catalyst
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8813	SCR NOx Injection grid piping/valves
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8814	SCR NOx Catalyst support material
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8815	SCR NOx Soot blowers
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8816	SCR NOx Plugging
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8817	SCR NOx Control system

TABLE B09-43 Pollution Control Equipment: NOx Reduction Systems - Selective Catalytic Reduction Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8820	SCR NOx Ammonia injection grid piping/valves
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8821	SCR NOx Ammonia tanks, piping and valves (not injection)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8822	SCR NOx Ammonia air blowers
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8823	SCR NOx Other ammonia system problems
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8825	Other SCR NOx problems
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

TABLE B09-44 Pollution Control Equipment: NOx Reduction Systems - Selective Non-Catalytic Reduction Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8800	SNCR NOx Reagent
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8801	SNCR NOx Carrier gas
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8802	SNCR NOx Control system
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8803	SNCR Performance Testing
Gas Turbine/Jet Engine (Simple Cycle Operation)	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8809	Other SNCR NOx problems
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

REGULATORY, SAFETY, ENVIRONMENTAL

Use these codes only for events not directly attributable to equipment failures. Inspections or testing of certain equipment due to regulation are reported using the appropriate equipment cause codes, and the fact that it was a regulatory requirement noted in the verbal description section.

TABLE B09-45 Regulatory, Safety, Environmental: Other Operating Environmental Limitations					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9663	Thermal discharge limits - gas turbines
Gas Turbine/Jet Engine (Simple Cycle Operation)	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9664	Thermal discharge limits - jet engines
Gas Turbine/Jet Engine (Simple Cycle Operation)	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9673	Noise limits (not for personnel safety) - gas turbines
Gas Turbine/Jet Engine (Simple Cycle Operation)	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9674	Noise limits (not for personnel safety) - jet engines
Gas Turbine/Jet Engine (Simple Cycle Operation)	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9678	Noise limits testing - gas turbines
Gas Turbine/Jet Engine (Simple Cycle Operation)	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9679	Noise limits testing - jet engines
Gas Turbine/Jet Engine (Simple Cycle Operation)	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9683	Fish kill - gas turbines
Gas Turbine/Jet Engine (Simple Cycle Operation)	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9684	Fish kill - jet engines
Gas Turbine/Jet Engine (Simple Cycle Operation)	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9693	Other miscellaneous operational environmental limits - gas turbines
Gas Turbine/Jet Engine (Simple Cycle Operation)	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9694	Other miscellaneous operational environmental limits - jet engines
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

TABLE B09-46 Regulatory, Safety, Environmental: Regulatory					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Regulatory, Safety, Environmental	Regulatory		9504	Regulatory (environmental) proceedings and hearings - regulatory agency initiated
Gas Turbine/Jet Engine (Simple Cycle Operation)	Regulatory, Safety, Environmental	Regulatory		9506	Regulatory (environmental) proceedings and hearings - intervenor initiated
Gas Turbine/Jet Engine (Simple Cycle Operation)	Regulatory, Safety, Environmental	Regulatory		9510	Plant modifications strictly for compliance with new or changed regulatory requirements (scrubbers, cooling towers, etc.)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Regulatory, Safety, Environmental	Regulatory		9520	Oil spill in Gulf of Mexico (OMC)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Regulatory, Safety, Environmental	Regulatory		9590	Miscellaneous regulatory (this code is primarily intended for use with event contribution code 2 to indicate that a regulatory-related factor contributed to the primary cause of the event)
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

TABLE B09-47 Regulatory, Safety, Environmental: Safety					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Regulatory, Safety, Environmental	Safety		9700	OSHA-related retrofit or inspection
Gas Turbine/Jet Engine (Simple Cycle Operation)	Regulatory, Safety, Environmental	Safety		9720	Other safety problems
Notes: 1) For use with Unit Codes 300–399 and 700–799.					

TABLE B09-48 Regulatory, Safety, Environmental: Stack Emission					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Gas Turbine/Jet Engine (Simple Cycle Operation)	Regulatory, Safety, Environmental	Stack Emission		9603	SO2 stack emissions - gas turbines
Gas Turbine/Jet Engine (Simple Cycle Operation)	Regulatory, Safety, Environmental	Stack Emission		9604	SO2 stack emissions - jet engines
Gas Turbine/Jet Engine (Simple Cycle Operation)	Regulatory, Safety, Environmental	Stack Emission		9613	NOx stack emissions - gas turbines
Gas Turbine/Jet Engine (Simple Cycle Operation)	Regulatory, Safety, Environmental	Stack Emission		9614	NOx stack emissions - jet engines
Gas Turbine/Jet Engine (Simple Cycle Operation)	Regulatory, Safety, Environmental	Stack Emission		9616	CO stack emissions - fossil
Gas Turbine/Jet Engine (Simple Cycle Operation)	Regulatory, Safety, Environmental	Stack Emission		9623	Particulate stack emissions - gas turbines
Gas Turbine/Jet Engine (Simple Cycle Operation)	Regulatory, Safety, Environmental	Stack Emission		9624	Particulate stack emissions - jet engines
Gas Turbine/Jet Engine (Simple Cycle Operation)	Regulatory, Safety, Environmental	Stack Emission		9633	Opacity - gas turbines
Gas Turbine/Jet Engine (Simple Cycle Operation)	Regulatory, Safety, Environmental	Stack Emission		9634	Opacity - jet engines
Gas Turbine/Jet Engine (Simple Cycle Operation)	Regulatory, Safety, Environmental	Stack Emission		9653	Other stack or exhaust emissions - gas turbines (use codes 9200 to 9290 if fuel quality causes pollution control equipment problems that result in excess stack emissions)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Regulatory, Safety, Environmental	Stack Emission		9654	Other stack or exhaust emissions - jet engines (use codes 9200 to 9290 if fuel quality causes pollution control equipment problems that result in excess stack emissions)
Gas Turbine/Jet Engine (Simple Cycle Operation)	Regulatory, Safety, Environmental	Stack Emission		9657	Other stack or exhaust emissions testing - gas turbines
Gas Turbine/Jet Engine (Simple Cycle Operation)	Regulatory, Safety, Environmental	Stack Emission		9658	Other stack or exhaust emissions testing - jet engines
Notes: 1) For use with Unit Codes 300–399 and 700–799. 2) Include exhaust emissions.					

Appendix B10: Index To Geothermal Unit Cause Codes

GEOTHERMAL UNITS

INDEX TO SYSTEM/COMPONENT/SUB-COMPONENT CAUSE CODE TABLES			
TABLE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**
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B10-2	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems
B10-3	Balance of Plant	Auxiliary Systems	Fire Protection System
B10-4	Balance of Plant	Auxiliary Systems	Instrument Air
B10-5	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)
B10-6	Balance of Plant	Auxiliary Systems	Open Cooling Water System
B10-7	Balance of Plant	Auxiliary Systems	Seal Air Fans
B10-8	Balance of Plant	Auxiliary Systems	Service Air
B10-9	Balance of Plant	Auxiliary Systems	Service Water (Open System)
B10-10	Balance of Plant	Circulating Water Systems	
B10-11	Balance of Plant	Condensate System	Miscellaneous (Condensate System)
B10-12	Balance of Plant	Condensate System	Pumps, Piping, and Valves
B10-13	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals
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B10-15	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment
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B10-17	Balance of Plant	Condensing System	Vacuum Equipment
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INDEX TO SYSTEM/COMPONENT/SUB-COMPONENT CAUSE CODE TABLES			
TABLE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**
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B10-35	Personnel or Procedural Errors	Personnel or Procedural Errors	
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B10-37	Pollution Control Equipment	Wet Scrubbers	Chemical Supply
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B10-39	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans
B10-40	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber
B10-41	Regulatory, Safety, Environmental	Regulatory	
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B10-47	Steam Turbine	Piping	
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BALANCE OF PLANT

TABLE B10-1 Balance of Plant: Auxiliary Systems - Auxiliary Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3830	Auxiliary boiler
Geothermal	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3831	Auxiliary steam piping
Geothermal	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3832	Auxiliary steam valves
Geothermal	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3833	Auxiliary steam controls and instruments
Geothermal	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3834	Auxiliary boiler tube leaks
Geothermal	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3835	Auxiliary boiler burner management system
Geothermal	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3839	Other auxiliary steam problems (also see extraction steam codes 3520 to 3529; startup bypass codes 0630 to 0660; and soot blower steam code 0870)
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-2 Balance of Plant: Auxiliary Systems - Closed Cooling Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3820	Closed cooling water pumps and motors
Geothermal	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3821	Closed cooling water piping
Geothermal	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3822	Closed cooling water valves
Geothermal	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3823	Closed cooling water heat exchangers
Geothermal	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3824	Closed cooling water system fouling
Geothermal	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3825	Closed cooling water instrumentation
Geothermal	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3826	Closed cooling water strainer
Geothermal	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3829	Other closed cooling water system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-3 Balance of Plant: Auxiliary Systems - Fire Protection System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Balance of Plant	Auxiliary Systems	Fire Protection System	3860	Fire protection system pumps
Geothermal	Balance of Plant	Auxiliary Systems	Fire Protection System	3861	Fire protection system piping
Geothermal	Balance of Plant	Auxiliary Systems	Fire Protection System	3862	Fire protection system valves
Geothermal	Balance of Plant	Auxiliary Systems	Fire Protection System	3863	Fire protection system fouling
Geothermal	Balance of Plant	Auxiliary Systems	Fire Protection System	3864	Fire protection system instrumentation and controls
Geothermal	Balance of Plant	Auxiliary Systems	Fire Protection System	3869	Other fire protection system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-4 Balance of Plant: Auxiliary Systems - Instrument Air					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Balance of Plant	Auxiliary Systems	Instrument Air	3850	Instrument air compressors
Geothermal	Balance of Plant	Auxiliary Systems	Instrument Air	3851	Instrument air piping
Geothermal	Balance of Plant	Auxiliary Systems	Instrument Air	3852	Instrument air valves
Geothermal	Balance of Plant	Auxiliary Systems	Instrument Air	3853	Instrument air dryers
Geothermal	Balance of Plant	Auxiliary Systems	Instrument Air	3854	N2 backup to instrument air
Geothermal	Balance of Plant	Auxiliary Systems	Instrument Air	3859	Other instrument air problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-5 Balance of Plant: Auxiliary Systems - Miscellaneous (Auxiliary Systems)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	3898	Miscellaneous plant auxiliary process and services instrumentation and controls
Geothermal	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	3899	Other miscellaneous auxiliary system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-6 Balance of Plant: Auxiliary Systems - Open Cooling Water System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3800	Open cooling water pumps and motors
Geothermal	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3801	Open cooling water piping
Geothermal	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3802	Open cooling water valves
Geothermal	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3803	Open cooling water heat exchangers
Geothermal	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3804	Open cooling water system fouling
Geothermal	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3805	Open cooling water system instrumentation
Geothermal	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3806	Open cooling water strainer
Geothermal	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3809	Other open cooling water problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-7 Balance of Plant: Auxiliary Systems - Seal Air Fans					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Balance of Plant	Auxiliary Systems	Seal Air Fans	3880	Seal air fan
Geothermal	Balance of Plant	Auxiliary Systems	Seal Air Fans	3881	Seal air fan drive - motor
Geothermal	Balance of Plant	Auxiliary Systems	Seal Air Fans	3882	Seal air control dampers and drives
Geothermal	Balance of Plant	Auxiliary Systems	Seal Air Fans	3883	Seal air filters
Geothermal	Balance of Plant	Auxiliary Systems	Seal Air Fans	3889	Other seal air fan problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-8 Balance of Plant: Auxiliary Systems - Service Air					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Balance of Plant	Auxiliary Systems	Service Air	3840	Service air compressors
Geothermal	Balance of Plant	Auxiliary Systems	Service Air	3841	Service air piping
Geothermal	Balance of Plant	Auxiliary Systems	Service Air	3842	Service air valves
Geothermal	Balance of Plant	Auxiliary Systems	Service Air	3843	Service air dryers
Geothermal	Balance of Plant	Auxiliary Systems	Service Air	3844	Soot blowing air compressor and system
Geothermal	Balance of Plant	Auxiliary Systems	Service Air	3849	Other service air problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-9 Balance of Plant: Auxiliary Systems - Service Water (Open System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3810	Service water pumps and motors
Geothermal	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3811	Service water piping
Geothermal	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3812	Service water valves
Geothermal	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3813	Service water heat exchangers
Geothermal	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3814	Service water system fouling
Geothermal	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3815	Service water strainer
Geothermal	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3819	Other service water problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-10 Balance of Plant: Circulating Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Balance of Plant	Circulating Water Systems		3210	Circulating water pumps
Geothermal	Balance of Plant	Circulating Water Systems		3211	Circulating water pump motors
Geothermal	Balance of Plant	Circulating Water Systems		3220	Circulating water piping
Geothermal	Balance of Plant	Circulating Water Systems		3221	Circulating water piping fouling
Geothermal	Balance of Plant	Circulating Water Systems		3230	Circulating water valves
Geothermal	Balance of Plant	Circulating Water Systems		3231	Waterbox
Geothermal	Balance of Plant	Circulating Water Systems		3232	Condenser tube cleaning system including debris filter
Geothermal	Balance of Plant	Circulating Water Systems		3233	Circulating water priming system
Geothermal	Balance of Plant	Circulating Water Systems		3235	Cooling tower booster pump
Geothermal	Balance of Plant	Circulating Water Systems		3236	Cooling tower booster motor
Geothermal	Balance of Plant	Circulating Water Systems		3238	Cooling tower fan motors

TABLE B10-10 Balance of Plant: Circulating Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Balance of Plant	Circulating Water Systems		3239	Cooling tower fan motors - variable speed
Geothermal	Balance of Plant	Circulating Water Systems		3240	Cooling tower fans
Geothermal	Balance of Plant	Circulating Water Systems		3241	Cooling tower efficiency below design
Geothermal	Balance of Plant	Circulating Water Systems		3242	Cooling tower fill damage
Geothermal	Balance of Plant	Circulating Water Systems		3243	Cooling tower icing
Geothermal	Balance of Plant	Circulating Water Systems		3244	Cooling tower fires
Geothermal	Balance of Plant	Circulating Water Systems		3245	Other cooling tower problems
Geothermal	Balance of Plant	Circulating Water Systems		3246	Cooling tower fouling
Geothermal	Balance of Plant	Circulating Water Systems		3247	Cooling tower instrumentation
Geothermal	Balance of Plant	Circulating Water Systems		3248	Cooling Tower Overhaul
Geothermal	Balance of Plant	Circulating Water Systems		3250	Circulating water system instruments and controls
Geothermal	Balance of Plant	Circulating Water Systems		3260	Traveling screens
Geothermal	Balance of Plant	Circulating Water Systems		3261	Traveling screen fouling
Geothermal	Balance of Plant	Circulating Water Systems		3269	Circulating water biological conditions (ie, zebra mussels)
Geothermal	Balance of Plant	Circulating Water Systems		3270	Intake system problems other than traveling screens
Geothermal	Balance of Plant	Circulating Water Systems		3271	Intake grating fouling
Geothermal	Balance of Plant	Circulating Water Systems		3272	Circulating water screenwash system
Geothermal	Balance of Plant	Circulating Water Systems		3280	High circulating water temperature (not due to season, tower efficiency below design, or other listed equipment problem)
Geothermal	Balance of Plant	Circulating Water Systems		3281	Circulating water tempering system
Geothermal	Balance of Plant	Circulating Water Systems		3282	Circulating water cooling ponds
Geothermal	Balance of Plant	Circulating Water Systems		3285	Circulating water chemistry
Geothermal	Balance of Plant	Circulating Water Systems		3299	Other circulating water system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-11 Balance of Plant: Condensate System - Miscellaneous (Condensate System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3360	Condensate makeup and return (including storage tanks)
Geothermal	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3370	Condensate system controls and instrumentation (not hotwell level, heater level, or deaerator level controls; see codes 3150-3159, 3344, 3502).
Geothermal	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3380	Condensate coolers
Geothermal	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3399	Other miscellaneous condensate system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-12 Balance of Plant: Condensate System - Pumps, Piping, and Valves					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3300	Condensate water pre-treatment
Geothermal	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3310	Condensate/hotwell pumps
Geothermal	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3311	Condensate/hotwell pump motor
Geothermal	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3312	Condensate booster pump
Geothermal	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3313	Condensate booster pump motor
Geothermal	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3314	Condensate booster pump motor - variable speed
Geothermal	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3315	Condensate booster pump drive (other than 3313 and 3314)
Geothermal	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3320	Condensate piping
Geothermal	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3330	Condensate valves
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-13 Balance of Plant: Condensing System - Condenser Casing or Shell and Internals					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3120	Tube sheets
Geothermal	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3121	Expansion joint

TABLE B10-13 Balance of Plant: Condensing System - Condenser Casing or Shell and Internals					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3122	Gaskets and seals
Geothermal	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3123	Hot well
Geothermal	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3124	Tube sheet fouling
Geothermal	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3129	Other condenser casing or shell and internal problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-14 Balance of Plant: Condensing System - Condenser Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Balance of Plant	Condensing System	Condenser Controls	3150	Hot well level controls
Geothermal	Balance of Plant	Condensing System	Condenser Controls	3151	Vacuum pump and air ejector controls
Geothermal	Balance of Plant	Condensing System	Condenser Controls	3152	Air-cooled condenser controls
Geothermal	Balance of Plant	Condensing System	Condenser Controls	3159	Other condensing system controls and instruments
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-15 Balance of Plant: Condensing System - Condenser Tubes and Support Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3110	Condenser tube leaks
Geothermal	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3111	Condenser tube fouling shell side
Geothermal	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3112	Condenser tube fouling tube side
Geothermal	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3113	Condenser tube and water box cleaning (including circulating water flow reversal)
Geothermal	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3114	Air-cooled condenser tubes
Geothermal	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3115	Air-cooled condenser pumps

TABLE B10-15 Balance of Plant: Condensing System - Condenser Tubes and Support Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3116	Air-cooled condenser fans
Geothermal	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3117	Air-cooled condenser fan motors
Geothermal	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3118	Other Air-cooled condenser problems
Geothermal	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3119	Other condenser tube casing or shell and internal problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-16 Balance of Plant: Condensing System - Miscellaneous (Condensing System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3170	Condenser inspection (use code 3110 to report looking for tube leaks)
Geothermal	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3171	Air-cooled condenser inspections
Geothermal	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3180	Major condenser overhaul
Geothermal	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3185	Water side cathodic protection
Geothermal	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3190	Air leakage (for losses not attributable to previously noted equipment related codes)
Geothermal	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3199	Other miscellaneous condensing system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-17 Balance of Plant: Condensing System - Vacuum Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Balance of Plant	Condensing System	Vacuum Equipment	3130	Air ejectors
Geothermal	Balance of Plant	Condensing System	Vacuum Equipment	3131	Air ejector piping and valves
Geothermal	Balance of Plant	Condensing System	Vacuum Equipment	3132	Inter and after condensers
Geothermal	Balance of Plant	Condensing System	Vacuum Equipment	3133	Vacuum pumps
Geothermal	Balance of Plant	Condensing System	Vacuum Equipment	3134	Vacuum pump piping and valves
Geothermal	Balance of Plant	Condensing System	Vacuum Equipment	3135	Vacuum pump motor and auxiliaries

TABLE B10-17 Balance of Plant: Condensing System - Vacuum Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Balance of Plant	Condensing System	Vacuum Equipment	3139	Other air extraction system problems - general
Geothermal	Balance of Plant	Condensing System	Vacuum Equipment	3149	Loss of vacuum not attributable to a particular component such as air ejectors or valves, or high back pressure not attributable to high circulating water temperature, or vacuum losses from a known cause.
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-18 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Balance of Plant	Electrical		3600	Switchyard transformers and associated cooling systems - external (OMC)
Geothermal	Balance of Plant	Electrical		3601	Switchyard transformers and associated cooling systems - external (not OMC)
Geothermal	Balance of Plant	Electrical		3610	Switchyard circuit breakers - external (not OMC)
Geothermal	Balance of Plant	Electrical		3611	Switchyard circuit breakers - external (OMC)
Geothermal	Balance of Plant	Electrical		3612	Switchyard system protection devices - external (OMC)
Geothermal	Balance of Plant	Electrical		3613	Switchyard system protection devices - external (not OMC)
Geothermal	Balance of Plant	Electrical		3618	Other switchyard equipment - external (not OMC)
Geothermal	Balance of Plant	Electrical		3619	Other switchyard equipment - external (OMC)
Geothermal	Balance of Plant	Electrical		3620	Main transformer
Geothermal	Balance of Plant	Electrical		3621	Unit auxiliaries transformer
Geothermal	Balance of Plant	Electrical		3622	Station service startup transformer
Geothermal	Balance of Plant	Electrical		3623	Auxiliary generators
Geothermal	Balance of Plant	Electrical		3629	Other switchyard or high voltage system problems - external
Geothermal	Balance of Plant	Electrical		3630	400-700 volt transformers

TABLE B10-18 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Balance of Plant	Electrical		3631	400-700 volt circuit breakers
Geothermal	Balance of Plant	Electrical		3632	400-700 volt conductors and buses
Geothermal	Balance of Plant	Electrical		3633	400-700 volt insulators
Geothermal	Balance of Plant	Electrical		3634	400-700 volt protection devices
Geothermal	Balance of Plant	Electrical		3639	Other 400-700 volt problems
Geothermal	Balance of Plant	Electrical		3640	AC instrument power transformers
Geothermal	Balance of Plant	Electrical		3641	AC Circuit breakers
Geothermal	Balance of Plant	Electrical		3642	AC Conductors and buses
Geothermal	Balance of Plant	Electrical		3643	AC Inverters
Geothermal	Balance of Plant	Electrical		3644	AC Protection devices
Geothermal	Balance of Plant	Electrical		3649	Other AC instrument power problems
Geothermal	Balance of Plant	Electrical		3650	DC instrument power battery chargers
Geothermal	Balance of Plant	Electrical		3651	DC circuit breakers
Geothermal	Balance of Plant	Electrical		3652	DC conductors and buses
Geothermal	Balance of Plant	Electrical		3653	DC protection devices
Geothermal	Balance of Plant	Electrical		3659	Other DC power problems
Geothermal	Balance of Plant	Electrical		3660	4000-7000 volt transformers
Geothermal	Balance of Plant	Electrical		3661	4000-7000 volt circuit breakers
Geothermal	Balance of Plant	Electrical		3662	4000-7000 volt conductors and buses
Geothermal	Balance of Plant	Electrical		3663	4000-7000 volt insulators
Geothermal	Balance of Plant	Electrical		3664	4000-7000 volt protection devices
Geothermal	Balance of Plant	Electrical		3669	Other 4000-7000 volt problems
Geothermal	Balance of Plant	Electrical		3670	12-15kV transformers
Geothermal	Balance of Plant	Electrical		3671	12-15kV circuit breakers
Geothermal	Balance of Plant	Electrical		3672	12-15kV conductors and buses
Geothermal	Balance of Plant	Electrical		3673	12-15kV insulators
Geothermal	Balance of Plant	Electrical		3674	12-15kV protection devices
Geothermal	Balance of Plant	Electrical		3679	Other 12-15kV problems
Geothermal	Balance of Plant	Electrical		3680	Other voltage transformers
Geothermal	Balance of Plant	Electrical		3681	Other voltage circuit breakers
Geothermal	Balance of Plant	Electrical		3682	Other voltage conductors and buses
Geothermal	Balance of Plant	Electrical		3683	Other voltage insulators
Geothermal	Balance of Plant	Electrical		3684	Other voltage protection devices
Geothermal	Balance of Plant	Electrical		3689	Other voltage problems

TABLE B10-18 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Balance of Plant	Electrical		3690	Station Service Power Distribution System, General
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-19 Balance of Plant: Miscellaneous (Balance of Plant)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Balance of Plant	Miscellaneous (Balance of Plant)		3950	Process computer
Geothermal	Balance of Plant	Miscellaneous (Balance of Plant)		3960	Thermal derating (thermal efficiency losses in balance of plant when specific cause(s) unknown)
Geothermal	Balance of Plant	Miscellaneous (Balance of Plant)		3970	Distributive Control System (DCS) - process computer
Geothermal	Balance of Plant	Miscellaneous (Balance of Plant)		3971	DCS - data highway
Geothermal	Balance of Plant	Miscellaneous (Balance of Plant)		3972	DCS - hardware problems (including card failure)
Geothermal	Balance of Plant	Miscellaneous (Balance of Plant)		3973	DCS - internal and termination wiring
Geothermal	Balance of Plant	Miscellaneous (Balance of Plant)		3974	DCS - logic problems
Geothermal	Balance of Plant	Miscellaneous (Balance of Plant)		3975	DCS - upgrades
Geothermal	Balance of Plant	Miscellaneous (Balance of Plant)		3979	Other DCS problems
Geothermal	Balance of Plant	Miscellaneous (Balance of Plant)		3980	Programmable Logic Controller (PLC)
Geothermal	Balance of Plant	Miscellaneous (Balance of Plant)		3981	PLC - data highway
Geothermal	Balance of Plant	Miscellaneous (Balance of Plant)		3982	PLC - hardware problems (including card failure)
Geothermal	Balance of Plant	Miscellaneous (Balance of Plant)		3983	PLC - internal and termination wiring
Geothermal	Balance of Plant	Miscellaneous (Balance of Plant)		3984	PLC - logic problems
Geothermal	Balance of Plant	Miscellaneous (Balance of Plant)		3985	PLC - upgrades
Geothermal	Balance of Plant	Miscellaneous (Balance of Plant)		3989	Other PLC problems
Geothermal	Balance of Plant	Miscellaneous (Balance of Plant)		3995	Powerhouse heating and ventilating systems
Geothermal	Balance of Plant	Miscellaneous (Balance of Plant)		3996	Air conditioning systems - rooms and areas
Geothermal	Balance of Plant	Miscellaneous (Balance of Plant)		3998	Balance of plant overhaul/outage
Geothermal	Balance of Plant	Miscellaneous (Balance of Plant)		3999	Other miscellaneous balance of plant problems

TABLE B10-19 Balance of Plant: Miscellaneous (Balance of Plant)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-20 Balance of Plant: Power Station Switchyard					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Balance of Plant	Power Station Switchyard		3700	Power Station switchyard (non generating unit equipment)
Geothermal	Balance of Plant	Power Station Switchyard		3710	Transmission line (connected to powerhouse switchyard to 1st Substation)
Geothermal	Balance of Plant	Power Station Switchyard		3720	Transmission equipment at the 1st substation (see code 9300 if applicable)
Geothermal	Balance of Plant	Power Station Switchyard		3730	Transmission equipment beyond the 1st substation (see code 9300 if applicable)
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-21 Balance of Plant: Waste Water (zero discharge) Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Balance of Plant	Waste Water (zero discharge) Systems		3290	Waste water (zero discharge) tanks, pumps, and motors
Geothermal	Balance of Plant	Waste Water (zero discharge) Systems		3291	Waste water (zero discharge) system fouling
Geothermal	Balance of Plant	Waste Water (zero discharge) Systems		3292	Waste water (zero discharge) piping
Geothermal	Balance of Plant	Waste Water (zero discharge) Systems		3293	Waste water (zero discharge) valves
Geothermal	Balance of Plant	Waste Water (zero discharge) Systems		3294	Waste water (zero discharge) controls and instrumentation
Geothermal	Balance of Plant	Waste Water (zero discharge) Systems		3295	Other waste water (zero discharge) problems
Notes: 1) For use with Unit Codes 800–899.					

BOILER

TABLE B10-22 Boiler: Boiler Piping System - Desuperheaters/Attemperators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Boiler	Boiler Piping System	Desuperheaters/Attemperators	580	Desuperheater/attemperator piping
Geothermal	Boiler	Boiler Piping System	Desuperheaters/Attemperators	590	Desuperheater/attemperator valves
Geothermal	Boiler	Boiler Piping System	Desuperheaters/Attemperators	600	Desuperheater/attemperator spray nozzles
Geothermal	Boiler	Boiler Piping System	Desuperheaters/Attemperators	610	Desuperheater/attemperator drums
Geothermal	Boiler	Boiler Piping System	Desuperheaters/Attemperators	620	Other desuperheater/attemperator problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-23 Boiler: Boiler Piping System - Main Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Boiler	Boiler Piping System	Main Steam	500	Main steam piping up to turbine stop valves
Geothermal	Boiler	Boiler Piping System	Main Steam	510	Main steam relief/safety valves off superheater
Geothermal	Boiler	Boiler Piping System	Main Steam	520	Other main steam valves (including vent and drain valves but not including the turbine stop valves)
Geothermal	Boiler	Boiler Piping System	Main Steam	530	Other main steam system problems
Notes: 1) For use with Unit Codes 800–899.					

EXTERNAL

Use this set of codes to report events caused by external factors (flood, lightning, etc.); economic factors (lack of fuel, labor strikes, etc.); operator training; and transmission system problems external to the plant.

TABLE B10-24 External: Catastrophe					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	External	Catastrophe		9000	Flood
Geothermal	External	Catastrophe		9001	Drought
Geothermal	External	Catastrophe		9010	Fire including wildfires, not related to a specific component
Geothermal	External	Catastrophe		9020	Lightning

TABLE B10-24 External: Catastrophe					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	External	Catastrophe		9025	Geomagnetic disturbance
Geothermal	External	Catastrophe		9030	Earthquake
Geothermal	External	Catastrophe		9031	Tornado
Geothermal	External	Catastrophe		9035	Hurricane
Geothermal	External	Catastrophe		9036	Storms (ice, snow, etc)
Geothermal	External	Catastrophe		9040	Other catastrophe
Geothermal	External	Catastrophe		9090	Physical Security Incident
Geothermal	External	Catastrophe		9091	Physical Security Incident (OMC)
Geothermal	External	Catastrophe		9092	Cyber Security Incident
Geothermal	External	Catastrophe		9093	Cyber Security Incident (OMC)
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-25 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	External	Economic		0000	Reserve shutdown
Geothermal	External	Economic		9130	Failure of fuel supplier to fulfill contractual obligations or a pre-arranged deal due to physical fuel disruptions or operational impairments (e.g. force majeure on a pipeline or compressor down; making the pipeline incapable of making its firm deliveries.)
Geothermal	External	Economic		9131	Lack of fuel – due to contractual or tariff provisions that allow for service interruption or price fluctuations during peak demand periods.
Geothermal	External	Economic		9134	Fuel conservation
Geothermal	External	Economic		9136	Problems with Primary Fuel for Units with Secondary Fuel Operation
Geothermal	External	Economic		9137	Ground water or other water supply problems
Geothermal	External	Economic		9139	Ground water or other water supply problems(OMC)
Geothermal	External	Economic		9140	Plant modifications to burn different fuel that are not regulatory mandated

TABLE B10-25 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	External	Economic		9150	Labor strikes company-wide problems or strikes outside the company's jurisdiction such as manufacturers (delaying repairs) or transportation (fuel supply) problems.
Geothermal	External	Economic		9151	Labor strikes direct plant management grievances that result in a walkout or strike are under plant management control.
Geothermal	External	Economic		9160	Other economic problems
Geothermal	External	Economic		9180	Economic (for internal use at plants only)
Geothermal	External	Economic		9181	Economic (for internal use at plants only)
Geothermal	External	Economic		9182	Economic (for internal use at plants only)
Geothermal	External	Economic		9183	Economic (for internal use at plants only)
Geothermal	External	Economic		9184	Economic (for internal use at plants only)
Geothermal	External	Economic		9185	Economic (for internal use at plants only)
Geothermal	External	Economic		9186	Economic (for internal use at plants only)
Geothermal	External	Economic		9187	Economic (for internal use at plants only)
Geothermal	External	Economic		9188	Economic (for internal use at plants only)
Geothermal	External	Economic		9189	Economic (for internal use at plants only)
Geothermal	External	Economic		9190	Economic (for internal use at plants only)
Geothermal	External	Economic		9191	Economic (for internal use at plants only)
Geothermal	External	Economic		9192	Economic (for internal use at plants only)
Geothermal	External	Economic		9193	Economic (for internal use at plants only)
Geothermal	External	Economic		9194	Economic (for internal use at plants only)
Geothermal	External	Economic		9195	Economic (for internal use at plants only)
Geothermal	External	Economic		9196	Economic (for internal use at plants only)
Geothermal	External	Economic		9197	Economic (for internal use at plants only)
Geothermal	External	Economic		9198	Economic (for internal use at plants only)
Geothermal	External	Economic		9199	Economic (for internal use at plants only)
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-26 External: Miscellaneous (External)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	External	Miscellaneous (External)		9300	Transmission system problems other than catastrophes (do not include switchyard problems in this category; see codes 3600 to 3629, 3720 to 3730)
Geothermal	External	Miscellaneous (External)		9305	Ash disposal problem
Geothermal	External	Miscellaneous (External)		9310	Operator training
Geothermal	External	Miscellaneous (External)		9320	Other miscellaneous external problems
Geothermal	External	Miscellaneous (External)		9340	Synchronous Condenser Operation
Notes: 1) For use with Unit Codes 800–899.					

GENERATOR

This set of codes contains the generator, exciter, generator cooling systems, and generator controls. Note the main leads up to and includes the generator output breaker in this set of codes.

TABLE B10-27 Generator: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Generator	Controls		4700	Generator voltage control
Geothermal	Generator	Controls		4710	Generator metering devices
Geothermal	Generator	Controls		4720	Generator synchronization equipment
Geothermal	Generator	Controls		4730	Generator current and potential transformers
Geothermal	Generator	Controls		4740	Emergency generator trip devices
Geothermal	Generator	Controls		4741	Frequency Trip (81 Relay)
Geothermal	Generator	Controls		4750	Other generator controls and metering problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-28 Generator: Cooling System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Generator	Cooling System		4610	Hydrogen cooling system piping and valves
Geothermal	Generator	Cooling System		4611	Hydrogen coolers
Geothermal	Generator	Cooling System		4612	Hydrogen storage system

TABLE B10-28 Generator: Cooling System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Generator	Cooling System		4613	Hydrogen seals
Geothermal	Generator	Cooling System		4619	Other hydrogen system problems
Geothermal	Generator	Cooling System		4620	Air cooling system
Geothermal	Generator	Cooling System		4630	Liquid cooling system
Geothermal	Generator	Cooling System		4640	Seal oil system and seals
Geothermal	Generator	Cooling System		4650	Other cooling system problems
Notes: 1) For use with Unit Codes 800–899. 2) Report failures caused by water leaks into generator as codes 4500, 4510, etc.					

TABLE B10-29 Generator: Exciter					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Generator	Exciter		4600	Exciter drive - motor
Geothermal	Generator	Exciter		4601	Exciter field rheostat
Geothermal	Generator	Exciter		4602	Exciter commutator and brushes
Geothermal	Generator	Exciter		4603	Solid state exciter element
Geothermal	Generator	Exciter		4604	Exciter drive - shaft
Geothermal	Generator	Exciter		4605	Exciter transformer
Geothermal	Generator	Exciter		4609	Other exciter problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-30 Generator: Generator					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Generator	Generator		4500	Rotor windings (including damper windings and fan blades on hydro units)
Geothermal	Generator	Generator		4510	Rotor collector rings
Geothermal	Generator	Generator		4511	Rotor, General
Geothermal	Generator	Generator		4512	Retaining Rings
Geothermal	Generator	Generator		4520	Stator windings, bushings, and terminals
Geothermal	Generator	Generator		4530	Stator core iron
Geothermal	Generator	Generator		4535	Stator, General
Geothermal	Generator	Generator		4536	Generator Heaters
Geothermal	Generator	Generator		4540	Brushes and brush rigging
Geothermal	Generator	Generator		4550	Generator bearings and lube oil system (including thrust bearings on hydro units)

TABLE B10-30 Generator: Generator					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Generator	Generator		4551	Generator bearings
Geothermal	Generator	Generator		4552	Generator lube oil system
Geothermal	Generator	Generator		4555	Bearing cooling system
Geothermal	Generator	Generator		4560	Generator vibration (excluding vibration due to failed bearing and other components)
Geothermal	Generator	Generator		4570	Generator casing
Geothermal	Generator	Generator		4580	Generator end bells and bolting
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-31 Generator: Miscellaneous (Generator)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Generator	Miscellaneous (Generator)		4800	Generator main leads
Geothermal	Generator	Miscellaneous (Generator)		4805	Generator Bus Duct Cooling System
Geothermal	Generator	Miscellaneous (Generator)		4810	Generator output breaker
Geothermal	Generator	Miscellaneous (Generator)		4830	Major generator overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)
Geothermal	Generator	Miscellaneous (Generator)		4831	Minor generator overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
Geothermal	Generator	Miscellaneous (Generator)		4840	Inspection
Geothermal	Generator	Miscellaneous (Generator)		4841	Generator doble testing
Geothermal	Generator	Miscellaneous (Generator)		4842	Reactive and capability testing
Geothermal	Generator	Miscellaneous (Generator)		4850	Core monitor alarm
Geothermal	Generator	Miscellaneous (Generator)		4860	Generator neutral grounding equipment
Geothermal	Generator	Miscellaneous (Generator)		4899	Other miscellaneous generator problems
Notes: 1) For use with Unit Codes 800–899.					

INACTIVE STATES

TABLE B10-32 Inactive States: Inactive States					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Inactive States	Inactive States		2	Inactive Reserve Shutdown

TABLE B10-32 Inactive States: Inactive States					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Inactive States	Inactive States		9990	Retired unit
Geothermal	Inactive States	Inactive States		9991	Mothballed unit
Notes: 1) For use with Unit Codes 800–899.					

MISCELLANEOUS

TABLE B10-33 Miscellaneous: Plant and Auxiliaries					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Miscellaneous	Plant and Auxiliaries		6410	Steam wells/steam field piping problems
Geothermal	Miscellaneous	Plant and Auxiliaries		6415	Low steam pressure
Geothermal	Miscellaneous	Plant and Auxiliaries		6420	Condensate reinjection system
Geothermal	Miscellaneous	Plant and Auxiliaries		6430	Unit H2S emission limitations - regulatory
Geothermal	Miscellaneous	Plant and Auxiliaries		6435	Steam field H2S emission limitations - regulatory
Geothermal	Miscellaneous	Plant and Auxiliaries		6440	H2S abatement system problems - general
Geothermal	Miscellaneous	Plant and Auxiliaries		6450	Heat exchanger problems due to H2S abatement system
Geothermal	Miscellaneous	Plant and Auxiliaries		6460	Condenser problems due to H2S abatement system
Geothermal	Miscellaneous	Plant and Auxiliaries		6470	Cooling tower problems due to H2S abatement system
Geothermal	Miscellaneous	Plant and Auxiliaries		6480	Steam strainer plugging - mineral deposits
Geothermal	Miscellaneous	Plant and Auxiliaries		6490	Turbine plugging - mineral deposits
Geothermal	Miscellaneous	Plant and Auxiliaries		6499	Geothermal
Notes: 1) For use with Unit Codes 800–899.					

PERFORMANCE

TABLE B10-34 Performance: Performance					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Performance	Performance		9997	NERC Reliability Standard Requirement
Geothermal	Performance	Performance		9998	Black start testing
Geothermal	Performance	Performance		9999	Total unit performance testing (use appropriate codes for individual component testing)
Notes: 1) For use with Unit Codes 800–899.					

PERSONNEL OR PROCEDURAL ERRORS

TABLE B10-35 Personnel or Procedural Errors: Personnel or Procedural Errors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Personnel or Procedural Errors	Personnel or Procedural Errors		9900	Operator error
Geothermal	Personnel or Procedural Errors	Personnel or Procedural Errors		9910	Maintenance personnel error
Geothermal	Personnel or Procedural Errors	Personnel or Procedural Errors		9920	Contractor error
Geothermal	Personnel or Procedural Errors	Personnel or Procedural Errors		9930	Operating procedure error
Geothermal	Personnel or Procedural Errors	Personnel or Procedural Errors		9940	Maintenance procedure error
Geothermal	Personnel or Procedural Errors	Personnel or Procedural Errors		9950	Contractor procedure error
Geothermal	Personnel or Procedural Errors	Personnel or Procedural Errors		9960	Staff shortage
Notes: 1) For use with Unit Codes 800–899.					

POLLUTION CONTROL EQUIPMENT

Use this set of codes to report problems with flue gas desulphurization equipment and stack gas particulate removal equipment. If outages or deratings occur due to reasons other than equipment problems, use the set of codes for Regulatory, Safety, Environmental stack emission limits. Use code 9510 for outages or deratings required to install pollution control equipment. Use codes 9600 to 9650 only when the pollution control equipment problems are not responsible for exceeding emission limits

TABLE B10-36 Pollution Control Equipment: Continuous Emissions Monitoring Systems (CEMS)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8700	CEMS Certification and Recertification
Geothermal	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8710	SO2 analyzer problems
Geothermal	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8720	NOx analyzer problems
Geothermal	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8730	CO analyzer problems

TABLE B10-36 Pollution Control Equipment: Continuous Emissions Monitoring Systems (CEMS)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8740	CO2 analyzer problems
Geothermal	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8750	O2 analyzer problems
Geothermal	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8760	Opacity monitor problems
Geothermal	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8770	Flow monitor problems
Geothermal	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8780	Data acquisition system problems
Geothermal	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8790	Miscellaneous CEMS problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-37 Pollution Control Equipment: Wet Scrubbers - Chemical Supply					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8000	Chemical feed storage, mill feeders, and conveyors
Geothermal	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8002	Screw conveyors
Geothermal	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8003	Bucket elevators
Geothermal	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8006	Weigh feeders
Geothermal	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8010	Crushers/mills
Geothermal	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8020	Mill slurry tanks supply problems
Geothermal	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8030	Classifiers
Geothermal	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8040	Slurry transfer pumps and motors
Geothermal	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8050	Chemical unavailability

TABLE B10-37 Pollution Control Equipment: Wet Scrubbers - Chemical Supply					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8099	Other chemical supply problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-38 Pollution Control Equipment: Wet Scrubbers - Miscellaneous (Wet Scrubber)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8400	Scrubber gas discharge reheaters - general
Geothermal	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8402	Scrubber gas discharge reheaters - vibration
Geothermal	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8404	Scrubber gas discharge reheaters - tube leaks
Geothermal	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8406	Scrubber gas discharge reheaters - ducts
Geothermal	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8410	Scrubber instruments and controls
Geothermal	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8415	Liquid level controls
Geothermal	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8420	Heat tracer
Geothermal	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8425	Miscellaneous mechanical failures
Geothermal	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8426	Miscellaneous electrical failures
Geothermal	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8430	Stack damage related to scrubber system
Geothermal	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8440	Major overhaul
Geothermal	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8450	Inspection
Geothermal	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8460	Testing
Geothermal	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8470	SO2 monitor

TABLE B10-38 Pollution Control Equipment: Wet Scrubbers - Miscellaneous (Wet Scrubber)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8499	Other miscellaneous wet scrubber problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-39 Pollution Control Equipment: Wet Scrubbers - Piping, Ducting, Dampers, and Fans					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8200	Piping
Geothermal	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8210	Valves
Geothermal	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8220	Strainers or filters
Geothermal	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8225	Drain pots
Geothermal	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8230	Ducting
Geothermal	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8235	Demister
Geothermal	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8240	Bypass dampers
Geothermal	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8250	Dampers other than bypass
Geothermal	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8260	Scrubber booster I.D. fan (fan specific to the scrubber)
Geothermal	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8261	Scrubber booster I.D. fan drive
Geothermal	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8262	Scrubber booster I.D. fan vibration (fan specific to the scrubber)
Geothermal	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8264	Scrubber booster I.D. fan blades (fan specific to the scrubber)
Geothermal	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8270	Scrubber booster F.D. fan (fan specific to the scrubber)
Geothermal	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8271	Scrubber booster F.D. fan drive

TABLE B10-39 Pollution Control Equipment: Wet Scrubbers - Piping, Ducting, Dampers, and Fans					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8272	Scrubber booster F.D. fan vibration (fan specific to the scrubber)
Geothermal	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8274	Scrubber booster F.D. fan blades (fan specific to the scrubber)
Geothermal	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8280	Reagent feed piping
Geothermal	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8290	Demister wash piping assembly
Geothermal	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8299	Other piping, ducting, damper, and fan problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-40 Pollution Control Equipment: Wet Scrubbers - Wet Scrubber					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8100	Scrubber/absorber tower or module
Geothermal	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8110	Spray nozzles
Geothermal	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8115	Disc scrubber throats
Geothermal	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8120	Spray pumps and motors
Geothermal	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8125	Scrubber recycle (liquid) pumps
Geothermal	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8127	Scrubber recycle (liquid) pump motors
Geothermal	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8130	Recirculation tanks including agitators
Geothermal	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8140	Reaction tanks including agitators
Geothermal	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8150	Tubes
Geothermal	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8160	Mist eliminators/demisters and washdown

TABLE B10-40 Pollution Control Equipment: Wet Scrubbers - Wet Scrubber					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8199	Other scrubber problems
Notes: 1) For use with Unit Codes 800–899.					

REGULATORY, SAFETY, ENVIRONMENTAL

Use these codes only for events not directly attributable to equipment failures. Inspections or testing of certain equipment due to regulation are reported using the appropriate equipment cause codes, and the fact that it was a regulatory requirement noted in the verbal description section.

TABLE B10-41 Regulatory, Safety, Environmental: Regulatory					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Regulatory, Safety, Environmental	Regulatory		9504	Regulatory (environmental) proceedings and hearings - regulatory agency initiated
Geothermal	Regulatory, Safety, Environmental	Regulatory		9506	Regulatory (environmental) proceedings and hearings - intervenor initiated
Geothermal	Regulatory, Safety, Environmental	Regulatory		9510	Plant modifications strictly for compliance with new or changed regulatory requirements (scrubbers, cooling towers, etc.)
Geothermal	Regulatory, Safety, Environmental	Regulatory		9520	Oil spill in Gulf of Mexico (OMC)
Geothermal	Regulatory, Safety, Environmental	Regulatory		9590	Miscellaneous regulatory (this code is primarily intended for use with event contribution code 2 to indicate that a regulatory-related factor contributed to the primary cause of the event)
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-42 Regulatory, Safety, Environmental: Safety					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Regulatory, Safety, Environmental	Safety		9700	OSHA-related retrofit or inspection

TABLE B10-42 Regulatory, Safety, Environmental: Safety					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Regulatory, Safety, Environmental	Safety		9720	Other safety problems
Notes: 1) For use with Unit Codes 800–899.					

STEAM TURBINE

Besides the turbine, this set includes the steam stop/control valves, turbine control system, and the turbine auxiliaries. The extraction steam codes are contained in the Balance of Plant set.

TABLE B10-43 Steam Turbine: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Steam Turbine	Controls		4290	Hydraulic system pumps
Geothermal	Steam Turbine	Controls		4291	Hydraulic system coolers
Geothermal	Steam Turbine	Controls		4292	Hydraulic system filters
Geothermal	Steam Turbine	Controls		4293	Hydraulic system pipes and valves
Geothermal	Steam Turbine	Controls		4299	Other hydraulic system problems
Geothermal	Steam Turbine	Controls		4300	Turbine supervisory system (use codes 4290 to 4299 for hydraulic oil)
Geothermal	Steam Turbine	Controls		4301	Turbine governing system
Geothermal	Steam Turbine	Controls		4302	Turbine trip devices (including instruments)
Geothermal	Steam Turbine	Controls		4303	Exhaust hood and spray controls
Geothermal	Steam Turbine	Controls		4304	Automatic turbine control systems - mechanical
Geothermal	Steam Turbine	Controls		4305	Automatic turbine control systems - mechanical - hydraulic
Geothermal	Steam Turbine	Controls		4306	Automatic turbine control systems - electro-hydraulic - analog
Geothermal	Steam Turbine	Controls		4307	Automatic turbine control systems - electro-hydraulic - digital
Geothermal	Steam Turbine	Controls		4308	Automatic turbine control systems - digital control and monitoring
Geothermal	Steam Turbine	Controls		4309	Other turbine instrument and control problems

TABLE B10-43 Steam Turbine: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Steam Turbine	Controls		4310	Steam Turbine Control System - data highway
Geothermal	Steam Turbine	Controls		4311	Steam Turbine Control System - hardware problems (including card failure)
Geothermal	Steam Turbine	Controls		4312	Steam Turbine Control System - internal and termination wiring
Geothermal	Steam Turbine	Controls		4313	Steam Turbine Control System - logic problems
Geothermal	Steam Turbine	Controls		4314	Steam Turbine Control System - upgrades
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-44 Steam Turbine: Low Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Steam Turbine	Low Pressure Turbine		4200	Outer casing
Geothermal	Steam Turbine	Low Pressure Turbine		4201	Inner casing
Geothermal	Steam Turbine	Low Pressure Turbine		4209	Nozzle bolting
Geothermal	Steam Turbine	Low Pressure Turbine		4210	Nozzles and nozzle blocks
Geothermal	Steam Turbine	Low Pressure Turbine		4211	Diaphragms
Geothermal	Steam Turbine	Low Pressure Turbine		4212	Buckets or blades
Geothermal	Steam Turbine	Low Pressure Turbine		4213	Bucket or blade fouling
Geothermal	Steam Turbine	Low Pressure Turbine		4215	Wheels or spindles
Geothermal	Steam Turbine	Low Pressure Turbine		4220	Shaft seals
Geothermal	Steam Turbine	Low Pressure Turbine		4221	Dummy rings
Geothermal	Steam Turbine	Low Pressure Turbine		4222	Gland rings
Geothermal	Steam Turbine	Low Pressure Turbine		4230	Rotor shaft
Geothermal	Steam Turbine	Low Pressure Turbine		4240	Bearings
Geothermal	Steam Turbine	Low Pressure Turbine		4241	Thrust bearings
Geothermal	Steam Turbine	Low Pressure Turbine		4250	Other low pressure turbine problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-45 Steam Turbine: Lube Oil					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Steam Turbine	Lube Oil		4280	Lube oil pumps
Geothermal	Steam Turbine	Lube Oil		4281	Lube oil coolers
Geothermal	Steam Turbine	Lube Oil		4282	Lube oil conditioners
Geothermal	Steam Turbine	Lube Oil		4283	Lube oil system valves and piping
Geothermal	Steam Turbine	Lube Oil		4284	Lube oil pump drive
Geothermal	Steam Turbine	Lube Oil		4289	Other lube oil system problems
Notes: 1) For use with Unit Codes 800–899. 2) Do not include bearing failures due to lube oil.					

TABLE B10-46 Steam Turbine: Miscellaneous (Steam Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Steam Turbine	Miscellaneous (Steam Turbine)		4400	Major turbine overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)
Geothermal	Steam Turbine	Miscellaneous (Steam Turbine)		4401	Inspection
Geothermal	Steam Turbine	Miscellaneous (Steam Turbine)		4402	Minor turbine overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
Geothermal	Steam Turbine	Miscellaneous (Steam Turbine)		4410	Turning gear and motor
Geothermal	Steam Turbine	Miscellaneous (Steam Turbine)		4411	Steam turbine gear box (single shaft configuration)
Geothermal	Steam Turbine	Miscellaneous (Steam Turbine)		4412	Steam turbine clutch (single shaft configuration)
Geothermal	Steam Turbine	Miscellaneous (Steam Turbine)		4415	Shaft coupling mechanism
Geothermal	Steam Turbine	Miscellaneous (Steam Turbine)		4420	Vibration of the turbine generator unit that cannot be attributed to a specific cause such as bearings or blades (use this code for balance moves)
Geothermal	Steam Turbine	Miscellaneous (Steam Turbine)		4430	Gland seal system
Geothermal	Steam Turbine	Miscellaneous (Steam Turbine)		4450	Water induction
Geothermal	Steam Turbine	Miscellaneous (Steam Turbine)		4460	Turbine overspeed trip test
Geothermal	Steam Turbine	Miscellaneous (Steam Turbine)		4470	Differential expansion
Geothermal	Steam Turbine	Miscellaneous (Steam Turbine)		4490	Turbine performance testing (use code 9999 for total unit performance testing)

TABLE B10-46 Steam Turbine: Miscellaneous (Steam Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Steam Turbine	Miscellaneous (Steam Turbine)		4499	Other miscellaneous steam turbine problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-47 Steam Turbine: Piping					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Steam Turbine	Piping		4270	Crossover or under piping
Geothermal	Steam Turbine	Piping		4279	Miscellaneous turbine piping
Notes: 1) For use with Unit Codes 800–899.					

TABLE B10-48 Steam Turbine: Valves					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Geothermal	Steam Turbine	Valves		4260	Main stop valves
Geothermal	Steam Turbine	Valves		4261	Control valves
Geothermal	Steam Turbine	Valves		4262	Intercept valves
Geothermal	Steam Turbine	Valves		4263	Reheat stop valves
Geothermal	Steam Turbine	Valves		4264	Combined intercept valves
Geothermal	Steam Turbine	Valves		4265	Miscellaneous drain and vent valves
Geothermal	Steam Turbine	Valves		4266	Main stop valve testing
Geothermal	Steam Turbine	Valves		4267	Control valve testing
Geothermal	Steam Turbine	Valves		4268	Reheat/intercept valve testing
Geothermal	Steam Turbine	Valves		4269	Other turbine valves (including LP steam admission valves)
Notes: 1) For use with Unit Codes 800–899.					

Appendix B11: Index To Internal Combustion/Reciprocating Engine Unit Cause Codes

INTERNAL COMBUSTION/RECIPROCATING ENGINE UNITS

INDEX TO SYSTEM/COMPONENT/SUB-COMPONENT CAUSE CODE TABLES			
TABLE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**
B11-1	Balance of Plant	Auxiliary Systems	
B11-2	Balance of Plant	Electrical	
B11-3	Balance of Plant	Miscellaneous (Balance of Plant)	
B11-4	Balance of Plant	Power Station Switchyard	
B11-5	External	Catastrophe	
B11-6	External	Economic	
B11-7	External	Fuel Quality	
B11-8	External	Miscellaneous (External)	
B11-9	Generator	Controls	
B11-10	Generator	Cooling System	
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B11-13	Generator	Miscellaneous (Generator)	
B11-14	Inactive States	Inactive States	
B11-15	Internal Combustion/Reciprocating Engines	Engine	
B11-16	Internal Combustion/Reciprocating Engines	Engine Auxiliaries	
B11-17	Internal Combustion/Reciprocating Engines	Engine Controls	
B11-18	Internal Combustion/Reciprocating Engines	Miscellaneous (Internal Combustion/Reciprocating Engines)	
B11-19	Performance	Performance	
B11-20	Personnel or Procedural Errors	Personnel or Procedural Errors	
B11-21	Regulatory, Safety, Environmental	Other Operating Environmental Limitations	
B11-22	Regulatory, Safety, Environmental	Regulatory	
B11-23	Regulatory, Safety, Environmental	Safety	
B11-24	Regulatory, Safety, Environmental	Stack Emission	

BALANCE OF PLANT

TABLE B11-1 Balance of Plant: Auxiliary Systems

UNIT TYPE	SYSTEM	COMPONENT	SUB-COMPONENT	CAUSE CODE	DESCRIPTION
Internal Combustion/Reciprocating Engines	Balance of Plant	Auxiliary Systems		3850	Instrument air compressors
Internal Combustion/Reciprocating Engines	Balance of Plant	Auxiliary Systems		3851	Instrument air piping
Internal Combustion/Reciprocating Engines	Balance of Plant	Auxiliary Systems		3852	Instrument air valves
Internal Combustion/Reciprocating Engines	Balance of Plant	Auxiliary Systems		3853	Instrument air dryers
Internal Combustion/Reciprocating Engines	Balance of Plant	Auxiliary Systems		3854	N2 backup to instrument air
Internal Combustion/Reciprocating Engines	Balance of Plant	Auxiliary Systems		3859	Other instrument air problems
Internal Combustion/Reciprocating Engines	Balance of Plant	Auxiliary Systems		3860	Fire protection system pumps
Internal Combustion/Reciprocating Engines	Balance of Plant	Auxiliary Systems		3861	Fire protection system piping
Internal Combustion/Reciprocating Engines	Balance of Plant	Auxiliary Systems		3862	Fire protection system valves
Internal Combustion/Reciprocating Engines	Balance of Plant	Auxiliary Systems		3863	Fire protection system fouling
Internal Combustion/Reciprocating Engines	Balance of Plant	Auxiliary Systems		3864	Fire protection system instrumentation and controls

TABLE B11-1 Balance of Plant: Auxiliary Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Balance of Plant	Auxiliary Systems		3998	Balance of plant overhaul/outage
Notes: 1) For use with Unit Codes 400-499.					

TABLE B11-2 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3600	Switchyard transformers and associated cooling systems - external (OMC)
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3601	Switchyard transformers and associated cooling systems - external (not OMC)
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3610	Switchyard circuit breakers - external (not OMC)
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3611	Switchyard circuit breakers - external (OMC)
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3612	Switchyard system protection devices - external (OMC)
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3613	Switchyard system protection devices - external (not OMC)
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3618	Other switchyard equipment - external (not OMC)
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3619	Other switchyard equipment - external (OMC)
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3620	Main transformer

TABLE B11-2 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3621	Unit auxiliaries transformer
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3622	Station service startup transformer
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3623	Auxiliary generators
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3624	Auxiliary generator voltage supply system
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3629	Other switchyard or high voltage system problems - external
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3630	400-700 volt transformers
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3631	400-700 volt circuit breakers
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3632	400-700 volt conductors and buses
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3633	400-700 volt insulators
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3634	400-700 volt protection devices
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3639	Other 400-700 volt problems
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3640	AC instrument power transformers

TABLE B11-2 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3641	AC Circuit breakers
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3642	AC Conductors and buses
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3643	AC Inverters
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3644	AC Protection devices
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3649	Other AC instrument power problems
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3650	DC instrument power battery chargers
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3651	DC circuit breakers
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3652	DC conductors and buses
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3653	DC protection devices
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3659	Other DC power problems
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3660	4000-7000 volt transformers
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3661	4000-7000 volt circuit breakers

TABLE B11-2 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3662	4000-7000 volt conductors and buses
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3663	4000-7000 volt insulators
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3664	4000-7000 volt protection devices
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3669	Other 4000-7000 volt problems
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3670	12-15kV transformers
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3671	12-15kV circuit breakers
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3672	12-15kV conductors and buses
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3673	12-15kV insulators
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3674	12-15kV protection devices
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3679	Other 12-15kV problems
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3680	Other voltage transformers
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3681	Other voltage circuit breakers

TABLE B11-2 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3682	Other voltage conductors and buses
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3683	Other voltage insulators
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3684	Other voltage protection devices
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3689	Other voltage problems
Internal Combustion/Reciprocating Engines	Balance of Plant	Electrical		3690	Station Service Power Distribution System, General
Notes: 1) For use with Unit Codes 400-499.					

TABLE B11-3 Balance of Plant: Miscellaneous (Balance of Plant)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Balance of Plant	Miscellaneous (Balance of Plant)		3970	Distributive Control System (DCS) - process computer
Internal Combustion/Reciprocating Engines	Balance of Plant	Miscellaneous (Balance of Plant)		3971	DCS - data highway
Internal Combustion/Reciprocating Engines	Balance of Plant	Miscellaneous (Balance of Plant)		3972	DCS - hardware problems (including card failure)
Internal Combustion/Reciprocating Engines	Balance of Plant	Miscellaneous (Balance of Plant)		3973	DCS - internal and termination wiring
Internal Combustion/Reciprocating Engines	Balance of Plant	Miscellaneous (Balance of Plant)		3974	DCS - logic problems

TABLE B11-3 Balance of Plant: Miscellaneous (Balance of Plant)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Balance of Plant	Miscellaneous (Balance of Plant)		3975	DCS - upgrades
Internal Combustion/Reciprocating Engines	Balance of Plant	Miscellaneous (Balance of Plant)		3979	Other DCS problems
Internal Combustion/Reciprocating Engines	Balance of Plant	Miscellaneous (Balance of Plant)		3980	Programmable Logic Controller (PLC)
Internal Combustion/Reciprocating Engines	Balance of Plant	Miscellaneous (Balance of Plant)		3981	PLC - data highway
Internal Combustion/Reciprocating Engines	Balance of Plant	Miscellaneous (Balance of Plant)		3982	PLC - hardware problems (including card failure)
Internal Combustion/Reciprocating Engines	Balance of Plant	Miscellaneous (Balance of Plant)		3983	PLC - internal and termination wiring
Internal Combustion/Reciprocating Engines	Balance of Plant	Miscellaneous (Balance of Plant)		3984	PLC - logic problems
Internal Combustion/Reciprocating Engines	Balance of Plant	Miscellaneous (Balance of Plant)		3985	PLC - upgrades
Internal Combustion/Reciprocating Engines	Balance of Plant	Miscellaneous (Balance of Plant)		3989	Other PLC problems
Notes: 1) For use with Unit Codes 400-499.					

TABLE B11-4 Balance of Plant: Power Station Switchyard					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Balance of Plant	Power Station Switchyard		3700	Power Station switchyard (non generating unit equipment)

TABLE B11-4 Balance of Plant: Power Station Switchyard					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Balance of Plant	Power Station Switchyard		3710	Transmission line (connected to powerhouse switchyard to 1st Substation)
Internal Combustion/Reciprocating Engines	Balance of Plant	Power Station Switchyard		3720	Transmission equipment at the 1st substation (see code 9300 if applicable)
Internal Combustion/Reciprocating Engines	Balance of Plant	Power Station Switchyard		3730	Transmission equipment beyond the 1st substation (see code 9300 if applicable)
Notes: 1) For use with Unit Codes 400-499.					

EXTERNAL

Use this set of codes to report events caused by external factors (flood, lightning, etc.); economic factors (lack of fuel, labor strikes, etc.); operator training; and transmission system problems external to the plant.

TABLE B11-5 External: Catastrophe					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	External	Catastrophe		9000	Flood
Internal Combustion/Reciprocating Engines	External	Catastrophe		9001	Drought
Internal Combustion/Reciprocating Engines	External	Catastrophe		9010	Fire including wildfires, not related to a specific component
Internal Combustion/Reciprocating Engines	External	Catastrophe		9020	Lightning
Internal Combustion/Reciprocating Engines	External	Catastrophe		9025	Geomagnetic disturbance

TABLE B11-5 External: Catastrophe					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	External	Catastrophe		9030	Earthquake
Internal Combustion/Reciprocating Engines	External	Catastrophe		9031	Tornado
Internal Combustion/Reciprocating Engines	External	Catastrophe		9035	Hurricane
Internal Combustion/Reciprocating Engines	External	Catastrophe		9036	Storms (ice, snow, etc)
Internal Combustion/Reciprocating Engines	External	Catastrophe		9040	Other catastrophe
Internal Combustion/Reciprocating Engines	External	Catastrophe		9090	Physical Security Incident
Internal Combustion/Reciprocating Engines	External	Catastrophe		9091	Physical Security Incident (OMC)
Internal Combustion/Reciprocating Engines	External	Catastrophe		9092	Cyber Security Incident
Internal Combustion/Reciprocating Engines	External	Catastrophe		9093	Cyber Security Incident (OMC)
Notes: 1) For use with Unit Codes 400-499.					

TABLE B11-6 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	External	Economic		0000	Reserve shutdown

TABLE B11-6 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	External	Economic		9130	Failure of fuel supplier to fulfill contractual obligations or a pre-arranged deal due to physical fuel disruptions or operational impairments (e.g. force majeure on a pipeline or compressor down; making the pipeline incapable of making its firm deliveries.)
Internal Combustion/Reciprocating Engines	External	Economic		9131	Lack of fuel – due to contractual or tariff provisions that allow for service interruption or price fluctuations during peak demand periods.
Internal Combustion/Reciprocating Engines	External	Economic		9134	Fuel conservation
Internal Combustion/Reciprocating Engines	External	Economic		9136	Problems with Primary Fuel for Units with Secondary Fuel Operation
Internal Combustion/Reciprocating Engines	External	Economic		9140	Plant modifications to burn different fuel that are not regulatory mandated
Internal Combustion/Reciprocating Engines	External	Economic		9150	Labor strikes company-wide problems or strikes outside the company's jurisdiction such as manufacturers (delaying repairs) or transportation (fuel supply) problems.
Internal Combustion/Reciprocating Engines	External	Economic		9151	Labor strikes direct plant management grievances that result in a walkout or strike are under plant management control.
Internal Combustion/Reciprocating Engines	External	Economic		9160	Other economic problems
Internal Combustion/Reciprocating Engines	External	Economic		9180	Economic (for internal use at plants only)
Internal Combustion/Reciprocating Engines	External	Economic		9181	Economic (for internal use at plants only)

TABLE B11-6 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	External	Economic		9182	Economic (for internal use at plants only)
Internal Combustion/Reciprocating Engines	External	Economic		9183	Economic (for internal use at plants only)
Internal Combustion/Reciprocating Engines	External	Economic		9184	Economic (for internal use at plants only)
Internal Combustion/Reciprocating Engines	External	Economic		9185	Economic (for internal use at plants only)
Internal Combustion/Reciprocating Engines	External	Economic		9186	Economic (for internal use at plants only)
Internal Combustion/Reciprocating Engines	External	Economic		9187	Economic (for internal use at plants only)
Internal Combustion/Reciprocating Engines	External	Economic		9188	Economic (for internal use at plants only)
Internal Combustion/Reciprocating Engines	External	Economic		9189	Economic (for internal use at plants only)
Internal Combustion/Reciprocating Engines	External	Economic		9190	Economic (for internal use at plants only)
Internal Combustion/Reciprocating Engines	External	Economic		9191	Economic (for internal use at plants only)
Internal Combustion/Reciprocating Engines	External	Economic		9192	Economic (for internal use at plants only)
Internal Combustion/Reciprocating Engines	External	Economic		9193	Economic (for internal use at plants only)

TABLE B11-6 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	External	Economic		9194	Economic (for internal use at plants only)
Internal Combustion/Reciprocating Engines	External	Economic		9195	Economic (for internal use at plants only)
Internal Combustion/Reciprocating Engines	External	Economic		9196	Economic (for internal use at plants only)
Internal Combustion/Reciprocating Engines	External	Economic		9197	Economic (for internal use at plants only)
Internal Combustion/Reciprocating Engines	External	Economic		9198	Economic (for internal use at plants only)
Internal Combustion/Reciprocating Engines	External	Economic		9199	Economic (for internal use at plants only)
Notes: 1) For use with Unit Codes 400-499.					

TABLE B11-7 External: Fuel Quality					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	External	Fuel Quality		9200	High ash content (OMC)
Internal Combustion/Reciprocating Engines	External	Fuel Quality		9201	High ash content (not OMC)
Internal Combustion/Reciprocating Engines	External	Fuel Quality		9205	Poor quality natural gas fuel, low heat content
Internal Combustion/Reciprocating Engines	External	Fuel Quality		9220	High sulfur content (OMC)

TABLE B11-7 External: Fuel Quality					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	External	Fuel Quality		9221	High sulfur content (not OMC)
Internal Combustion/Reciprocating Engines	External	Fuel Quality		9230	High vanadium content (OMC)
Internal Combustion/Reciprocating Engines	External	Fuel Quality		9231	High vanadium content (not OMC)
Internal Combustion/Reciprocating Engines	External	Fuel Quality		9240	High sodium content (OMC)
Internal Combustion/Reciprocating Engines	External	Fuel Quality		9241	High sodium content (not OMC)
Internal Combustion/Reciprocating Engines	External	Fuel Quality		9260	Low BTU oil (OMC)
Internal Combustion/Reciprocating Engines	External	Fuel Quality		9261	Low BTU oil (not OMC)
Internal Combustion/Reciprocating Engines	External	Fuel Quality		9290	Other fuel quality problems (OMC)
Internal Combustion/Reciprocating Engines	External	Fuel Quality		9291	Other fuel quality problems (not OMC)
Notes: 1) For use with Unit Codes 400-499. 2) Use code 9605 to 9655 if the fuel quality results in excess stack emissions through no fault in the pollution control equipment. Use the appropriate equipment code to report fouling and slagging.					

TABLE B11-8 External: Miscellaneous (External)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	External	Miscellaneous (External)		9300	Transmission system problems other than catastrophes (do not include switchyard problems

TABLE B11-8 External: Miscellaneous (External)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
					in this category; see codes 3600 to 3629, 3720 to 3730)
Internal Combustion/Reciprocating Engines	External	Miscellaneous (External)		9310	Operator training
Internal Combustion/Reciprocating Engines	External	Miscellaneous (External)		9320	Other miscellaneous external problems
Internal Combustion/Reciprocating Engines	External	Miscellaneous (External)		9340	Synchronous Condenser Operation
Notes: 1) For use with Unit Codes 400-499.					

GENERATOR

This set of codes contains the generator, exciter, generator cooling systems, and generator controls. Note the main leads up to and includes the generator output breaker in this set of codes.

TABLE B11-9 Generator: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Generator	Controls		4700	Generator voltage control
Internal Combustion/Reciprocating Engines	Generator	Controls		4710	Generator metering devices
Internal Combustion/Reciprocating Engines	Generator	Controls		4720	Generator synchronization equipment
Internal Combustion/Reciprocating Engines	Generator	Controls		4730	Generator current and potential transformers
Internal Combustion/Reciprocating Engines	Generator	Controls		4740	Emergency generator trip devices

TABLE B11-9 Generator: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Generator	Controls		4741	Frequency Trip (81 Relay)
Internal Combustion/Reciprocating Engines	Generator	Controls		4750	Other generator controls and metering problems
Notes: 1) For use with Unit Codes 400-499.					

TABLE B11-10 Generator: Cooling System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Generator	Cooling System		4610	Hydrogen cooling system piping and valves
Internal Combustion/Reciprocating Engines	Generator	Cooling System		4611	Hydrogen coolers
Internal Combustion/Reciprocating Engines	Generator	Cooling System		4612	Hydrogen storage system
Internal Combustion/Reciprocating Engines	Generator	Cooling System		4613	Hydrogen seals
Internal Combustion/Reciprocating Engines	Generator	Cooling System		4619	Other hydrogen system problems
Internal Combustion/Reciprocating Engines	Generator	Cooling System		4620	Air cooling system
Internal Combustion/Reciprocating Engines	Generator	Cooling System		4630	Liquid cooling system
Internal Combustion/Reciprocating Engines	Generator	Cooling System		4640	Seal oil system and seals

TABLE B11-10 Generator: Cooling System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Generator	Cooling System		4650	Other cooling system problems
Notes: 1) For use with Unit Codes 400-499. 2) Report failures caused by water leaks into generator as codes 4500, 4510, etc.					

TABLE B11-11 Generator: Exciter					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Generator	Exciter		4600	Exciter drive - motor
Internal Combustion/Reciprocating Engines	Generator	Exciter		4601	Exciter field rheostat
Internal Combustion/Reciprocating Engines	Generator	Exciter		4602	Exciter commutator and brushes
Internal Combustion/Reciprocating Engines	Generator	Exciter		4603	Solid state exciter element
Internal Combustion/Reciprocating Engines	Generator	Exciter		4604	Exciter drive - shaft
Internal Combustion/Reciprocating Engines	Generator	Exciter		4605	Exciter transformer
Internal Combustion/Reciprocating Engines	Generator	Exciter		4609	Other exciter problems
Notes: 1) For use with Unit Codes 400-499.					

TABLE B11-12 Generator: Generator					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Generator	Generator		4500	Rotor windings (including damper windings and fan blades on hydro units)
Internal Combustion/Reciprocating Engines	Generator	Generator		4510	Rotor collector rings
Internal Combustion/Reciprocating Engines	Generator	Generator		4511	Rotor, General
Internal Combustion/Reciprocating Engines	Generator	Generator		4512	Retaining Rings
Internal Combustion/Reciprocating Engines	Generator	Generator		4520	Stator windings, bushings, and terminals
Internal Combustion/Reciprocating Engines	Generator	Generator		4530	Stator core iron
Internal Combustion/Reciprocating Engines	Generator	Generator		4535	Stator, General
Internal Combustion/Reciprocating Engines	Generator	Generator		4536	Generator Heaters
Internal Combustion/Reciprocating Engines	Generator	Generator		4540	Brushes and brush rigging
Internal Combustion/Reciprocating Engines	Generator	Generator		4550	Generator bearings and lube oil system (including thrust bearings on hydro units)
Internal Combustion/Reciprocating Engines	Generator	Generator		4551	Generator bearings
Internal Combustion/Reciprocating Engines	Generator	Generator		4552	Generator lube oil system

TABLE B11-12 Generator: Generator					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Generator	Generator		4555	Bearing cooling system
Internal Combustion/Reciprocating Engines	Generator	Generator		4560	Generator vibration (excluding vibration due to failed bearing and other components)
Internal Combustion/Reciprocating Engines	Generator	Generator		4570	Generator casing
Internal Combustion/Reciprocating Engines	Generator	Generator		4580	Generator end bells and bolting
Notes: 1) For use with Unit Codes 400-499.					

TABLE B11-13 Generator: Miscellaneous (Generator)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Generator	Miscellaneous (Generator)		4800	Generator main leads
Internal Combustion/Reciprocating Engines	Generator	Miscellaneous (Generator)		4805	Generator Bus Duct Cooling System
Internal Combustion/Reciprocating Engines	Generator	Miscellaneous (Generator)		4810	Generator output breaker
Internal Combustion/Reciprocating Engines	Generator	Miscellaneous (Generator)		4830	Major generator overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)
Internal Combustion/Reciprocating Engines	Generator	Miscellaneous (Generator)		4831	Minor generator overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
Internal Combustion/Reciprocating Engines	Generator	Miscellaneous (Generator)		4840	Inspection

TABLE B11-13 Generator: Miscellaneous (Generator)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Generator	Miscellaneous (Generator)		4841	Generator doble testing
Internal Combustion/Reciprocating Engines	Generator	Miscellaneous (Generator)		4842	Reactive and capability testing
Internal Combustion/Reciprocating Engines	Generator	Miscellaneous (Generator)		4850	Core monitor alarm
Internal Combustion/Reciprocating Engines	Generator	Miscellaneous (Generator)		4860	Generator neutral grounding equipment
Internal Combustion/Reciprocating Engines	Generator	Miscellaneous (Generator)		4899	Other miscellaneous generator problems
Notes: 1) For use with Unit Codes 400-499.					

INACTIVE STATES

TABLE B11-14 Inactive States: Inactive States					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Inactive States	Inactive States		2	Inactive Reserve Shutdown
Internal Combustion/Reciprocating Engines	Inactive States	Inactive States		9990	Retired unit
Internal Combustion/Reciprocating Engines	Inactive States	Inactive States		9991	Mothballed unit
Notes: 1) For use with Unit Codes 400-499.					

INTERNAL COMBUSTION/RECIPROCATING ENGINES

TABLE B11-15 Internal Combustion/Reciprocating Engines: Engine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine		5700	Drive shaft and bearings
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine		5710	Cylinders
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine		5711	Cylinder heads
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine		5712	Hydraulic lock (water in cylinders)
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine		5720	Pistons
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine		5730	Intake valves
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine		5731	Exhaust valves
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine		5734	Exhaust gas bellow
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine		5735	Main starting air valve
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine		5740	Turbo charger
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine		5756	Starting air distributer

TABLE B11-15 Internal Combustion/Reciprocating Engines: Engine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine		5758	Charge air cooler
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine		5759	Wastegate
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine		5760	Main bearing
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine		5761	Camshaft
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine		5762	Crankshaft
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine		5763	Liner
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine		5764	Flywheel
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine		5765	Connecting rod
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine		5790	Vibration
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine		5792	Engine Overspeed Trip
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine		5799	Other engine problems
Notes: 1) For use with Unit Codes 400-499.					

TABLE B11-16 Internal Combustion/Reciprocating Engines: Engine Auxiliaries					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine Auxiliaries		5114	Lube oil filters
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine Auxiliaries		5800	Lube oil system
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine Auxiliaries		5801	Lube oil separator
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine Auxiliaries		5805	Cooling system
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine Auxiliaries		5810	Heater elements
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine Auxiliaries		5811	HT water pre heater
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine Auxiliaries		5812	LT water pre heater
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine Auxiliaries		5815	Fuel system
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine Auxiliaries		5816	CBU fuel pump
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine Auxiliaries		5817	CBU fuel filter
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine Auxiliaries		5818	Pilot filter
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine Auxiliaries		5820	Start system

TABLE B11-16 Internal Combustion/Reciprocating Engines: Engine Auxiliaries					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine Auxiliaries		5825	Battery and battery charger system
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine Auxiliaries		5830	Air filter system
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine Auxiliaries		5831	Exhaust gas rapture disc
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine Auxiliaries		5832	Turning gear
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine Auxiliaries		5849	Other engine auxiliaries problems
Notes: 1) For use with Unit Codes 400-499.					

TABLE B11-17 Internal Combustion/Reciprocating Engines: Engine Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine Controls		5850	Governor
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine Controls		5855	Engine control system
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine Controls		5860	Control power transformer
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine Controls		5865	Synchronization system
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine Controls		5870	Other engine control problems

TABLE B11-17 Internal Combustion/Reciprocating Engines: Engine Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine Controls		5871	Peak pressure sensor
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine Controls		5872	Knock sensor
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine Controls		5873	Gas admission valve
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine Controls		5874	Exhaust gas temp sensor
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Engine Controls		5880	Internal Combustion/Reciprocating Engines unit overhaul
Notes: 1) For use with Unit Codes 400-499.					

TABLE B11-18 Internal Combustion/Reciprocating Engines: Miscellaneous (Internal Combustion/Reciprocating Engines)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Miscellaneous (Internal Combustion/Reciprocating Engines)		5890	Major overhaul (use for non-specific overhaul only; see Page B-CCGT-2)
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Miscellaneous (Internal Combustion/Reciprocating Engines)		5895	Inspection
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Miscellaneous (Internal Combustion/Reciprocating Engines)		5990	Engine performance testing - individual engines (use code 9999 for total unit performance testing)
Internal Combustion/Reciprocating Engines	Internal Combustion/Reciprocating Engines	Miscellaneous (Internal Combustion/Reciprocating Engines)		5999	Other miscellaneous Internal Combustion/Reciprocating Engines problems
Notes: 1) For use with Unit Codes 400-499.					

PERFORMANCE

TABLE B11-19 Performance: Performance					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Performance	Performance		9997	NERC Reliability Standard Requirement
Internal Combustion/Reciprocating Engines	Performance	Performance		9998	Black start testing
Internal Combustion/Reciprocating Engines	Performance	Performance		9999	Total unit performance testing (use appropriate codes for individual component testing)
Notes: 1) For use with Unit Codes 400-499.					

PERSONNEL OR PROCEDURAL ERRORS

TABLE B11-20 Personnel or Procedural Errors: Personnel or Procedural Errors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Personnel or Procedural Errors	Personnel or Procedural Errors		9900	Operator error
Internal Combustion/Reciprocating Engines	Personnel or Procedural Errors	Personnel or Procedural Errors		9910	Maintenance personnel error
Internal Combustion/Reciprocating Engines	Personnel or Procedural Errors	Personnel or Procedural Errors		9920	Contractor error
Internal Combustion/Reciprocating Engines	Personnel or Procedural Errors	Personnel or Procedural Errors		9930	Operating procedure error
Internal Combustion/Reciprocating Engines	Personnel or Procedural Errors	Personnel or Procedural Errors		9940	Maintenance procedure error
Internal Combustion/Reciprocating Engines	Personnel or Procedural Errors	Personnel or Procedural Errors		9950	Contractor procedure error

TABLE B11-20 Personnel or Procedural Errors: Personnel or Procedural Errors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Personnel or Procedural Errors	Personnel or Procedural Errors		9960	Staff shortage
Notes: 1) For use with Unit Codes 400-499.					

REGULATORY, SAFETY, ENVIRONMENTAL

Use these codes only for events not directly attributable to equipment failures. Inspections or testing of certain equipment due to regulation are reported using the appropriate equipment cause codes, and the fact that it was a regulatory requirement noted in the verbal description section.

TABLE B11-21 Regulatory, Safety, Environmental: Other Operating Environmental Limitations					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9665	Thermal discharge limits (Internal Combustion/Reciprocating Engines)
Internal Combustion/Reciprocating Engines	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9675	Noise limits (not for personnel safety) (Internal Combustion/Reciprocating Engines)
Internal Combustion/Reciprocating Engines	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9685	Fish kill (Internal Combustion/Reciprocating Engines)
Internal Combustion/Reciprocating Engines	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9695	Other miscellaneous operational environmental limits (Internal Combustion/Reciprocating Engines)
Notes: 1) For use with Unit Codes 400-499.					

TABLE B11-22 Regulatory, Safety, Environmental: Regulatory					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Regulatory, Safety, Environmental	Regulatory		9504	Regulatory (environmental) proceedings and hearings - regulatory agency initiated
Internal Combustion/Reciprocating Engines	Regulatory, Safety, Environmental	Regulatory		9506	Regulatory (environmental) proceedings and hearings - intervenor initiated

TABLE B11-22 Regulatory, Safety, Environmental: Regulatory					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Regulatory, Safety, Environmental	Regulatory		9510	Plant modifications strictly for compliance with new or changed regulatory requirements (scrubbers, cooling towers, etc.)
Internal Combustion/Reciprocating Engines	Regulatory, Safety, Environmental	Regulatory		9520	Oil spill in Gulf of Mexico (OMC)
Internal Combustion/Reciprocating Engines	Regulatory, Safety, Environmental	Regulatory		9590	Miscellaneous regulatory (this code is primarily intended for use with event contribution code 2 to indicate that a regulatory-related factor contributed to the primary cause of the event)
Notes: 1) For use with Unit Codes 400-499.					

TABLE B11-23 Regulatory, Safety, Environmental: Safety					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Regulatory, Safety, Environmental	Safety		9700	OSHA-related retrofit or inspection
Internal Combustion/Reciprocating Engines	Regulatory, Safety, Environmental	Safety		9720	Other safety problems
Notes: 1) For use with Unit Codes 400-499.					

TABLE B11-24 Regulatory, Safety, Environmental: Stack Emission					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Regulatory, Safety, Environmental	Stack Emission		9605	SO2 stack emissions (Internal Combustion/Reciprocating Engines)
Internal Combustion/Reciprocating Engines	Regulatory, Safety, Environmental	Stack Emission		9615	NOx stack emissions (Internal Combustion/Reciprocating Engines)

TABLE B11-24 Regulatory, Safety, Environmental: Stack Emission					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Internal Combustion/Reciprocating Engines	Regulatory, Safety, Environmental	Stack Emission		9616	CO stack emissions - fossil
Internal Combustion/Reciprocating Engines	Regulatory, Safety, Environmental	Stack Emission		9625	Particulate stack emissions (Internal Combustion/Reciprocating Engines)
Internal Combustion/Reciprocating Engines	Regulatory, Safety, Environmental	Stack Emission		9635	Opacity (Internal Combustion/Reciprocating Engines)
Internal Combustion/Reciprocating Engines	Regulatory, Safety, Environmental	Stack Emission		9655	Other stack or exhaust emissions (Internal Combustion/Reciprocating Engines)
Notes: 1) For use with Unit Codes 400-499. 2) Include exhaust emissions. Use codes 9220 to 9290 if fuel quality causes pollution control equipment problems that result in excess stack emissions.					

Appendix B12: Index To Miscellaneous Unit Cause Codes

MISCELLANEOUS UNITS

INDEX TO SYSTEM/COMPONENT/SUB-COMPONENT CAUSE CODE TABLES			
TABLE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**
B12-1	Balance of Plant	Auxiliary Systems	Auxiliary Steam
B12-2	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems
B12-3	Balance of Plant	Auxiliary Systems	Fire Protection System
B12-4	Balance of Plant	Auxiliary Systems	Instrument Air
B12-5	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System
B12-6	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)
B12-7	Balance of Plant	Auxiliary Systems	Open Cooling Water System
B12-8	Balance of Plant	Auxiliary Systems	Seal Air Fans
B12-9	Balance of Plant	Auxiliary Systems	Service Air
B12-10	Balance of Plant	Auxiliary Systems	Service Water (Open System)
B12-11	Balance of Plant	Circulating Water Systems	
B12-12	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators
B12-13	Balance of Plant	Condensate System	Miscellaneous (Condensate System)
B12-14	Balance of Plant	Condensate System	Polishers/Chemical Addition
B12-15	Balance of Plant	Condensate System	Pumps, Piping, and Valves
B12-16	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals
B12-17	Balance of Plant	Condensing System	Condenser Controls
B12-18	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment
B12-19	Balance of Plant	Condensing System	Miscellaneous (Condensing System)
B12-20	Balance of Plant	Condensing System	Vacuum Equipment
B12-21	Balance of Plant	Electrical	
B12-22	Balance of Plant	Extraction Steam	
B12-23	Balance of Plant	Feedwater System	
B12-24	Balance of Plant	Heater Drain Systems	
B12-25	Balance of Plant	Miscellaneous (Balance of Plant)	
B12-26	Balance of Plant	Power Station Switchyard	
B12-27	Balance of Plant	Waste Water (zero discharge) Systems	
B12-28	Boiler	Bed Material Preparation System (FBC only)	
B12-29	Boiler	Bed Material Removal System	
B12-30	Boiler	Bed Solids Recirculation	
B12-31	Boiler	Boiler Air and Gas Systems	Air Supply
B12-32	Boiler	Boiler Air and Gas Systems	Flue Gas
B12-33	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation
B12-34	Boiler	Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)
B12-35	Boiler	Boiler Control Systems	
B12-36	Boiler	Boiler Design Limitations	

INDEX TO SYSTEM/COMPONENT/SUB-COMPONENT CAUSE CODE TABLES			
TABLE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**
B12-37	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners
B12-38	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Cyclone
B12-39	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)
B12-40	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts
B12-41	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers
B12-42	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)
B12-43	Boiler	Boiler Internals and Structures	
B12-44	Boiler	Boiler Overhaul and Inspections	
B12-45	Boiler	Boiler Piping System	Boiler Recirculation
B12-46	Boiler	Boiler Piping System	Cold and Hot Reheat Steam
B12-47	Boiler	Boiler Piping System	Desuperheaters/Attemperators
B12-48	Boiler	Boiler Piping System	Feedwater and Blowdown
B12-49	Boiler	Boiler Piping System	Main Steam
B12-50	Boiler	Boiler Piping System	Miscellaneous (Piping)
B12-51	Boiler	Boiler Piping System	Startup Bypass
B12-52	Boiler	Boiler Tube Fireside Slagging or Fouling	
B12-53	Boiler	Boiler Tube Leaks	
B12-54	Boiler	Boiler Water Condition	
B12-55	Boiler	External Fluidized Bed Heat Exchanger	
B12-56	Boiler	Miscellaneous (Boiler)	
B12-57	Boiler	Miscellaneous Boiler Tube Problems	
B12-58	Boiler	Slag and Ash Removal	
B12-59	Boiler	Sorbent Supply (FBC only)	Sorbent Feed Equipment from Bunkers to Boiler (FBC only)
B12-60	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)
B12-61	Expander Turbine	Expander Turbine	
B12-62	External	Catastrophe	
B12-63	External	Economic	
B12-64	External	Fuel Quality	
B12-65	External	Miscellaneous (External)	
B12-66	Gas Turbine	Auxiliary Systems	
B12-67	Gas Turbine	Exhaust Systems	
B12-68	Gas Turbine	Fuel, Ignition, and Combustion Systems	
B12-69	Gas Turbine	Inlet Air System and Compressors	Compressors
B12-70	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters
B12-71	Gas Turbine	Miscellaneous (Gas Turbine)	
B12-72	Gas Turbine	Turbine	
B12-73	Generator	Controls	
B12-74	Generator	Cooling System	
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B12-76	Generator	Generator	
B12-77	Generator	Miscellaneous (Generator)	

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TABLE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**
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B12-79	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators
B12-80	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam
B12-81	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass
B12-82	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks	
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B12-84	Hydro Turbine/Pump	Miscellaneous (Hydro Turbine/Pump)	
B12-85	Hydro Turbine/Pump	Turbine	
B12-86	Hydro Turbine/Pump	Water Supply/Discharge	
B12-87	Inactive States	Inactive States	
B12-88	Internal Combustion/Reciprocating Engines	Engine	
B12-89	Internal Combustion/Reciprocating Engines	Engine Auxiliaries	
B12-90	Internal Combustion/Reciprocating Engines	Engine Controls	
B12-91	Internal Combustion/Reciprocating Engines	Miscellaneous (Internal Combustion/Reciprocating Engines)	
B12-92	Jet Engine	Auxiliary Systems	
B12-93	Jet Engine	Exhaust Systems	
B12-94	Jet Engine	Fuel, Ignition, and Combustion Systems	
B12-95	Jet Engine	Inlet Air System and Compressors	Compressors
B12-96	Jet Engine	Inlet Air System and Compressors	Ducts and Filters
B12-97	Jet Engine	Miscellaneous (Jet Engine)	
B12-98	Jet Engine	Turbine	
B12-99	Miscellaneous	Instruments and Controls	
B12-100	Miscellaneous	Plant and Auxiliaries	
B12-101	Performance	Performance	
B12-102	Personnel or Procedural Errors	Personnel or Procedural Errors	
B12-103	Pollution Control Equipment	CO Reduction	
B12-104	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)	
B12-105	Pollution Control Equipment	Dry Scrubbers	Dry Scrubber
B12-106	Pollution Control Equipment	Dry Scrubbers	Miscellaneous (Dry Scrubber)
B12-107	Pollution Control Equipment	Dry Scrubbers	Piping, Ducting, and Dampers
B12-108	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply
B12-109	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery
B12-110	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)	
B12-111	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters
B12-112	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems
B12-113	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems
B12-114	Pollution Control Equipment	Precipitators	
B12-115	Pollution Control Equipment	Wet Scrubbers	Chemical Supply
B12-116	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)
B12-117	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans
B12-118	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery

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TABLE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**
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B12-120	Regulatory, Safety, Environmental	Other Operating Environmental Limitations	
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B12-122	Regulatory, Safety, Environmental	Safety	
B12-123	Regulatory, Safety, Environmental	Stack Emission	
B12-124	Steam Turbine	Controls	
B12-125	Steam Turbine	High Pressure Turbine	
B12-126	Steam Turbine	Intermediate Pressure Turbine	
B12-127	Steam Turbine	Low Pressure Turbine	
B12-128	Steam Turbine	Lube Oil	
B12-129	Steam Turbine	Miscellaneous (Steam Turbine)	
B12-130	Steam Turbine	Piping	
B12-131	Steam Turbine	Valves	

BALANCE OF PLANT

TABLE B12-1 Balance of Plant: Auxiliary Systems - Auxiliary Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3830	Auxiliary boiler
Miscellaneous	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3831	Auxiliary steam piping
Miscellaneous	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3832	Auxiliary steam valves
Miscellaneous	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3833	Auxiliary steam controls and instruments
Miscellaneous	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3834	Auxiliary boiler tube leaks
Miscellaneous	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3835	Auxiliary boiler burner management system
Miscellaneous	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3836	Steam transfer to other unit
Miscellaneous	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3839	Other auxiliary steam problems (also see extraction steam codes 3520 to 3529; startup bypass codes 0630 to 0660; and soot blower steam code 0870)
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-2 Balance of Plant: Auxiliary Systems - Closed Cooling Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3820	Closed cooling water pumps and motors
Miscellaneous	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3821	Closed cooling water piping
Miscellaneous	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3822	Closed cooling water valves
Miscellaneous	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3823	Closed cooling water heat exchangers
Miscellaneous	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3824	Closed cooling water system fouling

TABLE B12-2 Balance of Plant: Auxiliary Systems - Closed Cooling Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3825	Closed cooling water instrumentation
Miscellaneous	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3826	Closed cooling water strainer
Miscellaneous	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3829	Other closed cooling water system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-3 Balance of Plant: Auxiliary Systems - Fire Protection System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Auxiliary Systems	Fire Protection System	3860	Fire protection system pumps
Miscellaneous	Balance of Plant	Auxiliary Systems	Fire Protection System	3861	Fire protection system piping
Miscellaneous	Balance of Plant	Auxiliary Systems	Fire Protection System	3862	Fire protection system valves
Miscellaneous	Balance of Plant	Auxiliary Systems	Fire Protection System	3863	Fire protection system fouling
Miscellaneous	Balance of Plant	Auxiliary Systems	Fire Protection System	3864	Fire protection system instrumentation and controls
Miscellaneous	Balance of Plant	Auxiliary Systems	Fire Protection System	3869	Other fire protection system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-4 Balance of Plant: Auxiliary Systems - Instrument Air					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Auxiliary Systems	Instrument Air	3850	Instrument air compressors
Miscellaneous	Balance of Plant	Auxiliary Systems	Instrument Air	3851	Instrument air piping
Miscellaneous	Balance of Plant	Auxiliary Systems	Instrument Air	3852	Instrument air valves
Miscellaneous	Balance of Plant	Auxiliary Systems	Instrument Air	3853	Instrument air dryers
Miscellaneous	Balance of Plant	Auxiliary Systems	Instrument Air	3854	N2 backup to instrument air
Miscellaneous	Balance of Plant	Auxiliary Systems	Instrument Air	3859	Other instrument air problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-5 Balance of Plant: Auxiliary Systems - Low-pressure Gas Compression System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3870	Fuel Gas Compressor and Motors
Miscellaneous	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3871	Fuel Gas Compressor Piping
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-6 Balance of Plant: Auxiliary Systems - Miscellaneous (Auxiliary Systems)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	3898	Miscellaneous plant auxiliary process and services instrumentation and controls
Miscellaneous	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	3899	Other miscellaneous auxiliary system problems
Miscellaneous	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	6299	Other combined cycle block problems (Use other gas turbine problem codes, other steam turbine codes, etc., whenever appropriate.)
Miscellaneous	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	6399	Other coal gasification equipment problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-7 Balance of Plant: Auxiliary Systems - Open Cooling Water System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3800	Open cooling water pumps and motors
Miscellaneous	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3801	Open cooling water piping
Miscellaneous	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3802	Open cooling water valves
Miscellaneous	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3803	Open cooling water heat exchangers
Miscellaneous	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3804	Open cooling water system fouling
Miscellaneous	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3805	Open cooling water system instrumentation
Miscellaneous	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3806	Open cooling water strainer
Miscellaneous	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3809	Other open cooling water problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-8 Balance of Plant: Auxiliary Systems - Seal Air Fans					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Auxiliary Systems	Seal Air Fans	3880	Seal air fan
Miscellaneous	Balance of Plant	Auxiliary Systems	Seal Air Fans	3881	Seal air fan drive - motor
Miscellaneous	Balance of Plant	Auxiliary Systems	Seal Air Fans	3882	Seal air control dampers and drives
Miscellaneous	Balance of Plant	Auxiliary Systems	Seal Air Fans	3883	Seal air filters
Miscellaneous	Balance of Plant	Auxiliary Systems	Seal Air Fans	3889	Other seal air fan problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-9 Balance of Plant: Auxiliary Systems - Service Air					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Auxiliary Systems	Service Air	3840	Service air compressors
Miscellaneous	Balance of Plant	Auxiliary Systems	Service Air	3841	Service air piping
Miscellaneous	Balance of Plant	Auxiliary Systems	Service Air	3842	Service air valves

TABLE B12-9 Balance of Plant: Auxiliary Systems - Service Air					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Auxiliary Systems	Service Air	3843	Service air dryers
Miscellaneous	Balance of Plant	Auxiliary Systems	Service Air	3844	Soot blowing air compressor and system
Miscellaneous	Balance of Plant	Auxiliary Systems	Service Air	3849	Other service air problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-10 Balance of Plant: Auxiliary Systems - Service Water (Open System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3810	Service water pumps and motors
Miscellaneous	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3811	Service water piping
Miscellaneous	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3812	Service water valves
Miscellaneous	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3813	Service water heat exchangers
Miscellaneous	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3814	Service water system fouling
Miscellaneous	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3815	Service water strainer
Miscellaneous	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3819	Other service water problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-11 Balance of Plant: Circulating Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Circulating Water Systems		3210	Circulating water pumps
Miscellaneous	Balance of Plant	Circulating Water Systems		3211	Circulating water pump motors
Miscellaneous	Balance of Plant	Circulating Water Systems		3220	Circulating water piping
Miscellaneous	Balance of Plant	Circulating Water Systems		3221	Circulating water piping fouling
Miscellaneous	Balance of Plant	Circulating Water Systems		3230	Circulating water valves
Miscellaneous	Balance of Plant	Circulating Water Systems		3231	Waterbox
Miscellaneous	Balance of Plant	Circulating Water Systems		3232	Condenser tube cleaning system including debris filter
Miscellaneous	Balance of Plant	Circulating Water Systems		3233	Circulating water priming system
Miscellaneous	Balance of Plant	Circulating Water Systems		3235	Cooling tower booster pump
Miscellaneous	Balance of Plant	Circulating Water Systems		3236	Cooling tower booster motor
Miscellaneous	Balance of Plant	Circulating Water Systems		3238	Cooling tower fan motors
Miscellaneous	Balance of Plant	Circulating Water Systems		3239	Cooling tower fan motors - variable speed
Miscellaneous	Balance of Plant	Circulating Water Systems		3240	Cooling tower fans
Miscellaneous	Balance of Plant	Circulating Water Systems		3241	Cooling tower efficiency below design
Miscellaneous	Balance of Plant	Circulating Water Systems		3242	Cooling tower fill damage
Miscellaneous	Balance of Plant	Circulating Water Systems		3243	Cooling tower icing
Miscellaneous	Balance of Plant	Circulating Water Systems		3244	Cooling tower fires
Miscellaneous	Balance of Plant	Circulating Water Systems		3245	Other cooling tower problems
Miscellaneous	Balance of Plant	Circulating Water Systems		3246	Cooling tower fouling

TABLE B12-11 Balance of Plant: Circulating Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Circulating Water Systems		3247	Cooling tower instrumentation
Miscellaneous	Balance of Plant	Circulating Water Systems		3248	Cooling Tower Overhaul
Miscellaneous	Balance of Plant	Circulating Water Systems		3250	Circulating water system instruments and controls
Miscellaneous	Balance of Plant	Circulating Water Systems		3260	Traveling screens
Miscellaneous	Balance of Plant	Circulating Water Systems		3261	Traveling screen fouling
Miscellaneous	Balance of Plant	Circulating Water Systems		3269	Circulating water biological conditions (ie, zebra mussels)
Miscellaneous	Balance of Plant	Circulating Water Systems		3270	Intake system problems other than traveling screens
Miscellaneous	Balance of Plant	Circulating Water Systems		3271	Intake grating fouling
Miscellaneous	Balance of Plant	Circulating Water Systems		3272	Circulating water screenwash system
Miscellaneous	Balance of Plant	Circulating Water Systems		3273	Debris in circulating water from outside sources (leaves, mud, etc.)
Miscellaneous	Balance of Plant	Circulating Water Systems		3280	High circulating water temperature (not due to season, tower efficiency below design, or other listed equipment problem)
Miscellaneous	Balance of Plant	Circulating Water Systems		3281	Circulating water tempering system
Miscellaneous	Balance of Plant	Circulating Water Systems		3282	Circulating water cooling ponds
Miscellaneous	Balance of Plant	Circulating Water Systems		3285	Circulating water chemistry
Miscellaneous	Balance of Plant	Circulating Water Systems		3299	Other circulating water system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-12 Balance of Plant: Condensate System - Low/Intermediate Pressure Heater and Deaerators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3339	LP heater head leaks
Miscellaneous	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3340	LP heater tube leaks
Miscellaneous	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3341	Other LP heater - general
Miscellaneous	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3342	IP heater tube leaks
Miscellaneous	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3343	Other IP heater - general
Miscellaneous	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3344	Deaerator (including level control)
Miscellaneous	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3345	IP heater head leaks
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-13 Balance of Plant: Condensate System - Miscellaneous (Condensate System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3360	Condensate makeup and return (including storage tanks)
Miscellaneous	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3370	Condensate system controls and instrumentation (not hotwell level, heater level, or deaerator level controls; see codes 3150-3159, 3344, 3502).
Miscellaneous	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3380	Condensate coolers
Miscellaneous	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3399	Other miscellaneous condensate system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-14 Balance of Plant: Condensate System - Polishers/Chemical Addition					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Condensate System	Polishers/Chemical Addition	3350	Condensate polishing and filtering systems
Miscellaneous	Balance of Plant	Condensate System	Polishers/Chemical Addition	3351	Chemical addition systems
Miscellaneous	Balance of Plant	Condensate System	Polishers/Chemical Addition	3352	Feedwater chemistry (not specific to condenser, polishers, or chemical addition)
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-15 Balance of Plant: Condensate System - Pumps, Piping, and Valves					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3300	Condensate water pre-treatment
Miscellaneous	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3310	Condensate/hotwell pumps
Miscellaneous	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3311	Condensate/hotwell pump motor
Miscellaneous	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3312	Condensate booster pump
Miscellaneous	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3313	Condensate booster pump motor
Miscellaneous	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3314	Condensate booster pump motor - variable speed
Miscellaneous	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3315	Condensate booster pump drive (other than 3313 and 3314)
Miscellaneous	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3320	Condensate piping
Miscellaneous	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3330	Condensate valves
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-16 Balance of Plant: Condensing System - Condenser Casing or Shell and Internals					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3120	Tube sheets
Miscellaneous	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3121	Expansion joint

TABLE B12-16 Balance of Plant: Condensing System - Condenser Casing or Shell and Internals					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3122	Gaskets and seals
Miscellaneous	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3123	Hot well
Miscellaneous	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3124	Tube sheet fouling
Miscellaneous	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3129	Other condenser casing or shell and internal problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-17 Balance of Plant: Condensing System - Condenser Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Condensing System	Condenser Controls	3150	Hot well level controls
Miscellaneous	Balance of Plant	Condensing System	Condenser Controls	3151	Vacuum pump and air ejector controls
Miscellaneous	Balance of Plant	Condensing System	Condenser Controls	3152	Air-cooled condenser controls
Miscellaneous	Balance of Plant	Condensing System	Condenser Controls	3159	Other condensing system controls and instruments
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-18 Balance of Plant: Condensing System - Condenser Tubes and Support Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3110	Condenser tube leaks
Miscellaneous	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3111	Condenser tube fouling shell side
Miscellaneous	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3112	Condenser tube fouling tube side
Miscellaneous	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3113	Condenser tube and water box cleaning (including circulating water flow reversal)
Miscellaneous	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3114	Air-cooled condenser tubes
Miscellaneous	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3115	Air-cooled condenser pumps
Miscellaneous	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3116	Air-cooled condenser fans
Miscellaneous	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3117	Air-cooled condenser fan motors
Miscellaneous	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3118	Other Air-cooled condenser problems
Miscellaneous	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3119	Other condenser tube casing or shell and internal problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-19 Balance of Plant: Condensing System - Miscellaneous (Condensing System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3170	Condenser inspection (use code 3110 to report looking for tube leaks)
Miscellaneous	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3171	Air-cooled condenser inspections
Miscellaneous	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3180	Major condenser overhaul
Miscellaneous	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3185	Water side cathodic protection
Miscellaneous	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3186	Auxiliary condenser and associated equipment
Miscellaneous	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3190	Air leakage (for losses not attributable to previously noted equipment related codes)
Miscellaneous	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3199	Other miscellaneous condensing system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-20 Balance of Plant: Condensing System - Vacuum Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Condensing System	Vacuum Equipment	3130	Air ejectors
Miscellaneous	Balance of Plant	Condensing System	Vacuum Equipment	3131	Air ejector piping and valves
Miscellaneous	Balance of Plant	Condensing System	Vacuum Equipment	3132	Inter and after condensers
Miscellaneous	Balance of Plant	Condensing System	Vacuum Equipment	3133	Vacuum pumps
Miscellaneous	Balance of Plant	Condensing System	Vacuum Equipment	3134	Vacuum pump piping and valves
Miscellaneous	Balance of Plant	Condensing System	Vacuum Equipment	3135	Vacuum pump motor and auxiliaries
Miscellaneous	Balance of Plant	Condensing System	Vacuum Equipment	3139	Other air extraction system problems - general
Miscellaneous	Balance of Plant	Condensing System	Vacuum Equipment	3149	Loss of vacuum not attributable to a particular component such as air ejectors or valves, or high back pressure not attributable to high circulating water temperature, or vacuum losses from a known cause.
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-21 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Electrical		3600	Switchyard transformers and associated cooling systems - external (OMC)
Miscellaneous	Balance of Plant	Electrical		3601	Switchyard transformers and associated cooling systems - external (not OMC)
Miscellaneous	Balance of Plant	Electrical		3610	Switchyard circuit breakers – external (not OMC)
Miscellaneous	Balance of Plant	Electrical		3611	Switchyard circuit breakers - external (OMC)

TABLE B12-21 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Electrical		3612	Switchyard system protection devices - external (OMC)
Miscellaneous	Balance of Plant	Electrical		3613	Switchyard system protection devices – external (not OMC)
Miscellaneous	Balance of Plant	Electrical		3618	Other switchyard equipment - external (not OMC)
Miscellaneous	Balance of Plant	Electrical		3619	Other switchyard equipment - external (OMC)
Miscellaneous	Balance of Plant	Electrical		3620	Main transformer
Miscellaneous	Balance of Plant	Electrical		3621	Unit auxiliaries transformer
Miscellaneous	Balance of Plant	Electrical		3622	Station service startup transformer
Miscellaneous	Balance of Plant	Electrical		3623	Auxiliary generators
Miscellaneous	Balance of Plant	Electrical		3624	Auxiliary generator voltage supply system
Miscellaneous	Balance of Plant	Electrical		3629	Other switchyard or high voltage system problems - external
Miscellaneous	Balance of Plant	Electrical		3630	400-700 volt transformers
Miscellaneous	Balance of Plant	Electrical		3631	400-700 volt circuit breakers
Miscellaneous	Balance of Plant	Electrical		3632	400-700 volt conductors and buses
Miscellaneous	Balance of Plant	Electrical		3633	400-700 volt insulators
Miscellaneous	Balance of Plant	Electrical		3634	400-700 volt protection devices
Miscellaneous	Balance of Plant	Electrical		3639	Other 400-700 volt problems
Miscellaneous	Balance of Plant	Electrical		3640	AC instrument power transformers
Miscellaneous	Balance of Plant	Electrical		3641	AC Circuit breakers
Miscellaneous	Balance of Plant	Electrical		3642	AC Conductors and buses
Miscellaneous	Balance of Plant	Electrical		3643	AC Inverters
Miscellaneous	Balance of Plant	Electrical		3644	AC Protection devices
Miscellaneous	Balance of Plant	Electrical		3649	Other AC instrument power problems
Miscellaneous	Balance of Plant	Electrical		3650	DC instrument power battery chargers
Miscellaneous	Balance of Plant	Electrical		3651	DC circuit breakers
Miscellaneous	Balance of Plant	Electrical		3652	DC conductors and buses
Miscellaneous	Balance of Plant	Electrical		3653	DC protection devices
Miscellaneous	Balance of Plant	Electrical		3659	Other DC power problems
Miscellaneous	Balance of Plant	Electrical		3660	4000-7000 volt transformers
Miscellaneous	Balance of Plant	Electrical		3661	4000-7000 volt circuit breakers
Miscellaneous	Balance of Plant	Electrical		3662	4000-7000 volt conductors and buses
Miscellaneous	Balance of Plant	Electrical		3663	4000-7000 volt insulators
Miscellaneous	Balance of Plant	Electrical		3664	4000-7000 volt protection devices
Miscellaneous	Balance of Plant	Electrical		3669	Other 4000-7000 volt problems
Miscellaneous	Balance of Plant	Electrical		3670	12-15kV transformers
Miscellaneous	Balance of Plant	Electrical		3671	12-15kV circuit breakers

TABLE B12-21 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Electrical		3672	12-15kV conductors and buses
Miscellaneous	Balance of Plant	Electrical		3673	12-15kV insulators
Miscellaneous	Balance of Plant	Electrical		3674	12-15kV protection devices
Miscellaneous	Balance of Plant	Electrical		3679	Other 12-15kV problems
Miscellaneous	Balance of Plant	Electrical		3680	Other voltage transformers
Miscellaneous	Balance of Plant	Electrical		3681	Other voltage circuit breakers
Miscellaneous	Balance of Plant	Electrical		3682	Other voltage conductors and buses
Miscellaneous	Balance of Plant	Electrical		3683	Other voltage insulators
Miscellaneous	Balance of Plant	Electrical		3684	Other voltage protection devices
Miscellaneous	Balance of Plant	Electrical		3689	Other voltage problems
Miscellaneous	Balance of Plant	Electrical		3690	Station Service Power Distribution System, General
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-22 Balance of Plant: Extraction Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Extraction Steam		3520	HP Extraction steam piping
Miscellaneous	Balance of Plant	Extraction Steam		3521	HP Extraction steam valves
Miscellaneous	Balance of Plant	Extraction Steam		3522	HP Extraction steam instruments and controls
Miscellaneous	Balance of Plant	Extraction Steam		3529	Other HP extraction steam system problems
Miscellaneous	Balance of Plant	Extraction Steam		3530	IP Extraction steam piping
Miscellaneous	Balance of Plant	Extraction Steam		3531	IP Extraction steam valves
Miscellaneous	Balance of Plant	Extraction Steam		3532	IP Extraction steam instruments and controls
Miscellaneous	Balance of Plant	Extraction Steam		3539	Other IP extraction steam system problems
Miscellaneous	Balance of Plant	Extraction Steam		3540	LP Extraction steam piping
Miscellaneous	Balance of Plant	Extraction Steam		3541	LP Extraction steam valves
Miscellaneous	Balance of Plant	Extraction Steam		3542	LP Extraction steam instruments and controls
Miscellaneous	Balance of Plant	Extraction Steam		3549	Other LP extraction steam system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-23 Balance of Plant: Feedwater System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Feedwater System		3401	Startup feedwater pump
Miscellaneous	Balance of Plant	Feedwater System		3402	Startup feedwater pump drives - all types
Miscellaneous	Balance of Plant	Feedwater System		3407	Feedwater pump suction screens
Miscellaneous	Balance of Plant	Feedwater System		3408	Feedwater pump drive - local controls

TABLE B12-23 Balance of Plant: Feedwater System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Feedwater System		3409	Feedwater pump drive motor - variable speed
Miscellaneous	Balance of Plant	Feedwater System		3410	Feedwater pump
Miscellaneous	Balance of Plant	Feedwater System		3411	Feedwater pump drive - motor
Miscellaneous	Balance of Plant	Feedwater System		3412	Feedwater pump drive - steam turbine
Miscellaneous	Balance of Plant	Feedwater System		3413	Feedwater pump coupling and drive shaft
Miscellaneous	Balance of Plant	Feedwater System		3414	Feedwater pump local controls
Miscellaneous	Balance of Plant	Feedwater System		3415	Feedwater pump/drive lube oil system
Miscellaneous	Balance of Plant	Feedwater System		3416	Other feedwater pump problems
Miscellaneous	Balance of Plant	Feedwater System		3417	Feedwater pump drive - main shaft
Miscellaneous	Balance of Plant	Feedwater System		3418	Feedwater pump drive - other
Miscellaneous	Balance of Plant	Feedwater System		3419	Feedwater pump drive - gear
Miscellaneous	Balance of Plant	Feedwater System		3420	Feedwater piping and supports
Miscellaneous	Balance of Plant	Feedwater System		3430	Feedwater regulating (boiler level control) valve
Miscellaneous	Balance of Plant	Feedwater System		3431	Other feedwater valves
Miscellaneous	Balance of Plant	Feedwater System		3439	HP heater head leaks
Miscellaneous	Balance of Plant	Feedwater System		3440	High pressure heater tube leaks
Miscellaneous	Balance of Plant	Feedwater System		3441	Other high pressure heater problems (see condensate system for LP and IP heater codes)
Miscellaneous	Balance of Plant	Feedwater System		3451	Feedwater booster pump suction screens
Miscellaneous	Balance of Plant	Feedwater System		3452	Feedwater booster pump drive - local controls
Miscellaneous	Balance of Plant	Feedwater System		3453	Feedwater booster pump drive motor - variable speed
Miscellaneous	Balance of Plant	Feedwater System		3454	Feedwater booster pump
Miscellaneous	Balance of Plant	Feedwater System		3455	Feedwater booster pump drive - motor
Miscellaneous	Balance of Plant	Feedwater System		3456	Feedwater booster pump drive - steam turbine
Miscellaneous	Balance of Plant	Feedwater System		3457	Feedwater booster pump coupling and drive shaft
Miscellaneous	Balance of Plant	Feedwater System		3458	Feedwater booster pump local controls
Miscellaneous	Balance of Plant	Feedwater System		3459	Feedwater booster pump/drive lube oil system
Miscellaneous	Balance of Plant	Feedwater System		3460	Other feedwater booster pump problems
Miscellaneous	Balance of Plant	Feedwater System		3461	Feedwater booster pump drive - main shaft
Miscellaneous	Balance of Plant	Feedwater System		3462	Feedwater booster pump drive - other
Miscellaneous	Balance of Plant	Feedwater System		3463	Feedwater booster pump drive - gear
Miscellaneous	Balance of Plant	Feedwater System		3499	Other feedwater system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-24 Balance of Plant: Heater Drain Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Heater Drain Systems		3501	Heater drain pumps
Miscellaneous	Balance of Plant	Heater Drain Systems		3502	Heater level control
Miscellaneous	Balance of Plant	Heater Drain Systems		3503	Heater drain piping
Miscellaneous	Balance of Plant	Heater Drain Systems		3504	Heater drain valves
Miscellaneous	Balance of Plant	Heater Drain Systems		3505	Heater drain pump drive
Miscellaneous	Balance of Plant	Heater Drain Systems		3509	Other heater drain system problems
Notes: 1) For use with Unit Codes 800–899. 2) Excluding extraction or drain systems.					

TABLE B12-25 Balance of Plant: Miscellaneous (Balance of Plant)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Miscellaneous (Balance of Plant)		3950	Process computer
Miscellaneous	Balance of Plant	Miscellaneous (Balance of Plant)		3960	Thermal derating (thermal efficiency losses in balance of plant when specific cause(s) unknown)
Miscellaneous	Balance of Plant	Miscellaneous (Balance of Plant)		3970	Distributive Control System (DCS) - process computer
Miscellaneous	Balance of Plant	Miscellaneous (Balance of Plant)		3971	DCS - data highway
Miscellaneous	Balance of Plant	Miscellaneous (Balance of Plant)		3972	DCS - hardware problems (including card failure)
Miscellaneous	Balance of Plant	Miscellaneous (Balance of Plant)		3973	DCS - internal and termination wiring
Miscellaneous	Balance of Plant	Miscellaneous (Balance of Plant)		3974	DCS - logic problems
Miscellaneous	Balance of Plant	Miscellaneous (Balance of Plant)		3975	DCS - upgrades
Miscellaneous	Balance of Plant	Miscellaneous (Balance of Plant)		3979	Other DCS problems
Miscellaneous	Balance of Plant	Miscellaneous (Balance of Plant)		3980	Programmable Logic Controller (PLC)
Miscellaneous	Balance of Plant	Miscellaneous (Balance of Plant)		3981	PLC - data highway
Miscellaneous	Balance of Plant	Miscellaneous (Balance of Plant)		3982	PLC - hardware problems (including card failure)
Miscellaneous	Balance of Plant	Miscellaneous (Balance of Plant)		3983	PLC - internal and termination wiring
Miscellaneous	Balance of Plant	Miscellaneous (Balance of Plant)		3984	PLC - logic problems
Miscellaneous	Balance of Plant	Miscellaneous (Balance of Plant)		3985	PLC - upgrades
Miscellaneous	Balance of Plant	Miscellaneous (Balance of Plant)		3989	Other PLC problems
Miscellaneous	Balance of Plant	Miscellaneous (Balance of Plant)		3995	Powerhouse heating and ventilating systems
Miscellaneous	Balance of Plant	Miscellaneous (Balance of Plant)		3996	Air conditioning systems - rooms and areas
Miscellaneous	Balance of Plant	Miscellaneous (Balance of Plant)		3998	Balance of plant overhaul/outage
Miscellaneous	Balance of Plant	Miscellaneous (Balance of Plant)		3999	Other miscellaneous balance of plant problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-26 Balance of Plant: Power Station Switchyard					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Power Station Switchyard		3700	Power Station switchyard (non generating unit equipment)
Miscellaneous	Balance of Plant	Power Station Switchyard		3710	Transmission line (connected to powerhouse switchyard to 1st Substation)
Miscellaneous	Balance of Plant	Power Station Switchyard		3720	Transmission equipment at the 1st substation (see code 9300 if applicable)
Miscellaneous	Balance of Plant	Power Station Switchyard		3730	Transmission equipment beyond the 1st substation (see code 9300 if applicable)
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-27 Balance of Plant: Waste Water (zero discharge) Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Balance of Plant	Waste Water (zero discharge) Systems		3290	Waste water (zero discharge) tanks, pumps, and motors
Miscellaneous	Balance of Plant	Waste Water (zero discharge) Systems		3291	Waste water (zero discharge) system fouling
Miscellaneous	Balance of Plant	Waste Water (zero discharge) Systems		3292	Waste water (zero discharge) piping
Miscellaneous	Balance of Plant	Waste Water (zero discharge) Systems		3293	Waste water (zero discharge) valves
Miscellaneous	Balance of Plant	Waste Water (zero discharge) Systems		3294	Waste water (zero discharge) controls and instrumentation
Miscellaneous	Balance of Plant	Waste Water (zero discharge) Systems		3295	Other waste water (zero discharge) problems
Notes: 1) For use with Unit Codes 800–899.					

BOILER

This set of codes contains the following:

- Boiler
- Boiler internals (tubes, refractory, supports, etc.)
- All the fuel handling, storage, preparation, and burning equipment.
- The forced/induced draft air system.
- Slag and ash removal except for particulate and gas cleanup. These latter items are covered under pollution control equipment.
- The main steam and reheat steam systems up to but not including the turbine stop or isolation valves.
- The feedwater system downstream of the final valve prior to entry into the economizer or boiler.
- Boiler blowdown systems.
- The startup bypass system including drains up to the heaters or condenser.
- Boiler water chemistry problems not due to problems in the condensate/feedwater system, the chemical addition system, or the demineralizer/polisher system.
- The instruments and controls associated with the above equipment.

TABLE B12-28 Boiler: Bed Material Preparation System (FBC only)

UNIT TYPE	SYSTEM	COMPONENT	SUB-COMPONENT	CAUSE CODE	DESCRIPTION
Miscellaneous	Boiler	Bed Material Preparation System (FBC only)		160	Bed material tanks/hoppers
Miscellaneous	Boiler	Bed Material Preparation System (FBC only)		162	Bed material conveyors
Miscellaneous	Boiler	Bed Material Preparation System (FBC only)		163	Bed material feeders
Miscellaneous	Boiler	Bed Material Preparation System (FBC only)		164	Bed material feeder motors
Miscellaneous	Boiler	Bed Material Preparation System (FBC only)		165	Bed material crushers
Miscellaneous	Boiler	Bed Material Preparation System (FBC only)		166	Bed material crusher motors
Miscellaneous	Boiler	Bed Material Preparation System (FBC only)		167	Bed material screens
Miscellaneous	Boiler	Bed Material Preparation System (FBC only)		168	Bed material blowers/fans
Miscellaneous	Boiler	Bed Material Preparation System (FBC only)		169	Bed material blower/fan motors
Miscellaneous	Boiler	Bed Material Preparation System (FBC only)		170	Bed material cyclone
Miscellaneous	Boiler	Bed Material Preparation System (FBC only)		171	Bed material baghouse
Miscellaneous	Boiler	Bed Material Preparation System (FBC only)		172	Bed material drying equipment
Miscellaneous	Boiler	Bed Material Preparation System (FBC only)		173	Bed material pneumatic transport system including piping and valves
Miscellaneous	Boiler	Bed Material Preparation System (FBC only)		174	Other bed material handling equipment

Notes: 1) For use with Unit Codes 800–899.

TABLE B12-29 Boiler: Bed Material Removal System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Bed Material Removal System		930	Bed material coolers
Miscellaneous	Boiler	Bed Material Removal System		931	Bed material transport piping/valves
Miscellaneous	Boiler	Bed Material Removal System		932	Bed material transport tanks/hoppers
Miscellaneous	Boiler	Bed Material Removal System		933	Bed material fans/blowers
Miscellaneous	Boiler	Bed Material Removal System		934	Bed material fan/blower motors
Miscellaneous	Boiler	Bed Material Removal System		935	Bed material disposal conditioner
Miscellaneous	Boiler	Bed Material Removal System		936	Bed material conveyors
Miscellaneous	Boiler	Bed Material Removal System		937	Bed material mechanical separators and baghouse
Miscellaneous	Boiler	Bed Material Removal System		950	Other bed material system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-30 Boiler: Bed Solids Recirculation					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Bed Solids Recirculation		951	Char reinjection feeders
Miscellaneous	Boiler	Bed Solids Recirculation		952	Char reinjection piping/valves
Miscellaneous	Boiler	Bed Solids Recirculation		953	Char reinjection controls
Miscellaneous	Boiler	Bed Solids Recirculation		959	Other char reinjection equipment problems
Miscellaneous	Boiler	Bed Solids Recirculation		960	Char transport piping and valves
Miscellaneous	Boiler	Bed Solids Recirculation		961	Char transfer tanks/hoppers
Miscellaneous	Boiler	Bed Solids Recirculation		962	Char conditioner
Miscellaneous	Boiler	Bed Solids Recirculation		969	Other char equipment problems
Miscellaneous	Boiler	Bed Solids Recirculation		970	Flue gas-solids separator
Miscellaneous	Boiler	Bed Solids Recirculation		971	Flue gas-solids separator piping and valves
Miscellaneous	Boiler	Bed Solids Recirculation		972	Flue gas-solids separator controls
Miscellaneous	Boiler	Bed Solids Recirculation		973	Flue gas-solids separator refractory
Miscellaneous	Boiler	Bed Solids Recirculation		980	High pressure loop seal recirculation fans/blowers
Miscellaneous	Boiler	Bed Solids Recirculation		981	High pressure loop seal recirculation fan/blower motors
Miscellaneous	Boiler	Bed Solids Recirculation		982	High pressure loop seal recirculation fan/blower controls
Miscellaneous	Boiler	Bed Solids Recirculation		989	Other bed solids recirculation problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-31 Boiler: Boiler Air and Gas Systems - Air Supply					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Boiler Air and Gas Systems	Air Supply	1400	Forced draft fans

TABLE B12-31 Boiler: Boiler Air and Gas Systems - Air Supply					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Boiler Air and Gas Systems	Air Supply	1401	Forced draft fan dampers
Miscellaneous	Boiler	Boiler Air and Gas Systems	Air Supply	1407	Forced draft fan lubrication system
Miscellaneous	Boiler	Boiler Air and Gas Systems	Air Supply	1410	Forced draft fan motors
Miscellaneous	Boiler	Boiler Air and Gas Systems	Air Supply	1411	Forced draft fan motors - variable speed
Miscellaneous	Boiler	Boiler Air and Gas Systems	Air Supply	1412	Forced draft fan drives (other than motor)
Miscellaneous	Boiler	Boiler Air and Gas Systems	Air Supply	1413	Forced draft fan couplings
Miscellaneous	Boiler	Boiler Air and Gas Systems	Air Supply	1415	Forced draft fan controls
Miscellaneous	Boiler	Boiler Air and Gas Systems	Air Supply	1420	Other forced draft fan problems
Miscellaneous	Boiler	Boiler Air and Gas Systems	Air Supply	1421	Secondary air fans/blowers
Miscellaneous	Boiler	Boiler Air and Gas Systems	Air Supply	1422	Secondary air fan/blower motors - single speed
Miscellaneous	Boiler	Boiler Air and Gas Systems	Air Supply	1423	Secondary air fan/blower motors - variable speed
Miscellaneous	Boiler	Boiler Air and Gas Systems	Air Supply	1424	Secondary air fan/blower controls
Miscellaneous	Boiler	Boiler Air and Gas Systems	Air Supply	1430	Air supply ducts from FD fan
Miscellaneous	Boiler	Boiler Air and Gas Systems	Air Supply	1432	Air supply duct expansion joints
Miscellaneous	Boiler	Boiler Air and Gas Systems	Air Supply	1440	Air supply dampers
Miscellaneous	Boiler	Boiler Air and Gas Systems	Air Supply	1450	Other air supply problems
Miscellaneous	Boiler	Boiler Air and Gas Systems	Air Supply	1451	Fluidized Air Fan (FBC Only)
Notes: 1) For use with Unit Codes 800–899. 2) Excluding burner pipes, wind boxes, primary air, or pulverizer exhausters.					

TABLE B12-32 Boiler: Boiler Air and Gas Systems - Flue Gas					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Boiler Air and Gas Systems	Flue Gas	1455	Induced draft fans
Miscellaneous	Boiler	Boiler Air and Gas Systems	Flue Gas	1456	Induced draft fan dampers
Miscellaneous	Boiler	Boiler Air and Gas Systems	Flue Gas	1457	Induced draft fan lubrication systems
Miscellaneous	Boiler	Boiler Air and Gas Systems	Flue Gas	1460	Induced draft fan fouling
Miscellaneous	Boiler	Boiler Air and Gas Systems	Flue Gas	1470	Induced draft fan motors and drives
Miscellaneous	Boiler	Boiler Air and Gas Systems	Flue Gas	1471	Induced draft fan motors - variable speed
Miscellaneous	Boiler	Boiler Air and Gas Systems	Flue Gas	1472	Inducted draft fan coupling
Miscellaneous	Boiler	Boiler Air and Gas Systems	Flue Gas	1475	Induced draft fan controls
Miscellaneous	Boiler	Boiler Air and Gas Systems	Flue Gas	1476	Induced draft fan speed changer
Miscellaneous	Boiler	Boiler Air and Gas Systems	Flue Gas	1480	Other induced draft fan problems
Miscellaneous	Boiler	Boiler Air and Gas Systems	Flue Gas	1487	Air heater (tubular)
Miscellaneous	Boiler	Boiler Air and Gas Systems	Flue Gas	1488	Air heater (regenerative)
Miscellaneous	Boiler	Boiler Air and Gas Systems	Flue Gas	1489	Air heater (heat pipe, plate-type)
Miscellaneous	Boiler	Boiler Air and Gas Systems	Flue Gas	1492	Air heater fouling (tubular)
Miscellaneous	Boiler	Boiler Air and Gas Systems	Flue Gas	1493	Air heater fouling (regenerative)
Miscellaneous	Boiler	Boiler Air and Gas Systems	Flue Gas	1495	Other air heater fouling (heat pipe, plate-type)

TABLE B12-32 Boiler: Boiler Air and Gas Systems - Flue Gas					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Boiler Air and Gas Systems	Flue Gas	1500	Air heater soot blowers
Miscellaneous	Boiler	Boiler Air and Gas Systems	Flue Gas	1510	Flue gas ducts (except recirculation)
Miscellaneous	Boiler	Boiler Air and Gas Systems	Flue Gas	1512	Flue gas expansion joints
Miscellaneous	Boiler	Boiler Air and Gas Systems	Flue Gas	1520	Flue gas dampers (except recirculation)
Miscellaneous	Boiler	Boiler Air and Gas Systems	Flue Gas	1530	Other flue gas problems
Notes: 1) For use with Unit Codes 800–899. 2) Excluding burner pipes, wind boxes, primary air, or pulverizer exhausters.					

TABLE B12-33 Boiler: Boiler Air and Gas Systems - Flue Gas Recirculation					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1535	Flue gas recirculating fan
Miscellaneous	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1536	Flue gas recirculating fan dampers
Miscellaneous	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1537	Flue gas recirculating fan lubrication systems
Miscellaneous	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1540	Flue gas recirculation fan fouling
Miscellaneous	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1550	Flue gas recirculation fan motors
Miscellaneous	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1555	Flue gas recirculation fan controls
Miscellaneous	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1560	Other flue gas recirculation fan problems
Miscellaneous	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1570	Flue gas recirculation ducts
Miscellaneous	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1572	Flue gas recirculation duct expansion joints
Miscellaneous	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1580	Flue gas recirculation dampers
Notes: 1) For use with Unit Codes 800–899. 2) Excluding burner pipes, wind boxes, primary air, or pulverizer exhausters.					

TABLE B12-34 Boiler: Boiler Air and Gas Systems - Miscellaneous (Boiler Air and Gas Systems)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1590	Stacks (use code 8430 for stack problems due to pollution control equipment)
Miscellaneous	Boiler	Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1591	Stack damper and linkage
Miscellaneous	Boiler	Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1592	Stack damper linkage motors
Miscellaneous	Boiler	Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1599	Other miscellaneous boiler air and gas system problems
Notes: 1) For use with Unit Codes 800–899. 2) Excluding burner pipes, wind boxes, primary air, or pulverizer exhausters.					

TABLE B12-35 Boiler: Boiler Control Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Boiler Control Systems		1700	Feedwater controls (report local controls - feedwater pump, feedwater regulator valve, etc., - with component or system)
Miscellaneous	Boiler	Boiler Control Systems		1710	Combustion/steam condition controls (report local controls - burners, pulverizers, etc., - with component or system)
Miscellaneous	Boiler	Boiler Control Systems		1720	Desuperheater/attemperator controls
Miscellaneous	Boiler	Boiler Control Systems		1730	Boiler explosion or implosion
Miscellaneous	Boiler	Boiler Control Systems		1740	Boiler drum gage glasses / level indicator
Miscellaneous	Boiler	Boiler Control Systems		1741	Furnace and water gauge television auxiliary system
Miscellaneous	Boiler	Boiler Control Systems		1750	Burner management system
Miscellaneous	Boiler	Boiler Control Systems		1760	Feedwater instrumentation (not local controls)
Miscellaneous	Boiler	Boiler Control Systems		1761	Combustion/Steam condition instrumentation (not local controls)
Miscellaneous	Boiler	Boiler Control Systems		1762	Desuperheater/attemperator instrumentation (not local controls)
Miscellaneous	Boiler	Boiler Control Systems		1799	Other boiler instrumentation and control problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-36 Boiler: Boiler Design Limitations					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Boiler Design Limitations		1900	Improper balance between tube sections not due to fouling or plugging
Miscellaneous	Boiler	Boiler Design Limitations		1910	Inadequate air not due to equipment problems
Notes: 1) For use with Unit Codes 800–899. 2) Including instruments which input to the controls.					

TABLE B12-37 Boiler: Boiler Fuel Supply from Bunkers to Boiler - Burners					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	358	Oil burner piping and valves
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	359	Gas burner piping and valves
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	360	Burners
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	361	Burner orifices
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	365	Bed warmup burners (FBC only)
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	366	Duct burners (FBC only)
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	370	Burner instruments and controls (except light off)

TABLE B12-37 Boiler: Boiler Fuel Supply from Bunkers to Boiler - Burners					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	375	Burner instruments and controls (FBC light-off system)
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	380	Light off (igniter) systems (including fuel supply)
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	385	Igniters
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	390	Burner wind boxes and dampers
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	400	Burner wind box fires
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	410	Other burner problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-38 Boiler: Boiler Fuel Supply from Bunkers to Boiler - Cyclone					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Cyclone	415	Cyclone feeders
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Cyclone	420	Cyclone crusher
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Cyclone	425	Cyclone dampers
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Cyclone	426	Cyclone air ducts
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Cyclone	430	Cyclone furnace
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Cyclone	435	Other cyclone problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-39 Boiler: Boiler Fuel Supply from Bunkers to Boiler - Oil and Gas Systems (except light off)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	440	Fuel oil pumps (general)
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	441	Fuel oil pumps (burner supply)
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	442	Fuel oil pumps (forwarding/transfer)
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	443	Fuel oil (burner supply) pump drives
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	444	Fuel oil (forwarding/transfer) pump drives
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	450	Fuel oil heaters
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	460	Fuel oil atomizers
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	470	Oil and gas fires
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	475	Fuel lance (FBC only)
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	480	Other oil and gas fuel supply problems (see codes 0360-0410 for burner problems)
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-40 Boiler: Boiler Fuel Supply from Bunkers to Boiler - Pulverizers, Primary Air Fans, and Associated Ducts					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	200	Pulverizer exhauster fan (for indirect firing)
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	205	Pulverizer exhauster fan drive
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	210	Pulverizer heater (for indirect firing)
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	220	Pulverizer system cyclone separator
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	230	Pulverizer bag filter
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	240	Pulverized coal bin
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	250	Pulverizer feeders
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	253	Pulverizer feeder motor
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	255	Pulverizer feeder coal scales
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	256	Seal air system (air to pulverizers)
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	260	Primary air fan
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	262	Primary air fan lube oil system
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	263	Primary air fan drives
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	264	Other primary air fan problems
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	265	Primary air heater
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	266	Primary air heater fouling
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	267	Primary air flow instrumentation
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	270	Primary air duct and dampers
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	280	Pulverizer fires
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	290	Pulverizer reduced capacity due to wear
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	300	Pulverizer motors and drives
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	310	Pulverizer mills
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	312	Pulverizer mill classifiers
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	313	Pulverizer mill trunnion seals

TABLE B12-40 Boiler: Boiler Fuel Supply from Bunkers to Boiler - Pulverizers, Primary Air Fans, and Associated Ducts					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	314	Pulverizer mill ball charger hopper (ball mills only)
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	315	Pulverizer mill coal level controls
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	320	Foreign object in Pulverizers mill
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	325	Pulverizer skidding
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	330	Pulverizer coal leak (pulverizers only)
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	331	Pulverizer system coal leaks (other than pulverizers, see code 0330)
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	335	Pulverizer lube oil system
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	338	Pulverizer control systems (temperature and pressure)
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	340	Other pulverizer problems
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	341	Pulverizer deluge system
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	342	Pulverizer inert system
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	344	Pulverizer inspection
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	345	Pulverizer overhaul
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	346	Pulverizer pyrite removal system
Miscellaneous	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	350	Pulverized fuel and air piping (from pulverizer to wind box) (see code 0898 for pulverizer reject system problems)
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-41 Boiler: Boiler Fuel Supply to Bunker - Coal Handling Equipment up Through Bunkers					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	10	Thaw shed failure or fire
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	20	Coal car dumpers, shakers, and unloaders
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	22	Unloading/receiving hopper (train/truck)
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	24	Rotary plow
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	26	Dust suppression system

TABLE B12-41 Boiler: Boiler Fuel Supply to Bunker - Coal Handling Equipment up Through Bunkers					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	28	Dust collection system
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	30	Coal conveyors and feeders
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	35	Metal detector/collector (including magnetic separator)
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	40	Coal elevators
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	50	Coal storage fires
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	60	Coal crushers including motors
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	70	Coal samplers
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	75	Storage silos/hoppers
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	80	Stackers/reclaimers
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	84	Coal conveyor scales storage coal pile
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	85	Bunker feeder coal scales
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	90	Bunker fires
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	95	Bunker flow problems
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	100	Bunker gates
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	105	Bunker structures
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	106	Coal drying system (see additional codes 0125-0127)
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	107	Screen (prior to bunkers)
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	110	Other coal fuel supply problems up through bunkers
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	125	Coal crusher dryer hammers (see code 0106)
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	126	Coal crusher lube oil system (see code 0106)
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	127	Other coal crusher dryer problems (see code 0106)
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-42 Boiler: Boiler Fuel Supply to Bunker - Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	111	Solid fuel feeder conveyors
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	112	Solid fuel feed tanks/hoppers
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	113	Solid fuel tank/hopper fires
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	114	Solid fuel volumetric feeder
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	115	Solid fuel gravimetric feeder
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	116	Solid fuel feeder motors
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	117	Solid fuel pneumatic transport system including piping and valves
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	118	Solid fuel drying system including screens
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	119	Solid fuel crushers
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	120	Solid fuel crusher motors
Miscellaneous	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	121	Other solid fuel feed problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-43 Boiler: Boiler Internals and Structures					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Boiler Internals and Structures		800	Drums and drum internals (single drum only)
Miscellaneous	Boiler	Boiler Internals and Structures		810	Boiler supports and structures (use code 1320 for tube supports)
Miscellaneous	Boiler	Boiler Internals and Structures		811	Convection pass enclosure (FBC only)
Miscellaneous	Boiler	Boiler Internals and Structures		812	Distribution plate (FBC only)
Miscellaneous	Boiler	Boiler Internals and Structures		813	Lower furnace (in-bed) tube supports (FBC only)
Miscellaneous	Boiler	Boiler Internals and Structures		814	In-bed bubble caps (FBC only)
Miscellaneous	Boiler	Boiler Internals and Structures		820	Casing
Miscellaneous	Boiler	Boiler Internals and Structures		830	Doors
Miscellaneous	Boiler	Boiler Internals and Structures		840	Refractory and insulation
Miscellaneous	Boiler	Boiler Internals and Structures		845	Windbox expansion joints
Miscellaneous	Boiler	Boiler Internals and Structures		846	Convection pass expansion joints (FBC only)

TABLE B12-43 Boiler: Boiler Internals and Structures					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Boiler Internals and Structures		847	Other expansion joints
Miscellaneous	Boiler	Boiler Internals and Structures		850	Other internal or structural problems
Miscellaneous	Boiler	Boiler Internals and Structures		855	Drum relief/safety valves (single drum only)
Miscellaneous	Boiler	Boiler Internals and Structures		859	Tube external fins/membranes
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-44 Boiler: Boiler Overhaul and Inspections					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Boiler Overhaul and Inspections		1800	Major boiler overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)
Miscellaneous	Boiler	Boiler Overhaul and Inspections		1801	Minor boiler overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
Miscellaneous	Boiler	Boiler Overhaul and Inspections		1810	Other boiler inspections
Miscellaneous	Boiler	Boiler Overhaul and Inspections		1811	Boiler Inspections - problem identification / investigation
Miscellaneous	Boiler	Boiler Overhaul and Inspections		1812	Boiler Inspections - scheduled or routine
Miscellaneous	Boiler	Boiler Overhaul and Inspections		1820	Chemical cleaning/steam blows
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-45 Boiler: Boiler Piping System - Boiler Recirculation					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Boiler Piping System	Boiler Recirculation	740	Boiler recirculation pumps
Miscellaneous	Boiler	Boiler Piping System	Boiler Recirculation	741	Boiler recirculation pumps - motors
Miscellaneous	Boiler	Boiler Piping System	Boiler Recirculation	742	Boiler recirculation pumps - motors - cooling system
Miscellaneous	Boiler	Boiler Piping System	Boiler Recirculation	750	Boiler recirculation piping including downcomers
Miscellaneous	Boiler	Boiler Piping System	Boiler Recirculation	760	Boiler recirculation valves
Miscellaneous	Boiler	Boiler Piping System	Boiler Recirculation	770	Other boiler recirculation problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-46 Boiler: Boiler Piping System - Cold and Hot Reheat Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Boiler Piping System	Cold and Hot Reheat Steam	540	Hot reheat steam piping up to turbine stop valves
Miscellaneous	Boiler	Boiler Piping System	Cold and Hot Reheat Steam	541	Cold reheat steam piping up to boiler
Miscellaneous	Boiler	Boiler Piping System	Cold and Hot Reheat Steam	550	Reheat steam relief/safety valves

TABLE B12-46 Boiler: Boiler Piping System - Cold and Hot Reheat Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Boiler Piping System	Cold and Hot Reheat Steam	560	Other hot reheat steam valves (not including turbine stop or intercept valves)
Miscellaneous	Boiler	Boiler Piping System	Cold and Hot Reheat Steam	561	Other cold reheat steam valves (not including turbine stop or intercept valves)
Miscellaneous	Boiler	Boiler Piping System	Cold and Hot Reheat Steam	570	Other reheat steam problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-47 Boiler: Boiler Piping System - Desuperheaters/Attemperators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Boiler Piping System	Desuperheaters/Attemperators	580	Desuperheater/attemperator piping
Miscellaneous	Boiler	Boiler Piping System	Desuperheaters/Attemperators	590	Desuperheater/attemperator valves
Miscellaneous	Boiler	Boiler Piping System	Desuperheaters/Attemperators	600	Desuperheater/attemperator spray nozzles
Miscellaneous	Boiler	Boiler Piping System	Desuperheaters/Attemperators	610	Desuperheater/attemperator drums
Miscellaneous	Boiler	Boiler Piping System	Desuperheaters/Attemperators	620	Other desuperheater/attemperator problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-48 Boiler: Boiler Piping System - Feedwater and Blowdown					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Boiler Piping System	Feedwater and Blowdown	670	Feedwater piping downstream of feedwater regulating valve
Miscellaneous	Boiler	Boiler Piping System	Feedwater and Blowdown	680	Feedwater valves (not feedwater regulating valve)
Miscellaneous	Boiler	Boiler Piping System	Feedwater and Blowdown	690	Other feedwater problems downstream of feedwater regulating valve (use codes 3401 to 3499 for remainder of feedwater system)
Miscellaneous	Boiler	Boiler Piping System	Feedwater and Blowdown	700	Blowdown system valves
Miscellaneous	Boiler	Boiler Piping System	Feedwater and Blowdown	710	Blowdown system piping
Miscellaneous	Boiler	Boiler Piping System	Feedwater and Blowdown	720	Blowdown system controls / instrumentation
Miscellaneous	Boiler	Boiler Piping System	Feedwater and Blowdown	730	Other blowdown system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-49 Boiler: Boiler Piping System - Main Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Boiler Piping System	Main Steam	500	Main steam piping up to turbine stop valves
Miscellaneous	Boiler	Boiler Piping System	Main Steam	510	Main steam relief/safety valves off superheater

TABLE B12-49 Boiler: Boiler Piping System - Main Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Boiler Piping System	Main Steam	520	Other main steam valves (including vent and drain valves but not including the turbine stop valves)
Miscellaneous	Boiler	Boiler Piping System	Main Steam	530	Other main steam system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-50 Boiler: Boiler Piping System - Miscellaneous (Piping)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Boiler Piping System	Miscellaneous (Piping)	775	Economizer piping
Miscellaneous	Boiler	Boiler Piping System	Miscellaneous (Piping)	780	Headers between tube bundles
Miscellaneous	Boiler	Boiler Piping System	Miscellaneous (Piping)	782	Headers and caps
Miscellaneous	Boiler	Boiler Piping System	Miscellaneous (Piping)	790	Pipe hangers, brackets, supports (general)
Miscellaneous	Boiler	Boiler Piping System	Miscellaneous (Piping)	799	Other miscellaneous piping system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-51 Boiler: Boiler Piping System - Startup Bypass					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Boiler Piping System	Startup Bypass	630	Startup bypass system piping (including drain lines up to heaters or condenser)
Miscellaneous	Boiler	Boiler Piping System	Startup Bypass	640	Startup bypass system valves
Miscellaneous	Boiler	Boiler Piping System	Startup Bypass	650	Startup bypass tanks or flash tanks
Miscellaneous	Boiler	Boiler Piping System	Startup Bypass	655	Steam by-pass system instrumentation and controls
Miscellaneous	Boiler	Boiler Piping System	Startup Bypass	660	Other startup bypass system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-52 Boiler: Boiler Tube Fireside Slagging or Fouling					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Boiler Tube Fireside Slagging or Fouling		1100	Waterwall (Furnace wall)
Miscellaneous	Boiler	Boiler Tube Fireside Slagging or Fouling		1103	Steam generating tubes between steam drum and mud drum
Miscellaneous	Boiler	Boiler Tube Fireside Slagging or Fouling		1105	Generating tubes
Miscellaneous	Boiler	Boiler Tube Fireside Slagging or Fouling		1110	Cyclone Furnace (in cyclone area only)
Miscellaneous	Boiler	Boiler Tube Fireside Slagging or Fouling		1120	Convection Pass Wall
Miscellaneous	Boiler	Boiler Tube Fireside Slagging or Fouling		1130	Boiler screen, wing wall, or slag screen (water tubes only)
Miscellaneous	Boiler	Boiler Tube Fireside Slagging or Fouling		1140	First superheater

TABLE B12-52 Boiler: Boiler Tube Fireside Slagging or Fouling					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Boiler Tube Fireside Slagging or Fouling		1150	Second superheater
Miscellaneous	Boiler	Boiler Tube Fireside Slagging or Fouling		1160	First reheater
Miscellaneous	Boiler	Boiler Tube Fireside Slagging or Fouling		1170	Second reheater
Miscellaneous	Boiler	Boiler Tube Fireside Slagging or Fouling		1180	Economizer
Miscellaneous	Boiler	Boiler Tube Fireside Slagging or Fouling		1190	Other tube slagging or fouling
Miscellaneous	Boiler	Boiler Tube Fireside Slagging or Fouling		1191	Bed agglomeration (FBC only)
Miscellaneous	Boiler	Boiler Tube Fireside Slagging or Fouling		1200	Operation at reduced power to avoid slagging or fouling (use codes 1100 to 1190 to report power reductions for slag accumulation or slag removal)
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-53 Boiler: Boiler Tube Leaks					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Boiler Tube Leaks		1000	Waterwall (Furnace wall)
Miscellaneous	Boiler	Boiler Tube Leaks		1003	Steam generating tubes between steam drum and mud drum
Miscellaneous	Boiler	Boiler Tube Leaks		1005	Generating tubes
Miscellaneous	Boiler	Boiler Tube Leaks		1006	In-bed reheat tubes (FBC only - includes external heat exchangers)
Miscellaneous	Boiler	Boiler Tube Leaks		1010	Cyclone furnace (in cyclone area only)
Miscellaneous	Boiler	Boiler Tube Leaks		1020	Convection pass wall (water tubes only)
Miscellaneous	Boiler	Boiler Tube Leaks		1030	Boiler screen, wing wall, or slag screen (water tubes only)
Miscellaneous	Boiler	Boiler Tube Leaks		1035	Platen superheater
Miscellaneous	Boiler	Boiler Tube Leaks		1040	First superheater
Miscellaneous	Boiler	Boiler Tube Leaks		1045	In-bed superheater tubes (FBC only - includes external heat exchangers)
Miscellaneous	Boiler	Boiler Tube Leaks		1050	Second superheater
Miscellaneous	Boiler	Boiler Tube Leaks		1055	External superheater link tubing
Miscellaneous	Boiler	Boiler Tube Leaks		1060	First reheater
Miscellaneous	Boiler	Boiler Tube Leaks		1070	Second reheater
Miscellaneous	Boiler	Boiler Tube Leaks		1075	External reheater link tubing
Miscellaneous	Boiler	Boiler Tube Leaks		1080	Economizer
Miscellaneous	Boiler	Boiler Tube Leaks		1085	In-bed evaporative tubes (FBC only - includes external heat exchangers)
Miscellaneous	Boiler	Boiler Tube Leaks		1090	Other boiler tube leaks
Notes: 1) For use with Unit Codes 800–899. 2) Use codes 860 and 870 for fouling or slagging due to unavailability of soot blowers or their air or steam supply.					

TABLE B12-54 Boiler: Boiler Water Condition					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Boiler Water Condition		1850	Boiler water condition (not feedwater water quality)
Notes: 1) For use with Unit Codes 800–899. 2) Use code 859 for tube/membrane failures.					

TABLE B12-55 Boiler: External Fluidized Bed Heat Exchanger					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	External Fluidized Bed Heat Exchanger		990	Refractory
Miscellaneous	Boiler	External Fluidized Bed Heat Exchanger		991	Tube leaks
Miscellaneous	Boiler	External Fluidized Bed Heat Exchanger		992	Tube supports
Miscellaneous	Boiler	External Fluidized Bed Heat Exchanger		999	Other heat exchanger problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-56 Boiler: Miscellaneous (Boiler)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Miscellaneous (Boiler)		1980	Boiler safety valve test
Miscellaneous	Boiler	Miscellaneous (Boiler)		1990	Boiler performance testing (use code 9999 for total unit performance testing)
Miscellaneous	Boiler	Miscellaneous (Boiler)		1999	Boiler, miscellaneous
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-57 Boiler: Miscellaneous Boiler Tube Problems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Miscellaneous Boiler Tube Problems		1300	Water side fouling
Miscellaneous	Boiler	Miscellaneous Boiler Tube Problems		1305	Fireside cleaning (which requires a full outage) Use code 1200 for cleanings that cause deratings.
Miscellaneous	Boiler	Miscellaneous Boiler Tube Problems		1310	Water side cleaning (acid cleaning)
Miscellaneous	Boiler	Miscellaneous Boiler Tube Problems		1320	Tube supports/attachments
Miscellaneous	Boiler	Miscellaneous Boiler Tube Problems		1330	Slag fall damage
Miscellaneous	Boiler	Miscellaneous Boiler Tube Problems		1340	Tube modifications (including addition and removal of tubes)
Miscellaneous	Boiler	Miscellaneous Boiler Tube Problems		1350	Other miscellaneous boiler tube problems
Miscellaneous	Boiler	Miscellaneous Boiler Tube Problems		1360	Boiler drains system
Notes: 1) For use with Unit Codes 800–899. 2) Use more specific codes - other slagging and fouling problems, other control problems, etc. - whenever possible. Describe miscellaneous problems in the verbal description.					

TABLE B12-58 Boiler: Slag and Ash Removal					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Slag and Ash Removal		860	Soot blowers - air (see code 3844 for air delivery system)
Miscellaneous	Boiler	Slag and Ash Removal		870	Soot blowers - steam
Miscellaneous	Boiler	Slag and Ash Removal		871	Soot blowers - sonic
Miscellaneous	Boiler	Slag and Ash Removal		872	Soot blowers - water
Miscellaneous	Boiler	Slag and Ash Removal		873	Soot blower drives
Miscellaneous	Boiler	Slag and Ash Removal		876	Soot blower controls
Miscellaneous	Boiler	Slag and Ash Removal		880	Fly Ash Removal System (not precipitators, scrubbers, mechanical collectors, or baghouses)
Miscellaneous	Boiler	Slag and Ash Removal		885	Fly ash Removal System - wet transport
Miscellaneous	Boiler	Slag and Ash Removal		890	Bottom ash systems (wet or dry)
Miscellaneous	Boiler	Slag and Ash Removal		891	Bottom ash hoppers (including gates)
Miscellaneous	Boiler	Slag and Ash Removal		892	Bottom ash clinker grinders
Miscellaneous	Boiler	Slag and Ash Removal		893	Bottom ash water pumps and motors
Miscellaneous	Boiler	Slag and Ash Removal		894	Bottom ash piping and valves
Miscellaneous	Boiler	Slag and Ash Removal		895	Ashpit trouble
Miscellaneous	Boiler	Slag and Ash Removal		896	Bottom ash dewatering bin system, instruments and controls
Miscellaneous	Boiler	Slag and Ash Removal		897	Bottom ash rotary (drag chain type) conveyor and motor
Miscellaneous	Boiler	Slag and Ash Removal		898	Bottom ash pyrite hopper (pulverizer reject) system
Miscellaneous	Boiler	Slag and Ash Removal		899	Bottom ash controls and instrumentation
Miscellaneous	Boiler	Slag and Ash Removal		900	Slag tap (cyclone furnace)
Miscellaneous	Boiler	Slag and Ash Removal		910	Slag tap (other than cyclone furnace)
Miscellaneous	Boiler	Slag and Ash Removal		920	Other slag and ash removal problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-59 Boiler: Sorbent Supply (FBC only) - Sorbent Feed Equipment from Bunkers to Boiler (FBC only)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Sorbent Supply (FBC only)	Sorbent Feed Equipment from Bunkers to Boiler (FBC only)	150	Sorbent feed conveyors
Miscellaneous	Boiler	Sorbent Supply (FBC only)	Sorbent Feed Equipment from Bunkers to Boiler (FBC only)	151	Sorbent feed tanks/hoppers
Miscellaneous	Boiler	Sorbent Supply (FBC only)	Sorbent Feed Equipment from Bunkers to Boiler (FBC only)	152	Sorbent feed volumetric feeder
Miscellaneous	Boiler	Sorbent Supply (FBC only)	Sorbent Feed Equipment from Bunkers to Boiler (FBC only)	153	Sorbent feed gravimetric feeder

TABLE B12-59 Boiler: Sorbent Supply (FBC only) - Sorbent Feed Equipment from Bunkers to Boiler (FBC only)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Sorbent Supply (FBC only)	Sorbent Feed Equipment from Bunkers to Boiler (FBC only)	154	Sorbent feed feeder motors
Miscellaneous	Boiler	Sorbent Supply (FBC only)	Sorbent Feed Equipment from Bunkers to Boiler (FBC only)	155	Sorbent feed pneumatic transport system including piping and valves
Miscellaneous	Boiler	Sorbent Supply (FBC only)	Sorbent Feed Equipment from Bunkers to Boiler (FBC only)	156	Other sorbent feed problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-60 Boiler: Sorbent Supply (FBC only) - Sorbent Handling System up Through Bunkers (FBC only)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	130	Sorbent handling tanks/hoppers
Miscellaneous	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	131	Sorbent handling conveyors
Miscellaneous	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	132	Sorbent handling feeders
Miscellaneous	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	133	Sorbent handling feeder motors
Miscellaneous	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	134	Sorbent handling crushers
Miscellaneous	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	135	Sorbent handling crusher motors
Miscellaneous	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	136	Sorbent handling blowers/fans
Miscellaneous	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	137	Sorbent handling blower/fan motors
Miscellaneous	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	138	Sorbent handling baghouse
Miscellaneous	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	139	Sorbent handling drying equipment
Miscellaneous	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	140	Sorbent handling screens
Miscellaneous	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	141	Other sorbent handling equipment problems
Notes: 1) For use with Unit Codes 800–899.					

EXPANDER TURBINE

TABLE B12-61 Expander Turbine: Expander Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Expander Turbine	Expander Turbine		7800	Couplings
Miscellaneous	Expander Turbine	Expander Turbine		7810	Shaft
Miscellaneous	Expander Turbine	Expander Turbine		7820	Bearings
Miscellaneous	Expander Turbine	Expander Turbine		7830	Blades
Miscellaneous	Expander Turbine	Expander Turbine		7840	Discs
Miscellaneous	Expander Turbine	Expander Turbine		7850	Spacers
Miscellaneous	Expander Turbine	Expander Turbine		7860	Nozzles/vanes
Miscellaneous	Expander Turbine	Expander Turbine		7870	Heat shields
Miscellaneous	Expander Turbine	Expander Turbine		7880	Exhaust diffusers
Miscellaneous	Expander Turbine	Expander Turbine		7890	Seal oil system and seals
Miscellaneous	Expander Turbine	Expander Turbine		7900	Inner casing
Miscellaneous	Expander Turbine	Expander Turbine		7910	Outer exhaust casing
Miscellaneous	Expander Turbine	Expander Turbine		7920	Lube oil system
Miscellaneous	Expander Turbine	Expander Turbine		7930	Controls and instrumentation
Miscellaneous	Expander Turbine	Expander Turbine		7940	Evactor
Miscellaneous	Expander Turbine	Expander Turbine		7950	Major overhaul
Miscellaneous	Expander Turbine	Expander Turbine		7960	Other expander turbine problems
Notes: 1) For use with Unit Codes 800–899.					

EXTERNAL

Use this set of codes to report events caused by external factors (flood, lightning, etc.); economic factors (lack of fuel, labor strikes, etc.); operator training; and transmission system problems external to the plant.

TABLE B12-62 External: Catastrophe					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	External	Catastrophe		9000	Flood
Miscellaneous	External	Catastrophe		9001	Drought
Miscellaneous	External	Catastrophe		9010	Fire including wildfires, not related to a specific component
Miscellaneous	External	Catastrophe		9020	Lightning
Miscellaneous	External	Catastrophe		9025	Geomagnetic disturbance
Miscellaneous	External	Catastrophe		9030	Earthquake
Miscellaneous	External	Catastrophe		9031	Tornado
Miscellaneous	External	Catastrophe		9035	Hurricane
Miscellaneous	External	Catastrophe		9036	Storms (ice, snow, etc)
Miscellaneous	External	Catastrophe		9040	Other catastrophe
Miscellaneous	External	Catastrophe		9090	Physical Security Incident
Miscellaneous	External	Catastrophe		9091	Physical Security Incident (OMC)

TABLE B12-62 External: Catastrophe					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	External	Catastrophe		9092	Cyber Security Incident
Miscellaneous	External	Catastrophe		9093	Cyber Security Incident (OMC)
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-63 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	External	Economic		0000	Reserve shutdown
Miscellaneous	External	Economic		9130	Failure of fuel supplier to fulfill contractual obligations or a pre-arranged deal due to physical fuel disruptions or operational impairments (e.g. force majeure on a pipeline or compressor down; making the pipeline incapable of making its firm deliveries.)
Miscellaneous	External	Economic		9131	Lack of fuel – due to contractual or tariff provisions that allow for service interruption or price fluctuations during peak demand periods.
Miscellaneous	External	Economic		9132	Wet Fuel - Biomass
Miscellaneous	External	Economic		9134	Fuel conservation
Miscellaneous	External	Economic		9135	Lack of water
Miscellaneous	External	Economic		9136	Problems with Primary Fuel for Units with Secondary Fuel Operation
Miscellaneous	External	Economic		9137	Ground water or other water supply problems
Miscellaneous	External	Economic		9138	High Water Level in Tailrace (too much water)
Miscellaneous	External	Economic		9139	Ground water or other water supply problems(OMC)
Miscellaneous	External	Economic		9140	Plant modifications to burn different fuel that are not regulatory mandated
Miscellaneous	External	Economic		9150	Labor strikes company-wide problems or strikes outside the company's jurisdiction such as manufacturers (delaying repairs) or transportation (fuel supply) problems.
Miscellaneous	External	Economic		9151	Labor strikes direct plant management grievances that result in a walkout or strike are under plant management control.
Miscellaneous	External	Economic		9160	Other economic problems
Miscellaneous	External	Economic		9180	Economic (for internal use at plants only)
Miscellaneous	External	Economic		9181	Economic (for internal use at plants only)
Miscellaneous	External	Economic		9182	Economic (for internal use at plants only)
Miscellaneous	External	Economic		9183	Economic (for internal use at plants only)

TABLE B12-63 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	External	Economic		9184	Economic (for internal use at plants only)
Miscellaneous	External	Economic		9185	Economic (for internal use at plants only)
Miscellaneous	External	Economic		9186	Economic (for internal use at plants only)
Miscellaneous	External	Economic		9187	Economic (for internal use at plants only)
Miscellaneous	External	Economic		9188	Economic (for internal use at plants only)
Miscellaneous	External	Economic		9189	Economic (for internal use at plants only)
Miscellaneous	External	Economic		9190	Economic (for internal use at plants only)
Miscellaneous	External	Economic		9191	Economic (for internal use at plants only)
Miscellaneous	External	Economic		9192	Economic (for internal use at plants only)
Miscellaneous	External	Economic		9193	Economic (for internal use at plants only)
Miscellaneous	External	Economic		9194	Economic (for internal use at plants only)
Miscellaneous	External	Economic		9195	Economic (for internal use at plants only)
Miscellaneous	External	Economic		9196	Economic (for internal use at plants only)
Miscellaneous	External	Economic		9197	Economic (for internal use at plants only)
Miscellaneous	External	Economic		9198	Economic (for internal use at plants only)
Miscellaneous	External	Economic		9199	Economic (for internal use at plants only)
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-64 External: Fuel Quality					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	External	Fuel Quality		9200	High ash content (OMC)
Miscellaneous	External	Fuel Quality		9205	Poor quality natural gas fuel, low heat content
Miscellaneous	External	Fuel Quality		9210	Low grindability (OMC)
Miscellaneous	External	Fuel Quality		9220	High sulfur content (OMC)
Miscellaneous	External	Fuel Quality		9230	High vanadium content (OMC)
Miscellaneous	External	Fuel Quality		9240	High sodium content (OMC)
Miscellaneous	External	Fuel Quality		9250	Low BTU coal (OMC)
Miscellaneous	External	Fuel Quality		9251	Low BTU coal (not OMC)
Miscellaneous	External	Fuel Quality		9260	Low BTU oil (OMC)
Miscellaneous	External	Fuel Quality		9270	Wet coal (OMC)
Miscellaneous	External	Fuel Quality		9271	Wet coal (not OMC)
Miscellaneous	External	Fuel Quality		9280	Frozen coal (OMC)
Miscellaneous	External	Fuel Quality		9281	Frozen coal (not OMC)
Miscellaneous	External	Fuel Quality		9290	Other fuel quality problems (OMC)
Miscellaneous	External	Fuel Quality		9291	Other fuel quality problems (not OMC)
Notes: 1) For use with Unit Codes 800–899. 2) Use code 9600 to 9650 if the fuel quality results in excess stack emissions through no fault in the pollution control equipment. Use the appropriate equipment code to report fouling and slagging.					

TABLE B12-65 External: Miscellaneous (External)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	External	Miscellaneous (External)		9300	Transmission system problems other than catastrophes (do not include switchyard problems in this category; see codes 3600 to 3629, 3720 to 3730)
Miscellaneous	External	Miscellaneous (External)		9305	Ash disposal problem
Miscellaneous	External	Miscellaneous (External)		9310	Operator training
Miscellaneous	External	Miscellaneous (External)		9320	Other miscellaneous external problems
Miscellaneous	External	Miscellaneous (External)		9340	Synchronous Condenser Operation
Notes: 1) For use with Unit Codes 800–899.					

GAS TURBINE

TABLE B12-66 Gas Turbine: Auxiliary Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Gas Turbine	Auxiliary Systems		5110	Lube oil system - general
Miscellaneous	Gas Turbine	Auxiliary Systems		5111	Lube oil pumps
Miscellaneous	Gas Turbine	Auxiliary Systems		5112	Lube oil coolers
Miscellaneous	Gas Turbine	Auxiliary Systems		5113	Lube oil valves/piping
Miscellaneous	Gas Turbine	Auxiliary Systems		5114	Lube oil filters
Miscellaneous	Gas Turbine	Auxiliary Systems		5115	Oil vapor extractor
Miscellaneous	Gas Turbine	Auxiliary Systems		5119	Power augmentation controls
Miscellaneous	Gas Turbine	Auxiliary Systems		5120	Hydraulic oil system
Miscellaneous	Gas Turbine	Auxiliary Systems		5130	Starting system (including motor)
Miscellaneous	Gas Turbine	Auxiliary Systems		5140	Battery and charger system
Miscellaneous	Gas Turbine	Auxiliary Systems		5150	Turning gear and motor
Miscellaneous	Gas Turbine	Auxiliary Systems		5160	Cooling and seal air system
Miscellaneous	Gas Turbine	Auxiliary Systems		5170	Cooling water system
Miscellaneous	Gas Turbine	Auxiliary Systems		5180	Anti-icing system
Miscellaneous	Gas Turbine	Auxiliary Systems		5190	Other auxiliary system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-67 Gas Turbine: Exhaust Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Gas Turbine	Exhaust Systems		5100	Chamber
Miscellaneous	Gas Turbine	Exhaust Systems		5101	Hoods
Miscellaneous	Gas Turbine	Exhaust Systems		5102	Vanes/nozzles

TABLE B12-67 Gas Turbine: Exhaust Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Gas Turbine	Exhaust Systems		5103	Silencer
Miscellaneous	Gas Turbine	Exhaust Systems		5104	Cones
Miscellaneous	Gas Turbine	Exhaust Systems		5108	High engine exhaust temperature
Miscellaneous	Gas Turbine	Exhaust Systems		5109	Other exhaust problems (including high exhaust system temperature not attributable to a specific problem)
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-68 Gas Turbine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Gas Turbine	Fuel, Ignition, and Combustion Systems		5040	Fuel tanks
Miscellaneous	Gas Turbine	Fuel, Ignition, and Combustion Systems		5041	Fuel piping and valves
Miscellaneous	Gas Turbine	Fuel, Ignition, and Combustion Systems		5042	Fuel nozzles/vanes
Miscellaneous	Gas Turbine	Fuel, Ignition, and Combustion Systems		5043	Fuel filters
Miscellaneous	Gas Turbine	Fuel, Ignition, and Combustion Systems		5044	Liquid fuel oil pump
Miscellaneous	Gas Turbine	Fuel, Ignition, and Combustion Systems		5046	Liquid fuel oil transfer/forwarding pump
Miscellaneous	Gas Turbine	Fuel, Ignition, and Combustion Systems		5047	Liquid fuel purge system
Miscellaneous	Gas Turbine	Fuel, Ignition, and Combustion Systems		5048	Gas fuel system including controls and instrumentation
Miscellaneous	Gas Turbine	Fuel, Ignition, and Combustion Systems		5049	Other fuel system problems
Miscellaneous	Gas Turbine	Fuel, Ignition, and Combustion Systems		5050	Ignition system
Miscellaneous	Gas Turbine	Fuel, Ignition, and Combustion Systems		5051	Pilot fuel piping and valves
Miscellaneous	Gas Turbine	Fuel, Ignition, and Combustion Systems		5052	Pilot fuel nozzles/vanes
Miscellaneous	Gas Turbine	Fuel, Ignition, and Combustion Systems		5053	Pilot fuel filters
Miscellaneous	Gas Turbine	Fuel, Ignition, and Combustion Systems		5054	Water injection system
Miscellaneous	Gas Turbine	Fuel, Ignition, and Combustion Systems		5060	Atomizing air system
Miscellaneous	Gas Turbine	Fuel, Ignition, and Combustion Systems		5070	Combustor casing
Miscellaneous	Gas Turbine	Fuel, Ignition, and Combustion Systems		5071	Combustor liner
Miscellaneous	Gas Turbine	Fuel, Ignition, and Combustion Systems		5072	Combustor caps
Miscellaneous	Gas Turbine	Fuel, Ignition, and Combustion Systems		5073	Flame scanners
Miscellaneous	Gas Turbine	Fuel, Ignition, and Combustion Systems		5074	Flashback including instrumentation
Miscellaneous	Gas Turbine	Fuel, Ignition, and Combustion Systems		5079	Other combustor problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-69 Gas Turbine: Inlet Air System and Compressors - Compressors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Gas Turbine	Inlet Air System and Compressors	Compressors	5010	High pressure shaft
Miscellaneous	Gas Turbine	Inlet Air System and Compressors	Compressors	5011	High pressure bearings

TABLE B12-69 Gas Turbine: Inlet Air System and Compressors - Compressors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Gas Turbine	Inlet Air System and Compressors	Compressors	5012	High pressure blades/buckets
Miscellaneous	Gas Turbine	Inlet Air System and Compressors	Compressors	5013	Compressor casing and bolts
Miscellaneous	Gas Turbine	Inlet Air System and Compressors	Compressors	5014	Compressor diaphragms
Miscellaneous	Gas Turbine	Inlet Air System and Compressors	Compressors	5015	Compressor seals
Miscellaneous	Gas Turbine	Inlet Air System and Compressors	Compressors	5016	High pressure compressor bleed valves
Miscellaneous	Gas Turbine	Inlet Air System and Compressors	Compressors	5017	Low pressure compressor bleed valves
Miscellaneous	Gas Turbine	Inlet Air System and Compressors	Compressors	5019	Other high pressure problems
Miscellaneous	Gas Turbine	Inlet Air System and Compressors	Compressors	5020	Low pressure shaft
Miscellaneous	Gas Turbine	Inlet Air System and Compressors	Compressors	5021	Low pressure bearings
Miscellaneous	Gas Turbine	Inlet Air System and Compressors	Compressors	5022	Low pressure blades/buckets
Miscellaneous	Gas Turbine	Inlet Air System and Compressors	Compressors	5029	Other low pressure problems
Miscellaneous	Gas Turbine	Inlet Air System and Compressors	Compressors	5030	Supercharging fans
Miscellaneous	Gas Turbine	Inlet Air System and Compressors	Compressors	5035	Compressor washing
Miscellaneous	Gas Turbine	Inlet Air System and Compressors	Compressors	5037	Inlet bleed heat valve
Notes: 1) For use with Unit Codes 800–899. 2) Use HP compressor if only one.					

TABLE B12-70 Gas Turbine: Inlet Air System and Compressors - Ducts and Filters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5000	Inlet air ducts
Miscellaneous	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5001	Inlet air vanes/nozzles
Miscellaneous	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5002	Inlet air filters
Miscellaneous	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5003	Inlet cone
Miscellaneous	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5009	Other inlet air problems
Notes: 1) For use with Unit Codes 800–899. 2) Use HP compressor if only one.					

TABLE B12-71 Gas Turbine: Miscellaneous (Gas Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Gas Turbine	Miscellaneous (Gas Turbine)		5200	Reduction gear
Miscellaneous	Gas Turbine	Miscellaneous (Gas Turbine)		5201	Load shaft and bearings
Miscellaneous	Gas Turbine	Miscellaneous (Gas Turbine)		5205	Main coupling between the turbine and generator
Miscellaneous	Gas Turbine	Miscellaneous (Gas Turbine)		5206	Clutch
Miscellaneous	Gas Turbine	Miscellaneous (Gas Turbine)		5210	Intercoolers
Miscellaneous	Gas Turbine	Miscellaneous (Gas Turbine)		5220	Regenerators
Miscellaneous	Gas Turbine	Miscellaneous (Gas Turbine)		5230	Heat shields
Miscellaneous	Gas Turbine	Miscellaneous (Gas Turbine)		5240	Fire detection and extinguishing system (including hazardous gas detection system)
Miscellaneous	Gas Turbine	Miscellaneous (Gas Turbine)		5241	Fire in unit

TABLE B12-71 Gas Turbine: Miscellaneous (Gas Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Gas Turbine	Miscellaneous (Gas Turbine)		5245	Gas Turbine Control System - data highway
Miscellaneous	Gas Turbine	Miscellaneous (Gas Turbine)		5246	Gas Turbine Control System - hardware problems (including card failure)
Miscellaneous	Gas Turbine	Miscellaneous (Gas Turbine)		5247	Gas Turbine Control System - internal and termination wiring
Miscellaneous	Gas Turbine	Miscellaneous (Gas Turbine)		5248	Gas Turbine Control System - logic problems
Miscellaneous	Gas Turbine	Miscellaneous (Gas Turbine)		5249	Gas Turbine Control System - upgrades
Miscellaneous	Gas Turbine	Miscellaneous (Gas Turbine)		5250	Other controls and instrumentation problems
Miscellaneous	Gas Turbine	Miscellaneous (Gas Turbine)		5255	Computer
Miscellaneous	Gas Turbine	Miscellaneous (Gas Turbine)		5260	Major overhaul (use for non-specific overhaul only; see page B-CCGT-2)
Miscellaneous	Gas Turbine	Miscellaneous (Gas Turbine)		5261	Gas turbine/compressor washing
Miscellaneous	Gas Turbine	Miscellaneous (Gas Turbine)		5262	Gas turbine exchange
Miscellaneous	Gas Turbine	Miscellaneous (Gas Turbine)		5270	Hot end inspection
Miscellaneous	Gas Turbine	Miscellaneous (Gas Turbine)		5272	Boroscope inspection
Miscellaneous	Gas Turbine	Miscellaneous (Gas Turbine)		5274	General unit inspection
Miscellaneous	Gas Turbine	Miscellaneous (Gas Turbine)		5280	Vibration (not engine) in unit not attributable to bearings or other components
Miscellaneous	Gas Turbine	Miscellaneous (Gas Turbine)		5285	Gas turbine vibration
Miscellaneous	Gas Turbine	Miscellaneous (Gas Turbine)		5286	Gas turbine lockout
Miscellaneous	Gas Turbine	Miscellaneous (Gas Turbine)		5290	Gas turbine performance testing - individual engines (use code 9999 for total unit performance testing)
Miscellaneous	Gas Turbine	Miscellaneous (Gas Turbine)		5292	Turbine Overspeed Trip Test - Gas Turbine
Miscellaneous	Gas Turbine	Miscellaneous (Gas Turbine)		5295	Synchronous condenser equipment
Miscellaneous	Gas Turbine	Miscellaneous (Gas Turbine)		5298	Main gas filter
Miscellaneous	Gas Turbine	Miscellaneous (Gas Turbine)		5299	Other miscellaneous gas turbine problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-72 Gas Turbine: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Gas Turbine	Turbine		5080	High pressure shaft
Miscellaneous	Gas Turbine	Turbine		5081	High pressure bearings
Miscellaneous	Gas Turbine	Turbine		5082	High pressure blades/buckets
Miscellaneous	Gas Turbine	Turbine		5083	High pressure nozzles/vanes
Miscellaneous	Gas Turbine	Turbine		5084	High pressure casing/expansion joints
Miscellaneous	Gas Turbine	Turbine		5085	Interstage gas passages - HP
Miscellaneous	Gas Turbine	Turbine		5086	High pressure shaft seals
Miscellaneous	Gas Turbine	Turbine		5087	Thrust bearing

TABLE B12-72 Gas Turbine: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Gas Turbine	Turbine		5089	Other high pressure problems
Miscellaneous	Gas Turbine	Turbine		5090	Low pressure shaft
Miscellaneous	Gas Turbine	Turbine		5091	Low pressure bearings
Miscellaneous	Gas Turbine	Turbine		5092	Low pressure blades/buckets
Miscellaneous	Gas Turbine	Turbine		5093	Low pressure nozzles/vanes
Miscellaneous	Gas Turbine	Turbine		5094	Low pressure casing/expansion joints
Miscellaneous	Gas Turbine	Turbine		5095	Interstage gas passages - LP
Miscellaneous	Gas Turbine	Turbine		5096	Low pressure shaft seals
Miscellaneous	Gas Turbine	Turbine		5097	Other low pressure problems
Miscellaneous	Gas Turbine	Turbine		5098	Expansion joints
Miscellaneous	Gas Turbine	Turbine		5099	HP to LP coupling
Notes: 1) For use with Unit Codes 800–899. 2) Use HP if only one.					

GENERATOR

This set of codes contains the generator, exciter, generator cooling systems, and generator controls. Note the main leads up to and includes the generator output breaker in this set of codes.

TABLE B12-73 Generator: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Generator	Controls		4700	Generator voltage control
Miscellaneous	Generator	Controls		4710	Generator metering devices
Miscellaneous	Generator	Controls		4720	Generator synchronization equipment
Miscellaneous	Generator	Controls		4730	Generator current and potential transformers
Miscellaneous	Generator	Controls		4740	Emergency generator trip devices
Miscellaneous	Generator	Controls		4741	Frequncy Trip (81 Relay)
Miscellaneous	Generator	Controls		4750	Other generator controls and metering problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-74 Generator: Cooling System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Generator	Cooling System		4610	Hydrogen cooling system piping and valves
Miscellaneous	Generator	Cooling System		4611	Hydrogen coolers
Miscellaneous	Generator	Cooling System		4612	Hydrogen storage system
Miscellaneous	Generator	Cooling System		4613	Hydrogen seals
Miscellaneous	Generator	Cooling System		4619	Other hydrogen system problems
Miscellaneous	Generator	Cooling System		4620	Air cooling system

TABLE B12-74 Generator: Cooling System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Generator	Cooling System		4630	Liquid cooling system
Miscellaneous	Generator	Cooling System		4640	Seal oil system and seals
Miscellaneous	Generator	Cooling System		4650	Other cooling system problems
Notes: 1) For use with Unit Codes 800–899. 2) Report failures caused by water leaks into generator as codes 4500, 4510, etc.					

TABLE B12-75 Generator: Exciter					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Generator	Exciter		4600	Exciter drive - motor
Miscellaneous	Generator	Exciter		4601	Exciter field rheostat
Miscellaneous	Generator	Exciter		4602	Exciter commutator and brushes
Miscellaneous	Generator	Exciter		4603	Solid state exciter element
Miscellaneous	Generator	Exciter		4604	Exciter drive - shaft
Miscellaneous	Generator	Exciter		4605	Exciter transformer
Miscellaneous	Generator	Exciter		4609	Other exciter problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-76 Generator: Generator					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Generator	Generator		4500	Rotor windings (including damper windings and fan blades on hydro units)
Miscellaneous	Generator	Generator		4510	Rotor collector rings
Miscellaneous	Generator	Generator		4511	Rotor, General
Miscellaneous	Generator	Generator		4512	Retaining Rings
Miscellaneous	Generator	Generator		4520	Stator windings, bushings, and terminals
Miscellaneous	Generator	Generator		4530	Stator core iron
Miscellaneous	Generator	Generator		4535	Stator, General
Miscellaneous	Generator	Generator		4536	Generator Heaters
Miscellaneous	Generator	Generator		4540	Brushes and brush rigging
Miscellaneous	Generator	Generator		4550	Generator bearings and lube oil system (including thrust bearings on hydro units)
Miscellaneous	Generator	Generator		4551	Generator bearings
Miscellaneous	Generator	Generator		4552	Generator lube oil system
Miscellaneous	Generator	Generator		4555	Bearing cooling system
Miscellaneous	Generator	Generator		4560	Generator vibration (excluding vibration due to failed bearing and other components)
Miscellaneous	Generator	Generator		4570	Generator casing
Miscellaneous	Generator	Generator		4580	Generator end bells and bolting

TABLE B12-76 Generator: Generator					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Generator	Generator		4590	Generator brakes
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-77 Generator: Miscellaneous (Generator)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Generator	Miscellaneous (Generator)		4800	Generator main leads
Miscellaneous	Generator	Miscellaneous (Generator)		4805	Generator Bus Duct Cooling System
Miscellaneous	Generator	Miscellaneous (Generator)		4810	Generator output breaker
Miscellaneous	Generator	Miscellaneous (Generator)		4830	Major generator overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)
Miscellaneous	Generator	Miscellaneous (Generator)		4831	Minor generator overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
Miscellaneous	Generator	Miscellaneous (Generator)		4840	Inspection
Miscellaneous	Generator	Miscellaneous (Generator)		4841	Generator doble testing
Miscellaneous	Generator	Miscellaneous (Generator)		4842	Reactive and capability testing
Miscellaneous	Generator	Miscellaneous (Generator)		4850	Core monitor alarm
Miscellaneous	Generator	Miscellaneous (Generator)		4860	Generator neutral grounding equipment
Miscellaneous	Generator	Miscellaneous (Generator)		4899	Other miscellaneous generator problems
Notes: 1) For use with Unit Codes 800–899.					

HEAT RECOVERY STEAM GENERATOR (HRSG)

TABLE B12-78 Heat Recovery Steam Generator (HRSG): HRSG Boiler Internals and Structures					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		801	HP Drum (including drum level trips not attributable to other causes)
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		802	IP Drum (including drum level trips not attributable to other causes)
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		803	LP Drum (including drum level trips not attributable to other causes)
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		848	Inlet panel
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		856	HP Drum relief/safety valves
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		857	IP Drum relief/safety valves

TABLE B12-78 Heat Recovery Steam Generator (HRSG): HRSG Boiler Internals and Structures					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		858	LP Drum relief/safety valves
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-79 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Desuperheaters/Attemperators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6140	HP Desuperheater/attemperator piping - Greater than 600 PSIG.
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6141	HP Desuperheater/attemperator valves
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6142	HP Desuperheater/attemperator spray nozzles
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6143	HP Desuperheater/attemperator drums
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6144	Other HP desuperheater/attemperator problems
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6145	IP Desuperheater/attemperator piping - Between 200-600 PSIG
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6146	IP Desuperheater/attemperator valves
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6147	IP Desuperheater/attemperator spray nozzles
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6148	IP Desuperheater/attemperator drums
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6149	Other IP desuperheater/attemperator problems
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6150	LP Desuperheater/attemperator piping - Less than 200 PSIG
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6151	LP Desuperheater/attemperator valves
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6152	LP Desuperheater/attemperator spray nozzles
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6153	LP Desuperheater/attemperator drums
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6154	Other LP desuperheater/attemperator problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-80 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Main Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6110	HP steam piping up to turbine stop valves - Greater than 600 PSIG (see 0790 for piping supports)
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6111	HP steam relief/safety valves

TABLE B12-80 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Main Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6112	Other HP steam valves (including vent and drain valves but not including the turbine stop valves)
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6113	Other HP steam system problems
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6114	HP steam isolation/boundary valves
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6120	IP steam piping up to turbine stop valves - Between 200 & 600 PSIG (see 0790 for piping supports)
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6121	IP steam relief/safety valves
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6122	Other IP steam valves (including vent and drain valves but not including the turbine stop valves)
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6123	Other IP steam system problems
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6130	LP steam piping up to turbine stop valves - Less than 200 PSIG (see 0790 for piping supports)
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6131	LP steam relief/safety valves
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6132	Other LP steam valves (including vent and drain valves but not including the turbine stop valves)
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6133	Other LP steam system problems
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6134	Other main steam valves (including vent and drain valves but not including the turbine stop valves)
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	6135	LP steam isolation/boundary valves
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-81 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Startup Bypass					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6160	HP Startup bypass system piping (including drain lines up to heaters or condenser) - Greater than 600 PSIG
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6161	HP Startup bypass system valves
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6162	HP Startup bypass tanks or flash tanks
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6163	Other HP startup bypass system problems
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6164	HP startup bypass instrumentation and controls
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6170	IP Startup bypass system piping (including drain lines up to heaters or condenser) - Between 200-600 PSIG
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6171	IP Startup bypass system valves
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6172	IP Startup bypass tanks or flash tanks

TABLE B12-81 Heat Recovery Steam Generator (HRSG): HRSG Boiler Piping System - HRSG Startup Bypass					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6173	Other IP startup bypass system problems
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6174	IP startup bypass instrumentation and controls
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6180	LP Startup bypass system piping (including drain lines up to heaters or condenser) - Less than 200 PSIG
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6181	LP Startup bypass system valves
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6182	LP Startup bypass tanks or flash tanks
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6183	Other LP startup bypass system problems
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6184	LP startup bypass instrumentation and controls
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-82 Heat Recovery Steam Generator (HRSG): HRSG Boiler Tube Leaks					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6005	HP Evaporator tubes
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6006	IP Evaporator tubes
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6007	LP Evaporator tubes
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6010	HP superheater
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6011	HP reheater
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6012	HP economizer
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6020	IP superheater
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6021	IP reheater
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6022	IP economizer
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6030	LP reheater
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6031	LP superheater
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6032	LP economizer
Miscellaneous	Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6090	Other HRSG tube problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-83 Heat Recovery Steam Generator (HRSG): Miscellaneous (HRSG Boiler)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		6000	Heat recovery steam generator to gas turbine connecting equipment. For additional codes, use Fossil Steam Cause Codes 0010 to 1999.

TABLE B12-83 Heat Recovery Steam Generator (HRSG): Miscellaneous (HRSG Boiler)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		6100	Steam turbine to gas turbine coupling. For additional codes, use Fossil Steam Cause Codes 4000 to 4499.
Notes: 1) For use with Unit Codes 800–899.					

HYDRO TURBINE/PUMP

TABLE B12-84 Hydro Turbine/Pump: Miscellaneous (Hydro Turbine/Pump)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Hydro Turbine/Pump	Miscellaneous (Hydro Turbine/Pump)		7200	Major overhaul (use for non-specific overhaul only; see page B-CCGT-2)
Miscellaneous	Hydro Turbine/Pump	Miscellaneous (Hydro Turbine/Pump)		7201	Inspection
Miscellaneous	Hydro Turbine/Pump	Miscellaneous (Hydro Turbine/Pump)		7210	Canals (including siphons, radial gates, and spills)
Miscellaneous	Hydro Turbine/Pump	Miscellaneous (Hydro Turbine/Pump)		7220	Unit out of service due to common penstock with unit under repair
Miscellaneous	Hydro Turbine/Pump	Miscellaneous (Hydro Turbine/Pump)		7230	Pony motor (pumped storage units only)
Miscellaneous	Hydro Turbine/Pump	Miscellaneous (Hydro Turbine/Pump)		7240	Powerhouse substructure
Miscellaneous	Hydro Turbine/Pump	Miscellaneous (Hydro Turbine/Pump)		7299	Other miscellaneous hydro turbine/pump problems (use generator codes and balance of plant electrical and auxiliary codes as appropriate)
Miscellaneous	Hydro Turbine/Pump	Miscellaneous (Hydro Turbine/Pump)		7300	Routine Hydro Planned Outage (reoccurring schedule) (Use 4840 or 7201 for specific inspections.)
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-85 Hydro Turbine/Pump: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Hydro Turbine/Pump	Turbine		7000	Shaft
Miscellaneous	Hydro Turbine/Pump	Turbine		7001	Shaft packing
Miscellaneous	Hydro Turbine/Pump	Turbine		7003	Lube oil system (use code 7007 to report bearing failures due to lube oil problems)
Miscellaneous	Hydro Turbine/Pump	Turbine		7007	Bearings
Miscellaneous	Hydro Turbine/Pump	Turbine		7008	Bearing cooling system
Miscellaneous	Hydro Turbine/Pump	Turbine		7009	Bearing oil system
Miscellaneous	Hydro Turbine/Pump	Turbine		7010	Runner cavitation damage
Miscellaneous	Hydro Turbine/Pump	Turbine		7011	Other runner problems
Miscellaneous	Hydro Turbine/Pump	Turbine		7012	Casing, wear ring, or liner cavitation damage
Miscellaneous	Hydro Turbine/Pump	Turbine		7014	Blade or bucket cracking

TABLE B12-85 Hydro Turbine/Pump: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Hydro Turbine/Pump	Turbine		7020	Nozzle assembly
Miscellaneous	Hydro Turbine/Pump	Turbine		7030	Vibration (Only for unbalance, report bearing failure, etc., in appropriate category)
Miscellaneous	Hydro Turbine/Pump	Turbine		7040	Turbine overhaul
Miscellaneous	Hydro Turbine/Pump	Turbine		7050	Turbine governor
Miscellaneous	Hydro Turbine/Pump	Turbine		7052	Other turbine control problems (Report specific wicket gate controls, etc., using the code for the appropriate equipment item.)
Miscellaneous	Hydro Turbine/Pump	Turbine		7053	Governor oil system
Miscellaneous	Hydro Turbine/Pump	Turbine		7070	Speed Increaser
Miscellaneous	Hydro Turbine/Pump	Turbine		7099	Other turbine problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-86 Hydro Turbine/Pump: Water Supply/Discharge					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Hydro Turbine/Pump	Water Supply/Discharge		7100	Upper reservoir dams and dikes
Miscellaneous	Hydro Turbine/Pump	Water Supply/Discharge		7101	Lower reservoir dams and dikes
Miscellaneous	Hydro Turbine/Pump	Water Supply/Discharge		7102	Auxiliary reservoir dams and dikes
Miscellaneous	Hydro Turbine/Pump	Water Supply/Discharge		7110	Intake channel or flume (including trash racks)
Miscellaneous	Hydro Turbine/Pump	Water Supply/Discharge		7111	Intake tunnel
Miscellaneous	Hydro Turbine/Pump	Water Supply/Discharge		7120	Headgates
Miscellaneous	Hydro Turbine/Pump	Water Supply/Discharge		7121	Shutoff valves
Miscellaneous	Hydro Turbine/Pump	Water Supply/Discharge		7123	Shutoff valve bypass line and valve
Miscellaneous	Hydro Turbine/Pump	Water Supply/Discharge		7124	Penstock
Miscellaneous	Hydro Turbine/Pump	Water Supply/Discharge		7130	Spiral case
Miscellaneous	Hydro Turbine/Pump	Water Supply/Discharge		7140	Wicket gate assembly
Miscellaneous	Hydro Turbine/Pump	Water Supply/Discharge		7141	Wicket gate operating mechanism or positioner
Miscellaneous	Hydro Turbine/Pump	Water Supply/Discharge		7142	Wicket gate shear pin
Miscellaneous	Hydro Turbine/Pump	Water Supply/Discharge		7150	Stay vanes
Miscellaneous	Hydro Turbine/Pump	Water Supply/Discharge		7160	Pressure regulating valve
Miscellaneous	Hydro Turbine/Pump	Water Supply/Discharge		7161	Pressure regulating valve operator or positioner
Miscellaneous	Hydro Turbine/Pump	Water Supply/Discharge		7162	Relief valve and vacuum breakers
Miscellaneous	Hydro Turbine/Pump	Water Supply/Discharge		7170	Draft tube
Miscellaneous	Hydro Turbine/Pump	Water Supply/Discharge		7180	Tailrace
Miscellaneous	Hydro Turbine/Pump	Water Supply/Discharge		7181	Tail water depressing equipment
Miscellaneous	Hydro Turbine/Pump	Water Supply/Discharge		7190	Dewatering and rewatering equipment
Miscellaneous	Hydro Turbine/Pump	Water Supply/Discharge		7191	Equalizing line

TABLE B12-86 Hydro Turbine/Pump: Water Supply/Discharge					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Hydro Turbine/Pump	Water Supply/Discharge		7199	Other water supply/discharge problems (use for equipment related problems; use codes 9135 or 9320 for lack of water or discharge limit related problems)
Notes: 1) For use with Unit Codes 800–899.					

INACTIVE STATES

TABLE B12-87 Inactive States: Inactive States					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Inactive States	Inactive States		2	Inactive Reserve Shutdown
Miscellaneous	Inactive States	Inactive States		9990	Retired unit
Miscellaneous	Inactive States	Inactive States		9991	Mothballed unit
Notes: 1) For use with Unit Codes 800–899.					

INTERNAL COMBUSTION/RECIPROCATING ENGINE

TABLE B12-88 Internal Combustion/Reciprocating Engines: Engine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Internal Combustion/Reciprocating Engines	Engine		5700	Drive shaft and bearings
Miscellaneous	Internal Combustion/Reciprocating Engines	Engine		5710	Cylinders
Miscellaneous	Internal Combustion/Reciprocating Engines	Engine		5711	Cylinder heads
Miscellaneous	Internal Combustion/Reciprocating Engines	Engine		5712	Hydraulic lock (water in cylinders)
Miscellaneous	Internal Combustion/Reciprocating Engines	Engine		5720	Pistons
Miscellaneous	Internal Combustion/Reciprocating Engines	Engine		5730	Intake valves
Miscellaneous	Internal Combustion/Reciprocating Engines	Engine		5731	Exhaust valves
Miscellaneous	Internal Combustion/Reciprocating Engines	Engine		5740	Turbo charger
Miscellaneous	Internal Combustion/Reciprocating Engines	Engine		5790	Vibration
Miscellaneous	Internal Combustion/Reciprocating Engines	Engine		5799	Other engine problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-89 Internal Combustion/Reciprocating Engines: Engine Auxiliaries					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Internal Combustion/Reciprocating Engines	Engine Auxiliaries		5800	Lube oil system
Miscellaneous	Internal Combustion/Reciprocating Engines	Engine Auxiliaries		5805	Cooling system
Miscellaneous	Internal Combustion/Reciprocating Engines	Engine Auxiliaries		5810	Heater elements

TABLE B12-89 Internal Combustion/Reciprocating Engines: Engine Auxiliaries					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Internal Combustion/Reciprocating Engines	Engine Auxiliaries		5815	Fuel system
Miscellaneous	Internal Combustion/Reciprocating Engines	Engine Auxiliaries		5820	Start system
Miscellaneous	Internal Combustion/Reciprocating Engines	Engine Auxiliaries		5825	Battery and battery charger system
Miscellaneous	Internal Combustion/Reciprocating Engines	Engine Auxiliaries		5830	Air filter system
Miscellaneous	Internal Combustion/Reciprocating Engines	Engine Auxiliaries		5849	Other engine auxiliaries problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-90 Internal Combustion/Reciprocating Engines: Engine Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Internal Combustion/Reciprocating Engines	Engine Controls		5850	Governor
Miscellaneous	Internal Combustion/Reciprocating Engines	Engine Controls		5855	Engine control system
Miscellaneous	Internal Combustion/Reciprocating Engines	Engine Controls		5860	Control power transformer
Miscellaneous	Internal Combustion/Reciprocating Engines	Engine Controls		5865	Synchronization system
Miscellaneous	Internal Combustion/Reciprocating Engines	Engine Controls		5870	Other engine control problems
Miscellaneous	Internal Combustion/Reciprocating Engines	Engine Controls		5880	Internal Combustion/Reciprocating Engines unit overhaul
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-91 Internal Combustion/Reciprocating Engines: Miscellaneous (Internal Combustion/Reciprocating Engines)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Internal Combustion/Reciprocating Engines	Miscellaneous (Internal Combustion/Reciprocating Engines)		5890	Major overhaul (use for non-specific overhaul only; see Page B-CCGT-2)
Miscellaneous	Internal Combustion/Reciprocating Engines	Miscellaneous (Internal Combustion/Reciprocating Engines)		5895	Inspection
Miscellaneous	Internal Combustion/Reciprocating Engines	Miscellaneous (Internal Combustion/Reciprocating Engines)		5990	Engine performance testing - individual engines (use code 9999 for total unit performance testing)
Miscellaneous	Internal Combustion/Reciprocating Engines	Miscellaneous (Internal Combustion/Reciprocating Engines)		5999	Other miscellaneous Internal Combustion/Reciprocating Engines problems
Notes: 1) For use with Unit Codes 800–899.					

JET ENGINE

TABLE B12-92 Jet Engine: Auxiliary Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Jet Engine	Auxiliary Systems		5510	Lube oil system
Miscellaneous	Jet Engine	Auxiliary Systems		5520	Hydraulic oil system
Miscellaneous	Jet Engine	Auxiliary Systems		5530	Starting system (including motor)
Miscellaneous	Jet Engine	Auxiliary Systems		5540	Battery and charger system
Miscellaneous	Jet Engine	Auxiliary Systems		5550	Turning gear and motor
Miscellaneous	Jet Engine	Auxiliary Systems		5560	Cooling and seal air system
Miscellaneous	Jet Engine	Auxiliary Systems		5570	Cooling water system
Miscellaneous	Jet Engine	Auxiliary Systems		5580	Anti-icing system
Miscellaneous	Jet Engine	Auxiliary Systems		5590	Other auxiliary system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-93 Jet Engine: Exhaust Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Jet Engine	Exhaust Systems		5500	Chamber
Miscellaneous	Jet Engine	Exhaust Systems		5501	Hoods
Miscellaneous	Jet Engine	Exhaust Systems		5502	Vanes/nozzles
Miscellaneous	Jet Engine	Exhaust Systems		5503	Silencer
Miscellaneous	Jet Engine	Exhaust Systems		5504	Cones
Miscellaneous	Jet Engine	Exhaust Systems		5508	High engine exhaust temperature
Miscellaneous	Jet Engine	Exhaust Systems		5509	Other exhaust problems (including high exhaust temperature not attributable to a specific problem)
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-94 Jet Engine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Jet Engine	Fuel, Ignition, and Combustion Systems		5440	Fuel tanks
Miscellaneous	Jet Engine	Fuel, Ignition, and Combustion Systems		5441	Fuel piping and valves
Miscellaneous	Jet Engine	Fuel, Ignition, and Combustion Systems		5442	Fuel nozzles/vanes
Miscellaneous	Jet Engine	Fuel, Ignition, and Combustion Systems		5443	Fuel filters
Miscellaneous	Jet Engine	Fuel, Ignition, and Combustion Systems		5449	Other fuel system problems
Miscellaneous	Jet Engine	Fuel, Ignition, and Combustion Systems		5450	Ignition system
Miscellaneous	Jet Engine	Fuel, Ignition, and Combustion Systems		5455	Fuel nozzle/vane cooling air system
Miscellaneous	Jet Engine	Fuel, Ignition, and Combustion Systems		5460	Atomizing air system
Miscellaneous	Jet Engine	Fuel, Ignition, and Combustion Systems		5470	Combustor casing
Miscellaneous	Jet Engine	Fuel, Ignition, and Combustion Systems		5471	Combustor liner
Miscellaneous	Jet Engine	Fuel, Ignition, and Combustion Systems		5472	Combustor caps
Miscellaneous	Jet Engine	Fuel, Ignition, and Combustion Systems		5479	Other combustor problems

TABLE B12-94 Jet Engine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-95 Jet Engine: Inlet Air System and Compressors - Compressors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Jet Engine	Inlet Air System and Compressors	Compressors	5410	High pressure shaft
Miscellaneous	Jet Engine	Inlet Air System and Compressors	Compressors	5411	High pressure bearings
Miscellaneous	Jet Engine	Inlet Air System and Compressors	Compressors	5412	High pressure blades/buckets
Miscellaneous	Jet Engine	Inlet Air System and Compressors	Compressors	5413	Other high pressure problems
Miscellaneous	Jet Engine	Inlet Air System and Compressors	Compressors	5420	Low pressure shaft
Miscellaneous	Jet Engine	Inlet Air System and Compressors	Compressors	5421	Low pressure bearings
Miscellaneous	Jet Engine	Inlet Air System and Compressors	Compressors	5422	Low pressure blades/buckets
Miscellaneous	Jet Engine	Inlet Air System and Compressors	Compressors	5429	Other low pressure problems
Miscellaneous	Jet Engine	Inlet Air System and Compressors	Compressors	5430	Supercharging fans
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-96 Jet Engine: Inlet Air System and Compressors - Ducts and Filters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5400	Inlet air ducts
Miscellaneous	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5401	Inlet air vanes/nozzles
Miscellaneous	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5402	Inlet air filters
Miscellaneous	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5403	Inlet and exhaust cones
Miscellaneous	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5409	Other inlet air problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-97 Jet Engine: Miscellaneous (Jet Engine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Jet Engine	Miscellaneous (Jet Engine)		5600	Reduction gear
Miscellaneous	Jet Engine	Miscellaneous (Jet Engine)		5601	Load shaft and bearings
Miscellaneous	Jet Engine	Miscellaneous (Jet Engine)		5605	Main coupling between the turbine and generator
Miscellaneous	Jet Engine	Miscellaneous (Jet Engine)		5606	Clutch
Miscellaneous	Jet Engine	Miscellaneous (Jet Engine)		5610	Intercoolers
Miscellaneous	Jet Engine	Miscellaneous (Jet Engine)		5620	Regenerators
Miscellaneous	Jet Engine	Miscellaneous (Jet Engine)		5630	Heat shields
Miscellaneous	Jet Engine	Miscellaneous (Jet Engine)		5640	Fire detection and extinguishing system
Miscellaneous	Jet Engine	Miscellaneous (Jet Engine)		5641	Fire in unit

TABLE B12-97 Jet Engine: Miscellaneous (Jet Engine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Jet Engine	Miscellaneous (Jet Engine)		5645	Jet Engine Control System - data highway
Miscellaneous	Jet Engine	Miscellaneous (Jet Engine)		5646	Jet Engine Control System - hardware problems (including card failure)
Miscellaneous	Jet Engine	Miscellaneous (Jet Engine)		5647	Jet Engine Control System - internal and termination wiring
Miscellaneous	Jet Engine	Miscellaneous (Jet Engine)		5648	Jet Engine Control System - logic problems
Miscellaneous	Jet Engine	Miscellaneous (Jet Engine)		5649	Jet Engine Control System - upgrades
Miscellaneous	Jet Engine	Miscellaneous (Jet Engine)		5650	Other controls and instrumentation problems
Miscellaneous	Jet Engine	Miscellaneous (Jet Engine)		5660	Major overhaul (use for non-specific overhaul only; see page B-CCGT-2)
Miscellaneous	Jet Engine	Miscellaneous (Jet Engine)		5661	Engine/compressor washing
Miscellaneous	Jet Engine	Miscellaneous (Jet Engine)		5662	Engine exchange
Miscellaneous	Jet Engine	Miscellaneous (Jet Engine)		5665	Engine shafts and bearings
Miscellaneous	Jet Engine	Miscellaneous (Jet Engine)		5670	Hot end inspection
Miscellaneous	Jet Engine	Miscellaneous (Jet Engine)		5672	Boroscope inspection
Miscellaneous	Jet Engine	Miscellaneous (Jet Engine)		5674	General unit inspection
Miscellaneous	Jet Engine	Miscellaneous (Jet Engine)		5680	Vibration (not engine) in unit not attributable to bearings or other components
Miscellaneous	Jet Engine	Miscellaneous (Jet Engine)		5685	Engine vibration
Miscellaneous	Jet Engine	Miscellaneous (Jet Engine)		5686	Jet engine lockout
Miscellaneous	Jet Engine	Miscellaneous (Jet Engine)		5690	Engine performance testing - individual engines (use code 9999 for total unit performance testing)
Miscellaneous	Jet Engine	Miscellaneous (Jet Engine)		5692	Turbine Overspeed Trip Test - Jet Engine
Miscellaneous	Jet Engine	Miscellaneous (Jet Engine)		5695	Synchronous condenser equipment
Miscellaneous	Jet Engine	Miscellaneous (Jet Engine)		5699	Other miscellaneous jet engine problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-98 Jet Engine: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Jet Engine	Turbine		5480	High pressure shaft
Miscellaneous	Jet Engine	Turbine		5481	High pressure bearings
Miscellaneous	Jet Engine	Turbine		5482	High pressure blades/buckets
Miscellaneous	Jet Engine	Turbine		5483	High pressure nozzles/vanes
Miscellaneous	Jet Engine	Turbine		5484	High pressure casing/expansion joint
Miscellaneous	Jet Engine	Turbine		5485	Interstage gas passages
Miscellaneous	Jet Engine	Turbine		5486	High pressure shaft seals
Miscellaneous	Jet Engine	Turbine		5487	Thrust bearing
Miscellaneous	Jet Engine	Turbine		5489	Other high pressure problems

TABLE B12-98 Jet Engine: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Jet Engine	Turbine		5490	Low pressure shaft
Miscellaneous	Jet Engine	Turbine		5491	Low pressure bearings
Miscellaneous	Jet Engine	Turbine		5492	Low pressure blades/buckets
Miscellaneous	Jet Engine	Turbine		5493	Low pressure nozzles/vanes
Miscellaneous	Jet Engine	Turbine		5494	Low pressure casing/expansion joints
Miscellaneous	Jet Engine	Turbine		5497	Other low pressure problems
Miscellaneous	Jet Engine	Turbine		5498	Expansion joints
Miscellaneous	Jet Engine	Turbine		5499	Shaft seals
Notes: 1) For use with Unit Codes 800–899.					

MISCELLANEOUS

TABLE B12-99 Miscellaneous: Instruments and Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Miscellaneous	Instruments and Controls		6200	Combined cycle instruments and controls. (Report instruments and controls specific to the gas turbine, steam turbine, boiler, generator, or balance of plant using the codes for the appropriate piece of equipment.)
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-100 Miscellaneous: Plant and Auxiliaries					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Miscellaneous	Plant and Auxiliaries		6410	Steam wells/steam field piping problems
Miscellaneous	Miscellaneous	Plant and Auxiliaries		6415	Low steam pressure
Miscellaneous	Miscellaneous	Plant and Auxiliaries		6420	Condensate reinjection system
Miscellaneous	Miscellaneous	Plant and Auxiliaries		6430	Unit H2S emission limitations - regulatory
Miscellaneous	Miscellaneous	Plant and Auxiliaries		6435	Steam field H2S emission limitations - regulatory
Miscellaneous	Miscellaneous	Plant and Auxiliaries		6440	H2S abatement system problems - general
Miscellaneous	Miscellaneous	Plant and Auxiliaries		6450	Heat exchanger problems due to H2S abatement system
Miscellaneous	Miscellaneous	Plant and Auxiliaries		6460	Condenser problems due to H2S abatement system
Miscellaneous	Miscellaneous	Plant and Auxiliaries		6470	Cooling tower problems due to H2S abatement system
Miscellaneous	Miscellaneous	Plant and Auxiliaries		6480	Steam strainer plugging - mineral deposits
Miscellaneous	Miscellaneous	Plant and Auxiliaries		6490	Turbine plugging - mineral deposits
Miscellaneous	Miscellaneous	Plant and Auxiliaries		6499	Geothermal

TABLE B12-100 Miscellaneous: Plant and Auxiliaries					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Notes: 1) For use with Unit Codes 800–899.					

PERFORMANCE

TABLE B12-101 Performance: Performance					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Performance	Performance		9998	Black start testing
Miscellaneous	Performance	Performance		9999	Total unit performance testing (use appropriate codes for individual component testing)
Notes: 1) For use with Unit Codes 800–899.					

PERSONNEL OR PROCEDURAL ERRORS

TABLE B12-102 Personnel or Procedural Errors: Personnel or Procedural Errors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Personnel or Procedural Errors	Personnel or Procedural Errors		9900	Operator error
Miscellaneous	Personnel or Procedural Errors	Personnel or Procedural Errors		9910	Maintenance personnel error
Miscellaneous	Personnel or Procedural Errors	Personnel or Procedural Errors		9920	Contractor error
Miscellaneous	Personnel or Procedural Errors	Personnel or Procedural Errors		9930	Operating procedure error
Miscellaneous	Personnel or Procedural Errors	Personnel or Procedural Errors		9940	Maintenance procedure error
Miscellaneous	Personnel or Procedural Errors	Personnel or Procedural Errors		9950	Contractor procedure error
Miscellaneous	Personnel or Procedural Errors	Personnel or Procedural Errors		9960	Staff shortage
Notes: 1) For use with Unit Codes 800–899.					

POLLUTION CONTROL EQUIPMENT

Use this set of codes to report problems with flue gas desulphurization equipment and stack gas particulate removal equipment. If outages or deratings occur due to reasons other than equipment problems, use the set of codes for Regulatory, Safety, Environmental stack emission limits.

TABLE B12-103 Pollution Control Equipment: CO Reduction

UNIT TYPE	SYSTEM	COMPONENT	SUB-COMPONENT	CAUSE CODE	DESCRIPTION
Miscellaneous	Pollution Control Equipment	CO Reduction		8840	CO Active catalyst
Miscellaneous	Pollution Control Equipment	CO Reduction		8841	CO Support materials
Miscellaneous	Pollution Control Equipment	CO Reduction		8842	CO Plugging
Miscellaneous	Pollution Control Equipment	CO Reduction		8845	Other CO reduction problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-104 Pollution Control Equipment: Continuous Emissions Monitoring Systems (CEMS)

UNIT TYPE	SYSTEM	COMPONENT	SUB-COMPONENT	CAUSE CODE	DESCRIPTION
Miscellaneous	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8700	CEMS Certification and Recertification
Miscellaneous	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8710	SO2 analyzer problems
Miscellaneous	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8720	NOx analyzer problems
Miscellaneous	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8730	CO analyzer problems
Miscellaneous	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8740	CO2 analyzer problems
Miscellaneous	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8750	O2 analyzer problems
Miscellaneous	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8760	Opacity monitor problems
Miscellaneous	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8770	Flow monitor problems
Miscellaneous	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8780	Data acquisition system problems

TABLE B12-104 Pollution Control Equipment: Continuous Emissions Monitoring Systems (CEMS)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8790	Miscellaneous CEMS problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-105 Pollution Control Equipment: Dry Scrubbers - Dry Scrubber					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Dry Scrubber	8528	Dry scrubber instruments and controls
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Dry Scrubber	8529	Gas dispersers
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Dry Scrubber	8530	Spray towers
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Dry Scrubber	8531	Spray machine/atomizer
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Dry Scrubber	8532	Spray machine/atomizer motors
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Dry Scrubber	8533	Spray machine/atomizer lubrication systems
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Dry Scrubber	8534	Spray machine/atomizer vibration problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-106 Pollution Control Equipment: Dry Scrubbers - Miscellaneous (Dry Scrubber)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Miscellaneous (Dry Scrubber)	8544	Mechanical failures
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Miscellaneous (Dry Scrubber)	8545	Electrical failures
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Miscellaneous (Dry Scrubber)	8546	Major overhaul
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Miscellaneous (Dry Scrubber)	8547	Inspection
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Miscellaneous (Dry Scrubber)	8548	Testing

TABLE B12-106 Pollution Control Equipment: Dry Scrubbers - Miscellaneous (Dry Scrubber)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Miscellaneous (Dry Scrubber)	8549	Other dry scrubber problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-107 Pollution Control Equipment: Dry Scrubbers - Piping, Ducting, and Dampers					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Piping, Ducting, and Dampers	8522	Piping
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Piping, Ducting, and Dampers	8523	Valves
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Piping, Ducting, and Dampers	8524	Strainers or filters
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Piping, Ducting, and Dampers	8525	Ducting
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Piping, Ducting, and Dampers	8526	Dampers
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Piping, Ducting, and Dampers	8527	Other piping, ducting, and damper problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-108 Pollution Control Equipment: Dry Scrubbers - Reagent\Slurry Supply					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8500	Slurry storage and feed tanks
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8501	Reagent storage, feed bins, and conveyors
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8502	Weigh feeders
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8503	Screw conveyors
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8504	Mills/slakers
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8505	Scalping screens

TABLE B12-108 Pollution Control Equipment: Dry Scrubbers - Reagent\Slurry Supply					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8506	Slurry pipelines
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8507	Reagent uploading and transfer systems
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8508	Reagent unavailability
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8510	Slurry mixers and agitators
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8520	Slurry transfer pumps and motors
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8521	Reagent/slurry problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-109 Pollution Control Equipment: Dry Scrubbers - Waste Disposal and Recovery					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8535	Fly ash conveyors
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8536	Bucket elevators
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8537	Weigh hoppers
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8538	Recycle storage and feed tanks including agitators
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8539	Recycle slurry transfer pumps
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8540	Waste disposal
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8541	Recycle feed bins
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8542	Recycle feed bins aeration systems
Miscellaneous	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8543	Powder coolers
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-110 Pollution Control Equipment: Miscellaneous (Pollution Control Equipment)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8565	Electrostatic Precipitator rebuild/overhaul
Miscellaneous	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8600	Flue gas additives (furnace injection)
Miscellaneous	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8601	SO3 mitigation
Miscellaneous	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8620	Mercury Abatement Equipment
Miscellaneous	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8650	Baghouse systems, general
Miscellaneous	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8651	Bag failures and rebagging
Miscellaneous	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8652	Shakers and rappers
Miscellaneous	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8653	Inflation and deflation fans and motors
Miscellaneous	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8654	Baghouse booster fans and motors
Miscellaneous	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8655	Structural duct work and dampers
Miscellaneous	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8656	Controls and instrumentation
Miscellaneous	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8657	Ash handling system and hoppers
Miscellaneous	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8658	Slurry system from precipitators
Miscellaneous	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8670	Emission monitors (other than CEMS)
Miscellaneous	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8699	Other miscellaneous pollution control equipment problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-111 Pollution Control Equipment: NOx Reduction Systems - Catalytic Air Heaters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8830	CAH NOx Active catalyst
Miscellaneous	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8831	CAH NOx Support materials
Miscellaneous	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8832	CAH NOx Plugging
Miscellaneous	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8835	Other CAH problems
Notes: 1) For use with Unit Codes 800–899. 2) Use code 360 for Low NOx Burners.					

TABLE B12-112 Pollution Control Equipment: NOx Reduction Systems - Selective Catalytic Reduction Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8810	SCR NOx Reactor
Miscellaneous	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8811	SCR NOx Reagent
Miscellaneous	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8812	SCR NOx Catalyst
Miscellaneous	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8813	SCR NOx Injection grid piping/valves
Miscellaneous	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8814	SCR NOx Catalyst support material
Miscellaneous	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8815	SCR NOx Soot blowers
Miscellaneous	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8816	SCR NOx Plugging
Miscellaneous	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8817	SCR NOx Control system
Miscellaneous	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8820	SCR NOx Ammonia injection grid piping/valves
Miscellaneous	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8821	SCR NOx Ammonia tanks, piping and valves (not injection)
Miscellaneous	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8822	SCR NOx Ammonia air blowers

TABLE B12-112 Pollution Control Equipment: NOx Reduction Systems - Selective Catalytic Reduction Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8823	SCR NOx Other ammonia system problems
Miscellaneous	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8825	Other SCR NOx problems
Notes: 1) For use with Unit Codes 800–899. 2) Use code 360 for Low NOx Burners.					

TABLE B12-113 Pollution Control Equipment: NOx Reduction Systems - Selective Non-Catalytic Reduction Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8800	SNCR NOx Reagent
Miscellaneous	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8801	SNCR NOx Carrier gas
Miscellaneous	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8802	SNCR NOx Control system
Miscellaneous	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8803	SNCR Performance Testing
Miscellaneous	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8809	Other SNCR NOx problems
Notes: 1) For use with Unit Codes 800–899. 2) Use code 360 for Low NOx Burners.					

TABLE B12-114 Pollution Control Equipment: Precipitators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Pollution Control Equipment	Precipitators		8550	Electrostatic precipitator fouling
Miscellaneous	Pollution Control Equipment	Precipitators		8551	Electrostatic precipitator field out of service
Miscellaneous	Pollution Control Equipment	Precipitators		8560	Electrostatic precipitator problems
Miscellaneous	Pollution Control Equipment	Precipitators		8570	Mechanical precipitator fouling
Miscellaneous	Pollution Control Equipment	Precipitators		8580	Mechanical precipitator problems
Miscellaneous	Pollution Control Equipment	Precipitators		8590	Other precipitator problems

TABLE B12-114 Pollution Control Equipment: Precipitators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-115 Pollution Control Equipment: Wet Scrubbers - Chemical Supply					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8000	Chemical feed storage, mill feeders, and conveyors
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8002	Screw conveyors
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8003	Bucket elevators
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8006	Weigh feeders
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8010	Crushers/mills
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8020	Mill slurry tanks supply problems
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8030	Classifiers
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8040	Slurry transfer pumps and motors
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8050	Chemical unavailability
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8099	Other chemical supply problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-116 Pollution Control Equipment: Wet Scrubbers - Miscellaneous (Wet Scrubber)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8400	Scrubber gas discharge reheaters - general
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8402	Scrubber gas discharge reheaters - vibration
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8404	Scrubber gas discharge reheaters - tube leaks

TABLE B12-116 Pollution Control Equipment: Wet Scrubbers - Miscellaneous (Wet Scrubber)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8406	Scrubber gas discharge reheaters - ducts
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8410	Scrubber instruments and controls
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8415	Liquid level controls
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8420	Heat tracer
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8425	Miscellaneous mechanical failures
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8426	Miscellaneous electrical failures
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8430	Stack damage related to scrubber system
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8440	Major overhaul
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8450	Inspection
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8460	Testing
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8470	SO2 monitor
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8499	Other miscellaneous wet scrubber problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-117 Pollution Control Equipment: Wet Scrubbers - Piping, Ducting, Dampers, and Fans					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8200	Piping
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8210	Valves
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8220	Strainers or filters

TABLE B12-117 Pollution Control Equipment: Wet Scrubbers - Piping, Ducting, Dampers, and Fans					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8225	Drain pots
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8230	Ducting
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8235	Demister
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8240	Bypass dampers
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8250	Dampers other than bypass
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8260	Scrubber booster I.D. fan (fan specific to the scrubber)
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8261	Scrubber booster I.D. fan drive
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8262	Scrubber booster I.D. fan vibration (fan specific to the scrubber)
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8264	Scrubber booster I.D. fan blades (fan specific to the scrubber)
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8265	Scrubber booster I.D. fan dampers
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8270	Scrubber booster F.D. fan (fan specific to the scrubber)
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8271	Scrubber booster F.D. fan drive
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8272	Scrubber booster F.D. fan vibration (fan specific to the scrubber)
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8274	Scrubber booster F.D. fan blades (fan specific to the scrubber)
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8275	Scrubber booster F.D. fan dampers
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8280	Reagent feed piping
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8290	Demister wash piping assembly
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8299	Other piping, ducting, damper, and fan problems

TABLE B12-117 Pollution Control Equipment: Wet Scrubbers - Piping, Ducting, Dampers, and Fans					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Notes: 1) For use with Unit Codes 800–899. 2) Use code 9510 for outages or deratings required to install pollution control equipment. Use codes 9600 to 9650 only when the pollution control equipment problems are not responsible for exceeding emission limits.					

TABLE B12-118 Pollution Control Equipment: Wet Scrubbers - Waste Disposal and Recovery					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8300	Waste disposal/recovery tanks
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8310	Waste disposal/recovery pumps
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8320	Waste disposal ponds
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8325	Ash disposal problems
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8330	Dewatering equipment (thickener, centrifuge, etc.)
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8335	Dryers
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8340	Centrifuge/vacuum filter
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8345	Calciners
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8349	Other waste disposal and recovery problems
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8399	Solids conveying and mixing system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-119 Pollution Control Equipment: Wet Scrubbers - Wet Scrubber					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8100	Scrubber/absorber tower or module
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8110	Spray nozzles

TABLE B12-119 Pollution Control Equipment: Wet Scrubbers - Wet Scrubber					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8115	Disc scrubber throats
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8120	Spray pumps and motors
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8125	Scrubber recycle (liquid) pumps
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8127	Scrubber recycle (liquid) pump motors
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8130	Recirculation tanks including agitators
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8140	Reaction tanks including agitators
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8150	Tubes
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8160	Mist eliminators/demisters and washdown
Miscellaneous	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8199	Other scrubber problems
Notes: 1) For use with Unit Codes 800–899.					

REGULATORY, SAFETY, ENVIRONMENTAL

Use these codes only for events not directly attributable to equipment failures. Inspections or testing of certain equipment due to regulation are reported using the appropriate equipment cause codes, and the fact that it was a regulatory requirement noted in the verbal description section.

TABLE B12-120 Regulatory, Safety, Environmental: Other Operating Environmental Limitations					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9660	Thermal discharge limits - fossil and nuclear
Miscellaneous	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9663	Thermal discharge limits - gas turbines
Miscellaneous	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9664	Thermal discharge limits - jet engines
Miscellaneous	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9665	Thermal discharge limits (Internal Combustion/Reciprocating Engines)

TABLE B12-120 Regulatory, Safety, Environmental: Other Operating Environmental Limitations					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9670	Noise limits (not for personnel safety) - fossil and nuclear
Miscellaneous	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9673	Noise limits (not for personnel safety) - gas turbines
Miscellaneous	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9674	Noise limits (not for personnel safety) - jet engines
Miscellaneous	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9675	Noise limits (not for personnel safety) (Internal Combustion/Reciprocating Engines)
Miscellaneous	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9676	Noise limits (not for personnel safety) - hydro and pumped storage
Miscellaneous	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9677	Noise limits testing - fossil
Miscellaneous	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9678	Noise limits testing - gas turbines
Miscellaneous	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9679	Noise limits testing - jet engines
Miscellaneous	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9680	Fish kill - fossil and nuclear
Miscellaneous	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9683	Fish kill - gas turbines
Miscellaneous	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9684	Fish kill - jet engines
Miscellaneous	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9685	Fish kill (Internal Combustion/Reciprocating Engines)
Miscellaneous	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9686	Fish kill - hydro and pumped storage
Miscellaneous	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9690	Other miscellaneous operational environmental limits - fossil and nuclear
Miscellaneous	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9693	Other miscellaneous operational environmental limits - gas turbines
Miscellaneous	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9694	Other miscellaneous operational environmental limits - jet engines
Miscellaneous	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9695	Other miscellaneous operational environmental limits (Internal Combustion/Reciprocating Engines)

TABLE B12-120 Regulatory, Safety, Environmental: Other Operating Environmental Limitations					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9696	Other miscellaneous operational environmental limits - hydro and pumped storage
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-121 Regulatory, Safety, Environmental: Regulatory					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Regulatory, Safety, Environmental	Regulatory		9504	Regulatory (environmental) proceedings and hearings - regulatory agency initiated
Miscellaneous	Regulatory, Safety, Environmental	Regulatory		9506	Regulatory (environmental) proceedings and hearings - intervenor initiated
Miscellaneous	Regulatory, Safety, Environmental	Regulatory		9510	Plant modifications strictly for compliance with new or changed regulatory requirements (scrubbers, cooling towers, etc.)
Miscellaneous	Regulatory, Safety, Environmental	Regulatory		9520	Oil spill in Gulf of Mexico (OMC)
Miscellaneous	Regulatory, Safety, Environmental	Regulatory		9590	Miscellaneous regulatory (this code is primarily intended for use with event contribution code 2 to indicate that a regulatory-related factor contributed to the primary cause of the event)
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-122 Regulatory, Safety, Environmental: Safety					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Regulatory, Safety, Environmental	Safety		9700	OSHA-related retrofit or inspection
Miscellaneous	Regulatory, Safety, Environmental	Safety		9720	Other safety problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-123 Regulatory, Safety, Environmental: Stack Emission					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Regulatory, Safety, Environmental	Stack Emission		9600	SO2 stack emissions - fossil
Miscellaneous	Regulatory, Safety, Environmental	Stack Emission		9603	SO2 stack emissions - gas turbines
Miscellaneous	Regulatory, Safety, Environmental	Stack Emission		9604	SO2 stack emissions - jet engines
Miscellaneous	Regulatory, Safety, Environmental	Stack Emission		9605	SO2 stack emissions (Internal Combustion/Reciprocating Engines)
Miscellaneous	Regulatory, Safety, Environmental	Stack Emission		9610	NOx stack emissions - fossil
Miscellaneous	Regulatory, Safety, Environmental	Stack Emission		9613	NOx stack emissions - gas turbines
Miscellaneous	Regulatory, Safety, Environmental	Stack Emission		9614	NOx stack emissions - jet engines
Miscellaneous	Regulatory, Safety, Environmental	Stack Emission		9615	NOx stack emissions (Internal Combustion/Reciprocating Engines)
Miscellaneous	Regulatory, Safety, Environmental	Stack Emission		9616	CO stack emissions - fossil
Miscellaneous	Regulatory, Safety, Environmental	Stack Emission		9620	Particulate stack emissions - fossil
Miscellaneous	Regulatory, Safety, Environmental	Stack Emission		9623	Particulate stack emissions - gas turbines
Miscellaneous	Regulatory, Safety, Environmental	Stack Emission		9624	Particulate stack emissions - jet engines
Miscellaneous	Regulatory, Safety, Environmental	Stack Emission		9625	Particulate stack emissions (Internal Combustion/Reciprocating Engines)
Miscellaneous	Regulatory, Safety, Environmental	Stack Emission		9630	Opacity - fossil
Miscellaneous	Regulatory, Safety, Environmental	Stack Emission		9633	Opacity - gas turbines
Miscellaneous	Regulatory, Safety, Environmental	Stack Emission		9634	Opacity - jet engines
Miscellaneous	Regulatory, Safety, Environmental	Stack Emission		9635	Opacity (Internal Combustion/Reciprocating Engines)

TABLE B12-123 Regulatory, Safety, Environmental: Stack Emission					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Regulatory, Safety, Environmental	Stack Emission		9650	Other stack/exhaust emissions - fossil (use codes 9200 to 9290 if fuel quality causes pollution control equipment problems that result in excess stack emissions)
Miscellaneous	Regulatory, Safety, Environmental	Stack Emission		9653	Other stack or exhaust emissions - gas turbines (use codes 9200 to 9290 if fuel quality causes pollution control equipment problems that result in excess stack emissions)
Miscellaneous	Regulatory, Safety, Environmental	Stack Emission		9654	Other stack or exhaust emissions - jet engines (use codes 9200 to 9290 if fuel quality causes pollution control equipment problems that result in excess stack emissions)
Miscellaneous	Regulatory, Safety, Environmental	Stack Emission		9655	Other stack or exhaust emissions (Internal Combustion/Reciprocating Engines)
Miscellaneous	Regulatory, Safety, Environmental	Stack Emission		9656	Other stack or exhaust emissions testing - fossil
Miscellaneous	Regulatory, Safety, Environmental	Stack Emission		9657	Other stack or exhaust emissions testing - gas turbines
Miscellaneous	Regulatory, Safety, Environmental	Stack Emission		9658	Other stack or exhaust emissions testing - jet engines
Notes: 1) For use with Unit Codes 800–899. 2) Include exhaust emissions.					

STEAM TURBINE

Besides the turbine, this set includes the steam stop/control valves, turbine control system, and the turbine auxiliaries. The extraction steam codes are contained in the Balance of Plant set.

TABLE B12-124 Steam Turbine: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Steam Turbine	Controls		4290	Hydraulic system pumps
Miscellaneous	Steam Turbine	Controls		4291	Hydraulic system coolers
Miscellaneous	Steam Turbine	Controls		4292	Hydraulic system filters
Miscellaneous	Steam Turbine	Controls		4293	Hydraulic system pipes and valves
Miscellaneous	Steam Turbine	Controls		4299	Other hydraulic system problems

TABLE B12-124 Steam Turbine: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Steam Turbine	Controls		4300	Turbine supervisory system (use codes 4290 to 4299 for hydraulic oil)
Miscellaneous	Steam Turbine	Controls		4301	Turbine governing system
Miscellaneous	Steam Turbine	Controls		4302	Turbine trip devices (including instruments)
Miscellaneous	Steam Turbine	Controls		4303	Exhaust hood and spray controls
Miscellaneous	Steam Turbine	Controls		4304	Automatic turbine control systems - mechanical
Miscellaneous	Steam Turbine	Controls		4305	Automatic turbine control systems - mechanical - hydraulic
Miscellaneous	Steam Turbine	Controls		4306	Automatic turbine control systems - electro-hydraulic - analog
Miscellaneous	Steam Turbine	Controls		4307	Automatic turbine control systems - electro-hydraulic - digital
Miscellaneous	Steam Turbine	Controls		4308	Automatic turbine control systems - digital control and monitoring
Miscellaneous	Steam Turbine	Controls		4309	Other turbine instrument and control problems
Miscellaneous	Steam Turbine	Controls		4310	Steam Turbine Control System - data highway
Miscellaneous	Steam Turbine	Controls		4311	Steam Turbine Control System - hardware problems (including card failure)
Miscellaneous	Steam Turbine	Controls		4312	Steam Turbine Control System - internal and termination wiring
Miscellaneous	Steam Turbine	Controls		4313	Steam Turbine Control System - logic problems
Miscellaneous	Steam Turbine	Controls		4314	Steam Turbine Control System - upgrades
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-125 Steam Turbine: High Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Steam Turbine	High Pressure Turbine		4000	Outer casing
Miscellaneous	Steam Turbine	High Pressure Turbine		4001	Inner casing

TABLE B12-125 Steam Turbine: High Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Steam Turbine	High Pressure Turbine		4009	Nozzle bolting
Miscellaneous	Steam Turbine	High Pressure Turbine		4010	Nozzles and nozzle blocks
Miscellaneous	Steam Turbine	High Pressure Turbine		4011	Diaphragms
Miscellaneous	Steam Turbine	High Pressure Turbine		4012	Buckets or blades
Miscellaneous	Steam Turbine	High Pressure Turbine		4013	Diaphragms unit and shroud type
Miscellaneous	Steam Turbine	High Pressure Turbine		4014	Bucket or blade fouling
Miscellaneous	Steam Turbine	High Pressure Turbine		4015	Wheels or spindles
Miscellaneous	Steam Turbine	High Pressure Turbine		4020	Shaft seals
Miscellaneous	Steam Turbine	High Pressure Turbine		4021	Dummy rings
Miscellaneous	Steam Turbine	High Pressure Turbine		4022	Gland rings
Miscellaneous	Steam Turbine	High Pressure Turbine		4030	Rotor shaft
Miscellaneous	Steam Turbine	High Pressure Turbine		4040	Bearings
Miscellaneous	Steam Turbine	High Pressure Turbine		4041	Thrust bearings
Miscellaneous	Steam Turbine	High Pressure Turbine		4099	Other high pressure turbine problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-126 Steam Turbine: Intermediate Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Steam Turbine	Intermediate Pressure Turbine		4100	Outer casing
Miscellaneous	Steam Turbine	Intermediate Pressure Turbine		4101	Inner casing
Miscellaneous	Steam Turbine	Intermediate Pressure Turbine		4109	Nozzle bolting
Miscellaneous	Steam Turbine	Intermediate Pressure Turbine		4110	Nozzles and nozzle blocks
Miscellaneous	Steam Turbine	Intermediate Pressure Turbine		4111	Diaphragms
Miscellaneous	Steam Turbine	Intermediate Pressure Turbine		4112	Buckets or blades
Miscellaneous	Steam Turbine	Intermediate Pressure Turbine		4113	Bucket or blade fouling
Miscellaneous	Steam Turbine	Intermediate Pressure Turbine		4115	Wheels or spindles
Miscellaneous	Steam Turbine	Intermediate Pressure Turbine		4120	Shaft seals
Miscellaneous	Steam Turbine	Intermediate Pressure Turbine		4121	Dummy rings
Miscellaneous	Steam Turbine	Intermediate Pressure Turbine		4122	Gland rings
Miscellaneous	Steam Turbine	Intermediate Pressure Turbine		4130	Rotor shaft
Miscellaneous	Steam Turbine	Intermediate Pressure Turbine		4140	Bearings
Miscellaneous	Steam Turbine	Intermediate Pressure Turbine		4141	Thrust bearings
Miscellaneous	Steam Turbine	Intermediate Pressure Turbine		4199	Other intermediate pressure turbine problems

TABLE B12-126 Steam Turbine: Intermediate Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-127 Steam Turbine: Low Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Steam Turbine	Low Pressure Turbine		4200	Outer casing
Miscellaneous	Steam Turbine	Low Pressure Turbine		4201	Inner casing
Miscellaneous	Steam Turbine	Low Pressure Turbine		4209	Nozzle bolting
Miscellaneous	Steam Turbine	Low Pressure Turbine		4210	Nozzles and nozzle blocks
Miscellaneous	Steam Turbine	Low Pressure Turbine		4211	Diaphragms
Miscellaneous	Steam Turbine	Low Pressure Turbine		4212	Buckets or blades
Miscellaneous	Steam Turbine	Low Pressure Turbine		4213	Bucket or blade fouling
Miscellaneous	Steam Turbine	Low Pressure Turbine		4215	Wheels or spindles
Miscellaneous	Steam Turbine	Low Pressure Turbine		4220	Shaft seals
Miscellaneous	Steam Turbine	Low Pressure Turbine		4221	Dummy rings
Miscellaneous	Steam Turbine	Low Pressure Turbine		4222	Gland rings
Miscellaneous	Steam Turbine	Low Pressure Turbine		4230	Rotor shaft
Miscellaneous	Steam Turbine	Low Pressure Turbine		4240	Bearings
Miscellaneous	Steam Turbine	Low Pressure Turbine		4241	Thrust bearings
Miscellaneous	Steam Turbine	Low Pressure Turbine		4250	Other low pressure turbine problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-128 Steam Turbine: Lube Oil					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Steam Turbine	Lube Oil		4280	Lube oil pumps
Miscellaneous	Steam Turbine	Lube Oil		4281	Lube oil coolers
Miscellaneous	Steam Turbine	Lube Oil		4282	Lube oil conditioners
Miscellaneous	Steam Turbine	Lube Oil		4283	Lube oil system valves and piping
Miscellaneous	Steam Turbine	Lube Oil		4284	Lube oil pump drive
Miscellaneous	Steam Turbine	Lube Oil		4289	Other lube oil system problems
Notes: 1) For use with Unit Codes 800–899. 2) Do not include bearing failures due to lube oil.					

TABLE B12-129 Steam Turbine: Miscellaneous (Steam Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Steam Turbine	Miscellaneous (Steam Turbine)		4400	Major turbine overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)
Miscellaneous	Steam Turbine	Miscellaneous (Steam Turbine)		4401	Inspection
Miscellaneous	Steam Turbine	Miscellaneous (Steam Turbine)		4402	Minor turbine overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
Miscellaneous	Steam Turbine	Miscellaneous (Steam Turbine)		4410	Turning gear and motor
Miscellaneous	Steam Turbine	Miscellaneous (Steam Turbine)		4411	Steam turbine gear box (single shaft configuration)
Miscellaneous	Steam Turbine	Miscellaneous (Steam Turbine)		4412	Steam turbine clutch (single shaft configuration)
Miscellaneous	Steam Turbine	Miscellaneous (Steam Turbine)		4415	Shaft coupling mechanism
Miscellaneous	Steam Turbine	Miscellaneous (Steam Turbine)		4420	Vibration of the turbine generator unit that cannot be attributed to a specific cause such as bearings or blades (use this code for balance moves)
Miscellaneous	Steam Turbine	Miscellaneous (Steam Turbine)		4430	Gland seal system
Miscellaneous	Steam Turbine	Miscellaneous (Steam Turbine)		4440	Moisture separator/reheater (nuclear including MSR drains, controls, etc.)
Miscellaneous	Steam Turbine	Miscellaneous (Steam Turbine)		4445	Steam reheater
Miscellaneous	Steam Turbine	Miscellaneous (Steam Turbine)		4450	Water induction
Miscellaneous	Steam Turbine	Miscellaneous (Steam Turbine)		4460	Turbine overspeed trip test
Miscellaneous	Steam Turbine	Miscellaneous (Steam Turbine)		4470	Differential expansion
Miscellaneous	Steam Turbine	Miscellaneous (Steam Turbine)		4490	Turbine performance testing (use code 9999 for total unit performance testing)
Miscellaneous	Steam Turbine	Miscellaneous (Steam Turbine)		4499	Other miscellaneous steam turbine problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-130 Steam Turbine: Piping					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Steam Turbine	Piping		4270	Crossover or under piping
Miscellaneous	Steam Turbine	Piping		4279	Miscellaneous turbine piping
Notes: 1) For use with Unit Codes 800–899.					

TABLE B12-131 Steam Turbine: Valves					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Miscellaneous	Steam Turbine	Valves		4260	Main stop valves
Miscellaneous	Steam Turbine	Valves		4261	Control valves
Miscellaneous	Steam Turbine	Valves		4262	Intercept valves
Miscellaneous	Steam Turbine	Valves		4263	Reheat stop valves
Miscellaneous	Steam Turbine	Valves		4264	Combined intercept valves
Miscellaneous	Steam Turbine	Valves		4265	Miscellaneous drain and vent valves
Miscellaneous	Steam Turbine	Valves		4266	Main stop valve testing
Miscellaneous	Steam Turbine	Valves		4267	Control valve testing
Miscellaneous	Steam Turbine	Valves		4268	Reheat/intercept valve testing
Miscellaneous	Steam Turbine	Valves		4269	Other turbine valves (including LP steam admission valves)
Notes: 1) For use with Unit Codes 800–899.					

Appendix B13: Index To Multi-boiler/Multi-turbine Unit Cause Codes

MULTI-BOILER/MULTI-TURBINE UNITS

INDEX TO SYSTEM/COMPONENT/SUB-COMPONENT CAUSE CODE TABLES			
TABLE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**
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B13-2	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems
B13-3	Balance of Plant	Auxiliary Systems	Fire Protection System
B13-4	Balance of Plant	Auxiliary Systems	Instrument Air
B13-5	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System
B13-6	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)
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B13-8	Balance of Plant	Auxiliary Systems	Seal Air Fans
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B13-10	Balance of Plant	Auxiliary Systems	Service Water (Open System)
B13-11	Balance of Plant	Circulating Water Systems	
B13-12	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators
B13-13	Balance of Plant	Condensate System	Miscellaneous (Condensate System)
B13-14	Balance of Plant	Condensate System	Polishers/Chemical Addition
B13-15	Balance of Plant	Condensate System	Pumps, Piping, and Valves
B13-16	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals
B13-17	Balance of Plant	Condensing System	Condenser Controls
B13-18	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment
B13-19	Balance of Plant	Condensing System	Miscellaneous (Condensing System)
B13-20	Balance of Plant	Condensing System	Vacuum Equipment
B13-21	Balance of Plant	Electrical	
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B13-23	Balance of Plant	Feedwater System	
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B13-26	Balance of Plant	Power Station Switchyard	
B13-27	Balance of Plant	Waste Water (zero discharge) Systems	
B13-28	Boiler	Bed Material Preparation System (FBC only)	
B13-29	Boiler	Bed Material Removal System	
B13-30	Boiler	Bed Solids Recirculation	
B13-31	Boiler	Boiler Air and Gas Systems	Air Supply
B13-32	Boiler	Boiler Air and Gas Systems	Flue Gas

INDEX TO SYSTEM/COMPONENT/SUB-COMPONENT CAUSE CODE TABLES			
TABLE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**
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B13-34	Boiler	Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)
B13-35	Boiler	Boiler Control Systems	
B13-36	Boiler	Boiler Design Limitations	
B13-37	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners
B13-38	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Cyclone
B13-39	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)
B13-40	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts
B13-41	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers
B13-42	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)
B13-43	Boiler	Boiler Internals and Structures	
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B13-45	Boiler	Boiler Piping System	Boiler Recirculation
B13-46	Boiler	Boiler Piping System	Cold and Hot Reheat Steam
B13-47	Boiler	Boiler Piping System	Desuperheaters/Attemperators
B13-48	Boiler	Boiler Piping System	Feedwater and Blowdown
B13-49	Boiler	Boiler Piping System	Main Steam
B13-50	Boiler	Boiler Piping System	Miscellaneous (Piping)
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B13-54	Boiler	Boiler Water Condition	
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B13-56	Boiler	Miscellaneous (Boiler)	
B13-57	Boiler	Miscellaneous Boiler Tube Problems	
B13-58	Boiler	Slag and Ash Removal	
B13-59	Boiler	Sorbent Supply (FBC only)	Sorbent Feed Equipment from Bunkers to Boiler (FBC only)
B13-60	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)
B13-61	Expander Turbine	Expander Turbine	
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INDEX TO SYSTEM/COMPONENT/SUB-COMPONENT CAUSE CODE TABLES			
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B13-67	Gas Turbine	Exhaust Systems	
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B13-69	Gas Turbine	Inlet Air System and Compressors	Compressors
B13-70	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters
B13-71	Gas Turbine	Miscellaneous (Gas Turbine)	
B13-72	Gas Turbine	Turbine	
B13-73	Generator	Controls	
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B13-77	Generator	Miscellaneous (Generator)	
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B13-79	Inactive States	Inactive States	
B13-80	Jet Engine	Auxiliary Systems	
B13-81	Jet Engine	Exhaust Systems	
B13-82	Jet Engine	Fuel, Ignition, and Combustion Systems	
B13-83	Jet Engine	Inlet Air System and Compressors	Compressors
B13-84	Jet Engine	Inlet Air System and Compressors	Ducts and Filters
B13-85	Jet Engine	Miscellaneous (Jet Engine)	
B13-86	Jet Engine	Turbine	
B13-87	Miscellaneous	Instruments and Controls	
B13-88	Performance	Performance	
B13-89	Personnel or Procedural Errors	Personnel or Procedural Errors	
B13-90	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)	
B13-91	Pollution Control Equipment	Dry Scrubbers	Dry Scrubber
B13-92	Pollution Control Equipment	Dry Scrubbers	Miscellaneous (Dry Scrubber)
B13-93	Pollution Control Equipment	Dry Scrubbers	Piping, Ducting, and Dampers
B13-94	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply
B13-95	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery
B13-96	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)	
B13-97	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters
B13-98	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems
B13-99	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems
B13-100	Pollution Control Equipment	Precipitators	
B13-101	Pollution Control Equipment	Wet Scrubbers	Chemical Supply

INDEX TO SYSTEM/COMPONENT/SUB-COMPONENT CAUSE CODE TABLES			
TABLE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**
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B13-103	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans
B13-104	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery
B13-105	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber
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B13-117	Steam Turbine	Valves	

BALANCE OF PLANT

TABLE B13-1 Balance of Plant: Auxiliary Systems - Auxiliary Steam

UNIT TYPE	SYSTEM	COMPONENT	SUB-COMPONENT	CAUSE CODE	DESCRIPTION
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3830	Auxiliary boiler
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3831	Auxiliary steam piping
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3832	Auxiliary steam valves
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3833	Auxiliary steam controls and instruments
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3834	Auxiliary boiler tube leaks
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3835	Auxiliary boiler burner management system
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3836	Steam transfer to other unit

TABLE B13-1 Balance of Plant: Auxiliary Systems - Auxiliary Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3839	Other auxiliary steam problems (also see extraction steam codes 3520 to 3529; startup bypass codes 0630 to 0660; and soot blower steam code 0870)
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-2 Balance of Plant: Auxiliary Systems - Closed Cooling Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3820	Closed cooling water pumps and motors
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3821	Closed cooling water piping
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3822	Closed cooling water valves
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3823	Closed cooling water heat exchangers
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3824	Closed cooling water system fouling
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3825	Closed cooling water instrumentation
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3826	Closed cooling water strainer
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3829	Other closed cooling water system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-3 Balance of Plant: Auxiliary Systems - Fire Protection System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Fire Protection System	3860	Fire protection system pumps
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Fire Protection System	3861	Fire protection system piping
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Fire Protection System	3862	Fire protection system valves

TABLE B13-3 Balance of Plant: Auxiliary Systems - Fire Protection System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Fire Protection System	3863	Fire protection system fouling
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Fire Protection System	3864	Fire protection system instrumentation and controls
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Fire Protection System	3869	Other fire protection system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-4 Balance of Plant: Auxiliary Systems - Instrument Air					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Instrument Air	3850	Instrument air compressors
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Instrument Air	3851	Instrument air piping
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Instrument Air	3852	Instrument air valves
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Instrument Air	3853	Instrument air dryers
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Instrument Air	3854	N2 backup to instrument air
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Instrument Air	3859	Other instrument air problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-5 Balance of Plant: Auxiliary Systems - Low-pressure Gas Compression System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3870	Fuel Gas Compressor and Motors
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3871	Fuel Gas Compressor Piping
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3875	Fuel Gas Compressor Filters
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3876	Fuel Gas Compressor Fire System

TABLE B13-5 Balance of Plant: Auxiliary Systems - Low-pressure Gas Compression System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3879	Fuel Gas Compressor - other
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-6 Balance of Plant: Auxiliary Systems - Miscellaneous (Auxiliary Systems)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	3898	Miscellaneous plant auxiliary process and services instrumentation and controls
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	3899	Other miscellaneous auxiliary system problems
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	6299	Other combined cycle block problems (Use other gas turbine problem codes, other steam turbine codes, etc., whenever appropriate.)
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	6399	Other coal gasification equipment problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-7 Balance of Plant: Auxiliary Systems - Open Cooling Water System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3800	Open cooling water pumps and motors
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3801	Open cooling water piping
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3802	Open cooling water valves
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3803	Open cooling water heat exchangers
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3804	Open cooling water system fouling
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3805	Open cooling water system instrumentation
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3806	Open cooling water strainer

TABLE B13-7 Balance of Plant: Auxiliary Systems - Open Cooling Water System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3809	Other open cooling water problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-8 Balance of Plant: Auxiliary Systems - Seal Air Fans					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Seal Air Fans	3880	Seal air fan
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Seal Air Fans	3881	Seal air fan drive - motor
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Seal Air Fans	3882	Seal air control dampers and drives
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Seal Air Fans	3883	Seal air filters
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Seal Air Fans	3889	Other seal air fan problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-9 Balance of Plant: Auxiliary Systems - Service Air					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Service Air	3840	Service air compressors
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Service Air	3841	Service air piping
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Service Air	3842	Service air valves
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Service Air	3843	Service air dryers
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Service Air	3844	Soot blowing air compressor and system
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Service Air	3849	Other service air problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-10 Balance of Plant: Auxiliary Systems - Service Water (Open System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3810	Service water pumps and motors
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3811	Service water piping
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3812	Service water valves
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3813	Service water heat exchangers
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3814	Service water system fouling
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3815	Service water strainer
Multi-boiler/Multi-turbine	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3819	Other service water problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-11 Balance of Plant: Circulating Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3210	Circulating water pumps
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3211	Circulating water pump motors
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3220	Circulating water piping
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3221	Circulating water piping fouling
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3230	Circulating water valves
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3231	Waterbox
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3232	Condenser tube cleaning system including debris filter
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3233	Circulating water priming system

TABLE B13-11 Balance of Plant: Circulating Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3235	Cooling tower booster pump
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3236	Cooling tower booster motor
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3238	Cooling tower fan motors
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3239	Cooling tower fan motors - variable speed
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3240	Cooling tower fans
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3241	Cooling tower efficiency below design
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3242	Cooling tower fill damage
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3243	Cooling tower icing
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3244	Cooling tower fires
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3245	Other cooling tower problems
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3246	Cooling tower fouling
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3247	Cooling tower instrumentation
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3248	Cooling Tower Overhaul
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3250	Circulating water system instruments and controls
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3260	Traveling screens
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3261	Traveling screen fouling
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3269	Circulating water biological conditions (ie, zebra mussels)
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3270	Intake system problems other than traveling screens

TABLE B13-11 Balance of Plant: Circulating Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3271	Intake grating fouling
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3272	Circulating water screenwash system
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3273	Debris in circulating water from outside sources (leaves, mud, etc.)
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3280	High circulating water temperature (not due to season, tower efficiency below design, or other listed equipment problem)
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3281	Circulating water tempering system
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3282	Circulating water cooling ponds
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3285	Circulating water chemistry
Multi-boiler/Multi-turbine	Balance of Plant	Circulating Water Systems		3299	Other circulating water system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-12 Balance of Plant: Condensate System - Low/Intermediate Pressure Heater and Deaerators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3339	LP heater head leaks
Multi-boiler/Multi-turbine	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3340	LP heater tube leaks
Multi-boiler/Multi-turbine	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3341	Other LP heater - general
Multi-boiler/Multi-turbine	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3342	IP heater tube leaks
Multi-boiler/Multi-turbine	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3343	Other IP heater - general
Multi-boiler/Multi-turbine	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3344	Deaerator (including level control)
Multi-boiler/Multi-turbine	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3345	IP heater head leaks

TABLE B13-12 Balance of Plant: Condensate System - Low/Intermediate Pressure Heater and Deaerators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-13 Balance of Plant: Condensate System - Miscellaneous (Condensate System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3360	Condensate makeup and return (including storage tanks)
Multi-boiler/Multi-turbine	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3370	Condensate system controls and instrumentation (not hotwell level, heater level, or deaerator level controls; see codes 3150-3159, 3344, 3502).
Multi-boiler/Multi-turbine	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3380	Condensate coolers
Multi-boiler/Multi-turbine	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3399	Other miscellaneous condensate system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-14 Balance of Plant: Condensate System - Polishers/Chemical Addition					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Condensate System	Polishers/Chemical Addition	3350	Condensate polishing and filtering systems
Multi-boiler/Multi-turbine	Balance of Plant	Condensate System	Polishers/Chemical Addition	3351	Chemical addition systems
Multi-boiler/Multi-turbine	Balance of Plant	Condensate System	Polishers/Chemical Addition	3352	Feedwater chemistry (not specific to condenser, polishers, or chemical addition)
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-15 Balance of Plant: Condensate System - Pumps, Piping, and Valves					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3300	Condensate water pre-treatment
Multi-boiler/Multi-turbine	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3310	Condensate/hotwell pumps

TABLE B13-15 Balance of Plant: Condensate System - Pumps, Piping, and Valves					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3311	Condensate/hotwell pump motor
Multi-boiler/Multi-turbine	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3312	Condensate booster pump
Multi-boiler/Multi-turbine	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3313	Condensate booster pump motor
Multi-boiler/Multi-turbine	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3314	Condensate booster pump motor - variable speed
Multi-boiler/Multi-turbine	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3315	Condensate booster pump drive (other than 3313 and 3314)
Multi-boiler/Multi-turbine	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3320	Condensate piping
Multi-boiler/Multi-turbine	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3330	Condensate valves
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-16 Balance of Plant: Condensing System - Condenser Casing or Shell and Internals					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3120	Tube sheets
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3121	Expansion joint
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3122	Gaskets and seals
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3123	Hot well
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3124	Tube sheet fouling
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3129	Other condenser casing or shell and internal problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-17 Balance of Plant: Condensing System - Condenser Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Condenser Controls	3150	Hot well level controls
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Condenser Controls	3151	Vacuum pump and air ejector controls
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Condenser Controls	3152	Air-cooled condenser controls
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Condenser Controls	3159	Other condensing system controls and instruments
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-18 Balance of Plant: Condensing System - Condenser Tubes and Support Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3110	Condenser tube leaks
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3111	Condenser tube fouling shell side
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3112	Condenser tube fouling tube side
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3113	Condenser tube and water box cleaning (including circulating water flow reversal)
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3114	Air-cooled condenser tubes
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3115	Air-cooled condenser pumps
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3116	Air-cooled condenser fans
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3117	Air-cooled condenser fan motors
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3118	Other Air-cooled condenser problems
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3119	Other condenser tube casing or shell and internal problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-19 Balance of Plant: Condensing System - Miscellaneous (Condensing System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3170	Condenser inspection (use code 3110 to report looking for tube leaks)
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3171	Air-cooled condenser inspections
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3180	Major condenser overhaul
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3185	Water side cathodic protection
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3186	Auxiliary condenser and associated equipment
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3190	Air leakage (for losses not attributable to previously noted equipment related codes)
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3199	Other miscellaneous condensing system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-20 Balance of Plant: Condensing System - Vacuum Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Vacuum Equipment	3130	Air ejectors
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Vacuum Equipment	3131	Air ejector piping and valves
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Vacuum Equipment	3132	Inter and after condensers
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Vacuum Equipment	3133	Vacuum pumps
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Vacuum Equipment	3134	Vacuum pump piping and valves
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Vacuum Equipment	3135	Vacuum pump motor and auxiliaries
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Vacuum Equipment	3139	Other air extraction system problems - general

TABLE B13-20 Balance of Plant: Condensing System - Vacuum Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Condensing System	Vacuum Equipment	3149	Loss of vacuum not attributable to a particular component such as air ejectors or valves, or high back pressure not attributable to high circulating water temperature, or vacuum losses from a known cause.
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-21 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3600	Switchyard transformers and associated cooling systems - external (OMC)
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3601	Switchyard transformers and associated cooling systems - external (not OMC)
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3610	Switchyard circuit breakers - external (not OMC)
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3611	Switchyard circuit breakers - external (OMC)
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3612	Switchyard system protection devices - external (OMC)
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3613	Switchyard system protection devices - external (not OMC)
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3618	Other switchyard equipment - external (not OMC)
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3619	Other switchyard equipment - external (OMC)
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3620	Main transformer
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3621	Unit auxiliaries transformer
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3622	Station service startup transformer
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3623	Auxiliary generators
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3624	Auxiliary generator voltage supply system

TABLE B13-21 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3629	Other switchyard or high voltage system problems - external
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3630	400-700 volt transformers
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3631	400-700 volt circuit breakers
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3632	400-700 volt conductors and buses
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3633	400-700 volt insulators
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3634	400-700 volt protection devices
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3639	Other 400-700 volt problems
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3640	AC instrument power transformers
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3641	AC Circuit breakers
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3642	AC Conductors and buses
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3643	AC Inverters
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3644	AC Protection devices
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3649	Other AC instrument power problems
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3650	DC instrument power battery chargers
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3651	DC circuit breakers
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3652	DC conductors and buses
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3653	DC protection devices
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3659	Other DC power problems

TABLE B13-21 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3660	4000-7000 volt transformers
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3661	4000-7000 volt circuit breakers
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3662	4000-7000 volt conductors and buses
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3663	4000-7000 volt insulators
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3664	4000-7000 volt protection devices
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3669	Other 4000-7000 volt problems
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3670	12-15kV transformers
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3671	12-15kV circuit breakers
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3672	12-15kV conductors and buses
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3673	12-15kV insulators
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3674	12-15kV protection devices
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3679	Other 12-15kV problems
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3680	Other voltage transformers
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3681	Other voltage circuit breakers
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3682	Other voltage conductors and buses
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3683	Other voltage insulators
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3684	Other voltage protection devices
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3689	Other voltage problems

TABLE B13-21 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Electrical		3690	Station Service Power Distribution System, General
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-22 Balance of Plant: Extraction Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Extraction Steam		3520	HP Extraction steam piping
Multi-boiler/Multi-turbine	Balance of Plant	Extraction Steam		3521	HP Extraction steam valves
Multi-boiler/Multi-turbine	Balance of Plant	Extraction Steam		3522	HP Extraction steam instruments and controls
Multi-boiler/Multi-turbine	Balance of Plant	Extraction Steam		3529	Other HP extraction steam system problems
Multi-boiler/Multi-turbine	Balance of Plant	Extraction Steam		3530	IP Extraction steam piping
Multi-boiler/Multi-turbine	Balance of Plant	Extraction Steam		3531	IP Extraction steam valves
Multi-boiler/Multi-turbine	Balance of Plant	Extraction Steam		3532	IP Extraction steam instruments and controls
Multi-boiler/Multi-turbine	Balance of Plant	Extraction Steam		3539	Other IP extraction steam system problems
Multi-boiler/Multi-turbine	Balance of Plant	Extraction Steam		3540	LP Extraction steam piping
Multi-boiler/Multi-turbine	Balance of Plant	Extraction Steam		3541	LP Extraction steam valves
Multi-boiler/Multi-turbine	Balance of Plant	Extraction Steam		3542	LP Extraction steam instruments and controls
Multi-boiler/Multi-turbine	Balance of Plant	Extraction Steam		3549	Other LP extraction steam system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-23 Balance of Plant: Feedwater System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3401	Startup feedwater pump
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3402	Startup feedwater pump drives - all types
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3407	Feedwater pump suction screens
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3408	Feedwater pump drive - local controls
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3409	Feedwater pump drive motor - variable speed
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3410	Feedwater pump
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3411	Feedwater pump drive - motor
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3412	Feedwater pump drive - steam turbine
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3413	Feedwater pump coupling and drive shaft
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3414	Feedwater pump local controls
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3415	Feedwater pump/drive lube oil system
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3416	Other feedwater pump problems
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3417	Feedwater pump drive - main shaft
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3418	Feedwater pump drive - other
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3419	Feedwater pump drive - gear
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3420	Feedwater piping and supports
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3430	Feedwater regulating (boiler level control) valve
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3431	Other feedwater valves

TABLE B13-23 Balance of Plant: Feedwater System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3439	HP heater head leaks
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3440	High pressure heater tube leaks
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3441	Other high pressure heater problems (see condensate system for LP and IP heater codes)
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3451	Feedwater booster pump suction screens
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3452	Feedwater booster pump drive - local controls
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3453	Feedwater booster pump drive motor - variable speed
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3454	Feedwater booster pump
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3455	Feedwater booster pump drive - motor
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3456	Feedwater booster pump drive - steam turbine
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3457	Feedwater booster pump coupling and drive shaft
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3458	Feedwater booster pump local controls
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3459	Feedwater booster pump/drive lube oil system
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3460	Other feedwater booster pump problems
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3461	Feedwater booster pump drive - main shaft
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3462	Feedwater booster pump drive - other
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3463	Feedwater booster pump drive - gear
Multi-boiler/Multi-turbine	Balance of Plant	Feedwater System		3499	Other feedwater system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-24 Balance of Plant: Heater Drain Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Heater Drain Systems		3501	Heater drain pumps
Multi-boiler/Multi-turbine	Balance of Plant	Heater Drain Systems		3502	Heater level control
Multi-boiler/Multi-turbine	Balance of Plant	Heater Drain Systems		3503	Heater drain piping
Multi-boiler/Multi-turbine	Balance of Plant	Heater Drain Systems		3504	Heater drain valves
Multi-boiler/Multi-turbine	Balance of Plant	Heater Drain Systems		3505	Heater drain pump drive
Multi-boiler/Multi-turbine	Balance of Plant	Heater Drain Systems		3509	Other heater drain system problems
Notes: 1) For use with Unit Codes 800–899. 2) Excluding extraction or drain systems.					

TABLE B13-25 Balance of Plant: Miscellaneous (Balance of Plant)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Miscellaneous (Balance of Plant)		3950	Process computer
Multi-boiler/Multi-turbine	Balance of Plant	Miscellaneous (Balance of Plant)		3960	Thermal derating (thermal efficiency losses in balance of plant when specific cause(s) unknown)
Multi-boiler/Multi-turbine	Balance of Plant	Miscellaneous (Balance of Plant)		3970	Distributive Control System (DCS) - process computer
Multi-boiler/Multi-turbine	Balance of Plant	Miscellaneous (Balance of Plant)		3971	DCS - data highway
Multi-boiler/Multi-turbine	Balance of Plant	Miscellaneous (Balance of Plant)		3972	DCS - hardware problems (including card failure)
Multi-boiler/Multi-turbine	Balance of Plant	Miscellaneous (Balance of Plant)		3973	DCS - internal and termination wiring
Multi-boiler/Multi-turbine	Balance of Plant	Miscellaneous (Balance of Plant)		3974	DCS - logic problems
Multi-boiler/Multi-turbine	Balance of Plant	Miscellaneous (Balance of Plant)		3975	DCS - upgrades
Multi-boiler/Multi-turbine	Balance of Plant	Miscellaneous (Balance of Plant)		3979	Other DCS problems

TABLE B13-25 Balance of Plant: Miscellaneous (Balance of Plant)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Miscellaneous (Balance of Plant)		3980	Programmable Logic Controller (PLC)
Multi-boiler/Multi-turbine	Balance of Plant	Miscellaneous (Balance of Plant)		3981	PLC - data highway
Multi-boiler/Multi-turbine	Balance of Plant	Miscellaneous (Balance of Plant)		3982	PLC - hardware problems (including card failure)
Multi-boiler/Multi-turbine	Balance of Plant	Miscellaneous (Balance of Plant)		3983	PLC - internal and termination wiring
Multi-boiler/Multi-turbine	Balance of Plant	Miscellaneous (Balance of Plant)		3984	PLC - logic problems
Multi-boiler/Multi-turbine	Balance of Plant	Miscellaneous (Balance of Plant)		3985	PLC - upgrades
Multi-boiler/Multi-turbine	Balance of Plant	Miscellaneous (Balance of Plant)		3989	Other PLC problems
Multi-boiler/Multi-turbine	Balance of Plant	Miscellaneous (Balance of Plant)		3998	Balance of plant overhaul/outage
Multi-boiler/Multi-turbine	Balance of Plant	Miscellaneous (Balance of Plant)		3999	Other miscellaneous balance of plant problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-26 Balance of Plant: Power Station Switchyard					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Power Station Switchyard		3700	Power Station switchyard (non generating unit equipment)
Multi-boiler/Multi-turbine	Balance of Plant	Power Station Switchyard		3710	Transmission line (connected to powerhouse switchyard to 1st Substation)
Multi-boiler/Multi-turbine	Balance of Plant	Power Station Switchyard		3720	Transmission equipment at the 1st substation (see code 9300 if applicable)
Multi-boiler/Multi-turbine	Balance of Plant	Power Station Switchyard		3730	Transmission equipment beyond the 1st substation (see code 9300 if applicable)
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-27 Balance of Plant: Waste Water (zero discharge) Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Balance of Plant	Waste Water (zero discharge) Systems		3290	Waste water (zero discharge) tanks, pumps, and motors
Multi-boiler/Multi-turbine	Balance of Plant	Waste Water (zero discharge) Systems		3291	Waste water (zero discharge) system fouling
Multi-boiler/Multi-turbine	Balance of Plant	Waste Water (zero discharge) Systems		3292	Waste water (zero discharge) piping
Multi-boiler/Multi-turbine	Balance of Plant	Waste Water (zero discharge) Systems		3293	Waste water (zero discharge) valves
Multi-boiler/Multi-turbine	Balance of Plant	Waste Water (zero discharge) Systems		3294	Waste water (zero discharge) controls and instrumentation
Multi-boiler/Multi-turbine	Balance of Plant	Waste Water (zero discharge) Systems		3295	Other waste water (zero discharge) problems
Notes: 1) For use with Unit Codes 800–899.					

BOILER

This set of codes contains the following:

- Boiler
- Boiler internals (tubes, refractory, supports, etc.)
- All the fuel handling, storage, preparation, and burning equipment.
- The forced/induced draft air system.
- Slag and ash removal except for particulate and gas cleanup. These latter items are covered under pollution control equipment.
- The main steam and reheat steam systems up to but not including the turbine stop or isolation valves.
- The feedwater system downstream of the final valve prior to entry into the economizer or boiler.
- Boiler blowdown systems.
- The startup bypass system including drains up to the heaters or condenser.
- Boiler water chemistry problems not due to problems in the condensate/feedwater system, the chemical addition system, or the demineralizer/polisher system.
- The instruments and controls associated with the above equipment.

TABLE B13-28 Boiler: Bed Material Preparation System (FBC only)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Bed Material Preparation System (FBC only)		160	Bed material tanks/hoppers
Multi-boiler /Multi-turbine	Boiler	Bed Material Preparation System (FBC only)		162	Bed material conveyors
Multi-boiler /Multi-turbine	Boiler	Bed Material Preparation System (FBC only)		163	Bed material feeders
Multi-boiler /Multi-turbine	Boiler	Bed Material Preparation System (FBC only)		164	Bed material feeder motors
Multi-boiler /Multi-turbine	Boiler	Bed Material Preparation System (FBC only)		165	Bed material crushers
Multi-boiler /Multi-turbine	Boiler	Bed Material Preparation System (FBC only)		166	Bed material crusher motors
Multi-boiler /Multi-turbine	Boiler	Bed Material Preparation System (FBC only)		167	Bed material screens
Multi-boiler /Multi-turbine	Boiler	Bed Material Preparation System (FBC only)		168	Bed material blowers/fans
Multi-boiler /Multi-turbine	Boiler	Bed Material Preparation System (FBC only)		169	Bed material blower/fan motors
Multi-boiler /Multi-turbine	Boiler	Bed Material Preparation System (FBC only)		170	Bed material cyclone
Multi-boiler /Multi-turbine	Boiler	Bed Material Preparation System (FBC only)		171	Bed material baghouse
Multi-boiler /Multi-turbine	Boiler	Bed Material Preparation System (FBC only)		172	Bed material drying equipment
Multi-boiler /Multi-turbine	Boiler	Bed Material Preparation System (FBC only)		173	Bed material pneumatic transport system including piping and valves
Multi-boiler /Multi-turbine	Boiler	Bed Material Preparation System (FBC only)		174	Other bed material handling equipment
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-29 Boiler: Bed Material Removal System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Bed Material Removal System		930	Bed material coolers

TABLE B13-29 Boiler: Bed Material Removal System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Bed Material Removal System		931	Bed material transport piping/valves
Multi-boiler /Multi-turbine	Boiler	Bed Material Removal System		932	Bed material transport tanks/hoppers
Multi-boiler /Multi-turbine	Boiler	Bed Material Removal System		933	Bed material fans/blowers
Multi-boiler /Multi-turbine	Boiler	Bed Material Removal System		934	Bed material fan/blower motors
Multi-boiler /Multi-turbine	Boiler	Bed Material Removal System		935	Bed material disposal conditioner
Multi-boiler /Multi-turbine	Boiler	Bed Material Removal System		936	Bed material conveyors
Multi-boiler /Multi-turbine	Boiler	Bed Material Removal System		937	Bed material mechanical separators and baghouse
Multi-boiler /Multi-turbine	Boiler	Bed Material Removal System		950	Other bed material system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-30 Boiler: Bed Solids Recirculation					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Bed Solids Recirculation		951	Char reinjection feeders
Multi-boiler /Multi-turbine	Boiler	Bed Solids Recirculation		952	Char reinjection piping/valves
Multi-boiler /Multi-turbine	Boiler	Bed Solids Recirculation		953	Char reinjection controls
Multi-boiler /Multi-turbine	Boiler	Bed Solids Recirculation		959	Other char reinjection equipment problems
Multi-boiler /Multi-turbine	Boiler	Bed Solids Recirculation		960	Char transport piping and valves
Multi-boiler /Multi-turbine	Boiler	Bed Solids Recirculation		961	Char transfer tanks/hoppers
Multi-boiler /Multi-turbine	Boiler	Bed Solids Recirculation		962	Char conditioner

TABLE B13-30 Boiler: Bed Solids Recirculation					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Bed Solids Recirculation		969	Other char equipment problems
Multi-boiler /Multi-turbine	Boiler	Bed Solids Recirculation		970	Flue gas-solids separator
Multi-boiler /Multi-turbine	Boiler	Bed Solids Recirculation		971	Flue gas-solids separator piping and valves
Multi-boiler /Multi-turbine	Boiler	Bed Solids Recirculation		972	Flue gas-solids separator controls
Multi-boiler /Multi-turbine	Boiler	Bed Solids Recirculation		973	Flue gas-solids separator refractory
Multi-boiler /Multi-turbine	Boiler	Bed Solids Recirculation		980	High pressure loop seal recirculation fans/blowers
Multi-boiler /Multi-turbine	Boiler	Bed Solids Recirculation		981	High pressure loop seal recirculation fan/blower motors
Multi-boiler /Multi-turbine	Boiler	Bed Solids Recirculation		982	High pressure loop seal recirculation fan/blower controls
Multi-boiler /Multi-turbine	Boiler	Bed Solids Recirculation		989	Other bed solids recirculation problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-31 Boiler: Boiler Air and Gas Systems - Air Supply					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Air Supply	1400	Forced draft fans
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Air Supply	1401	Forced draft fan dampers
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Air Supply	1407	Forced draft fan lubrication system
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Air Supply	1410	Forced draft fan motors
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Air Supply	1411	Forced draft fan motors - variable speed
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Air Supply	1412	Forced draft fan drives (other than motor)

TABLE B13-31 Boiler: Boiler Air and Gas Systems - Air Supply					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Air Supply	1413	Forced draft fan couplings
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Air Supply	1415	Forced draft fan controls
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Air Supply	1420	Other forced draft fan problems
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Air Supply	1421	Secondary air fans/blowers
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Air Supply	1422	Secondary air fan/blower motors - single speed
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Air Supply	1423	Secondary air fan/blower motors - variable speed
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Air Supply	1424	Secondary air fan/blower controls
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Air Supply	1430	Air supply ducts from FD fan
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Air Supply	1431	Air supply dampers from FD fan
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Air Supply	1432	Air supply duct expansion joints
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Air Supply	1440	Air supply dampers
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Air Supply	1450	Other air supply problems
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Air Supply	1451	Fluidized Air Fan (FBC Only)
Notes: 1) For use with Unit Codes 800–899. 2) Excluding burner pipes, wind boxes, primary air, or pulverizer exhausters.					

TABLE B13-32 Boiler: Boiler Air and Gas Systems - Flue Gas					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Flue Gas	1455	Induced draft fans
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Flue Gas	1456	Induced draft fan dampers

TABLE B13-32 Boiler: Boiler Air and Gas Systems - Flue Gas					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Flue Gas	1457	Induced draft fan lubrication systems
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Flue Gas	1460	Induced draft fan fouling
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Flue Gas	1470	Induced draft fan motors and drives
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Flue Gas	1471	Induced draft fan motors - variable speed
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Flue Gas	1472	Inducted draft fan coupling
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Flue Gas	1475	Induced draft fan controls
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Flue Gas	1476	Induced draft fan speed changer
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Flue Gas	1480	Other induced draft fan problems
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Flue Gas	1487	Air heater (tubular)
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Flue Gas	1488	Air heater (regenerative)
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Flue Gas	1489	Air heater (heat pipe, plate-type)
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Flue Gas	1492	Air heater fouling (tubular)
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Flue Gas	1493	Air heater fouling (regenerative)
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Flue Gas	1495	Other air heater fouling (heat pipe, plate-type)
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Flue Gas	1500	Air heater soot blowers
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Flue Gas	1510	Flue gas ducts (except recirculation)
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Flue Gas	1512	Flue gas expansion joints
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Flue Gas	1520	Flue gas dampers (except recirculation)

TABLE B13-32 Boiler: Boiler Air and Gas Systems - Flue Gas					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Flue Gas	1530	Other flue gas problems
Notes: 1) For use with Unit Codes 800–899. 2) Excluding burner pipes, wind boxes, primary air, or pulverizer exhausters.					

TABLE B13-33 Boiler: Boiler Air and Gas Systems - Flue Gas Recirculation					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1535	Flue gas recirculating fan
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1536	Flue gas recirculating fan dampers
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1537	Flue gas recirculating fan lubrication systems
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1540	Flue gas recirculation fan fouling
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1550	Flue gas recirculation fan motors
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1555	Flue gas recirculation fan controls
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1560	Other flue gas recirculation fan problems
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1570	Flue gas recirculation ducts
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1572	Flue gas recirculation duct expansion joints
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation	1580	Flue gas recirculation dampers
Notes: 1) For use with Unit Codes 800–899. 2) Excluding burner pipes, wind boxes, primary air, or pulverizer exhausters.					

TABLE B13-34 Boiler: Boiler Air and Gas Systems - Miscellaneous (Boiler Air and Gas Systems)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1590	Stacks (use code 8430 for stack problems due to pollution control equipment)
Multi-boiler /Multi-turbine	Boiler	Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1599	Other miscellaneous boiler air and gas system problems

TABLE B13-34 Boiler: Boiler Air and Gas Systems - Miscellaneous (Boiler Air and Gas Systems)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Notes: 1) For use with Unit Codes 800–899. 2) Excluding burner pipes, wind boxes, primary air, or pulverizer exhausters.					

TABLE B13-35 Boiler: Boiler Control Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Control Systems		1700	Feedwater controls (report local controls - feedwater pump, feedwater regulator valve, etc., - with component or system)
Multi-boiler /Multi-turbine	Boiler	Boiler Control Systems		1710	Combustion/steam condition controls (report local controls - burners, pulverizers, etc., - with component or system)
Multi-boiler /Multi-turbine	Boiler	Boiler Control Systems		1720	Desuperheater/attemperator controls
Multi-boiler /Multi-turbine	Boiler	Boiler Control Systems		1730	Boiler explosion or implosion
Multi-boiler /Multi-turbine	Boiler	Boiler Control Systems		1740	Boiler drum gage glasses / level indicator
Multi-boiler /Multi-turbine	Boiler	Boiler Control Systems		1750	Burner management system
Multi-boiler /Multi-turbine	Boiler	Boiler Control Systems		1760	Feedwater instrumentation (not local controls)
Multi-boiler /Multi-turbine	Boiler	Boiler Control Systems		1799	Other boiler instrumentation and control problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-36 Boiler: Boiler Design Limitations					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Design Limitations		1900	Improper balance between tube sections not due to fouling or plugging
Multi-boiler /Multi-turbine	Boiler	Boiler Design Limitations		1910	Inadequate air not due to equipment problems
Notes: 1) For use with Unit Codes 800–899. 2) Including instruments which input to the controls.					

TABLE B13-37 Boiler: Boiler Fuel Supply from Bunkers to Boiler - Burners					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	358	Oil burner piping and valves
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	359	Gas burner piping and valves
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	360	Burners
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	361	Burner orifices
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	362	Burner tilts
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	365	Bed warmup burners (FBC only)
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	366	Duct burners (FBC only)
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	370	Burner instruments and controls (except light off)
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	375	Burner instruments and controls (FBC light-off system)
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	380	Light off (igniter) systems (including fuel supply)
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	385	Igniters
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	390	Burner wind boxes and dampers
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	400	Burner wind box fires
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners	410	Other burner problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-38 Boiler: Boiler Fuel Supply from Bunkers to Boiler - Cyclone					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Cyclone	415	Cyclone feeders

TABLE B13-38 Boiler: Boiler Fuel Supply from Bunkers to Boiler - Cyclone					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Cyclone	420	Cyclone crusher
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Cyclone	425	Cyclone dampers
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Cyclone	426	Cyclone air ducts
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Cyclone	430	Cyclone furnace
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Cyclone	435	Other cyclone problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-39 Boiler: Boiler Fuel Supply from Bunkers to Boiler - Oil and Gas Systems (except light off)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	440	Fuel oil pumps (general)
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	441	Fuel oil pumps (burner supply)
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	442	Fuel oil pumps (forwarding/transfer)
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	443	Fuel oil (burner supply) pump drives
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	444	Fuel oil (forwarding/transfer) pump drives
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	450	Fuel oil heaters
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	460	Fuel oil atomizers
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	470	Oil and gas fires
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	475	Fuel lance (FBC only)
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)	480	Other oil and gas fuel supply problems (see codes 0360-0410 for burner problems)
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-40 Boiler: Boiler Fuel Supply from Bunkers to Boiler - Pulverizers, Primary Air Fans, and Associated Ducts					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	200	Pulverizer exhauster fan (for indirect firing)
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	205	Pulverizer exhauster fan drive
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	210	Pulverizer heater (for indirect firing)
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	220	Pulverizer system cyclone separator
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	230	Pulverizer bag filter
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	240	Pulverized coal bin
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	250	Pulverizer feeders
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	253	Pulverizer feeder motor
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	255	Pulverizer feeder coal scales
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	256	Seal air system (air to pulverizers)
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	257	Coal Crusher/dryer between feeder and pulverizer
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	260	Primary air fan
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	262	Primary air fan lube oil system
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	263	Primary air fan drives
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	264	Other primary air fan problems
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	265	Primary air heater
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	266	Primary air heater fouling

TABLE B13-40 Boiler: Boiler Fuel Supply from Bunkers to Boiler - Pulverizers, Primary Air Fans, and Associated Ducts					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	267	Primary air flow instrumentation
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	270	Primary air duct and dampers
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	280	Pulverizer fires
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	290	Pulverizer reduced capacity due to wear
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	300	Pulverizer motors and drives
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	310	Pulverizer mills
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	312	Pulverizer mill classifiers
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	313	Pulverizer mill trunnion seals
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	314	Pulverizer mill ball charger hopper (ball mills only)
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	315	Pulverizer mill coal level controls
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	320	Foreign object in Pulverizers mill
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	325	Pulverizer skidding
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	330	Pulverizer coal leak (pulverizers only)
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	331	Pulverizer system coal leaks (other than pulverizers, see code 0330)
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	335	Pulverizer lube oil system
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	338	Pulverizer control systems (temperature and pressure)
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	340	Other pulverizer problems
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	341	Pulverizer deluge system

TABLE B13-40 Boiler: Boiler Fuel Supply from Bunkers to Boiler - Pulverizers, Primary Air Fans, and Associated Ducts					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	342	Pulverizer inert system
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	344	Pulverizer inspection
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	345	Pulverizer overhaul
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	346	Pulverizer pyrite removal system
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts	350	Pulverized fuel and air piping (from pulverizer to wind box) (see code 0898 for pulverizer reject system problems)
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-41 Boiler: Boiler Fuel Supply to Bunker - Coal Handling Equipment up Through Bunkers					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	10	Thaw shed failure or fire
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	20	Coal car dumpers, shakers, and unloaders
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	22	Unloading/receiving hopper (train/truck)
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	24	Rotary plow
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	26	Dust suppression system
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	28	Dust collection system
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	30	Coal conveyors and feeders
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	35	Metal detector/collector (including magnetic separator)
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	40	Coal elevators
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	50	Coal storage fires

TABLE B13-41 Boiler: Boiler Fuel Supply to Bunker - Coal Handling Equipment up Through Bunkers					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	60	Coal crushers including motors
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	70	Coal samplers
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	75	Storage silos/hoppers
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	80	Stackers/reclaimers
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	84	Coal conveyor scales storage coal pile
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	85	Bunker feeder coal scales
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	90	Bunker fires
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	95	Bunker flow problems
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	100	Bunker gates
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	105	Bunker structures
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	106	Coal drying system (see additional codes 0125-0127)
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	107	Screen (prior to bunkers)
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	110	Other coal fuel supply problems up through bunkers
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	125	Coal crusher dryer hammers (see code 0106)
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	126	Coal crusher lube oil system (see code 0106)
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	127	Other coal crusher dryer problems (see code 0106)
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers	129	Other coal processing system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-42 Boiler: Boiler Fuel Supply to Bunker - Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	111	Solid fuel feeder conveyors
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	112	Solid fuel feed tanks/hoppers
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	113	Solid fuel tank/hopper fires
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	114	Solid fuel volumetric feeder
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	115	Solid fuel gravimetric feeder
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	116	Solid fuel feeder motors
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	117	Solid fuel pneumatic transport system including piping and valves
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	118	Solid fuel drying system including screens
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	119	Solid fuel crushers
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	120	Solid fuel crusher motors
Multi-boiler /Multi-turbine	Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)	121	Other solid fuel feed problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-43 Boiler: Boiler Internals and Structures					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Internals and Structures		800	Drums and drum internals (single drum only)
Multi-boiler /Multi-turbine	Boiler	Boiler Internals and Structures		810	Boiler supports and structures (use code 1320 for tube supports)
Multi-boiler /Multi-turbine	Boiler	Boiler Internals and Structures		811	Convection pass enclosure (FBC only)
Multi-boiler /Multi-turbine	Boiler	Boiler Internals and Structures		812	Distribution plate (FBC only)

TABLE B13-43 Boiler: Boiler Internals and Structures					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Internals and Structures		813	Lower furnace (in-bed) tube supports (FBC only)
Multi-boiler /Multi-turbine	Boiler	Boiler Internals and Structures		814	In-bed bubble caps (FBC only)
Multi-boiler /Multi-turbine	Boiler	Boiler Internals and Structures		820	Casing
Multi-boiler /Multi-turbine	Boiler	Boiler Internals and Structures		830	Doors
Multi-boiler /Multi-turbine	Boiler	Boiler Internals and Structures		840	Refractory and insulation
Multi-boiler /Multi-turbine	Boiler	Boiler Internals and Structures		845	Windbox expansion joints
Multi-boiler /Multi-turbine	Boiler	Boiler Internals and Structures		846	Convection pass expansion joints (FBC only)
Multi-boiler /Multi-turbine	Boiler	Boiler Internals and Structures		847	Other expansion joints
Multi-boiler /Multi-turbine	Boiler	Boiler Internals and Structures		850	Other internal or structural problems
Multi-boiler /Multi-turbine	Boiler	Boiler Internals and Structures		855	Drum relief/safety valves (single drum only)
Multi-boiler /Multi-turbine	Boiler	Boiler Internals and Structures		859	Tube external fins/membranes
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-44 Boiler: Boiler Overhaul and Inspections					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Overhaul and Inspections		1800	Major boiler overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)
Multi-boiler /Multi-turbine	Boiler	Boiler Overhaul and Inspections		1801	Minor boiler overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
Multi-boiler /Multi-turbine	Boiler	Boiler Overhaul and Inspections		1810	Other boiler inspections

TABLE B13-44 Boiler: Boiler Overhaul and Inspections					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Overhaul and Inspections		1811	Boiler Inspections - problem identification / investigation
Multi-boiler /Multi-turbine	Boiler	Boiler Overhaul and Inspections		1812	Boiler Inspections - scheduled or routine
Multi-boiler /Multi-turbine	Boiler	Boiler Overhaul and Inspections		1820	Chemical cleaning/steam blows
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-45 Boiler: Boiler Piping System - Boiler Recirculation					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Boiler Recirculation	740	Boiler recirculation pumps
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Boiler Recirculation	741	Boiler recirculation pumps - motors
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Boiler Recirculation	742	Boiler recirculation pumps - motors - cooling system
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Boiler Recirculation	750	Boiler recirculation piping including downcomers
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Boiler Recirculation	760	Boiler recirculation valves
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Boiler Recirculation	770	Other boiler recirculation problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-46 Boiler: Boiler Piping System - Cold and Hot Reheat Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Cold and Hot Reheat Steam	540	Hot reheat steam piping up to turbine stop valves
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Cold and Hot Reheat Steam	541	Cold reheat steam piping up to boiler
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Cold and Hot Reheat Steam	550	Reheat steam relief/safety valves
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Cold and Hot Reheat Steam	560	Other hot reheat steam valves (not including turbine stop or intercept valves)

TABLE B13-46 Boiler: Boiler Piping System - Cold and Hot Reheat Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Cold and Hot Reheat Steam	561	Other cold reheat steam valves (not including turbine stop or intercept valves)
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Cold and Hot Reheat Steam	570	Other reheat steam problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-47 Boiler: Boiler Piping System - Desuperheaters/Attemperators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Desuperheaters/Attemperators	580	Desuperheater/attemperator piping
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Desuperheaters/Attemperators	590	Desuperheater/attemperator valves
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Desuperheaters/Attemperators	600	Desuperheater/attemperator spray nozzles
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Desuperheaters/Attemperators	610	Desuperheater/attemperator drums
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Desuperheaters/Attemperators	620	Other desuperheater/attemperator problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-48 Boiler: Boiler Piping System - Feedwater and Blowdown					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Feedwater and Blowdown	670	Feedwater piping downstream of feedwater regulating valve
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Feedwater and Blowdown	680	Feedwater valves (not feedwater regulating valve)
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Feedwater and Blowdown	690	Other feedwater problems downstream of feedwater regulating valve (use codes 3401 to 3499 for remainder of feedwater system)
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Feedwater and Blowdown	700	Blowdown system valves
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Feedwater and Blowdown	710	Blowdown system piping

TABLE B13-48 Boiler: Boiler Piping System - Feedwater and Blowdown					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Feedwater and Blowdown	720	Blowdown system controls / instrumentation
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Feedwater and Blowdown	730	Other blowdown system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-49 Boiler: Boiler Piping System - Main Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Main Steam	500	Main steam piping up to turbine stop valves
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Main Steam	510	Main steam relief/safety valves off superheater
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Main Steam	520	Other main steam valves (including vent and drain valves but not including the turbine stop valves)
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Main Steam	530	Other main steam system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-50 Boiler: Boiler Piping System - Miscellaneous (Piping)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Miscellaneous (Piping)	775	Economizer piping
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Miscellaneous (Piping)	780	Headers between tube bundles
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Miscellaneous (Piping)	782	Headers and caps
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Miscellaneous (Piping)	790	Pipe hangers, brackets, supports (general)
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Miscellaneous (Piping)	799	Other miscellaneous piping system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-51 Boiler: Boiler Piping System - Startup Bypass					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Startup Bypass	630	Startup bypass system piping (including drain lines up to heaters or condenser)
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Startup Bypass	640	Startup bypass system valves
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Startup Bypass	650	Startup bypass tanks or flash tanks
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Startup Bypass	655	Steam by-pass system instrumentation and controls
Multi-boiler /Multi-turbine	Boiler	Boiler Piping System	Startup Bypass	660	Other startup bypass system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-52 Boiler: Boiler Tube Fireside Slagging or Fouling					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Tube Fireside Slagging or Fouling		1100	Waterwall (Furnace wall)
Multi-boiler /Multi-turbine	Boiler	Boiler Tube Fireside Slagging or Fouling		1105	Generating tubes
Multi-boiler /Multi-turbine	Boiler	Boiler Tube Fireside Slagging or Fouling		1110	Cyclone Furnace (in cyclone area only)
Multi-boiler /Multi-turbine	Boiler	Boiler Tube Fireside Slagging or Fouling		1120	Convection Pass Wall
Multi-boiler /Multi-turbine	Boiler	Boiler Tube Fireside Slagging or Fouling		1130	Boiler screen, wing wall, or slag screen (water tubes only)
Multi-boiler /Multi-turbine	Boiler	Boiler Tube Fireside Slagging or Fouling		1140	First superheater
Multi-boiler /Multi-turbine	Boiler	Boiler Tube Fireside Slagging or Fouling		1150	Second superheater
Multi-boiler /Multi-turbine	Boiler	Boiler Tube Fireside Slagging or Fouling		1160	First reheater
Multi-boiler /Multi-turbine	Boiler	Boiler Tube Fireside Slagging or Fouling		1170	Second reheater
Multi-boiler /Multi-turbine	Boiler	Boiler Tube Fireside Slagging or Fouling		1180	Economizer

TABLE B13-52 Boiler: Boiler Tube Fireside Slagging or Fouling					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Tube Fireside Slagging or Fouling		1190	Other tube slagging or fouling
Multi-boiler /Multi-turbine	Boiler	Boiler Tube Fireside Slagging or Fouling		1191	Bed agglomeration (FBC only)
Multi-boiler /Multi-turbine	Boiler	Boiler Tube Fireside Slagging or Fouling		1200	Operation at reduced power to avoid slagging or fouling (use codes 1100 to 1190 to report power reductions for slag accumulation or slag removal)
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-53 Boiler: Boiler Tube Leaks					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Tube Leaks		1000	Waterwall (Furnace wall)
Multi-boiler /Multi-turbine	Boiler	Boiler Tube Leaks		1003	Steam generating tubes between steam drum and mud drum
Multi-boiler /Multi-turbine	Boiler	Boiler Tube Leaks		1005	Generating tubes
Multi-boiler /Multi-turbine	Boiler	Boiler Tube Leaks		1006	In-bed reheat tubes (FBC only - includes external heat exchangers)
Multi-boiler /Multi-turbine	Boiler	Boiler Tube Leaks		1010	Cyclone furnace (in cyclone area only)
Multi-boiler /Multi-turbine	Boiler	Boiler Tube Leaks		1020	Convection pass wall (water tubes only)
Multi-boiler /Multi-turbine	Boiler	Boiler Tube Leaks		1030	Boiler screen, wing wall, or slag screen (water tubes only)
Multi-boiler /Multi-turbine	Boiler	Boiler Tube Leaks		1035	Platen superheater
Multi-boiler /Multi-turbine	Boiler	Boiler Tube Leaks		1040	First superheater
Multi-boiler /Multi-turbine	Boiler	Boiler Tube Leaks		1045	In-bed superheater tubes (FBC only - includes external heat exchangers)
Multi-boiler /Multi-turbine	Boiler	Boiler Tube Leaks		1050	Second superheater

TABLE B13-53 Boiler: Boiler Tube Leaks					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Tube Leaks		1055	External superheater link tubing
Multi-boiler /Multi-turbine	Boiler	Boiler Tube Leaks		1060	First reheater
Multi-boiler /Multi-turbine	Boiler	Boiler Tube Leaks		1070	Second reheater
Multi-boiler /Multi-turbine	Boiler	Boiler Tube Leaks		1075	External reheater link tubing
Multi-boiler /Multi-turbine	Boiler	Boiler Tube Leaks		1080	Economizer
Multi-boiler /Multi-turbine	Boiler	Boiler Tube Leaks		1085	In-bed evaporative tubes (FBC only - includes external heat exchangers)
Multi-boiler /Multi-turbine	Boiler	Boiler Tube Leaks		1090	Other boiler tube leaks
Notes: 1) For use with Unit Codes 800–899. 2) Use codes 860 and 870 for fouling or slagging due to unavailability of soot blowers or their air or steam supply.					

TABLE B13-54 Boiler: Boiler Water Condition					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Boiler Water Condition		1850	Boiler water condition (not feedwater water quality)
Notes: 1) For use with Unit Codes 800–899. 2) Use code 859 for tube/membrane failures.					

TABLE B13-55 Boiler: External Fluidized Bed Heat Exchanger					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	External Fluidized Bed Heat Exchanger		990	Refractory
Multi-boiler /Multi-turbine	Boiler	External Fluidized Bed Heat Exchanger		991	Tube leaks
Multi-boiler /Multi-turbine	Boiler	External Fluidized Bed Heat Exchanger		992	Tube supports
Multi-boiler /Multi-turbine	Boiler	External Fluidized Bed Heat Exchanger		999	Other heat exchanger problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-56 Boiler: Miscellaneous (Boiler)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Miscellaneous (Boiler)		1980	Boiler safety valve test
Multi-boiler /Multi-turbine	Boiler	Miscellaneous (Boiler)		1990	Boiler performance testing (use code 9999 for total unit performance testing)
Multi-boiler /Multi-turbine	Boiler	Miscellaneous (Boiler)		1999	Boiler, miscellaneous
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-57 Boiler: Miscellaneous Boiler Tube Problems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Miscellaneous Boiler Tube Problems		1300	Water side fouling
Multi-boiler /Multi-turbine	Boiler	Miscellaneous Boiler Tube Problems		1305	Fireside cleaning (which requires a full outage) Use code 1200 for cleanings that cause deratings.
Multi-boiler /Multi-turbine	Boiler	Miscellaneous Boiler Tube Problems		1310	Water side cleaning (acid cleaning)
Multi-boiler /Multi-turbine	Boiler	Miscellaneous Boiler Tube Problems		1320	Tube supports/attachments
Multi-boiler /Multi-turbine	Boiler	Miscellaneous Boiler Tube Problems		1330	Slag fall damage
Multi-boiler /Multi-turbine	Boiler	Miscellaneous Boiler Tube Problems		1340	Tube modifications (including addition and removal of tubes)
Multi-boiler /Multi-turbine	Boiler	Miscellaneous Boiler Tube Problems		1350	Other miscellaneous boiler tube problems
Multi-boiler /Multi-turbine	Boiler	Miscellaneous Boiler Tube Problems		1360	Boiler drains system
Notes: 1) For use with Unit Codes 800–899. 2) Use more specific codes - other slagging and fouling problems, other control problems, etc. - whenever possible. Describe miscellaneous problems in the verbal description.					

TABLE B13-58 Boiler: Slag and Ash Removal					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Slag and Ash Removal		860	Soot blowers - air (see code 3844 for air delivery system)
Multi-boiler /Multi-turbine	Boiler	Slag and Ash Removal		870	Soot blowers - steam
Multi-boiler /Multi-turbine	Boiler	Slag and Ash Removal		871	Soot blowers - sonic
Multi-boiler /Multi-turbine	Boiler	Slag and Ash Removal		872	Soot blowers - water
Multi-boiler /Multi-turbine	Boiler	Slag and Ash Removal		873	Soot blower drives
Multi-boiler /Multi-turbine	Boiler	Slag and Ash Removal		876	Soot blower controls
Multi-boiler /Multi-turbine	Boiler	Slag and Ash Removal		880	Fly Ash Removal System (not precipitators, scrubbers, mechanical collectors, or baghouses)
Multi-boiler /Multi-turbine	Boiler	Slag and Ash Removal		885	Fly ash Removal System - wet transport
Multi-boiler /Multi-turbine	Boiler	Slag and Ash Removal		890	Bottom ash systems (wet or dry)
Multi-boiler /Multi-turbine	Boiler	Slag and Ash Removal		891	Bottom ash hoppers (including gates)
Multi-boiler /Multi-turbine	Boiler	Slag and Ash Removal		892	Bottom ash clinker grinders
Multi-boiler /Multi-turbine	Boiler	Slag and Ash Removal		893	Bottom ash water pumps and motors
Multi-boiler /Multi-turbine	Boiler	Slag and Ash Removal		894	Bottom ash piping and valves
Multi-boiler /Multi-turbine	Boiler	Slag and Ash Removal		895	Ashpit trouble
Multi-boiler /Multi-turbine	Boiler	Slag and Ash Removal		896	Bottom ash dewatering bin system, instruments and controls
Multi-boiler /Multi-turbine	Boiler	Slag and Ash Removal		897	Bottom ash rotary (drag chain type) conveyor and motor
Multi-boiler /Multi-turbine	Boiler	Slag and Ash Removal		898	Bottom ash pyrite hopper (pulverizer reject) system

TABLE B13-58 Boiler: Slag and Ash Removal					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Slag and Ash Removal		899	Bottom ash controls and instrumentation
Multi-boiler /Multi-turbine	Boiler	Slag and Ash Removal		900	Slag tap (cyclone furnace)
Multi-boiler /Multi-turbine	Boiler	Slag and Ash Removal		910	Slag tap (other than cyclone furnace)
Multi-boiler /Multi-turbine	Boiler	Slag and Ash Removal		920	Other slag and ash removal problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-59 Boiler: Sorbent Supply (FBC only) - Sorbent Feed Equipment from Bunkers to Boiler (FBC only)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Sorbent Supply (FBC only)	Sorbent Feed Equipment from Bunkers to Boiler (FBC only)	150	Sorbent feed conveyors
Multi-boiler /Multi-turbine	Boiler	Sorbent Supply (FBC only)	Sorbent Feed Equipment from Bunkers to Boiler (FBC only)	151	Sorbent feed tanks/hoppers
Multi-boiler /Multi-turbine	Boiler	Sorbent Supply (FBC only)	Sorbent Feed Equipment from Bunkers to Boiler (FBC only)	152	Sorbent feed volumetric feeder
Multi-boiler /Multi-turbine	Boiler	Sorbent Supply (FBC only)	Sorbent Feed Equipment from Bunkers to Boiler (FBC only)	153	Sorbent feed gravimetric feeder
Multi-boiler /Multi-turbine	Boiler	Sorbent Supply (FBC only)	Sorbent Feed Equipment from Bunkers to Boiler (FBC only)	154	Sorbent feed feeder motors
Multi-boiler /Multi-turbine	Boiler	Sorbent Supply (FBC only)	Sorbent Feed Equipment from Bunkers to Boiler (FBC only)	155	Sorbent feed pneumatic transport system including piping and valves
Multi-boiler /Multi-turbine	Boiler	Sorbent Supply (FBC only)	Sorbent Feed Equipment from Bunkers to Boiler (FBC only)	156	Other sorbent feed problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-60 Boiler: Sorbent Supply (FBC only) - Sorbent Handling System up Through Bunkers (FBC only)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	130	Sorbent handling tanks/hoppers
Multi-boiler /Multi-turbine	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	131	Sorbent handling conveyors

TABLE B13-60 Boiler: Sorbent Supply (FBC only) - Sorbent Handling System up Through Bunkers (FBC only)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	132	Sorbent handling feeders
Multi-boiler /Multi-turbine	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	133	Sorbent handling feeder motors
Multi-boiler /Multi-turbine	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	134	Sorbent handling crushers
Multi-boiler /Multi-turbine	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	135	Sorbent handling crusher motors
Multi-boiler /Multi-turbine	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	136	Sorbent handling blowers/fans
Multi-boiler /Multi-turbine	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	137	Sorbent handling blower/fan motors
Multi-boiler /Multi-turbine	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	138	Sorbent handling baghouse
Multi-boiler /Multi-turbine	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	139	Sorbent handling drying equipment
Multi-boiler /Multi-turbine	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	140	Sorbent handling screens
Multi-boiler /Multi-turbine	Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)	141	Other sorbent handling equipment problems
Notes: 1) For use with Unit Codes 800–899.					

EXPANDER TURBINE

TABLE B13-61 Expander Turbine: Expander Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Expander Turbine	Expander Turbine		7800	Couplings
Multi-boiler /Multi-turbine	Expander Turbine	Expander Turbine		7810	Shaft
Multi-boiler /Multi-turbine	Expander Turbine	Expander Turbine		7820	Bearings
Multi-boiler /Multi-turbine	Expander Turbine	Expander Turbine		7830	Blades
Multi-boiler /Multi-turbine	Expander Turbine	Expander Turbine		7840	Discs
Multi-boiler /Multi-turbine	Expander Turbine	Expander Turbine		7850	Spacers
Multi-boiler /Multi-turbine	Expander Turbine	Expander Turbine		7860	Nozzles/vanes
Multi-boiler /Multi-turbine	Expander Turbine	Expander Turbine		7870	Heat shields
Multi-boiler /Multi-turbine	Expander Turbine	Expander Turbine		7880	Exhaust diffusers

TABLE B13-61 Expander Turbine: Expander Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Expander Turbine	Expander Turbine		7890	Seal oil system and seals
Multi-boiler /Multi-turbine	Expander Turbine	Expander Turbine		7900	Inner casing
Multi-boiler /Multi-turbine	Expander Turbine	Expander Turbine		7910	Outer exhaust casing
Multi-boiler /Multi-turbine	Expander Turbine	Expander Turbine		7920	Lube oil system
Multi-boiler /Multi-turbine	Expander Turbine	Expander Turbine		7930	Controls and instrumentation
Multi-boiler /Multi-turbine	Expander Turbine	Expander Turbine		7940	Evactor
Multi-boiler /Multi-turbine	Expander Turbine	Expander Turbine		7950	Major overhaul
Multi-boiler /Multi-turbine	Expander Turbine	Expander Turbine		7960	Other expander turbine problems
Notes: 1) For use with Unit Codes 800–899.					

EXTERNAL

Use this set of codes to report events caused by external factors (flood, lightning, etc.); economic factors (lack of fuel, labor strikes, etc.); operator training; and transmission system problems external to the plant.

TABLE B13-62 External: Catastrophe					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	External	Catastrophe		9000	Flood
Multi-boiler /Multi-turbine	External	Catastrophe		9001	Drought
Multi-boiler /Multi-turbine	External	Catastrophe		9010	Fire including wildfires, not related to a specific component
Multi-boiler /Multi-turbine	External	Catastrophe		9020	Lightning
Multi-boiler /Multi-turbine	External	Catastrophe		9025	Geomagnetic disturbance
Multi-boiler /Multi-turbine	External	Catastrophe		9030	Earthquake
Multi-boiler /Multi-turbine	External	Catastrophe		9031	Tornado
Multi-boiler /Multi-turbine	External	Catastrophe		9035	Hurricane
Multi-boiler /Multi-turbine	External	Catastrophe		9036	Storms (ice, snow, etc)

TABLE B13-62 External: Catastrophe					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	External	Catastrophe		9040	Other catastrophe
Multi-boiler /Multi-turbine	External	Catastrophe		9090	Physical Security Incident
Multi-boiler /Multi-turbine	External	Catastrophe		9091	Physical Security Incident (OMC)
Multi-boiler /Multi-turbine	External	Catastrophe		9092	Cyber Security Incident
Multi-boiler /Multi-turbine	External	Catastrophe		9093	Cyber Security Incident (OMC)
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-63 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	External	Economic		0000	Reserve shutdown
Multi-boiler /Multi-turbine	External	Economic		9130	Failure of fuel supplier to fulfill contractual obligations or a pre-arranged deal due to physical fuel disruptions or operational impairments (e.g. force majeure on a pipeline or compressor down; making the pipeline incapable of making its firm deliveries.)
Multi-boiler /Multi-turbine	External	Economic		9131	Lack of fuel – due to contractual or tariff provisions that allow for service interruption or price fluctuations during peak demand periods.
Multi-boiler /Multi-turbine	External	Economic		9132	Wet Fuel - Biomass
Multi-boiler /Multi-turbine	External	Economic		9134	Fuel conservation
Multi-boiler /Multi-turbine	External	Economic		9135	Lack of water
Multi-boiler /Multi-turbine	External	Economic		9137	Ground water or other water supply problems

TABLE B13-63 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	External	Economic		9139	Ground water or other water supply problems(OMC)
Multi-boiler /Multi-turbine	External	Economic		9140	Plant modifications to burn different fuel that are not regulatory mandated
Multi-boiler /Multi-turbine	External	Economic		9150	Labor strikes company-wide problems or strikes outside the company's jurisdiction such as manufacturers (delaying repairs) or transportation (fuel supply) problems.
Multi-boiler /Multi-turbine	External	Economic		9151	Labor strikes direct plant management grievances that result in a walkout or strike are under plant management control.
Multi-boiler /Multi-turbine	External	Economic		9160	Other economic problems
Multi-boiler /Multi-turbine	External	Economic		9180	Economic (for internal use at plants only)
Multi-boiler /Multi-turbine	External	Economic		9181	Economic (for internal use at plants only)
Multi-boiler /Multi-turbine	External	Economic		9182	Economic (for internal use at plants only)
Multi-boiler /Multi-turbine	External	Economic		9183	Economic (for internal use at plants only)
Multi-boiler /Multi-turbine	External	Economic		9184	Economic (for internal use at plants only)
Multi-boiler /Multi-turbine	External	Economic		9185	Economic (for internal use at plants only)
Multi-boiler /Multi-turbine	External	Economic		9186	Economic (for internal use at plants only)
Multi-boiler /Multi-turbine	External	Economic		9187	Economic (for internal use at plants only)
Multi-boiler /Multi-turbine	External	Economic		9188	Economic (for internal use at plants only)
Multi-boiler /Multi-turbine	External	Economic		9189	Economic (for internal use at plants only)
Multi-boiler /Multi-turbine	External	Economic		9190	Economic (for internal use at plants only)

TABLE B13-63 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	External	Economic		9191	Economic (for internal use at plants only)
Multi-boiler /Multi-turbine	External	Economic		9192	Economic (for internal use at plants only)
Multi-boiler /Multi-turbine	External	Economic		9193	Economic (for internal use at plants only)
Multi-boiler /Multi-turbine	External	Economic		9194	Economic (for internal use at plants only)
Multi-boiler /Multi-turbine	External	Economic		9195	Economic (for internal use at plants only)
Multi-boiler /Multi-turbine	External	Economic		9196	Economic (for internal use at plants only)
Multi-boiler /Multi-turbine	External	Economic		9197	Economic (for internal use at plants only)
Multi-boiler /Multi-turbine	External	Economic		9198	Economic (for internal use at plants only)
Multi-boiler /Multi-turbine	External	Economic		9199	Economic (for internal use at plants only)
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-64 External: Fuel Quality					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	External	Fuel Quality		9200	High ash content (OMC)
Multi-boiler /Multi-turbine	External	Fuel Quality		9201	High ash content (not OMC)
Multi-boiler /Multi-turbine	External	Fuel Quality		9205	Poor quality natural gas fuel, low heat content
Multi-boiler /Multi-turbine	External	Fuel Quality		9210	Low grindability (OMC)
Multi-boiler /Multi-turbine	External	Fuel Quality		9211	Low grindability (not OMC)
Multi-boiler /Multi-turbine	External	Fuel Quality		9220	High sulfur content (OMC)

TABLE B13-64 External: Fuel Quality					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	External	Fuel Quality		9221	High sulfur content (not OMC)
Multi-boiler /Multi-turbine	External	Fuel Quality		9230	High vanadium content (OMC)
Multi-boiler /Multi-turbine	External	Fuel Quality		9231	High vanadium content (not OMC)
Multi-boiler /Multi-turbine	External	Fuel Quality		9240	High sodium content (OMC)
Multi-boiler /Multi-turbine	External	Fuel Quality		9241	High sodium content (not OMC)
Multi-boiler /Multi-turbine	External	Fuel Quality		9250	Low BTU coal (OMC)
Multi-boiler /Multi-turbine	External	Fuel Quality		9251	Low BTU coal (not OMC)
Multi-boiler /Multi-turbine	External	Fuel Quality		9260	Low BTU oil (OMC)
Multi-boiler /Multi-turbine	External	Fuel Quality		9261	Low BTU oil (not OMC)
Multi-boiler /Multi-turbine	External	Fuel Quality		9270	Wet coal (OMC)
Multi-boiler /Multi-turbine	External	Fuel Quality		9271	Wet coal (not OMC)
Multi-boiler /Multi-turbine	External	Fuel Quality		9280	Frozen coal (OMC)
Multi-boiler /Multi-turbine	External	Fuel Quality		9281	Frozen coal (not OMC)
Multi-boiler /Multi-turbine	External	Fuel Quality		9290	Other fuel quality problems (OMC)
Multi-boiler /Multi-turbine	External	Fuel Quality		9291	Other fuel quality problems (not OMC)
Notes: 1) For use with Unit Codes 800–899. 2) Use code 9600 to 9650 if the fuel quality results in excess stack emissions through no fault in the pollution control equipment. Use the appropriate equipment code to report fouling and slagging.					

TABLE B13-65 External: Miscellaneous (External)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	External	Miscellaneous (External)		9300	Transmission system problems other than catastrophes (do not include switchyard problems in this category; see codes 3600 to 3629, 3720 to 3730)
Multi-boiler /Multi-turbine	External	Miscellaneous (External)		9305	Ash disposal problem
Multi-boiler /Multi-turbine	External	Miscellaneous (External)		9310	Operator training
Multi-boiler /Multi-turbine	External	Miscellaneous (External)		9320	Other miscellaneous external problems
Multi-boiler /Multi-turbine	External	Miscellaneous (External)		9340	Synchronous Condenser Operation
Notes: 1) For use with Unit Codes 800–899.					

GAS TURBINE

TABLE B13-66 Gas Turbine: Auxiliary Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Gas Turbine	Auxiliary Systems		5110	Lube oil system - general
Multi-boiler /Multi-turbine	Gas Turbine	Auxiliary Systems		5111	Lube oil pumps
Multi-boiler /Multi-turbine	Gas Turbine	Auxiliary Systems		5112	Lube oil coolers
Multi-boiler /Multi-turbine	Gas Turbine	Auxiliary Systems		5113	Lube oil valves/piping
Multi-boiler /Multi-turbine	Gas Turbine	Auxiliary Systems		5114	Lube oil filters
Multi-boiler /Multi-turbine	Gas Turbine	Auxiliary Systems		5115	Oil vapor extractor
Multi-boiler /Multi-turbine	Gas Turbine	Auxiliary Systems		5117	Power augmentation piping
Multi-boiler /Multi-turbine	Gas Turbine	Auxiliary Systems		5118	Power augmentation valves

Multi-boiler /Multi-turbine	Gas Turbine	Auxiliary Systems		5119	Power augmentation controls
Multi-boiler /Multi-turbine	Gas Turbine	Auxiliary Systems		5120	Hydraulic oil system
Multi-boiler /Multi-turbine	Gas Turbine	Auxiliary Systems		5130	Starting system (including motor)
Multi-boiler /Multi-turbine	Gas Turbine	Auxiliary Systems		5140	Battery and charger system
Multi-boiler /Multi-turbine	Gas Turbine	Auxiliary Systems		5150	Turning gear and motor
Multi-boiler /Multi-turbine	Gas Turbine	Auxiliary Systems		5160	Cooling and seal air system
Multi-boiler /Multi-turbine	Gas Turbine	Auxiliary Systems		5170	Cooling water system
Multi-boiler /Multi-turbine	Gas Turbine	Auxiliary Systems		5180	Anti-icing system
Multi-boiler /Multi-turbine	Gas Turbine	Auxiliary Systems		5190	Other auxiliary system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-67 Gas Turbine: Exhaust Systems

UNIT TYPE	SYSTEM	COMPONENT	SUB-COMPONENT	CAUSE CODE	DESCRIPTION
Multi-boiler /Multi-turbine	Gas Turbine	Exhaust Systems		5100	Chamber
Multi-boiler /Multi-turbine	Gas Turbine	Exhaust Systems		5101	Hoods
Multi-boiler /Multi-turbine	Gas Turbine	Exhaust Systems		5102	Vanes/nozzles
Multi-boiler /Multi-turbine	Gas Turbine	Exhaust Systems		5103	Silencer
Multi-boiler /Multi-turbine	Gas Turbine	Exhaust Systems		5104	Cones
Multi-boiler /Multi-turbine	Gas Turbine	Exhaust Systems		5108	High engine exhaust temperature
Multi-boiler /Multi-turbine	Gas Turbine	Exhaust Systems		5109	Other exhaust problems (including high exhaust system temperature not attributable to a specific problem)
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-68 Gas Turbine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Gas Turbine	Fuel, Ignition, and Combustion Systems		5040	Fuel tanks
Multi-boiler /Multi-turbine	Gas Turbine	Fuel, Ignition, and Combustion Systems		5041	Fuel piping and valves
Multi-boiler /Multi-turbine	Gas Turbine	Fuel, Ignition, and Combustion Systems		5042	Fuel nozzles/vanes
Multi-boiler /Multi-turbine	Gas Turbine	Fuel, Ignition, and Combustion Systems		5043	Fuel filters
Multi-boiler /Multi-turbine	Gas Turbine	Fuel, Ignition, and Combustion Systems		5044	Liquid fuel oil pump
Multi-boiler /Multi-turbine	Gas Turbine	Fuel, Ignition, and Combustion Systems		5046	Liquid fuel oil transfer/forwarding pump
Multi-boiler /Multi-turbine	Gas Turbine	Fuel, Ignition, and Combustion Systems		5048	Gas fuel system including controls and instrumentation
Multi-boiler /Multi-turbine	Gas Turbine	Fuel, Ignition, and Combustion Systems		5049	Other fuel system problems
Multi-boiler /Multi-turbine	Gas Turbine	Fuel, Ignition, and Combustion Systems		5050	Ignition system
Multi-boiler /Multi-turbine	Gas Turbine	Fuel, Ignition, and Combustion Systems		5060	Atomizing air system
Multi-boiler /Multi-turbine	Gas Turbine	Fuel, Ignition, and Combustion Systems		5070	Combustor casing
Multi-boiler /Multi-turbine	Gas Turbine	Fuel, Ignition, and Combustion Systems		5071	Combustor liner
Multi-boiler /Multi-turbine	Gas Turbine	Fuel, Ignition, and Combustion Systems		5072	Combustor caps
Multi-boiler /Multi-turbine	Gas Turbine	Fuel, Ignition, and Combustion Systems		5073	Flame scanners
Multi-boiler /Multi-turbine	Gas Turbine	Fuel, Ignition, and Combustion Systems		5079	Other combustor problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-69 Gas Turbine: Inlet Air System and Compressors - Compressors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Gas Turbine	Inlet Air System and Compressors	Compressors	5010	High pressure shaft
Multi-boiler /Multi-turbine	Gas Turbine	Inlet Air System and Compressors	Compressors	5011	High pressure bearings
Multi-boiler /Multi-turbine	Gas Turbine	Inlet Air System and Compressors	Compressors	5012	High pressure blades/buckets
Multi-boiler /Multi-turbine	Gas Turbine	Inlet Air System and Compressors	Compressors	5013	Compressor casing and bolts
Multi-boiler /Multi-turbine	Gas Turbine	Inlet Air System and Compressors	Compressors	5014	Compressor diaphragms
Multi-boiler /Multi-turbine	Gas Turbine	Inlet Air System and Compressors	Compressors	5015	Compressor seals
Multi-boiler /Multi-turbine	Gas Turbine	Inlet Air System and Compressors	Compressors	5016	High pressure compressor bleed valves
Multi-boiler /Multi-turbine	Gas Turbine	Inlet Air System and Compressors	Compressors	5019	Other high pressure problems
Multi-boiler /Multi-turbine	Gas Turbine	Inlet Air System and Compressors	Compressors	5020	Low pressure shaft
Multi-boiler /Multi-turbine	Gas Turbine	Inlet Air System and Compressors	Compressors	5021	Low pressure bearings
Multi-boiler /Multi-turbine	Gas Turbine	Inlet Air System and Compressors	Compressors	5022	Low pressure blades/buckets
Multi-boiler /Multi-turbine	Gas Turbine	Inlet Air System and Compressors	Compressors	5029	Other low pressure problems
Multi-boiler /Multi-turbine	Gas Turbine	Inlet Air System and Compressors	Compressors	5030	Supercharging fans
Multi-boiler /Multi-turbine	Gas Turbine	Inlet Air System and Compressors	Compressors	5039	Other compressor problems
Notes: 1) For use with Unit Codes 800–899. 2) Use HP compressor if only one.					

TABLE B13-70 Gas Turbine: Inlet Air System and Compressors - Ducts and Filters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5000	Inlet air ducts

TABLE B13-70 Gas Turbine: Inlet Air System and Compressors - Ducts and Filters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5001	Inlet air vanes/nozzles
Multi-boiler /Multi-turbine	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5002	Inlet air filters
Multi-boiler /Multi-turbine	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5003	Inlet cone
Multi-boiler /Multi-turbine	Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5009	Other inlet air problems
Notes: 1) For use with Unit Codes 800–899. 2) Use HP compressor if only one.					

TABLE B13-71 Gas Turbine: Miscellaneous (Gas Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Gas Turbine	Miscellaneous (Gas Turbine)		5200	Reduction gear
Multi-boiler /Multi-turbine	Gas Turbine	Miscellaneous (Gas Turbine)		5201	Load shaft and bearings
Multi-boiler /Multi-turbine	Gas Turbine	Miscellaneous (Gas Turbine)		5210	Intercoolers
Multi-boiler /Multi-turbine	Gas Turbine	Miscellaneous (Gas Turbine)		5220	Regenerators
Multi-boiler /Multi-turbine	Gas Turbine	Miscellaneous (Gas Turbine)		5230	Heat shields
Multi-boiler /Multi-turbine	Gas Turbine	Miscellaneous (Gas Turbine)		5240	Fire detection and extinguishing system (including hazardous gas detection system)
Multi-boiler /Multi-turbine	Gas Turbine	Miscellaneous (Gas Turbine)		5241	Fire in unit
Multi-boiler /Multi-turbine	Gas Turbine	Miscellaneous (Gas Turbine)		5250	Other controls and instrumentation problems
Multi-boiler /Multi-turbine	Gas Turbine	Miscellaneous (Gas Turbine)		5255	Computer
Multi-boiler /Multi-turbine	Gas Turbine	Miscellaneous (Gas Turbine)		5260	Major overhaul (use for non-specific overhaul only; see page B-CCGT-2)
Multi-boiler /Multi-turbine	Gas Turbine	Miscellaneous (Gas Turbine)		5261	Gas turbine/compressor washing

TABLE B13-71 Gas Turbine: Miscellaneous (Gas Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Gas Turbine	Miscellaneous (Gas Turbine)		5262	Gas turbine exchange
Multi-boiler /Multi-turbine	Gas Turbine	Miscellaneous (Gas Turbine)		5270	Hot end inspection
Multi-boiler /Multi-turbine	Gas Turbine	Miscellaneous (Gas Turbine)		5272	Boroscope inspection
Multi-boiler /Multi-turbine	Gas Turbine	Miscellaneous (Gas Turbine)		5274	General unit inspection
Multi-boiler /Multi-turbine	Gas Turbine	Miscellaneous (Gas Turbine)		5280	Vibration (not engine) in unit not attributable to bearings or other components
Multi-boiler /Multi-turbine	Gas Turbine	Miscellaneous (Gas Turbine)		5285	Gas turbine vibration
Multi-boiler /Multi-turbine	Gas Turbine	Miscellaneous (Gas Turbine)		5290	Gas turbine performance testing - individual engines (use code 9999 for total unit performance testing)
Multi-boiler /Multi-turbine	Gas Turbine	Miscellaneous (Gas Turbine)		5298	Main gas filter
Multi-boiler /Multi-turbine	Gas Turbine	Miscellaneous (Gas Turbine)		5299	Other miscellaneous gas turbine problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-72 Gas Turbine: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Gas Turbine	Turbine		5080	High pressure shaft
Multi-boiler /Multi-turbine	Gas Turbine	Turbine		5081	High pressure bearings
Multi-boiler /Multi-turbine	Gas Turbine	Turbine		5082	High pressure blades/buckets
Multi-boiler /Multi-turbine	Gas Turbine	Turbine		5083	High pressure nozzles/vanes
Multi-boiler /Multi-turbine	Gas Turbine	Turbine		5084	High pressure casing/expansion joints

TABLE B13-72 Gas Turbine: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Gas Turbine	Turbine		5085	Interstage gas passages - HP
Multi-boiler /Multi-turbine	Gas Turbine	Turbine		5086	High pressure shaft seals
Multi-boiler /Multi-turbine	Gas Turbine	Turbine		5089	Other high pressure problems
Multi-boiler /Multi-turbine	Gas Turbine	Turbine		5090	Low pressure shaft
Multi-boiler /Multi-turbine	Gas Turbine	Turbine		5091	Low pressure bearings
Multi-boiler /Multi-turbine	Gas Turbine	Turbine		5092	Low pressure blades/buckets
Multi-boiler /Multi-turbine	Gas Turbine	Turbine		5093	Low pressure nozzles/vanes
Multi-boiler /Multi-turbine	Gas Turbine	Turbine		5094	Low pressure casing/expansion joints
Multi-boiler /Multi-turbine	Gas Turbine	Turbine		5095	Interstage gas passages - LP
Multi-boiler /Multi-turbine	Gas Turbine	Turbine		5096	Low pressure shaft seals
Multi-boiler /Multi-turbine	Gas Turbine	Turbine		5097	Other low pressure problems
Multi-boiler /Multi-turbine	Gas Turbine	Turbine		5098	Expansion joints
Multi-boiler /Multi-turbine	Gas Turbine	Turbine		5099	HP to LP coupling
Notes: 1) For use with Unit Codes 800–899. 2) Use HP if only one.					

GENERATOR

This set of codes contains the generator, exciter, generator cooling systems, and generator controls. Note the main leads up to and includes the generator output breaker in this set of codes.

TABLE B13-73 Generator: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Generator	Controls		4700	Generator voltage control
Multi-boiler /Multi-turbine	Generator	Controls		4710	Generator metering devices
Multi-boiler /Multi-turbine	Generator	Controls		4720	Generator synchronization equipment
Multi-boiler /Multi-turbine	Generator	Controls		4730	Generator current and potential transformers
Multi-boiler /Multi-turbine	Generator	Controls		4740	Emergency generator trip devices
Multi-boiler /Multi-turbine	Generator	Controls		4741	Frequency Trip (81 Relay)
Multi-boiler /Multi-turbine	Generator	Controls		4750	Other generator controls and metering problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-74 Generator: Cooling System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Generator	Cooling System		4610	Hydrogen cooling system piping and valves
Multi-boiler /Multi-turbine	Generator	Cooling System		4611	Hydrogen coolers
Multi-boiler /Multi-turbine	Generator	Cooling System		4612	Hydrogen storage system
Multi-boiler /Multi-turbine	Generator	Cooling System		4613	Hydrogen seals
Multi-boiler /Multi-turbine	Generator	Cooling System		4619	Other hydrogen system problems
Multi-boiler /Multi-turbine	Generator	Cooling System		4620	Air cooling system
Multi-boiler /Multi-turbine	Generator	Cooling System		4630	Liquid cooling system
Multi-boiler /Multi-turbine	Generator	Cooling System		4640	Seal oil system and seals

TABLE B13-74 Generator: Cooling System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Generator	Cooling System		4650	Other cooling system problems
Notes: 1) For use with Unit Codes 800–899. 2) Report failures caused by water leaks into generator as codes 4500, 4510, etc.					

TABLE B13-75 Generator: Exciter					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Generator	Exciter		4600	Exciter drive - motor
Multi-boiler /Multi-turbine	Generator	Exciter		4601	Exciter field rheostat
Multi-boiler /Multi-turbine	Generator	Exciter		4602	Exciter commutator and brushes
Multi-boiler /Multi-turbine	Generator	Exciter		4603	Solid state exciter element
Multi-boiler /Multi-turbine	Generator	Exciter		4604	Exciter drive - shaft
Multi-boiler /Multi-turbine	Generator	Exciter		4605	Exciter transformer
Multi-boiler /Multi-turbine	Generator	Exciter		4609	Other exciter problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-76 Generator: Generator					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Generator	Generator		4500	Rotor windings (including damper windings and fan blades on hydro units)
Multi-boiler /Multi-turbine	Generator	Generator		4510	Rotor collector rings
Multi-boiler /Multi-turbine	Generator	Generator		4511	Rotor, General
Multi-boiler /Multi-turbine	Generator	Generator		4512	Retaining Rings
Multi-boiler /Multi-turbine	Generator	Generator		4520	Stator windings, bushings, and terminals

TABLE B13-76 Generator: Generator					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Generator	Generator		4530	Stator core iron
Multi-boiler /Multi-turbine	Generator	Generator		4535	Stator, General
Multi-boiler /Multi-turbine	Generator	Generator		4536	Generator Heaters
Multi-boiler /Multi-turbine	Generator	Generator		4540	Brushes and brush rigging
Multi-boiler /Multi-turbine	Generator	Generator		4550	Generator bearings and lube oil system (including thrust bearings on hydro units)
Multi-boiler /Multi-turbine	Generator	Generator		4551	Generator bearings
Multi-boiler /Multi-turbine	Generator	Generator		4552	Generator lube oil system
Multi-boiler /Multi-turbine	Generator	Generator		4555	Bearing cooling system
Multi-boiler /Multi-turbine	Generator	Generator		4560	Generator vibration (excluding vibration due to failed bearing and other components)
Multi-boiler /Multi-turbine	Generator	Generator		4570	Generator casing
Multi-boiler /Multi-turbine	Generator	Generator		4580	Generator end bells and bolting
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-77 Generator: Miscellaneous (Generator)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Generator	Miscellaneous (Generator)		4800	Generator main leads
Multi-boiler /Multi-turbine	Generator	Miscellaneous (Generator)		4805	Generator Bus Duct Cooling System
Multi-boiler /Multi-turbine	Generator	Miscellaneous (Generator)		4810	Generator output breaker

TABLE B13-77 Generator: Miscellaneous (Generator)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Generator	Miscellaneous (Generator)		4830	Major generator overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)
Multi-boiler /Multi-turbine	Generator	Miscellaneous (Generator)		4831	Minor generator overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
Multi-boiler /Multi-turbine	Generator	Miscellaneous (Generator)		4840	Inspection
Multi-boiler /Multi-turbine	Generator	Miscellaneous (Generator)		4841	Generator doble testing
Multi-boiler /Multi-turbine	Generator	Miscellaneous (Generator)		4842	Reactive and capability testing
Multi-boiler /Multi-turbine	Generator	Miscellaneous (Generator)		4850	Core monitor alarm
Multi-boiler /Multi-turbine	Generator	Miscellaneous (Generator)		4860	Generator neutral grounding equipment
Multi-boiler /Multi-turbine	Generator	Miscellaneous (Generator)		4899	Other miscellaneous generator problems
Notes: 1) For use with Unit Codes 800–899.					

HEAT RECOVERY STEAM GENERATOR (HRSG)

TABLE B13-78 Heat Recovery Steam Generator (HRSG): Miscellaneous (HRSG Boiler)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		6100	Steam turbine to gas turbine coupling. For additional codes, use Fossil Steam Cause Codes 4000 to 4499.
Multi-boiler /Multi-turbine	Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		6000	Heat recovery steam generator to gas turbine connecting equipment. For additional codes, use Fossil Steam Cause Codes 0010 to 1999.
Notes: 1) For use with Unit Codes 800–899.					

INACTIVE STATES

TABLE B13-79 Inactive States: Inactive States					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler /Multi-turbine	Inactive States	Inactive States		2	Inactive Reserve Shutdown
Multi-boiler /Multi-turbine	Inactive States	Inactive States		9990	Retired unit
Multi-boiler /Multi-turbine	Inactive States	Inactive States		9991	Mothballed unit
Notes: 1) For use with Unit Codes 800–899.					

JET ENGINE

TABLE B13-80 Jet Engine: Auxiliary Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Jet Engine	Auxiliary Systems		5510	Lube oil system
Multi-boiler/Multi-turbine	Jet Engine	Auxiliary Systems		5520	Hydraulic oil system
Multi-boiler/Multi-turbine	Jet Engine	Auxiliary Systems		5530	Starting system (including motor)
Multi-boiler/Multi-turbine	Jet Engine	Auxiliary Systems		5540	Battery and charger system
Multi-boiler/Multi-turbine	Jet Engine	Auxiliary Systems		5550	Turning gear and motor
Multi-boiler/Multi-turbine	Jet Engine	Auxiliary Systems		5560	Cooling and seal air system
Multi-boiler/Multi-turbine	Jet Engine	Auxiliary Systems		5570	Cooling water system
Multi-boiler/Multi-turbine	Jet Engine	Auxiliary Systems		5580	Anti-icing system
Multi-boiler/Multi-turbine	Jet Engine	Auxiliary Systems		5590	Other auxiliary system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-81 Jet Engine: Exhaust Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Jet Engine	Exhaust Systems		5500	Chamber

TABLE B13-81 Jet Engine: Exhaust Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Jet Engine	Exhaust Systems		5501	Hoods
Multi-boiler/Multi-turbine	Jet Engine	Exhaust Systems		5502	Vanes/nozzles
Multi-boiler/Multi-turbine	Jet Engine	Exhaust Systems		5503	Silencer
Multi-boiler/Multi-turbine	Jet Engine	Exhaust Systems		5504	Cones
Multi-boiler/Multi-turbine	Jet Engine	Exhaust Systems		5508	High engine exhaust temperature
Multi-boiler/Multi-turbine	Jet Engine	Exhaust Systems		5509	Other exhaust problems (including high exhaust temperature not attributable to a specific problem)
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-82 Jet Engine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Jet Engine	Fuel, Ignition, and Combustion Systems		5440	Fuel tanks
Multi-boiler/Multi-turbine	Jet Engine	Fuel, Ignition, and Combustion Systems		5441	Fuel piping and valves
Multi-boiler/Multi-turbine	Jet Engine	Fuel, Ignition, and Combustion Systems		5442	Fuel nozzles/vanes
Multi-boiler/Multi-turbine	Jet Engine	Fuel, Ignition, and Combustion Systems		5443	Fuel filters
Multi-boiler/Multi-turbine	Jet Engine	Fuel, Ignition, and Combustion Systems		5449	Other fuel system problems
Multi-boiler/Multi-turbine	Jet Engine	Fuel, Ignition, and Combustion Systems		5450	Ignition system
Multi-boiler/Multi-turbine	Jet Engine	Fuel, Ignition, and Combustion Systems		5455	Fuel nozzle/vane cooling air system
Multi-boiler/Multi-turbine	Jet Engine	Fuel, Ignition, and Combustion Systems		5460	Atomizing air system
Multi-boiler/Multi-turbine	Jet Engine	Fuel, Ignition, and Combustion Systems		5470	Combustor casing

TABLE B13-82 Jet Engine: Fuel, Ignition, and Combustion Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Jet Engine	Fuel, Ignition, and Combustion Systems		5471	Combustor liner
Multi-boiler/Multi-turbine	Jet Engine	Fuel, Ignition, and Combustion Systems		5472	Combustor caps
Multi-boiler/Multi-turbine	Jet Engine	Fuel, Ignition, and Combustion Systems		5479	Other combustor problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-83 Jet Engine: Inlet Air System and Compressors - Compressors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Jet Engine	Inlet Air System and Compressors	Compressors	5410	High pressure shaft
Multi-boiler/Multi-turbine	Jet Engine	Inlet Air System and Compressors	Compressors	5411	High pressure bearings
Multi-boiler/Multi-turbine	Jet Engine	Inlet Air System and Compressors	Compressors	5412	High pressure blades/buckets
Multi-boiler/Multi-turbine	Jet Engine	Inlet Air System and Compressors	Compressors	5413	Other high pressure problems
Multi-boiler/Multi-turbine	Jet Engine	Inlet Air System and Compressors	Compressors	5420	Low pressure shaft
Multi-boiler/Multi-turbine	Jet Engine	Inlet Air System and Compressors	Compressors	5421	Low pressure bearings
Multi-boiler/Multi-turbine	Jet Engine	Inlet Air System and Compressors	Compressors	5422	Low pressure blades/buckets
Multi-boiler/Multi-turbine	Jet Engine	Inlet Air System and Compressors	Compressors	5429	Other low pressure problems
Multi-boiler/Multi-turbine	Jet Engine	Inlet Air System and Compressors	Compressors	5430	Supercharging fans
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-84 Jet Engine: Inlet Air System and Compressors - Ducts and Filters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5400	Inlet air ducts

TABLE B13-84 Jet Engine: Inlet Air System and Compressors - Ducts and Filters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5401	Inlet air vanes/nozzles
Multi-boiler/Multi-turbine	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5402	Inlet air filters
Multi-boiler/Multi-turbine	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5403	Inlet and exhaust cones
Multi-boiler/Multi-turbine	Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5409	Other inlet air problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-85 Jet Engine: Miscellaneous (Jet Engine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Jet Engine	Miscellaneous (Jet Engine)		5600	Reduction gear
Multi-boiler/Multi-turbine	Jet Engine	Miscellaneous (Jet Engine)		5601	Load shaft and bearings
Multi-boiler/Multi-turbine	Jet Engine	Miscellaneous (Jet Engine)		5610	Intercoolers
Multi-boiler/Multi-turbine	Jet Engine	Miscellaneous (Jet Engine)		5620	Regenerators
Multi-boiler/Multi-turbine	Jet Engine	Miscellaneous (Jet Engine)		5630	Heat shields
Multi-boiler/Multi-turbine	Jet Engine	Miscellaneous (Jet Engine)		5640	Fire detection and extinguishing system
Multi-boiler/Multi-turbine	Jet Engine	Miscellaneous (Jet Engine)		5641	Fire in unit
Multi-boiler/Multi-turbine	Jet Engine	Miscellaneous (Jet Engine)		5650	Other controls and instrumentation problems
Multi-boiler/Multi-turbine	Jet Engine	Miscellaneous (Jet Engine)		5660	Major overhaul (use for non-specific overhaul only; see page B-CCGT-2)
Multi-boiler/Multi-turbine	Jet Engine	Miscellaneous (Jet Engine)		5661	Engine/compressor washing
Multi-boiler/Multi-turbine	Jet Engine	Miscellaneous (Jet Engine)		5662	Engine exchange

TABLE B13-85 Jet Engine: Miscellaneous (Jet Engine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Jet Engine	Miscellaneous (Jet Engine)		5665	Engine shafts and bearings
Multi-boiler/Multi-turbine	Jet Engine	Miscellaneous (Jet Engine)		5670	Hot end inspection
Multi-boiler/Multi-turbine	Jet Engine	Miscellaneous (Jet Engine)		5672	Boroscope inspection
Multi-boiler/Multi-turbine	Jet Engine	Miscellaneous (Jet Engine)		5674	General unit inspection
Multi-boiler/Multi-turbine	Jet Engine	Miscellaneous (Jet Engine)		5680	Vibration (not engine) in unit not attributable to bearings or other components
Multi-boiler/Multi-turbine	Jet Engine	Miscellaneous (Jet Engine)		5685	Engine vibration
Multi-boiler/Multi-turbine	Jet Engine	Miscellaneous (Jet Engine)		5690	Engine performance testing - individual engines (use code 9999 for total unit performance testing)
Multi-boiler/Multi-turbine	Jet Engine	Miscellaneous (Jet Engine)		5699	Other miscellaneous jet engine problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-86 Jet Engine: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Jet Engine	Turbine		5480	High pressure shaft
Multi-boiler/Multi-turbine	Jet Engine	Turbine		5481	High pressure bearings
Multi-boiler/Multi-turbine	Jet Engine	Turbine		5482	High pressure blades/buckets
Multi-boiler/Multi-turbine	Jet Engine	Turbine		5483	High pressure nozzles/vanes
Multi-boiler/Multi-turbine	Jet Engine	Turbine		5484	High pressure casing/expansion joint
Multi-boiler/Multi-turbine	Jet Engine	Turbine		5485	Interstage gas passages
Multi-boiler/Multi-turbine	Jet Engine	Turbine		5486	High pressure shaft seals

TABLE B13-86 Jet Engine: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Jet Engine	Turbine		5489	Other high pressure problems
Multi-boiler/Multi-turbine	Jet Engine	Turbine		5490	Low pressure shaft
Multi-boiler/Multi-turbine	Jet Engine	Turbine		5491	Low pressure bearings
Multi-boiler/Multi-turbine	Jet Engine	Turbine		5492	Low pressure blades/buckets
Multi-boiler/Multi-turbine	Jet Engine	Turbine		5493	Low pressure nozzles/vanes
Multi-boiler/Multi-turbine	Jet Engine	Turbine		5494	Low pressure casing/expansion joints
Multi-boiler/Multi-turbine	Jet Engine	Turbine		5497	Other low pressure problems
Multi-boiler/Multi-turbine	Jet Engine	Turbine		5498	Expansion joints
Multi-boiler/Multi-turbine	Jet Engine	Turbine		5499	Shaft seals
Notes: 1) For use with Unit Codes 800–899.					

MISCELLANEOUS

TABLE B13-87 Miscellaneous: Instruments and Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/ Multi-turbine	Miscellaneous	Instruments and Controls		6200	Combined cycle instruments and controls. (Report instruments and controls specific to the gas turbine, steam turbine, boiler, generator, or balance of plant using the codes for the appropriate piece of equipment.)
Notes: 1) For use with Unit Codes 800–899.					

PERFORMANCE

TABLE B13-88 Performance: Performance					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Performance	Performance		9997	NERC Reliability Standard Requirement
Multi-boiler/Multi-turbine	Performance	Performance		9998	Black start testing
Multi-boiler/Multi-turbine	Performance	Performance		9999	Total unit performance testing (use appropriate codes for individual component testing)
Notes: 1) For use with Unit Codes 800–899.					

PERSONNEL OR PROCEDURAL ERRORS

TABLE B13-89 Personnel or Procedural Errors: Personnel or Procedural Errors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Personnel or Procedural Errors	Personnel or Procedural Errors		9900	Operator error
Multi-boiler/Multi-turbine	Personnel or Procedural Errors	Personnel or Procedural Errors		9910	Maintenance personnel error
Multi-boiler/Multi-turbine	Personnel or Procedural Errors	Personnel or Procedural Errors		9920	Contractor error
Multi-boiler/Multi-turbine	Personnel or Procedural Errors	Personnel or Procedural Errors		9930	Operating procedure error
Multi-boiler/Multi-turbine	Personnel or Procedural Errors	Personnel or Procedural Errors		9940	Maintenance procedure error
Multi-boiler/Multi-turbine	Personnel or Procedural Errors	Personnel or Procedural Errors		9950	Contractor procedure error
Multi-boiler/Multi-turbine	Personnel or Procedural Errors	Personnel or Procedural Errors		9960	Staff shortage
Notes: 1) For use with Unit Codes 800–899.					

POLLUTION CONTROL EQUIPMENT

Use this set of codes to report problems with flue gas desulphurization equipment and stack gas particulate removal equipment. If outages or deratings occur due to reasons other than equipment problems, use the set of codes for Regulatory, Safety, Environmental stack emission limits.

TABLE B13-90 Pollution Control Equipment: Continuous Emissions Monitoring Systems (CEMS)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8700	CEMS Certification and Recertification
Multi-boiler/Multi-turbine	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8710	SO2 analyzer problems
Multi-boiler/Multi-turbine	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8720	NOx analyzer problems
Multi-boiler/Multi-turbine	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8730	CO analyzer problems
Multi-boiler/Multi-turbine	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8740	CO2 analyzer problems
Multi-boiler/Multi-turbine	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8750	O2 analyzer problems
Multi-boiler/Multi-turbine	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8760	Opacity monitor problems
Multi-boiler/Multi-turbine	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8770	Flow monitor problems
Multi-boiler/Multi-turbine	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8780	Data acquisition system problems
Multi-boiler/Multi-turbine	Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8790	Miscellaneous CEMS problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-91 Pollution Control Equipment: Dry Scrubbers - Dry Scrubber					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Dry Scrubber	8529	Gas dispersers
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Dry Scrubber	8530	Spray towers
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Dry Scrubber	8531	Spray machine/atomizer
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Dry Scrubber	8532	Spray machine/atomizer motors
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Dry Scrubber	8533	Spray machine/atomizer lubrication systems

TABLE B13-91 Pollution Control Equipment: Dry Scrubbers - Dry Scrubber					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Dry Scrubber	8534	Spray machine/atomizer vibration problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-92 Pollution Control Equipment: Dry Scrubbers - Miscellaneous (Dry Scrubber)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Miscellaneous (Dry Scrubber)	8544	Mechanical failures
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Miscellaneous (Dry Scrubber)	8545	Electrical failures
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Miscellaneous (Dry Scrubber)	8546	Major overhaul
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Miscellaneous (Dry Scrubber)	8547	Inspection
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Miscellaneous (Dry Scrubber)	8548	Testing
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Miscellaneous (Dry Scrubber)	8549	Other dry scrubber problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-93 Pollution Control Equipment: Dry Scrubbers - Piping, Ducting, and Dampers					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Piping, Ducting, and Dampers	8522	Piping
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Piping, Ducting, and Dampers	8523	Valves
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Piping, Ducting, and Dampers	8524	Strainers or filters
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Piping, Ducting, and Dampers	8525	Ducting
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Piping, Ducting, and Dampers	8526	Dampers
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Piping, Ducting, and Dampers	8527	Other piping, ducting, and damper problems

TABLE B13-93 Pollution Control Equipment: Dry Scrubbers - Piping, Ducting, and Dampers					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-94 Pollution Control Equipment: Dry Scrubbers - Reagent\Slurry Supply					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8500	Slurry storage and feed tanks
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8501	Reagent storage, feed bins, and conveyors
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8502	Weigh feeders
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8503	Screw conveyors
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8504	Mills/slakers
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8505	Scalping screens
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8506	Slurry pipelines
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8507	Reagent uploading and transfer systems
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8508	Reagent unavailability
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8510	Slurry mixers and agitators
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8520	Slurry transfer pumps and motors
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply	8521	Reagent/slurry problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-95 Pollution Control Equipment: Dry Scrubbers - Waste Disposal and Recovery					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8535	Fly ash conveyors

TABLE B13-95 Pollution Control Equipment: Dry Scrubbers - Waste Disposal and Recovery					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8536	Bucket elevators
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8537	Weigh hoppers
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8538	Recycle storage and feed tanks including agitators
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8539	Recycle slurry transfer pumps
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8540	Waste disposal
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8541	Recycle feed bins
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8542	Recycle feed bins aeration systems
Multi-boiler/Multi-turbine	Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery	8543	Powder coolers
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-96 Pollution Control Equipment: Miscellaneous (Pollution Control Equipment)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8565	Electrostatic Precipitator rebuild/overhaul
Multi-boiler/Multi-turbine	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8600	Flue gas additives (furnace injection)
Multi-boiler/Multi-turbine	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8601	SO3 mitigation
Multi-boiler/Multi-turbine	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8620	Mercury Abatement Equipment
Multi-boiler/Multi-turbine	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8650	Baghouse systems, general
Multi-boiler/Multi-turbine	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8651	Bag failures and rebagging
Multi-boiler/Multi-turbine	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8652	Shakers and rappers

TABLE B13-96 Pollution Control Equipment: Miscellaneous (Pollution Control Equipment)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8653	Inflation and deflation fans and motors
Multi-boiler/Multi-turbine	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8654	Baghouse booster fans and motors
Multi-boiler/Multi-turbine	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8655	Structural duct work and dampers
Multi-boiler/Multi-turbine	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8656	Controls and instrumentation
Multi-boiler/Multi-turbine	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8657	Ash handling system and hoppers
Multi-boiler/Multi-turbine	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8658	Slurry system from precipitators
Multi-boiler/Multi-turbine	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8670	Emission monitors (other than CEMS)
Multi-boiler/Multi-turbine	Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)		8699	Other miscellaneous pollution control equipment problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-97 Pollution Control Equipment: NOx Reduction Systems - Catalytic Air Heaters					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8830	CAH NOx Active catalyst
Multi-boiler/Multi-turbine	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8831	CAH NOx Support materials
Multi-boiler/Multi-turbine	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8832	CAH NOx Plugging
Multi-boiler/Multi-turbine	Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8835	Other CAH problems
Notes: 1) For use with Unit Codes 800–899. 2) Use code 360 for Low NOx Burners.					

TABLE B13-98 Pollution Control Equipment: NOx Reduction Systems - Selective Catalytic Reduction Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8810	SCR NOx Reactor

TABLE B13-98 Pollution Control Equipment: NOx Reduction Systems - Selective Catalytic Reduction Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8811	SCR NOx Reagent
Multi-boiler/Multi-turbine	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8812	SCR NOx Catalyst
Multi-boiler/Multi-turbine	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8813	SCR NOx Injection grid piping/valves
Multi-boiler/Multi-turbine	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8814	SCR NOx Catalyst support material
Multi-boiler/Multi-turbine	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8815	SCR NOx Soot blowers
Multi-boiler/Multi-turbine	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8816	SCR NOx Plugging
Multi-boiler/Multi-turbine	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8817	SCR NOx Control system
Multi-boiler/Multi-turbine	Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8825	Other SCR NOx problems
Notes: 1) For use with Unit Codes 800–899. 2) Use code 360 for Low NOx Burners.					

TABLE B13-99 Pollution Control Equipment: NOx Reduction Systems - Selective Non-Catalytic Reduction Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8800	SNCR NOx Reagent
Multi-boiler/Multi-turbine	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8801	SNCR NOx Carrier gas
Multi-boiler/Multi-turbine	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8802	SNCR NOx Control system
Multi-boiler/Multi-turbine	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8803	SNCR Performance Testing
Multi-boiler/Multi-turbine	Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8809	Other SNCR NOx problems
Notes: 1) For use with Unit Codes 800–899. 2) Use code 360 for Low NOx Burners.					

TABLE B13-100 Pollution Control Equipment: Precipitators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Pollution Control Equipment	Precipitators		8550	Electrostatic precipitator fouling
Multi-boiler/Multi-turbine	Pollution Control Equipment	Precipitators		8551	Electrostatic precipitator field out of service
Multi-boiler/Multi-turbine	Pollution Control Equipment	Precipitators		8560	Electrostatic precipitator problems
Multi-boiler/Multi-turbine	Pollution Control Equipment	Precipitators		8570	Mechanical precipitator fouling
Multi-boiler/Multi-turbine	Pollution Control Equipment	Precipitators		8580	Mechanical precipitator problems
Multi-boiler/Multi-turbine	Pollution Control Equipment	Precipitators		8590	Other precipitator problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-101 Pollution Control Equipment: Wet Scrubbers - Chemical Supply					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8000	Chemical feed storage, mill feeders, and conveyors
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8002	Screw conveyors
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8003	Bucket elevators
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8006	Weigh feeders
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8010	Crushers/mills
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8020	Mill slurry tanks supply problems
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8030	Classifiers
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8040	Slurry transfer pumps and motors
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8050	Chemical unavailability

TABLE B13-101 Pollution Control Equipment: Wet Scrubbers - Chemical Supply					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Chemical Supply	8099	Other chemical supply problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-102 Pollution Control Equipment: Wet Scrubbers - Miscellaneous (Wet Scrubber)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8400	Scrubber gas discharge reheaters - general
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8402	Scrubber gas discharge reheaters - vibration
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8404	Scrubber gas discharge reheaters - tube leaks
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8406	Scrubber gas discharge reheaters - ducts
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8410	Scrubber instruments and controls
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8415	Liquid level controls
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8420	Heat tracer
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8425	Miscellaneous mechanical failures
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8426	Miscellaneous electrical failures
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8430	Stack damage related to scrubber system
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8440	Major overhaul
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8450	Inspection
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8460	Testing
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8470	SO2 monitor

TABLE B13-102 Pollution Control Equipment: Wet Scrubbers - Miscellaneous (Wet Scrubber)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)	8499	Other miscellaneous wet scrubber problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-103 Pollution Control Equipment: Wet Scrubbers - Piping, Ducting, Dampers, and Fans					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8200	Piping
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8210	Valves
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8220	Strainers or filters
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8225	Drain pots
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8230	Ducting
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8235	Demister
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8240	Bypass dampers
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8250	Dampers other than bypass
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8260	Scrubber booster I.D. fan (fan specific to the scrubber)
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8261	Scrubber booster I.D. fan drive
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8262	Scrubber booster I.D. fan vibration (fan specific to the scrubber)
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8264	Scrubber booster I.D. fan blades (fan specific to the scrubber)
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8265	Scrubber booster I.D. fan dampers
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8270	Scrubber booster F.D. fan (fan specific to the scrubber)

TABLE B13-103 Pollution Control Equipment: Wet Scrubbers - Piping, Ducting, Dampers, and Fans					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8271	Scrubber booster F.D. fan drive
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8272	Scrubber booster F.D. fan vibration (fan specific to the scrubber)
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8274	Scrubber booster F.D. fan blades (fan specific to the scrubber)
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8275	Scrubber booster F.D. fan dampers
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8280	Reagent feed piping
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8290	Demister wash piping assembly
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans	8299	Other piping, ducting, damper, and fan problems
Notes: 1) For use with Unit Codes 800–899. 2) Use code 9510 for outages or deratings required to install pollution control equipment. Use codes 9600 to 9650 only when the pollution control equipment problems are not responsible for exceeding emission limits.					

TABLE B13-104 Pollution Control Equipment: Wet Scrubbers - Waste Disposal and Recovery					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8300	Waste disposal/recovery tanks
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8310	Waste disposal/recovery pumps
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8320	Waste disposal ponds
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8325	Ash disposal problems
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8330	Dewatering equipment (thickener, centrifuge, etc.)
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8335	Dryers
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8340	Centrifuge/vacuum filter
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8345	Calciners

TABLE B13-104 Pollution Control Equipment: Wet Scrubbers - Waste Disposal and Recovery					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8349	Other waste disposal and recovery problems
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery	8399	Solids conveying and mixing system problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-105 Pollution Control Equipment: Wet Scrubbers - Wet Scrubber					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8100	Scrubber/absorber tower or module
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8110	Spray nozzles
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8115	Disc scrubber throats
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8120	Spray pumps and motors
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8125	Scrubber recycle (liquid) pumps
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8127	Scrubber recycle (liquid) pump motors
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8130	Recirculation tanks including agitators
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8140	Reaction tanks including agitators
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8150	Tubes
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8160	Mist eliminators/demisters and washdown
Multi-boiler/Multi-turbine	Pollution Control Equipment	Wet Scrubbers	Wet Scrubber	8199	Other scrubber problems
Notes: 1) For use with Unit Codes 800–899.					

REGULATORY, SAFETY, ENVIRONMENTAL

Use these codes only for events not directly attributable to equipment failures. Inspections or testing of certain equipment due to regulation are reported using the appropriate equipment cause codes, and the fact that it was a regulatory requirement noted in the verbal description section.

TABLE B13-106 Regulatory, Safety, Environmental: Other Operating Environmental Limitations

UNIT TYPE	SYSTEM	COMPONENT	SUB-COMPONENT	CAUSE CODE	DESCRIPTION
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9660	Thermal discharge limits - fossil and nuclear
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9663	Thermal discharge limits - gas turbines
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9664	Thermal discharge limits - jet engines
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9665	Thermal discharge limits (Internal Combustion/Reciprocating Engines)
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9670	Noise limits (not for personnel safety) - fossil and nuclear
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9673	Noise limits (not for personnel safety) - gas turbines
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9674	Noise limits (not for personnel safety) - jet engines
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9675	Noise limits (not for personnel safety) (Internal Combustion/Reciprocating Engines)
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9676	Noise limits (not for personnel safety) - hydro and pumped storage
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9680	Fish kill - fossil and nuclear
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9683	Fish kill - gas turbines
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9684	Fish kill - jet engines
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9685	Fish kill (Internal Combustion/Reciprocating Engines)
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9686	Fish kill - hydro and pumped storage
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9690	Other miscellaneous operational environmental limits - fossil and nuclear
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9693	Other miscellaneous operational environmental limits - gas turbines

TABLE B13-106 Regulatory, Safety, Environmental: Other Operating Environmental Limitations					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9694	Other miscellaneous operational environmental limits - jet engines
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9695	Other miscellaneous operational environmental limits (Internal Combustion/Reciprocating Engines)
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9696	Other miscellaneous operational environmental limits - hydro and pumped storage
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-107 Regulatory, Safety, Environmental: Regulatory					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Regulatory		9504	Regulatory (environmental) proceedings and hearings - regulatory agency initiated
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Regulatory		9506	Regulatory (environmental) proceedings and hearings - intervenor initiated
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Regulatory		9510	Plant modifications strictly for compliance with new or changed regulatory requirements (scrubbers, cooling towers, etc.)
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Regulatory		9520	Oil spill in Gulf of Mexico (OMC)
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Regulatory		9590	Miscellaneous regulatory (this code is primarily intended for use with event contribution code 2 to indicate that a regulatory-related factor contributed to the primary cause of the event)
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-108 Regulatory, Safety, Environmental: Safety					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Safety		9700	OSHA-related retrofit or inspection

TABLE B13-108 Regulatory, Safety, Environmental: Safety					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Safety		9720	Other safety problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-109 Regulatory, Safety, Environmental: Stack Emission					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Stack Emission		9600	SO2 stack emissions - fossil
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Stack Emission		9603	SO2 stack emissions - gas turbines
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Stack Emission		9604	SO2 stack emissions - jet engines
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Stack Emission		9605	SO2 stack emissions (Internal Combustion/Reciprocating Engines)
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Stack Emission		9610	NOx stack emissions - fossil
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Stack Emission		9613	NOx stack emissions - gas turbines
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Stack Emission		9614	NOx stack emissions - jet engines
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Stack Emission		9615	NOx stack emissions (Internal Combustion/Reciprocating Engines)
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Stack Emission		9616	CO stack emissions - fossil
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Stack Emission		9620	Particulate stack emissions - fossil
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Stack Emission		9623	Particulate stack emissions - gas turbines
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Stack Emission		9624	Particulate stack emissions - jet engines
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Stack Emission		9625	Particulate stack emissions (Internal Combustion/Reciprocating Engines)
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Stack Emission		9630	Opacity - fossil

TABLE B13-109 Regulatory, Safety, Environmental: Stack Emission					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Stack Emission		9633	Opacity - gas turbines
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Stack Emission		9634	Opacity - jet engines
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Stack Emission		9635	Opacity (Internal Combustion/Reciprocating Engines)
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Stack Emission		9650	Other stack/exhaust emissions - fossil (use codes 9200 to 9290 if fuel quality causes pollution control equipment problems that result in excess stack emissions)
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Stack Emission		9653	Other stack or exhaust emissions - gas turbines (use codes 9200 to 9290 if fuel quality causes pollution control equipment problems that result in excess stack emissions)
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Stack Emission		9654	Other stack or exhaust emissions - jet engines (use codes 9200 to 9290 if fuel quality causes pollution control equipment problems that result in excess stack emissions)
Multi-boiler/Multi-turbine	Regulatory, Safety, Environmental	Stack Emission		9656	Other stack or exhaust emissions testing - fossil
Notes: 1) For use with Unit Codes 800–899. 2) Include exhaust emissions.					

STEAM TURBINE

Besides the turbine, this set includes the steam stop/control valves, turbine control system, and the turbine auxiliaries. The extraction steam codes are contained in the Balance of Plant set.

TABLE B13-110 Steam Turbine: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Steam Turbine	Controls		4290	Hydraulic system pumps
Multi-boiler/Multi-turbine	Steam Turbine	Controls		4291	Hydraulic system coolers
Multi-boiler/Multi-turbine	Steam Turbine	Controls		4292	Hydraulic system filters

TABLE B13-110 Steam Turbine: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Steam Turbine	Controls		4293	Hydraulic system pipes and valves
Multi-boiler/Multi-turbine	Steam Turbine	Controls		4299	Other hydraulic system problems
Multi-boiler/Multi-turbine	Steam Turbine	Controls		4300	Turbine supervisory system (use codes 4290 to 4299 for hydraulic oil)
Multi-boiler/Multi-turbine	Steam Turbine	Controls		4301	Turbine governing system
Multi-boiler/Multi-turbine	Steam Turbine	Controls		4302	Turbine trip devices (including instruments)
Multi-boiler/Multi-turbine	Steam Turbine	Controls		4303	Exhaust hood and spray controls
Multi-boiler/Multi-turbine	Steam Turbine	Controls		4304	Automatic turbine control systems - mechanical
Multi-boiler/Multi-turbine	Steam Turbine	Controls		4305	Automatic turbine control systems - mechanical - hydraulic
Multi-boiler/Multi-turbine	Steam Turbine	Controls		4306	Automatic turbine control systems - electro-hydraulic - analog
Multi-boiler/Multi-turbine	Steam Turbine	Controls		4307	Automatic turbine control systems - electro-hydraulic - digital
Multi-boiler/Multi-turbine	Steam Turbine	Controls		4308	Automatic turbine control systems - digital control and monitoring
Multi-boiler/Multi-turbine	Steam Turbine	Controls		4309	Other turbine instrument and control problems
Multi-boiler/Multi-turbine	Steam Turbine	Controls		4310	Steam Turbine Control System - data highway
Multi-boiler/Multi-turbine	Steam Turbine	Controls		4311	Steam Turbine Control System - hardware problems (including card failure)
Multi-boiler/Multi-turbine	Steam Turbine	Controls		4312	Steam Turbine Control System - internal and termination wiring
Multi-boiler/Multi-turbine	Steam Turbine	Controls		4313	Steam Turbine Control System - logic problems
Multi-boiler/Multi-turbine	Steam Turbine	Controls		4314	Steam Turbine Control System - upgrades
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-111 Steam Turbine: High Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Steam Turbine	High Pressure Turbine		4000	Outer casing
Multi-boiler/Multi-turbine	Steam Turbine	High Pressure Turbine		4001	Inner casing
Multi-boiler/Multi-turbine	Steam Turbine	High Pressure Turbine		4009	Nozzle bolting
Multi-boiler/Multi-turbine	Steam Turbine	High Pressure Turbine		4010	Nozzles and nozzle blocks
Multi-boiler/Multi-turbine	Steam Turbine	High Pressure Turbine		4011	Diaphragms
Multi-boiler/Multi-turbine	Steam Turbine	High Pressure Turbine		4012	Buckets or blades
Multi-boiler/Multi-turbine	Steam Turbine	High Pressure Turbine		4013	Diaphragms unit and shroud type
Multi-boiler/Multi-turbine	Steam Turbine	High Pressure Turbine		4014	Bucket or blade fouling
Multi-boiler/Multi-turbine	Steam Turbine	High Pressure Turbine		4015	Wheels or spindles
Multi-boiler/Multi-turbine	Steam Turbine	High Pressure Turbine		4020	Shaft seals
Multi-boiler/Multi-turbine	Steam Turbine	High Pressure Turbine		4021	Dummy rings
Multi-boiler/Multi-turbine	Steam Turbine	High Pressure Turbine		4022	Gland rings
Multi-boiler/Multi-turbine	Steam Turbine	High Pressure Turbine		4030	Rotor shaft
Multi-boiler/Multi-turbine	Steam Turbine	High Pressure Turbine		4040	Bearings
Multi-boiler/Multi-turbine	Steam Turbine	High Pressure Turbine		4041	Thrust bearings
Multi-boiler/Multi-turbine	Steam Turbine	High Pressure Turbine		4099	Other high pressure turbine problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-112 Steam Turbine: Intermediate Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Steam Turbine	Intermediate Pressure Turbine		4100	Outer casing
Multi-boiler/Multi-turbine	Steam Turbine	Intermediate Pressure Turbine		4101	Inner casing
Multi-boiler/Multi-turbine	Steam Turbine	Intermediate Pressure Turbine		4109	Nozzle bolting
Multi-boiler/Multi-turbine	Steam Turbine	Intermediate Pressure Turbine		4110	Nozzles and nozzle blocks
Multi-boiler/Multi-turbine	Steam Turbine	Intermediate Pressure Turbine		4111	Diaphragms
Multi-boiler/Multi-turbine	Steam Turbine	Intermediate Pressure Turbine		4112	Buckets or blades
Multi-boiler/Multi-turbine	Steam Turbine	Intermediate Pressure Turbine		4113	Bucket or blade fouling
Multi-boiler/Multi-turbine	Steam Turbine	Intermediate Pressure Turbine		4115	Wheels or spindles
Multi-boiler/Multi-turbine	Steam Turbine	Intermediate Pressure Turbine		4120	Shaft seals
Multi-boiler/Multi-turbine	Steam Turbine	Intermediate Pressure Turbine		4121	Dummy rings
Multi-boiler/Multi-turbine	Steam Turbine	Intermediate Pressure Turbine		4122	Gland rings
Multi-boiler/Multi-turbine	Steam Turbine	Intermediate Pressure Turbine		4130	Rotor shaft
Multi-boiler/Multi-turbine	Steam Turbine	Intermediate Pressure Turbine		4140	Bearings
Multi-boiler/Multi-turbine	Steam Turbine	Intermediate Pressure Turbine		4141	Thrust bearings
Multi-boiler/Multi-turbine	Steam Turbine	Intermediate Pressure Turbine		4199	Other intermediate pressure turbine problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-113 Steam Turbine: Low Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Steam Turbine	Low Pressure Turbine		4200	Outer casing
Multi-boiler/Multi-turbine	Steam Turbine	Low Pressure Turbine		4201	Inner casing
Multi-boiler/Multi-turbine	Steam Turbine	Low Pressure Turbine		4209	Nozzle bolting
Multi-boiler/Multi-turbine	Steam Turbine	Low Pressure Turbine		4210	Nozzles and nozzle blocks
Multi-boiler/Multi-turbine	Steam Turbine	Low Pressure Turbine		4211	Diaphragms
Multi-boiler/Multi-turbine	Steam Turbine	Low Pressure Turbine		4212	Buckets or blades
Multi-boiler/Multi-turbine	Steam Turbine	Low Pressure Turbine		4213	Bucket or blade fouling
Multi-boiler/Multi-turbine	Steam Turbine	Low Pressure Turbine		4215	Wheels or spindles
Multi-boiler/Multi-turbine	Steam Turbine	Low Pressure Turbine		4220	Shaft seals
Multi-boiler/Multi-turbine	Steam Turbine	Low Pressure Turbine		4221	Dummy rings
Multi-boiler/Multi-turbine	Steam Turbine	Low Pressure Turbine		4222	Gland rings
Multi-boiler/Multi-turbine	Steam Turbine	Low Pressure Turbine		4230	Rotor shaft
Multi-boiler/Multi-turbine	Steam Turbine	Low Pressure Turbine		4240	Bearings
Multi-boiler/Multi-turbine	Steam Turbine	Low Pressure Turbine		4241	Thrust bearings
Multi-boiler/Multi-turbine	Steam Turbine	Low Pressure Turbine		4250	Other low pressure turbine problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-114 Steam Turbine: Lube Oil					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Steam Turbine	Lube Oil		4280	Lube oil pumps
Multi-boiler/Multi-turbine	Steam Turbine	Lube Oil		4281	Lube oil coolers
Multi-boiler/Multi-turbine	Steam Turbine	Lube Oil		4282	Lube oil conditioners
Multi-boiler/Multi-turbine	Steam Turbine	Lube Oil		4283	Lube oil system valves and piping
Multi-boiler/Multi-turbine	Steam Turbine	Lube Oil		4284	Lube oil pump drive
Multi-boiler/Multi-turbine	Steam Turbine	Lube Oil		4289	Other lube oil system problems
Notes: 1) For use with Unit Codes 800–899. 2) Do not include bearing failures due to lube oil.					

TABLE B13-115 Steam Turbine: Miscellaneous (Steam Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Steam Turbine	Miscellaneous (Steam Turbine)		4400	Major turbine overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)
Multi-boiler/Multi-turbine	Steam Turbine	Miscellaneous (Steam Turbine)		4401	Inspection
Multi-boiler/Multi-turbine	Steam Turbine	Miscellaneous (Steam Turbine)		4402	Minor turbine overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
Multi-boiler/Multi-turbine	Steam Turbine	Miscellaneous (Steam Turbine)		4410	Turning gear and motor
Multi-boiler/Multi-turbine	Steam Turbine	Miscellaneous (Steam Turbine)		4420	Vibration of the turbine generator unit that cannot be attributed to a specific cause such as bearings or blades (use this code for balance moves)
Multi-boiler/Multi-turbine	Steam Turbine	Miscellaneous (Steam Turbine)		4430	Gland seal system
Multi-boiler/Multi-turbine	Steam Turbine	Miscellaneous (Steam Turbine)		4440	Moisture separator/reheater (nuclear including MSR drains, controls, etc.)

TABLE B13-115 Steam Turbine: Miscellaneous (Steam Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Steam Turbine	Miscellaneous (Steam Turbine)		4445	Steam reheater
Multi-boiler/Multi-turbine	Steam Turbine	Miscellaneous (Steam Turbine)		4450	Water induction
Multi-boiler/Multi-turbine	Steam Turbine	Miscellaneous (Steam Turbine)		4460	Turbine overspeed trip test
Multi-boiler/Multi-turbine	Steam Turbine	Miscellaneous (Steam Turbine)		4470	Differential expansion
Multi-boiler/Multi-turbine	Steam Turbine	Miscellaneous (Steam Turbine)		4490	Turbine performance testing (use code 9999 for total unit performance testing)
Multi-boiler/Multi-turbine	Steam Turbine	Miscellaneous (Steam Turbine)		4499	Other miscellaneous steam turbine problems
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-116 Steam Turbine: Piping					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Steam Turbine	Piping		4270	Crossover or under piping
Multi-boiler/Multi-turbine	Steam Turbine	Piping		4279	Miscellaneous turbine piping
Notes: 1) For use with Unit Codes 800–899.					

TABLE B13-117 Steam Turbine: Valves					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Steam Turbine	Valves		4260	Main stop valves
Multi-boiler/Multi-turbine	Steam Turbine	Valves		4261	Control valves
Multi-boiler/Multi-turbine	Steam Turbine	Valves		4262	Intercept valves
Multi-boiler/Multi-turbine	Steam Turbine	Valves		4263	Reheat stop valves
Multi-boiler/Multi-turbine	Steam Turbine	Valves		4264	Combined intercept valves

TABLE B13-117 Steam Turbine: Valves					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Multi-boiler/Multi-turbine	Steam Turbine	Valves		4265	Miscellaneous drain and vent valves
Multi-boiler/Multi-turbine	Steam Turbine	Valves		4266	Main stop valve testing
Multi-boiler/Multi-turbine	Steam Turbine	Valves		4267	Control valve testing
Multi-boiler/Multi-turbine	Steam Turbine	Valves		4268	Reheat/intercept valve testing
Multi-boiler/Multi-turbine	Steam Turbine	Valves		4269	Other turbine valves (including LP steam admission valves)
Notes: 1) For use with Unit Codes 800–899.					

Appendix B14: Index To Nuclear Unit Cause Codes

NUCLEAR UNITS

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BALANCE OF PLANT

TABLE B14-1 Balance of Plant: Auxiliary Systems - Auxiliary Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3830	Auxiliary boiler
Nuclear	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3831	Auxiliary steam piping
Nuclear	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3832	Auxiliary steam valves
Nuclear	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3833	Auxiliary steam controls and instruments
Nuclear	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3834	Auxiliary boiler tube leaks
Nuclear	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3835	Auxiliary boiler burner management system

TABLE B14-1 Balance of Plant: Auxiliary Systems - Auxiliary Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3836	Steam transfer to other unit
Nuclear	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3839	Other auxiliary steam problems (also see extraction steam codes 3520 to 3529; startup bypass codes 0630 to 0660; and soot blower steam code 0870)
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-2 Balance of Plant: Auxiliary Systems - Closed Cooling Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3820	Closed cooling water pumps and motors
Nuclear	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3821	Closed cooling water piping
Nuclear	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3822	Closed cooling water valves
Nuclear	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3823	Closed cooling water heat exchangers
Nuclear	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3824	Closed cooling water system fouling
Nuclear	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3825	Closed cooling water instrumentation
Nuclear	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3826	Closed cooling water strainer
Nuclear	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3829	Other closed cooling water system problems
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-3 Balance of Plant: Auxiliary Systems - Fire Protection System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Auxiliary Systems	Fire Protection System	3860	Fire protection system pumps
Nuclear	Balance of Plant	Auxiliary Systems	Fire Protection System	3861	Fire protection system piping
Nuclear	Balance of Plant	Auxiliary Systems	Fire Protection System	3862	Fire protection system valves
Nuclear	Balance of Plant	Auxiliary Systems	Fire Protection System	3863	Fire protection system fouling
Nuclear	Balance of Plant	Auxiliary Systems	Fire Protection System	3864	Fire protection system instrumentation and controls
Nuclear	Balance of Plant	Auxiliary Systems	Fire Protection System	3869	Other fire protection system problems
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-4 Balance of Plant: Auxiliary Systems - Instrument Air					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Auxiliary Systems	Instrument Air	3850	Instrument air compressors
Nuclear	Balance of Plant	Auxiliary Systems	Instrument Air	3851	Instrument air piping
Nuclear	Balance of Plant	Auxiliary Systems	Instrument Air	3852	Instrument air valves
Nuclear	Balance of Plant	Auxiliary Systems	Instrument Air	3853	Instrument air dryers
Nuclear	Balance of Plant	Auxiliary Systems	Instrument Air	3854	N2 backup to instrument air

TABLE B14-4 Balance of Plant: Auxiliary Systems - Instrument Air					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Auxiliary Systems	Instrument Air	3859	Other instrument air problems
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-5 Balance of Plant: Auxiliary Systems - Miscellaneous (Auxiliary Systems)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	3898	Miscellaneous plant auxiliary process and services instrumentation and controls
Nuclear	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	3899	Other miscellaneous auxiliary system problems
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-6 Balance of Plant: Auxiliary Systems - Open Cooling Water System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3800	Open cooling water pumps and motors
Nuclear	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3801	Open cooling water piping
Nuclear	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3802	Open cooling water valves
Nuclear	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3803	Open cooling water heat exchangers
Nuclear	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3804	Open cooling water system fouling
Nuclear	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3805	Open cooling water system instrumentation
Nuclear	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3806	Open cooling water strainer
Nuclear	Balance of Plant	Auxiliary Systems	Open Cooling Water System	3809	Other open cooling water problems
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-7 Balance of Plant: Auxiliary Systems - Seal Air Fans					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Auxiliary Systems	Seal Air Fans	3880	Seal air fan
Nuclear	Balance of Plant	Auxiliary Systems	Seal Air Fans	3881	Seal air fan drive - motor
Nuclear	Balance of Plant	Auxiliary Systems	Seal Air Fans	3882	Seal air control dampers and drives
Nuclear	Balance of Plant	Auxiliary Systems	Seal Air Fans	3883	Seal air filters
Nuclear	Balance of Plant	Auxiliary Systems	Seal Air Fans	3889	Other seal air fan problems
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-8 Balance of Plant: Auxiliary Systems - Service Air					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Auxiliary Systems	Service Air	3840	Service air compressors

TABLE B14-8 Balance of Plant: Auxiliary Systems - Service Air					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Auxiliary Systems	Service Air	3841	Service air piping
Nuclear	Balance of Plant	Auxiliary Systems	Service Air	3842	Service air valves
Nuclear	Balance of Plant	Auxiliary Systems	Service Air	3843	Service air dryers
Nuclear	Balance of Plant	Auxiliary Systems	Service Air	3849	Other service air problems
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-9 Balance of Plant: Auxiliary Systems - Service Water (Open System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3810	Service water pumps and motors
Nuclear	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3811	Service water piping
Nuclear	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3812	Service water valves
Nuclear	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3813	Service water heat exchangers
Nuclear	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3814	Service water system fouling
Nuclear	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3815	Service water strainer
Nuclear	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3819	Other service water problems
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-10 Balance of Plant: Circulating Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Circulating Water Systems		3210	Circulating water pumps
Nuclear	Balance of Plant	Circulating Water Systems		3211	Circulating water pump motors
Nuclear	Balance of Plant	Circulating Water Systems		3220	Circulating water piping
Nuclear	Balance of Plant	Circulating Water Systems		3221	Circulating water piping fouling
Nuclear	Balance of Plant	Circulating Water Systems		3230	Circulating water valves
Nuclear	Balance of Plant	Circulating Water Systems		3231	Waterbox
Nuclear	Balance of Plant	Circulating Water Systems		3232	Condenser tube cleaning system including debris filter
Nuclear	Balance of Plant	Circulating Water Systems		3233	Circulating water priming system
Nuclear	Balance of Plant	Circulating Water Systems		3235	Cooling tower booster pump
Nuclear	Balance of Plant	Circulating Water Systems		3236	Cooling tower booster motor
Nuclear	Balance of Plant	Circulating Water Systems		3238	Cooling tower fan motors
Nuclear	Balance of Plant	Circulating Water Systems		3239	Cooling tower fan motors - variable speed
Nuclear	Balance of Plant	Circulating Water Systems		3240	Cooling tower fans
Nuclear	Balance of Plant	Circulating Water Systems		3241	Cooling tower efficiency below design
Nuclear	Balance of Plant	Circulating Water Systems		3242	Cooling tower fill damage
Nuclear	Balance of Plant	Circulating Water Systems		3243	Cooling tower icing
Nuclear	Balance of Plant	Circulating Water Systems		3244	Cooling tower fires
Nuclear	Balance of Plant	Circulating Water Systems		3245	Other cooling tower problems

TABLE B14-10 Balance of Plant: Circulating Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Circulating Water Systems		3246	Cooling tower fouling
Nuclear	Balance of Plant	Circulating Water Systems		3247	Cooling tower instrumentation
Nuclear	Balance of Plant	Circulating Water Systems		3248	Cooling Tower Overhaul
Nuclear	Balance of Plant	Circulating Water Systems		3250	Circulating water system instruments and controls
Nuclear	Balance of Plant	Circulating Water Systems		3260	Traveling screens
Nuclear	Balance of Plant	Circulating Water Systems		3261	Traveling screen fouling
Nuclear	Balance of Plant	Circulating Water Systems		3269	Circulating water biological conditions (ie, zebra mussels)
Nuclear	Balance of Plant	Circulating Water Systems		3270	Intake system problems other than traveling screens
Nuclear	Balance of Plant	Circulating Water Systems		3271	Intake grating fouling
Nuclear	Balance of Plant	Circulating Water Systems		3272	Circulating water screenwash system
Nuclear	Balance of Plant	Circulating Water Systems		3273	Debris in circulating water from outside sources (leaves, mud, etc.)
Nuclear	Balance of Plant	Circulating Water Systems		3274	Ice blockages at intake structures including frazil ice, sheets, blocks of ice, etc.
Nuclear	Balance of Plant	Circulating Water Systems		3280	High circulating water temperature (not due to season, tower efficiency below design, or other listed equipment problem)
Nuclear	Balance of Plant	Circulating Water Systems		3281	Circulating water tempering system
Nuclear	Balance of Plant	Circulating Water Systems		3282	Circulating water cooling ponds
Nuclear	Balance of Plant	Circulating Water Systems		3285	Circulating water chemistry
Nuclear	Balance of Plant	Circulating Water Systems		3299	Other circulating water system problems
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-11 Balance of Plant: Condensate System - Low/Intermediate Pressure Heater and Deaerators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3339	LP heater head leaks
Nuclear	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3340	LP heater tube leaks
Nuclear	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3341	Other LP heater - general
Nuclear	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3342	IP heater tube leaks
Nuclear	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3343	Other IP heater - general
Nuclear	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3344	Deaerator (including level control)
Nuclear	Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3345	IP heater head leaks

TABLE B14-11 Balance of Plant: Condensate System - Low/Intermediate Pressure Heater and Deaerators					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-12 Balance of Plant: Condensate System - Miscellaneous (Condensate System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3360	Condensate makeup and return (including storage tanks)
Nuclear	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3370	Condensate system controls and instrumentation (not hotwell level, heater level, or deaerator level controls; see codes 3150-3159, 3344, 3502).
Nuclear	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3380	Condensate coolers
Nuclear	Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3399	Other miscellaneous condensate system problems
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-13 Balance of Plant: Condensate System - Polishers/Chemical Addition					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Condensate System	Polishers/Chemical Addition	3350	Condensate polishing and filtering systems
Nuclear	Balance of Plant	Condensate System	Polishers/Chemical Addition	3351	Chemical addition systems
Nuclear	Balance of Plant	Condensate System	Polishers/Chemical Addition	3352	Feedwater chemistry (not specific to condenser, polishers, or chemical addition)
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-14 Balance of Plant: Condensate System - Pumps, Piping, and Valves					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3300	Condensate water pre-treatment
Nuclear	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3310	Condensate/hotwell pumps
Nuclear	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3311	Condensate/hotwell pump motor
Nuclear	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3312	Condensate booster pump
Nuclear	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3313	Condensate booster pump motor
Nuclear	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3314	Condensate booster pump motor - variable speed
Nuclear	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3315	Condensate booster pump drive (other than 3313 and 3314)
Nuclear	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3320	Condensate piping
Nuclear	Balance of Plant	Condensate System	Pumps, Piping, and Valves	3330	Condensate valves
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-15 Balance of Plant: Condensing System - Condenser Casing or Shell and Internals					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3120	Tube sheets
Nuclear	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3121	Expansion joint
Nuclear	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3122	Gaskets and seals
Nuclear	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3123	Hot well
Nuclear	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3124	Tube sheet fouling
Nuclear	Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3129	Other condenser casing or shell and internal problems
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-16 Balance of Plant: Condensing System - Condenser Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Condensing System	Condenser Controls	3150	Hot well level controls
Nuclear	Balance of Plant	Condensing System	Condenser Controls	3151	Vacuum pump and air ejector controls
Nuclear	Balance of Plant	Condensing System	Condenser Controls	3152	Air-cooled condenser controls
Nuclear	Balance of Plant	Condensing System	Condenser Controls	3159	Other condensing system controls and instruments
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-17 Balance of Plant: Condensing System - Condenser Tubes and Support Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3110	Condenser tube leaks
Nuclear	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3111	Condenser tube fouling shell side
Nuclear	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3112	Condenser tube fouling tube side
Nuclear	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3113	Condenser tube and water box cleaning (including circulating water flow reversal)
Nuclear	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3114	Air-cooled condenser tubes
Nuclear	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3115	Air-cooled condenser pumps
Nuclear	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3116	Air-cooled condenser fans
Nuclear	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3117	Air-cooled condenser fan motors
Nuclear	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3118	Other Air-cooled condenser problems
Nuclear	Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3119	Other condenser tube casing or shell and internal problems
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-18 Balance of Plant: Condensing System - Miscellaneous (Condensing System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3170	Condenser inspection (use code 3110 to report looking for tube leaks)
Nuclear	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3171	Air-cooled condenser inspections
Nuclear	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3180	Major condenser overhaul
Nuclear	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3185	Water side cathodic protection
Nuclear	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3190	Air leakage (for losses not attributable to previously noted equipment related codes)
Nuclear	Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3199	Other miscellaneous condensing system problems
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-19 Balance of Plant: Condensing System - Vacuum Equipment					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Condensing System	Vacuum Equipment	3130	Air ejectors
Nuclear	Balance of Plant	Condensing System	Vacuum Equipment	3131	Air ejector piping and valves
Nuclear	Balance of Plant	Condensing System	Vacuum Equipment	3132	Inter and after condensers
Nuclear	Balance of Plant	Condensing System	Vacuum Equipment	3133	Vacuum pumps
Nuclear	Balance of Plant	Condensing System	Vacuum Equipment	3134	Vacuum pump piping and valves
Nuclear	Balance of Plant	Condensing System	Vacuum Equipment	3135	Vacuum pump motor and auxiliaries
Nuclear	Balance of Plant	Condensing System	Vacuum Equipment	3139	Other air extraction system problems - general
Nuclear	Balance of Plant	Condensing System	Vacuum Equipment	3149	Loss of vacuum not attributable to a particular component such as air ejectors or valves, or high back pressure not attributable to high circulating water temperature, or vacuum losses from a known cause.
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-20 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Electrical		3600	Switchyard transformers and associated cooling systems - external (OMC)
Nuclear	Balance of Plant	Electrical		3601	Switchyard transformers and associated cooling systems - external (not OMC)
Nuclear	Balance of Plant	Electrical		3610	Switchyard circuit breakers - external (not OMC)
Nuclear	Balance of Plant	Electrical		3611	Switchyard circuit breakers - external (OMC)
Nuclear	Balance of Plant	Electrical		3612	Switchyard system protection devices - external (OMC)

TABLE B14-20 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Electrical		3613	Switchyard system protection devices - external (not OMC)
Nuclear	Balance of Plant	Electrical		3618	Other switchyard equipment - external (not OMC)
Nuclear	Balance of Plant	Electrical		3619	Other switchyard equipment - external (OMC)
Nuclear	Balance of Plant	Electrical		3620	Main transformer
Nuclear	Balance of Plant	Electrical		3621	Unit auxiliaries transformer
Nuclear	Balance of Plant	Electrical		3622	Station service startup transformer
Nuclear	Balance of Plant	Electrical		3623	Auxiliary generators
Nuclear	Balance of Plant	Electrical		3624	Auxiliary generator voltage supply system
Nuclear	Balance of Plant	Electrical		3629	Other switchyard or high voltage system problems - external
Nuclear	Balance of Plant	Electrical		3630	400-700 volt transformers
Nuclear	Balance of Plant	Electrical		3631	400-700 volt circuit breakers
Nuclear	Balance of Plant	Electrical		3632	400-700 volt conductors and buses
Nuclear	Balance of Plant	Electrical		3633	400-700 volt insulators
Nuclear	Balance of Plant	Electrical		3634	400-700 volt protection devices
Nuclear	Balance of Plant	Electrical		3639	Other 400-700 volt problems
Nuclear	Balance of Plant	Electrical		3640	AC instrument power transformers
Nuclear	Balance of Plant	Electrical		3641	AC Circuit breakers
Nuclear	Balance of Plant	Electrical		3642	AC Conductors and buses
Nuclear	Balance of Plant	Electrical		3643	AC Inverters
Nuclear	Balance of Plant	Electrical		3644	AC Protection devices
Nuclear	Balance of Plant	Electrical		3649	Other AC instrument power problems
Nuclear	Balance of Plant	Electrical		3650	DC instrument power battery chargers
Nuclear	Balance of Plant	Electrical		3651	DC circuit breakers
Nuclear	Balance of Plant	Electrical		3652	DC conductors and buses
Nuclear	Balance of Plant	Electrical		3653	DC protection devices
Nuclear	Balance of Plant	Electrical		3659	Other DC power problems
Nuclear	Balance of Plant	Electrical		3660	4000-7000 volt transformers
Nuclear	Balance of Plant	Electrical		3661	4000-7000 volt circuit breakers
Nuclear	Balance of Plant	Electrical		3662	4000-7000 volt conductors and buses
Nuclear	Balance of Plant	Electrical		3663	4000-7000 volt insulators
Nuclear	Balance of Plant	Electrical		3664	4000-7000 volt protection devices
Nuclear	Balance of Plant	Electrical		3669	Other 4000-7000 volt problems
Nuclear	Balance of Plant	Electrical		3670	12-15kV transformers
Nuclear	Balance of Plant	Electrical		3671	12-15kV circuit breakers
Nuclear	Balance of Plant	Electrical		3672	12-15kV conductors and buses
Nuclear	Balance of Plant	Electrical		3673	12-15kV insulators
Nuclear	Balance of Plant	Electrical		3674	12-15kV protection devices

TABLE B14-20 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Electrical		3679	Other 12-15kV problems
Nuclear	Balance of Plant	Electrical		3680	Other voltage transformers
Nuclear	Balance of Plant	Electrical		3681	Other voltage circuit breakers
Nuclear	Balance of Plant	Electrical		3682	Other voltage conductors and buses
Nuclear	Balance of Plant	Electrical		3683	Other voltage insulators
Nuclear	Balance of Plant	Electrical		3684	Other voltage protection devices
Nuclear	Balance of Plant	Electrical		3689	Other voltage problems
Nuclear	Balance of Plant	Electrical		3690	Station Service Power Distribution System, General
Notes: 1) For use with Unit Codes 200-299. 2) Exclude nuclear safety (Class 1E) systems.					

TABLE B14-21 Balance of Plant: Extraction Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Extraction Steam		3520	HP Extraction steam piping
Nuclear	Balance of Plant	Extraction Steam		3521	HP Extraction steam valves
Nuclear	Balance of Plant	Extraction Steam		3522	HP Extraction steam instruments and controls
Nuclear	Balance of Plant	Extraction Steam		3529	Other HP extraction steam system problems
Nuclear	Balance of Plant	Extraction Steam		3530	IP Extraction steam piping
Nuclear	Balance of Plant	Extraction Steam		3531	IP Extraction steam valves
Nuclear	Balance of Plant	Extraction Steam		3532	IP Extraction steam instruments and controls
Nuclear	Balance of Plant	Extraction Steam		3539	Other IP extraction steam system problems
Nuclear	Balance of Plant	Extraction Steam		3540	LP Extraction steam piping
Nuclear	Balance of Plant	Extraction Steam		3541	LP Extraction steam valves
Nuclear	Balance of Plant	Extraction Steam		3542	LP Extraction steam instruments and controls
Nuclear	Balance of Plant	Extraction Steam		3549	Other LP extraction steam system problems
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-22 Balance of Plant: Feedwater System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Feedwater System		3401	Startup feedwater pump
Nuclear	Balance of Plant	Feedwater System		3402	Startup feedwater pump drives - all types
Nuclear	Balance of Plant	Feedwater System		3407	Feedwater pump suction screens
Nuclear	Balance of Plant	Feedwater System		3408	Feedwater pump drive - local controls
Nuclear	Balance of Plant	Feedwater System		3409	Feedwater pump drive motor - variable speed
Nuclear	Balance of Plant	Feedwater System		3410	Feedwater pump
Nuclear	Balance of Plant	Feedwater System		3411	Feedwater pump drive - motor
Nuclear	Balance of Plant	Feedwater System		3412	Feedwater pump drive - steam turbine

TABLE B14-22 Balance of Plant: Feedwater System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Feedwater System		3413	Feedwater pump coupling and drive shaft
Nuclear	Balance of Plant	Feedwater System		3414	Feedwater pump local controls
Nuclear	Balance of Plant	Feedwater System		3415	Feedwater pump/drive lube oil system
Nuclear	Balance of Plant	Feedwater System		3416	Other feedwater pump problems
Nuclear	Balance of Plant	Feedwater System		3417	Feedwater pump drive - main shaft
Nuclear	Balance of Plant	Feedwater System		3418	Feedwater pump drive - other
Nuclear	Balance of Plant	Feedwater System		3419	Feedwater pump drive - gear
Nuclear	Balance of Plant	Feedwater System		3420	Feedwater piping and supports
Nuclear	Balance of Plant	Feedwater System		3430	Feedwater regulating (boiler level control) valve
Nuclear	Balance of Plant	Feedwater System		3431	Other feedwater valves
Nuclear	Balance of Plant	Feedwater System		3439	HP heater head leaks
Nuclear	Balance of Plant	Feedwater System		3440	High pressure heater tube leaks
Nuclear	Balance of Plant	Feedwater System		3441	Other high pressure heater problems (see condensate system for LP and IP heater codes)
Nuclear	Balance of Plant	Feedwater System		3451	Feedwater booster pump suction screens
Nuclear	Balance of Plant	Feedwater System		3452	Feedwater booster pump drive - local controls
Nuclear	Balance of Plant	Feedwater System		3453	Feedwater booster pump drive motor - variable speed
Nuclear	Balance of Plant	Feedwater System		3454	Feedwater booster pump
Nuclear	Balance of Plant	Feedwater System		3455	Feedwater booster pump drive - motor
Nuclear	Balance of Plant	Feedwater System		3456	Feedwater booster pump drive - steam turbine
Nuclear	Balance of Plant	Feedwater System		3457	Feedwater booster pump coupling and drive shaft
Nuclear	Balance of Plant	Feedwater System		3458	Feedwater booster pump local controls
Nuclear	Balance of Plant	Feedwater System		3459	Feedwater booster pump/drive lube oil system
Nuclear	Balance of Plant	Feedwater System		3460	Other feedwater booster pump problems
Nuclear	Balance of Plant	Feedwater System		3461	Feedwater booster pump drive - main shaft
Nuclear	Balance of Plant	Feedwater System		3462	Feedwater booster pump drive - other
Nuclear	Balance of Plant	Feedwater System		3463	Feedwater booster pump drive - gear
Nuclear	Balance of Plant	Feedwater System		3499	Other feedwater system problems
Notes: 1) For use with Unit Codes 200-299. 2) Excluding extraction or drain systems.					

TABLE B14-23 Balance of Plant: Heater Drain Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Heater Drain Systems		3501	Heater drain pumps
Nuclear	Balance of Plant	Heater Drain Systems		3502	Heater level control

TABLE B14-23 Balance of Plant: Heater Drain Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Heater Drain Systems		3503	Heater drain piping
Nuclear	Balance of Plant	Heater Drain Systems		3504	Heater drain valves
Nuclear	Balance of Plant	Heater Drain Systems		3505	Heater drain pump drive
Nuclear	Balance of Plant	Heater Drain Systems		3509	Other heater drain system problems
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-24 Balance of Plant: Miscellaneous (Balance of Plant)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Miscellaneous (Balance of Plant)		3950	Process computer
Nuclear	Balance of Plant	Miscellaneous (Balance of Plant)		3960	Thermal derating (thermal efficiency losses in balance of plant when specific cause(s) unknown)
Nuclear	Balance of Plant	Miscellaneous (Balance of Plant)		3970	Distributive Control System (DCS) - process computer
Nuclear	Balance of Plant	Miscellaneous (Balance of Plant)		3971	DCS - data highway
Nuclear	Balance of Plant	Miscellaneous (Balance of Plant)		3972	DCS - hardware problems (including card failure)
Nuclear	Balance of Plant	Miscellaneous (Balance of Plant)		3973	DCS - internal and termination wiring
Nuclear	Balance of Plant	Miscellaneous (Balance of Plant)		3974	DCS - logic problems
Nuclear	Balance of Plant	Miscellaneous (Balance of Plant)		3975	DCS - upgrades
Nuclear	Balance of Plant	Miscellaneous (Balance of Plant)		3979	Other DCS problems
Nuclear	Balance of Plant	Miscellaneous (Balance of Plant)		3980	Programmable Logic Controller (PLC)
Nuclear	Balance of Plant	Miscellaneous (Balance of Plant)		3981	PLC - data highway
Nuclear	Balance of Plant	Miscellaneous (Balance of Plant)		3982	PLC - hardware problems (including card failure)
Nuclear	Balance of Plant	Miscellaneous (Balance of Plant)		3983	PLC - internal and termination wiring
Nuclear	Balance of Plant	Miscellaneous (Balance of Plant)		3984	PLC - logic problems
Nuclear	Balance of Plant	Miscellaneous (Balance of Plant)		3985	PLC - upgrades
Nuclear	Balance of Plant	Miscellaneous (Balance of Plant)		3989	Other PLC problems
Nuclear	Balance of Plant	Miscellaneous (Balance of Plant)		3995	Powerhouse heating and ventilating systems
Nuclear	Balance of Plant	Miscellaneous (Balance of Plant)		3996	Air conditioning systems - rooms and areas
Nuclear	Balance of Plant	Miscellaneous (Balance of Plant)		3998	Balance of plant overhaul/outage
Nuclear	Balance of Plant	Miscellaneous (Balance of Plant)		3999	Other miscellaneous balance of plant problems
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-25 Balance of Plant: Power Station Switchyard					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Power Station Switchyard		3700	Power Station switchyard (non generating unit equipment)
Nuclear	Balance of Plant	Power Station Switchyard		3710	Transmission line (connected to powerhouse switchyard to 1st Substation)
Nuclear	Balance of Plant	Power Station Switchyard		3720	Transmission equipment at the 1st substation (see code 9300 if applicable)
Nuclear	Balance of Plant	Power Station Switchyard		3730	Transmission equipment beyond the 1st substation (see code 9300 if applicable)
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-26 Balance of Plant: Waste Water (zero discharge) Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Balance of Plant	Waste Water (zero discharge) Systems		3290	Waste water (zero discharge) tanks, pumps, and motors
Nuclear	Balance of Plant	Waste Water (zero discharge) Systems		3291	Waste water (zero discharge) system fouling
Nuclear	Balance of Plant	Waste Water (zero discharge) Systems		3292	Waste water (zero discharge) piping
Nuclear	Balance of Plant	Waste Water (zero discharge) Systems		3293	Waste water (zero discharge) valves
Nuclear	Balance of Plant	Waste Water (zero discharge) Systems		3294	Waste water (zero discharge) controls and instrumentation
Nuclear	Balance of Plant	Waste Water (zero discharge) Systems		3295	Other waste water (zero discharge) problems
Notes: 1) For use with Unit Codes 200-299.					

EXTERNAL

Use this set of codes to report events caused by external factors (flood, lightning, etc.); economic factors (lack of fuel, labor strikes, etc.); operator training; and transmission system problems external to the plant.

TABLE B14-27 External: Catastrophe

UNIT TYPE	SYSTEM	COMPONENT	SUB-COMPONENT	CAUSE CODE	DESCRIPTION
Nuclear	External	Catastrophe		9000	Flood
Nuclear	External	Catastrophe		9001	Drought
Nuclear	External	Catastrophe		9010	Fire including wildfires, not related to a specific component
Nuclear	External	Catastrophe		9020	Lightning
Nuclear	External	Catastrophe		9025	Geomagnetic disturbance
Nuclear	External	Catastrophe		9030	Earthquake
Nuclear	External	Catastrophe		9031	Tornado
Nuclear	External	Catastrophe		9035	Hurricane
Nuclear	External	Catastrophe		9036	Storms (ice, snow, etc)
Nuclear	External	Catastrophe		9040	Other catastrophe
Nuclear	External	Catastrophe		9090	Physical Security Incident
Nuclear	External	Catastrophe		9091	Physical Security Incident (OMC)
Nuclear	External	Catastrophe		9092	Cyber Security Incident
Nuclear	External	Catastrophe		9093	Cyber Security Incident (OMC)
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-28 External: Economic

UNIT TYPE	SYSTEM	COMPONENT	SUB-COMPONENT	CAUSE CODE	DESCRIPTION
Nuclear	External	Economic		0000	Reserve shutdown
Nuclear	External	Economic		9110	Core coastdown (nuclear)
Nuclear	External	Economic		9120	Core conservation (nuclear)
Nuclear	External	Economic		9130	Failure of fuel supplier to fulfill contractual obligations or a pre-arranged deal due to physical fuel disruptions or operational impairments (e.g. force majeure on a pipeline or compressor down; making the pipeline incapable of making its firm deliveries.)
Nuclear	External	Economic		9131	Lack of fuel – due to contractual or tariff provisions that allow for service interruption or price fluctuations during peak demand periods.
Nuclear	External	Economic		9134	Fuel conservation
Nuclear	External	Economic		9137	Ground water or other water supply problems
Nuclear	External	Economic		9139	Ground water or other water supply problems(OMC)

TABLE B14-28 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	External	Economic		9150	Labor strikes company-wide problems or strikes outside the company's jurisdiction such as manufacturers (delaying repairs) or transportation (fuel supply) problems.
Nuclear	External	Economic		9151	Labor strikes direct plant management grievances that result in a walkout or strike are under plant management control.
Nuclear	External	Economic		9160	Other economic problems
Nuclear	External	Economic		9180	Economic (for internal use at plants only)
Nuclear	External	Economic		9181	Economic (for internal use at plants only)
Nuclear	External	Economic		9182	Economic (for internal use at plants only)
Nuclear	External	Economic		9183	Economic (for internal use at plants only)
Nuclear	External	Economic		9184	Economic (for internal use at plants only)
Nuclear	External	Economic		9185	Economic (for internal use at plants only)
Nuclear	External	Economic		9186	Economic (for internal use at plants only)
Nuclear	External	Economic		9187	Economic (for internal use at plants only)
Nuclear	External	Economic		9188	Economic (for internal use at plants only)
Nuclear	External	Economic		9189	Economic (for internal use at plants only)
Nuclear	External	Economic		9190	Economic (for internal use at plants only)
Nuclear	External	Economic		9191	Economic (for internal use at plants only)
Nuclear	External	Economic		9192	Economic (for internal use at plants only)
Nuclear	External	Economic		9193	Economic (for internal use at plants only)
Nuclear	External	Economic		9194	Economic (for internal use at plants only)
Nuclear	External	Economic		9195	Economic (for internal use at plants only)
Nuclear	External	Economic		9196	Economic (for internal use at plants only)
Nuclear	External	Economic		9197	Economic (for internal use at plants only)
Nuclear	External	Economic		9198	Economic (for internal use at plants only)
Nuclear	External	Economic		9199	Economic (for internal use at plants only)
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-29 External: Miscellaneous (External)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	External	Miscellaneous (External)		9300	Transmission system problems other than catastrophes (do not include switchyard problems in this category; see codes 3600 to 3629, 3720 to 3730)
Nuclear	External	Miscellaneous (External)		9310	Operator training
Nuclear	External	Miscellaneous (External)		9320	Other miscellaneous external problems
Notes: 1) For use with Unit Codes 200-299.					

GENERATOR

This set of codes contains the generator, exciter, generator cooling systems, and generator controls. Note the main leads up to and includes the generator output breaker in this set of codes.

TABLE B14-30 Generator: Controls

UNIT TYPE	SYSTEM	COMPONENT	SUB-COMPONENT	CAUSE CODE	DESCRIPTION
Nuclear	Generator	Controls		4700	Generator voltage control
Nuclear	Generator	Controls		4710	Generator metering devices
Nuclear	Generator	Controls		4720	Generator synchronization equipment
Nuclear	Generator	Controls		4730	Generator current and potential transformers
Nuclear	Generator	Controls		4740	Emergency generator trip devices
Nuclear	Generator	Controls		4741	Frequency Trip (81 Relay)
Nuclear	Generator	Controls		4750	Other generator controls and metering problems
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-31 Generator: Cooling System

UNIT TYPE	SYSTEM	COMPONENT	SUB-COMPONENT	CAUSE CODE	DESCRIPTION
Nuclear	Generator	Cooling System		4610	Hydrogen cooling system piping and valves
Nuclear	Generator	Cooling System		4611	Hydrogen coolers
Nuclear	Generator	Cooling System		4612	Hydrogen storage system
Nuclear	Generator	Cooling System		4613	Hydrogen seals
Nuclear	Generator	Cooling System		4619	Other hydrogen system problems
Nuclear	Generator	Cooling System		4620	Air cooling system
Nuclear	Generator	Cooling System		4630	Liquid cooling system
Nuclear	Generator	Cooling System		4640	Seal oil system and seals
Nuclear	Generator	Cooling System		4650	Other cooling system problems
Notes: 1) For use with Unit Codes 200-299. 2) Report failures caused by water leaks into generator as codes 4500, 4510, etc.					

TABLE B14-32 Generator: Exciter

UNIT TYPE	SYSTEM	COMPONENT	SUB-COMPONENT	CAUSE CODE	DESCRIPTION
Nuclear	Generator	Exciter		4600	Exciter drive - motor
Nuclear	Generator	Exciter		4601	Exciter field rheostat
Nuclear	Generator	Exciter		4602	Exciter commutator and brushes
Nuclear	Generator	Exciter		4603	Solid state exciter element
Nuclear	Generator	Exciter		4604	Exciter drive - shaft
Nuclear	Generator	Exciter		4605	Exciter transformer
Nuclear	Generator	Exciter		4609	Other exciter problems

TABLE B14-32 Generator: Exciter					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-33 Generator: Generator					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Generator	Generator		4500	Rotor windings (including damper windings and fan blades on hydro units)
Nuclear	Generator	Generator		4510	Rotor collector rings
Nuclear	Generator	Generator		4511	Rotor, General
Nuclear	Generator	Generator		4512	Retaining Rings
Nuclear	Generator	Generator		4520	Stator windings, bushings, and terminals
Nuclear	Generator	Generator		4530	Stator core iron
Nuclear	Generator	Generator		4535	Stator, General
Nuclear	Generator	Generator		4536	Generator Heaters
Nuclear	Generator	Generator		4540	Brushes and brush rigging
Nuclear	Generator	Generator		4550	Generator bearings and lube oil system (including thrust bearings on hydro units)
Nuclear	Generator	Generator		4551	Generator bearings
Nuclear	Generator	Generator		4552	Generator lube oil system
Nuclear	Generator	Generator		4555	Bearing cooling system
Nuclear	Generator	Generator		4560	Generator vibration (excluding vibration due to failed bearing and other components)
Nuclear	Generator	Generator		4570	Generator casing
Nuclear	Generator	Generator		4580	Generator end bells and bolting
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-34 Generator: Miscellaneous (Generator)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Generator	Miscellaneous (Generator)		4800	Generator main leads
Nuclear	Generator	Miscellaneous (Generator)		4805	Generator Bus Duct Cooling System
Nuclear	Generator	Miscellaneous (Generator)		4810	Generator output breaker
Nuclear	Generator	Miscellaneous (Generator)		4830	Major generator overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)
Nuclear	Generator	Miscellaneous (Generator)		4831	Minor generator overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
Nuclear	Generator	Miscellaneous (Generator)		4840	Inspection
Nuclear	Generator	Miscellaneous (Generator)		4841	Generator doble testing

TABLE B14-34 Generator: Miscellaneous (Generator)					
UNIT TYPE	SYSTEM	COMPONENT	SUB-COMPONENT	CAUSE CODE	DESCRIPTION
Nuclear	Generator	Miscellaneous (Generator)		4842	Reactive and capability testing
Nuclear	Generator	Miscellaneous (Generator)		4850	Core monitor alarm
Nuclear	Generator	Miscellaneous (Generator)		4860	Generator neutral grounding equipment
Nuclear	Generator	Miscellaneous (Generator)		4899	Other miscellaneous generator problems
Notes: 1) For use with Unit Codes 200-299.					

INACTIVE STATES

TABLE B14-35 Inactive States: Inactive States					
UNIT TYPE	SYSTEM	COMPONENT	SUB-COMPONENT	CAUSE CODE	DESCRIPTION
Nuclear	Inactive States	Inactive States		2	Inactive Reserve Shutdown
Nuclear	Inactive States	Inactive States		9990	Retired unit
Nuclear	Inactive States	Inactive States		9991	Mothballed unit
Notes: 1) For use with Unit Codes 200-299.					

NUCLEAR REACTOR

This set of codes contains the following:

- The reactor
- The containment system
- The reactor coolant system, including chemical, volume, and pressure control system
- Safety systems, both electrical and mechanical
- Residual heat removal systems
- Closed loop cooling water for reactor systems
- Service water for closed loop cooling and other reactor systems
- Steam generators
- Main steam systems up to the outboard containment isolation valve
- Feedwater systems from the reactor or steam generator up to the outboard containment isolation valve
- Blowdown systems
- Radioactive waste and off-gas systems

TABLE B14-36 Nuclear Reactor: Auxiliary Systems					
UNIT TYPE	SYSTEM	COMPONENT	SUB-COMPONENT	CAUSE CODE	DESCRIPTION
Nuclear	Nuclear Reactor	Auxiliary Systems		2840	Auxiliary feedwater pumps

TABLE B14-36 Nuclear Reactor: Auxiliary Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Nuclear Reactor	Auxiliary Systems		2841	Auxiliary feedwater pump motors
Nuclear	Nuclear Reactor	Auxiliary Systems		2842	Auxiliary feedwater pump steam turbines (including steam control valves)
Nuclear	Nuclear Reactor	Auxiliary Systems		2843	Auxiliary feedwater piping
Nuclear	Nuclear Reactor	Auxiliary Systems		2844	Auxiliary feedwater valves
Nuclear	Nuclear Reactor	Auxiliary Systems		2849	Other auxiliary feedwater problems
Nuclear	Nuclear Reactor	Auxiliary Systems		2870	Radioactive liquid waste system problems
Nuclear	Nuclear Reactor	Auxiliary Systems		2880	Radioactive gas and waste system problems
Nuclear	Nuclear Reactor	Auxiliary Systems		2890	Condenser off-gas system problems
Notes: 1) For use with Unit Codes 200-299. 2) See codes 3110 to 3999 for other auxiliary systems.					

TABLE B14-37 Nuclear Reactor: Chemical and Volume Control/Reactor Water Cleanup					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Nuclear Reactor	Chemical and Volume Control/Reactor Water Cleanup		2805	Moderator systems (CANDU)
Nuclear	Nuclear Reactor	Chemical and Volume Control/Reactor Water Cleanup		2806	Moderator purification (CANDU)
Nuclear	Nuclear Reactor	Chemical and Volume Control/Reactor Water Cleanup		2807	Moderator poison injection (CANDU)
Nuclear	Nuclear Reactor	Chemical and Volume Control/Reactor Water Cleanup		2810	Makeup pumps
Nuclear	Nuclear Reactor	Chemical and Volume Control/Reactor Water Cleanup		2811	Boric acid transfer pumps
Nuclear	Nuclear Reactor	Chemical and Volume Control/Reactor Water Cleanup		2812	Tanks
Nuclear	Nuclear Reactor	Chemical and Volume Control/Reactor Water Cleanup		2813	Demineralizers
Nuclear	Nuclear Reactor	Chemical and Volume Control/Reactor Water Cleanup		2814	Filters
Nuclear	Nuclear Reactor	Chemical and Volume Control/Reactor Water Cleanup		2815	Heat exchangers
Nuclear	Nuclear Reactor	Chemical and Volume Control/Reactor Water Cleanup		2816	Valves and piping
Nuclear	Nuclear Reactor	Chemical and Volume Control/Reactor Water Cleanup		2817	Instruments and controls
Nuclear	Nuclear Reactor	Chemical and Volume Control/Reactor Water Cleanup		2819	Other CVCS and RWC problems
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-38 Nuclear Reactor: Containment System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Nuclear Reactor	Containment System		2700	Containment structure
Nuclear	Nuclear Reactor	Containment System		2701	Containment liner
Nuclear	Nuclear Reactor	Containment System		2702	Containment hatches
Nuclear	Nuclear Reactor	Containment System		2703	Containment penetrations
Nuclear	Nuclear Reactor	Containment System		2720	Containment isolation valves and dampers
Nuclear	Nuclear Reactor	Containment System		2730	Containment isolation actuation
Nuclear	Nuclear Reactor	Containment System		2740	Containment penetration pressurization system
Nuclear	Nuclear Reactor	Containment System		2750	Containment hydrogen control system (vents, recombiners, etc.)
Nuclear	Nuclear Reactor	Containment System		2760	Containment spray system (including actuation)
Nuclear	Nuclear Reactor	Containment System		2770	Containment cooling system - normal
Nuclear	Nuclear Reactor	Containment System		2771	Containment cooling and gas cleanup - post accident
Nuclear	Nuclear Reactor	Containment System		2780	Containment testing
Nuclear	Nuclear Reactor	Containment System		2799	Other containment system problems
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-39 Nuclear Reactor: Control Rods and Drives					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Nuclear Reactor	Control Rods and Drives		2110	Control rod drive motors
Nuclear	Nuclear Reactor	Control Rods and Drives		2111	Control rod magnetic jack drives
Nuclear	Nuclear Reactor	Control Rods and Drives		2112	Control rod hydraulic drives
Nuclear	Nuclear Reactor	Control Rods and Drives		2120	Control rod scram mechanisms
Nuclear	Nuclear Reactor	Control Rods and Drives		2125	Reactivity control units (CANDU)
Nuclear	Nuclear Reactor	Control Rods and Drives		2130	Control rod assemblies other than drive and scram mechanisms
Nuclear	Nuclear Reactor	Control Rods and Drives		2140	Control rod drive cooling
Nuclear	Nuclear Reactor	Control Rods and Drives		2150	Control rod instrumentation
Nuclear	Nuclear Reactor	Control Rods and Drives		2151	Control rod drive controls
Nuclear	Nuclear Reactor	Control Rods and Drives		2152	Control rod drive power supplies
Nuclear	Nuclear Reactor	Control Rods and Drives		2155	Control rod testing
Nuclear	Nuclear Reactor	Control Rods and Drives		2160	Other control rod drive problems
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-40 Nuclear Reactor: Core Cooling/Safety Injection					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Nuclear Reactor	Core Cooling/Safety Injection		2600	High pressure safety injection, core injection, or core spray pumps (including RCIC)
Nuclear	Nuclear Reactor	Core Cooling/Safety Injection		2601	Motors for high pressure pumps
Nuclear	Nuclear Reactor	Core Cooling/Safety Injection		2602	Steam turbine drives for high pressure pumps (including RCIC)
Nuclear	Nuclear Reactor	Core Cooling/Safety Injection		2603	High pressure piping
Nuclear	Nuclear Reactor	Core Cooling/Safety Injection		2604	High pressure valves
Nuclear	Nuclear Reactor	Core Cooling/Safety Injection		2609	Other high pressure injection problems
Nuclear	Nuclear Reactor	Core Cooling/Safety Injection		2620	Low pressure safety injection, core spray, or decay heat pumps
Nuclear	Nuclear Reactor	Core Cooling/Safety Injection		2621	Motors for low pressure pumps
Nuclear	Nuclear Reactor	Core Cooling/Safety Injection		2622	Low pressure piping
Nuclear	Nuclear Reactor	Core Cooling/Safety Injection		2623	Low pressure valves
Nuclear	Nuclear Reactor	Core Cooling/Safety Injection		2624	Low pressure heat exchangers
Nuclear	Nuclear Reactor	Core Cooling/Safety Injection		2625	Accumulators (up to and including check valves)
Nuclear	Nuclear Reactor	Core Cooling/Safety Injection		2628	Residual heat removal/decay heat removal system
Nuclear	Nuclear Reactor	Core Cooling/Safety Injection		2629	Other low pressure problems
Nuclear	Nuclear Reactor	Core Cooling/Safety Injection		2630	Safeguard actuation system (including sensors, logic, activators, and sequencers)
Nuclear	Nuclear Reactor	Core Cooling/Safety Injection		2649	Other emergency core cooling/residual heat removal system problems
Notes: 1) For use with Unit Codes 200-299. 2) Where portions of these systems also serve in the makeup system, report problems as CVCS problems.					

TABLE B14-41 Nuclear Reactor: Core/Fuel					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Nuclear Reactor	Core/Fuel		2010	Fuel failure, including high activity in Reactor Coolant System (RCS) or off-gas system
Nuclear	Nuclear Reactor	Core/Fuel		2020	Control rod pattern changes and control rod repatch. (Preconditioning following a pattern change is to be reported using code 2031.)
Nuclear	Nuclear Reactor	Core/Fuel		2021	Power limited by rod pattern. (If rod pattern is limited by fuel limits, use appropriate code below.)
Nuclear	Nuclear Reactor	Core/Fuel		2030	Fuel limits - peaking factors
Nuclear	Nuclear Reactor	Core/Fuel		2031	Fuel preconditioning
Nuclear	Nuclear Reactor	Core/Fuel		2032	Fuel limits - MCPR (Minimum Critical Power Ratio - BWR units only)

TABLE B14-41 Nuclear Reactor: Core/Fuel					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Nuclear Reactor	Core/Fuel		2033	Fuel limits - MAPLHGR (Maximum Average Planar Linear Heat Generation Rate - BWR units only)
Nuclear	Nuclear Reactor	Core/Fuel		2034	Core tilt restrictions
Nuclear	Nuclear Reactor	Core/Fuel		2035	Core xenon restrictions
Nuclear	Nuclear Reactor	Core/Fuel		2036	End of life scram reactivity/rod worth restrictions
Nuclear	Nuclear Reactor	Core/Fuel		2037	Other fuel limits (use codes 9110 and 9120 for core coastdown, conservation, or stretch)
Nuclear	Nuclear Reactor	Core/Fuel		2040	Core physics tests
Nuclear	Nuclear Reactor	Core/Fuel		2050	Burnable poison problems including poison curtains
Nuclear	Nuclear Reactor	Core/Fuel		2060	Excore nuclear instrumentation
Nuclear	Nuclear Reactor	Core/Fuel		2061	Incore nuclear instrumentation
Nuclear	Nuclear Reactor	Core/Fuel		2062	Other fuel/core related instrumentation problems
Nuclear	Nuclear Reactor	Core/Fuel		2070	Normal refueling
Nuclear	Nuclear Reactor	Core/Fuel		2071	Refueling equipment problems
Nuclear	Nuclear Reactor	Core/Fuel		2072	Fuel storage
Nuclear	Nuclear Reactor	Core/Fuel		2080	Fueling machine and auxiliaries (CANDU)
Nuclear	Nuclear Reactor	Core/Fuel		2082	Fuel transfer problems (CANDU)
Nuclear	Nuclear Reactor	Core/Fuel		2090	Other core/fuel problems
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-42 Nuclear Reactor: Electrical Safety Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Nuclear Reactor	Electrical Safety Systems		2650	Emergency diesel generators (including actuating systems)
Nuclear	Nuclear Reactor	Electrical Safety Systems		2651	Emergency diesel generator output breakers
Nuclear	Nuclear Reactor	Electrical Safety Systems		2660	Safeguard buses and associated equipment (transformers, breakers, etc.)
Nuclear	Nuclear Reactor	Electrical Safety Systems		2670	DC safety system power supplies
Nuclear	Nuclear Reactor	Electrical Safety Systems		2680	120V AC safety system power supplies (including inverter)
Nuclear	Nuclear Reactor	Electrical Safety Systems		2699	Other electrical safety system power supplies (use codes 3600 to 3659 for nonsafety electrical systems)
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-43 Nuclear Reactor: Miscellaneous (Reactor)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Nuclear Reactor	Miscellaneous (Reactor)		2900	Reactor overhaul (use for non-specific overhaul only; see page B-CCGT-2)
Nuclear	Nuclear Reactor	Miscellaneous (Reactor)		2990	Plant radiation levels
Nuclear	Nuclear Reactor	Miscellaneous (Reactor)		2991	Radioactivity discharge levels to the environment
Nuclear	Nuclear Reactor	Miscellaneous (Reactor)		2995	Reactor performance testing (use code 9999 for total unit performance testing)
Nuclear	Nuclear Reactor	Miscellaneous (Reactor)		2999	Other miscellaneous nuclear reactor problems
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-44 Nuclear Reactor: Nuclear Cooling Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Nuclear Reactor	Nuclear Cooling Water Systems		2820	Nuclear closed cooling water pumps
Nuclear	Nuclear Reactor	Nuclear Cooling Water Systems		2821	Nuclear closed cooling water piping
Nuclear	Nuclear Reactor	Nuclear Cooling Water Systems		2822	Nuclear closed cooling water valves
Nuclear	Nuclear Reactor	Nuclear Cooling Water Systems		2823	Nuclear closed cooling heat exchanger
Nuclear	Nuclear Reactor	Nuclear Cooling Water Systems		2825	Turbine building closed cooling water system
Nuclear	Nuclear Reactor	Nuclear Cooling Water Systems		2829	Other closed cooling water system problems
Nuclear	Nuclear Reactor	Nuclear Cooling Water Systems		2830	Nuclear service water pumps
Nuclear	Nuclear Reactor	Nuclear Cooling Water Systems		2831	Nuclear service water piping
Nuclear	Nuclear Reactor	Nuclear Cooling Water Systems		2832	Nuclear service water valves
Nuclear	Nuclear Reactor	Nuclear Cooling Water Systems		2833	Nuclear service water heat exchangers
Nuclear	Nuclear Reactor	Nuclear Cooling Water Systems		2839	Other service water problems
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-45 Nuclear Reactor: Reactor Coolant System - Instruments and Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Nuclear Reactor	Reactor Coolant System	Instruments and Controls	2330	Pressurizer level instruments and controls
Nuclear	Nuclear Reactor	Reactor Coolant System	Instruments and Controls	2340	Pressurizer pressure instruments and controls
Nuclear	Nuclear Reactor	Reactor Coolant System	Instruments and Controls	2350	BWR feedwater controls
Nuclear	Nuclear Reactor	Reactor Coolant System	Instruments and Controls	2360	BWR pressure controls
Nuclear	Nuclear Reactor	Reactor Coolant System	Instruments and Controls	2370	Reactor trip system including sensors, logic, and actuators (includes spurious trips but not valid trips)
Nuclear	Nuclear Reactor	Reactor Coolant System	Instruments and Controls	2380	Reactor control system/integrated control system problems
Nuclear	Nuclear Reactor	Reactor Coolant System	Instruments and Controls	2390	Other reactor coolant system instruments and controls
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-46 Nuclear Reactor: Reactor Coolant System - Miscellaneous (Reactor Coolant System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Nuclear Reactor	Reactor Coolant System	Miscellaneous (Reactor Coolant System)	2399	Other miscellaneous reactor coolant system problems
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-47 Nuclear Reactor: Reactor Coolant System - Piping					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Nuclear Reactor	Reactor Coolant System	Piping	2230	Reactor coolant system piping
Nuclear	Nuclear Reactor	Reactor Coolant System	Piping	2240	Reactor coolant system pipe supports
Nuclear	Nuclear Reactor	Reactor Coolant System	Piping	2250	Reactor coolant system filters and strainers
Nuclear	Nuclear Reactor	Reactor Coolant System	Piping	2260	Reactor coolant flanges, fittings, and manways
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-48 Nuclear Reactor: Reactor Coolant System - Pressurizer					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Nuclear Reactor	Reactor Coolant System	Pressurizer	2265	Pressurizer (also see codes 2290, 2330, and 2340)
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-49 Nuclear Reactor: Reactor Coolant System - Pumps					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Nuclear Reactor	Reactor Coolant System	Pumps	2200	Reactor coolant/recirculating pumps
Nuclear	Nuclear Reactor	Reactor Coolant System	Pumps	2210	Reactor coolant/recirculating pump motors
Nuclear	Nuclear Reactor	Reactor Coolant System	Pumps	2220	Reactor coolant/recirculating pump MG sets
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-50 Nuclear Reactor: Reactor Coolant System - Valves					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Nuclear Reactor	Reactor Coolant System	Valves	2270	Power operated relief and safety/relief valves
Nuclear	Nuclear Reactor	Reactor Coolant System	Valves	2280	Non-power operated safety valves
Nuclear	Nuclear Reactor	Reactor Coolant System	Valves	2290	Pressurizer spray valves
Nuclear	Nuclear Reactor	Reactor Coolant System	Valves	2300	Recirculation loop flow control valves
Nuclear	Nuclear Reactor	Reactor Coolant System	Valves	2320	Other reactor coolant valves (including RCS boundary valves in connected systems)
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-51 Nuclear Reactor: Reactor Vessel and Internals					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Nuclear Reactor	Reactor Vessel and Internals		2170	Reactor vessel flanges and seals
Nuclear	Nuclear Reactor	Reactor Vessel and Internals		2171	Reactor vessel nozzles
Nuclear	Nuclear Reactor	Reactor Vessel and Internals		2172	Feedwater sparges
Nuclear	Nuclear Reactor	Reactor Vessel and Internals		2173	Jet pumps
Nuclear	Nuclear Reactor	Reactor Vessel and Internals		2174	Core support
Nuclear	Nuclear Reactor	Reactor Vessel and Internals		2175	Specimen holders
Nuclear	Nuclear Reactor	Reactor Vessel and Internals		2176	Control rod guides (not in fuel)
Nuclear	Nuclear Reactor	Reactor Vessel and Internals		2180	Calandria and Calandria tubes (CANDU)
Nuclear	Nuclear Reactor	Reactor Vessel and Internals		2185	Coolant assemblies (pressure tubes) (CANDU)
Nuclear	Nuclear Reactor	Reactor Vessel and Internals		2199	Other reactor vessel problems
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-52 Nuclear Reactor: Steam Generators and Steam System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Nuclear Reactor	Steam Generators and Steam System		2400	Steam generator tube leaks
Nuclear	Nuclear Reactor	Steam Generators and Steam System		2411	Steam generator tube inspections
Nuclear	Nuclear Reactor	Steam Generators and Steam System		2412	Steam generator tube supports
Nuclear	Nuclear Reactor	Steam Generators and Steam System		2420	Steam generator moisture separators and dryers
Nuclear	Nuclear Reactor	Steam Generators and Steam System		2421	Steam generator feedwater nozzles
Nuclear	Nuclear Reactor	Steam Generators and Steam System		2422	Other steam generator internals problems
Nuclear	Nuclear Reactor	Steam Generators and Steam System		2430	Steam generator shell
Nuclear	Nuclear Reactor	Steam Generators and Steam System		2431	Steam generator flanges, manways, and fittings
Nuclear	Nuclear Reactor	Steam Generators and Steam System		2432	Steam generator supports and snubbers
Nuclear	Nuclear Reactor	Steam Generators and Steam System		2440	Steam generator chemistry (excluding feedwater chemistry)
Nuclear	Nuclear Reactor	Steam Generators and Steam System		2441	Steam generator tube lancing
Nuclear	Nuclear Reactor	Steam Generators and Steam System		2442	Steam generator chemical cleaning
Nuclear	Nuclear Reactor	Steam Generators and Steam System		2443	Steam generator modifications
Nuclear	Nuclear Reactor	Steam Generators and Steam System		2450	Blowdown system piping
Nuclear	Nuclear Reactor	Steam Generators and Steam System		2460	Blowdown system valves
Nuclear	Nuclear Reactor	Steam Generators and Steam System		2470	Blowdown system instruments and controls
Nuclear	Nuclear Reactor	Steam Generators and Steam System		2480	Other blowdown
Nuclear	Nuclear Reactor	Steam Generators and Steam System		2500	Steam piping (up to turbine stop valves and bypass valves)
Nuclear	Nuclear Reactor	Steam Generators and Steam System		2510	Main steam isolation valves (BWR and PWR)

TABLE B14-52 Nuclear Reactor: Steam Generators and Steam System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Nuclear Reactor	Steam Generators and Steam System		2515	Main steam isolation valve testing
Nuclear	Nuclear Reactor	Steam Generators and Steam System		2520	Main steam safety/relief valves
Nuclear	Nuclear Reactor	Steam Generators and Steam System		2521	Main steam safety/relief valve testing
Nuclear	Nuclear Reactor	Steam Generators and Steam System		2530	Atmospheric or condenser dump valves (not SRVs)
Nuclear	Nuclear Reactor	Steam Generators and Steam System		2540	Other steam valves
Nuclear	Nuclear Reactor	Steam Generators and Steam System		2550	Steam generator instruments (including piping and valves) (no RPS or SAS inputs)
Nuclear	Nuclear Reactor	Steam Generators and Steam System		2560	Steam generator controls
Nuclear	Nuclear Reactor	Steam Generators and Steam System		2599	Other steam generator problems
Notes: 1) For use with Unit Codes 200-299.					

PERFORMANCE

TABLE B14-53 Performance: Performance					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Performance	Performance		9997	NERC Reliability Standard Requirement
Nuclear	Performance	Performance		9998	Black start testing
Nuclear	Performance	Performance		9999	Total unit performance testing (use appropriate codes for individual component testing)
Notes: 1) For use with Unit Codes 200-299.					

PERSONNEL OR PROCEDURAL ERRORS

TABLE B14-54 Personnel or Procedural Errors: Personnel or Procedural Errors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Personnel or Procedural Errors	Personnel or Procedural Errors		9900	Operator error
Nuclear	Personnel or Procedural Errors	Personnel or Procedural Errors		9910	Maintenance personnel error
Nuclear	Personnel or Procedural Errors	Personnel or Procedural Errors		9920	Contractor error
Nuclear	Personnel or Procedural Errors	Personnel or Procedural Errors		9930	Operating procedure error
Nuclear	Personnel or Procedural Errors	Personnel or Procedural Errors		9940	Maintenance procedure error
Nuclear	Personnel or Procedural Errors	Personnel or Procedural Errors		9950	Contractor procedure error
Nuclear	Personnel or Procedural Errors	Personnel or Procedural Errors		9960	Staff shortage

TABLE B14-54 Personnel or Procedural Errors: Personnel or Procedural Errors					
UNIT TYPE	SYSTEM	COMPONENT	SUB-COMPONENT	CAUSE CODE	DESCRIPTION
Notes: 1) For use with Unit Codes 200-299.					

REGULATORY, SAFETY, ENVIRONMENTAL

Use these codes only for events not directly attributable to equipment failures. Inspections or testing of certain equipment due to regulation are reported using the appropriate equipment cause codes, and the fact that it was a regulatory requirement noted in the verbal description section.

TABLE B14-55 Regulatory, Safety, Environmental: Other Operating Environmental Limitations					
UNIT TYPE	SYSTEM	COMPONENT	SUB-COMPONENT	CAUSE CODE	DESCRIPTION
Nuclear	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9660	Thermal discharge limits - fossil and nuclear
Nuclear	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9670	Noise limits (not for personnel safety) – fossil and nuclear
Nuclear	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9680	Fish kill - fossil and nuclear
Nuclear	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9690	Other miscellaneous operational environmental limits - fossil and nuclear
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-56 Regulatory, Safety, Environmental: Regulatory					
UNIT TYPE	SYSTEM	COMPONENT	SUB-COMPONENT	CAUSE CODE	DESCRIPTION
Nuclear	Regulatory, Safety, Environmental	Regulatory		9500	Regulatory (nuclear) proceedings and hearings - regulatory agency initiated
Nuclear	Regulatory, Safety, Environmental	Regulatory		9502	Regulatory (nuclear) proceedings and hearings - intervenor initiated
Nuclear	Regulatory, Safety, Environmental	Regulatory		9504	Regulatory (environmental) proceedings and hearings - regulatory agency initiated
Nuclear	Regulatory, Safety, Environmental	Regulatory		9506	Regulatory (environmental) proceedings and hearings - intervenor initiated
Nuclear	Regulatory, Safety, Environmental	Regulatory		9510	Plant modifications strictly for compliance with new or changed regulatory requirements (scrubbers, cooling towers, etc.)
Nuclear	Regulatory, Safety, Environmental	Regulatory		9520	Oil spill in Gulf of Mexico (OMC)
Nuclear	Regulatory, Safety, Environmental	Regulatory		9590	Miscellaneous regulatory (this code is primarily intended for use with event contribution code 2 to indicate that a regulatory-related factor contributed to the primary cause of the event)
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-57 Regulatory, Safety, Environmental: Safety					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Regulatory, Safety, Environmental	Safety		9700	OSHA-related retrofit or inspection
Nuclear	Regulatory, Safety, Environmental	Safety		9710	Investigation of possible nuclear safety problems
Nuclear	Regulatory, Safety, Environmental	Safety		9720	Other safety problems
Notes: 1) For use with Unit Codes 200-299.					

STEAM TURBINE

Besides the turbine, this set includes the steam stop/control valves, turbine control system, and the turbine auxiliaries. The extraction steam codes are contained in the Balance of Plant set.

TABLE B14-58 Steam Turbine: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Steam Turbine	Controls		4290	Hydraulic system pumps
Nuclear	Steam Turbine	Controls		4291	Hydraulic system coolers
Nuclear	Steam Turbine	Controls		4292	Hydraulic system filters
Nuclear	Steam Turbine	Controls		4293	Hydraulic system pipes and valves
Nuclear	Steam Turbine	Controls		4299	Other hydraulic system problems
Nuclear	Steam Turbine	Controls		4300	Turbine supervisory system (use codes 4290 to 4299 for hydraulic oil)
Nuclear	Steam Turbine	Controls		4301	Turbine governing system
Nuclear	Steam Turbine	Controls		4302	Turbine trip devices (including instruments)
Nuclear	Steam Turbine	Controls		4303	Exhaust hood and spray controls
Nuclear	Steam Turbine	Controls		4304	Automatic turbine control systems - mechanical
Nuclear	Steam Turbine	Controls		4305	Automatic turbine control systems - mechanical - hydraulic
Nuclear	Steam Turbine	Controls		4306	Automatic turbine control systems - electro-hydraulic - analog
Nuclear	Steam Turbine	Controls		4307	Automatic turbine control systems - electro-hydraulic - digital
Nuclear	Steam Turbine	Controls		4308	Automatic turbine control systems - digital control and monitoring
Nuclear	Steam Turbine	Controls		4309	Other turbine instrument and control problems
Nuclear	Steam Turbine	Controls		4310	Steam Turbine Control System - data highway
Nuclear	Steam Turbine	Controls		4311	Steam Turbine Control System - hardware problems (including card failure)
Nuclear	Steam Turbine	Controls		4312	Steam Turbine Control System - internal and termination wiring
Nuclear	Steam Turbine	Controls		4313	Steam Turbine Control System - logic problems

TABLE B14-58 Steam Turbine: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Steam Turbine	Controls		4314	Steam Turbine Control System - upgrades
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-59 Steam Turbine: High Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Steam Turbine	High Pressure Turbine		4000	Outer casing
Nuclear	Steam Turbine	High Pressure Turbine		4001	Inner casing
Nuclear	Steam Turbine	High Pressure Turbine		4009	Nozzle bolting
Nuclear	Steam Turbine	High Pressure Turbine		4010	Nozzles and nozzle blocks
Nuclear	Steam Turbine	High Pressure Turbine		4011	Diaphragms
Nuclear	Steam Turbine	High Pressure Turbine		4012	Buckets or blades
Nuclear	Steam Turbine	High Pressure Turbine		4013	Diaphragms unit and shroud type
Nuclear	Steam Turbine	High Pressure Turbine		4014	Bucket or blade fouling
Nuclear	Steam Turbine	High Pressure Turbine		4015	Wheels or spindles
Nuclear	Steam Turbine	High Pressure Turbine		4020	Shaft seals
Nuclear	Steam Turbine	High Pressure Turbine		4021	Dummy rings
Nuclear	Steam Turbine	High Pressure Turbine		4022	Gland rings
Nuclear	Steam Turbine	High Pressure Turbine		4030	Rotor shaft
Nuclear	Steam Turbine	High Pressure Turbine		4040	Bearings
Nuclear	Steam Turbine	High Pressure Turbine		4041	Thrust bearings
Nuclear	Steam Turbine	High Pressure Turbine		4099	Other high pressure turbine problems
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-60 Steam Turbine: Intermediate Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Steam Turbine	Intermediate Pressure Turbine		4100	Outer casing
Nuclear	Steam Turbine	Intermediate Pressure Turbine		4101	Inner casing
Nuclear	Steam Turbine	Intermediate Pressure Turbine		4109	Nozzle bolting
Nuclear	Steam Turbine	Intermediate Pressure Turbine		4110	Nozzles and nozzle blocks
Nuclear	Steam Turbine	Intermediate Pressure Turbine		4111	Diaphragms
Nuclear	Steam Turbine	Intermediate Pressure Turbine		4112	Buckets or blades
Nuclear	Steam Turbine	Intermediate Pressure Turbine		4113	Bucket or blade fouling
Nuclear	Steam Turbine	Intermediate Pressure Turbine		4115	Wheels or spindles
Nuclear	Steam Turbine	Intermediate Pressure Turbine		4120	Shaft seals
Nuclear	Steam Turbine	Intermediate Pressure Turbine		4121	Dummy rings
Nuclear	Steam Turbine	Intermediate Pressure Turbine		4122	Gland rings
Nuclear	Steam Turbine	Intermediate Pressure Turbine		4130	Rotor shaft

TABLE B14-60 Steam Turbine: Intermediate Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Steam Turbine	Intermediate Pressure Turbine		4140	Bearings
Nuclear	Steam Turbine	Intermediate Pressure Turbine		4141	Thrust bearings
Nuclear	Steam Turbine	Intermediate Pressure Turbine		4199	Other intermediate pressure turbine problems
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-61 Steam Turbine: Low Pressure Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Steam Turbine	Low Pressure Turbine		4200	Outer casing
Nuclear	Steam Turbine	Low Pressure Turbine		4201	Inner casing
Nuclear	Steam Turbine	Low Pressure Turbine		4209	Nozzle bolting
Nuclear	Steam Turbine	Low Pressure Turbine		4210	Nozzles and nozzle blocks
Nuclear	Steam Turbine	Low Pressure Turbine		4211	Diaphragms
Nuclear	Steam Turbine	Low Pressure Turbine		4212	Buckets or blades
Nuclear	Steam Turbine	Low Pressure Turbine		4213	Bucket or blade fouling
Nuclear	Steam Turbine	Low Pressure Turbine		4215	Wheels or spindles
Nuclear	Steam Turbine	Low Pressure Turbine		4220	Shaft seals
Nuclear	Steam Turbine	Low Pressure Turbine		4221	Dummy rings
Nuclear	Steam Turbine	Low Pressure Turbine		4222	Gland rings
Nuclear	Steam Turbine	Low Pressure Turbine		4230	Rotor shaft
Nuclear	Steam Turbine	Low Pressure Turbine		4240	Bearings
Nuclear	Steam Turbine	Low Pressure Turbine		4241	Thrust bearings
Nuclear	Steam Turbine	Low Pressure Turbine		4250	Other low pressure turbine problems
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-62 Steam Turbine: Lube Oil					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Steam Turbine	Lube Oil		4280	Lube oil pumps
Nuclear	Steam Turbine	Lube Oil		4281	Lube oil coolers
Nuclear	Steam Turbine	Lube Oil		4282	Lube oil conditioners
Nuclear	Steam Turbine	Lube Oil		4283	Lube oil system valves and piping
Nuclear	Steam Turbine	Lube Oil		4284	Lube oil pump drive
Nuclear	Steam Turbine	Lube Oil		4289	Other lube oil system problems
Notes: 1) For use with Unit Codes 200-299. 2) Do not include bearing failures due to lube oil.					

TABLE B14-63 Steam Turbine: Miscellaneous (Steam Turbine)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Steam Turbine	Miscellaneous (Steam Turbine)		4400	Major turbine overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)
Nuclear	Steam Turbine	Miscellaneous (Steam Turbine)		4401	Inspection
Nuclear	Steam Turbine	Miscellaneous (Steam Turbine)		4402	Minor turbine overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
Nuclear	Steam Turbine	Miscellaneous (Steam Turbine)		4410	Turning gear and motor
Nuclear	Steam Turbine	Miscellaneous (Steam Turbine)		4411	Steam turbine gear box (single shaft configuration)
Nuclear	Steam Turbine	Miscellaneous (Steam Turbine)		4412	Steam turbine clutch (single shaft configuration)
Nuclear	Steam Turbine	Miscellaneous (Steam Turbine)		4415	Shaft coupling mechanism
Nuclear	Steam Turbine	Miscellaneous (Steam Turbine)		4420	Vibration of the turbine generator unit that cannot be attributed to a specific cause such as bearings or blades (use this code for balance moves)
Nuclear	Steam Turbine	Miscellaneous (Steam Turbine)		4430	Gland seal system
Nuclear	Steam Turbine	Miscellaneous (Steam Turbine)		4440	Moisture separator/reheater (nuclear including MSR drains, controls, etc.)
Nuclear	Steam Turbine	Miscellaneous (Steam Turbine)		4445	Steam reheater
Nuclear	Steam Turbine	Miscellaneous (Steam Turbine)		4450	Water induction
Nuclear	Steam Turbine	Miscellaneous (Steam Turbine)		4460	Turbine overspeed trip test
Nuclear	Steam Turbine	Miscellaneous (Steam Turbine)		4470	Differential expansion
Nuclear	Steam Turbine	Miscellaneous (Steam Turbine)		4490	Turbine performance testing (use code 9999 for total unit performance testing)
Nuclear	Steam Turbine	Miscellaneous (Steam Turbine)		4499	Other miscellaneous steam turbine problems
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-64 Steam Turbine: Piping					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Steam Turbine	Piping		4270	Crossover or under piping
Nuclear	Steam Turbine	Piping		4279	Miscellaneous turbine piping
Notes: 1) For use with Unit Codes 200-299.					

TABLE B14-65 Steam Turbine: Valves					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Steam Turbine	Valves		4260	Main stop valves
Nuclear	Steam Turbine	Valves		4261	Control valves
Nuclear	Steam Turbine	Valves		4262	Intercept valves

TABLE B14-65 Steam Turbine: Valves					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Nuclear	Steam Turbine	Valves		4263	Reheat stop valves
Nuclear	Steam Turbine	Valves		4264	Combined intercept valves
Nuclear	Steam Turbine	Valves		4265	Miscellaneous drain and vent valves
Nuclear	Steam Turbine	Valves		4266	Main stop valve testing
Nuclear	Steam Turbine	Valves		4267	Control valve testing
Nuclear	Steam Turbine	Valves		4268	Reheat/intercept valve testing
Nuclear	Steam Turbine	Valves		4269	Other turbine valves (including LP steam admission valves)
Notes: 1) For use with Unit Codes 200-299.					

Appendix B15: Index To Pumped Storage/Hydro Unit Cause Codes

PUMPED STORAGE/HYDRO UNITS

INDEX TO SYSTEM/COMPONENT/SUB-COMPONENT CAUSE CODE TABLES			
TABLE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**
B15-1	Balance of Plant	Auxiliary Systems	Auxiliary Steam
B15-2	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems
B15-3	Balance of Plant	Auxiliary Systems	Fire Protection System
B15-4	Balance of Plant	Auxiliary Systems	Instrument Air
B15-5	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)
B15-6	Balance of Plant	Auxiliary Systems	Service Air
B15-7	Balance of Plant	Auxiliary Systems	Service Water (Open System)
B15-8	Balance of Plant	Electrical	
B15-9	Balance of Plant	Miscellaneous (Balance of Plant)	
B15-10	Balance of Plant	Power Station Switchyard	
B15-11	External	Catastrophe	
B15-12	External	Economic	
B15-13	External	Miscellaneous (External)	
B15-14	Generator	Controls	
B15-15	Generator	Cooling System	
B15-16	Generator	Exciter	
B15-17	Generator	Generator	
B15-18	Generator	Miscellaneous (Generator)	
B15-19	Hydro Turbine/Pump	Miscellaneous (Hydro Turbine/Pump)	
B15-20	Hydro Turbine/Pump	Turbine	
B15-21	Hydro Turbine/Pump	Water Supply/Discharge	
B15-22	Inactive States	Inactive States	
B15-23	Performance	Performance	
B15-24	Personnel or Procedural Errors	Personnel or Procedural Errors	
B15-25	Regulatory, Safety, Environmental	Other Operating Environmental Limitations	
B15-26	Regulatory, Safety, Environmental	Regulatory	
B15-27	Regulatory, Safety, Environmental	Safety	

BALANCE OF PLANT

TABLE B15-1 Balance of Plant: Auxiliary Systems - Auxiliary Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3830	Auxiliary boiler
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3831	Auxiliary steam piping
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3832	Auxiliary steam valves
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3833	Auxiliary steam controls and instruments

TABLE B15-1 Balance of Plant: Auxiliary Systems - Auxiliary Steam					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3834	Auxiliary boiler tube leaks
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Auxiliary Steam	3839	Other auxiliary steam problems
Notes: 1) For use with Unit Codes 500-599 and 900-999.					

TABLE B15-2 Balance of Plant: Auxiliary Systems - Closed Cooling Water Systems					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3820	Closed cooling water pumps and motors
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3821	Closed cooling water piping
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3822	Closed cooling water valves
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3823	Closed cooling water heat exchangers
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3824	Closed cooling water system fouling
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3829	Other closed cooling water system problems
Notes: 1) For use with Unit Codes 500-599 and 900-999.					

TABLE B15-3 Balance of Plant: Auxiliary Systems - Fire Protection System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Fire Protection System	3860	Fire protection system pumps
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Fire Protection System	3861	Fire protection system piping
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Fire Protection System	3862	Fire protection system valves
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Fire Protection System	3863	Fire protection system fouling
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Fire Protection System	3869	Other fire protection system problems
Notes: 1) For use with Unit Codes 500-599 and 900-999.					

TABLE B15-4 Balance of Plant: Auxiliary Systems - Instrument Air					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Instrument Air	3850	Instrument air compressors
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Instrument Air	3851	Instrument air piping
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Instrument Air	3852	Instrument air valves
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Instrument Air	3853	Instrument air dryers
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Instrument Air	3854	N2 backup to instrument air
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Instrument Air	3859	Other instrument air problems
Notes: 1) For use with Unit Codes 500-599 and 900-999.					

TABLE B15-5 Balance of Plant: Auxiliary Systems - Miscellaneous (Auxiliary Systems)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	3898	Miscellaneous plant auxiliary process and services instrumentation and controls
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	3899	Other miscellaneous auxiliary system problems
Notes: 1) For use with Unit Codes 500-599 and 900-999.					

TABLE B15-6 Balance of Plant: Auxiliary Systems - Service Air					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Service Air	3840	Service air compressors
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Service Air	3841	Service air piping
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Service Air	3842	Service air valves
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Service Air	3843	Service air dryers
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Service Air	3849	Other service air problems
Notes: 1) For use with Unit Codes 500-599 and 900-999.					

TABLE B15-7 Balance of Plant: Auxiliary Systems - Service Water (Open System)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3810	Service water pumps and motors
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3811	Service water piping
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3812	Service water valves
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3813	Service water heat exchangers
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3814	Service water system fouling
Pumped Storage/Hydro	Balance of Plant	Auxiliary Systems	Service Water (Open System)	3819	Other service water problems
Notes: 1) For use with Unit Codes 500-599 and 900-999.					

TABLE B15-8 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	Balance of Plant	Electrical		3600	Switchyard transformers and associated cooling systems - external (OMC)
Pumped Storage/Hydro	Balance of Plant	Electrical		3601	Switchyard transformers and associated cooling systems - external (not OMC)
Pumped Storage/Hydro	Balance of Plant	Electrical		3610	Switchyard circuit breakers - external (not OMC)
Pumped Storage/Hydro	Balance of Plant	Electrical		3611	Switchyard circuit breakers - external (OMC)
Pumped Storage/Hydro	Balance of Plant	Electrical		3612	Switchyard system protection devices - external (OMC)

TABLE B15-8 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	Balance of Plant	Electrical		3613	Switchyard system protection devices - external (not OMC)
Pumped Storage/Hydro	Balance of Plant	Electrical		3618	Other switchyard equipment - external (not OMC)
Pumped Storage/Hydro	Balance of Plant	Electrical		3619	Other switchyard equipment - external (OMC)
Pumped Storage/Hydro	Balance of Plant	Electrical		3620	Main transformer
Pumped Storage/Hydro	Balance of Plant	Electrical		3621	Unit auxiliaries transformer
Pumped Storage/Hydro	Balance of Plant	Electrical		3622	Station service startup transformer
Pumped Storage/Hydro	Balance of Plant	Electrical		3623	Auxiliary generators
Pumped Storage/Hydro	Balance of Plant	Electrical		3624	Auxiliary generator voltage supply system
Pumped Storage/Hydro	Balance of Plant	Electrical		3629	Other switchyard or high voltage system problems - external
Pumped Storage/Hydro	Balance of Plant	Electrical		3630	400-700 volt transformers
Pumped Storage/Hydro	Balance of Plant	Electrical		3631	400-700 volt circuit breakers
Pumped Storage/Hydro	Balance of Plant	Electrical		3632	400-700 volt conductors and buses
Pumped Storage/Hydro	Balance of Plant	Electrical		3633	400-700 volt insulators
Pumped Storage/Hydro	Balance of Plant	Electrical		3634	400-700 volt protection devices
Pumped Storage/Hydro	Balance of Plant	Electrical		3639	Other 400-700 volt problems
Pumped Storage/Hydro	Balance of Plant	Electrical		3640	AC instrument power transformers
Pumped Storage/Hydro	Balance of Plant	Electrical		3641	AC Circuit breakers
Pumped Storage/Hydro	Balance of Plant	Electrical		3642	AC Conductors and buses
Pumped Storage/Hydro	Balance of Plant	Electrical		3643	AC Inverters
Pumped Storage/Hydro	Balance of Plant	Electrical		3644	AC Protection devices
Pumped Storage/Hydro	Balance of Plant	Electrical		3649	Other AC instrument power problems
Pumped Storage/Hydro	Balance of Plant	Electrical		3650	DC instrument power battery chargers
Pumped Storage/Hydro	Balance of Plant	Electrical		3651	DC circuit breakers
Pumped Storage/Hydro	Balance of Plant	Electrical		3652	DC conductors and buses
Pumped Storage/Hydro	Balance of Plant	Electrical		3653	DC protection devices
Pumped Storage/Hydro	Balance of Plant	Electrical		3659	Other DC power problems
Pumped Storage/Hydro	Balance of Plant	Electrical		3660	4000-7000 volt transformers
Pumped Storage/Hydro	Balance of Plant	Electrical		3661	4000-7000 volt circuit breakers
Pumped Storage/Hydro	Balance of Plant	Electrical		3662	4000-7000 volt conductors and buses
Pumped Storage/Hydro	Balance of Plant	Electrical		3663	4000-7000 volt insulators
Pumped Storage/Hydro	Balance of Plant	Electrical		3664	4000-7000 volt protection devices
Pumped Storage/Hydro	Balance of Plant	Electrical		3669	Other 4000-7000 volt problems
Pumped Storage/Hydro	Balance of Plant	Electrical		3670	12-15kV transformers
Pumped Storage/Hydro	Balance of Plant	Electrical		3671	12-15kV circuit breakers
Pumped Storage/Hydro	Balance of Plant	Electrical		3672	12-15kV conductors and buses
Pumped Storage/Hydro	Balance of Plant	Electrical		3673	12-15kV insulators
Pumped Storage/Hydro	Balance of Plant	Electrical		3674	12-15kV protection devices

TABLE B15-8 Balance of Plant: Electrical					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	Balance of Plant	Electrical		3679	Other 12-15kV problems
Pumped Storage/Hydro	Balance of Plant	Electrical		3680	Other voltage transformers
Pumped Storage/Hydro	Balance of Plant	Electrical		3681	Other voltage circuit breakers
Pumped Storage/Hydro	Balance of Plant	Electrical		3682	Other voltage conductors and buses
Pumped Storage/Hydro	Balance of Plant	Electrical		3683	Other voltage insulators
Pumped Storage/Hydro	Balance of Plant	Electrical		3684	Other voltage protection devices
Pumped Storage/Hydro	Balance of Plant	Electrical		3689	Other voltage problems
Pumped Storage/Hydro	Balance of Plant	Electrical		3690	Station Service Power Distribution System, General
Notes: 1) For use with Unit Codes 500-599 and 900-999.					

TABLE B15-9 Balance of Plant: Miscellaneous (Balance of Plant)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	Balance of Plant	Miscellaneous (Balance of Plant)		3950	Process computer
Pumped Storage/Hydro	Balance of Plant	Miscellaneous (Balance of Plant)		3970	Distributive Control System (DCS) - process computer
Pumped Storage/Hydro	Balance of Plant	Miscellaneous (Balance of Plant)		3971	DCS - data highway
Pumped Storage/Hydro	Balance of Plant	Miscellaneous (Balance of Plant)		3972	DCS - hardware problems (including card failure)
Pumped Storage/Hydro	Balance of Plant	Miscellaneous (Balance of Plant)		3973	DCS - internal and termination wiring
Pumped Storage/Hydro	Balance of Plant	Miscellaneous (Balance of Plant)		3974	DCS - logic problems
Pumped Storage/Hydro	Balance of Plant	Miscellaneous (Balance of Plant)		3975	DCS - upgrades
Pumped Storage/Hydro	Balance of Plant	Miscellaneous (Balance of Plant)		3979	Other DCS problems
Pumped Storage/Hydro	Balance of Plant	Miscellaneous (Balance of Plant)		3980	Programmable Logic Controller (PLC)
Pumped Storage/Hydro	Balance of Plant	Miscellaneous (Balance of Plant)		3981	PLC - data highway
Pumped Storage/Hydro	Balance of Plant	Miscellaneous (Balance of Plant)		3982	PLC - hardware problems (including card failure)
Pumped Storage/Hydro	Balance of Plant	Miscellaneous (Balance of Plant)		3983	PLC - internal and termination wiring
Pumped Storage/Hydro	Balance of Plant	Miscellaneous (Balance of Plant)		3984	PLC - logic problems
Pumped Storage/Hydro	Balance of Plant	Miscellaneous (Balance of Plant)		3985	PLC - upgrades
Pumped Storage/Hydro	Balance of Plant	Miscellaneous (Balance of Plant)		3989	Other PLC problems
Pumped Storage/Hydro	Balance of Plant	Miscellaneous (Balance of Plant)		3999	Other miscellaneous balance of plant problems
Notes: 1) For use with Unit Codes 500-599 and 900-999.					

TABLE B15-10 Balance of Plant: Power Station Switchyard					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	Balance of Plant	Power Station Switchyard		3700	Power Station switchyard (non generating unit equipment)

TABLE B15-10 Balance of Plant: Power Station Switchyard					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	Balance of Plant	Power Station Switchyard		3710	Transmission line (connected to powerhouse switchyard to 1st Substation)
Pumped Storage/Hydro	Balance of Plant	Power Station Switchyard		3720	Transmission equipment at the 1st substation (see code 9300 if applicable)
Pumped Storage/Hydro	Balance of Plant	Power Station Switchyard		3730	Transmission equipment beyond the 1st substation (see code 9300 if applicable)
Notes: 1) For use with Unit Codes 500-599 and 900-999.					

EXTERNAL

Use this set of codes to report events caused by external factors (flood, lightning, etc.); economic factors (lack of fuel, labor strikes, etc.); operator training; and transmission system problems external to the plant.

TABLE B15-11 External: Catastrophe					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	External	Catastrophe		9000	Flood
Pumped Storage/Hydro	External	Catastrophe		9001	Drought
Pumped Storage/Hydro	External	Catastrophe		9010	Fire including wildfires, not related to a specific component
Pumped Storage/Hydro	External	Catastrophe		9020	Lightning
Pumped Storage/Hydro	External	Catastrophe		9025	Geomagnetic disturbance
Pumped Storage/Hydro	External	Catastrophe		9030	Earthquake
Pumped Storage/Hydro	External	Catastrophe		9031	Tornado
Pumped Storage/Hydro	External	Catastrophe		9035	Hurricane
Pumped Storage/Hydro	External	Catastrophe		9036	Storms (ice, snow, etc)
Pumped Storage/Hydro	External	Catastrophe		9040	Other catastrophe
Pumped Storage/Hydro	External	Catastrophe		9090	Physical Security Incident
Pumped Storage/Hydro	External	Catastrophe		9091	Physical Security Incident (OMC)
Pumped Storage/Hydro	External	Catastrophe		9092	Cyber Security Incident
Pumped Storage/Hydro	External	Catastrophe		9093	Cyber Security Incident (OMC)
Notes: 1) For use with Unit Codes 500-599 and 900-999.					

TABLE B15-12 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	External	Economic		0000	Reserve shutdown
Pumped Storage/Hydro	External	Economic		9130	Failure of fuel supplier to fulfill contractual obligations or a pre-arranged deal due to physical fuel disruptions or operational impairments (e.g. force majeure on a

TABLE B15-12 External: Economic					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
					pipeline or compressor down; making the pipeline incapable of making its firm deliveries.)
Pumped Storage/Hydro	External	Economic		9135	Lack of water
Pumped Storage/Hydro	External	Economic		9137	Ground water or other water supply problems
Pumped Storage/Hydro	External	Economic		9138	High Water Level in Tailrace (too much water)
Pumped Storage/Hydro	External	Economic		9139	Ground water or other water supply problems(OMC)
Pumped Storage/Hydro	External	Economic		9140	Plant modifications to burn different fuel that are not regulatory mandated
Pumped Storage/Hydro	External	Economic		9150	Labor strikes company-wide problems or strikes outside the company's jurisdiction such as manufacturers (delaying repairs) or transportation (fuel supply) problems.
Pumped Storage/Hydro	External	Economic		9151	Labor strikes direct plant management grievances that result in a walkout or strike are under plant management control.
Pumped Storage/Hydro	External	Economic		9160	Other economic problems
Pumped Storage/Hydro	External	Economic		9180	Economic (for internal use at plants only)
Pumped Storage/Hydro	External	Economic		9181	Economic (for internal use at plants only)
Pumped Storage/Hydro	External	Economic		9182	Economic (for internal use at plants only)
Pumped Storage/Hydro	External	Economic		9183	Economic (for internal use at plants only)
Pumped Storage/Hydro	External	Economic		9184	Economic (for internal use at plants only)
Pumped Storage/Hydro	External	Economic		9185	Economic (for internal use at plants only)
Pumped Storage/Hydro	External	Economic		9186	Economic (for internal use at plants only)
Pumped Storage/Hydro	External	Economic		9187	Economic (for internal use at plants only)
Pumped Storage/Hydro	External	Economic		9188	Economic (for internal use at plants only)
Pumped Storage/Hydro	External	Economic		9189	Economic (for internal use at plants only)
Pumped Storage/Hydro	External	Economic		9190	Economic (for internal use at plants only)
Pumped Storage/Hydro	External	Economic		9191	Economic (for internal use at plants only)
Pumped Storage/Hydro	External	Economic		9192	Economic (for internal use at plants only)
Pumped Storage/Hydro	External	Economic		9193	Economic (for internal use at plants only)
Pumped Storage/Hydro	External	Economic		9194	Economic (for internal use at plants only)
Pumped Storage/Hydro	External	Economic		9195	Economic (for internal use at plants only)
Pumped Storage/Hydro	External	Economic		9196	Economic (for internal use at plants only)
Pumped Storage/Hydro	External	Economic		9197	Economic (for internal use at plants only)
Pumped Storage/Hydro	External	Economic		9198	Economic (for internal use at plants only)
Pumped Storage/Hydro	External	Economic		9199	Economic (for internal use at plants only)
Notes: 1) For use with Unit Codes 500-599 and 900-999.					

TABLE B15-13 External: Miscellaneous (External)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	External	Miscellaneous (External)		9300	Transmission system problems other than catastrophes (do not include switchyard problems in this category; see codes 3600 to 3629, 3720 to 3730)
Pumped Storage/Hydro	External	Miscellaneous (External)		9310	Operator training
Pumped Storage/Hydro	External	Miscellaneous (External)		9320	Other miscellaneous external problems
Pumped Storage/Hydro	External	Miscellaneous (External)		9340	Synchronous Condenser Operation
Pumped Storage/Hydro	External	Miscellaneous (External)		9345	Pumping Operations
Pumped Storage/Hydro	External	Miscellaneous (External)		9350	Public Safety (water hazard or river rescue)
Notes: 1) For use with Unit Codes 500-599 and 900-999.					

GENERATOR

This set of codes contains the generator, exciter, generator cooling systems, and generator controls. Note the main leads up to and includes the generator output breaker in this set of codes.

TABLE B15-14 Generator: Controls					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	Generator	Controls		4700	Generator voltage control
Pumped Storage/Hydro	Generator	Controls		4710	Generator metering devices
Pumped Storage/Hydro	Generator	Controls		4720	Generator synchronization equipment
Pumped Storage/Hydro	Generator	Controls		4730	Generator current and potential transformers
Pumped Storage/Hydro	Generator	Controls		4740	Emergency generator trip devices
Pumped Storage/Hydro	Generator	Controls		4741	Frequency Trip (81 relay)
Pumped Storage/Hydro	Generator	Controls		4750	Other generator controls and metering problems
Notes: 1) For use with Unit Codes 500-599 and 900-999.					

TABLE B15-15 Generator: Cooling System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	Generator	Cooling System		4610	Hydrogen cooling system piping and valves
Pumped Storage/Hydro	Generator	Cooling System		4611	Hydrogen coolers
Pumped Storage/Hydro	Generator	Cooling System		4612	Hydrogen storage system
Pumped Storage/Hydro	Generator	Cooling System		4613	Hydrogen seals
Pumped Storage/Hydro	Generator	Cooling System		4619	Other hydrogen system problems
Pumped Storage/Hydro	Generator	Cooling System		4620	Air cooling system
Pumped Storage/Hydro	Generator	Cooling System		4630	Liquid cooling system
Pumped Storage/Hydro	Generator	Cooling System		4640	Seal oil system and seals
Pumped Storage/Hydro	Generator	Cooling System		4650	Other cooling system problems

TABLE B15-15 Generator: Cooling System					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Notes: 1) For use with Unit Codes 500-599 and 900-999. 2) Report failures caused by water leaks into generator as codes 4500, 4510, etc.					

TABLE B15-16 Generator: Exciter					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	Generator	Exciter		4600	Exciter drive - motor
Pumped Storage/Hydro	Generator	Exciter		4601	Exciter field rheostat
Pumped Storage/Hydro	Generator	Exciter		4602	Exciter commutator and brushes
Pumped Storage/Hydro	Generator	Exciter		4603	Solid state exciter element
Pumped Storage/Hydro	Generator	Exciter		4604	Exciter drive - shaft
Pumped Storage/Hydro	Generator	Exciter		4605	Exciter transformer
Pumped Storage/Hydro	Generator	Exciter		4609	Other exciter problems
Notes: 1) For use with Unit Codes 500-599 and 900-999.					

TABLE B15-17 Generator: Generator					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	Generator	Generator		4500	Rotor windings (including damper windings and fan blades on hydro units)
Pumped Storage/Hydro	Generator	Generator		4510	Rotor collector rings
Pumped Storage/Hydro	Generator	Generator		4511	Rotor, General
Pumped Storage/Hydro	Generator	Generator		4512	Retaining Rings
Pumped Storage/Hydro	Generator	Generator		4520	Stator windings, bushings, and terminals
Pumped Storage/Hydro	Generator	Generator		4530	Stator core iron
Pumped Storage/Hydro	Generator	Generator		4535	Stator, General
Pumped Storage/Hydro	Generator	Generator		4536	Generator Heaters
Pumped Storage/Hydro	Generator	Generator		4540	Brushes and brush rigging
Pumped Storage/Hydro	Generator	Generator		4550	Generator bearings and lube oil system (including thrust bearings on hydro units)
Pumped Storage/Hydro	Generator	Generator		4551	Generator bearings
Pumped Storage/Hydro	Generator	Generator		4552	Generator lube oil system
Pumped Storage/Hydro	Generator	Generator		4555	Bearing cooling system
Pumped Storage/Hydro	Generator	Generator		4560	Generator vibration (excluding vibration due to failed bearing and other components)
Pumped Storage/Hydro	Generator	Generator		4570	Generator casing
Pumped Storage/Hydro	Generator	Generator		4580	Generator end bells and bolting
Pumped Storage/Hydro	Generator	Generator		4590	Generator brakes
Notes: 1) For use with Unit Codes 500-599 and 900-999.					

TABLE B15-18 Generator: Miscellaneous (Generator)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	Generator	Miscellaneous (Generator)		4800	Generator main leads
Pumped Storage/Hydro	Generator	Miscellaneous (Generator)		4805	Generator Bus Duct Cooling System
Pumped Storage/Hydro	Generator	Miscellaneous (Generator)		4810	Generator output breaker
Pumped Storage/Hydro	Generator	Miscellaneous (Generator)		4830	Major generator overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-CCGT-2)
Pumped Storage/Hydro	Generator	Miscellaneous (Generator)		4831	Minor generator overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-CCGT-2)
Pumped Storage/Hydro	Generator	Miscellaneous (Generator)		4840	Inspection
Pumped Storage/Hydro	Generator	Miscellaneous (Generator)		4841	Generator doble testing
Pumped Storage/Hydro	Generator	Miscellaneous (Generator)		4842	Reactive and capability testing
Pumped Storage/Hydro	Generator	Miscellaneous (Generator)		4850	Core monitor alarm
Pumped Storage/Hydro	Generator	Miscellaneous (Generator)		4860	Generator neutral grounding equipment
Pumped Storage/Hydro	Generator	Miscellaneous (Generator)		4899	Other miscellaneous generator problems
Notes: 1) For use with Unit Codes 500-599 and 900-999.					

HYDRO TURBINE/PUMP

TABLE B15-19 Hydro Turbine/Pump: Miscellaneous (Hydro Turbine/Pump)					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	Hydro Turbine/Pump	Miscellaneous (Hydro Turbine/Pump)		7200	Major overhaul (use for non-specific overhaul only; see page B-CCGT-2)
Pumped Storage/Hydro	Hydro Turbine/Pump	Miscellaneous (Hydro Turbine/Pump)		7201	Inspection
Pumped Storage/Hydro	Hydro Turbine/Pump	Miscellaneous (Hydro Turbine/Pump)		7210	Canals (including siphons, radial gates, and spills)
Pumped Storage/Hydro	Hydro Turbine/Pump	Miscellaneous (Hydro Turbine/Pump)		7220	Unit out of service due to common penstock with unit under repair
Pumped Storage/Hydro	Hydro Turbine/Pump	Miscellaneous (Hydro Turbine/Pump)		7230	Pony motor (pumped storage units only)
Pumped Storage/Hydro	Hydro Turbine/Pump	Miscellaneous (Hydro Turbine/Pump)		7240	Powerhouse substructure
Pumped Storage/Hydro	Hydro Turbine/Pump	Miscellaneous (Hydro Turbine/Pump)		7299	Other miscellaneous hydro turbine/pump problems (use generator codes and balance of plant electrical and auxiliary codes as appropriate)
Pumped Storage/Hydro	Hydro Turbine/Pump	Miscellaneous (Hydro Turbine/Pump)		7300	Routine Hydro Planned Outage (reoccurring schedule) (Use 4840 or 7201 for specific inspections.)
Notes: 1) For use with Unit Codes 500-599 and 900-999.					

TABLE B15-20 Hydro Turbine/Pump: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	Hydro Turbine/Pump	Turbine		7000	Shaft

TABLE B15-20 Hydro Turbine/Pump: Turbine					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	Hydro Turbine/Pump	Turbine		7001	Shaft packing
Pumped Storage/Hydro	Hydro Turbine/Pump	Turbine		7003	Lube oil system (use code 7007 to report bearing failures due to lube oil problems)
Pumped Storage/Hydro	Hydro Turbine/Pump	Turbine		7007	Bearings
Pumped Storage/Hydro	Hydro Turbine/Pump	Turbine		7008	Bearing cooling system
Pumped Storage/Hydro	Hydro Turbine/Pump	Turbine		7009	Bearing oil system
Pumped Storage/Hydro	Hydro Turbine/Pump	Turbine		7010	Runner cavitation damage
Pumped Storage/Hydro	Hydro Turbine/Pump	Turbine		7011	Other runner problems
Pumped Storage/Hydro	Hydro Turbine/Pump	Turbine		7012	Casing, wear ring, or liner cavitation damage
Pumped Storage/Hydro	Hydro Turbine/Pump	Turbine		7014	Blade or bucket cracking
Pumped Storage/Hydro	Hydro Turbine/Pump	Turbine		7020	Nozzle assembly
Pumped Storage/Hydro	Hydro Turbine/Pump	Turbine		7030	Vibration (Only for unbalance, report bearing failure, etc., in appropriate category)
Pumped Storage/Hydro	Hydro Turbine/Pump	Turbine		7040	Turbine overhaul
Pumped Storage/Hydro	Hydro Turbine/Pump	Turbine		7050	Turbine governor
Pumped Storage/Hydro	Hydro Turbine/Pump	Turbine		7052	Other turbine control problems (Report specific wicket gate controls, etc., using the code for the appropriate equipment item.)
Pumped Storage/Hydro	Hydro Turbine/Pump	Turbine		7053	Governor oil system
Pumped Storage/Hydro	Hydro Turbine/Pump	Turbine		7070	Speed Increaser
Pumped Storage/Hydro	Hydro Turbine/Pump	Turbine		7099	Other turbine problems
Notes: 1) For use with Unit Codes 500-599 and 900-999.					

TABLE B15-21 Hydro Turbine/Pump: Water Supply/Discharge					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	Hydro Turbine/Pump	Water Supply/Discharge		7100	Upper reservoir dams and dikes
Pumped Storage/Hydro	Hydro Turbine/Pump	Water Supply/Discharge		7101	Lower reservoir dams and dikes
Pumped Storage/Hydro	Hydro Turbine/Pump	Water Supply/Discharge		7102	Auxiliary reservoir dams and dikes
Pumped Storage/Hydro	Hydro Turbine/Pump	Water Supply/Discharge		7110	Intake channel or flume (including trash racks)
Pumped Storage/Hydro	Hydro Turbine/Pump	Water Supply/Discharge		7111	Intake tunnel
Pumped Storage/Hydro	Hydro Turbine/Pump	Water Supply/Discharge		7112	Ice blockages at intake structures including frazil ice, sheets, blocks of ice, etc.
Pumped Storage/Hydro	Hydro Turbine/Pump	Water Supply/Discharge		7120	Headgates
Pumped Storage/Hydro	Hydro Turbine/Pump	Water Supply/Discharge		7121	Shutoff valves
Pumped Storage/Hydro	Hydro Turbine/Pump	Water Supply/Discharge		7123	Shutoff valve bypass line and valve

TABLE B15-21 Hydro Turbine/Pump: Water Supply/Discharge					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	Hydro Turbine/Pump	Water Supply/Discharge		7124	Penstock
Pumped Storage/Hydro	Hydro Turbine/Pump	Water Supply/Discharge		7130	Spiral case
Pumped Storage/Hydro	Hydro Turbine/Pump	Water Supply/Discharge		7140	Wicket gate assembly
Pumped Storage/Hydro	Hydro Turbine/Pump	Water Supply/Discharge		7141	Wicket gate operating mechanism or positioner
Pumped Storage/Hydro	Hydro Turbine/Pump	Water Supply/Discharge		7142	Wicket gate shear pin
Pumped Storage/Hydro	Hydro Turbine/Pump	Water Supply/Discharge		7150	Stay vanes
Pumped Storage/Hydro	Hydro Turbine/Pump	Water Supply/Discharge		7160	Pressure regulating valve
Pumped Storage/Hydro	Hydro Turbine/Pump	Water Supply/Discharge		7161	Pressure regulating valve operator or positioner
Pumped Storage/Hydro	Hydro Turbine/Pump	Water Supply/Discharge		7162	Relief valve and vacuum breakers
Pumped Storage/Hydro	Hydro Turbine/Pump	Water Supply/Discharge		7170	Draft tube
Pumped Storage/Hydro	Hydro Turbine/Pump	Water Supply/Discharge		7180	Tailrace
Pumped Storage/Hydro	Hydro Turbine/Pump	Water Supply/Discharge		7181	Tail water depressing equipment
Pumped Storage/Hydro	Hydro Turbine/Pump	Water Supply/Discharge		7190	Dewatering and rewatering equipment
Pumped Storage/Hydro	Hydro Turbine/Pump	Water Supply/Discharge		7191	Equalizing line
Pumped Storage/Hydro	Hydro Turbine/Pump	Water Supply/Discharge		7199	Other water supply/discharge problems (use for equipment related problems; use codes 9135 or 9320 for lack of water or discharge limit related problems)
Notes: 1) For use with Unit Codes 500-599 and 900-999.					

INACTIVE STATES

TABLE B15-22 Inactive States: Inactive States					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	Inactive States	Inactive States		2	Inactive Reserve Shutdown
Pumped Storage/Hydro	Inactive States	Inactive States		9990	Retired unit
Pumped Storage/Hydro	Inactive States	Inactive States		9991	Mothballed unit
Notes: 1) For use with Unit Codes 500-599 and 900-999.					

PERFORMANCE

TABLE B15-23 Performance: Performance					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	Performance	Performance		9997	NERC Reliability Standard Requirement
Pumped Storage/Hydro	Performance	Performance		9998	Black start testing

TABLE B15-23 Performance: Performance					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	Performance	Performance		9999	Total unit performance testing (use appropriate codes for individual component testing)
Notes: 1) For use with Unit Codes 500-599 and 900-999.					

PERSONNEL OR PROCEDURAL ERRORS

TABLE B15-24 Personnel or Procedural Errors: Personnel or Procedural Errors					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	Personnel or Procedural Errors	Personnel or Procedural Errors		9900	Operator error
Pumped Storage/Hydro	Personnel or Procedural Errors	Personnel or Procedural Errors		9910	Maintenance personnel error
Pumped Storage/Hydro	Personnel or Procedural Errors	Personnel or Procedural Errors		9920	Contractor error
Pumped Storage/Hydro	Personnel or Procedural Errors	Personnel or Procedural Errors		9930	Operating procedure error
Pumped Storage/Hydro	Personnel or Procedural Errors	Personnel or Procedural Errors		9940	Maintenance procedure error
Pumped Storage/Hydro	Personnel or Procedural Errors	Personnel or Procedural Errors		9950	Contractor procedure error
Pumped Storage/Hydro	Personnel or Procedural Errors	Personnel or Procedural Errors		9960	Staff shortage
Notes: 1) For use with Unit Codes 500-599 and 900-999.					

REGULATORY, SAFETY, ENVIRONMENTAL

Use these codes only for events not directly attributable to equipment failures. Inspections or testing of certain equipment due to regulation are reported using the appropriate equipment cause codes, and the fact that it was a regulatory requirement noted in the verbal description section.

TABLE B15-25 Regulatory, Safety, Environmental: Other Operating Environmental Limitations					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9676	Noise limits (not for personnel safety) - hydro and pumped storage
Pumped Storage/Hydro	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9686	Fish kill - hydro and pumped storage
Pumped Storage/Hydro	Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9696	Other miscellaneous operational environmental limits - hydro and pumped storage
Notes: 1) For use with Unit Codes 500-599 and 900-999.					

TABLE B15-26 Regulatory, Safety, Environmental: Regulatory					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	Regulatory, Safety, Environmental	Regulatory		9504	Regulatory (environmental) proceedings and hearings - regulatory agency initiated
Pumped Storage/Hydro	Regulatory, Safety, Environmental	Regulatory		9506	Regulatory (environmental) proceedings and hearings - intervenor initiated
Pumped Storage/Hydro	Regulatory, Safety, Environmental	Regulatory		9510	Plant modifications strictly for compliance with new or changed regulatory requirements (scrubbers, cooling towers, etc.)
Pumped Storage/Hydro	Regulatory, Safety, Environmental	Regulatory		9520	Oil spill in Gulf of Mexico (OMC)
Pumped Storage/Hydro	Regulatory, Safety, Environmental	Regulatory		9590	Miscellaneous regulatory (this code is primarily intended for use with event contribution code 2 to indicate that a regulatory-related factor contributed to the primary cause of the event)
Notes: 1) For use with Unit Codes 500-599 and 900-999.					

TABLE B15-27 Regulatory, Safety, Environmental: Safety					
UNIT TYPE	**SYSTEM**	**COMPONENT**	**SUB-COMPONENT**	**CAUSE CODE**	**DESCRIPTION**
Pumped Storage/Hydro	Regulatory, Safety, Environmental	Safety		9700	OSHA-related retrofit or inspection
Pumped Storage/Hydro	Regulatory, Safety, Environmental	Safety		9720	Other safety problems
Notes: 1) For use with Unit Codes 500-599 and 900-999.					

Appendix C: Utility Identification Codes

Utility Identification Code

NERC assigns each utility participating in the Generating Availability Data System (GADS) a unique identification code. This three digit code allows each system's data to be uniquely catalogued and filed in the database. This appendix contains a list of the codes for each utility system presently participating or assigned a NERC-GADS utility code.

Northeast Power Coordinating Council (NPCC)

Northeast Power Coordinating Council
1040 Avenue of the Americas (6th Avenue)
4th Floor
New York, New York 10018

212-840-1070; 212-921-1040

NPCC	
Utility Code	**Utility Name**
004	NB Power
043	Nova Scotia Power
098	Dynegy Generation
100	Brookfield Power
102	Constellation Energy
105	Central Maine Power Company
107	Connecticut Light And Power Co.
108	Consolidated Edison Co. Of New York, Inc.
108	Astoria Energy, LLC
108	Astoria Energy II LLC
109	Glenwood Energy Center
110	Port Jefferson Energy Center
113	National Grid
115	Transcanada
117	Somerset Operating Company
120	New York Power Authority
121	Public Service Of New Hampshire
126	Mass. Municipal Wholesale Elec. Co.
127	Dominion Nuclear Connecticut
130	Covanta SEMASS
131	Exelon New England Holding, LLC
132	Hawkeye Energy Greenport
133	NextEra Energy Resources
136	Mirant New England
137	Ocean State Power
141	NRG Energy - New England
145	Berkshire Power Company
147	Braintree Electric Light Department
149	Milford Power Company
150	Connecticut Municipal Electric Energy Coop.
151	US Power Generating Company
152	NRG Energy - New York
155	Calpine Corporation
161	Wallingford Energy, LLC
164	EP Energy Massachusetts LLC
164	EP Newington Energy

NPCC	
Utility Code	**Utility Name**
167	Taunton Municipal Light
170	Masspower
173	NextEra Energy Seabrook
175	Wheelabrator Millbury, Inc.
176	Wheelabrator Technologies, Inc.
190	FirstLight Hydro Generating Company
191	PS&H Ipps
192	ReEnergy Stratton Lp
194	NextEra Energy Resources
197	Peabody Municipal Light
1A0	Brookfield Power (NYISO)
1A1	Brookfield Power
1A2	Morris Energy
1A3	Rensselaer Cogeneration LLC
1A4	NAES Corporation-Kleen Energy Systems
1A6	Cogen Technologies
1A7	Selkirk Cogen Partners, L.P.
1A9	Bayonne Energy Center
1B3	Allegany Generating Station
1B4	Wheelabrator Bridgeport, L.P.
1B6	Velco 182
1B8	Dartmouth Power Associates
1B9	Lockport Energy Associates
1C1	Tiverton Power Inc.
1C5	Fortistar North Tonawanda
1C8	AP (Curtis Palmer)
1D1	Waterside Power, LLC
1D2	Indeck – Silver Springs
1D3	Entergy Wholesale Commodities
1D9	ReEnergy Black River
1E2	Indeck-Corinth LP
1E5	CCI Roseton LLC
1E8	Plainfield Renewable Energy
1E9	New Athens
1F2	Indeck-Olean LP
1F5	Kendall Green Energy
1F6	Danskammer Energy
1F8	Bucksport Generation
1F9	SBF New York
1G1	Pixelle Energy Services LLC
1G2	Indeck-Oswego LP
1G3	L'Energia Energy Center
1G5	Footprint Power Salem Harbor Development
1G7	Helix Ravenswood
1G8	CPV Valley
1G9	CPV Towantic

NPCC	
Utility Code	**Utility Name**
1H1	Penobscot Energy Recovery Company
1H2	Indeck-Yerkes LP
1H3	Pittsfield Generating Company LP
1H4	Canal Station
1H5	Manchester Street
1H6	GSP Schiller
1H7	GSP Newington
1H8	GSP Merrimack
1J2	Jamestown Board of Utilites
1J4	Vermont Public Power Supply Authority
1J5	Cricket Valley Energy Center
1J6	RED-Rochester
1J8	Devon Power
1J9	Cos Cob Power
1K4	Middletown Power
1K5	Montville Power
1K6	Arthur Kill Power
1K7	New Haven Harbor
1K8	Bridgeport Harbor
1K9	Bethlehem Energy Center
1L2	Carthage Energy LLC
1L3	Lake Road Generating Company, LP
1L4	Canal Generating
1L5	Bowline
1L6	Greenidge Generation
1L7	Marco DM Holding
1M3	Burlington Electric Department
1N1	Saranac Energy
1N2	Seneca Power Partners, L.P.
1N3	Firstlight Hydro Generating Company
1P3	Rumford Power Inc.
1Q1	CLI Energy Center
1Q2	Dynegy Generation
1R2	Sterling Power Partners, L.P.
1R3	Millennium Power Partners L.P.
1S1	Empire Generating Co, LLC
1S3	Waterbury Generation
1T1	Bridgeport Energy LLC
1T2	Wheelabrator Westchester Inc
1W2	Shoreham Energy LL
1X2	Edgewood Energy LLC
1Y2	Equus Power LP 1
1Z1	Castleton Power, LLC
1Z2	Pinelawn Power LLC

ReliabilityFirst (RF)

ReliabilityFirst
3 Summit Park Drive, Suite 600
Cleveland, Ohio 44131

216-503-0660

RF	
Utility Code	**Utility Name**
200	Safe Harbor Water Power Corporation - Brookfield Utility
201	Conectiv (AE)
202	Constellation Energy
202	Constellation Maryland Peaker Fleet
203	Delaware Municipal Utilities
205	Jersey Central Power & Light Company
207	Forked River Power
208	First Energy (Metropolitan Edison Company)
209	Vineland Municipal Electric Utilities
210	Panda Brandywine LP
211	First Energy (Pennnsylvania Electric Company)
212	PPL Generation Co
213	Exelon Generation Co., LLC (Philadelphia Electric Company)
215	Public Service Electric And Gas Co.
216	UGI Corporation
218	Horthampton
222	PEI Power Corp.
223	Nextera Energy Resources
223	Wisconsin Electric Power Co.
230	Integrys Energy Services
234	Commonwealth Chesapeake
235	GenOn Energy
236	Genon Energy (East)
237	Genon Energy (Central)
238	Genon Energy (West)
242	NRG Energy - Mid Atlantic
244	Convanta Energy
248	Old Dominion Electric Cooperative
249	AES Energy
250	Calpine Corporation
251	Delaware City Refining Company
254	East Coast Power
256	Newmarket Power Company, LLC
257	Liberty Electric Power, LLC.
260	Ontelaunee Power Operating Co.
262	Brookfield Power
263	Sunbury Generation LP
270	EFS Parlin

RF	
Utility Code	**Utility Name**
280	Eagle Point Power Generation, LLC
281	Covanta Essex
282	Scrubgrass Generating Company
284	USACE – Detroit District
288	Northeast Maryland
290	Brandon Shores LLC
292	H.A. Wagner LLC
294	Wheelabrator Baltimore, L.P.
297	Seneca Generation, LLC (LS Power)
298	West Deptford Energy
2A2	Invenergy Nelson
2A3	Newark Energy Center
2A4	CPV Shore
2A7	Panda Liberty
2A8	Wabash Valley Power Association
2A9	Panda Patriot LLC
2B1	CPV Maryland,
2B2	Lightstone Generation
2B4	Oregon Clean Energy, LLC
2B5	Troy Energy, LLC
2B6	Armstrong Power
2B7	Helix Ironwood
2B8	Carroll County Energy
2B9	Middleton Energy Center
2C1	Moxie Freedom
2C2	Lackawanna Energy Center
2C3	Buchanan Generation
2C4	Essential Power
2C5	Lakewood Generation
2C6	St Joseph Energy Center
2C8	Red Oak Power
2C9	Panda Hummel Station
2D1	Hunterstown Combined Cycle Generating Station
2D2	Upper Michigan Energy Resources Corporation
2D3	Rock Springs
2D4	Clean Energy Future – Lordstown
2D5	Westmoreland Generating Station
2D6	Walleye Power
2D7	Gen-on MidAtlantic
2D8	Fairless Energy
2D9	Vermillion Power
2E1	Seward Generation
2E2	Birdsborow Power
2E3	Garrison Energy Center
2E4	CPV Fairview
2E5	Montpeilier Generation Station

RF	
Utility Code	**Utility Name**
2E6	O.H. Hutchings CT
2E7	Tait Electric Generating Station
2E8	Yankee Street
2E9	Hickory Run Energy
2F1	Energy Harbor Generation
2F2	Energy Harbor Nuclear Generation
2F3	Yards Creek Energy
2F5	Hill top Energy Center
2F6	South Field Energy
2F7	Long Ridge Energy
2F9	Racine Hydro
2G1	Jackson Generation
2G2	Shell Chemicals Appalachia
2G3	Indeck Niles
2G4	Hallador Energy
2G5	Burlington Generating Station
2G6	Kearney Generating Station
2G7	Bergen Generating Station
2G8	Sewaren Generating Station
2H2	Guernsey Power Station
2H4	Keys Energy Center
2H4	KeyCon Generating
2H5	CPV Three Rivers
325	Warrick
394	Wheelabrator Portsmouth
400	Duke Energy Commercial Asset Management
401	Appalachian Power Co. (AEP)
406	Consumers Energy
408	Detroit Edison Co.
411	Indiana Michigan Power Company (AEP)
412	Indiana-Kentucky Electric Corp. (OVEC)
413	Indianapolis Power & Light Company
414	Kentucky Power Company (AEP)
417	FirstEnergy – Regulated NUG's
418	Northern Indiana Public Service Co.
421	Ohio Valley Electric Corp. (OVEC)
425	Vectren Power Supply
427	Allegheny Energy Supply
430	Cinergy
431	Genon Energy (Reliant Energy Midwest)
437	Duke Energy Trading
441	American Municipal Power-Ohio, Inc
442	Indiana Municipal Power Agency (IMPA)
445	LS Power
447	Hoosier Energy

RF	
Utility Code	**Utility Name**
449	Tenaska
449	Rolling Hills Generating, L.L.C
449	Wolf Hills Energy, LLC
450	Buckeye Power
454	Midland Cogeneration Venture, L.P.
458	CMS Enterprise
458	Dearborn Industrial Generation, L.L.C
458	Consumers Energy
459	Whiting Clean Energy
470	City of Lansing Board Of Water & Light
472	GenPower Services LLC/Longview Power
476	Richland Stryker Generation
499	AEP Generation Resources Inc
501	University Park Energy, LLC
502	Cordova Energy Company
505	Wheelabrator Falls
506	Exelon Generation , LLC
510	Edison Mission Energy
512	Wheeling Power Co. (AEP)
518	LS Power (University Park North)
521	Wisconsin Electric Power Company
523	Wisconsin Public Service
524	Calpine
526	Genon Energy (RRI Energy)
527	Duke Energy Trading
529	Lincoln Generating Facility, LLC
531	Tenaska (Crete)
532	Exelon Generation , Llc
534	LS Power (Kendall)
535	NRG Energy
539	Fox Energy Company LLC
541	Wisonsin River Power Company
552	LSP-Whitewater L.P.
556	Rocky Road Power, LLC
631	Wolverine Power Supply Cooperative, Inc

SERC Reliability Corporation (SERC)

SERC Reliability Corporation
3701 Arco Corporate Drive, Suite 300
Charlotte, NC 28273

704-357-SERC(7372)

SERC	
Utility Code	**Utility Name**
301	Powersouth Energy Cooperative
302	Alabama Power Co. (SOCO)
303	Progress Energy Carolina
304	Southern Power
305	Tallahassee Electric Dept.
307	Duke Energy
308	Florida Power and Light Co.
309	Progress Energy - Florida
310	Shady Hills Power Company, LLC
311	Old Dominion Electric Cooperative
312	Georgia Power Co. (SOCO)
314	Jacksonville Electric Authority
315	Mississippi Power Co. (SOCO)
316	Municipal Electric Authority Of Georgia
317	GenOn Energy
319	South Carolina Electric & Gas Co.
320	So. Carolina Public Service Authority
321	So. Mississippi Electric Power Assoc.
324	Tampa Electric Co
325	Yadkin
326	Tennessee Valley Authority
328	Dominion Virginia Power
328	Covanta Fairfax
328	Spruane Genco
329	Constellation Energy
330	Seminole Electric Coop, Inc.
331	Oglethorpe Power Coop.
332	Calpine Corporation
338	Hardee Power Partners Limited
340	Tenaska
343	Florida Municipal Powe Agency
347	Lakeland Electric
349	Batesville Generating Facility (LSP Energy Lp)
354	Plum Point Energy
355	Vandolah Power Company
357	Sowega Power, LLC
358	Baconton Power, LLC
359	Hot Spring Power Company, LLC

SERC	
Utility Code	**Utility Name**
361	Choctaw Generation Limited Partnership
366	Occidental Chemical Corporation
371	Doswell Limited Partnership
372	Cherokee County Cogeneration Partners, LLC
373	Alabama Municipal Electric-Authority
376	Craven County Wood Energy Ltd Partnership
377	AL Sandersonville Power Plant
378	MPC Generating
379	Walton County Power
380	Washington County Power
381	South Eastern Generating Corporation
382	Lee County
383	Gainesville Regional Utilities
385	Dow Chemical Company Louisiana
386	Eagle US 2, LLC
392	City of Lake Worth Florida Utilities
396	Nextera Energy Resouces
397	Covanta Palm Beach Resource Recovery
410	East Kentucky Power Cooperative
415	Kentucky Utilities Company
416	Louisville Gas And Electric Co.
423	ExxonMobil Oil Corporation – Beaumont Refinery
428	North Carolina Electric Membership Corporation
429	ExxonMobil – Baton Rouge
467	Big Rivers Electric Corporation
475	East Texas Electric Cooperative
479	Mid Georgia Cogen L.P.
481	USACE Charleston District
482	USACE Fort Worth District
483	USACE Mobile District
484	USACE Nashville District
485	USACE Savannah District
486	USACE Wilmington District
488	Brookfield Smoky Mountain LLC
489	Broad River Energy LLC
490	Nelson Industrial Steam Company
491	Carville Energy
492	Decatur Energy Center
493	Santa Rosa Energy Center
494	Mobile Energy
495	Piedmont Green Power
497	Entergy Texas, Inc
4A3	Panda Stonewall, LLC
4A5	Sabine River Authority
4A6	Kings Mountain Energy Center
4A7	Dorchester Biomass, LLC

SERC	
Utility Code	**Utility Name**
4A8	South Boston Energy Center
4A9	Holland Energy
503	Ameren – Cilco
504	Ameren - CIPS
508	Dynegy Midwest Generation
514	Southern Illinois Power Coop.
516	City Water, Light & Power (Springfield)
517	Ameren - UE
526	GenOn Energy (RELIANT ENERGY)
545	Prairie Power, Inc
556	LS Power (Rocky Road)
700	Rain II Carbon
701	Arkansas Electric Cooperative Corporation
702	Lafayette Utilities System
703	Arkansas Power & Light Co. (Entergy)
704	Associated Electric Cooperative
708	Central Louisiana Electric Co.
711	Prairie State Generating Company
717	E.I. du Pont de Nemours and Company
721	Sikeston Board of Municipal Utilities
722	Louisiana Power & Light Co. (Entergy)
723	Mississippi Power & Light Co. (Entergy)
727	City of Alexandria, LA
728	New Orleans Public Service, Inc. (Entergy)
738	USACE – St. Louis District
739	System Energy Resources, Inc. (Entergy)
740	NRG - Louisiana Generating, LLC
741	USACE – Vickburg District
742	Clarksdale Public Utilities
743	LEPA
746	City Water & Light – Jonesboro Arkansas
756	Brookfield Power
832	Air Liquide Large Industries U.S., LP

Midwest Reliability Organization (MRO)

Midwest Reliability Organization
380 St. Peter St, Suite 800
St. Paul, Minnesota 55102

651-855-1760

MRO	
Utility Code	**Utility Name**
005	Manitoba Hydro-Electric Board
398	MEC Holdings
520	Madison Electric And Gas Co.
522	Alliant Energy
528	Kincaid Generation, LLC
533	Wisconsic Public Power Inc.
537	Morris Cogeneration LLC
540	Upper Peninsula Power Company
557	Marshfield Utilities
560	City Utilities of Springfield, MO
601	Basin Electric Power Coop., Inc.
605	Dairyland Power Coop.
607	Alliant Energy (Interstate Power)
608	Alliant Energy (IES Utilities)
609	Mid American Energy Co.
610	Mid American Energy Co.
611	Mid American Energy Co.
612	Alliant Energy (IES Utilities)
614	Lincoln Electric System
615	Otter Tail Power Company
616	Minnesota Power
617	Minnkota Power Coop., Inc.
618	Montana-Dakota Utilities Co.
619	Muscatine Power & Water
620	Nebraska Public Power District
621	Xcel Energy
622	Northwestern Energy
623	Omaha Public Power District
624	Great River Energy
625	U.S. Army Corp. Of Engineers – Omaha District
626	Missouri Basin / Missouri River Energy Services
627	Minnkota Power Coop., Inc.
630	Minnesota Municipal Power Agency
637	Invenergy Cannon Falls Energy Center
639	New Ulm Public Utilities
652	Marshall Municipal Utilities
656	Brookfield Power
658	Hastings Utilities

MRO	
Utility Code	**Utility Name**
659	City of Grand Island, NE
661	Rochester Public Utilities
666	RockGen Energy
667	Kansas City Board of Public Utilities
668	The Central Nebraska Public Power and Irrigation District
669	LSP – Cottage Grove
671	Rainbow Energy Center
706	Green County Energy LLC
707	Hobbs Generating Station
709	Denver City Energy Associates
714	Blackhawk Station
715	Empire District Electric Co.
716	Grand River Dam Authority
719	Westar Energy (KGE)
720	Westar Energy (KPL)
724	USACE – Little Rock District
726	PIC Group, Inc
729	Oklahoma Gas and Electric Co.
730	Public Service Co of Oklahoma (American Electric Power West)
731	Yoakum Electric Generating Cooperative
732	Southwestern Electric Generating Coop. (American Electric Power West)
733	Southwestern Power Administration
734	Xcel Energy
735	Sunflower Electric Coop., Inc.
736	USACE – Kansas City District
737	Western Farmers Electric Cooperative
744	Independence Power & Light
745	LCEC Generation
747	Oneta Power
748	Oklahoma Municipal Power Authority
749	Board of Public Utilities, City of McPherson, Kansas
757	Dogwood Energy LLC
759	Northeast Texas Electric Cooperative HCPP
859	Eastman Cogeneration
995	Heartland Consumers Power District

Texas Regional Entity (Texas RE)

Texas Reliability Entity
8000 Metropolis Drive, Building A, Suite 300
Austin, TX 78744

512-583-4900

Texas RE	
Utility Code	**Utility Name**
800	CCO (Equistar Chemical, LP)
801	Austin Energy
802	Exelon Generation, LLC
803	Constellation Energy
806	Tenaska
806	Kiowa Power Partners
809	Wolf Hollow LP
810	Calpine Corporation
812	Topaz Power Group
815	Channelview Cogeneration
819	Luminant Power
821	Power Resources Limited
825	Gregory Power Partners, L.P
826	Sweeny Cogen Limited Partnership
828	Garland Power & Light Co.
829	Oxy Vinyls LP
830	Ingleside Cogeneration LP
831	Victoria Power Station
832	Air Liquide Large Industries U.S. LP
833	South Houston Green Power
835	ExxonMobil Refining and Supply Company
836	South Texas Electric Cooperative, Inc.
837	Bryan Texas Utilities
840	NRG Texas, LLC
842	NRG Cedar Bayou Development LLC
843	Bastrop Energy Partners, LP
845	Paris Generation, LP
846	Formosa Utility Venture, Ltd
847	Sandy Creek Energy Station
848	Silas Ray
849	Petra Nova Parish Holdings LLC
850	OptimaEnergy Altura Cogen LLC
854	Lower Colorado River Authority
855	Panda Temple
856	Quail Run Energy Center
857	Ector County Energy
858	Nacogdoches Power LLC
861	Dynegy

Texas RE	
Utility Code	**Utility Name**
862	Texas Medical Center Central Heating and Cooling Services Corp
863	Port Comfort Power
864	Chamon Power
865	Colorado Bend I Power
866	LaPorte Power
867	Mountain Creek Power
868	CPS Energy
871	PHR Holdings
872	Victoria Port Power
873	Victoria City Power
874	Sky global Power One
875	Denton Municipal Electric
876	Tejas Power Generation
877	Topaz Generating
878	Topaz II
880	Luminant Power
881	HO Clarke II
882	HO Clarke Generating
883	Major Oak Power
886	Braes Bayou Generating
887	Luminant Power
889	San Miguel Electric Coop., Inc.
891	Signal Hill Llc
892	Braes Bayou II
893	Victoria Port Power
895	Mark One Generating
897	Wharton County Generation
898	Rayburn Energy Station
899	Brotman Generating
8A1	Jack County Power
8A2	Johnson County Power
8A3	RW Miller Power
8A4	Bortman II

Western Electricity Coordinating Council (WECC)

Western Electricity Coordinating Council
155 North 400 West, Suite 200
Salt Lake City, Utah 84103

801-883-6879

WECC	
Utility Code	**Utility Name**
001	B.C. Hydro
007	Trans Alta Utilities
601	Basin Electric Power Coop, Inc
901	Brookfield Power
902	Arizona Electric Power Coop., Inc.
903	Sycamore Cogeneration Company
904	Arizona Public Service Company
905	Calpine Corporation
908	Oxy Elk Hills Power, LLC
909	Tri-State G & T Association, Inc.
90G	Colorado Springs Utilities
90H	Clark Public Utility District
90J	Frederickson Power LP
90L	Avista Corp
90M	City of Farmington, New Mexico
90P	Termoelectrica de Mexicali (TDM)
90Q	South Feather Water & Power Agency
90R	Blythe Energy, LLC
90T	Crockett Cogeneration
911	Burbank Water & Power
912	Black Hills Power, Inc.
913	El Paso Electric Company
914	Eugene Water & Electric Board
915	Black Hill Wyoming
916	Kern River Cogeneration Company
917	Idaho Power Company
918	Southwest Generation
918	SWG Colorado
918	Valencia Power
920	L.A. Dept. Of Water And Power
921	La Paloma Generating
922	PPL-Montana
924	Nevada Power Co.
925	Pacific Gas And Electric Co.
926	PacifiCorp Energy - Pacific Power
930	Platte River Power Authority
931	Portland General Electric Co.
932	Xcel Energy

WECC	
Utility Code	**Utility Name**
933	Public Service Co. Of New Mexico
936	PUD #1 Of Chelan County
938	PUD #1 Of Douglas County
940	Genon Energy (Reliant Energy)
942	Sacramento Municipal Utility Dist.
944	Salt River Project
945	San Diego Gas & Electric Co.
947	Seattle City Light
948	Sierra Pacific Power Company
949	Southern California Edison Co.
950	Cheyenne Light Fuel & Power
952	Black Hills/Colorado Electric Utility Company
954	PacifiCorp Energy - (Utah Power & Light Co)
955	Grays Harbor Energy LLC
956	Energy Northwest
958	Tucson Electric Power Company
959	US Army Corp. Of Engineers - Portland District
960	US Army Corp Of Engineers - Walla Walla District
961	US Army Corp. Of Engineers - Seattle District
963	Spindle Hill Energy Center
964	Black Hills Colorado Independent Power Producer (Bhcipp)
965	Deseret Generation & Transmission Coop.
966	Imperial Irrigation District
967	AES - Redondo Beach
968	US Bureau Of Reclamation
970	High Desert Power Project, LLC
971	AES - Alamitos LLC
972	NRG Energy – Western
976	Wildflower Energy LLP
976	Indigo Generation, LLC
977	Wellhead Electric Co. Inc.
978	Griffith Energy
979	Sunrise Power Company
984	Calpeak Power - Panoche LLC
985	Calpeak Power - Vaca Dixon LLC
987	Dynegy Power
989	California Power Holdings LLC (Chowchilla)
989	California Power Holdings LLC (Red Bluff)
990	CalPeak Power - Starwood Power-Midway LLC
991	Arlington Valley
993	Watson Cogeneration, LLC
994	Northwestern Energy
995	Orange Grove Energy, L.P.
996	Puget Sound Energy
997	Panoche Energy Center
9A1	Rathdrum Power LLC

WECC	
Utility Code	**Utility Name**
9A2	Nevada Cogeneration Associates #1
9A3	Yuma Cogeneration Associates
9A5	Colstrip Energy Limited Partnership
9A6	Midway Sunset Cogeneration Company
9A7	Hetch Hetchy Water and Power
9B3	Colorado Energy Management – RMP
9B5	Gila River Power
9B6	New Harquahala
9B7	Turlock Irrigation District
9B8	Utah Associated Municipal Power Systems
9B9	Mesquite Power
9C1	City of Redding
9C2	Donnells Powerhouse
9C3	Coso Finance Partners
9C4	Coso Power Developers
9C5	Coso Energy Developers
9C6	Terra-Gen Dixie Valley
9C7	AES Huntington Beach
9C8	Hermiston Generating Co., L.P.
9C9	Modesto Irrigation District
9D1	Kings River Conservation District
9D3	Grand Coulee Project Hydro Authority
9D4	Boise-Kuna Irrigation District
9D6	Burney Forest Products
9D7	POPD (Pend Oreille County Public Utility)
9D9	PPME (Iberdrola Renewables)
9E1	City of Tacoma
9E6	Sierra Pacific Industries
9E7	Public Utility District No. 1 of Snohomish County
9F1	Swift
9F3	Mariposa GT
9F4	KES Kingsburg L.P.
9F5	Ripon GT1
9F7	CPV Sentinal, LLC
9G2	RockTenn
9G3	Spokane Regional
9G4	West Valley Power
9G5	Silicon Valley Power
9G6	Public Utility District No. 2 of Grant County, Washington
9G8	Calpeak Malaga Power
9G9	SPI Anderson 2
9H1	Northern California Power Agency
9H2	Energy Keepers
9H4	Yuba County Water Agency
9H5	Pio Pico Energy Center
9H6	Merced Irrigation District

WECC	
Utility Code	**Utility Name**
9H7	Pacific Ultrapower Chinese Station
9H8	Rio Bravo Fresno
9H9	Rio Bravo Rocklin
9J2	Sunnyside Generation
9J3	Algonquin Power Sanger
9J4	Clearway Energy Operating LLC – Fossil
9J5	MRP – san Joaquin Energy
9J6	Placer County Water Agency
9J7	AES Alamitos Energy
9J8	AES Huntington Beach Energy
9J9	ORNI 41
9K4	ORNI 39
9K5	ORNI 43
9K6	ORNI 47
9K7	Steamboat Hills
9K8	AltaGas Brush Energy
9K9	Brush Power

Appendix D: Cause Code Cross Reference

This appendix contains a high level cross reference for cause codes. Table D-1 is a cross reference between System, Component, Sub-Component and Unit Type of the applicable Cause Code ranges.

In order to fit within a reasonable amount of space the unit types have been abbreviated. Use the table below to find your unit type.

UNIT TYPE NAME ABBREVIATIONS	
Unit Type	**Abbreviation**
CC GT units	CCGT
CC steam units	CCST
Co-Generator GT units	CoGT
Co-Generator steam units	CoST
Co-Generator Block	CoB
Combined Cycle Block	CCB
Fluidized Bed	FBC
Fossil-Steam	FS
Gas Turbine/Jet Engine (Simple Cycle Operation)	GT/JE
Geothermal	GEO
Internal Combustion/Reciprocating Engines	IC/RE
Miscellaneous	MISC
Multi-boiler/Multi-turbine	MB/MT
Nuclear	NU
Pumped Storage/Hydro	PS/H

TABLE D-1: CROSS REFERENCE OF CAUSE CODE RANGES BETWEEN SYSTEM, COMPONENT,SUB-COMPONENT AND UNIT TYPE																
System Name	**Component Name**	**Sub-Component Name**	**CCGT**	**CCST**	**CoGT**	**CoST**	**CoB**	**CCB**	**FBC**	**FS**	**GT/JE**	**GEO**	**IC/RE**	**MISC**	**MB/MT**	**NU**	**PS/H**
Balance of Plant	Auxiliary Systems	Auxiliary Steam	3830-3839	3830-3839	3830-3839	3830-3839	3830-3839	3830-3839	3830-3839	3830-3839	3830-3839	3830-3839		3830-3839	3830-3839	3830-3839	3830-3839
Balance of Plant	Auxiliary Systems	Closed Cooling Water Systems	3820-3829	3820-3829	3820-3829	3820-3829	3820-3829	3820-3829	3820-3829	3820-3829	3820-3829	3820-3829		3820-3829	3820-3829	3820-3829	3820-3829
Balance of Plant	Auxiliary Systems	Fire Protection System	3860-3869	3860-3869	3860-3869	3860-3869	3860-3869	3860-3869	3860-3869	3860-3869	3860-3869	3860-3869		3860-3869	3860-3869	3860-3869	3860-3869
Balance of Plant	Auxiliary Systems	Instrument Air	3850-3859	3850-3859	3850-3859	3850-3859	3850-3859	3850-3859	3850-3859	3850-3859	3850-3859	3850-3859		3850-3859	3850-3859	3850-3859	3850-3859
Balance of Plant	Auxiliary Systems	Low-pressure Gas Compression System	3870-3879	3870-3879	3870-3879	3870-3879	3870-3879	3870-3879	3870-3879	3870-3879	3870-3879			3870-3871	3870-3879		
Balance of Plant	Auxiliary Systems	Miscellaneous (Auxiliary Systems)	3898-6399	3898-6399	3898-6399	3898-6399	3898-6399	3898-6399	3898-3899	3898-3899	3898-3899	3898-3899		3898-6399	3898-6399	3898-3899	3898-3899
Balance of Plant	Auxiliary Systems	Open Cooling Water System	3800-3809	3800-3809	3800-3809	3800-3809	3800-3809	3800-3809	3800-3809	3800-3809		3800-3809		3800-3809	3800-3809	3800-3809	
Balance of Plant	Auxiliary Systems	Seal Air Fans	3880-3889	3880-3889	3880-3889	3880-3889	3880-3889	3880-3889	3880-3889	3880-3889		3880-3889		3880-3889	3880-3889	3880-3889	
Balance of Plant	Auxiliary Systems	Service Air	3840-3849	3840-3849	3840-3849	3840-3849	3840-3849	3840-3849	3840-3849	3840-3849	3840-3849	3840-3849		3840-3849	3840-3849	3840-3849	3840-3849
Balance of Plant	Auxiliary Systems	Service Water (Open System)	3810-3819	3810-3819	3810-3819	3810-3819	3810-3819	3810-3819	3810-3819	3810-3819	3810-3819	3810-3819		3810-3819	3810-3819	3810-3819	3810-3819
Balance of Plant	Auxiliary Systems												3850-3998				
Balance of Plant	Circulating Water Systems		3210-3299	3210-3299	3210-3299	3210-3299	3210-3299	3210-3299	3210-3299	3210-3299		3210-3299		3210-3299	3210-3299	3210-3299	
Balance of Plant	Condensate System	Low/Intermediate Pressure Heater and Deaerators	3339-3345	3339-3345	3339-3345	3339-3345	3339-3345	3339-3345	3339-3345	3339-3345				3339-3345	3339-3345	3339-3345	
Balance of Plant	Condensate System	Miscellaneous (Condensate System)	3360-3399	3360-3399	3360-3399	3360-3399	3360-3399	3360-3399	3360-3399	3360-3399		3360-3399		3360-3399	3360-3399	3360-3399	
Balance of Plant	Condensate System	Polishers/Chemical Addition	3350-3352	3350-3352	3350-3352	3350-3352	3350-3352	3350-3352	3350-3352	3350-3352				3350-3352	3350-3352	3350-3352	
Balance of Plant	Condensate System	Pumps, Piping, and Valves	3300-3330	3300-3330	3300-3330	3300-3330	3300-3330	3300-3330	3300-3330	3300-3330		3300-3330		3300-3330	3300-3330	3300-3330	
Balance of Plant	Condensing System	Condenser Casing or Shell and Internals	3120-3129	3120-3129	3120-3129	3120-3129	3120-3129	3120-3129	3120-3129	3120-3129		3120-3129		3120-3129	3120-3129	3120-3129	
Balance of Plant	Condensing System	Condenser Controls	3150-3159	3150-3159	3150-3159	3150-3159	3150-3159	3150-3159	3150-3159	3150-3159		3150-3159		3150-3159	3150-3159	3150-3159	

TABLE D-1: CROSS REFERENCE OF CAUSE CODE RANGES BETWEEN SYSTEM, COMPONENT,SUB-COMPONENT AND UNIT TYPE																
System Name	**Component Name**	**Sub-Component Name**	**CCGT**	**CCST**	**CoGT**	**CoST**	**CoB**	**CCB**	**FBC**	**FS**	**GT/JE**	**GEO**	**IC/RE**	**MISC**	**MB/MT**	**NU**	**PS/H**
Balance of Plant	Condensing System	Condenser Tubes and Support Equipment	3110-3119	3110-3119	3110-3119	3110-3119	3110-3119	3110-3119	3110-3119	3110-3119		3110-3119		3110-3119	3110-3119	3110-3119	
Balance of Plant	Condensing System	Miscellaneous (Condensing System)	3170-3199	3170-3199	3170-3199	3170-3199	3170-3199	3170-3199	3170-3199	3170-3199		3170-3199		3170-3199	3170-3199	3170-3199	
Balance of Plant	Condensing System	Vacuum Equipment	3130-3149	3130-3149	3130-3149	3130-3149	3130-3149	3130-3149	3130-3149	3130-3149		3130-3149		3130-3149	3130-3149	3130-3149	
Balance of Plant	Electrical		3600-3690	3600-3690	3600-3690	3600-3690	3600-3690	3600-3690	3600-3690	3600-3690	3600-3690	3600-3690	3600-3690	3600-3690	3600-3690	3600-3690	3600-3690
Balance of Plant	Extraction Steam		3520-3549	3520-3549	3520-3549	3520-3549	3520-3549	3520-3549	3520-3549	3520-3549				3520-3549	3520-3549	3520-3549	
Balance of Plant	Feedwater System		3401-3499	3401-3499	3401-3499	3401-3499	3401-3499	3401-3499	3401-3499	3401-3499				3401-3499	3401-3499	3401-3499	
Balance of Plant	Heater Drain Systems		3501-3509	3501-3509	3501-3509	3501-3509	3501-3509	3501-3509	3501-3509	3501-3509				3501-3509	3501-3509	3501-3509	
Balance of Plant	Miscellaneous (Balance of Plant)		3950-3999	3950-3999	3950-3999	3950-3999	3950-3999	3950-3999	3950-3999	3950-3999	3950-3999	3950-3999	3970-3989	3950-3999	3950-3999	3950-3999	3950-3999
Balance of Plant	Power Station Switchyard		3700-3730	3700-3730	3700-3730	3700-3730	3700-3730	3700-3730	3700-3730	3700-3730	3700-3730	3700-3730	3700-3730	3700-3730	3700-3730	3700-3730	3700-3730
Balance of Plant	Waste Water (zero discharge) Systems		3290-3295	3290-3295	3290-3295	3290-3295	3290-3295	3290-3295	3290-3295	3290-3295		3290-3295		3290-3295	3290-3295	3290-3295	
Boiler	Bed Material Preparation System (FBC only)								160-174					160-174	160-174		
Boiler	Bed Material Removal System								930-950					930-950	930-950		
Boiler	Bed Solids Recirculation								951-989					951-989	951-989		
Boiler	Boiler Air and Gas Systems	Air Supply							1400-1451	1400-1450				1400-1451	1400-1451		
Boiler	Boiler Air and Gas Systems	Flue Gas							1455-1530	1455-1530				1455-1530	1455-1530		
Boiler	Boiler Air and Gas Systems	Flue Gas Recirculation							1535-1580	1535-1580				1535-1580	1535-1580		
Boiler	Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)							1590-1599	1590-1599				1590-1599	1590-1599		
Boiler	Boiler Control Systems								1700-1799	1700-1799				1700-1799	1700-1799		

TABLE D-1: CROSS REFERENCE OF CAUSE CODE RANGES BETWEEN SYSTEM, COMPONENT,SUB-COMPONENT AND UNIT TYPE																	
System Name	**Component Name**	**Sub-Component Name**	**CCGT**	**CCST**	**CoGT**	**CoST**	**CoB**	**CCB**	**FBC**	**FS**	**GT/JE**	**GEO**	**IC/RE**	**MISC**	**MB/MT**	**NU**	**PS/H**
Boiler	Boiler Design Limitations								1900-1910	1900-1910				1900-1910	1900-1910		
Boiler	Boiler Fuel Supply from Bunkers to Boiler	Burners							358-410	358-410				358-410	358-410		
Boiler	Boiler Fuel Supply from Bunkers to Boiler	Cyclone							415-435	415-435				415-435	415-435		
Boiler	Boiler Fuel Supply from Bunkers to Boiler	Oil and Gas Systems (except light off)							440-480	440-480				440-480	440-480		
Boiler	Boiler Fuel Supply from Bunkers to Boiler	Pulverizers, Primary Air Fans, and Associated Ducts							200-350	200-350				200-350	200-350		
Boiler	Boiler Fuel Supply to Bunker	Coal Handling Equipment up Through Bunkers							10-127	10-129				10-127	10-129		
Boiler	Boiler Fuel Supply to Bunker	Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)							111-129					111-121	111-121		
Boiler	Boiler Internals and Structures								800-859	800-859				800-859	800-859		
Boiler	Boiler Overhaul and Inspections								1800-1820	1800-1820				1800-1820	1800-1820		
Boiler	Boiler Piping System	Boiler Recirculation							740-770	740-770				740-770	740-770		
Boiler	Boiler Piping System	Cold and Hot Reheat Steam							540-570	540-570				540-570	540-570		
Boiler	Boiler Piping System	Desuperheaters/Attemperators							580-620	580-620		580-620		580-620	580-620		
Boiler	Boiler Piping System	Feedwater and Blowdown							670-730	670-730				670-730	670-730		
Boiler	Boiler Piping System	Main Steam							500-530	500-530		500-530		500-530	500-530		
Boiler	Boiler Piping System	Miscellaneous (Piping)							775-799	775-799				775-799	775-799		
Boiler	Boiler Piping System	Startup Bypass							630-660	630-660				630-660	630-660		

TABLE D-1: CROSS REFERENCE OF CAUSE CODE RANGES BETWEEN SYSTEM, COMPONENT,SUB-COMPONENT AND UNIT TYPE																	
System Name	**Component Name**	**Sub-Component Name**	**CCGT**	**CCST**	**CoGT**	**CoST**	**CoB**	**CCB**	**FBC**	**FS**	**GT/JE**	**GEO**	**IC/RE**	**MISC**	**MB/MT**	**NU**	**PS/H**
Boiler	Boiler Tube Fireside Slagging or Fouling								1100-1200	1100-1210				1100-1200	1100-1200		
Boiler	Boiler Tube Leaks								1000-1090	1000-1090				1000-1090	1000-1090		
Boiler	Boiler Water Condition								1850-1850	1850-1850				1850-1850	1850-1850		
Boiler	External Fluidized Bed Heat Exchanger								990-999					990-999	990-999		
Boiler	Miscellaneous (Boiler)								1980-1999	1980-1999				1980-1999	1980-1999		
Boiler	Miscellaneous Boiler Tube Problems								1300-1360	1300-1360				1300-1360	1300-1360		
Boiler	Slag and Ash Removal								860-920	860-920				860-920	860-920		
Boiler	Sorbent Supply (FBC only)	Sorbent Feed Equipment from Bunkers to Boiler (FBC only)							150-156					150-156	150-156		
Boiler	Sorbent Supply (FBC only)	Sorbent Handling System up Through Bunkers (FBC only)							130-141					130-141	130-141		
Expander Turbine	Expander Turbine		7800-7960	7800-7960	7800-7960	7800-7960	7800-7960	7800-7960			7800-7960			7800-7960	7800-7960		
External	Catastrophe		9000-9040	9000-9040	9000-9040	9000-9040	9000-9040	9000-9040	9000-9040	9000-9040	9000-9040	9000-9040	9000-9040	9000-9040	9000-9040	9000-9040	9000-9040
External	Economic		0-9199	0-9199	0-9199	0-9199	0-9199	0-9199	0-9199	0-9199	0-9199	0-9199	0-9199	0-9199	0-9199	0-9199	0-9199
External	Fuel Quality		9200-9291	9200-9291	9200-9291	9200-9291	9200-9291	9200-9291	9200-9291	9200-9291	9200-9291		9200-9291	9200-9291	9200-9291		
External	Miscellaneous (External)		9300-9340	9300-9340	9300-9340	9300-9340	9300-9340	9300-9340	9300-9340	9300-9340	9300-9340	9300-9340	9300-9340	9300-9340	9300-9340	9300-9320	9300-9350
Gas Turbine	Auxiliary Systems		5110-5190	5110-5190	5110-5190	5110-5190	5110-5190	5110-5190			5110-5190			5110-5190	5110-5190		
Gas Turbine	Exhaust Systems		5100-5109	5100-5109	5100-5109	5100-5109	5100-5109	5100-5109			5100-5109			5100-5109	5100-5109		
Gas Turbine	Fuel, Ignition, and Combustion Systems		5040-5079	5040-5079	5040-5079	5040-5079	5040-5079	5040-5079			5040-5079			5040-5079	5040-5079		

TABLE D-1: CROSS REFERENCE OF CAUSE CODE RANGES BETWEEN SYSTEM, COMPONENT,SUB-COMPONENT AND UNIT TYPE																	
System Name	**Component Name**	**Sub-Component Name**	**CCGT**	**CCST**	**CoGT**	**CoST**	**CoB**	**CCB**	**FBC**	**FS**	**GT/JE**	**GEO**	**IC/RE**	**MISC**	**MB/MT**	**NU**	**PS/H**
Gas Turbine	Inlet Air System and Compressors	Compressors	5010-5039	5010-5039	5010-5039	5010-5039	5010-5039	5010-5039			5010-5039			5010-5037	5010-5039		
Gas Turbine	Inlet Air System and Compressors	Ducts and Filters	5000-5009	5000-5009	5000-5009	5000-5009	5000-5009	5000-5009			5000-5009			5000-5009	5000-5009		
Gas Turbine	Miscellaneous (Gas Turbine)		5200-5299	5200-5299	5200-5299	5200-5299	5200-5299	5200-5299			4460-5299			5200-5299	5200-5299		
Gas Turbine	Turbine		5080-5099	5080-5099	5080-5099	5080-5099	5080-5099	5080-5099			5080-5099			5080-5099	5080-5099		
Generator	Controls		4700-4750	4700-4750	4700-4750	4700-4750	4700-4750	4700-4750	4700-4750	4700-4750	4700-4750	4700-4750	4700-4750	4700-4750	4700-4750	4700-4750	4700-4750
Generator	Cooling System		4610-4650	4610-4650	4610-4650	4610-4650	4610-4650	4610-4650	4610-4650	4610-4650	4610-4650	4610-4650	4610-4650	4610-4650	4610-4650	4610-4650	4610-4650
Generator	Exciter		4600-4609	4600-4609	4600-4609	4600-4609	4600-4609	4600-4609	4600-4609	4600-4609	4600-4609	4600-4609	4600-4609	4600-4609	4600-4609	4600-4609	4600-4609
Generator	Generator		4500-4580	4500-4580	4500-4580	4500-4580	4500-4580	4500-4580	4500-4580	4500-4580	4500-4590	4500-4580	4500-4580	4500-4590	4500-4580	4500-4580	4500-4590
Generator	Miscellaneous (Generator)		4800-4899	4800-4899	4800-4899	4800-4899	4800-4899	4800-4899	4800-4899	4800-4899	4800-4899	4800-4899	4800-4899	4800-4899	4800-4899	4800-4899	4800-4899
Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Air Supply	1400-1456	1400-1456	1400-1456	1400-1456	1400-1536	1400-1536									
Heat Recovery Steam Generator (HRSG)	HRSG Boiler Air and Gas Systems	Miscellaneous (Boiler Air and Gas Systems)	1590-1599	1590-1599	1590-1599	1590-1599	1590-1599	1590-1599									
Heat Recovery Steam Generator (HRSG)	HRSG Boiler Control Systems		1700-1799	1700-1799	1700-1799	1700-1799	1700-1799	1700-1799									
Heat Recovery Steam Generator (HRSG)	HRSG Boiler Design Limitations		1900-1910	1900-1910	1900-1910	1900-1910	1900-1910	1900-1910									
Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Burners (Duct Burners)	358-410	358-410	358-410	358-410	358-410	358-410									

TABLE D-1: CROSS REFERENCE OF CAUSE CODE RANGES BETWEEN SYSTEM, COMPONENT,SUB-COMPONENT AND UNIT TYPE																	
System Name	**Component Name**	**Sub-Component Name**	**CCGT**	**CCST**	**CoGT**	**CoST**	**CoB**	**CCB**	**FBC**	**FS**	**GT/JE**	**GEO**	**IC/RE**	**MISC**	**MB/MT**	**NU**	**PS/H**
Heat Recovery Steam Generator (HRSG)	HRSG Boiler Fuel Supply	Oil and Gas Systems (except light off)	440-480	440-480	440-480	440-480	440-480	440-480									
Heat Recovery Steam Generator (HRSG)	HRSG Boiler Internals and Structures		800-859	800-859	800-859	800-859	800-859	800-859						801-858			
Heat Recovery Steam Generator (HRSG)	HRSG Boiler Overhaul and Inspections		1800-1820	1800-1820	1800-1820	1800-1820	1800-1820	1800-1820									
Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Boiler Recirculation	740-770	740-770	740-770	740-770	740-770	740-770									
Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Feedwater and Blowdown	670-730	670-730	670-730	670-730	670-730	670-730									
Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Cold and Hot Reheat Steam	540-570	540-570	540-570	540-570	540-570	540-570									
Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Desuperheaters/Attemperators	6140-6154	6140-6154	6140-6154	6140-6154	6140-6154	6140-6154						6140-6154			
Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Main Steam	500-6135	500-6135	500-6135	500-6135	500-6135	500-6135						6110-6135			
Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	HRSG Startup Bypass	6160-6184	6160-6184	6160-6184	6160-6184	6160-6184	6160-6184						6160-6184			

TABLE D-1: CROSS REFERENCE OF CAUSE CODE RANGES BETWEEN SYSTEM, COMPONENT,SUB-COMPONENT AND UNIT TYPE																	
System Name	**Component Name**	**Sub-Component Name**	**CCGT**	**CCST**	**CoGT**	**CoST**	**CoB**	**CCB**	**FBC**	**FS**	**GT/JE**	**GEO**	**IC/RE**	**MISC**	**MB/MT**	**NU**	**PS/H**
Heat Recovery Steam Generator (HRSG)	HRSG Boiler Piping System	Miscellaneous (Piping)	775-799	775-799	775-799	775-799	775-799	775-799									
Heat Recovery Steam Generator (HRSG)	HRSG Boiler Tube Leaks		6005-6090	6005-6090	6005-6090	6005-6090	6005-6090	6005-6090						6005-6090			
Heat Recovery Steam Generator (HRSG)	HRSG Boiler Water Condition		1850-1850	1850-1850	1850-1850	1850-1850	1850-1850	1850-1850									
Heat Recovery Steam Generator (HRSG)	Miscellaneous (HRSG Boiler)		1980-6100	1980-6100	1980-6100	1980-6100	1980-6100	1980-6100						6000-6100	6000-6100		
Heat Recovery Steam Generator (HRSG)	Miscellaneous HRSG Boiler Tube Problems		1300-1360	1300-1360	1300-1360	1300-1360	1300-1360	1300-1360									
Hydro Turbine/Pump	Miscellaneous (Hydro Turbine/Pump)													7200-7300			7200-7300
Hydro Turbine/Pump	Turbine													7000-7099			7000-7099
Hydro Turbine/Pump	Water Supply/Discharge													7100-7199			7100-7199
Inactive States	Inactive States		2-9991	2-9991	2-9991	2-9991	2-9991	2-9991	2-9991	2-9991	2-9991	2-9991	2-9991	2-9991	2-9991	2-9991	2-9991
Internal Combustion/Reciprocating Engines	Engine												5700-5799	5700-5799			
Internal Combustion/Reciprocating Engines	Engine Auxiliaries												5114-5849	5800-5849			

TABLE D-1: CROSS REFERENCE OF CAUSE CODE RANGES BETWEEN SYSTEM, COMPONENT,SUB-COMPONENT AND UNIT TYPE																
System Name	**Component Name**	**Sub-Component Name**	**CCGT**	**CCST**	**CoGT**	**CoST**	**CoB**	**CCB**	**FBC**	**FS**	**GT/JE**	**GEO**	**IC/RE**	**MISC**	**MB/MT**	**NU**	**PS/H**
Internal Combustion/Reciprocating Engines	Engine Controls												5850-5880	5850-5880			
Internal Combustion/Reciprocating Engines	Miscellaneous (Internal Combustion/Reciprocating Engines)												4460-5999	5890-5999			
Jet Engine	Auxiliary Systems		5510-5590	5510-5590	5510-5590	5510-5590	5510-5590	5510-5590			5510-5590			5510-5590	5510-5590		
Jet Engine	Exhaust Systems		5500-5509	5500-5509	5500-5509	5500-5509	5500-5509	5500-5509			5500-5509			5500-5509	5500-5509		
Jet Engine	Fuel, Ignition, and Combustion Systems		5440-5479	5440-5479	5440-5479	5440-5479	5440-5479	5440-5479			5440-5479			5440-5479	5440-5479		
Jet Engine	Inlet Air System and Compressors	Compressors	5410-5439	5410-5439	5410-5439	5410-5439	5410-5439	5410-5439			5410-5439			5410-5430	5410-5430		
Jet Engine	Inlet Air System and Compressors	Ducts and Filters	5400-5409	5400-5409	5400-5409	5400-5409	5400-5409	5400-5409			5400-5409			5400-5409	5400-5409		
Jet Engine	Miscellaneous (Jet Engine)		5600-5699	5600-5699	5600-5699	5600-5699	5600-5699	5600-5699			5600-5699			5600-5699	5600-5699		
Jet Engine	Turbine		5480-5499	5480-5499	5480-5499	5480-5499	5480-5499	5480-5499			5480-5499			5480-5499	5480-5499		
Miscellaneous	Instruments and Controls		6200-6200	6200-6200	6200-6200	6200-6200	6200-6200	6200-6200						6200-6200	6200-6200		
Miscellaneous	Plant and Auxiliaries											6410-6499		6410-6499			
Nuclear Reactor	Auxiliary Systems															2840-2890	
Nuclear Reactor	Chemical and Volume Control/Reactor Water Cleanup															2805-2819	
Nuclear Reactor	Containment System															2700-2799	
Nuclear Reactor	Control Rods and Drives															2110-2160	

TABLE D-1: CROSS REFERENCE OF CAUSE CODE RANGES BETWEEN SYSTEM, COMPONENT,SUB-COMPONENT AND UNIT TYPE																	
System Name	**Component Name**	**Sub-Component Name**	**CCGT**	**CCST**	**CoGT**	**CoST**	**CoB**	**CCB**	**FBC**	**FS**	**GT/JE**	**GEO**	**IC/RE**	**MISC**	**MB/MT**	**NU**	**PS/H**
Nuclear Reactor	Core Cooling/Safety Injection															2600-2649	
Nuclear Reactor	Core/Fuel															2010-2090	
Nuclear Reactor	Electrical Safety Systems															2650-2699	
Nuclear Reactor	Miscellaneous (Reactor)															2900-2999	
Nuclear Reactor	Nuclear Cooling Water Systems															2820-2839	
Nuclear Reactor	Reactor Coolant System	Instruments and Controls														2330-2390	
Nuclear Reactor	Reactor Coolant System	Miscellaneous (Reactor Coolant System)														2399-2399	
Nuclear Reactor	Reactor Coolant System	Piping														2230-2260	
Nuclear Reactor	Reactor Coolant System	Pressurizer														2265-2265	
Nuclear Reactor	Reactor Coolant System	Pumps														2200-2220	
Nuclear Reactor	Reactor Coolant System	Valves														2270-2320	
Nuclear Reactor	Reactor Vessel and Internals															2170-2199	
Nuclear Reactor	Steam Generators and Steam System															2400-2599	
Performance	Performance		9997-9999	9997-9999	9997-9999	9997-9999	9997-9999	9997-9999	9997-9999	9997-9999	9997-9999	9997-9999	9997-9999	9998-9999	9997-9999	9997-9999	9997-9999
Personnel or Procedural Errors	Personnel or Procedural Errors		9900-9960	9900-9960	9900-9960	9900-9960	9900-9960	9900-9960	9900-9960	9900-9960	9900-9960	9900-9960	9900-9960	9900-9960	9900-9960	9900-9960	9900-9960
Pollution Control Equipment	CO Reduction		8840-8845	8840-8845	8840-8845	8840-8845	8840-8845	8840-8845	8840-8845	8840-8845	8840-8845			8840-8845			
Pollution Control Equipment	Continuous Emissions Monitoring Systems (CEMS)		8700-8790	8700-8790	8700-8790	8700-8790	8700-8790	8700-8790	8700-8790	8700-8790	8700-8790	8700-8790		8700-8790	8700-8790		

TABLE D-1: CROSS REFERENCE OF CAUSE CODE RANGES BETWEEN SYSTEM, COMPONENT,SUB-COMPONENT AND UNIT TYPE																	
System Name	**Component Name**	**Sub-Component Name**	**CCGT**	**CCST**	**CoGT**	**CoST**	**CoB**	**CCB**	**FBC**	**FS**	**GT/JE**	**GEO**	**IC/RE**	**MISC**	**MB/MT**	**NU**	**PS/H**
Pollution Control Equipment	Dry Scrubbers	Dry Scrubber							8528-8534	8528-8534				8528-8534	8529-8534		
Pollution Control Equipment	Dry Scrubbers	Miscellaneous (Dry Scrubber)							8544-8549	8544-8549				8544-8549	8544-8549		
Pollution Control Equipment	Dry Scrubbers	Piping, Ducting, and Dampers							8522-8527	8522-8527				8522-8527	8522-8527		
Pollution Control Equipment	Dry Scrubbers	Reagent\Slurry Supply							8500-8521	8500-8521				8500-8521	8500-8521		
Pollution Control Equipment	Dry Scrubbers	Waste Disposal and Recovery							8535-8543	8535-8543				8535-8543	8535-8543		
Pollution Control Equipment	Miscellaneous (Pollution Control Equipment)								8565-8699	8565-8699	8656-8656			8565-8699	8565-8699		
Pollution Control Equipment	NOx Reduction Systems	Catalytic Air Heaters	8830-8835	8830-8835	8830-8835	8830-8835	8830-8835	8830-8835	8830-8835	8830-8835	8830-8835			8830-8835	8830-8835		
Pollution Control Equipment	NOx Reduction Systems	Selective Catalytic Reduction Systems	8810-8825	8810-8825	8810-8825	8810-8825	8810-8825	8810-8825	8810-8825	8810-8825	8810-8825			8810-8825	8810-8825		
Pollution Control Equipment	NOx Reduction Systems	Selective Non-Catalytic Reduction Systems	8800-8809	8800-8809	8800-8809	8800-8809	8800-8809	8800-8809	8800-8809	8800-8809	8800-8809			8800-8809	8800-8809		
Pollution Control Equipment	Precipitators								8550-8590	8550-8590				8550-8590	8550-8590		
Pollution Control Equipment	Wet Scrubbers	Chemical Supply							8000-8099	8000-8099		8000-8099		8000-8099	8000-8099		
Pollution Control Equipment	Wet Scrubbers	Miscellaneous (Wet Scrubber)							8400-8499	8400-8499		8400-8499		8400-8499	8400-8499		
Pollution Control Equipment	Wet Scrubbers	Piping, Ducting, Dampers, and Fans							8200-8299	8200-8299		8200-8299		8200-8299	8200-8299		
Pollution Control Equipment	Wet Scrubbers	Waste Disposal and Recovery							8300-8399	8300-8399				8300-8399	8300-8399		
Pollution Control Equipment	Wet Scrubbers	Wet Scrubber							8100-8199	8100-8199		8100-8199		8100-8199	8100-8199		
Regulatory, Safety, Environmental	Other Operating Environmental Limitations		9660-9694	9660-9694	9660-9694	9660-9694	9660-9694	9660-9694	9660-9690	9660-9690	9663-9694		9665-9695	9660-9696	9660-9696	9660-9690	9676-9696
Regulatory, Safety, Environmental	Regulatory		9504-9590	9504-9590	9504-9590	9504-9590	9504-9590	9504-9590	9504-9590	9504-9590	9504-9590	9504-9590	9504-9590	9504-9590	9504-9590	9500-9590	9504-9590

TABLE D-1: CROSS REFERENCE OF CAUSE CODE RANGES BETWEEN SYSTEM, COMPONENT,SUB-COMPONENT AND UNIT TYPE																	
System Name	**Component Name**	**Sub-Component Name**	**CCGT**	**CCST**	**CoGT**	**CoST**	**CoB**	**CCB**	**FBC**	**FS**	**GT/JE**	**GEO**	**IC/RE**	**MISC**	**MB/MT**	**NU**	**PS/H**
Regulatory, Safety, Environmental	Safety		9700-9720	9700-9720	9700-9720	9700-9720	9700-9720	9700-9720	9700-9720	9700-9720	9700-9720	9700-9720	9700-9720	9700-9720	9700-9720	9700-9720	9700-9720
Regulatory, Safety, Environmental	Stack Emission		9600-9658	9600-9658	9600-9658	9600-9658	9600-9658	9600-9658	9600-9656	9600-9656	9603-9658		9605-9655	9600-9658	9600-9656		
Steam Turbine	Controls		4290-4314	4290-4314	4290-4314	4290-4314	4290-4314	4290-4314	4290-4314	4290-4314		4290-4314		4290-4314	4290-4314	4290-4314	
Steam Turbine	High Pressure Turbine		4000-4099	4000-4099	4000-4099	4000-4099	4000-4099	4000-4099	4000-4099	4000-4099				4000-4099	4000-4099	4000-4099	
Steam Turbine	Intermediate Pressure Turbine		4100-4199	4100-4199	4100-4199	4100-4199	4100-4199	4100-4199	4100-4199	4100-4199				4100-4199	4100-4199	4100-4199	
Steam Turbine	Low Pressure Turbine		4200-4250	4200-4250	4200-4250	4200-4250	4200-4250	4200-4250	4200-4250	4200-4250		4200-4250		4200-4250	4200-4250	4200-4250	
Steam Turbine	Lube Oil		4280-4289	4280-4289	4280-4289	4280-4289	4280-4289	4280-4289	4280-4289	4280-4289		4280-4289		4280-4289	4280-4289	4280-4289	
Steam Turbine	Miscellaneous (Steam Turbine)		4400-4499	4400-4499	4400-4499	4400-4499	4400-4499	4400-4499	4400-4499	4400-4499		4400-4499		4400-4499	4400-4499	4400-4499	
Steam Turbine	Piping		4270-4279	4270-4279	4270-4279	4270-4279	4270-4279	4270-4279	4270-4279	4270-4279		4270-4279		4270-4279	4270-4279	4270-4279	
Steam Turbine	Valves		4260-4269	4260-4269	4260-4269	4260-4269	4260-4269	4260-4269	4260-4269	4260-4269		4260-4269		4260-4269	4260-4269	4260-4269	

Appendix E: Unit Design Data Forms

Note: The NERC Board of Trustees approved a Section 1600 request to collect additional design data for conventional generating units starting in 2024.

This Appendix contains a list of different components based on Unit Type that are now mandatory under the revised GADS Data Reporting Instructions. This data accompany the Chapter V – Design Data that was previously mandatory under Section 1600.

If any of the major components in the Design are updated or replaced after initial configuration, then it is expected that the company update those components in the Design Data.

Appendix E1: Unit Design Data – Fossil Steam

Note: The NERC Board of Trustees approved a Section 1600 request to collect additional design data for conventional generating units starting in 2024.

Instructions

Use the Excel file, "Fossil Steam Workbook," on the GADS DRI page to report design and installed equipment data. The tables on the following pages show the data that is required to complete the Excel file for submittal to the OATI GADS portal. The data order in the tables matches the order of the data columns in the Excel file. A GUI interface in the OATI portal and design fields in commercially available GADS programs can also be used to report design and equipment information for FOSSIL (steam) units. FOSSIL units are units with a single steam generator connected to a single or cross-compound turbine generator drive train. Report units that have multiple steam generators and/or multiple turbine generators connected by headers using the forms found under the heading "MISCELLANEOUS."

Data reported in these files should reflect the current condition and design of the unit.

Table 1: General Information			
Field	**Units**	**Entry Type**	**Description**
NCR Number		Input answer	Company NCR ID
NERC Region Code		Pick an option	MRO
			NPCC
			RF
			SERC
			TRE
			WECC
NERC Sub-Region Code		Pick an option	Varies by region, choose region if unknown
Utility Code		Input answer	NERC utility code
Unit Code		Input answer	NERC unit code
Unit Type Code		Pick an option	100 - Fossil Steam
Unit Name		Input answer	Name of unit
Time Zone		Pick an option	Time zone used for GADS reporting, not necessarily where it is located. Chose appropriate prevailing time if DST is observed.
EIA Number (US only)		Input answer	EIA plant ID
Block Utility Code		Input answer	Used in component reported combined cycles, see OATI portal
Block Unit Code		Input answer	Used in component reported combined cycles, see OATI portal
Unit loading characteristics at time of design		Pick an option	1 - Base load with minor load following
			2 - Periodic startup
			3- Weekly startup
			4 - Daily startup
			5 - Startup chiefly to meet daily peaks
			9 - Other
Nameplate Rating	MW	Input answer	Unit nameplate rating
Status		Pick an option	Voluntary reporting
			Non-reporting
			Reporting
Country		Pick an option	USA
			CA
			MX
State/Province		Pick an option	Abbreviation for state or province
Date the unit entered service	mm/dd/yyyy	Input answer	Date unit was first declared available for dispatch or date unit operated at 50% of nameplate capacity
Unit Status Change Date	mm/dd/yyyy	Input answer	Enter a date when unit is sold or retired
Unit Status		Pick an option	Active
			Sold
			Retired

Table 2: Fossil Boiler			
Field	**Units**	**Entry Type**	**Description**
Fossil boiler commissioning year		Input answer	Year of boiler commissioning
More than 50% of boiler outdoors		Pick an option	Yes
			No
Steam flow rate	klbs/hr	Input answer	Total design steam flow for unit
Design steam temperature	F	Input answer	Design main steam temperature
Design steam pressure	psig	Input answer	Design main steam pressure
Fuel system firing type		Pick an option	A - Front or back
			B - Opposed
			C - Vertical
			D - Tangential
			E - Cyclone
			F - Concentric
			G - Circulating fluid bed
			H - Bubbling fluid bed
			I - Stoker
Number of forced draft (FD) fans		Input answer	Number of fans including spares
Type of FD fan drive		Pick an option	1- Single speed motor
			2 - Two speed motor
			3 - Variable speed motor
			4 - Steam turbine
			9 - Other
Number of induced draft (ID) fans		Input answer	Number of fans including spares
Number of gas recirculating fans		Input answer	Number of fans including spares
Number of primary air heaters		Input answer	Number of air heaters. Small air heaters that heat air that only goes to pulverizers.
Type of primary air heater			1 - Regenerative (Ljungstrom)
			2 - Tubular
			3 - Steam coil
			4 - Regenerative (Rothemuhle)
			9 - Other
			0 - Does not have
Number of secondary air heaters		Input answer	Air heaters that provide combustion air to boiler. Between FD fan and boiler.
Type of secondary air heater		Pick an option	1 - Regenerative (Ljungstrom)
			2 - Tubular

Table 2: Fossil Boiler			
Field	**Units**	**Entry Type**	**Description**
			3 - Steam coil
			4 - Regenerative (Rothemuhle)
			9 - Other
			0 - Does not have

Table 3: Auxiliary Systems			
Field	**Units**	**Entry Type**	**Description**
Type of condenser cooling water		Pick an option	1 - Fresh
			2 - Brackish
			3 - Salt
			9 - Other
Origin of condenser cooling water		Pick an option	1 - River
			2 - Lake
			3 - Ocean or bay
			9 - Other
Total number of condensate pumps		Input answer	Number of pumps
Min number of condensate pumps for max continuous output		Input answer	Number of pumps
Total number of feedwater pumps		Input answer	Number of pumps
Min number of feedwater pumps for max continuous output		Input answer	Number of pumps
Can startup pump be used with boiler feed pumps		Pick an option	1 - Additive
			3 - Startup only
			0 - Does not have
Capability of startup pump		Input answer	Percent of total flow
Number of high pressure heaters per train		Input answer	Number of heaters
Number of intermediate pressure heaters per train		Input answer	Number of heaters
Number of low pressure heaters per train		Input answer	Number of heaters
Total number of circulating water pumps		Input answer	Number of pumps
Type of cooling tower		Pick an option	1 - Mechanical draft (induced, forced, cross-flow, counterflow, counterflow)
			2 - Atmospheric spray
			3 - Hyberbolic (natural draft)
			4 - Deck-filled
			5 - Coil shed
			9 - Other
Is there a startup boiler (fossil steam only)		Picklist	Yes
			No

Table 4: FGD System			
Field	**Units**	**Entry Type**	**Description**
First year of FGD operation		Input answer	First year of operation
Was FGD part of original design		Pick an option	Yes
			No
Are FGD modules shared with other units		Pick an option	Yes
			No
Type of scrubber/absorber		Pick an option	1 - Venturi
			2 - Spray
			3 - Tray
			4 - Packed
			5 - Combination
			9 - Other
Number of FGD fans		Input answer	Number of fans including spares
Min number of fans for max load		Input answer	Number of fans
Location of FGD fans with respect to scrubber		Pick an option	1 - Before
			2 - After

Table 5: Fuel Type			
Field	**Units**	**Entry Type**	**Description**
Primary Fuel		Pick an option	Type of Primary fuel
			CC-Coal
			LI-Lignite
			GG-Natural gas
			DI-Distillate oil (#2)
			OO-Oil (like #6)
			BM-Biomass
			WD-Wood
			PE-Peat
			PC-Petroleum coke
			PR-Propane
			SL-Sludge gas
			OS-Other solid
			OL-Other liquid
			OG-Other gas
Secondary Fuel		Pick an option	Type of Secondary fuel
			CC-Coal
			LI-Lignite
			GG-Natural gas
			DI-Distillate oil (#2)
			OO-Oil (like #6)

Table 5: Fuel Type			
Field	**Units**	**Entry Type**	**Description**
Secondary Fuel		Pick an option	Type of Secondary fuel
			BM-Biomass
			WD-Wood
			PE-Peat
			PC-Petroleum coke
			PR-Propane
			SL-Sludge gas
			OS-Other solid
			OL-Other liquid
			OG-Other gas

Table 6: Fossil Fuel Coal			
Field	**Units**	**Entry Type**	**Description**
Number of critical path coal conveyors		Input answer	Number of conveyors
Number of coal pulverizers		Input answer	Number of pulverizers including spares
Number of pulverizers for max load without secondary fuel		Input answer	Number of pulverizers
Type of pulverizers		Pick an option	1- Ball
			2 - Roll race
			3 - Ball tube (Hardinge)
			4 - Impact (attrition)
			9 - Other
Location of the mechanical precipitator with respect to the air heater		Pick an option	1 - Before air heaters
			2 - After air heaters
			3 - Both
			9 - Other
			0 - Does not have
Location of the electrostatic precipitator with respect to the air heater		Pick an option	1 - Before air heaters
			2 - After air heaters
			3 - Both
			9 - Other
			0 - Does not have
Number of baghouse booster fans		Input answer	Number of fans including spares
Baghouse type		Pick an option	1 - Reverse
			2 - Pulse (or pulse set)
			3 - Shaker
			9 - Other
			0 - Does not have

Table 6: Fossil Fuel Coal			
Field	**Units**	**Entry Type**	**Description**
Type of flyash removal system		Pick an option	1 - Vacuum
			2 - Pressure
			3 - Vacuum-Pressure
			4 - Water (sluice)
			5 - Vacuum and water slurry
			9 - Other
			0 - Does not have

Table 7: Steam Turbine			
Field	**Units**	**Entry Type**	**Description**
Steam turbine commissioning year		Input answer	Year steam turbine was commissioned
More than 50% of steam turbine outdoors		Pick an option	Yes
			No
Steam turbine output	MW	Input answer	Rating of steam turbine

Table 8: Generator			
Field	**Units**	**Entry Type**	**Description**
Generator commissioning year		Input answer	Year generator was commissioned
Year of last rewind or replacement		Input answer	Year of last rewind or replacement
More than 50% of generator outdoors		Pick an option	Yes
			No
Main generator nameplate	MW	Input answer	Generator nameplate rating
Second generator nameplate	MW	Input answer	Can be used for cross compound or block reported combined cycle units
Third generator nameplate	MW	Input answer	Can be used for cross compound or block reported combined cycle units
Generator voltage	kV	Input answer	Generator output voltage
Generator capability	MVA	Input answer	Generator MVA rating
Generator speed	rpm	Input answer	Generator rotational speed
Generator power factor	%	Input answer	Design power factor
Excitation system		Pick an option	1 - Single
			2 - Redundant
Type of exciter		Pick an option	1 - Static
			2 - Rotating dc generator
			3 - Brushless
			4 - Alternator rectifier
			9 - Other

Table 9: Balance of Plant (Electrical)			
Field	**Units**	**Entry Type**	**Description**
BOP commissioning year		Input answer	Year GSU and breakers were commissioned
Generator Sync breaker interrupting media		Pick an option	1 - Air/air blast (ACB)
			2- Oil (OCB)
			3 - Vacuum (VCB)
			4 SF6/gas (GCB)
			9 - Other
Generator sync breaker voltage	kV	Input answer	Nameplate voltage
Gen sync breaker current rating	amps	Input answer	Nameplate current rating
Generator sync breaker interrupt rating	kA	Input answer	Nameplate interrupt current rating
Type of main transformer (GSU)		Pick an option	1 - Single phase
			2 - Three phase
			9 - Other
MVA Rating of main transformer (GSU)	MVA	Input answer	Nameplate rating of main transformer
High side voltage of GSU	kV	Input answer	GSU output voltage
Low side voltage of GSU	kV	Input answer	GSU input voltage
Second high side voltage of GSU	kV	Input answer	GSU output voltage
Second low side voltage of GSU	kV	Input answer	GSU input voltage

Table 10: NOx Reduction System			
Field	**Units**	**Entry Type**	**Description**
Selective non-catalytic reduction system (SNCR)?		Pick an option	Yes
			No
Selective catalytic reduction system (SNCR)?		Pick an option	Yes
			No
Catalytic air heaters (CAH)?		Pick an option	Yes
			No
Water injection system?		Pick an option	Yes
			No

Appendix E2: Unit Design Data – Fluidized Bed Combustion

Note: The NERC Board of Trustees approved a Section 1600 request to collect additional design data for conventional generating units starting in 2024.

Instructions

Use the Excel file, "Fluidized Bed Workbook," on the GADS DRI page to report design and installed equipment data. The tables on the following pages show the data that is required to complete the Excel file for submittal to the OATI GADS portal. The data order in the tables matches the order of the data columns in the Excel file. A GUI interface in the OATI portal and design fields in commercially available GADS programs can also be used to report design and equipment information for FLUIDIZED BED (steam) units. FLUIDIZED BED units are similar to fossil steam units except that the boiler design is different and requires different boiler design data.

Data reported in these files should reflect the current condition and design of the unit.

Table 1: General Information			
Field	**Units**	**Entry Type**	**Description**
NCR Number		Input answer	Company NCR ID
NERC Region Code		Pick an option	MRO
			NPCC
			RF
			SERC
			TRE
			WECC
NERC Sub-Region Code		Pick an option	Varies by region, choose region if unknown
Utility Code		Input answer	NERC utility code
Unit Code		Input answer	NERC unit code
Unit Type Code		Pick an option	650 – Fluidized Bed
Unit Name		Input answer	Name of unit
Time Zone		Pick an option	Time zone used for GADS reporting, not necessarily where it is located. Chose appropriate prevailing time if DST is observed.
EIA Number (US only)		Input answer	EIA plant ID
Block Utility Code		Input answer	Used in component reported combined cycles, see OATI portal
Block Unit Code		Input answer	Used in component reported combined cycles, see OATI portal
Unit loading characteristics at time of design		Pick an option	1 - Base load with minor load following
			2 - Periodic startup
			3- Weekly startup
			4 - Daily startup
			5 - Startup chiefly to meet daily peaks
			9 - Other
Nameplate Rating	MW	Input answer	Unit nameplate rating
Status		Pick an option	Voluntary reporting
			Non-reporting
			Reporting
Country		Pick an option	USA
			CA
			MX
State/Province		Pick an option	Abbreviation for state or province
Date the unit entered service	mm/dd/yyyy	Input answer	Date unit was first declared available for dispatch or date unit operated at 50% of nameplate capacity
Unit Status Change Date	mm/dd/yyyy	Input answer	Enter a date when unit is sold or retired
Unit Status		Pick an option	Active
			Sold
			Retired

Table 2: Fluidized Bed Boiler			
Field	**Units**	**Entry Type**	**Description**
Fluid bed boiler commissioning year		Input answer	Year of boiler commissioning
More than 50% of boiler outdoors		Pick an option	Yes
			No
Steam flow rate	klbs/hr	Input answer	Total design steam flow for unit
Design stem temperatue	F	Input answer	Design main steam temperature
Design steam pressure	psig	Input answer	Design main steam pressure
Fuel system firing type		Pick an option	A - Front or back
			B - Opposed
			C - Vertical
			D - Tangential
			E - Cyclone
			F - Concentric
			G - Circulating fluid bed
			H - Bubbling fluid bed
			I - Stoker
Bed material injection system		Pick an option	1 - Gravimetric feeders
			2 - Volumetric feeders
			3 - Pnuenatic feeders
Number of forced draft (FD) fans		Input answer	Number of fans including spares
Type of FD fan drive		Pick an option	1- Single speed motor
			2 - Two speed motor
			3 - Variable speed motor
			4 - Steam turbine
			9 - Other
Number of induced draft (ID) fans		Input answer	Number of fans including spares
Number of gas recirculating fans		Input answer	Number of fans including spares
Number of primary air heaters			Not used in fluid bed
Type of primary air heater			Not used in fluid bed
Number of secondary air heaters		Input answer	Air heaters that provide combustion air to boiler. Beteen FD fan and boiler.
Type of secondary air heater		Pick an option	1 - Regeneratis (Ljungstrom)
			2 - Tubular
			3 - Steam coil
			4 - Regenerative (Rothemuhle)
			9 - Other

Table 2: Fluidized Bed Boiler			
Field	**Units**	**Entry Type**	**Description**
			0 - Does not have

Table 3: Auxiliary Systems			
Field	**Units**	**Entry Type**	**Description**
Type of condenser cooling water		Pick an option	1 - Fresh
			2 - Brackish
			3 - Salt
			9 - Other
Origin of condenser cooling water		Pick an option	1 - River
			2 - Lake
			3 - Ocean or bay
			9 - Other
Total number of condensate pumps		Input answer	Number of pumps
Min number of condensate pumps for max continous output		Input answer	Number of pumps
Total number of feedwater pumps		Input answer	Number of pumps
Min number of feedwater pumps for max continous output		Input answer	Number of pumps
Can startup pump be used with boiler feed pumps		Pick an option	1 - Additive
			3 - Startup only
			0 - Does not have
Capability of startup pump		Input answer	Percent of total flow
Number of high pressure heaters per train		Input answer	Number of heaters
Number of intermediate pressure heaters per train		Input answer	Number of heaters
Number of low pressure heaters per train		Input answer	Number of heaters
Total number of circulating water pumps		Input answer	Number of pumps
Type of cooling tower		Pick an option	1 - Mechanical draft (induced, forced, cross-flow, counterflow, counterflow)
			2 - Atmospheric spray
			3 - Hyberbolic (natural draft)
			4 - Deck-filled
			5 - Coil shed
			9 - Other

Table 4: FGD System			
Field	**Units**	**Entry Type**	**Description**
First year of FGD operation		Input answer	First year of operation
Was FGD part of original design		Pick an option	Yes
			No
Are FGD modules shared with other units		Pick an option	Yes
			No
Type of scrubber/absorber		Pick an option	1 - Venturi
			2 - Spray
			3 - Tray
			4 - Packed
			5 - Combination
			9 - Other
Number of FGD fans		Input answer	Number of fans including spares
Min number of fans for max load		Input answer	Number of fans
Location of FGD fans with respect to scrubber		Pick an option	1 - Before
			2 - After

Table 5: Fuel Fluidized Bed			
Field	**Units**	**Entry Type**	**Description**
Method of feeding solid fuel into boiler		Pick an option	1 - Over-bed feed (BFB)
			2 - Under-bed feed (BFB)
			3 - Both over-bed and under-bed feed (BFB)
			4 - Within-bed feed (CFB)
			9 - Other
Method of feeding sorbent into boiler		Pick an option	1 - Over-bed feed (BFB)
			2 - Under-bed feed (BFB)
			3 - Both over-bed and under-bed feed (BFB)
			4 - Within-bed feed (CFB)
			9 - Other
Method of feeding sorbent into boiler		Pick an option	1 - Over-bed feed (BFB)
			2 - Under-bed feed (BFB)
			3 - Both over-bed and under-bed feed (BFB)
			4 - Within-bed feed (CFB)
			9 - Other
Sorbent fed with fuel		Pick an option	Yes
			No
Method of feeding bed material into boiler		Pick an option	1 - Over-bed feed (BFB)
			2 - Under-bed feed (BFB)
			3 - Both over-bed and under-bed feed (BFB)
			4 - Within-bed feed (CFB)
			9 - Other
Primary fuel		Pick an option	BM - Biomass
			CC - Coal
			LI - Lignite
			OS - Other solid
			PC - Petroleum coke
			PE - Peat
			WD - Wood
Secondary fuel		Pick an option	BM - Biomass
			CC - Coal
			DI - Distillate oil (#2)
			GG - Natural gas
			LI - Lignite
			OG - Other gas
			OL - Other liguid
			OO - Oil

Table 5: Fuel Fluidized Bed			
Field	**Units**	**Entry Type**	**Description**
			OS - Other solid
			PC - Petroleum coke
			PE - Peat
Bed material type		Input answer	Material used for bed
Is sorbent screened		Pick an option	Yes
			No
Type of solid fuel crushing system		Input answer	Type of crushing system
Char re-injection system		Pick an option	Yes
			No
Location of the mechanical precipitator with respect to the air heater		Pick an option	1 - Before air heaters
			2 - After air heaters
			3 - Both
			9 - Other
			0 - Does not have
Location of the electrostatic precipitator with respect to the air heater		Pick an option	1 - Before air heaters
			2 - After air heaters
			3 - Both
			9 - Other
			0 - Does not have
Number of baghouse booster fans		Input answer	Number of fans including spares
Baghouse type		Pick an option	1 - Reverse
			2 - Pulse (or pulse set)
			3 - Shaker
			9 - Other
			0 - Does not have
Type of flyash removal system		Pick an option	1 - Vacuum
			2 - Pressure
			3 - Vacuum-Pressure
			4 - Water (sluice)
			5 - Vacuum and water slurry
			9 - Other
			0 - Does not have

Table 6: Steam Turbine			
Field	**Units**	**Entry Type**	**Description**
Steam turbine commissioning year		Input answer	Year steam turbine was commissioned
More than 50% of steam turbine outdoors		Pick an option	Yes
			No
Steam turbine output	MW	Input answer	Rating of steam turbine

Table 7: Generator			
Field	**Units**	**Entry Type**	**Description**
Generator commissioning year		Input answer	Year generator was commissioned
Year of last rewind or replacement		Input answer	Year of last rewind or replacement
More than 50% of generator outdoors		Pick an option	Yes
			No
Main generator nameplate	MW	Input answer	Generator nameplate rating
Second generator nameplate	MW	Input answer	Can be used for cross compound or block reported combined cycle units
Third generator nameplate	MW	Input answer	Can be used for cross compound or block reported combined cycle units
Generator voltage	kV	Input answer	Generator output voltage
Generator capability	MVA	Input answer	Generator MVA rating
Generator speed	rpm	Input answer	Generator rotational speed
Generator power factor	%	Input answer	Design power factor
Excitation system		Pick an option	1 - Single
			2 - Redundant
Type of exciter		Pick an option	1 - Static
			2 - Rotating dc generator
			3 - Brushless
			4 - Alternator rectifier
			9 - Other

Table 8: Balance of Plant (Electrical)			
Field	**Units**	**Entry Type**	**Description**
BOP commissioning year		Input answer	Year GSU and breakers were commissioned
Generator Sync breaker interrupting media		Pick an option	1 - Air/air blast (ACB)
			2- Oil (OCB)
			3 - Vacuum (VCB)
			4 SF6/gas (GCB)
			9 - Other
Generator sync breaker voltage	kV	Input answer	Nameplate voltage
Gen sync breaker current rating	amps	Input answer	Nameplate current rating
Generator sync breaker interrupt rating	kA	Input answer	Nameplate interrupt current rating
Type of main transformer (GSU)		Pick an option	1 - Single phase
			2 - Three phase
			9 - Other
MVA Rating of main transformer (GSU)	MVA	Input answer	Nameplate rating of main transformer
High side voltage of GSU	kV	Input answer	GSU output voltage
Low side voltage of GSU	kV	Input answer	GSU input voltage
Second high side voltage of GSU	kV	Input answer	GSU output voltage
Second low side voltage of GSU	kV	Input answer	GSU input voltage

Table 9: NOx Reduction System			
Field	**Units**	**Entry Type**	**Description**
Selective non-catalytic reduction system (SNCR)?		Pick an option	Yes
			No
Selective catalytic reduction system (SNCR)?		Pick an option	Yes
			No
Catalytic air heaters (CAH)?		Pick an option	Yes
			No
Water injection system?		Pick an option	Yes
			No

Appendix E3: Unit Design Data – Gas Turbine/Jet Engine

Note: The NERC Board of Trustees approved a Section 1600 request to collect additional design data for conventional generating units starting in 2024.

Instructions

Use the Excel file, "Gas Turbine-Jet Engine Workbook," on the GADS DRI page to report design and installed equipment data. The tables on the following pages show the data that is required to complete the Excel file for submittal to the OATI GADS portal. The data order in the tables matches the order of the data columns in the Excel file. A GUI interface in the OATI portal and design fields in commercially available GADS programs can also be used to report design and equipment information for gas (combustion) turbine or jet engine units.

Data reported in these files should reflect the current condition and design of the unit.

Table 1: General Information			
Field	**Units**	**Entry Type**	**Description**
NCR Number		Input answer	Company NCR ID
NERC Region Code		Pick an option	MRO
			NPCC
			RF
			SERC
			TRE
			WECC
NERC Sub-Region Code		Pick an option	Varies by region, choose region if unknown
Utility Code		Input answer	NERC utility code
Unit Code		Input answer	NERC unit code
Unit Type Code		Pick an option	300 - Gas turbine/jet engine
Unit Name		Input answer	Name of unit
Time Zone		Pick an option	Time zone used for GADS reporting, not necessarily where it is located. Chose appropriate prevailing time if DST is observed.
EIA Number (US only)		Input answer	EIA plant ID
Block Utility Code		Input answer	Used in component reported combined cycles, see OATI portal
Block Unit Code		Input answer	Used in component reported combined cycles, see OATI portal
Unit loading characteristics at time of design		Pick an option	1 - Base load with minor load following
			2 - Periodic startup
			3- Weekly startup
			4 - Daily startup
			5 - Startup chiefly to meet daily peaks
			9 - Other
Nameplate Rating	MW	Input answer	Unit nameplate rating
Status		Pick an option	Voluntary reporting
			Non-reporting
			Reporting
Country		Pick an option	USA
			CA
			MX
State/Province		Pick an option	Abbreviation for state or province
Date the unit entered service	mm/dd/yyyy	Input answer	Date unit was first declared available for dispatch or date unit operated at 50% of nameplate capacity
Unit Status Change Date	mm/dd/yyyy	Input answer	Enter a date when unit is sold or retired
Unit Status		Pick an option	Active
			Sold
			Retired

Table 2: Gas Turbine			
Field	**Units**	**Entry Type**	**Description**
Gas turbine/jet engine commissioning year		Input answer	Year gas turbine commissioned
Gas turbine/jet engine nameplate rating	MW	Input answer	Rating of gas turbine
Turbine/engine model number		Input answer	Model of turbine or engine
Type of fuel used		Pick an option	DI - Distillate oil (#2)
			GG - Natural gas
			JP - JP4 or JP5
			KE - Kerosene
			OG - Other gas
			OL - Other liquid
			OO - Oil (like #6)
			PR - Propane
			SL - Sludge gas
Cycle type			1 - Reheat
			2 - Simple
			3- Regenerative
			4 - Recuperative
			5 - Intercooled
			6 - Pre-cooled
			7 - Complex
			9 - Other
Startup system type			1 - Air
			2- Auxiliary motor
			3 - Electric motor
			4 - Natural gas
			5- Flow turbine
			6 - Supercharging fan
			7 - Hydraulic
			8 - Not used
			9- Other
			A - LCI/SFC
Time in minutes for normal cold start to full load	Minutes	Input answer	Startup time
Time in minutes for normal cold start to full load	Minutes	Input answer	Startup time
Black start capability			Yes
			No
			Answer may be yes even if not registered as black start unit.

Table 3: Generator			
Field	**Units**	**Entry Type**	**Description**
Generator commissioning year		Input answer	Year generator was commissioned
Year of last rewind or replacement		Input answer	Year of last rewind or replacement
More than 50% of generator outdoors		Pick an option	Yes
			No
Main generator nameplate	MW	Input answer	Generator nameplate rating
Second generator nameplate	MW	Input answer	Can be used for cross compound or block reported combined cycle units
Third generator nameplate	MW	Input answer	Can be used for cross compound or block reported combined cycle units
Generator voltage	kV	Input answer	Generator output voltage
Generator capability	MVA	Input answer	Generator MVA rating
Generator speed	rpm	Input answer	Generator rotational speed
Generator power factor	%	Input answer	Design power factor
Excitation system		Pick an option	1 - Single
			2 - Redundant
Type of exciter		Pick an option	1 - Static
			2 - Rotating dc generator
			3 - Brushless
			4 - Alternator rectifier
			9 - Other

Table 4: Balance of Plant (Electrical)			
Field	**Units**	**Entry Type**	**Description**
BOP commissioning year		Input answer	Year GSU and breakers were commissioned
Generator Sync breaker interrupting media		Pick an option	1 - Air/air blast (ACB)
			2- Oil (OCB)
			3 - Vacuum (VCB)
			4 SF6/gas (GCB)
			9 - Other
Generator sync breaker voltage	kV	Input answer	Nameplate voltage
Gen sync breaker current rating	amps	Input answer	Nameplate current rating
Generator sync breaker interrupt rating	kA	Input answer	Nameplate interrupt current rating
Type of main transformer (GSU)		Pick an option	1 - Single phase
			2 - Three phase
			9 - Other
MVA Rating of main transformer (GSU)	MVA	Input answer	Nameplate rating of main transformer
High side voltage of GSU	kV	Input answer	GSU output voltage
Low side voltage of GSU	kV	Input answer	GSU input voltage
Second high side voltage of GSU	kV	Input answer	GSU output voltage
Second low side voltage of GSU	kV	Input answer	GSU input voltage

Table 5: NOx Reduction System			
Field	**Units**	**Entry Type**	**Description**
Selective non-catalytic reduction system (SNCR)?		Pick an option	Yes
			No
Selective catalytic reduction system (SNCR)?		Pick an option	Yes
			No
Catalytic air heaters (CAH)?		Pick an option	Yes
			No
Water injection system?		Pick an option	Yes
			No

Appendix E4: Unit Design Data – Combined Cycle/Cogeneration

Note: The NERC Board of Trustees approved a Section 1600 request to collect additional design data for conventional generating units starting in 2024.

Instructions

Use the Excel file (link shown below) to report design and installed equipment data. The tables on the following pages show the data that is required to complete the Excel file for submittal to the OATI GADS portal. The data order in the tables matches the order of the data columns in the Excel file. A GUI interface in the OATI portal and design fields in commercially available GADS programs can also be used to report design and equipment information for combined cycle and cogeneration units. These units typically have gas turbines that exhaust their hot gases into a heat recovery steam generator (HRSG) that produces steam to supply a steam turbine.

Data reported in these files should reflect the current condition and design of the unit.

Table 1: General Information			
Field	**Units**	**Entry Type**	**Description**
NCR Number		Input answer	Company NCR ID
NERC Region Code		Pick an option	MRO
			NPCC
			RF
			SERC
			TRE
			WECC
NERC Sub-Region Code		Pick an option	Varies by region, choose region if unknown
Utility Code		Input answer	NERC utility code
Unit Code		Input answer	NERC unit code
Unit Type Code		Pick an option	800 - Miscellaneous
			850 - Combined cycle block
			851 - Gas turbine in combined cycle
			852 - Steam turbine in combined cycle
			860 - Cogeneration block
			861 - Gas turbine in cogeneration
			862 - Steam turbine in cogeneration
Unit Name		Input answer	Name of unit
Time Zone		Pick an option	Time zone used for GADS reporting, not necessarily where it is located. Chose appropriate prevailing time if DST is observed.
EIA Number (US only)		Input answer	EIA plant ID
Block Utility Code		Input answer	Used in component reported combined cycles, see OATI portal
Block Unit Code		Input answer	Used in component reported combined cycles, see OATI portal
Unit loading characteristics at time of design		Pick an option	1 - Base load with minor load following
			2 - Periodic startup
			3- Weekly startup
			4 - Daily startup
			5 - Startup chiefly to meet daily peaks
			9 - Other
Nameplate Rating	MW	Input answer	Unit nameplate rating
Status		Pick an option	Voluntary reporting
			Non-reporting
			Reporting
Country		Pick an option	USA
			CA
			MX
State/Province		Pick an option	Abbreviation for state or province

Table 1: General Information			
Field	**Units**	**Entry Type**	**Description**
Date the unit entered service	mm/dd/yyyy	Input answer	Date unit was first declared available for dispatch or date unit operated at 50% of nameplate capacity
Unit Status Change Date	mm/dd/yyyy	Input answer	Enter a date when unit is sold or retired
Unit Status		Pick an option	Active
			Sold
			Retired

Table 2: Gas Turbine			
Field	**Units**	**Entry Type**	**Description**
Gas turbine/jet engine commissioning year		Input answer	Year gas turbine commissioned
Gas turbine/jet engine nameplate rating	MW	Input answer	Rating of gas turbine
Turbine/engine model number		Input answer	Model of turbine or engine
Type of fuel used		Pick an option	DI - Distillate oil (#2)
			GG - Natural gas
			JP - JP4 or JP5
			KE - Kerosene
			OG - Other gas
			OL - Other liquid
			OO - Oil (like #6)
			PR - Propane
			SL - Sludge gas
Cycle type			1 - Reheat
			2 - Simple
			3- Regenerative
			4 - Recuperative
			5 - Intercooled
			6 - Pre-cooled
			7 - Complex
			9 - Other
Startup system type			1 - Air
			2- Auxiliary motor
			3 - Electric motor
			4 - Natural gas
			5- Flow turbine
			6 - Supercharging fan
			7 - Hydraulic
			8 - Not used
			9- Other
			? - LCI/SFC
Time in minutes for normal cold start to full load	Minutes	Input answer	Startup time
Time in minutes for normal cold start to full load	Minutes	Input answer	Startup time
Black start capability			Yes
			No
			Answer may be yes even if not registered as black start unit.

Table 3: HRSG			
Field	**Units**	**Entry Type**	**Description**
HRSG Commisioning Year		Input answer	Year HRSG commisssioned
More than 50% of HRSG outdoors		Pick an option	Yes
			No
Design steam Flow rate	klbs/hr	Input answer	Design main steam flow rate
Design Temp	F	Input answer	Design main steam temperature
Design Pressure	psig	Input answer	Design main steam pressure
Duct burner primary fuel		Pick an option	DI - Distillate oil (#2)
			GG - Natural gas
			JP - JP4 or JP5
			KE - Kerosene
			OG - Other gas
			OL - Other liquid
			OO - Oil (like #6)
			PR - Propane
			SL - Sludge gas
Duct burner secondary fuel (if applicable)		Pick an option	DI - Distillate oil (#2)
			GG - Natural gas
			JP - JP4 or JP5
			KE - Kerosene
			OG - Other gas
			OL - Other liquid
			OO - Oil (like #6)
			PR - Propane
			SL - Sludge gas

Table 4: Steam Turbine			
Field	**Units**	**Entry Type**	**Description**
Steam turbine commissioning year		Input answer	Year steam turbine was commissioned
More than 50% of steam turbine outdoors		Pick an option	Yes
			No
Steam turbine output	MW	Input answer	Rating of steam turbine

Table 5: Auxiliary Systems			
Field	**Units**	**Entry Type**	**Description**
Type of condenser cooling water		Pick an option	1 - Fresh
			2 - Brackish
			3 - Salt
			9 - Other
Origin of condenser cooling water		Pick an option	1 - River
			2 - Lake
			3 - Ocean or bay
			9 - Other
Total number of condensate pumps		Input answer	Number of pumps
Min number of condensate pumps for max continous output		Input answer	Number of pumps
Total number of feedwater pumps		Input answer	Number of pumps
Min number of feedwater pumps for max continous output		Input answer	Number of pumps
Total number of circulating water pumps		Input answer	Number of pumps
Type of cooling tower		Pick an option	1 - Mechanical draft (induced, forced, cross-flow, counterflow, counterflow)
			2 - Atmospheric spray
			3 - Hyberbolic (natural draft)
			4 - Deck-filled
			5 - Coil shed
			9 - Other

Table 6: Generator			
Field	**Units**	**Entry Type**	**Description**
Generator commissioning year		Input answer	Year generator was commissioned
Year of last rewind or replacement		Input answer	Year of last rewind or replacement
More than 50% of generator outdoors		Pick an option	Yes
			No
Main generator nameplate	MW	Input answer	Generator nameplate rating
Second generator nameplate	MW	Input answer	Can be used for cross compound or block reported combined cycle units
Third generator nameplate	MW	Input answer	Can be used for cross compound or block reported combined cycle units
Generator voltage	kV	Input answer	Generator output voltage
Generator capability	MVA	Input answer	Generator MVA rating
Generator speed	rpm	Input answer	Generator rotational speed
Generator power factor	%	Input answer	Design power factor
Excitation system		Pick an option	1 - Single
			2 - Redundant
Type of exciter		Pick an option	1 - Static
			2 - Rotating dc generator
			3 - Brushless
			4 - Alternator rectifier
			9 - Other

Table 7: Balance of Plant (Electrical)			
Field	**Units**	**Entry Type**	**Description**
BOP commissioning year		Input answer	Year GSU and breakers were commissioned
Generator Sync breaker interrupting media		Pick an option	1 - Air/air blast (ACB)
			2- Oil (OCB)
			3 - Vacuum (VCB)
			4 SF6/gas (GCB)
			9 - Other
Generator sync breaker voltage	kV	Input answer	Nameplate voltage
Gen sync breaker current rating	amps	Input answer	Nameplate current rating
Generator sync breaker interrupt rating	kA	Input answer	Nameplate interrupt current rating
Type of main transformer (GSU)		Pick an option	1 - Single phase
			2 - Three phase
			9 - Other
MVA Rating of main transformer (GSU)	MVA	Input answer	Nameplate rating of main transformer
High side voltage of GSU	kV	Input answer	GSU output voltage
Low side voltage of GSU	kV	Input answer	GSU input voltage
Second high side voltage of GSU	kV	Input answer	GSU output voltage
Second low side voltage of GSU	kV	Input answer	GSU input voltage

Table 8: NOx Reduction System			
Field	**Units**	**Entry Type**	**Description**
Selective non-catalytic reduction system (SNCR)?		Pick an option	Yes
			No
Selective catalytic reduction system (SNCR)?		Pick an option	Yes
			No
Catalytic air heaters (CAH)?		Pick an option	Yes
			No
Water injection system?		Pick an option	Yes
			No

Appendix E4a: Unit Design Data – Gas Turbine in Combined Cycle/Cogeneration

Note: The NERC Board of Trustees approved a Section 1600 request to collect additional design data for conventional generating units starting in 2024.

Instructions

Use the Excel file, "Gas Turb-Jet Eng in CC-Cogen Workbook," on the GADS DRI page to report design and installed equipment data. The tables on the following pages show the data that is required to complete the Excel file for submittal to the OATI GADS portal. The data order in the tables matches the order of the data columns in the Excel file. A GUI interface in the OATI portal and design fields in commercially available GADS programs can also be used to report design and equipment equipment information for combined cycle and cogeneration units. These units typically have gas turbines that exhaust their hot gases into a heat recovery steam generator (HRSG) that produces steam to supply a steam turbine.

Data reported in these files should reflect the current condition and design of the unit.

Table 1: General Information			
Field	**Units**	**Entry Type**	**Description**
NCR Number		Input answer	Company NCR ID
NERC Region Code		Pick an option	MRO
			NPCC
			RF
			SERC
			TRE
			WECC
NERC Sub-Region Code		Pick an option	Varies by region, choose region if unknown
Utility Code		Input answer	NERC utility code
Unit Code		Input answer	NERC unit code
Unit Type Code		Pick an option	851 - Gas turbine in combined cycle
			861 - Gas turbine in cogeneration
Unit Name		Input answer	Name of unit
Time Zone		Pick an option	Time zone used for GADS reporting, not necessarily where it is located. Chose appropriate prevailing time if DST is observed.
EIA Number (US only)		Input answer	EIA plant ID
Block Utility Code		Input answer	Used in component reported combined cycles, see OATI portal
Block Unit Code		Input answer	Used in component reported combined cycles, see OATI portal
Unit loading characteristics at time of design		Pick an option	1 - Base load with minor load following
			2 - Periodic startup
			3- Weekly startup
			4 - Daily startup
			5 - Startup chiefly to meet daily peaks
			9 - Other
Nameplate Rating	MW	Input answer	Unit nameplate rating
Status		Pick an option	Voluntary reporting
			Non-reporting
			Reporting
Country		Pick an option	USA
			CA
			MX
State/Province		Pick an option	Abbreviation for state or province
Date the unit entered service	mm/dd/yyyy	Input answer	Date unit was first declared available for dispatch or date unit operated at 50% of nameplate capacity
Unit Status Change Date	mm/dd/yyyy	Input answer	Enter a date when unit is sold or retired
Unit Status		Pick an option	Active
			Sold
			Retired

Table 1: General Information			
Field	**Units**	**Entry Type**	**Description**
State/Province		Pick an option	Abbreviation for state or province
Date the unit entered service	mm/dd/yyyy	Input answer	Date unit was first declared available for dispatch or date unit operated at 50% of nameplate capacity
Unit Status Change Date	mm/dd/yyyy	Input answer	Enter a date when unit is sold or retired
Unit Status		Pick an option	Active
			Sold
			Retired

Table 2: Gas Turbine			
Field	**Units**	**Entry Type**	**Description**
Gas turbine/jet engine commissioning year		Input answer	Year gas turbine commissioned
Gas turbine/jet engine nameplate rating	MW	Input answer	Rating of gas turbine
Turbine/engine model number		Input answer	Model of turbine or engine
Type of fuel used		Pick an option	DI - Distillate oil (#2)
			GG - Natural gas
			JP - JP4 or JP5
			KE - Kerosene
			OG - Other gas
			OL - Other liquid
			OO - Oil (like #6)
			PR - Propane
			SL - Sludge gas
Cycle type			1 - Reheat
			2 - Simple
			3- Regenerative
			4 - Recuperative
			5 - Intercooled
			6 - Pre-cooled
			7 - Complex
			9 - Other
Startup system type			1 - Air
			2- Auxiliary motor
			3 - Electric motor
			4 - Natural gas
			5- Flow turbine
			6 - Supercharging fan
			7 - Hydraulic
			8 - Not used
			9- Other

Table 2: Gas Turbine			
Field	**Units**	**Entry Type**	**Description**
			? - LCI/SFC
Time in minutes for normal cold start to full load	Minutes	Input answer	Startup time
Time in minutes for normal cold start to full load	Minutes	Input answer	Startup time
Black start capability			Yes
			No
			Answer may be yes even if not registered as black start unit.

Table 3: HRSG			
Field	**Units**	**Entry Type**	**Description**
HRSG Commisioning Year		Input answer	Year HRSG commisssioned
More than 50% of HRSG outdoors		Pick an option	Yes
			No
Design steam Flow rate	klbs/hr	Input answer	Design main steam flow rate
Design Temp	F	Input answer	Design main steam temperature
Design Pressure	psig	Input answer	Design main steam pressure
Duct burner primary fuel		Pick an option	DI - Distillate oil (#2)
			GG - Natural gas
			JP - JP4 or JP5
			KE - Kerosene
			OG - Other gas
			OL - Other liquid
			OO - Oil (like #6)
			PR - Propane
			SL - Sludge gas
Duct burner secondary fuel (if applicable)		Pick an option	DI - Distillate oil (#2)
			GG - Natural gas
			JP - JP4 or JP5
			KE - Kerosene
			OG - Other gas
			OL - Other liquid
			OO - Oil (like #6)
			PR - Propane
			SL - Sludge gas

Table 4: Steam Turbine			
Field	**Units**	**Entry Type**	**Description**
Steam turbine commissioning year		Input answer	Year steam turbine was commissioned
More than 50% of steam turbine outdoors		Pick an option	Yes
			No
Steam turbine output	MW	Input answer	Rating of steam turbine

Table 5: Auxiliary Systems			
Field	**Units**	**Entry Type**	**Description**
Total number of feedwater pumps		Input answer	Number of pumps
Min number of feedwater pumps for max continous output		Input answer	Number of pumps

Table 6: Generator			
Field	**Units**	**Entry Type**	**Description**
Generator commissioning year		Input answer	Year generator was commissioned
Year of last rewind or replacement		Input answer	Year of last rewind or replacement
More than 50% of generator outdoors		Pick an option	Yes
			No
Main generator nameplate	MW	Input answer	Generator nameplate rating
Second generator nameplate	MW	Input answer	Can be used for cross compound or block reported combined cycle units
Third generator nameplate	MW	Input answer	Can be used for cross compound or block reported combined cycle units
Generator voltage	kV	Input answer	Generator output voltage
Generator capability	MVA	Input answer	Generator MVA rating
Generator speed	rpm	Input answer	Generator rotational speed
Generator power factor	%	Input answer	Design power factor
Excitation system		Pick an option	1 - Single
			2 - Redundant
Type of exciter		Pick an option	1 - Static
			2 - Rotating dc generator
			3 - Brushless
			4 - Alternator rectifier
			9 - Other

Table 7: Balance of Plant (Electrical)			
Field	**Units**	**Entry Type**	**Description**
BOP commissioning year		Input answer	Year GSU and breakers were commissioned
Generator Sync breaker interrupting media		Pick an option	1 - Air/air blast (ACB)
			2- Oil (OCB)
			3 - Vacuum (VCB)
			4 SF6/gas (GCB)
			9 - Other
Generator sync breaker voltage	kV	Input answer	Nameplate voltage
Gen sync breaker current rating	amps	Input answer	Nameplate current rating
Generator sync breaker interrupt rating	kA	Input answer	Nameplate interrupt current rating
Type of main transformer (GSU)		Pick an option	1 - Single phase

Table 7: Balance of Plant (Electrical)			
Field	**Units**	**Entry Type**	**Description**
			2 - Three phase
			9 - Other
MVA Rating of main transformer (GSU)	MVA	Input answer	Nameplate rating of main transformer
High side voltage of GSU	kV	Input answer	GSU output voltage
Low side voltage of GSU	kV	Input answer	GSU input voltage
Second high side voltage of GSU	kV	Input answer	GSU output voltage
Second low side voltage of GSU	kV	Input answer	GSU input voltage

Table 8: NOx Reduction System			
Field	**Units**	**Entry Type**	**Description**
Selective non-catalytic reduction system (SNCR)?		Pick an option	Yes
			No
Selective catalytic reduction system (SNCR)?		Pick an option	Yes
			No
Catalytic air heaters (CAH)?		Pick an option	Yes
			No
Water injection system?		Pick an option	Yes
			No

Appendix E4b: Unit Design Data – Steam Turbine in Combined Cycle/Cogeneration

Note: The NERC Board of Trustees approved a Section 1600 request to collect additional design data for conventional generating units starting in 2024.

Instructions

Use the Excel file, "Steam Turbine in CC-Cogen Workbook," on the GADS DRI page to report design and installed equipment data. The tables on the following pages show the data that is required to complete the Excel file for submittal to the OATI GADS portal. The data order in the tables matches the order of the data columns in the Excel file. A GUI interface in the OATI portal and design fields in commercially available GADS programs can also be used to report design and equipment equipment information for combined cycle and cogeneration units. These units typically have gas turbines that exhaust their hot gases into a heat recovery steam generator (HRSG) that produces steam to supply a steam turbine.

Data reported in these files should reflect the current condition and design of the unit.

Table 1: General Information			
Field	**Units**	**Entry Type**	**Description**
NCR Number		Input answer	Company NCR ID
NERC Region Code		Pick an option	MRO
			NPCC
			RF
			SERC
			TRE
			WECC
NERC Sub-Region Code		Pick an option	Varies by region, choose region if unknown
Utility Code		Input answer	NERC utility code
Unit Code		Input answer	NERC unit code
Unit Type Code		Pick an option	852 - Steam turbine in combined cycle
			862 - Steam turbine in cogeneration
Unit Name		Input answer	Name of unit
Time Zone		Pick an option	Time zone used for GADS reporting, not necessarily where it is located. Chose appropriate prevailing time if DST is observed.
EIA Number (US only)		Input answer	EIA plant ID
Block Utility Code		Input answer	Used in component reported combined cycles, see OATI portal
Block Unit Code		Input answer	Used in component reported combined cycles, see OATI portal
Unit loading characteristics at time of design		Pick an option	1 - Base load with minor load following
			2 - Periodic startup
			3- Weekly startup
			4 - Daily startup
			5 - Startup chiefly to meet daily peaks
			9 - Other
Nameplate Rating	MW	Input answer	Unit nameplate rating
Status		Pick an option	Voluntary reporting
			Non-reporting
			Reporting
Country		Pick an option	USA
			CA
			MX
State/Province		Pick an option	Abbreviation for state or province
Date the unit entered service	mm/dd/yyyy	Input answer	Date unit was first declared available for dispatch or date unit operated at 50% of nameplate capacity
Unit Status Change Date	mm/dd/yyyy	Input answer	Enter a date when unit is sold or retired
Unit Status		Pick an option	Active

Table 1: General Information			
Field	**Units**	**Entry Type**	**Description**
			Sold
			Retired

Table 2: Steam Turbine			
Field	**Units**	**Entry Type**	**Description**
Steam turbine commissioning year		Input answer	Year steam turbine was commissioned
More than 50% of steam turbine outdoors		Pick an option	Yes
			No
Steam turbine output	MW	Input answer	Rating of steam turbine

Table 3: Auxiliary Systems			
Field	**Units**	**Entry Type**	**Description**
Type of condenser cooling water		Pick an option	1 - Fresh
			2 - Brackish
			3 - Salt
			9 - Other
Origin of condenser cooling water		Pick an option	1 - River
			2 - Lake
			3 - Ocean or bay
			9 - Other
Total number of condensate pumps		Input answer	Number of pumps
Min number of condensate pumps for max continous output		Input answer	Number of pumps
Total number of circulating water pumps		Input answer	Number of pumps
Type of cooling tower		Pick an option	1 - Mechanical draft (induced, forced, cross-flow, counterflow, counterflow)
			2 - Atmospheric spray
			3 - Hyberbolic (natural draft)
			4 - Deck-filled
			5 - Coil shed
			9 - Other

Table 4: Generator			
Field	**Units**	**Entry Type**	**Description**
Generator commissioning year		Input answer	Year generator was commissioned
Year of last rewind or replacement		Input answer	Year of last rewind or replacement
More than 50% of generator outdoors		Pick an option	Yes No

Table 4: Generator			
Field	**Units**	**Entry Type**	**Description**
Main generator nameplate	MW	Input answer	Generator nameplate rating
Second generator nameplate	MW	Input answer	Can be used for cross compound or block reported combined cycle units
Third generator nameplate	MW	Input answer	Can be used for cross compound or block reported combined cycle units
Generator voltage	kV	Input answer	Generator output voltage
Generator capability	MVA	Input answer	Generator MVA rating
Generator speed	rpm	Input answer	Generator rotational speed
Generator power factor	%	Input answer	Design power factor
Excitation system		Pick an option	1 - Single
			2 - Redundant
Type of exciter		Pick an option	1 - Static
			2 - Rotating dc generator
			3 - Brushless
			4 - Alternator rectifier
			9 - Other

Table 5: Balance of Plant (Electrical)			
Field	**Units**	**Entry Type**	**Description**
Field	Units	Entry Type	Description
BOP commissioning year		Input answer	Year GSU and breakers were commissioned
Generator Sync breaker interrupting media		Pick an option	1 - Air/air blast (ACB)
			2- Oil (OCB)
			3 - Vacuum (VCB)
			4 SF6/gas (GCB)
			9 - Other
Generator sync breaker voltage	kV	Input answer	Nameplate voltage
Gen sync breaker current rating	amps	Input answer	Nameplate current rating
Generator sync breaker interrupt rating	kA	Input answer	Nameplate interrupt current rating
Type of main transformer (GSU)		Pick an option	1 - Single phase
			2 - Three phase
			9 - Other
MVA Rating of main transformer (GSU)	MVA	Input answer	Nameplate rating of main transformer
High side voltage of GSU	kV	Input answer	GSU output voltage
Low side voltage of GSU	kV	Input answer	GSU input voltage
Second high side voltage of GSU	kV	Input answer	GSU output voltage
Second low side voltage of GSU	kV	Input answer	GSU input voltage

Appendix E5: Unit Design Data – Hydro or Pumped Storage

Note: The NERC Board of Trustees approved a Section 1600 request to collect additional design data for conventional generating units starting in 2024.

Instructions

Use the Excel file, "Hydro-Pumped Storage Workbook," on the GADS DRI page to report design and installed equipment data. The tables on the following pages show the data that is required to complete the Excel file for submittal to the OATI GADS portal. The data order in the tables matches the order of the data columns in the Excel file. A GUI interface in the OATI portal and design fields in commercially available GADS programs can also be used to report design and equipment information for hydro or pumped storage units.

Data reported in these files should reflect the current condition and design of the unit.

Table 1: General Information			
Field	**Units**	**Entry Type**	**Description**
NCR Number		Input answer	Company NCR ID
NERC Region Code		Pick an option	MRO
			NPCC
			RF
			SERC
			TRE
			WECC
NERC Sub-Region Code		Pick an option	Varies by region, choose region if unknown
Utility Code		Input answer	NERC utility code
Unit Code		Input answer	NERC unit code
Unit Type Code		Pick an option	500 - Hydro/Pumped Storage
Unit Name		Input answer	Name of unit
Time Zone		Pick an option	Time zone used for GADS reporting, not necessarily where it is located. Chose appropriate prevailing time if DST is observed.
EIA Number (US only)		Input answer	EIA plant ID
Block Utility Code		Input answer	Used in component reported combined cycles, see OATI portal
Block Unit Code		Input answer	Used in component reported combined cycles, see OATI portal
Unit loading characteristics at time of design		Pick an option	1 - Base load with minor load following
			2 - Periodic startup
			3- Weekly startup
			4 - Daily startup
			5 - Startup chiefly to meet daily peaks
			9 - Other
Nameplate Rating	MW	Input answer	Unit nameplate rating
Status		Pick an option	Voluntary reporting
			Non-reporting
			Reporting
Country		Pick an option	USA
			CA
			MX
State/Province		Pick an option	Abbreviation for state or province
Date the unit entered service	mm/dd/yyyy	Input answer	Date unit was first declared available for dispatch or date unit operated at 50% of nameplate capacity
Unit Status Change Date	mm/dd/yyyy	Input answer	Enter a date when unit is sold or retired
Unit Status		Pick an option	Active
			Sold
			Retired

Table 2: Hydro and Pumped Storage			
Field	**Units**	**Entry Type**	**Description**
Hydro turbine commissioning year		Input answer	Year of turbine commissioning
Hydro turbine orientation		Pick an option	1 - Horizontal
			2 - Vertical
			3 - Other
Hydro turbine configuration		Pick an option	1 - Single
			2 - Twin (Double)
			3 - Triplex
			4 - Double discharge quad
			0 - Other
Hydro turbine type		Pick an option	1 -Francis
			2 - Kaplan -adjustable blade propeller
			3 - Fixed blade propeller
			4 - Pump turbine
			5 - Mixed flow
			6 - Impulse
			9 - Other
Turbine head to nearest foot	ft	Input answer	Design turbine head
Turbine speed	rpm	Input answer	Design rpm
Turbine rated output	MW	Input answer	Design may be in horsepower so conversion will be required
Synchronous condensing capability		Pick an option	Yes
			No
Automatic generation control		Pick an option	Yes
			No
Pump turbine impeller installed		Pick an option	Yes
			No
Pump turbine or impeller type		Pick an option	1 - Impeller
			2 - Pump turbine
			9 - Other
Pump turbine head to nearest foot	ft	Input answer	Design pump turbine head
Pump rated load	MW	Input answer	Design rated load
Pump turbine sync condense capability		Pick an option	Yes No

Table 3: Generator			
Field	**Units**	**Entry Type**	**Description**
Generator commissioning year		Input answer	Year generator was commissioned
Year of last rewind or replacement		Input answer	Year of last rewind or replacement
More than 50% of generator outdoors		Pick an option	Yes No
Main generator nameplate	MW	Input answer	Generator nameplate rating
Second generator nameplate	MW	Input answer	Can be used for cross compound or block reported combined cycle units
Third generator nameplate	MW	Input answer	Can be used for cross compound or block reported combined cycle units
Generator voltage	kV	Input answer	Generator output voltage
Generator capability	MVA	Input answer	Generator MVA rating
Generator speed	rpm	Input answer	Generator rotational speed
Generator power factor	%	Input answer	Design power factor
Excitation system		Pick an option	1 - Single
			2 - Redundant
Type of exciter		Pick an option	1 - Static
			2 - Rotating dc generator
			3 - Brushless
			4 - Alternator rectifier
			9 - Other

Table 4: Balance of Plant (Electrical)			
Field	**Units**	**Entry Type**	**Description**
BOP commissioning year		Input answer	Year GSU and breakers were commissioned
Generator Sync breaker interrupting media		Pick an option	1 - Air/air blast (ACB)
			2- Oil (OCB)
			3 - Vacuum (VCB)
			4 SF6/gas (GCB)
			9 - Other
Generator sync breaker voltage	kV	Input answer	Nameplate voltage
Gen sync breaker current rating	amps	Input answer	Nameplate current rating
Generator sync breaker interrupt rating	kA	Input answer	Nameplate interrupt current rating
Type of main transformer (GSU)		Pick an option	1 - Single phase
			2 - Three phase
			9 - Other
MVA Rating of main transformer (GSU)	MVA	Input answer	Nameplate rating of main transformer
High side voltage of GSU	kV	Input answer	GSU output voltage
Low side voltage of GSU	kV	Input answer	GSU input voltage
Second high side voltage of GSU	kV	Input answer	GSU output voltage
Second low side voltage of GSU	kV	Input answer	GSU input voltage

Appendix E6: Unit Design Data – Internal Combustion Unit

Note: The NERC Board of Trustees approved a Section 1600 request to collect additional design data for conventional generating units starting in 2024.

Instructions

Use the Excel file, "Internal Combustion Reciprocating Engine Workbook," on the GADS DRI page to report design and installed equipment data. The tables on the following pages show the data that is required to complete the Excel file for submittal to the OATI GADS portal. The data order in the tables matches the order of the data columns in the Excel file. A GUI interface in the OATI portal and design fields in commercially available GADS programs can also be used to report design and equipment information for internal combustion/reciprocating engine units.

Data reported in these files should reflect the current condition and design of the unit.

Table 1: General Information			
Field	**Units**	**Entry Type**	**Description**
NCR Number		Input answer	Company NCR ID
NERC Region Code		Pick an option	MRO
			NPCC
			RF
			SERC
			TRE
			WECC
NERC Sub-Region Code		Pick an option	Varies by region, choose region if unknown
Utility Code		Input answer	NERC utility code
Unit Code		Input answer	NERC unit code
Unit Type Code		Pick an option	100 - Fossil Steam
Unit Name		Input answer	Name of unit
Time Zone		Pick an option	Time zone used for GADS reporting, not necessarily where it is located. Chose appropriate prevailing time if DST is observed.
EIA Number (US only)		Input answer	EIA plant ID
Block Utility Code		Input answer	Used in component reported combined cycles, see OATI portal
Block Unit Code		Input answer	Used in component reported combined cycles, see OATI portal
Unit loading characteristics at time of design		Pick an option	1 - Base load with minor load following
			2 - Periodic startup
			3- Weekly startup
			4 - Daily startup
			5 - Startup chiefly to meet daily peaks
			9 - Other
Nameplate Rating	MW	Input answer	Unit nameplate rating
Status		Pick an option	Voluntary reporting
			Non-reporting
			Reporting
Country		Pick an option	USA
			CA
			MX
State/Province		Pick an option	Abbreviation for state or province
Date the unit entered service	mm/dd/yyyy	Input answer	Date unit was first declared available for dispatch or date unit operated at 50% of nameplate capacity
Unit Status Change Date	mm/dd/yyyy	Input answer	Enter a date when unit is sold or retired
Unit Status		Pick an option	Active
			Sold
			Retired

Table 2: Internal Combustion/Reciprocating Engines			
Field	**Units**	**Entry Type**	**Description**
Engine commissioning year		Input answer	Year engine was commissioned
Engine nameplate rating	MW	Input answer	Design enfine rating
Engine model number		Input answer	Model number for engine
Type of fuel used		Pick an option	DI - Distillate oil (#2)
			GG - Natural gas
			JP - JP4 or JP5
			KE - Kerosene
			OG - Other gas
			OL - Other liquid
			OO - Oil (like #6)
			PR - Propane
			SL - Sludge gas
Number of cylinders		Input answer	Number of cylinders
Black start capability		Pick an option	Yes
			No
			Answer may be yes even if not registered as black start unit.

Table 3: Generator			
Field	**Units**	**Entry Type**	**Description**
Generator commissioning year		Input answer	Year generator was commissioned
Year of last rewind or replacement		Input answer	Year of last rewind or replacement
More than 50% of generator outdoors		Pick an option	1 - Yes
			2 - No
Main generator nameplate	MW	Input answer	Generator nameplate rating
Second generator nameplate	MW	Input answer	Can be used for cross compound or block reported combined cycle units
Third generator nameplate	MW	Input answer	Can be used for cross compound or block reported combined cycle units
Generator voltage	kV	Input answer	Generator output voltage
Generator capability	MVA	Input answer	Generator MVA rating
Generator speed	rpm	Input answer	Generator rotational speed
Generator power factor	%	Input answer	Design power factor
Excitation system		Pick an option	1 - Single
			2 - Redundant
Type of exciter		Pick an option	1 - Static
			2 - Rotating dc generator

Table 3: Generator			
Field	**Units**	**Entry Type**	**Description**
			3 - Brushless
			4 - Alternator rectifier
			9 - Other

Table 4: Balance of Plant (Electrical)			
Field	**Units**	**Entry Type**	**Description**
BOP commissioning year		Input answer	Year GSU and breakers were commissioned
Generator Sync breaker interrupting media		Pick an option	1 - Air/air blast (ACB)
			2- Oil (OCB)
			3 - Vacuum (VCB)
			4 SF6/gas (GCB)
			9 - Other
Generator sync breaker voltage	kV	Input answer	Nameplate voltage
Gen sync breaker current rating	amps	Input answer	Nameplate current rating
Generator sync breaker interrupt rating	kA	Input answer	Nameplate interrupt current rating
Type of main transformer (GSU)		Pick an option	1 - Single phase
			2 - Three phase
			9 - Other
MVA Rating of main transformer (GSU)	MVA	Input answer	Nameplate rating of main transformer
High side voltage of GSU	kV	Input answer	GSU output voltage
Low side voltage of GSU	kV	Input answer	GSU input voltage
Second high side voltage of GSU	kV	Input answer	GSU output voltage
Second low side voltage of GSU	kV	Input answer	GSU input voltage

Table 5: NOx Reduction System			
Field	**Units**	**Entry Type**	**Description**
Selective non-catalytic reduction system (SNCR)?		Pick an option	Yes
			No
Selective catalytic reduction system (SNCR)?		Pick an option	Yes
			No
Catalytic air heaters (CAH)?		Pick an option	Yes
			No
Water injection system?		Pick an option	Yes
			No

Appendix F: Performance Indexes and Equations

General Information

Appendix F discusses the relationships among the performance indexes calculated from the event and performance data outlined in Sections III and IV. The basis for these relationships is IEEE Standard No. 762 "Definitions for Use in Reporting Electric Generating Unit Reliability, Availability and Productivity."

All calculations are subject to the following adjustments:

1. All events must be adjusted for Daylight Savings Time (DST) if a unit is in a time zone to which it applies.
2. All events must be adjusted for the time period under analysis. Example: To analyze August for an event that starts in July and ends in September exclude the portions of the event outside August.
2. Derate events must be adjusted for shadowing by outages and by dominant derates. See Appendix G.

Summary of Various Time and Energy Factors Used by Indexes

1.	Service Hours - SH	Sum of all unit Service Hours.
2.	Synchronous Condensing Hours	Sum of all hours the unit is in the synchronous condensing mode. The units are considered to be in non-generating service operation.
3.	Pumping Hours	Sum of all hours the pumped storage unit is in pumping mode. The units are considered to be in non-generating service operation.
4.	Available Hours - AH	Sum of all Service Hours (SH) **+** Reserve Shutdown Hours (RSH) **+** Pumping Hours **+** Synchronous Condensing Hours
5.	Planned Outage Hours - POH	Sum of all hours experienced during Planned Outages (PO) **+** Planned Outage Extensions (PE) of any Planned Outages (PO).
6.	Unplanned Outage Hours - UOH	Sum of all hours experienced during Forced Outages (U1, U2, and U3) **+** Startup Failures (SF) **+** Maintenance Outages (MO) **+** Maintenance Outage Extensions (ME) of any Maintenance Outages (MO).
7.	Forced Outage Hours - FOH	Sum of all hours experienced during Forced Outages (U1, U2, and U3) **+** Startup Failures (SF).
8.	Maintenance Outage Hours - MOH	Sum of all hours experienced during Maintenance Outages (MO) **+** Maintenance Outage Extensions (ME) of any Maintenance Outages (MO).
9.	Unavailable Hours - UH	Sum of all Planned Outage Hours (POH) **+** Forced Outage Hours (FOH) **+** Maintenance Outage Hours (MOH).
10.	Scheduled Outage Hours - SOH	Sum of all hours experienced during Planned Outages (PO) **+** Maintenance Outages (MO) **+** Scheduled Outage

		Extensions (ME and PE) of any Maintenance Outages (MO) and Planned Outages (PO).
11.	Period Hours - PH	Number of hours in the period being reported that the unit was in the active state.
12.	Equivalent Seasonal Derated Hours - ESEDH	(Net Maximum Capacity (NMC) **-** Net Dependable Capacity (NDC)) **x** Available Hours (AH) **/** Net Maximum Capacity (NMC) $\frac{(NMC - NDC) \times AH}{NMC}$
13a.	Equivalent Forced Derated Hours - EFDH	Each individual Forced Derating (D1, D2, and D3) transformed into equivalent full outage hour(s). This is calculated by multiplying the actual duration of the derating (hours) by the size of the reduction (MW) and dividing by the Net Maximum Capacity (NMC). These equivalent hour(s) are then summed. $\frac{\text{Derating Hours} \times \text{Size of Reduction}}{NMC}$* NOTE: Includes Forced Deratings (D1, D2, and D3) during Reserve Shutdowns (RS). See calculation 13f (EFDHRS), Page F-4, for comparison.
13b.	Equivalent Maintenance Derated Hours - EMDH	Each individual Maintenance Derating (D4, DM of D4) is transformed into equivalent full outage hour(s). This is calculated by multiplying the actual duration of the derating (hours) by the size of reduction (MW) and dividing by the Net Maximum Capacity (NMC). These equivalent hour(s) are then summed. $\frac{\text{Derating Hours} \times \text{Size of Reduction}}{NMC}$* NOTE: Includes Maintenance Deratings (D4) during Reserve Shutdowns (RS). See calculation 13h (EMDHRS), Page F-5, for comparison.
13c.	Equivalent Planned Derated Hours - EPDH	Each individual Planned Derating (PD, DP of PD) is transformed into equivalent full outage hour(s). This is calculated by multiplying the actual duration of the derating (hours) by the size of reduction (MW) and dividing by the Net Maximum Capacity (NMC). These equivalent hour(s) are then summed. $\frac{\text{Derating Hours} \times \text{Size of Reduction}}{NMC}$*

NOTE: Includes Planned Deratings (PD) during Reserve Shutdowns (RS).
See calculation 13g (EPDHRS), Page F-4, for comparison.

13d. Equivalent Scheduled Derated Hours - ESDH

Each individual Planned Derating (PD, DP of PD) and Maintenance Derating (D4, DM of D4) is transformed into equivalent full outage hour(s). This is calculated by multiplying the actual duration of the derating (hours) by the size of reduction (MW) and dividing by the Net Maximum Capacity (NMC). These equivalent hour(s) are then summed.

$$\frac{\text{Derating Hours } \mathbf{x} \text{ Size of Reduction}^*}{\text{NMC}}$$

13e. Equivalent Unplanned Derated Hours - EUDH

Each individual Unplanned Derating (D1, D2, D3, D4, and DM of D4) is transformed into equivalent full outage hour(s). This is calculated by multiplying the actual duration of the derating (hours) by the size of reduction (MW) and dividing by the Net Maximum Capacity (NMC). These equivalent hour(s) are then summed.

$$\frac{\text{Derating Hours } \mathbf{x} \text{ Size of Reduction}^*}{\text{NMC}}$$

NOTE: Includes Unplanned Deratings (D1, D2, D3, D4, and DM of D4) during Reserve Shutdowns (RS).

13f. Equivalent Forced Derated Hours During Reserve Shutdowns - EFDHRS

Each individual Forced Derating (D1, D2, and D3) or the portion of any Forced Derating which occurred during a Reserve Shutdown (RS) is transformed into equivalent full outage hour(s). This is calculated by multiplying the actual duration of the derating (hours) by the size of the reduction (MW) and dividing by the Net Maximum Capacity (NMC). These equivalent hour(s) are then summed.

$$\frac{\text{Derating Hours } \mathbf{x} \text{ Size of Reduction}^*}{\text{NMC}}$$

13g. Equivalent Planned Derated Hours During Reserve Shutdowns - EPDHRS

Each individual Planned Derating (PD) or the portion of any Planned Derating which occurred during a Reserve Shutdown (RS) is transformed into equivalent full outage hour(s). This is calculated by multiplying the actual duration of the derating (hours) by the size of the reduction (MW) and dividing by the Net Maximum Capacity (NMC). These equivalent hour(s) are then summed.

$$\frac{\text{Derating Hours } \mathbf{x} \text{ Size of Reduction}^*}{\text{NMC}}$$

13h.	Equivalent Maintenance Derated Hours During Reserve Shutdowns - EMDHRS	Each individual Maintenance Derating (D4) or the portion of any Maintenance Derating which occurred during a Reserve Shutdown (RS) is transformed into equivalent full outage hour(s). This is calculated by multiplying the actual duration of the derating (hours) by the size of the reduction (MW) and dividing by the Net Maximum Capacity (NMC). These equivalent hour(s) are then summed. $\frac{\text{Derating Hours } \mathbf{x} \text{ Size of Reduction}^*}{\text{NMC}}$

** Size of Reduction is determined by subtracting the Net Available Capacity (NAC) from the Net Dependable Capacity (NDC). In cases of multiple deratings, the Size of Reduction of each derating will be determined by the difference in the Net Available Capacity of the unit prior to the derating and the reported Net Available Capacity as a result of the derating.*

14.	Number of Planned Outages (PO) which occur from in-service state only	A count of the number of all Planned Outages (PO) reported on the GADS Event Report (07). (Since Planned Outage Extensions (PE) of Planned Outages are considered part of the original Planned Outage (PO), they are not included in this count.)
15.	Number of Unplanned Outages (MO, U1, U2, and U3) which occur from in-service state only	A count of the number of all Unplanned Outages (U1, U2, U3, and MO) reported on the GADS Event Report (07). (IEEE Standard 762 does not include Startup Failures (SF) in this count.)
16.	Number of Forced Outages (U1, U2, and U3) which occur from in-service state only	A count of the number of all Unplanned (Forced) Outages (U1, U2, U3) reported on the GADS Event Report (07). (IEEE Standard 762 does not include Startup Failures (SF) in this count.)
17.	Number of Maintenance Outages (MO) which occur from in-service state only	A count of the number of all Maintenance Outages (MO) reported on the GADS Event Report (07). (Since Maintenance Outage Extensions (ME) of Maintenance Outages are considered part of the original Maintenance Outage (MO), they are not included in this count.)

Performance Indexes

The following sections describe performance indexes used to measure the performance of generating units. The sections are divided into:

1. Unweighted (time-based) methods for calculating single unit statistics.
2. Unweighted (time-based) methods for calculating pooled (grouped) unit statistics.
3. Weighted (capacity-based) methods for calculating pooled (grouped) unit statistics.
4. Unweighted (time-based) methods for calculating statistics excluding problems outside management control for single unit and pooled (grouped) unit statistics.
5. Weighted (capacity-based) methods for calculating statistics excluding problems outside management control for pooled (grouped) unit statistics.

Calculation Notes

Please note that when you are calculating a single generating unit's performance statistics, it does not matter much if you use unweighted or weighted statistics. If the weighting (NMC) does not vary over the analysis time period it will cancel out and not matter. If NMC varies over the analysis time period it will make a small difference. The real difference between the unweighted and weighted statistics is in pooled (grouped) sets of generating units. In these cases, a group of units of similar size will show only small differences, but a group of units where the MW size is very different (greater than 50 MW), the statistics will be very different.

With unweighted statistics, all units are considered equal in outage impact. In the unweighted equations, no MW size is introduced into the equations and the results are based on time, not energy produced or not produced. In such cases, a 50 MW gas turbine and a 1,000 MW nuclear unit have the same impact on the resulting statistics.

With weighted statistics, the larger MW size unit in the group has more impact on the final statistics than a smaller generating unit. That is because the MW size of the unit (NMC) is part of the equation. In these cases, a 1,000 MW nuclear unit would have 20 times impact on the final outcome of the calculation than would its 50 MW gas turbine companion.

Data Pooling Notes

When grouping a fleet of units of dissimilar size and/or duty cycle, weighting puts the proper relative weight of each unit's contribution into the fleet's composite statistics.

Using the unweighted equations currently in the IEEE 762 Standard (Section 9), an older, smaller, and little-run unit will have just as much weight as a newer, larger, base-load unit. The effect of this could unrealistically and disproportionately swing the fleet unweighted averages too high (for a very high availability on a small unit) or too low (for a very low availability on a small unit).

However, the current IEEE 762 Standard's unweighted equations should not be abandoned even for group statistics. There are valid applications for this method as well. (One being purely to evaluate equipment reliability and availability regardless of size).

The weighted calculations, although primarily needed for grouping units' performance indexes, may apply to individual units as well. The effect depends on how much a unit's net maximum capacities (NMC) changes during the time period in question.

SPECIAL NOTE: *To weight an equation, one does not simply take each unit's EFOR, for example, and multiply the EFOR by the NMC, add them up and divide by the sum of the NMCs. Each term in the equation must be multiplied by the NMC and then all the products are summed over all the units.*

Unweighted (time-based) Methods for Calculating Single Unit Statistics

1. Planned Outage Factor – POF

$$\mathbf{POF} = \frac{\mathbf{POH}}{\mathbf{PH}} \mathbf{x\ 100}\%$$

2. Unplanned Outage Factor – UOF

$$\mathbf{UOF} = \frac{\mathbf{UOH}}{\mathbf{PH}} \mathbf{x\ 100}\%$$

$$\mathbf{UOF} = \frac{\mathbf{FOH+MOH}}{\mathbf{PH}} \mathbf{x\ 100}\%$$

3. Forced Outage Factor – FOF

$$\mathbf{FOF} = \frac{\mathbf{FOH}}{\mathbf{PH}} \mathbf{x\ 100}\%$$

4. Maintenance Outage Factor – MOF

$$\mathbf{MOF} = \frac{\mathbf{MOH}}{\mathbf{PH}} \mathbf{x\ 100}\ \%$$

5. Scheduled Outage Factor – SOF

$$\mathbf{SOF} = \frac{\mathbf{SOH}}{\mathbf{PH}} \mathbf{x\ 100}\%$$

$$\mathbf{SOF} = \frac{\mathbf{MOH + POH}}{\mathbf{PH}} \mathbf{x\ 100}\%$$

6. Unavailability Factor – UF

$$\mathbf{UF} = \frac{\mathbf{UH}}{\mathbf{PH}} \mathbf{x\ 100}\%$$

$$\mathbf{UF} = \frac{\mathbf{FOH + MOH + POH}}{\mathbf{PH}} \mathbf{x\ 100}\%$$

7. Availability Factor – AF

$$\mathbf{AF} = \frac{\mathbf{AH}}{\mathbf{PH}} \mathbf{x\ 100}\%$$

$$\mathbf{AF} = \frac{\mathbf{RSH + SH + Synchronous\ Condensing\ Hours + Pumping\ Hours}}{\mathbf{PH}} \mathbf{x\ 100}\%$$

8. Service Factor – SF

$$\mathbf{SF} = \frac{\mathbf{SH}}{\mathbf{PH}} \mathbf{x\ 100\%}$$

9. Seasonal Derating Factor – SEDF

$$\mathbf{SEDF} = \frac{\mathbf{ESEDH}}{\mathbf{PH}} \mathbf{x\ 100\%}$$

10. Unit Derating Factor – UDF

$$\mathbf{UDF} = \frac{\mathbf{EPDH + EUDH}}{\mathbf{PH}} \mathbf{x\ 100\%}$$

$$\mathbf{UDF} = \frac{\mathbf{EPDH + EMDH + EFDH}}{\mathbf{PH}} \mathbf{x\ 100\%}$$

11. Equivalent Unavailability Factor – EUF

$$\mathbf{EUF} = \frac{\mathbf{UOH + POH + EUDH + EPDH}}{\mathbf{PH}} \mathbf{x\ 100\%}$$

$$\mathbf{EUF} = \frac{\mathbf{FOH + SOH + EFDH + ESDH}}{\mathbf{PH}} \mathbf{x\ 100\%}$$

$$\mathbf{EUF} = \frac{\mathbf{FOH + MOH + POH + EFDH + EMDH + EPDH}}{\mathbf{PH}} \mathbf{x\ 100\%}$$

12. Equivalent Availability Factor – EAF

$$\mathbf{EAF} = \frac{\mathbf{AH - EPDH - EUDH - ESEDH}}{\mathbf{PH}} \mathbf{x\ 100\%}$$

$$\mathbf{EAF} = \frac{\mathbf{AH - EPDH - EFDH - EMDH - ESEDH}}{\mathbf{PH}} \mathbf{x\ 100\%}$$

13. Gross Capacity Factor – GCF

$$\mathbf{GCF} = \frac{\mathbf{Gross\ Actual\ Generation}}{\mathbf{PH\ x\ GMC}} \mathbf{x\ 100\%}$$

14. Net Capacity Factor – NCF

$$\mathbf{NCF} = \frac{\mathbf{Net\ Actual\ Generation}}{\mathbf{PH\ x\ NMC}} \mathbf{x\ 100\%}$$

Note: *Net capacity factor calculated using this equation can be negative during a period when the unit is shutdown.*

15. Gross Output Factor – GOF

$$\mathbf{GOF} = \frac{\mathbf{Gross\ Actual\ Generation}}{\mathbf{SH\ x\ GMC}} \mathbf{x\ 100\%}$$

16. Net Output Factor – NOF

$$\mathbf{NOF} = \frac{\mathbf{Net\ Actual\ Generation}}{\mathbf{SH\ x\ NMC}} \mathbf{x\ 100\%}$$

17. Equivalent Maintenance Outage Factor – EMOF

$$\mathbf{EMOF} = \frac{\mathbf{MOH + EMDH}}{\mathbf{PH}} \mathbf{x\ 100\%}$$

18. Equivalent Planned Outage Factor – EPOF

$$\mathbf{EPOF} = \frac{\mathbf{POH + EPDH}}{\mathbf{PH}} \mathbf{x\ 100\%}$$

19. Equivalent Forced Outage Factor – EFOF

$$\mathbf{EFOF} = \frac{\mathbf{FOH + EFDH}}{\mathbf{PH}} \mathbf{x\ 100\%}$$

20. Equivalent Scheduled Outage Factor – ESOF

$$\mathbf{ESOF} = \frac{\mathbf{SOH + ESDH}}{\mathbf{PH}} \mathbf{x\ 100\%}$$

$$\mathbf{ESOF} = \frac{\mathbf{MOH + POH + EMDH + EPDH}}{\mathbf{PH}} \mathbf{x\ 100\%}$$

21. Equivalent Unplanned Outage Factor – EUOF

$$\mathbf{EUOF} = \frac{\mathbf{UOH + EUDH}}{\mathbf{PH}} \mathbf{x\ 100\%}$$

$$\mathbf{EUOF} = \frac{\mathbf{MOH + FOH + EMDH + EFDH}}{\mathbf{PH}} \mathbf{x\ 100\%}$$

(NOTE: This EUOF is identical to the Unit Capability Loss Factor except this equation includes all events, including those outside plant management control.)

22. Forced Outage Rate – FOR

$$\mathbf{FOR} = \frac{\mathbf{FOH}}{\mathbf{FOH + SH + Synchronous\ Condensing\ Hours + Pumping\ Hours}} \mathbf{x\ 100\%}$$

23. Forced Outage Rate Demand – FORd (See Notes 1 and 2 at the end of this section.)

$$\mathbf{FORd} = \frac{\mathbf{FOHd}}{\mathbf{FOHd + SH}} \mathbf{x\ 100\%}$$

Where: FOHd = f x FOH

NOTE: FOHd is the number of hours a unit was in a U1, U2, U3, or SF AND the unit would have operated had it been available. FOHd can be determined directly if periods of demand are recorded. Demand can be defined as the traditional demand for the generating unit for economic or reliable operation of the system, or it can be any other user-defined condition, such as specific weather condition, load level, or energy price. When FOHd is determined directly from recorded periods of demand, service hours (SH) in the above equation should include only those under the specified demand condition. If periods of demand are not recorded, FOHd may be estimated using the demand factor f. The demand factor is applicable to traditional demand for economic or reliable system operation.

$f = (\frac{1}{r} + \frac{1}{T})/(\frac{1}{r} + \frac{1}{T} + \frac{1}{D})$

r=Average forced outage duration = (FOH) / (# of FO occurrences)
D=Average demand time = (SH) / (# of unit actual starts)
T=Average reserve shutdown time = (RSH) / (# of unit attempted starts)

24. Equivalent Forced Outage Rate – EFOR

$$\mathbf{EFOR} = \frac{\mathbf{FOH + EFDH}}{\mathbf{FOH + SH + Synchronous\ Condensing\ Hours + Pumping\ Hours + EFDHRS}}\ \mathbf{x\ 100\%}$$

25. Equivalent Forced Outage Rate demand – EFORd (See Notes 1 and 2 at the end of this section.)

$$\mathbf{EFORd} = \frac{\mathbf{FOHd + EFDHd}}{\mathbf{SH + FOHd}}\ \mathbf{x\ 100\%}$$

Where: FOHd = f x FOH
EFDHd = (EFDH – EFDHRS) if reserve shutdown events reported, or
= (fp x EFDH) if no reserve shutdown events reported – an approximation.
fp = (SH/AH)

NOTE: FOHd is the number of hours a unit was in a U1, U2, U3, or SF AND the unit would have operated had it been available. FOHd can be determined directly if periods of demand are recorded. Demand can be defined as the traditional demand for the generating unit for economic or reliable operation of the system, or it can be any other user-defined condition, such as specific weather condition, load level, or energy price. When FOHd is determined directly from recorded periods of demand, service hours (SH) in the above equation should include only those under the specified demand condition. If periods of demand are not recorded, FOHd may be estimated using the demand factor f. The demand factor is applicable to traditional demand for economic or reliable system operation.

$f = (\frac{1}{r} + \frac{1}{T})/(\frac{1}{r} + \frac{1}{T} + \frac{1}{D})$

r=Average forced outage deration = (FOH) / (# of FO occurrences)
D=Average demand time = (SH) / (# of unit actual starts)
T=Average reserve shutdown time = (RSH) / (# of unit attempted starts)

26. Equivalent Planned Outage Rate – EPOR

$$\mathbf{EPOR} = \frac{\mathbf{POH + EPDH}}{\mathbf{POH + SH + Synchronous\ Condensing\ Hours + Pumping\ Hours + EPDHRS}}\ \mathbf{x\ 100\%}$$

27. Equivalent Maintenance Outage Rate – EMOR

$$\mathbf{EMOR} = \frac{\mathbf{MOH + EMDH}}{\mathbf{MOH + SH + Synchronous\ Condensing\ Hours + Pumping\ Hours + EMDHRS}}\ \mathbf{x\ 100\%}$$

28. Equivalent Unplanned Outage Rate – EUOR

$$\mathbf{EUOR} = \frac{\mathbf{UOH + EUDH}}{\mathbf{UOH + SH + Synchronous\ Condensing\ Hours + Pumping\ Hours + EUDHRS}}\ \mathbf{x\ 100\%}$$

$$\mathbf{EUOR} = \frac{\mathbf{FOH + EFDH + MOH + EMDH}}{\mathbf{FOH + MOH + SH + Synchronous\ Condensing\ Hours + Pumping\ Hours + EFDHRS + EMDHRS}}\ \mathbf{x\ 100\%}$$

29. Average Run Time – ART

$$\mathbf{ART} = \frac{\mathbf{SH}}{\mathbf{Actual\ Unit\ Starts}}$$

30. Starting Reliability – SR

$$\mathbf{SR} = \frac{\textbf{Actual Unit Starts}}{\textbf{Attempted Unit Starts}} \mathbf{x\ 100\%}$$

Mean Service Time to Outage:

31a. Mean Service Time to Planned Outage – MSTPO

$$\mathbf{MSTPO} = \frac{\textbf{SH}}{\textbf{Number of Planned Outages which occur from in-service state only}}$$

31b. Mean Service Time to Unplanned Outage – MSTUO

$$\mathbf{MSTUO} = \frac{\textbf{SH}}{\textbf{Number of Unplanned Outages which occur from in-service state only}}$$

31c. Mean Service Time to Forced Outage – MSTFO

$$\mathbf{MSTFO} = \frac{\textbf{SH}}{\textbf{Number of Forced Outages which occur from in-service state only}}$$

31d. Mean Service Time to Maintenance Outage – MSTMO

$$\mathbf{MSTMO} = \frac{\textbf{SH}}{\textbf{Number of Maintenance Outages which occur from in-service state only}}$$

Mean Outage Duration:

32a. Mean Planned Outage Duration – MPOD

$$\mathbf{MPOD} = \frac{\textbf{Planned Outage Hours which occur from in-service state only}}{\textbf{Number of Planned Outages which occur from in-service state only}}$$

32b. Mean Unplanned Outage Duration – MUOD

$$\mathbf{MUOD} = \frac{\textbf{Unplanned Outage Hours which occur from in-service state only}}{\textbf{Number of Unplanned Outages which occur from in-service state only}}$$

32c. Mean Forced Outage Duration – MFOD

$$\mathbf{MFOD} = \frac{\textbf{Forced Outage Hours which occur from in-service state only}}{\textbf{Number of Forced Outages which occur from in-service state only}}$$

32d. Mean Maintenance Outage Duration – MMOD

$$\mathbf{MMOD} = \frac{\textbf{Maintenance Outage Hours which occur from in-service state only}}{\textbf{Number of Maintenance Outages which occur from in-service state only}}$$

Unweighted (time-based) methods for calculating pooled (grouped) unit statistics

33. Planned Outage Factor – POF

$$\mathbf{POF} = \frac{\mathbf{\Sigma\ POH}}{\mathbf{\Sigma\ PH}}\ \mathbf{x\ 100\%}$$

34. Unplanned Outage Factor – UOF

$$\mathbf{UOF} = \frac{\mathbf{\Sigma\ (FOH + MOH)}}{\mathbf{\Sigma\ PH}}\ \mathbf{x\ 100\%}$$

35. Forced Outage Factor – FOF

$$\mathbf{FOF} = \frac{\mathbf{\Sigma\ FOH}}{\mathbf{\Sigma\ PH}}\ \mathbf{x\ 100\%}$$

36. Maintenance Outage Factor – MOF

$$\mathbf{MOF} = \frac{\mathbf{\Sigma\ MOH}}{\mathbf{\Sigma\ PH}}\ \mathbf{x\ 100\%}$$

37. Scheduled Outage Factor – SOF

$$\mathbf{SOF} = \frac{\mathbf{\Sigma\ (POH + MOH)}}{\mathbf{\Sigma\ PH}}\ \mathbf{x\ 100\%}$$

38. Unavailability Factor – UF

$$\mathbf{UF} = \frac{\mathbf{\Sigma\ (POH + MOH + FOH)}}{\mathbf{\Sigma\ PH}}\ \mathbf{x\ 100\%}$$

39. Availability Factor – AF

$$\mathbf{AF} = \frac{\mathbf{\Sigma\ AH}}{\mathbf{\Sigma\ PH}}\ \mathbf{x\ 100\%}$$

$$\mathbf{AF} = \frac{\mathbf{\Sigma\ (SH + RSH + Symchronous\ Condensing\ Hours + Pumping\ Hours)}}{\mathbf{\Sigma\ PH}}\ \mathbf{x\ 100\%}$$

40. Service Factor – SF

$$\mathbf{SF} = \frac{\mathbf{\Sigma\ SH}}{\mathbf{\Sigma\ PH}}\ \mathbf{x\ 100\%}$$

41. Seasonal Derating Factor – SEDF

$$\mathbf{SEDF} = \frac{\mathbf{\Sigma\ ESEDH}}{\mathbf{\Sigma\ PH}}\ \mathbf{x\ 100\%}$$

42. Unit Derating Factor – UDF

$$\mathbf{UDF} = \frac{\mathbf{\Sigma\ (EUDH + EPDH)}}{\mathbf{\Sigma\ PH}}\ \mathbf{x\ 100\%}$$

$$\mathbf{UDF} = \frac{\mathbf{\Sigma\ (EFDH + EMDH + EPDH)}}{\mathbf{\Sigma\ PH}}\ \mathbf{x\ 100\%}$$

43. Equivalent Unavailability Factor – EUF

$$\mathbf{EUF} = \frac{\mathbf{\Sigma\ (POH + UOH + EUDH + EPDH)}}{\mathbf{\Sigma\ PH}}\ \mathbf{x\ 100\%}$$

$$\mathbf{EUF} = \frac{\mathbf{\Sigma\ (SOH + FOH + ESDH + EFDH)}}{\mathbf{\Sigma\ PH}}\ \mathbf{x\ 100\%}$$

$$\mathbf{EUF} = \frac{\mathbf{\Sigma\ (POH + MOH + FOH + EFDH + EMDH + EPDH)}}{\mathbf{\Sigma\ PH}}\ \mathbf{x\ 100\%}$$

44. Equivalent Availability Factor – EAF

$$\mathbf{EAF} = \frac{\mathbf{\Sigma\ (AH - EUDH - EPDH - ESEDH)}}{\mathbf{\Sigma\ PH}}\ \mathbf{x\ 100\%}$$

$$\mathbf{EAF} = \frac{\mathbf{\Sigma\ (AH - EFDH - EMDH - EPDH - ESEDH)}}{\mathbf{\Sigma\ PH}}\ \mathbf{x\ 100\%}$$

45. Gross Capacity Factor – GCF *

$$\mathbf{GCF} = \frac{\mathbf{\Sigma\ (Gross\ Actual\ Generation)}}{\mathbf{\Sigma\ (GMC\ x\ PH)}}\mathbf{x\ 100\%}$$

46. Net Capacity Factor – NCF *

$$\mathbf{NCF} = \frac{\mathbf{\Sigma\ (Net\ Actual\ Generation)}}{\mathbf{\Sigma\ (NMC\ x\ PH)}}\mathbf{x\ 100\%}$$

47. Gross Output Factor – GOF *

$$\mathbf{GOF} = \frac{\mathbf{\Sigma\ (Gross\ Actual\ Generation)}}{\mathbf{\Sigma\ (GMC\ x\ SH)}}\mathbf{x\ 100\%}$$

48. Net Output Factor – NOF *

$$\mathbf{NOF} = \frac{\mathbf{\Sigma\ (Net\ Actual\ Generation)}}{\mathbf{\Sigma\ (NMC\ x\ SH)}}\mathbf{x\ 100\%}$$

49. Equivalent Maintenance Outage Factor – EMOF

$$\mathbf{EMOF} = \frac{\mathbf{\Sigma\ (MOH + EMDH)}}{\mathbf{\Sigma\ PH}}\mathbf{x\ 100\%}$$

*These are “energy term” (GCF, NCF, GOF, NOF) statistics, and are inherently energy-weighted. These equations are the same as IEEE-762 9.12 – 9.15. When calculating for a group of units (or a unit that has a varying capacity value over time), do not average the capacities shown in the denominators. Follow the equations.

50. Equivalent Planned Outage Factor – EPOF

$$\mathbf{EPOF} = \frac{\mathbf{\Sigma\ (POH + EPDH)}}{\mathbf{\Sigma\ PH}}\ \mathbf{x\ 100\%}$$

51. Equivalent Forced Outage Factor – EFOF

$$\mathbf{EFOF} = \frac{\mathbf{\Sigma\ (FOH + EFDH)}}{\mathbf{\Sigma\ PH}}\ \mathbf{x\ 100\%}$$

52. Equivalent Scheduled Outage Factor – ESOF

$$\mathbf{ESOF} = \frac{\mathbf{\Sigma\ (SOH + ESDH)}}{\mathbf{\Sigma\ PH}}\ \mathbf{x\ 100\%}$$

$$\mathbf{ESOF} = \frac{\mathbf{\Sigma\ (MOH + POH + EMDH + EPDH)}}{\mathbf{\Sigma\ PH}}\ \mathbf{x\ 100\%}$$

53. Equivalent Unplanned Outage Factor – EUOF

$$\mathbf{EUOF} = \frac{\mathbf{\Sigma\ (UOH + EUDH)}}{\mathbf{\Sigma\ PH}}\ \mathbf{x\ 100\%}$$

$$\mathbf{EUOF} = \frac{\mathbf{\Sigma\ (MOH\ + FOH + EMDH + EFDH)}}{\mathbf{\Sigma\ PH}}\ \mathbf{x\ 100\%}$$

54. Forced Outage Rate – FOR

$$\mathbf{FOR} = \frac{\mathbf{\Sigma\ FOH}}{\mathbf{\Sigma\ (FOH + SH + Synchronous\ Condensing\ Hours + Pumping\ Hours)}}\ \mathbf{x\ 100\%}$$

55. Forced Outage Rate demand – FORd (See Notes 1 and 2 at the end of this section.)

$$\mathbf{FORd} = \frac{\mathbf{\Sigma\ FOHd}}{\mathbf{\Sigma\ (FOHd + SH)}}\ \mathbf{x\ 100\%}$$

Where: FOHd = f x FOH

NOTE: FOHd is the number of hours a unit was in a U1, U2, U3, or SF AND the unit would have operated had it been available. FOHd can be determined directly if periods of demand are recorded. Demand can be defined as the traditional demand for the generating unit for economic or reliable operation of the system, or it can be any other user-defined condition, such as specific weather condition, load level, or energy price. When FOHd is determined directly from recorded periods of demand, service hours (SH) in the above equation should include only those under the specified demand condition. If periods of demand are not recorded, FOHd may be estimated using the demand factor f. The demand factor is applicable to traditional demand for economic or reliable system operation.

$$f = (\frac{1}{r} + \frac{1}{T})/(\frac{1}{r} + \frac{1}{T} + \frac{1}{D})$$

r=Average forced outage duration = (FOH) / (# of FO occurrences)
D=Average demand time = (SH) / (# of unit actual starts)
T=Average reserve shutdown time = (RSH) / (# of unit attempted starts)

56. Equivalent Forced Outage Rate – EFOR

$$\mathbf{EFOR} = \frac{\mathbf{\Sigma\ (FOH + EFDH)}}{\mathbf{\Sigma\ (FOH + SH + Synchronous\ Condensing\ Hours + Pumping\ Hours + EFDHRS)}}\ \mathbf{x\ 100\%}$$

57. Equivalent Forced Outage Rate demand – EFORd (See Notes 1 and 2 at the end of this section.)

$$\mathbf{EFORd} = \frac{\mathbf{\Sigma\ (FOHd + EFDHd)}}{\mathbf{\Sigma\ (SH + FOHd)}}\ \mathbf{x\ 100\%}$$

Where: FOHd = f x FOH
EFDHd = (EFDH – EFDHRS) if reserve shutdown events reported, or
= (fp x EFDH) if no reserve shutdown events reported – an approximation.
fp = (SH/AH)

NOTE: FOHd is the number of hours a unit was in a U1, U2, U3, or SF AND the unit would have operated had it been available. FOHd can be determined directly if periods of demand are recorded. Demand can be defined as the traditional demand for the generating unit for economic or reliable operation of the system, or it can be any other user-defined condition, such as specific weather condition, load level, or energy price. When FOHd is determined directly from recorded periods of demand, service hours (SH) in the above equation should include only those under the specified demand condition. If periods of demand are not recorded, FOHd may be estimated using the demand factor f. The demand factor is applicable to traditional demand for economic or reliable system operation.

$$f = (\frac{1}{r} + \frac{1}{T})/(\frac{1}{r} + \frac{1}{T} + \frac{1}{D})$$

r=Average forced outage deration = (FOH) / (# of FO occurrences)
D=Average demand time = (SH) / (# of unit actual starts)
T=Average reserve shutdown time = (RSH) / (# of unit attempted starts)

58. Equivalent Planned Outage Rate – EPOR

$$\mathbf{EPOR} = \frac{\mathbf{\Sigma\ (POH + EPDH)}}{\mathbf{\Sigma\ (POH + SH + Synchronous\ Condensing\ Hours + Pumping\ Hours + EPDHRS)}}\ \mathbf{x\ 100\%}$$

59. Equivalent Maintenance Outage Rate – EMOR

$$\mathbf{EMOR} = \frac{\mathbf{\Sigma\ (MOH + EMDH)}}{\mathbf{\Sigma\ (MOH + SH + Synchronous\ Condensing\ Hours + Pumping\ Hours + EMDHRS)}}\ \mathbf{x\ 100\%}$$

60. Equivalent Unplanned Outage Rate – EUOR

$$\mathbf{EUOR} = \frac{\mathbf{\Sigma\ (UOH + EUDH)}}{\mathbf{\Sigma\ (UOH + SH + Synchronous\ Condensing\ Hours + Pumping\ Hours + EUDHRS)}}\ \mathbf{x\ 100\%}$$

$$\mathbf{EUOR} = \frac{\mathbf{\Sigma\ (FOH + EFDH + MOH + EMDH)}}{\mathbf{\Sigma\ (FOH + MOH + SH + Synchronous\ Condensing\ Hours + Pumping\ Hours + EFDHRS + EMDHRS)}}\ \mathbf{x\ 100\%}$$

61. Average Run Time – ART

$$\mathbf{ART} = \frac{\mathbf{\Sigma\ SH}}{\mathbf{\Sigma\ Actual\ Unit\ Starts}}$$

62. Starting Reliability – SR

$$\mathbf{SR} = \frac{\mathbf{\Sigma\ Actual\ Unit\ Starts}}{\mathbf{\Sigma\ Attempted\ Unit\ Starts}}\ \mathbf{x\ 100\%}$$

Mean Service Time to Outage:

63a. Mean Service Time to Planned Outage – MSTPO

$$\mathbf{MSTPO} = \frac{\mathbf{\Sigma\ SH}}{\mathbf{\Sigma\ Number\ of\ Planned\ Outages\ which\ occur\ from\ in{-}service\ state\ only}}$$

63b. Mean Service Time to Unplanned Outage – MSTUO

$$\mathbf{MSTUO} = \frac{\mathbf{\Sigma\ SH}}{\mathbf{\Sigma\ Number\ of\ Unplanned\ Outages\ which\ occur\ from\ in-service\ state\ only}}$$

63c. Mean Service Time to Forced Outage – MSTFO

$$\mathbf{MSTFO} = \frac{\mathbf{\Sigma\ SH}}{\mathbf{\Sigma\ Number\ of\ Forced\ Outages\ which\ occur\ from\ in-service\ state\ only}}$$

63d. Mean Service Time to Maintenance Outage – MSTMO

$$\mathbf{MSTMO} = \frac{\mathbf{\Sigma\ SH}}{\mathbf{\Sigma\ Number\ of\ Maintenance\ Outages\ which\ occur\ from\ in-service\ state\ only}}$$

Mean Outage Duration:

64a. Mean Planned Outage Duration – MPOD

$$\mathbf{MPOD} = \frac{\mathbf{\Sigma\ Planned\ Outage\ Hours\ which\ occur\ from\ in-service\ state\ only}}{\mathbf{\Sigma\ Number\ of\ Planned\ Outages\ which\ occur\ from\ in-service\ state\ only}}$$

64b. Mean Unplanned Outage Duration – MUOD

$$\mathbf{MUOD} = \frac{\mathbf{\Sigma\ Unplanned\ Outage\ Hours\ which\ occur\ from\ in-service\ state\ only}}{\mathbf{\Sigma\ Number\ of\ Unplanned\ Outages\ which\ occur\ from\ in-service\ state\ only}}$$

64c. Mean Forced Outage Duration – MFOD

$$\mathbf{MFOD} = \frac{\mathbf{\Sigma\ Forced\ Outage\ Hours\ which\ occur\ from\ in-service\ state\ only}}{\mathbf{\Sigma\ Number\ of\ Forced\ Outages\ which\ occur\ from\ in-service\ state\ only}}$$

64d. Mean Maintenance Outage Duration – MMOD

$$\mathbf{MMOD} = \frac{\mathbf{\Sigma\ Maintenance\ Outage\ Hours\ which\ occur\ from\ in-service\ state\ only}}{\mathbf{\Sigma\ Number\ of\ Maintenance\ Outages\ which\ occur\ from\ in-service\ state\ only}}$$

Weighted (capacity-based) methods for calculating pooled (grouped) unit statistics

65. Weighted Forced Outage Factor – WFOF

$$\mathbf{WFOF} = \frac{\mathbf{\Sigma\ (FOH\ x\ NMC)}}{\mathbf{\Sigma\ (PH\ x\ NMC)}}\ \mathbf{x\ 100\%}$$

66. Weighted Maintenance Outage Factor – WMOF

$$\mathbf{WMOF} = \frac{\mathbf{\Sigma\ (MOH\ x\ NMC)}}{\mathbf{\Sigma\ (PH\ x\ NMC)}}\ \mathbf{x\ 100\%}$$

67. Weighted Planned Outage Factor – WPOF

$$\mathbf{WPOF} = \frac{\mathbf{\Sigma\ (POH\ x\ NMC)}}{\mathbf{\Sigma\ (PH\ x\ NMC)}}\ \mathbf{x\ 100\%}$$

68. Weighted Unplanned Outage Factor – WUOF

$$\mathbf{WUOF} = \frac{\mathbf{\Sigma\ (UOH\ x\ NMC)}}{\mathbf{\Sigma\ (PH\ x\ NMC)}}\ \mathbf{x\ 100\%}$$

$$\mathbf{WUOF} = \frac{\mathbf{\Sigma\ ((FOH + MOH)\ x\ NMC)}}{\mathbf{\Sigma\ (PH\ x\ NMC)}}\ \mathbf{x\ 100\%}$$

69. Weighted Scheduled Outage Factor – WSOF

$$\mathbf{WSOF} = \frac{\mathbf{\Sigma\ (SOH\ x\ NMC)}}{\mathbf{\Sigma\ (PH\ x\ NMC)}}\ \mathbf{x\ 100\%}$$

$$\mathbf{WSOF} = \frac{\mathbf{\Sigma\ ((POH + MOH)\ x\ NMC)}}{\mathbf{\Sigma\ (PH\ x\ NMC)}}\ \mathbf{x\ 100\%}$$

70. Weighted Unavailability Factor – WUF

$$\mathbf{WUF} = \frac{\mathbf{\Sigma\ ((FOH +\ MOH + POH)\ x\ NMC)}}{\mathbf{\Sigma\ (PH\ x\ NMC)}}\ \mathbf{x\ 100\%}$$

71. Weighted Availability Factor – WAF

$$\mathbf{WAF} = \frac{\mathbf{\Sigma\ (AH\ x\ NMC)}}{\mathbf{\Sigma\ (PH\ x\ NMC)}}\ \mathbf{x\ 100\%}$$

72. Weighted Service Factor – WSF

$$\mathbf{WSF} = \frac{\mathbf{\Sigma\ (SH\ x\ NMC)}}{\mathbf{\Sigma\ (PH\ x\ NMC)}}\ \mathbf{x\ 100\%}$$

73. Weighted Seasonal Derating Factor – WSEDF

$$\mathbf{WSEDF} = \frac{\mathbf{\Sigma\ (ESEDH\ x\ NMC)}}{\mathbf{\Sigma\ (PH\ x\ NMC)}}\ \mathbf{x\ 100\%}$$

74. Weighted Unit Derating Factor – WUDF

$$\mathbf{WUDF} = \frac{\mathbf{\Sigma\ ((EUDH + EPDH)\ x\ NMC)}}{\mathbf{\Sigma\ (PH\ x\ NMC)}}\ \mathbf{x\ 100\%}$$

$$\mathbf{WUDF} = \frac{\mathbf{\Sigma\ ((EFDH + EMDH + EPDH)\ x\ NMC)}}{\mathbf{\Sigma\ (PH\ x\ NMC)}}\ \mathbf{x\ 100\%}$$

75. Weighted Equivalent Unavailability Factor – WEUF

$$\mathbf{WEUF} = \frac{\mathbf{\Sigma\ ((POH + UOH + EUDH + EPDH)\ x\ NMC)}}{\mathbf{\Sigma\ (PH\ x\ NMC)}}\ \mathbf{x\ 100\%}$$

$$\mathbf{WEUF} = \frac{\mathbf{\Sigma\ ((SOH + FOH + ESDH + EFDH)\ x\ NMC)}}{\mathbf{\Sigma\ (PH\ x\ NMC)}}\ \mathbf{x\ 100\%}$$

$$\mathbf{WEUF} = \frac{\mathbf{\Sigma\ ((POH + MOH + FOH + EFDH + EMDH + EPDH)\ x\ NMC)}}{\mathbf{\Sigma\ (PH\ x\ NMC)}}\ \mathbf{x\ 100\%}$$

76. Weighted Equivalent Availability Factor – WEAF

$$\mathbf{WEAF} = \frac{\mathbf{\Sigma\ ((AH - EUDH - EPDH - ESEDH)\ x\ NMC)}}{\mathbf{\Sigma\ (PH\ x\ NMC)}}\ \mathbf{x\ 100\%}$$

$$\mathbf{WEAF} = \frac{\mathbf{\Sigma\ ((AH - EFDH - EMDH - EPDH - ESEDH)\ x\ NMC)}}{\mathbf{\Sigma\ (PH\ x\ NMC)}}\ \mathbf{x\ 100\%}$$

77. Gross Capacity Factor – GCF *

$$\mathbf{GCF} = \frac{\mathbf{\Sigma\ (Gross\ Actual\ Generation)}}{\mathbf{\Sigma\ (GMC\ x\ PH)}}\mathbf{x\ 100\%}$$

78. Net Capacity Factor – NCF *

$$\mathbf{NCF} = \frac{\mathbf{\Sigma\ (Net\ Actual\ Generation)}}{\mathbf{\Sigma\ (NMC\ x\ PH)}}\mathbf{x\ 100\%}$$

79. Gross Output Factor – GOF *

$$\mathbf{GOF} = \frac{\mathbf{\Sigma\ (Gross\ Actual\ Generation)}}{\mathbf{\Sigma\ (GMC\ x\ SH)}}\mathbf{x\ 100\%}$$

80. Net Output Factor – NOF *

$$\mathbf{NOF} = \frac{\mathbf{\Sigma\ (Net\ Actual\ Generation)}}{\mathbf{\Sigma\ (NMC\ x\ SH)}}\mathbf{x\ 100\%}$$

*These are “energy term” (GCF, NCF, GOF, NOF) statistics, and are inherently energy-weighted. These equations are the same as IEEE-762 10.12 – 10.15. When calculating for a group of units (or a unit that has a varying capacity value over time), do not average the capacities shown in the denominators. Follow the equations.

81. Weighted Equivalent Maintenance Outage Factor – WEMOF

$$\mathbf{WEMOF} = \frac{\mathbf{\Sigma\ ((MOH + EMDH)\ x\ NMC)}}{\mathbf{\Sigma\ (PH\ x\ NMC)}}\ \mathbf{x\ 100\%}$$

82. Weighted Equivalent Planned Outage Factor – WEPOF

$$\mathbf{WEPOF} = \frac{\mathbf{\Sigma\ ((POH + EPDH)\ x\ NMC)}}{\mathbf{\Sigma\ (PH\ x\ NMC)}}\ \mathbf{x\ 100\%}$$

83. Weighted Equivalent Forced Outage Factor – WEFOF

$$\mathbf{WEFOF} = \frac{\mathbf{\Sigma\ ((FOH + EFDH)\ x\ NMC)}}{\mathbf{\Sigma\ (PH\ x\ NMC)}}\ \mathbf{x\ 100\%}$$

84. Weighted Equivalent Scheduled Outage Factor – WESOF

$$\mathbf{WESOF} = \frac{\mathbf{\Sigma\ ((SOH + ESDH)\ x\ NMC)}}{\mathbf{\Sigma\ (PH\ x\ NMC)}}\ \mathbf{x\ 100\%}$$

$$\mathbf{WESOF} = \frac{\mathbf{\Sigma\ ((MOH + POH + EMDH + EPDH)\ x\ NMC)}}{\mathbf{\Sigma\ (PH\ x\ NMC)}}\ \mathbf{x\ 100\%}$$

85. Weighted Equivalent Unplanned Outage Factor – WEUOF

$$\mathbf{WEUOF} = \frac{\mathbf{\Sigma\ ((UOH + EUDH)\ x\ NMC)}}{\mathbf{\Sigma\ (PH\ x\ NMC)}}\ \mathbf{x\ 100\%}$$

$$\mathbf{WEUOF} = \frac{\mathbf{\Sigma\ ((MOH + FOH + EFDH + EMDH)\ x\ NMC)}}{\mathbf{\Sigma\ (PH\ x\ NMC)}}\ \mathbf{x\ 100\%}$$

(NOTE: This is identical to the Weighted Unit Capability Loss Factor except this equation includes all events, including those outside plant management control.)

86. Weighted Forced Outage Rate – WFOR

$$\mathbf{WFOR} = \frac{\mathbf{\Sigma\ (FOH\ x\ NMC)}}{\mathbf{\Sigma\ ((FOH + SH + Sychnronous\ Condensing\ Hours + Pumping\ Hours)\ x\ NMC)}}\ \mathbf{x\ 100\%}$$

87. Weighted Forced Outage Rate demand – WFORd (See Notes 1 and 2 at the end of this section.)

$$\mathbf{WFORd} = \frac{\mathbf{\Sigma\ (FOHd\ x\ NMC)}}{\mathbf{\Sigma\ ((FOHd + SH)\ x\ NMC)}}\ \mathbf{x\ 100\%}$$

Where: FOHd = f x FOH

NOTE: FOHd is the number of hours a unit was in a U1, U2, U3, or SF AND the unit would have operated had it been available. FOHd can be determined directly if periods of demand are recorded. Demand can be defined as the traditional demand for the generating unit for economic or reliable operation of the system, or it can be any other user-defined condition, such as specific weather condition, load level, or energy price. When FOHd is determined directly from recorded periods of demand, service hours (SH) in the above equation should include only those under the specified demand condition. If periods of demand are not recorded, FOHd may be estimated

using the demand factor f. The demand factor is applicable to traditional demand for economic or reliable system operation.

$$f = (\frac{1}{r} + \frac{1}{T})/(\frac{1}{r} + \frac{1}{T} + \frac{1}{D})$$

r=Average forced outage duration = (FOH) / (# of FO occurrences)
D=Average demand time = (SH) / (# of unit actual starts)
T=Average reserve shutdown time = (RSH) / (# of unit attempted starts)

88. Weighted Equivalent Forced Outage Rate – WEFOR

$$\mathbf{WEFOR} = \frac{\mathbf{\Sigma\ ((FOH + EFDH)\ x\ NMC)}}{\mathbf{\Sigma\ ((FOH + SH + Synchronous\ Condensing\ Hours + Pumping\ Hours + EFDHRS)\ x\ NMC)}}\ \mathbf{x\ 100\%}$$

89. Weighted Equivalent Forced Outage Rate demand – WEFORd (See Notes 1 and 2 at the end of this section.)

$$\mathbf{WEFORd} = \frac{\mathbf{\Sigma\ ((FOHd + EFDHd)\ x\ NMC)}}{\mathbf{\Sigma\ ((SH + FOHd)\ x\ NMC)}}\ \mathbf{x\ 100\%}$$

Where: FOHd = f x FOH
EFDHd = (EFDH – EFDHRS) if reserve shutdown events reported, or
= (fp x EFDH) if no reserve shutdown events reported – an approximation.
fp = (SH/AH)

NOTE: FOHd is the number of hours a unit was in a U1, U2, U3, or SF AND the unit would have operated had it been available. FOHd can be determined directly if periods of demand are recorded. Demand can be defined as the traditional demand for the generating unit for economic or reliable operation of the system, or it can be any other user-defined condition, such as specific weather condition, load level, or energy price. When FOHd is determined directly from recorded periods of demand, service hours (SH) in the above equation should include only those under the specified demand condition. If periods of demand are not recorded, FOHd may be estimated using the demand factor f. The demand factor is applicable to traditional demand for economic or reliable system operation.

$$f = (\frac{1}{r} + \frac{1}{T})/(\frac{1}{r} + \frac{1}{T} + \frac{1}{D})$$

r=Average forced outage deration = (FOH) / (# of FO occurrences)
D=Average demand time = (SH) / (# of unit actual starts)
T=Average reserve shutdown time = (RSH) / (# of unit attempted starts)

90. Weighted Equivalent Planned Outage Rate – WEPOR

$$\mathbf{WEPOR} = \frac{\mathbf{\Sigma((POH + EPDH)\ x\ NMC)}}{\mathbf{\Sigma((POH + SH + Synchronous\ Condensing\ Hours + Pumping\ Hours + EPDHRS)\ x\ NMC)}}\ \mathbf{x\ 100\%}$$

91. Weighted Equivalent Maintenance Outage Rate – WEMOR

$$\mathbf{WEMOR} = \frac{\mathbf{\Sigma((MOH + EMDH)\ x\ NMC)}}{\mathbf{\Sigma((MOH + SH + Synchronous\ Condensing\ Hours + Pumping\ Hours + EMDHRS)\ x\ NMC)}}\ \mathbf{x\ 100\%}$$

92. Weighted Equivalent Unplanned Outage Rate – WEUOR

$$\mathbf{WEUOR} = \frac{\mathbf{\Sigma((UOH + EUDH)\ x\ NMC)}}{\mathbf{\Sigma((UOH + SH + Synchronous\ Condensing\ Hours + Pumping\ Hours + EUDHRS)\ x\ NMC)}}\ \mathbf{x\ 100\%}$$

Mean Service Time to Outage:

93a. Weighted Mean Service Time to Planned Outage – MSTPO

$$\mathbf{WMSTPO} = \frac{\mathbf{\Sigma(SH\ x\ NMC)}}{\mathbf{\Sigma(Number\ of\ Planned\ Outages\ which\ occur\ from\ in-service\ state\ only\ x\ NMC)}}$$

93b. Weighted Mean Service Time to Unplanned Outage – MSTUO

$$\mathbf{WMSTUO} = \frac{\mathbf{\Sigma(SH\ x\ NMC)}}{\mathbf{\Sigma(Number\ of\ Unplanned\ Outages\ which\ occur\ from\ in-service\ state\ only\ x\ NMC)}}$$

93c. Weighted Mean Service Time to Forced Outage – MSTFO

$$\mathbf{WMSTFO} = \frac{\mathbf{\Sigma(SH\ x\ NMC)}}{\mathbf{\Sigma(Number\ of\ Forced\ Outages\ which\ occur\ from\ in-service\ state\ only\ x\ NMC)}}$$

93d. Weighted Mean Service Time to Maintenance Outage – MSTMO

$$\mathbf{WMSTMO} = \frac{\mathbf{\Sigma(SH\ x\ NMC)}}{\mathbf{\Sigma(Number\ of\ Maintenance\ Outages\ which\ occur\ from\ in-service\ state\ only\ x\ NMC)}}$$

Mean Outage Duration:

94a. Weighted Mean Planned Outage Duration – MPOD

$$\mathbf{WMPOD} = \frac{\mathbf{\Sigma(Planned\ Outage\ Hours\ which\ occur\ from\ in-service\ state\ only\ x\ NMC)}}{\mathbf{\Sigma(Number\ of\ Planned\ Outages\ which\ occur\ from\ in-service\ state\ only\ x\ NMC)}}$$

94b. Weighted Mean Unplanned Outage Duration – MUOD

$$\mathbf{WMUOD} = \frac{\mathbf{\Sigma(Unplanned\ Outage\ Hours\ which\ occur\ from\ in-service\ state\ only\ x\ NMC)}}{\mathbf{\Sigma(Number\ of\ Unplanned\ Outages\ which\ occur\ from\ in-service\ state\ only\ x\ NMC)}}$$

94c. Weighted Mean Forced Outage Duration – MFOD

$$\mathbf{WMFOD} = \frac{\mathbf{\Sigma(Forced\ Outage\ Hours\ which\ occur\ from\ in-service\ state\ only\ x\ NMC)}}{\mathbf{\Sigma(Number\ of\ Forced\ Outages\ which\ occur\ from\ in-service\ state\ only\ x\ NMC)}}$$

94d. Weighted Mean Maintenance Outage Duration – MMOD

$$\mathbf{WMMOD} = \frac{\mathbf{\Sigma(Maintenance\ Outage\ Hours\ which\ occur\ from\ in-service\ state\ only\ x\ NMC)}}{\mathbf{\Sigma(Number\ of\ Maintenance\ Outages\ which\ occur\ from\ in-service\ state\ only\ x\ NMC)}}$$

Unweighted (time-based) methods for calculating statistics excluding problems outside management control for single unit and pooled unit calculations

Note: *The equations for calculating unweighted (time-based) performance excluding outside management control (OMC) events are identical to those shown earlier in this Appendix. The only differences are that the events using OMC cause codes are treated as non-curtailing events when analyzing the event records during the time of evaluation. In other words, the OMC events are ignored and not used in the calculations.*

The list of OMC cause codes, conditions and method for removing OMC events from the calculations is described in Appendix K.

95.	W/O OMC Planned Outage Factor – XPOF	(See equations 1 and 33.)
96.	W/O OMC Unplanned Outage Factor – XUOF	(See equations 2 and 34.)
97.	W/O OMC Forced Outage Factor – XFOF	(See equations 3 and 35.)
98.	W/O OMC Maintenance Outage Factor – XMOF	(See equations 4 and 36.)
99.	W/O OMC Scheduled Outage Factor – XSOF	(See equations 5 and 37.)
100.	W/O OMC Unavailability Factor – XUF	(See equations 6 and 38.)
101.	W/O OMC Availability Factor – XAF	(See equations 7 and 39.)
102.	W/O OMC Service Factor – XSF	(See equations 8 and 40.)
103.	W/O OMC Unit Derating Factor – XUDF	(See equations 10 and 42.)
104.	W/O OMC Equivalent Unavailability Factor – XEUF	(See equations 11 and 43.)
105.	W/O OMC Equivalent Availability Factor – XEAF	(See equations 12 and 44.)
106.	W/O OMC Equivalent Maintenance Outage Factor – XEMOF	(See equations 17 and 49.)
107.	W/O OMC Equivalent Planned Outage Factor – XEPOF	(See equations 18 and 50.)
108.	W/O OMC Equivalent Forced Outage Factor – XEFOF	(See equations 19 and 51.)
109.	W/O OMC Equivalent Scheduled Outage Factor – XESOF	(See equations 20 and 52.)
110.	W/O OMC Equivalent Unplanned Outage Factor – XEUOF	(See equations 21 and 53.)
111.	W/O OMC Forced Outage Rate – XFOR	(See equations 22 and 54.)
112.	W/O OMC Forced Outage Rate Demand – XFORd	(See equations 23 and 55.)
113.	W/O OMC Equivalent Forced Outage Rate – XEFOR	(See equations 24 and 56.)
114.	W/O OMC Equivalent Forced Outage Rate demand – XEFORd	(See equations 25 and 57.)
115.	W/O OMC Equivalent Planned Outage Rate – XEPOR	(See equations 26 and 58.)
116.	W/O OMC Equivalent Maintenance Outage Rate – XEMOR	(See equations 27 and 59.)
117.	W/O OMC Equivalent Unplanned Outage Rate – XEUOR	(See equations 28 and 60.)
118.	W/O OMC Average Run Time – XART	(See equations 29 and 61.)

Note: Unweighted single unit equations 9 (SEDF), 13-16 (GCF, NCF, GOF, NOF), 30-32 (SR, Mean Service Time to Outage, Mean Outage Duration), and Unweighted pooled unit equations 41 (SEDF), and 45-48 (GCF, NCF, GOF, NOF) do not have W/O OMC versions.

Weighted (capacity-based) methods for calculating statistics excluding problems outside management control for pooled unit statistics

Note: *The equations for calculating unweighted (time-based) performance excluding outside management control (OMC) events are identical to those shown earlier in this Appendix. The only differences are that the events using OMC cause codes are treated as non-curtailing events when analyzing the event records during the time of evaluation. In other words, the OMC events are ignored and not used in the calculations.*

The list of OMC cause codes, conditions and method for removing OMC events from the calculations is described in Appendix K.

119.	W/O OMC Weighted Forced Outage Factor – XWFOF	(See equation 65.)
120.	W/O OMC Weighted Maintenance Outage Factor – XWMOF	(See equation 66.)
121.	W/O OMC Weighted Planned Outage Factor – XWPOF	(See equation 67.)
122.	W/O OMC Weighted Unplanned Outage Factor – XWUOF	(See equation 68.)
123.	W/O OMC Weighted Scheduled Outage Factor – XWSOF	(See equation 69.)
124.	W/O OMC Weighted Unavailability Factor – XWUF	(See equation 70.)
125.	W/O OMC Weighted Availability Factor – XWAF	(See equation 71.)
126.	W/O OMC Weighted Service Factor – XWSF	(See equation 72.)
127.	W/O OMC Weighted Unit Derating Factor – XWUDF	(See equation 74.)
128.	W/O OMC Weighted Equivalent Unavailability Factor – XWEUF	(See equation 75.)
129.	W/O OMC Weighted Equivalent Availability Factor – XWEAF	(See equation 76.)
	(Also known as the "Unit Capability Factor" (UCF) in Europe and other parts of the world.)	
130.	W/O OMC Weighted Equivalent Maintenance Outage Factor – XWEMOF	(See equation 81.)
131.	W/O OMC Weighted Equivalent Planned Outage Factor – XWEPOF	(See equation 82.)
132.	W/O OMC Weighted Equivalent Forced Outage Factor – XWEFOF	(See equation 83.)
133.	W/O OMC Weighted Equivalent Scheduled Outage Factor – XWESOF	(See equation 84.)
134.	W/O OMC Weighted Equivalent Unplanned Outage Factor – XWEUOF	(See equation 85.)
	(Also known as the "Unit Capability Loss Factor" (UCLF) in Europe and other parts of the world.)	
135.	W/O OMC Weighted Forced Outage Rate – XWFOR	(See equation 86.)
136.	W/O OMC Weighted Forced Outage Rate demand – XWFORd	(See equation 87.)
137.	W/O OMC Weighted Equivalent Forced Outage Rate – XWEFOR	(See equation 88.)
138.	W/O OMC Weighted Equivalent Forced Outage Rate demand – XWEFORd	(See equation 89.)
139.	W/O OMC Weighted Equivalent Planned Outage Rate – XWEPOR	(See equation 90.)
140.	W/O OMC Weighted Equivalent Maintenance Outage Rate – XWEMOR	(See equation 91.)
141.	W/O OMC Weighted Equivalent Unplanned Outage Rate – XWEUOR	(See equation 92.)

Note: Weighted grouped unit equations 73 (WSEDF), 77-80 (GCF, NCF, GOF, NOF) do not have W/O OMC versions.

Run of River Hydro Equations Using Amplification Code WC (Water Condition)

The Run of River hydro equations take into account outages during time periods where water conditions prohibit the unit from operating. The unit is available during these times and can be put into various outage states while water conditions are unfavorable for operation. The outages are tracked by using the amplification code WC (Water Condition). Several of the time and energy factors used by indexes are modified for these equations. See the Hydro White Paper for more details.

There are two types of Run of River hydro equations:

1) Resource: All applicable equations 1 – 141 that ignore the WC amplification code and all factors are treated normally and calculation results are unchanged.

2) Equipment: All applicable equations 1 – 141 in which U3, MO, and PO outage events with amplification code WC are treated as available hours. The definitions of AH, FOH, MOH, and POH in equations 1 – 141 are replaced with the definitions for AH_{WC}, FOH_{WC}, MOH_{WC}, and POH_{WC} respectively, which account for water conditions. Three new terms $U3_{WC}$, MO_{WC}, and PO_{WC} are defined.

Summary of Run of River Hydro Time and Energy Factors Used by Indexes

4.	Available Hours – AH_{WC}	Sum of all Service Hours (SH) **+** Reserve Shutdown Hours (RSH) **+** Pumping Hours **+** Synchronous Condensing Hours + $U3_{WC}$ + MO_{WC} + PO_{WC}
5.	Planned Outage Hours - POH_{WC}	Sum of all hours experienced during Planned Outages (PO) **+** Planned Outage Extensions (PE) of any Planned Outages (PO) - PO_{WC}
	Planned Outage Hours - PO_{WC}	Sum of all hours experienced during Planned Outages (PO) during water conditions (amplification code WC)
7.	Forced Outage Hours – FOH_{WC}	Sum of all hours experienced during Forced Outages (U1, U2, and U3) **+** Startup Failures (SF) - $U3_{WC}$
	Forced Outage Hours – $U3_{WC}$	Sum of all hours experienced during Forced Outages of type U3 during water conditions (amplification code WC)
8.	Maintenance Outage Hours – MOH_{WC}	Sum of all hours experienced during Maintenance Outages (MO) **+** Maintenance Outage Extensions (ME) of any Maintenance Outages (MO) - MO_{WC}
	Maintenance Outage Hours – MO_{WC}	Sum of all hours experienced during Maintenance Outages (MO) during water conditions (amplification code WC)

Sample Equations

The Availability Factor (AF) is the percentage of period hours that a unit is available for generation.

$$\mathbf{AF} = \frac{\mathbf{AH}}{\mathbf{PH}}\mathbf{X100\%}$$

The Availability Factor of a hydro unit from the resource point of view does not account for water conditions and when the AH term is expanded it is the normal equation as expected.

$$\mathbf{AF} = \mathbf{AF_{Resource}} = \frac{\mathbf{RSH + SH + +Sync\ Cond\ Hours + Pumping\ Hours}}{\mathbf{PH}}\mathbf{X100\%}$$

The Availability Factor of a hydro unit from the equipment point of view accounts for water conditions and when the AH term is expanded it is modified to account for the outages marked by amplification code WC.

$$\mathbf{AF} = \frac{\mathbf{AH_{WC}}}{\mathbf{PH}}\mathbf{X100\%}$$

$$\mathbf{HAF} = \mathbf{AF_{Equipment}} = \frac{\mathbf{RSH + SH + Sync\ Cond\ hours + Pumping\ Hours + U3_{WC} + PO_{WC} + MO_{WC}}}{\mathbf{PH}}\mathbf{X100\%}$$

The Unplanned Outage Factor (UOF) is the percentage of period hours that a unit is on unplanned outage.

$$\mathbf{UOF} = \frac{\mathbf{UOH}}{\mathbf{PH}}\ \mathbf{x\ 100\%}$$

The Unplanned Outage Factor of a hydro unit from the resource point of view does not account for water conditions and when the UOH term is expanded it is the normal equation as expected.

$$\mathbf{UOF} = \mathbf{UOF_{Resource}} = \frac{\mathbf{FOH + MOH}}{\mathbf{PH}}\ \mathbf{x\ 100\%}$$

The Unplanned Outage Factor of a hydro unit from the equipment point of view accounts for water conditions and when the UOH term is expanded it is modified to account for the outages marked by amplification code WC.

$$\mathbf{UOF} = \frac{\mathbf{UOH_{WC}}}{\mathbf{PH}}\ \mathbf{x\ 100\%}$$

$$\mathbf{HUOF} = \mathbf{UOF_{Equipment}} = \frac{\mathbf{FOH_{WC} + MOH_{WC}}}{\mathbf{PH}}\ \mathbf{x\ 100\%}$$

A capital "H" prefixed to the front of the factor/rate acronym will designate it as a hydro equipment equation that takes water conditions (WC) into account.

All other applicable equations are to be treated in like manner and are not listed in this appendix to save space.

Note #1 for Appendix F

INTRODUCTION TO NOTE #1:
The information below comes from IEEE 762 Annex F. This section reviews several different methods for pooling EFORd only. Because of the nature of this equation, it can be pooled in several different methods as shown below.

PLEASE NOTE THAT after much consideration, NERC-GADS will use Method 2 in all its EFORd calculations. The reason for method 2 is:

- Consistency – all other GADS equations sum hours in both the denominator and numerator before division.
- Allow calculations of smaller groups. By allowing sums, smaller groups of units can be used to calculate EFORd without experiencing the divide by zero problem (see Note #2 for Appendix F).

FROM IEEE 762, ANNEX F: EFORd Pooling Sample

A comparison of three EFORd pooling methodologies.
Method (I): Pooled individual Unit Demand Studies

This method can give more weight to individual units with extreme $EFOR_d$ that have very few service hours, but with longer study time periods, the difference between the results of Methods I and II should be less.

Method (II): Group Demand Studies

This method may be more applicable in studying group statistics on units with known similar demand patterns, especially for forecasting and modeling. By calculating the f-factors over the group's total FOH, SH, RSH, and starts, the f-factor is "smoothed" and not subject to be unduly influenced by an one or more single units statistics that may have very high or very low hours or starts.

Method (III): Capacity Weighted Average of individually calculated $EFOR_d$ used by PJM to calculate pool average "unforced capacity" values for capacity market purposes.

In order to clearly demonstrate how these methods are used, two sets of comparison will be needed – the first uses the unweighted, time-based calculations as shown in Appendix F. The second will use a weighted version of these pooling methods.

Time-Based Pooling

This comparison of the three (3) pooling methodologies is based on the sample data and calculations found in the following two tables. Table 1 shows the raw data reported by 5 steam turbine generating units. Table 2 shows the interim values of the calculations used to produce the individual $EFOR_d$ for each unit.

Table 1: Raw Data Used as a Sample									
Unit	**Capacity (MW)**	**SH**	**RSH**	**AH**	**Actual Starts**	**Attempted Starts**	**EFDH**	**FOH**	**FO Events**
48	55	4556	1963	6519	31	31	110.51	407	5
49	57	4856	2063	6919	34	34	146.99	773	12
50	60	6460	516	6976	17	18	131.03	340	14
51	53	3942	3694	7636	36	36	19.92	504	11
52	55	6904	62	6966	14	16	35.81	138	12
Total	**280**	**26718**	**8298**	**35016**	**132**	**135**	**444.26**	**2162**	**54**

Table 2: Calculated Values Used in EFORd Formula									
Unit	**1/r**	**1/T**	**1/D**	**f**	**f x FOH**	**fp**	**fp x EFDH**	**EFORd x MW**	**EFORd**
48	0.0123	0.0158	0.0068	0.8049	327.608	0.6989	77.233	4.5594	8.29%
49	0.0155	0.0165	0.0070	0.8205	634.247	0.7018	103.163	7.6558	13.43%
50	0.0412	0.0349	0.0026	0.9666	328.630	0.9260	121.338	3.9770	6.63%
51	0.0218	0.0097	0.0091	0.7756	390.920	0.5162	10.283	4.9075	9.26%
52	0.0870	0.2581	0.0020	0.9942	137.194	0.9911	35.491	1.3489	2.45%
Method 1 Summed					1818.598		347.51		7.59%
Method 2 Calculated from reported totals	0.0250	0.0163	0.0049	0.8930	1930.734	0.763	338.98		7.92%
Method 3 Summed								22.4485	8.02%

Using this data, the 3 pooling methods can be shown as follows – Note that methods 1 and 2 are unweighted, time-based calculations.

- **Method 1** uses the sums of SH and the calculated values (f x FOH), (fp x EFDH) giving a pooled EFORd of 7.59%.

$$\frac{(1818.598+347.51)}{(26718+1818.598)}=7.59\%$$

- **Method 2** uses the sums of the reported data to represent the average unit and then calculates the pooled EFORd to be 7.92%.

$$\frac{(1930.734+338.98)}{(26718+1930.734)}=7.92\%$$

- **Method 3** weights the individual EFORd values with the unit capacity Σ (EFORd x MW) and uses the total capacity (Σ MW) to calculate a numeric average EFORd as 8.02%.

$$\frac{22.4485}{280}=8.02\%$$

Weighted Pooling

This method weights all time values by the Net Max Capacity of the individual unit. The raw data is the same as in the first example. Here Table 3 is added to show the weighted values used in the calculations.

Table 3: Weighted Values Used in EFORd Formula

Unit	wSH	wFOH	wEFDH	f	wFOHd	fp	wEFDHd	wEFORd
48	250580	22385	6078.05	0.8049	18018.42	0.69888	4247.83	8.29%
49	276792	44061	8378.43	0.8205	36152.06	0.701937	5880.28	13.43%
50	387600	20400	7861.80	0.9666	19717.79	0.925767	7280.28	6.63%
51	208926	26712	1055.76	0.7756	20718.75	0.516306	545.024	9.26%
52	379720	7590	1969.55	0.9942	7545.65	0.990815	1952.02	2.45%
Method 1 Summed	1503618				102152.67		19905.43	7.60%
Method 2 Calculated from reported totals	1503618	121148	25343.59	0.893	108188.97	0.763	19337.73	7.91%
Average wEFORd								8.01%

Weighted values in Table 3 are denoted with preceding w to indicate that the value has been weighted by its NMC. Below we substitute the weighted value for the expanded multiplication – wEFORd in place of (FORd x NMC)

- **Method 1** uses the weighted sums of wSH = SH x NMC, wFOHd = f x FOH x NMC, and wEFDHd = fp x EFDH x NMC, giving a pooled wEFORd of 7.60%.

$$\frac{\mathbf{\Sigma(wFOHd\ +\ wEFDHd)}}{\mathbf{wSH\ +\ \Sigma(wFOHd\ )}} = \mathbf{wEFORd\ (pooled)}$$

$$\frac{(102152.67+19905.43)}{(1503618+102152.67)} = 7.60\%$$

- **Method 2** uses the sums of the weighted reported data to represent the weighted average unit and then calculates the pooled EFORd to be 7.91%

$$\frac{\mathbf{(f\ x\ \Sigma\ wFOH)\ +\ (fp\ x\ \Sigma\ wEFDH)}}{\mathbf{\Sigma\ wSH\ +\ (f\ \ x\ \Sigma\ wFOH)}} = \mathbf{wEFORd\ (pooled)}$$

$$\frac{(0.893x121148)+(0.763x25343.59)}{1503618+(0.893x121148)} = 7.91\%$$

- **Average wEFORd** uses the sum of the weighted unit EFORd values to calculate the numerical average EFORd to be 8.01%.

$$\mathbf{Average\ EFORd} = \frac{\mathbf{\Sigma\ (WEFORd)}}{\mathbf{Count(WEFORd)}}\ \mathbf{x\ 100\%}$$

$$\frac{40.061}{5} = 8.01\%$$

Another Sample

Compare this sample to the samples earlier, and you will see that the relationship between the methods does not remain constant and is dependent on the distribution of the data.

Table 4: Raw Data Used as a Sample									
Unit	**Capacity (MW)**	**SH**	**RSH**	**AH**	**Actual Starts**	**Attempted Starts**	**EFDH**	**FOH**	**FO Events**
41	100	183	8576	8759	35	35	0	1	1
42	150	198	8562	8760	31	31	0	0	0
43	125	186	6867	7053	37	38	0	9	2
44	170	105	4128	4233	29	29	0	4528	3
45	180	62	8259	8321	20	20	0	98	1
Total	725	734	36392	37123	152	153	0	4636	7

Table 5: Calculated Values used in EFORd Formula									
Unit	**1/r**	**1/t**	**1/D**	**F**	**f x FOH**	**fp**	**fp x EFDH**	**EFORd x MW**	**EFORd**
41	1.000	0.004	0.191	0.840	0.840	0.021	0.000	0.457	0.46%
42	0.000	0.004	0.157	0.023	0.000	0.023	0.000	0.000	0.00%
43	0.222	0.006	0.199	0.534	4.804	0.026	0.000	3.147	2.52%
44	0.001	0.007	0.276	0.027	122.623	0.025	0.000	91.581	53.87%
45	0.010	0.002	0.323	0.038	3.691	0.007	0.000	10.114	5.62%
Method 1 Summed					131.959		0.000		15.24%
Method 2 Calculated from reported totals	0.002	0.004	0.207	0.027	124.488	0.020	0.000		14.50%
Method 3 Summed								105.299	14.52%

Table 6: Weighted Values Used in EFORd Formula								
Unit	**wSH**	**wFOH**	**wEFDH**	**F**	**wFOHd**	**fp**	**wEFDHd**	**wEFORd**
41	18300	100	0	0.840	84.000	0.021	0	0.46%
42	29700	0	0	0.023	0	0.023	0	0.00%
43	23250	1125	0	0.534	600.509	0.026	0	2.52%
44	17850	769760	0	0.027	20845.957	0.025	0	53.87%
45	11160	17640	0	0.038	664.418	0.007	0	5.62%
Method 1 Summed	100260				22194.884		0	18.12%
Method 2 Calculated from reported totals	100260	788625	0	0.027	21176.435	0.020	0	17.44%

Table 6: Weighted Values Used in EFORd Formula								
Unit	**wSH**	**wFOH**	**wEFDH**	**F**	**wFOHd**	**fp**	**wEFDHd**	**wEFORd**
Average wEFORd								12.49%

Hint: To make the second example calculations work correctly you will need to protect yourself against division by zero with statements like if r>0 then 1/r else 1/r= 0.

Note #2 for Appendix F

INTRODUCTION TO NOTE #2:

Table 7 below comes from IEEE 762 Annex G. In some cases Equivalent Forced Outage Rate – Demand (EFORd) and Forced Outage Rate – Demand (FORd) cannot be calculated or produce a reasonable result regardless of the method used or data sample size. Current industry practice is to calculate the six intermediate terms 1/r, 1/T, 1/D, f, fp, and EFDHd using data pooling method #2 with divide by zero protection on each calculation. This may force a meaningless answer in some cases and Table 7 shows under what circumstances a meaningful value can always be calculated.

PLEASE NOTE THAT NERC GADS will follow the recommendations of IEEE 762 Annex G as shown in Table 7 when calculating EFORd numbers. This means that in some GADS reports, there will not be an EFORd number because a calculated EFORd would be meaningless.

Table 7: Limiting Conditions for Forced Outage Indexes					
Case	**SH**	**FOH**	**RSH**	**FORd**	**EFORd**
Base	>0	>0	>0	Applicable	Applicable
1	0	>0	>0	Cannot be determined	Cannot be determined
2	0	0	>0	Cannot be determined	Cannot be determined
3	0	>0	0	Cannot be determined	Cannot be determined
4	>0	0	>0	0	EFDH/AH
5	>0	0	0	0	EFDH/SH
6	>0	>0	0	FOR	EFOR
7	0	0	0	Cannot be determined	Cannot be determined

Appendix G: Examples and Recommended Methods

Reporting Outages to the Generating Availability Data System (GADS)

Introduction

The examples in this appendix illustrate the reporting of outages and deratings to GADS. They are based on a fictional 600 MW coal-fired unit, Riverglenn #1, operated by the fictional "U.S. Power & Light Company." All the System/Component Cause Codes shown in these examples are real and found in *Appendix B08 – Fossil Steam Units.*

Each example includes a description of circumstances surrounding the event, the effect of the event on unit availability, and component repair time.

For the sake of space, the verbal description element (reported in Sections C and D of the event report (07)) is left out of the event description. Completing this information provides details about a failure's cause and appearance, identifies any contributing factors, and describes the corrective actions taken. Please refer to pages III-25 through III-26 for a discussion regarding the verbal description.

Index of Examples

Example 1: Simple Outage

Event Description

On January 3 at 4:30 a.m., Riverglenn #1 tripped off-line due to high turbine vibration. The cause was Low Pressure (LP) turbine bearings. Repairs began January 3 at 8:00 a.m. and were completed on January 8 at 9:30 a.m. The unit synchronized on January 8 at 5:00 p.m.

Report the following on Records 01, 02 and 03 of Event Report (07):

Event Number:	0001	
Event Type:	U1	
Start of Event:	January 3 at 04:30	
End of Event:	January 8 at 17:00	
Dominant Derating Column	(blank)	Record 01
System/Component Cause Code:	4240	
Time: Work Started:	January 3 at 08:00	
Time: Work Completed:	January 8 at 09:30	
Man Hours Worked:		Records 02/03

Effect on Unit Availability

The duration of this event was 132.50 hours (January 3, 4:30 a.m. to January 8, 5:00 p.m.).
Unit availability was affected for 132.50 hours.

Component Repair

The LP turbine bearings took 121.50 hours to repair (January 3, 8:00 a.m. to January 8 at 9:30 a.m.).

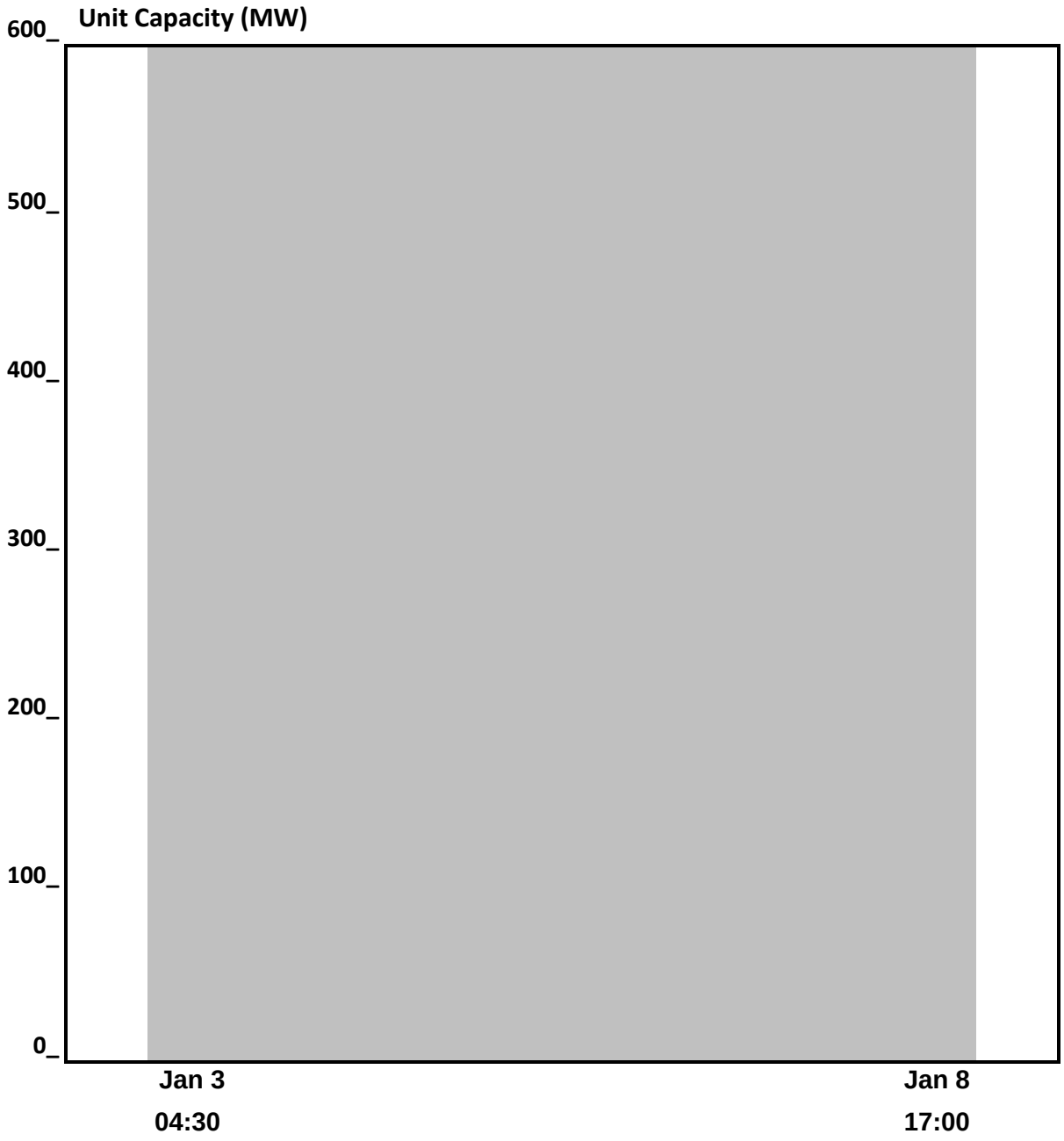


Figure G.1: Simple Outage

Example 2: Simple Derating

Event Description

On January 10 at 8:00 a.m., Riverglenn #1 reduced capacity by 400 MW due to a fouled north air preheater. Fouling began a few weeks earlier, but the unit stayed on-line at full capacity to meet load demand. Repair crews completed their work and the unit came back to full load (600 MW) on January 11 at 4:00 p.m.

Report the following on Records 01, 02 and 03 of Event Report (07):

Event Number:	0002	
Event Type:	D4	
Start of Event:	January 10 at 08:00	
Event of Event:	January 11 at 16:00	
Gross Available Capacity as a Result of Event:	*	
Net Available Capacity as a Result of Event:	200	
Dominant Derating Column	(blank)	Record 01

System/Component Cause Code:	1492	
Time: Work Started:	January 10 at 08:00	
Time: Work Completed:	January 10 at 16:00	
Man Hours Worked:	100	Records 02/03

Effect on Unit Availability

To measure the impact of this event on unit availability, the duration of the derating is converted to Equivalent Derated Hours. This conversion enables availability losses caused by deratings to be assessed on the same basis as losses caused by outages. It is done by multiplying the event duration (hours) by the size of reduction and dividing by the unit's Net Maximum Capacity (NMC). Size of Reduction is calculated by subtracting the reported Net Available Capacity as a result of the derating (NAC) from Net Dependable Capacity (NDC) of the unit. Equivalent Derated Hours for this event are:

[(600 MW – 200 MW) * 32 hours]/600 MW = 21.33

Thus, the availability of Riverglenn #1 is impacted for 21.33 Equivalent Derated Hours.

Component Repair

The air preheater required 32 hours to repair. The hours are not equivalent.

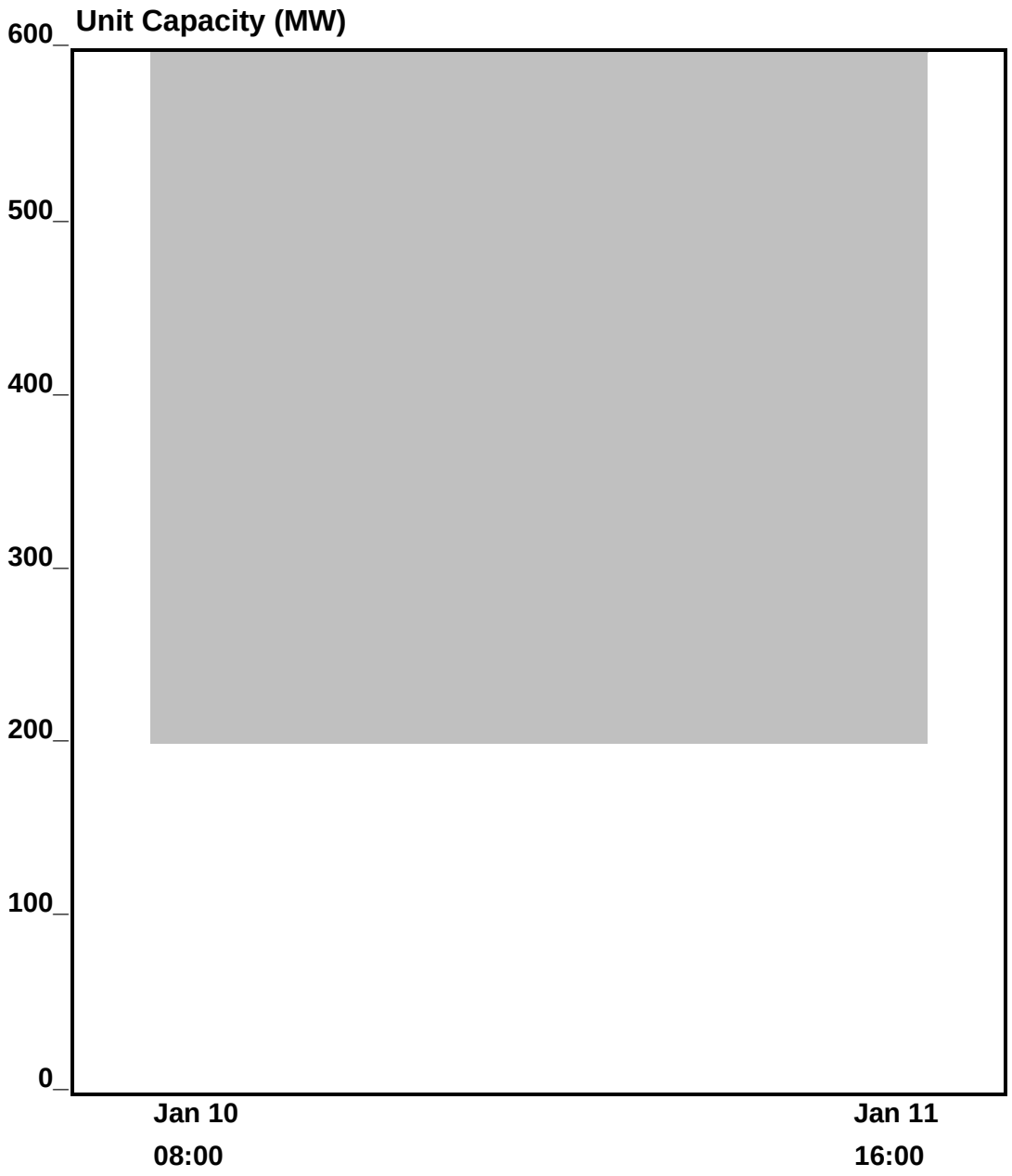


Figure G.2: Simple Derating

Example 3A: Overlapping Deratings
Second Derating Begins and Ends During First Derating

Description of Events

Riverglenn #1 experienced an immediate 75 MW derating on March 9 at 8:45 a.m. The cause was an "A" pulverizer feeder motor failure (Derating "A"). Net Available Capacity (NAC) as a result was 525 MW.

At 10:00 a.m. the same day, the unit lost another 75 MW due to a trip of the "B" pulverizer feeder motor. The Net Available Capacity (NAC) as a result of the second derating (Derating "B") was 450 MW. The motor was restarted and Derating "B" ended an hour later. The capability of the unit increased by 75 MW at this time.

Derating "A" ended when the "A" pulverizer feeder motor was repaired and the unit brought back to full load at 6:00 p.m. on March 9.

Report the following on Records 01, 02 and 03 of Event Report (07):

Derating "A"

Event Number:	0003	
Event Type:	D1	
Start of Event:	March 9 at 08:45	
End of Event:	March 9 at 18:00	
Gross Available Capacity as a Result of the Event:	*	
Net Available Capacity as a Result of the Event:	525	
Dominant Derating Column	(blank)	Record 01
System/Component Cause Code:	0253	
Time: Work Started:	*	
Time: Work Completed:	*	
Man Hours Worked:		Records 02/03

Derating "B"

Event Number:	0004	
Event Type:	D1	
Start of Event:	March 9 at 10:00	
End of Event:	March 9 at 11:00	
Gross Available Capacity as a Result of the Event:	*	
Net Available Capacity as a Result of the Event:	450	
Dominant Derating Column	(blank)	Record 01
System/Component Cause Code:	0253	
Time: Work Started:	*	
Time: Work Completed:	*	
Man Hours Worked:		Records 02/03

Effect on Unit Availability

In GADS, overlapping deratings are considered additive (unless the second derating occurs wholly within a derating of greater magnitude as in Example #4). When two deratings overlap, the size of reduction caused by

the second derating is determined by subtracting the Net Available Capacity as a result of the second derating from the Net Available Capacity of the unit as a result of the first derating.

The following shows the availability impact these two deratings had on the unit:

Derating "A": [(600 MW - 525 MW) * 9.25 hour]/600 MW = 1.16 Equivalent Derated Hours
Derating "B": [(525 MW - 450 MW) * 1.00 hour]/600 MW = 0.13 Equivalent Derated Hours

Component Repair

When "Time: Work Started" and "Time: Work Completed" are blank or asterisk-filled, the reported Start of Event and End of Event determine component repair time.

In this example, 10.25 hours are charged against the pulverizer feeder motor for repair (9.25 hours for Derating "A" and 1 hour for Derating "B.") These hours are not equivalent.

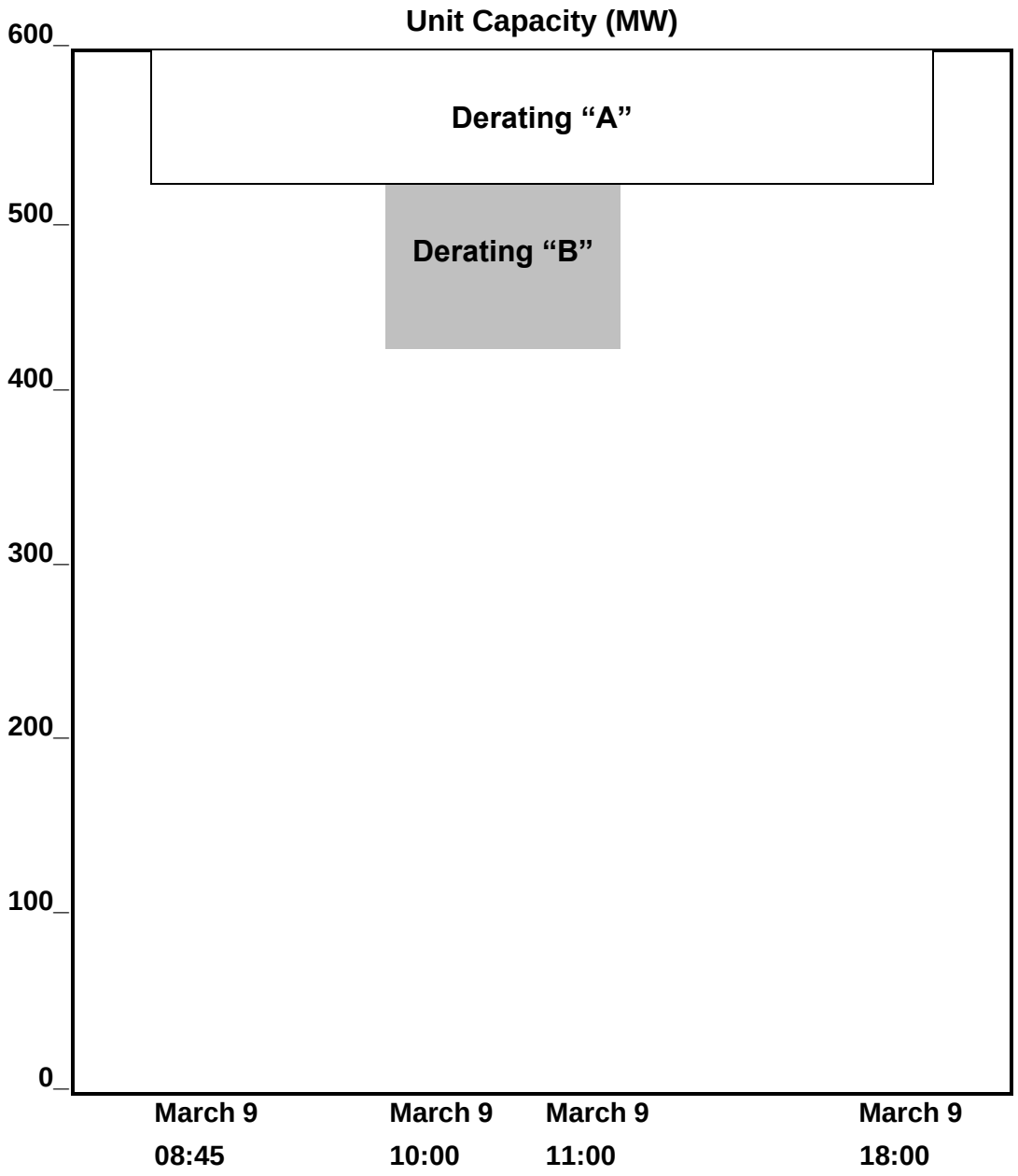


Figure G.3: Overlapping Deratings

Second derating begins and ends during first derating

Example 3B: Overlapping Deratings
Second Derating Begins and Ends During First Derating
First is Partially Shadowed

Description of Events

A derating began on July 3 at 2:30 p.m., when capacity was reduced to 575 MW for condenser maintenance. The maintenance began July 13 at 8:00 a.m. The event ended on July 23 at 11:45 a.m.

On July 19 at 11:15 a.m., while the maintenance derating was in progress, a feedwater pump tripped. Load immediately fell to 360 MW. (This would have been the case, whether or not the unit was already derated.) The feedwater water pump was back in service at noon the same day.

Report the following on Records 01, 02, and 03 of Event Report (07):

Derating "A"

Event Number:	0005	
Event Type:	D4	
Start of Event:	July 3 at 14:30	
End of Event:	July 23 at 11:45	
Gross Available Capacity as a Result of the Event:	*	
Net Available Capacity as a Result of the Event:	575	
Dominant Derating Column	(blank)	Record 01
System/Component Cause Code:	3112	
Time: Work Started:	July 13 at 08:00	
Time: Work Completed:	July 23 at 11:45	
Man Hours Worked:	550	Records 02/03

Derating "B"

Event Number:	0006	
Event Type:	D1	
Start of Event:	July 19 at 11:15	
End of Event:	July 19 at 12:00	
Gross Available Capacity as a Result of the Event:	*	
Net Available Capacity as a Result of the Event:	360	
Dominant Derating Column	D	Record 01
System/Component Cause Code:	3410	
Time: Work Started:	*	
Time: Work Completed:	*	
Man Hours Worked:	*	Records 02/03

Effect on Unit Availability

Dominant derates are not additive by definition. The reduction due to them always starts at NDC like an outage.

For the duration of the overlap of "A" by "B", or 0.75 hours, 25 MW, which would be attributed to derating "A" if it had occurred alone, are shadowed by derating "B" which acts on derating "A" like an outage. Because of shadowing, these equivalent hours are not double counted.

The unit's availability is affected as follows:

Derating "A": [(600 MW - 575 MW) * (477.25 hours – 0.75 hours)]/600 MW = 19.85 Equivalent Derated Hours
Derating "B": [(600 MW - 360 MW) * 0.75 hours]/600 MW = 0.30 Equivalent Derated Hours

Had derating "B" not been a dominant derate the two derates would have been additive (Figure G-3B would have to be redrawn with the top of Derate "B" starting at NAC_A) and the unit availability would have been affected as follows:

Derating "A": [(600 MW - 575 MW) * (477.25 hours)]/600 MW = 19.89 Equivalent Derated Hours
Derating "B": [(575 MW - 360 MW) * 0.75 hours]/600 MW = 0.27 Equivalent Derated Hours

Component Repair

Condenser maintenance took 243.75 hours. The feedwater pump was out of service for 0.75 hours. These hours are not equivalent.

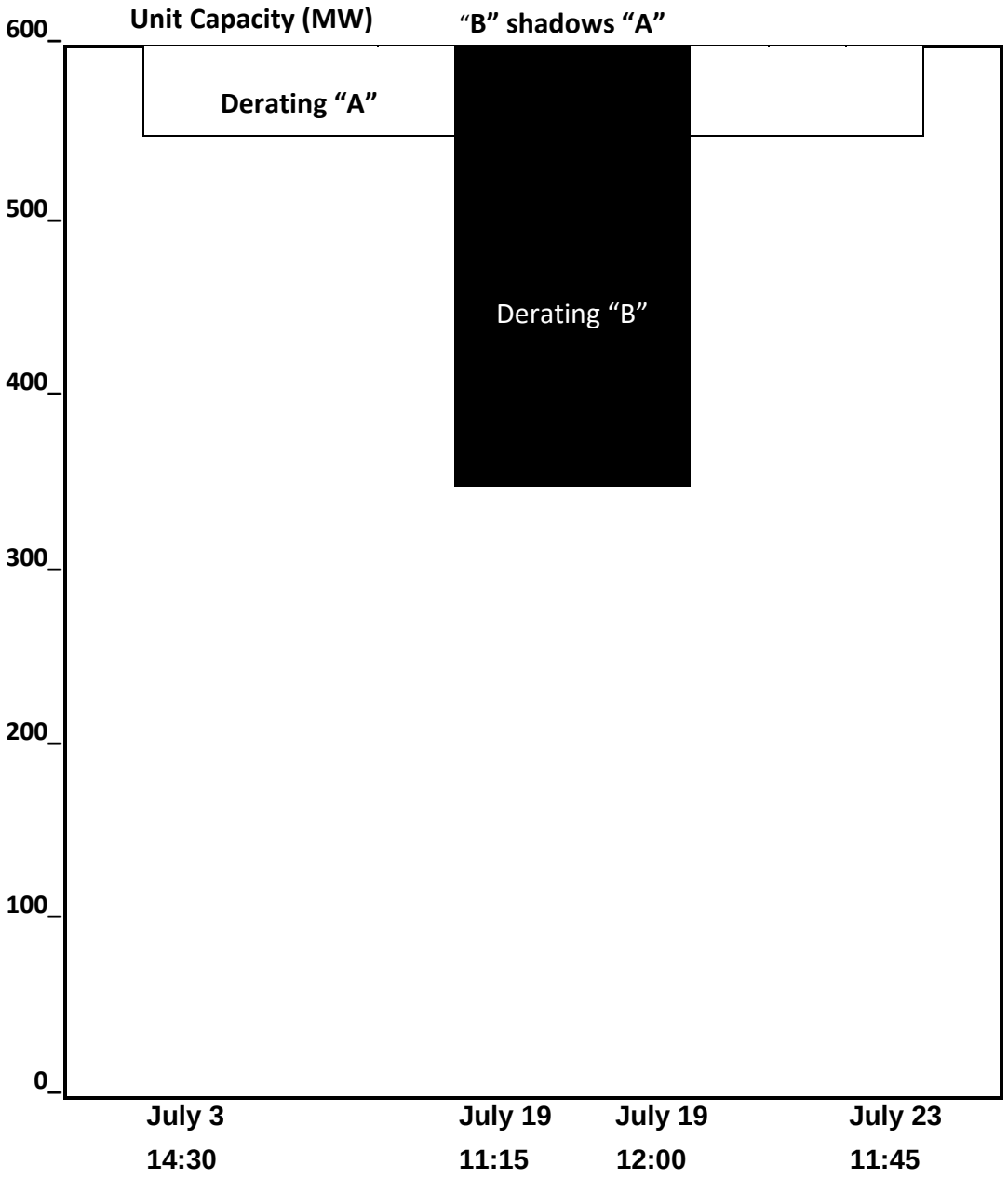


Figure G.4: Overlapping Deratings

Second derating begins and ends during first derating. Second is partially shadowed

Example 3C: Overlapping Deratings
First Derating Ends before Second Derating Capability of Unit Changes

Description of Events

A 50 MW load reduction occurred on January 13 at 8:00 a.m. for a feedwater heater inspection (Derating "A"). The inspection had been planned several months earlier.

At 10:00 a.m., Riverglenn #1 experienced excessive pulverizer vibration. Available Capacity changed from 550 MW to 350 MW — a 200 MW reduction — as a result. A foreign object was the cause.

While the mill was under repair, the feedwater heater was put back in service, ending Derating "A" at 1:00 p.m. on January 13. This caused a 50 MW increase in the unit's Net Available Capacity.

Derating "B" ended on January 14 at 8:00 p.m. after completing pulverizer repairs.

Report the following on Records 01, 02 and 03 of Event Report (07):

Derating "A"

Event Number:	0007	
Event Type:	PD	
Start of Event:	January 13 at 08:00	
End of Event:	January 13 at 13:00	
Gross Available Capacity as a Result of the Event:	*	
Net Available Capacity as a Result of the Event:	550	
Dominant Derating Column	(blank)	Record 01
System/Component Cause Code:	3340	
Time: Work Started:	January 13 at 08:30	
Time: Work Completed:	January 13 at 13:00	
Man Hours Worked:	*	Records 02/03

Derating "B"

Event Number:	0008	
Event Type:	D1	
Start of Event:	January 13 at 10:00	
End of Event:	January 14 at 20:00	
Gross Available Capacity as a Result of the Event:	*	
Net Available Capacity as a Result of the Event:	350	
Dominant Derating Column	(blank)	Record 01
System/Component Cause Code:	0320	
Time: Work Started:	*	
Time: Work Completed:	*	
Man Hours Worked:	160	Records 02/03

Effect on Unit Availability

These two deratings are additive (See Example 3A). Availability is affected as follows:

Derating "A": [(600 MW - 550 MW) * 5.00 hours)/600 MW = 0.42 Equivalent Derated Hours
Derating "B": [(550 MW - 350 MW) * 34.00 hours)/600 MW = 11.33 Equivalent Derated Hours

Component Repair

The feedwater heater took 5 hours to repair and the pulverizer took 34 hours.

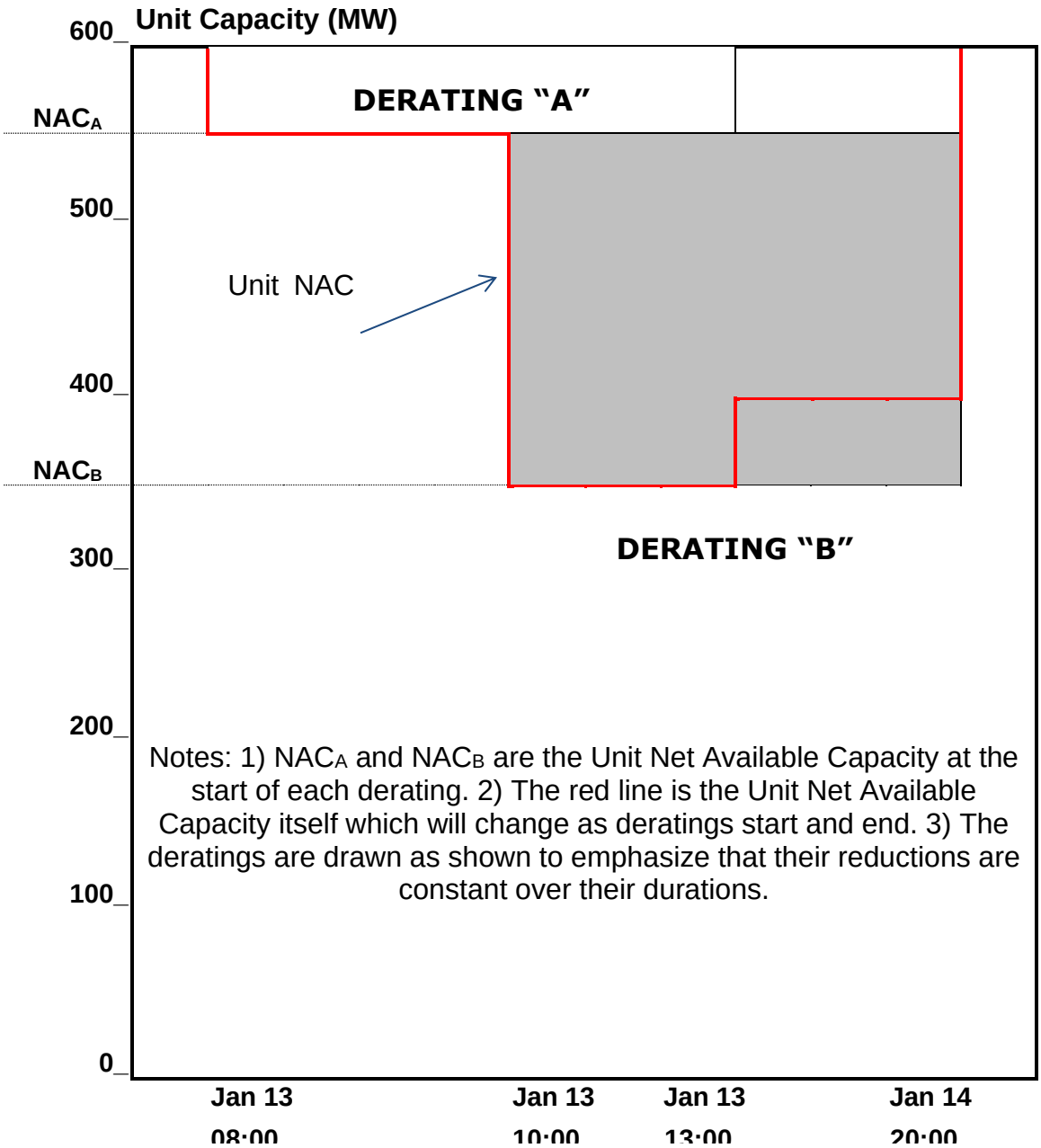


Figure G.5: Overlapping deratings
First derating ends before second derating; capability changes

Example 3D: Overlapping Deratings First Derating Ends before Second Derating Capability of Unit Does Not Change

Description of Events

A circuit breaker tripped, causing an immediate 100 MW load reduction on March 10 at 6:30 a.m. (Derating "A.") At 7:45 a.m. the same day, a traveling screen jammed, causing one of the unit's circulating water pumps to shut down (Derating "B"). Net Available Capacity as a result of the event was 360 MW.

Derating "A" ended at 10:30 a.m. on March 10 when the circuit breaker repairs were completed. However, the traveling screen problem continued, forcing the unit to remain at 360 MW. The unit was available for full load on March 10 at 7:30 p.m. after completing repairs to the traveling screen.

Report the following on Records 01, 02 and 03 of Event Report (07):

Derating "A"

Event Number:	0009	
Event Type:	D1	
Start of Event:	March 10 at 06:30	
End of Event:	March 10 at 10:30	
Gross Available Capacity as a Result of the Event:	*	
Net Available Capacity as a Result of the Event:	500	
Dominant Derating Column	(blank)	Record 01
System/Component Cause Code:	3661	
Time: Work Started:	March 10 at 08:00	
Time: Work Completed:	March 10 at 10:30	
Man Hours Worked:	*	Records 02/03

Derating "B"

Event Number:	0010	
Event Type:	D1	
Start of Event:	March 10 at 07:45	
End of Event:	March 10 at 19:30	
Gross Available Capacity as a Result of the Event:	*	
Net Available Capacity as a Result of the Event:	360	
Dominant Derating Column	D	Record 01
System/Component Cause Code:	3260	
Time: Work Started:	March 10 at 08:15	
Time: Work Completed:	March 10 at 19:30	
Man Hours Worked:	*	Records 02/03

Effect on Unit Availability

As shown in Example 3A GADS assumes that overlapping deratings are additive. In this example, however, Derating "A" and Derating "B" are not additive because the Net Available Capacity of the unit remains at 360 MW after the Derating "A" ends. The utility must report a dominant derating "turn off" of the additive assumption. To do this, end Derating "A" as normal and mark Derating "B" as a dominant derating (column 65 with a "D"). Net Available Capacity as a result of dominant derating is all that is necessary to retain the 360 MW available capacity.

The following losses are charged against unit availability:

Derating "A": [(600 MW - 500 MW) x 1.25 hours]/600 MW = 0.21 Equivalent Derated Hours
Derating "B": [(600 MW - 360 MW) x 11.75 hours]/600 MW = 4.70 Equivalent Derated Hours

Component Repair

The circuit breaker and the traveling screen are charged with 2.50 clock hours of repair and 11.25 clock hours of repair, respectively.

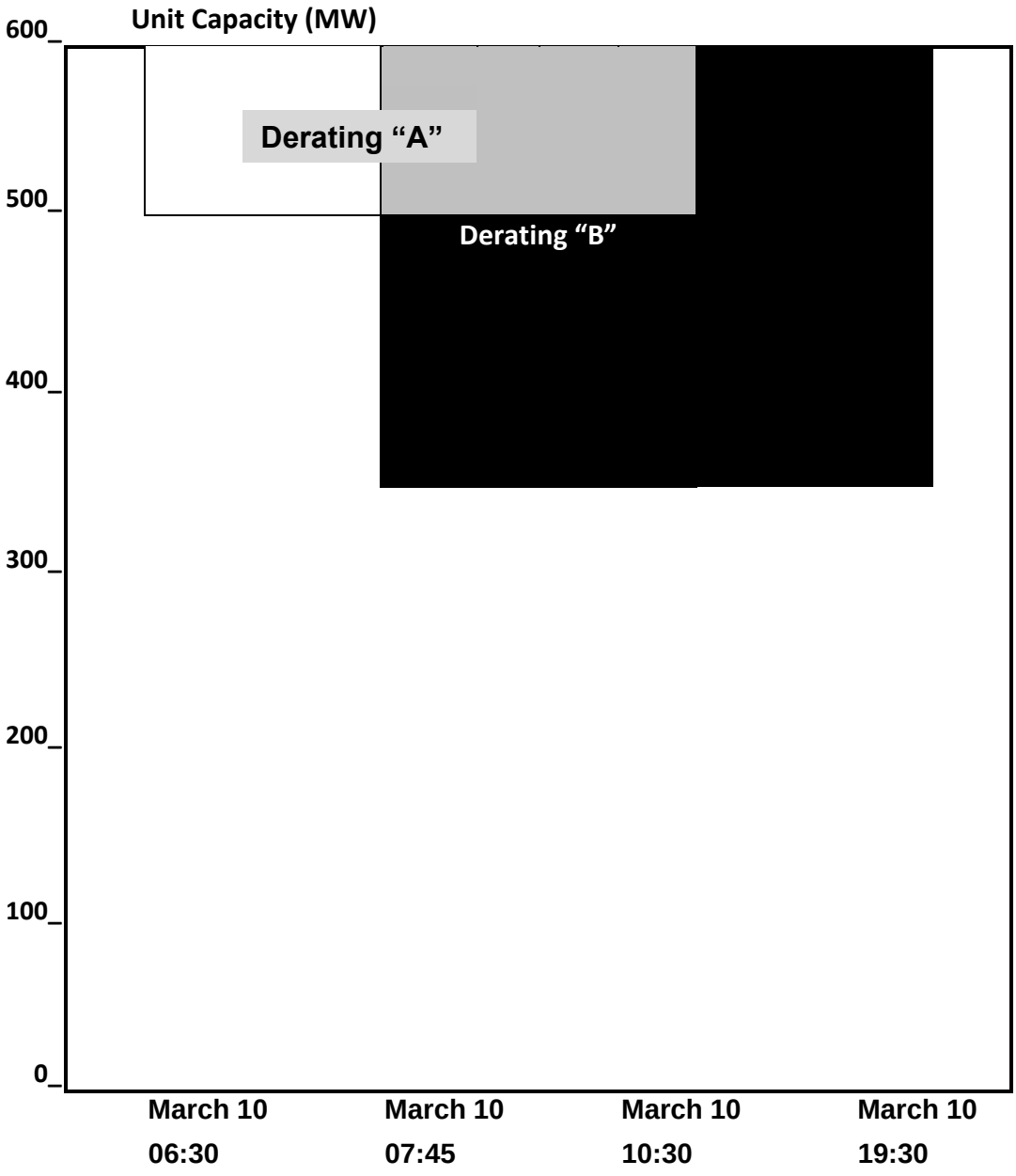


Figure G.6: Overlapping Deratings

First derating ends before second derating
Capability of unit does not change

Example 4: Derating During a Dominant Derating

Event Description

A forced draft fan failed at 6:30 a.m. on April 10 causing a 300 MW reduction. Repairs began at 8:00 a.m. The unit returned to full capacity at 7:00 p.m. April 10.

During the force draft fan repair, a problem with the feedwater chemistry developed at 8:30 a.m. and it was corrected by 3:45 p.m. If it had occurred alone, a reduction of 100 MW would have resulted. In this example, it is completely shadowed by the dominant derating.

Report the following on Records 01, 02, and 03 of Event Report (07):

Derating "A"

Event Number:	0012	
Event Type:	D1	
Start of Event:	April 10 at 06:30	
End of Event:	April 10 at 19:00	
Gross Available Capacity as a Result of the Event:	*	
Net Available Capacity as a Result of the Event:	300	
Dominant Derating Column:	D	Record 01
System/Component Cause Code:	1400	
Contribution Code:	1	
Time: Work Started:	April 10 at 08:00	
Time: Work Completed:	April 10 at 19:00	
Man Hours Worked:	*	Records 02/03

Derating "B"

Event Number:	0013	
Event Type:	D1	
Start of Event:	April 10 at 08:30	
End of Event:	April 10 at 15:45	
Gross Available Capacity as a Result of the Event:	*	
Net Available Capacity as a Result of the Event:	500	
Dominant Derating Column:	(blank)	Record 01
System/Component Cause Code:	3352	
Contribution Code:	1	
Time: Work Started:	April 10 at 09:00	
Time: Work Completed:	April 10 at 15:45	
Man Hours Worked:	*	Records 02/03

Effect on Unit Availability

The forced draft fan caused the problem that affected Riverglenn's availability. The feedwater chemistry problem did not impact availability because it was completely shadowed by the dominant derating. The unit availability impact is:

[(600 MW - 300 MW) * 12.50 hours]/600 MW = 6.25 Equivalent Derated Hours

Component Repair

Although the feedwater chemistry problem does not affect unit availability, its occurrence should be reported. This information is important for analysis purposes. Never mentally manipulate shadowed events and report the results. Always report the actual events and let the math take care of the shadowing.

Repair of the forced draft fan took 12.5 hours. It took 7.25 hours to correct the feedwater chemistry problem.

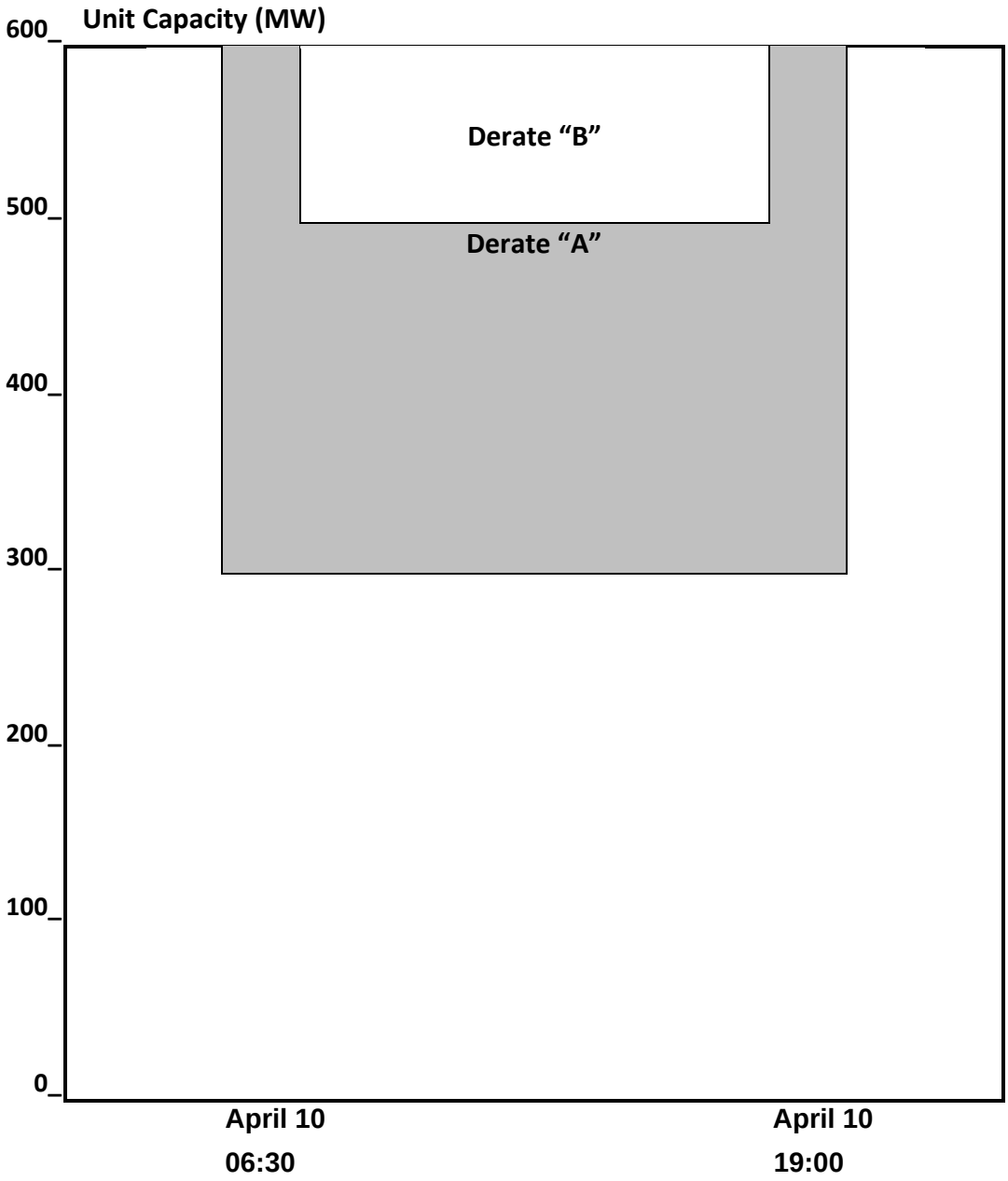


Figure G.7: Derating During Dominant Derating

Example 5: Derating During a Reserve Shutdown

Description of Event

A reserve shutdown began on May 31 at 7:30 p.m. Maintenance crews took advantage of the off-line time and took one boiler feed pump (BFP) out of service (two other BFP were available) to repair the steam turbine. The work started at 8:00 a.m. on June 1 and ended on June 2 at 3:30 p.m. While the BFP valve maintenance was underway, the unit would have been able to synchronize, but would have been limited to 400 MW.

Riverglenn #1 was back in service on June 3 at 8:30 a.m.

Report the following on Records 01, 02 and 03 of Event Report (07):

Event Number:	0014	
Event Type:	RS	
Start of Event:	May 31 at 19:30	
End of Event:	June 3 at 08:30	
Dominant Derating Column	(blank)	Record 01

Event Number:	0015	
Event Type:	D4	
Start of Event:	June 1 at 08:00	
End of Event:	June 2 at 15:30	
Gross Available Capacity as a Result of the Event:	*	
Net Available Capacity as a Result of the Event:	400	
Dominant Derating Column	(blank)	Record 01

System/Component Cause Code:	3412	
Time: Work Started:	June 1 at 08:00	
Time: Work Completed:	June 2 at 15:30	
Man Hours Worked:	80	Records 02/03

Effect on Unit Availability

Although it is off-line, a unit on reserve shutdown is available for full load. The “cause” of the event is economics, not equipment-related problems. However, if equipment is taken out of service that results in the unit’s inability to come back on-line and achieve full load, the reserve shutdown status has changed. A new event that accurately reflects the available status of the unit is required.

In this example, Riverglenn was available for full load until the BFP valve work began. The status of the unit changed because it was no longer available for full load. A derating event must be reported. (An outage would be reported if the unit would have been unable to synchronize while the BFP work was in progress.) The unit availability impact resulting from the BFP valve maintenance is:

[(600 MW - 400 MW) * 31.50 hours]/600 MW = 10.50 Equivalent Derated Hours

Component Repair

The feedwater pump steam turbine required 31.50 hours to repair.

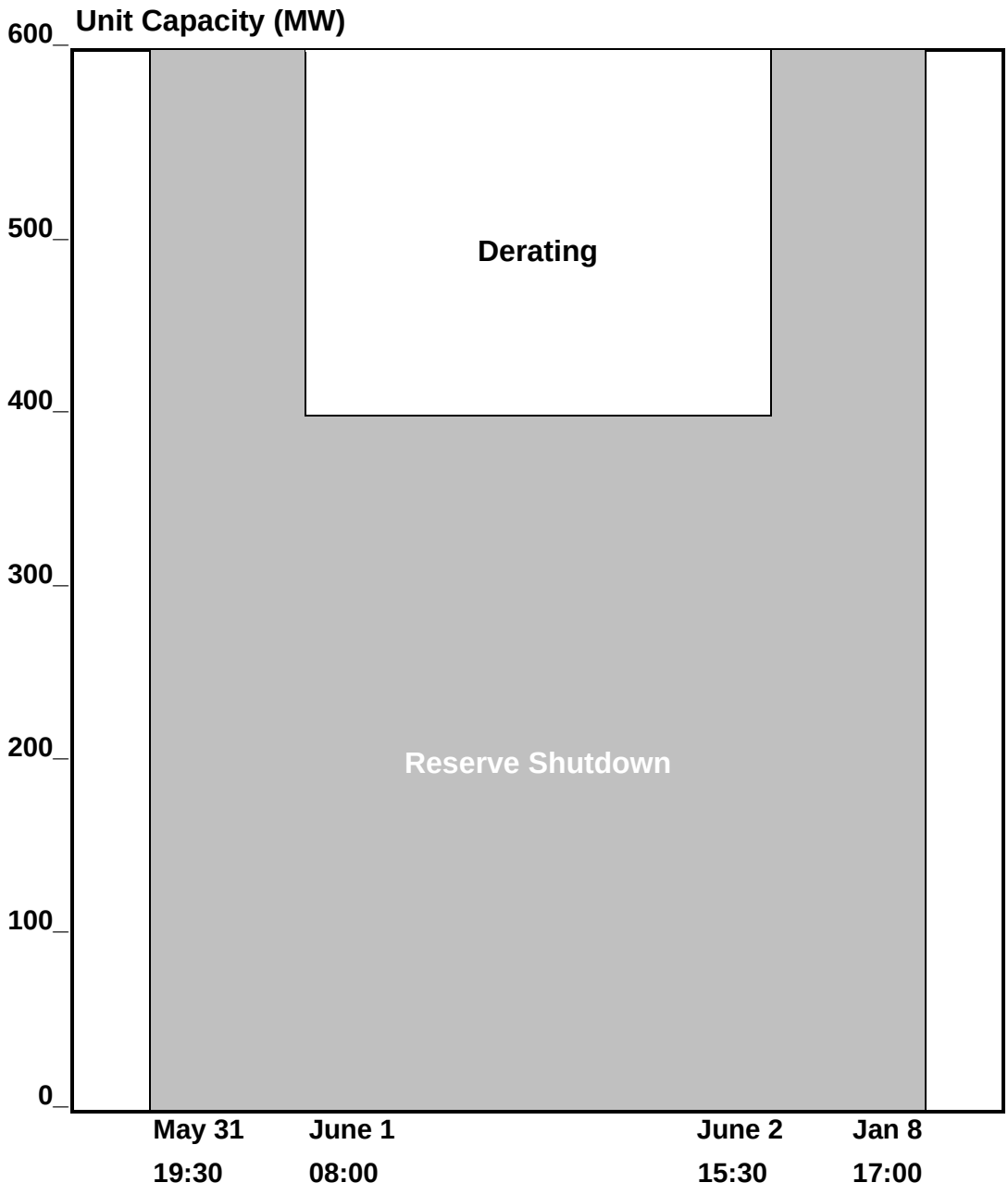


Figure G.8: Derating During a Reserve Shutdown

Example 6a: Derating Overlapped by a Full Outage Derating Ends before Full Outage

Description of Events

Riverglenn #1 lost 100 MW due to a feedwater heater high-level trip at 9:45 a.m. on February 27. An L.P. heater tube leak was the cause. Repairs began March 2 at 8:00 a.m. A secondary superheater tube leak on March 2 at 1: 15 a.m. caused the unit to trip off-line.

The feedwater heater (cause of the derating) was repaired by March 4 at 6:30 p.m.

Repairs to the superheater (cause of the outage) were completed on March 4 at 10:00 p.m. The unit synchronized on March 5 at 9:22 a.m.

Report the following on Records 01, 02 and 03 of Event Report (07):

Event Number:	0016	
Event Type:	D1	
Start of Event:	February 27 at 09:45	
End of Event:	March 4 at 18:30	
Gross Available Capacity as a Result of the Event:	*	
Net Available Capacity as a Result of the Event:	500	
Dominant Derating Column	(blank)	Record 01

System/Component Cause Code:	3340	
Time: Work Started:	March 2 at 08:00	
Time: Work Completed:	March 4 at 18:30	
Man Hours Worked:	234	Records 02/03

Event Number:	0017	
Event Type:	U1	
Start of Event:	March 2 at 01:15	
End of Event:	March 5 at 09:22	
Dominant Derating Column	(blank)	Record 01

System/Component Cause Code:	1050	
Time: Work Started:	March 2 at 12:00	
Time: Work Completed:	March 4 at 22:00	
Man Hours Worked:	600	Records 02/03

Effect on Unit Availability

The feedwater heater problem impacts availability until the outage begins:

[(600 MW - 500 MW) * 63.50 hours]/600 MW = 10.58 Equivalent Derated Hours

Once initiated, the outage assumes full responsibility for loss of availability. That is 80.12 hours in this example.

Component Repair

The feedwater heater was unavailable for 128.75 hours, the superheater for 80.12.

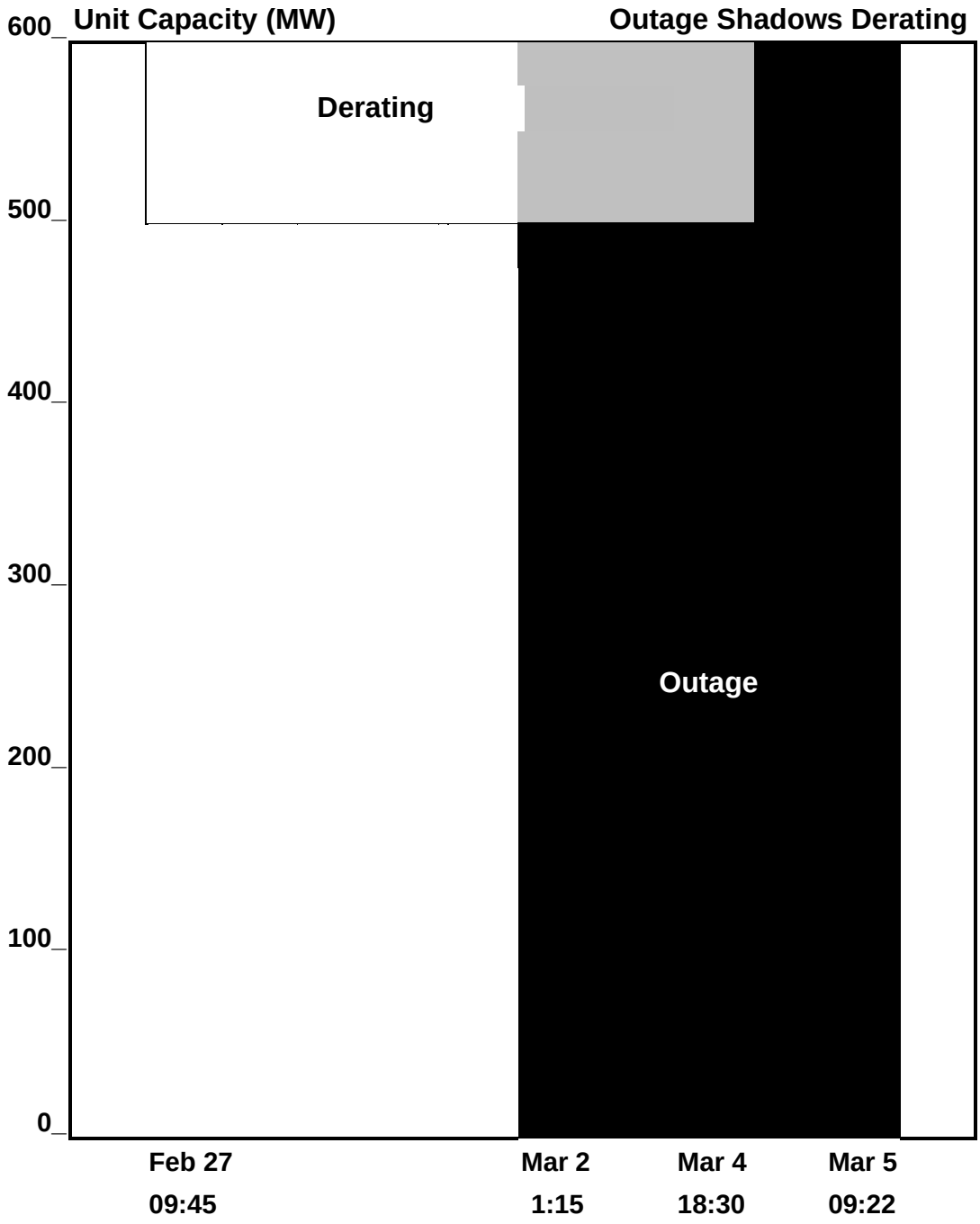


Figure G.9: Derating Overlapped by an Outage
Derating Ends before Outage

Example 6B: Derating Overlapped by a Full Outage
Full Outage Begins and Ends During Derating

Description of Events

A pulverizer motor failed on May 18 at 09:45 a.m. causing a 100 MW derating.

While the unit was derated, a maintenance crew discovered a severe water wall tube leak, forcing the unit off-line immediately. That occurred on May 20 at 6:45 p.m. The tube was welded, and the unit brought back into service at 2:42 a.m. on May 24. Pulverizer repairs were still in progress, so the unit was limited to 500 MW. The unit was available for full load on May 25 at 2:30 p.m. when pulverizer repairs were completed.

Report the following on Records 01, 02 and 03 of Event Report (07):

Event Number:	0018	
Event Type:	D1	
Start of Event:	May 18 at 09:45	
End of Event:	May 25 at 14:30	
Gross Available Capacity as a Result of the Event:	*	
Net Available Capacity as a Result of the Event:	500	
Dominant Derating Column	(blank)	Record 01

System/Component Cause Code:	0253	
Time: Work Started:	*	
Time: Work Completed:	*	
Man Hours Worked:	16	Records 02/03

Event Number:	0019	
Event Type:	U1	
Start of Event:	May 20 at 18:45	
End of Event:	May 24 at 02:42	
Dominant Derating Column	(blank)	Record 01

System/Component Cause Code:	1000	
Time: Work Started:	*	
Time: Work Completed:	*	
Man Hours Worked:	60	Records 02/03

Effect on Unit Availability

The outage interrupts the derating for 79.95 hours. The derating affects availability for 57 hours before the outage and 35.80 hours after the outage. Availability losses due to the derating are:

[(600 MW - 500 MW) * (57.00 Hours + 35.80 Hours)]/600 MW = 15.47 Equivalent Derated Hours

Component Repairs

Repair of the pulverizer motor, the cause of the derating, took 172.75 hours. The waterwall tube section repairs took 79.95 hours.

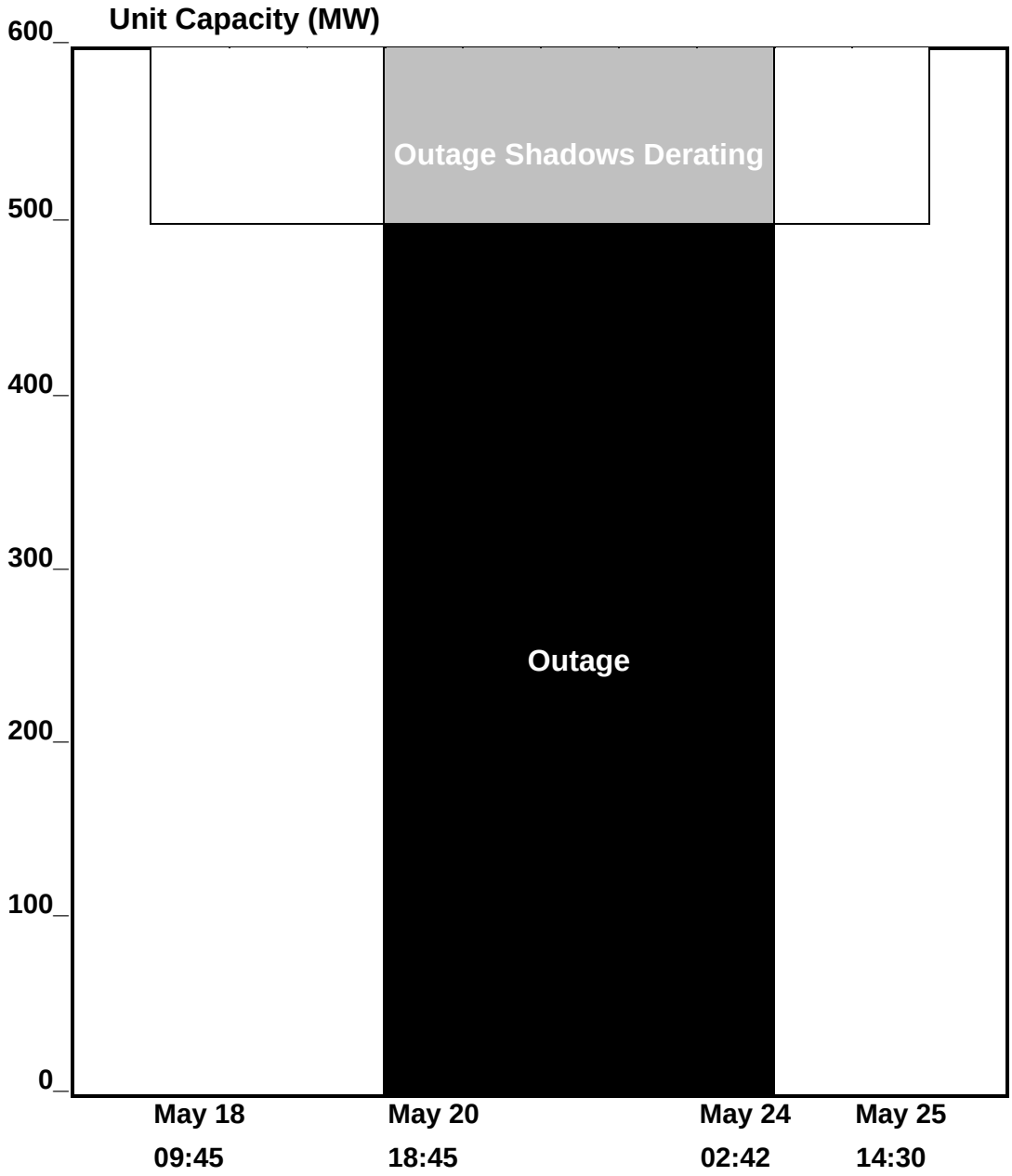


Figure G.10: Derating Overlapped by an Outage
Outage Begins and Ends during Derating

Example 7: Startup Failure

Event Description

Riverglenn began its normal 15-hour startup cycle following a two-week planned outage on October 1, 7:00 a.m. At the end of the normal cycle; however, the unit was not ready to synchronize. The reason was excessive H.P. turbine rotor vibration. The problem was corrected and Riverglenn #1 synchronized at 3:00 a.m. on October 3.

Report the following on Records 01, 02 and 03 of Event Report (07):

Event Number:	0022	
Event Type:	SF	
Start of Event:	October 1 at 22:00*	
End of Event:	October 3 at 03:00	
Dominant Derating Column	(blank)	Record 01

System/Component Cause Code:	4030	
Time: Work Started:	October 1 at 23:00	
Time: Work Completed:	October 2 at 16:00	
Event Contribution Code:	1	
Man Hours Worked:	*	Records 02/03

Effect on Total Unit Availability

*The startup failure event began when the 15-hour startup cycle was exceeded. The unit is charged with a forced outage (SF) for the 29 hours it took to repair the H.P. turbine vibration problem and synchronize the unit.

Component Repair

The H.P. turbine rotor shaft took 17 hours to repair.

An outage or reserve shutdown must immediately precede a Startup Failure event. The end of the outage must be the same as the start of the SF event (see Page III-8).

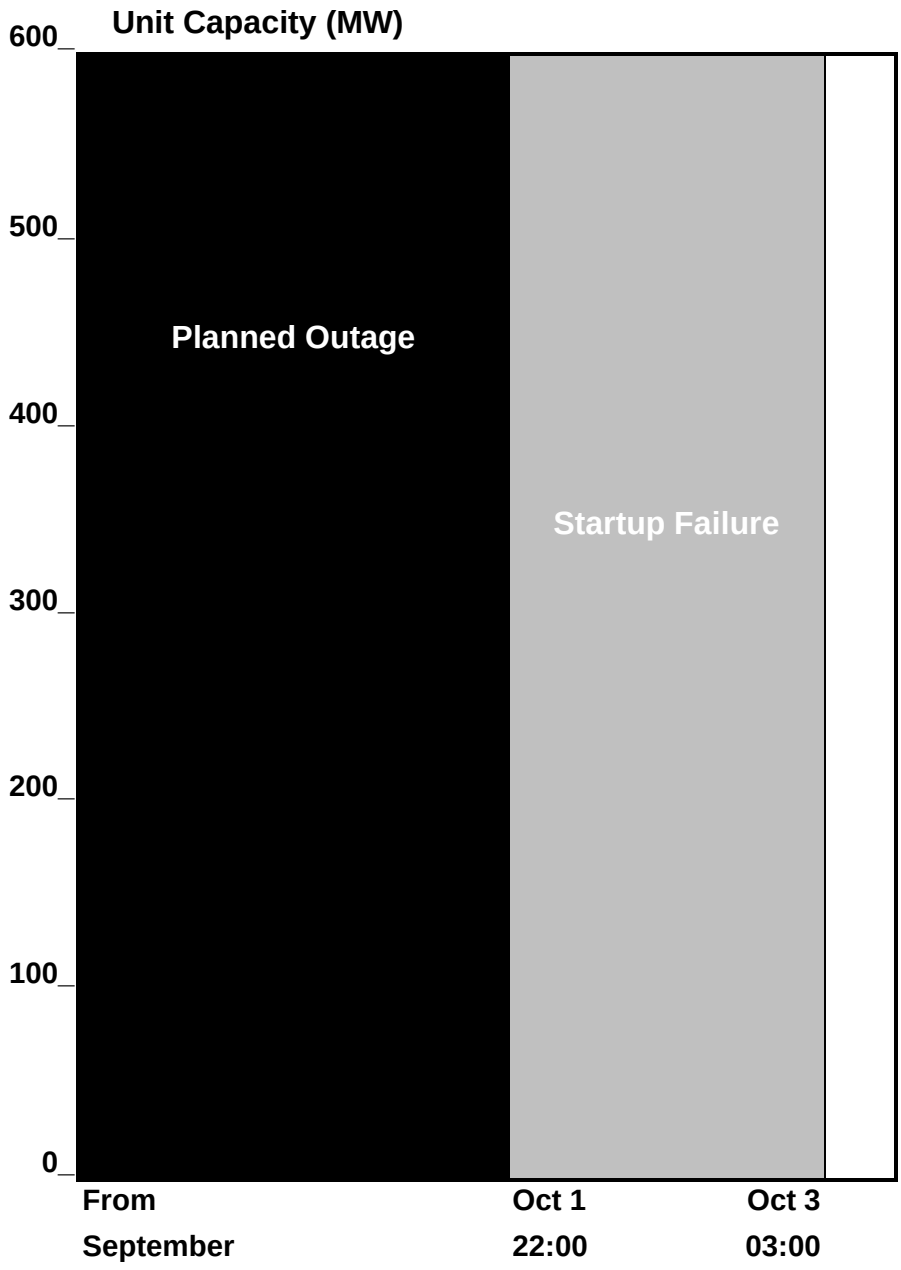


Figure G.11: Startup Failure

Example 8: Fuel Conservation

Description of Events

On June 10 at 8:00 a.m., management decided to operate Riverglenn #1 at 50% capacity – 300 MW – in order to avoid a potential fuel shortage. If system demand increased, Riverglenn would be returned to full load. Because Riverglenn was not limited by equipment, the decision to operate at a reduced load was an economic issue.

On August 25 at 5:00 a.m., the station reported that fuel was in short supply and the unit could no longer reach full load as a result. An unplanned derating began when fuel became a limitation. The Net Available Capacity as a result of the derating was 300 MW.

Riverglenn's fuel supply was exhausted on September 3 at 9:00 p.m. and the unit was forced out of service. A new supply of fuel was delivered on September 4. The unit was restarted and synchronized at 4:00 p.m. on September 6.

Report the following on Records 01, 02, and, 03 of Event Report (07):

Event Number:	0020	
Event Type:	D1	
Start of Event:	August 25 at 05:00	
End of Event:	September 3 at 21:00	
Gross Available Capacity as a Result of Event:	*	
Net Available Capacity as a Result of Event:	300	
Dominant Derating Column	(blank)	Record 01

System/Component Cause Code:	9130	
Time: Work Started:	*	
Time: Work Ended	*	
Man Hours Worked:	*	Records 02/03

Event Number:	0021	
Event Type:	U1	
Start of Event:	September 3 at 21:00	
End of Event:	September 6 at 16:00	
Dominant Derating Column	(blank)	Record 01

System/Component Cause Code:	9130	
Time: Work Started:	*	
Time: Work Ended:	*	
Man Hours Worked:	*	Records 02/03

Effect of Unit Availability

Availability was unaffected until the fuel limitation prevented the unit from returning to full load. When that occurred, unit availability was affected. Equivalent Derated Hours for the derating are 116 ([(600 MW - 300 MW * 232.00 hours)/600] = 116). The outage was responsible for 67.00 unavailable hours.

The situation described typically affects fossil and hydro units. Nuclear units are sometimes operated at reduced levels to "stretch the core" in order to prolong the time to the next refueling. If the reactor core is capable of full load, the decision to operate at a lower level is an economic issue and therefore not reportable to GADS. When

the core can no longer support operation at full load, a planned derating (PD) is reported. This condition is sometimes referred to as "coasting down." The magnitude of these deratings usually increase incrementally and should be reported as a series of PD events.

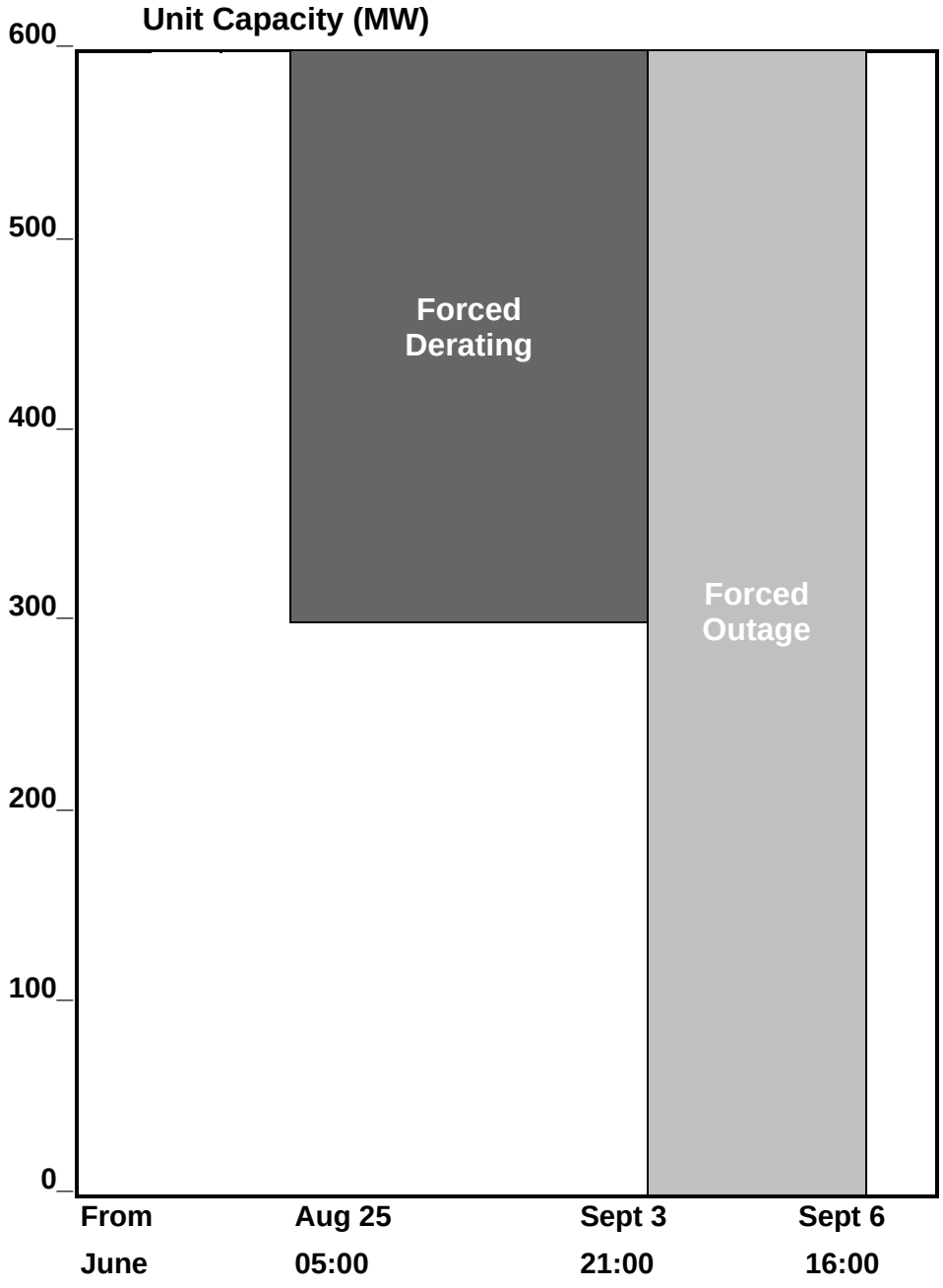


Figure G.12: Fuel Conservation

Example 9: Transitions - U2 to RS to SF

Description of Events

After experiencing several hours of excessive scrubber ID fan vibration, Riverglenn was taken off line for repair on December 3 at 3:30 p.m. After pinpointing the problem, repairs were made. The unit was ready to begin its normal 15-hour startup cycle by 21:30 p.m. on December 5. However, due to low demand, Riverglenn entered the reserve shutdown state. Startup began at 2:30 a.m. the following morning. Several waterwall tubes burst during the startup, requiring immediate repair. The tube problem occurred at 9:00 a.m. on December 6. After repairing the tubes and a successful startup, Riverglenn synchronized on December 9 at 5:00 p.m.

Report the following on Records 01, 02 and 03 of Event Report (07):

Event Number:	0023	
Event Type:	U2	
Start of Event:	December 3 at 15:30	
End of Event:	December 5 at 21:30	
Dominant Derating Column	(blank)	Record 01
System/Component Cause Code:	8262	
Time: Work Started:	December 3 at 16:00	
Time: Work Completed:	December 5 at 06:30	
Man Hours Worked:	72	Records 02/03
Event Number:	0024	
Event Type:	RS **	
Start of Event:	December 5 at 21:30	
End of Event:	December 6 at 09:00	
Dominant Derating Column	(blank)	Record 01
Event Number:	0025	
Event Type:	SF	
Start of Event:	December 6 at 09:00	
End of Event:	December 9 at 17:00	
Dominant Derating Column	(blank)	Record 01
System/Component Cause Code:	1000	
Time: Work Started:	*	
Time: Work Completed:	*	
Event Contribution Code:	1	Records 02/03

Effect on Unit Availability

In this sequence of events — U2 to RS to SF — Riverglenn's availability is affected for 54.00 actual hours due to ID fan problems and 80.00 actual hours due to the water wall tube failure.

Component Repair

The scrubber ID fan is charged with 38.50 repair hours, and the water wall tubes with 80.00 repair hours.

*** Reporting a primary cause of event for Reserve Shutdowns is optional. In this example, Records 02/03 were omitted.*

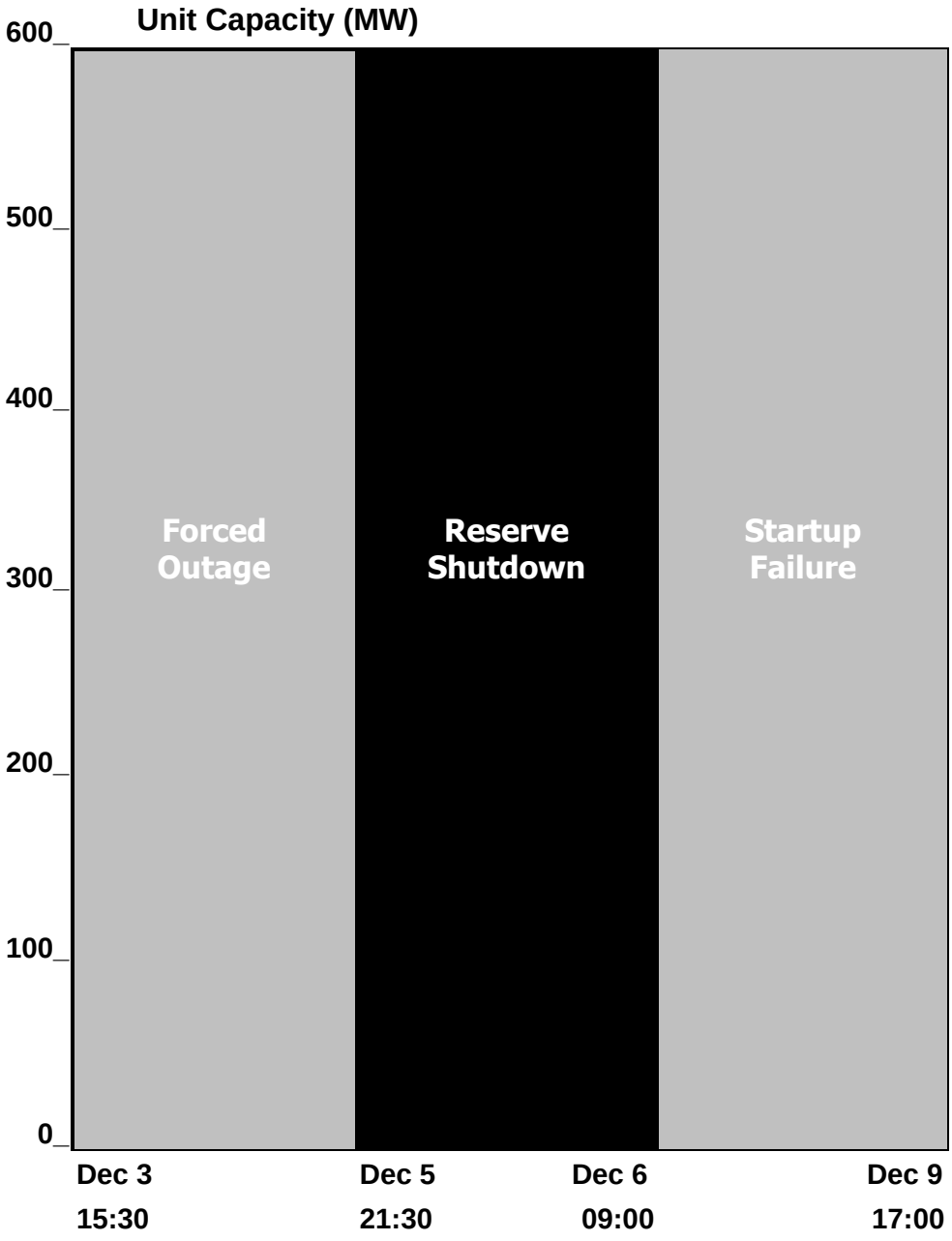


Figure G.13: Event Transitions
U2 to RS to SF

Appendix H: Failure Mechanism Codes

GADS	
Codes	**Description**
F010	Alignment/clearance not within limits – axial
F020	Alignment/clearance not within limits – radial
F030	Arced/flashover – electrical
F040	Balance, not within limits
F050	Binding – radial related contacts (use F670 if contact is in axial direction)
F060	Broken
F070	Burned/fire damage – initiated by component (ex. burned motor)
F080	Burned/fire damage – not initiated by component (ex. pump fire damage due to motor fire)
F090	Calibration, not within limits
F100	Carbon, covered
F110	Chemical excursion damage
F120	Clogged
F130	Closed
F140	Condensation – oil
F150	Condensation – water
F160	Connection, loose
F170	Contaminated – liquid fluids (use F320 for air contamination)
F180	Contaminated – metals and solids
F190	Cooling, inadequate – liquid
F200	Cooling, inadequate – air
F210	Corrosion – general
F220	Corrosion – caustic
F230	Corrosion – fatigue
F240	Corrosion – high temperature coal ash
F250	Corrosion – high temperature oil ash
F260	Corrosion – low temperature
F270	Corrosion – waterwall fire-side
F280	Cracked
F290	Creep, high temperature
F300	Damaged, foreign object
F310	Damaged, insulation
F320	Dirty (use for air contamination or particulate/dirt buildup)
F330	Disengage, failed to
F340	Engage, failed to
F350	Erosion – coal particle
F360	Erosion – falling slag
F370	Erosion – soot blower
F380	Erosion – fly ash
F390	Erosion – cause unknown
F400	Erratic or unexplained operating behavior
F410	Erratic, circuit
F420	Error, operator
F430	Error, wiring
F440	Explosion damage – initiated by the component (ex. pump explosion)
F450	Explosion damage – not initiated by the component (ex. pipe damage due to pump explosion)

GADS	
Codes	**Description**
F460	Flameout
F470	Foaming
F480	Frozen (temperature related)
F490	Grounded electrical component
F500	Hydrogen damage
F510	Impact damage
F520	Indication, false
F530	Inspection
F540	Leaks
F550	Loose
F560	Lubrication – excessive
F570	Lubrication – lack of
F580	Maintenance – cleaning damage
F590	Maintenance – general
F600	Material defects
F610	Modification(s)
F620	Noisy
F630	Open
F640	Overload
F650	Pitting (localized corrosion)
F660	Pressure, not within limits
F670	Rubbing damage – axial related contacts (use F050 if contact is in radial direction)
F680	Secondary damage
F690	Seized (not moving)
F700	Shorted electrical component
F710	Short-term overheating
F720	Sticking
F730	Stress corrosion cracking
F740	Temperature – compressor discharge, not within limits
F750	Temperature – exhaust, not within limits
F760	Temperature – oil, not within limits
F770	Temperature – wheel spacers, not within limits
F780	Temperature – general, not within limits
F790	Testing
F800	Thermal fatigue
F810	Torn
F820	Tripped/shutdown component – automatic controls
F830	Tripped/shutdown component – manual
F840	Unknown – investigation underway (change this code once failure mechanism is determined)
F850	Vibration, not within limits
F860	Vibration fatigue, leading to failure
F870	Voltage, not within limits
F880	Welded relay contacts
F890	Weld failure – broken weld
F900	Weld failure – dissimilar metals
F910	Weld failure – weld defects
F920	Wiped

GADS	
Codes	**Description**
F930	Worn, excessively
FA00	Silica restriction
FC00	Cleaning
FD00	Water Induction
FE00	Emission/environmental restrictions
FF00	Fouling
FP00	Personnel error
FR00	Fire
FS00	Slagging
FU00	Parts Unavailable
FV00	Vibration
FW00	Wet coal/frozen coal/debris
FX00	External equipment malfunction (outside plant management control)

Appendix I: GADS Data Release Guidelines

Data Release Guidelines

Unless expressly permitted in the following sections, or section 1500 of the NERC Rules of Procedure data by power generator, pool, Region, or specific unit will be provided only with the authorization of the appropriate power generator, pool, or Region. ("Power generators" are any owners or operators of electric generating units owned/operated by investor-owned, independent power producer (IPP), municipals, cooperative, federal, state, and all other groups of electric providers.) Special reports or studies which describe or rank power generators, pools, or regions by performance or other attributes – and in which specific units, power generators, pools, or regions are identifiable either by inclusion or exclusion – will be provided only with the authorization of the appropriate power generators, pools, or regions. Obtaining these approvals is the responsibility of the requester.

Appendix J: Cause Code Amplification Codes

The purpose of the amplification code is to further identify the cause of an outage by describing the failure mode. The amplification code is two alpha-numeric characters following the cause code (see Page III-25). Failure modes are leaks, corrosion, personnel error, fire, etc. They are almost identical to the GADS Failure Mechanism Codes (see *Appendix H*) except the Cause Code Amplification Code is just two-characters. Some existing cause codes contain these amplification codes as part of their description. The Cause Code Amplification Code allows all cause codes to be described with the set of failure modes without increasing the number of cause codes. It will also allow analysts to further explore the common causes of outages.

There are a few cases where the amplification code is limited to specific event types or conditions. The table below captures the specific limits. "None" means that the amplification codes can be used with any event types.

GADS Amplification Code	Description	Event Type Limits
01	Alignment/clearance not within limits – axial	None
02	Alignment/clearance not within limits – radial	None
03	Arced/flashover – electrical	None
04	Balance, not within limits	None
05	Binding – radial related contacts (use F670 if contact is in axial direction)	None
06	Broken	None
07	Burned/fire damage – initiated by component (ex. burned motor)	None
08	Burned/fire damage – not initiated by component (ex. pump fire damage due to motor fire)	None
09	Calibration, not within limits	None
10	Carbon, covered	None
11	Chemical excursion damage	None
C0	Cleaning	None
12	Clogged	None
13	Closed	None
14	Condensation - oil	None
15	Condensation - water	None
16	Connection, loose	None
17	Contaminated – liquid fluids (use F320 for air contamination)	None
18	Contaminated – metals and solids	None
20	Cooling, inadequate – air	None
19	Cooling, inadequate – liquid	None
22	Corrosion – caustic	None
23	Corrosion – fatigue	None
21	Corrosion – general	None
24	Corrosion – high temperature coal ash	None
25	Corrosion – high temperature oil ash	None
26	Corrosion – low temperature	None
27	Corrosion – waterwall fire-side	None
28	Cracked	None

GADS Amplification Code	Description	Event Type Limits
29	Creep, high temperature	None
30	Damaged, foreign object	None
31	Damaged, insulation	None
32	Dirty (use for air contamination or particulate/dirt buildup)	None
33	Disengage, failed to	None
E0	Emission/Environmental Restriction	None
34	Engage, failed to	None
35	Erosion – coal particle	None
36	Erosion – falling slag	None
38	Erosion – fly ash	None
37	Erosion – soot blower	None
39	Erosion – cause unknown	None
40	Erratic or unexplained operating behavior	None
41	Erratic, circuit	None
42	Error, operator	None
43	Error, wiring	None
44	Explosion damage – initiated by the component (ex. pump explosion)	None
45	Explosion damage – not initiated by the component (ex. pipe damage due to pump explosion)	None
X0	External equipment malfunction (outside plant management control)	None
R0	Fire	None
46	Flameout	None
47	Foaming	None
F0	Fouling	None
48	Frozen (temperature related)	None
FR	Fuel related	None
49	Grounded electrical component	None
50	Hydrogen damage	None
51	Impact damage	None
52	Indication, false	None
53	Inspection	None
54	Leaks	None
55	Loose	None
56	Lubrication – excessive	None
57	Lubrication – lack of	None
58	Maintenance – cleaning damage	None
59	Maintenance – general	None
60	Material defects	None
61	Modification(s)	None
62	Noisy	None
NF	No Fuel	None
63	Open	None

GADS Amplification Code	Description	Event Type Limits
WC	Water Condition – Run of River	Hydro only
64	Overload	None
U0	Parts unavailable	None
P0	Personnel error	None
65	Pitting (localized corrosion)	None
66	Pressure, not within limits	None
67	Rubbing damage – axial related contacts (use F050 if contact is in radial direction)	None
68	Secondary damage	None
69	Seized (not moving)	None
71	Short-term overheating	None
70	Shorted electrical component	None
A0	Silica restriction	None
S0	Slagging	None
ST	Steam transfer	None
72	Sticking	None
73	Stress corrosion cracking	None
H0	Temperature – high, not within limits	None
74	Temperature – compressor discharge, not within limits	None
75	Temperature – exhaust, not within limits	None
78	Temperature – general, not within limits	None
76	Temperature – oil, not within limits	None
77	Temperature – wheel spacers, not within limits	None
79	Testing	None
80	Thermal fatigue	None
81	Torn	None
82	Tripped/shutdown component – automatic	Deratings only
83	Tripped/shutdown component – manual	Deratings only
T1	Tripped/shutdown grid separation – automatic	In-service U1 outage only
T2	Tripped/shutdown grid separation – manual	In-service U1 outage only
84	Unknown – investigation underway (change this code once failure mechanism is determined)	In-service U1 outage only
V0	Vibration (other)	None
86	Vibration fatigue, leading to failure	None
85	Vibration, not within limits	None
87	Voltage, not within limits	None
D0	Water induction	None
89	Weld failure – broken weld	None
90	Weld failure – dissimilar metals	None
91	Weld failure – weld defects	None
88	Welded relay contacts	None
W0	Wet coal/frozen coal/debris	None
92	Wiped	None
93	Worn, excessively	None

Appendix K: Outside Management Control

Following this introduction of Outside Management Control (OMC) guidelines, we have listed those cause codes that GADS recognizes as being outside plant management control. At the end of this Appendix are guidelines for removing OMC events from standard calculations. Annex D of IEEE 762, quoted below, sets the standard for defining and handling OMC events. For more comments on OMC events, please refer to Section I-2 and III-13 of these GADS Data Reporting Instructions.

Annex D: Outside of Plant Management Control
The electric industry in Europe and other parts of the world has made a change to examine losses of generation caused by problems with and outside plant management control. After reviewing the work used by others, the following is provided as guidelines for determining what is and is not outside plant management control:

There are a number of outage causes that may prevent the energy coming from a power generating plant from reaching the customer. Some causes are due to the plant operation and equipment while others are outside plant management control.

The standard sets a boundary on the generator side of the power station (see Figure K-1, below) for the determination of equipment "outside management control".

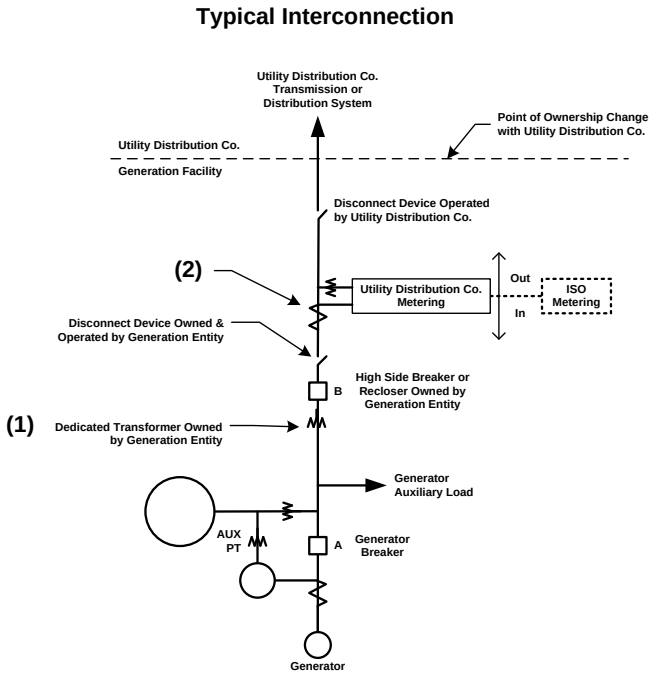


Figure K.1: The Physical Boundary of Outside Management Control

As shown in Figure K.1, a generating unit includes all equipment up to (in preferred order) (1) the high-voltage terminals of the generator step-up (GSU) transformer and the station service transformers; (2) the GSU transformer (load) side of the generator-voltage circuit breakers; or (3) at such equipment boundary as may be reasonable considering the design and configuration of the generating unit.

It may be assumed that all problems within the power station boundary are within plant management control; however that is not always the case. Therefore, there is a need for some additional clarification as to what is and what is not under plant management control.

It is easier to identify those actions outside plant management control than to identify the responsibilities of plant management. Therefore, the following are considered to be outside (external) of plant management control. All other items are considered within their jurisdiction and are the responsibility of the plant management for calculating power plant performance and statistics.

- Energy losses due to the following causes should not be considered when computing the unit controllable performance because these losses are not considered to be under the control of plant management:
- Grid connection or substation failure. This reason relates to problems with transmission lines and switchyard equipment outside the boundaries of the plant as specified by the "boundary of plant responsibility" shown in Figure K-1 on this Annex.
- Acts of nature such as ice storms, tornados, winds, lightning, etc are not under plant management control, whether inside or outside the plant boundary.
- Terrorist attacks on the generating/transmission facilities or transmission operating/repair errors are not under plant management control.
- Special environmental limitations such as low cooling pond level, or water intake restrictions that could not be prevented by operator action. These are acts of nature such as high ambient temperatures where the equipment is working within design specifications. However, if the equipment is not maintained by the plant such as opacity out of limits or NOx out of control, etc, then plant management should be penalized. These are equipment problems and are within plant management control.
- (9130) Failure of fuel supplier to fulfill contractual obligations or a pre-arranged deal due to physical fuel disruptions or operational impairments (e.g. force majeure on a pipeline or compressor down; making the pipeline incapable of making its firm deliveries.)

  This cause code is considered outside of management control. Examples of this would include:

  Firm pipeline gas transportation segment interrupted causing disruption or reduction in the flow of natural gas

  Physical damage to pipeline or cyber disruption

  Routine pipeline maintenance (e.g. pigging)

  Commodity supplier fails to deliver firm gas to primary pipeline receipt point

  (9131) Lack of fuel – due to contractual or tariff provisions that allow for service interruption or price fluctuations during peak demand periods.

  This cause code is not considered outside of management control. Examples of this would include:

  Company's fuel supply group allocates limited firm fuel to other fleet sites

  Interruptible pipeline transportation interrupted

  Pipeline issues Operational Flow Order

  Pipeline enforces ratable takes provision to tariff levels

  LDC confiscates or interrupts fuel scheduled for delivery to plant gate

  Plant fuel buyer rejects gas at implied delivered price (possibly including penalties)
- Labor strikes. Outages or load reductions caused by labor strikes are not normally under the direct control of plant management. These strikes may be company-wide problems or strikes outside the company's jurisdiction such as manufacturers (delaying repairs) or transportation (fuel supply) problems.

However, direct plant management grievances that result in a walkout or strike are under plant management control and are included as penalties against the plant. If a labor strike is caused by plant management/worker problems during an outage, any outage extensions are included as energy losses as long as the unit is incapable of being restarted because of equipment failures, maintenance, overhauls, or other activities.

- Other weather related problems such as seasonal variations in gross dependable capacity due to cooling water temperature variations are not within plant management control.

GADS Cause Codes Outside Plant Management Control

(As of January 1, 2021)

3600	Switchyard transformers and associated cooling systems - external (OMC)
3611	Switchyard circuit breakers - external (OMC)
3612	Switchyard system protection devices - external (OMC)
3619	Other switchyard equipment - external (OMC)
3710	Transmission line (connected to powerhouse switchyard to 1st Substation)
3720	Transmission equipment at the 1st substation (see code 9300 if applicable)
3730	Transmission equipment beyond the 1st substation (see code 9300 if applicable)
9000	Flood
9001	Drought
9010	Fire including wildfires, not related to a specific component
9015	Pandemic
9020	Lightning
9025	Geomagnetic disturbance
9030	Earthquake
9031	Tornado
9035	Hurricane
9036	Storms (ice, snow, etc)
9040	Other catastrophe
9091	Physical Security Incident
9093	Cyber Security Incident
9130	Failure of fuel supplier to fulfill contractual obligations or a pre-arranged deal due to physical fuel disruptions or operational impairments (e.g. force majeure on a pipeline or compressor down; making the pipeline incapable of making its firm deliveries.)
9132	Wet fuel – Biomass (OMC)
9135	Lack of water (hydro)
9138	High Water Level in Tailrace (too much water)
9139	Ground water or other water supply problems (OMC)
9150	Labor strikes company-wide problems or strikes outside the company's jurisdiction such as manufacturers (delaying repairs) or transportation (fuel supply) problems.
9200	High ash content (OMC)
9210	Low grindability (OMC)
9220	High sulfur content (OMC)
9230	High vanadium content (OMC)
9240	High sodium content (OMC)
9250	Low BTU coal (OMC)
9260	Low BTU oil (OMC)
9270	Wet coal (OMC)
9280	Frozen coal (OMC)

9290	Other fuel quality problems (OMC)
9300	Transmission system problems other than catastrophes (do not include switchyard problems in this category; see codes 3600 to 3629, 3720 to 3730)
9320	Other miscellaneous external problems
9500	Regulatory (nuclear) proceedings and hearings - regulatory agency initiated
9502	Regulatory (nuclear) proceedings and hearings - intervenor initiated
9504	Regulatory (environmental) proceedings and hearings - regulatory agency initiated
9506	Regulatory (environmental) proceedings and hearings - intervenor initiated
9510	Plant modifications strictly for compliance with new or changed regulatory requirements (scrubbers, cooling towers, etc.)
9520	Oil spill in Gulf of Mexico (OMC)
9590	Miscellaneous regulatory (this code is primarily intended for use with event contribution code 2 to indicate that a regulatory-related factor contributed to the primary cause of the event)

Policy on Handling Outside Management Control (OMC) Events and their Equations in GADS

(As of December 9, 2004)

Background

The IEEE 762 "Definitions for Reporting Electric Generating Unit Reliability, Availability and Productivity" (Annex D) is the basis for the OMC work. In part, Annex D states that:

> *"There are a number of outage causes that may prevent the energy coming from a power generating plant from reaching the customer. Some causes are due to the plant operation and equipment while others are outside plant management control."*

This Appendix K lists a number of cause codes that is universally accepted as those outside the control of management by the GADS program. It also identifies certain conditions under which those specific cause codes would be applied. The list may change with time and some additional clarifications may be added.

The list of cause codes shown hereafter should be reviewed from time to time to insure the latest cause codes are used in the OMC equations.

It is also VERY important that all cause codes (including all OMC cause codes) be reported to GADS. Some companies may wish to exclude a forced outage or change it to a non-curtailing event if it fits into the OMC category. THAT IS NOT RIGHT! The event should be reported as a forced outage and the OMC calculations will show the events without the FO.

Handling OMC Events

OMC events will come in two forms: outages or deratings. The OMC event types can be either forced, maintenance or planned but it is expected that the majority will be forced outage events.

For all existing GADS equation calculations, the OMC events will be treated as a standard event, i.e., a forced outage, forced derate, etc. The calculation will not change and will follow the calculations shown in Appendix F of the GADS DRI.

In calculating equations without OMC events, it is important to remember that the objective of the removal of OMC events is to affect the availability of the unit. To that end, we handle outages differently than derates. In

removing a particular event from a unit's event records we are faced with the question of what to put in place of the missing event. In the case of an outage, there is no sure way of knowing in what state a unit should be considered. The only sure thing is our objective of returning those hours to an available state. That is exactly what we do and that is all we do. Assuming that the unit is in reserve or in service during the time of the removed OMC outage event, and so, adding to either service or reserve hours presents a fictional summary of the unit's performance. In viewing the available hours we temporarily recalculate AH as (Service + Reserve + Synchronous Condensing + Pumping + OMC).

In the case of a derating event, however, we know for certain the state of the unit at the time of the removed event. Whenever an event is removed it is necessary to look for any derating events that may have been shadowed by or overlapping the removed event. Those overlapping hours must be accounted for by the software processing the OMC event. It isn't enough to simply recalculate Equivalent Availability by adding the sum of the removed OMC events because we need to now take into account the effect of the newly uncovered (un-overlapped) derating events.

Before we begin defining the methods there is an important assumption that needs to be made as to the processing of the data. Since the removal of the OMC outage event is seen as an adjustment, we'll assume that outage events have been processed as normal and that OMC removal is acting on clean data and that performance totals have already been summed for the unit. Also, in the case of derate events, that loss attributed to an event has been calculated particularly in the case of overlapping and shadowed events.

OMC Process Methods by Event Type

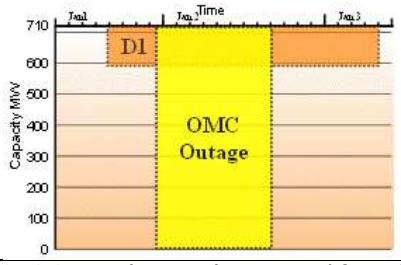
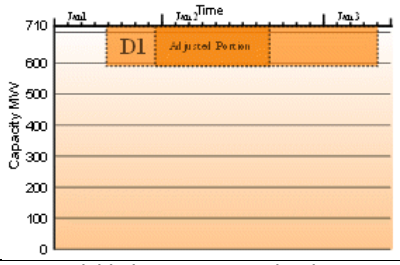
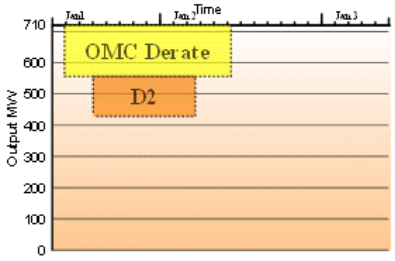
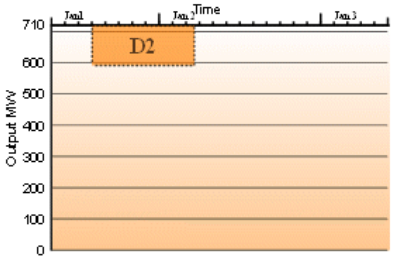
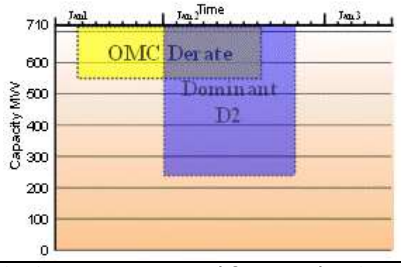
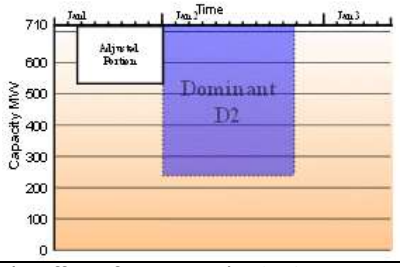
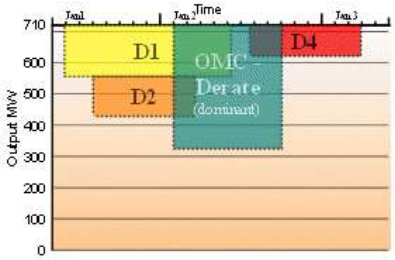
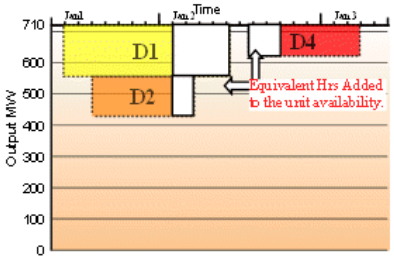
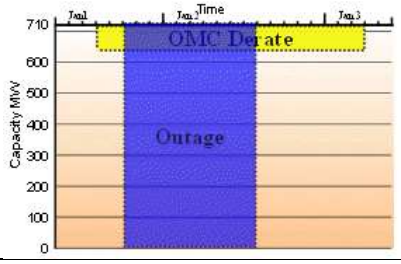
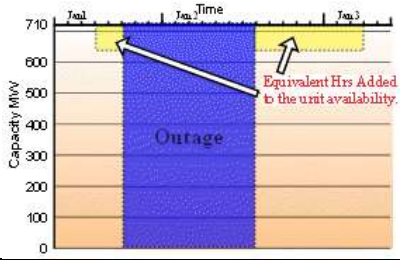
1. **Outage Events** – In simple terms, when an OMC outage event is encountered, the total associated hours would be reduced as well as the number of occurrences. In order to help keep our numbers in balance, we'll add these hours to an OMC Hours category. Notice that in each example below we are increasing available hours and not service hours even though we are reducing outage hours.
    a. **Forced Outage** – Regardless of whether it is a U1, U2, U3 or SF, removing an OMC_FO event would cause a decrease in Forced Outage hours and Forced Outage Occurrences and an increase in Available Hours.
    b. **Planned Outage** – Removing an OMC_PO event would cause a decrease in Planned Outage hours and Planned Outage Occurrences and an increase in Available Hours.
    c. **Maintenance Outage** – Removing an OMC_MO event would cause a decrease in Maintenance Outage hours and Maintenance Outage Occurrences and an increase in Available Hours.
    d. **Derate Event shadowed by an OMC outage** – If the removed OMC outage event shadows a derating event, the equivalent hours shadowed by the outage needs to be added into the equivalent outage hours so that it can be reflected in the equivalent availability.
2. **Derate Events** – In removing OMC derate events, it is important to keep in mind that the loss of capacity (a.k.a. reduction) originally calculated and attributed to an event is maintained when the OMC event is removed. The removal of the OMC event then properly affects the available capacity of the unit rather than increasing the losses attributed to the surrounding / overlapping derating events. Illustrations are included below in order to aid the explanations.
    a. **A simple OMC derate** – When there are no overlapping derating events, the equivalent hours of the OMC event can be removed from the total equivalent hours and the associated event occurrences can also be reduced by 1. The number of derate hours also is reduced by the duration of the event.
    b. **An OMC derate event overlapped by another derate** – If an OMC event is removed and there is another overlapping derate event, the OMC is removed and totals are adjusted just as in case 'a'

above. The NAC of the unit at the start of the overlapping event is increased, but the loss attributed to that event remains constant. (Normal derate events are considered loss-constant throughout their duration)

c. **OMC derate event which is shadowed by a dominant derate** – In this case, the overlapping derate is dominant and so, is considered to be capacity-constant. This means that removing the OMC event has no effect on the available capacity within the dominant overlapping derate. The adjustment to the unit performance stats would be limited to the duration and equivalent hours of that portion of the OMC event that exists outside the dominant derate.

d. **A dominant OMC derate overlaps another derate** – When the OMC derate event is marked as dominant, multiple adjustments may be necessary. The first adjustment is to take care of the total duration and equivalent hours of the OMC derate event. Once the OMC derate event affect is removed, the overlapped derate event(s) need to be accounted for by adding those portions of the event(s) that were overlapped by the OMC event to the equivalent hours total as well as any total durations. The number of derate event occurrences would not need to be adjusted.

e. **OMC derate event is shadowed by an outage** – Since an outage effectively truncates the derate event, only the portion of the OMC derate that extends outside the overlapping outage needs to be accounted for and removed.

Example#	Before OMC event removal	After OMC event removal
1-d - Derate Event shadowed by an OMC outage		
	OMC Outage (any type) is removed from shadowed derate.	Unit available hours increase by the outage duration. Equivalent hours are adjusted upward by the overlapped portion when derate D1 is now accounted for at its actual value.
2-b - An OMC derate event overlapped by another derate		
	OMC Derate is removed from above D2	Loss attributed to D2 remains unchanged. NAC of the unit increases
2-c - OMC derate event which is wholly or partially shadowed by a dominant derate		
	OMC Derate is removed from inside D2	The effect of removing the OMC event is to increase availability by the portions which extend beyond the dominant derate.
2-d – Dominant OMC derate overlaps other derates		
	Dominant OMC Derate is removed.	Events D1, D2 and D4 are extended and totalled at their original values.
2-e - OMC derate event is shadowed by an outage		
	OMC Derate is removed from being shadowed by an outage (any type)	The effect of removing the OMC event is to increase availability by the portions which extend beyond the outage.

New OMC Equations

Please note that all equations that include OMC events be calculated in the same methods and have the same names as that in IEEE 762 and Appendix F of the GADS DRI. In other words, those equations will not change at all but will be the benchmark as to what the unit was able to provide under all circumstances.

Please note also that any equation that excludes OMC events be calculated in the same methods as that in IEEE 762 and Appendix F of the GADS DRI but the names are modified to show they exclude OMC events. These equations will be used against the benchmark calculations to show what the unit *could* have done without OMC events. Both numbers will be provided by GADS and either number can be used based on the needs and the reports.

Equations 95-141 in Appendix F are for calculating the performance statistics without OMC events. Please note that they are the same as the equations for calculating the performance statistics with OMC events except that their names have an "X" in front of them.

Table K-1 below shows how the event based performance statistics can be affected by excluding OMC events. Two statistics, Starting Reliability (SR) and Seasonal Derating Factor (SEDF), do not have without OMC definitions. XSR is not defined because IEEE 762 does not adjust the actual/attempted starts when OMC events are removed, and although SEDF is based on available hours (AH), a without OMC version is not defined by NERC. Service Factor (SF) is not affected because it is only based on service hours (SH), which are not affected by removing OMC events. Because only AH is adjusted when excluding OMC events the performance statistics do, on rare occasions, exceed 100%. That is inherent with the concept of OMC events because the objective of their removal is to affect the availability of the unit and nothing else.

Table K.1: Comparison of OMC Affect on Performance Statistics in Appendix F

DESCRIPTION	CALC No.	NAME w/ OMC	CALC No.	NAME w/o OMC	AFFECTED BY OMC?	NUMERATOR FORMULA	DENOMINATOR FORMULA
Starting Reliability	62	SR	**	n/a	FALSE *	ACTSU	ATTSU
Forced Outage Factor	3	FOF	97	XFOF	TRUE	FOH	PH
Maintenance Outage Factor	4	MOF	98	XMOF	TRUE	MOH	PH
Planned Outage Factor	1	POF	95	XPOF	TRUE	POH	PH
Unplanned Outage Factor	2	UOF	96	XUOF	TRUE	FOH + MOH	PH
Scheduled Outage Factor	5	SOF	99	XSOF	TRUE	POH + MOH	PH
Unavailability Factor	6	UF	100	XUF	TRUE	FOH + MOH + POH	PH
Availability Factor	7	AF	101	XAF	TRUE	PH - FOH - MOH - POH	PH

Table K.1: Comparison of OMC Affect on Performance Statistics in Appendix F							
DESCRIPTION	CALC No.	NAME w/ OMC	CALC No.	NAME w/o OMC	AFFECTED BY OMC?	NUMERATOR FORMULA	DENOMINATOR FORMULA
Service Factor	8	SF	102	XSF	FALSE ***	SH	PH
Seasonal Derating Factor	9	SEDF	**	n/a	TRUE	ESEDH	PH
Unit Derating Factor	10	UDF	103	XUDF	TRUE	EFDH + EMDH + EPDH	PH
Equivalent Unavailability Factor	11	EUF	104	XEUF	TRUE	POH + MOH + FOH + EFDH + EMDH + EPDH	PH
Equivalent Availability Factor	12	EAF	105	XEAF	TRUE	PH - FOH - MOH - POH - EFDH - EMDH - EPDH - ESEDH	PH
Equivalent Maintenance Outage Factor	17	EMOF	106	XEMOF	TRUE	MOH + EMDH	PH
Equivalent Planned Outage Factor	18	EPOF	107	XEPOF	TRUE	POH + EPDH	PH
Equivalent Forced Outage Factor	19	EFOF	108	XEFOF	TRUE	FOH + EFDH	PH
Equivalent Scheduled Outage Factor	20	ESOF	109	XESOF	TRUE	MOH + POH + EMDH + EPDH	PH
Equivalent Unplanned Outage Factor	21	EUOF	110	XEUOF	TRUE	MOH + FOH + EFDH + EMDH	PH
Forced Outage Rate	22	FOR	111	XFOR	TRUE	FOH	FOH + SH + SYNCHRS + PUMPHRS
Forced Outage Rate demand	23	FORd	112	XFORd	TRUE	f*FOH	SH + SYNC + f*FOH
Equivalent Forced Outage Rate	24	EFOR	113	XEFOR	TRUE	FOH + EFDH	FOH + SH + SYNCHRS + PUMPHRS + EFDHRS
Equivalent Forced	25	EFORd	114	XEFORd	TRUE	f*FOH + p*EFDH	SH + SYNC + f*FOH

Table K.1: Comparison of OMC Affect on Performance Statistics in Appendix F							
DESCRIPTION	CALC No.	NAME w/ OMC	CALC No.	NAME w/o OMC	AFFECTED BY OMC?	NUMERATOR FORMULA	DENOMINATOR FORMULA
Outage Rate demand							
Equivalent Planned Outage Rate	26	EPOR	115	XEPOR	TRUE	POH + EPDH	POH + SH + SYNCHRS + PUMPHRS + EPDHRS
Equivalent Maintenance Outage Rate	27	EMOR	116	XEMOR	TRUE	MOH + EMDH	MOH + SH + SYNCHRS + PUMPHRS + EMDHRS
Equivalent Unplanned Outage Rate	28	EUOR	117	XEUOR	TRUE	MOH + FOH + EFDH + EMDH	FOH + MOH + SH + SYNCHRS + PUMPHRS + EFDHRS + EMDHRS
Notes: * IEEE 762 does not recommend adjusting actual/attempted starts when removing OMC events. ** Not defined by NERC. * SH is not affected by OMC events; only AH is affected.**							

Appendix L1: Calculating Combined Cycle and Co-Generation Block Data Using the Synthesis Event and Performance Method

Overview

This document will explain the synthesis method for collecting combined-cycle data on a unit-level basis and creating combined-cycle block statistics from the unit-level event and performance information.

This document applies only to reporters who wish to report event and performance data for each generating unit individually. This document does not apply to reporters wishing to continue reporting combined-cycle data to GADS as a 'single unit' (or traditional method). GADS will still accept the traditional method but it is not favored over the reporting of each generating unit within the block.

***Please Note**: The majority of this document is the same as the fleet-type roll up method. The basic data gathering process on a unit-level basis is **identical** in all respects. The differences are in creating block statistics from the unit level data.*

IEEE 762 does not address reporting separate units and bringing the components together to create combined-cycle block statistics. Therefore, this document establishes a NERC methodology for creating new combined-cycle block event and performance records based on reported unit level event and performance records.

Terms

To insure proper documentation, some terms must be agreed on to eliminate some of the ambiguity concerning combined-cycle blocks in general.

Combined-Cycle Block (also known in the industry as a "Block") – By definition, a combined cycle is a process for generating energy (either electricity or steam) constituted by the marriage of a Brayton Cycle (expand hot gas to turn a gas turbine) with a Rankine Cycle (use heat to boil water to make steam to turn a steam turbine). A combined-cycle block employs electric generating technology in which electricity and process steam is produced from otherwise lost waste heat exiting from one or more combustion turbines. In most situations, the exiting waste heat is routed to a conventional boiler or to a heat recovery steam generator (HRSG) for use by a steam turbine in the production of electricity. Therefore, the combined-cycle block consists of one or more gas turbines/jet engines, one or more steam turbines, and balance-of-plant equipment supporting the production of electricity or steam energy.

There may be more than one combined-cycle block at a plant site. Our discussion relates to each individual combined-cycle block reporting, not the process of reporting several combined-cycle blocks as one plant site.

Units – Each generator set is considered a "unit." Typically in combined cycle, each gas turbine or jet engine and each steam turbine are considered a "unit." Each unit contributes to the total electric generation of the combined-cycle block.

Heat Recovery Steam Generator (HRSG) – There may be one or more HRSG or waste heat boilers in a combined-cycle block. Some units may have a single HRSG per GT/jet engine; others may have several GT/jet engines feeding a single HRSG. The HRSG does not contribute electricity to the output of the combined-cycle block and so, is considered a component rather than a unit.

Other Balance of Plant Equipment – These are the other pieces of equipment in the combined-cycle block used to support the production of electricity. They are not related to any specific part of the block and are also considered as components.

Combined-Cycle Block/Unit Numbering

The combined-cycle block and unit numbering system is straightforward and follows the usual guidelines. The combined-cycle block is identified by the range 800-899 and will be used to relate the individual units to the block level. The gas turbine/jet engine units will be numbered from 300-399 or 700-799. The steam turbine units will be numbered as Fossil Steam Turbines in the range of 100-199.

Impact on Design Data

It will be necessary for each generating company to provide new and/or additional design data for the combined-cycle blocks that it is submitting GADS data on to NERC. This new design data will allow NERC to identify the specific units that make up each combined-cycle block for the purposes of creating synthesized calculations of the unit level data that is submitted to NERC.

Units - The design data is reported as though each unit were a separate generator, this meaning that each unit would have its own unit number and design data as described in the NERC guidelines for each unit type. In addition to this, the unit would be marked as being part of a combined-cycle block by a field that would hold the Identifying 800 series unit code of the combined-cycle block.

Combined-Cycle Block – Balance of plant and other equipment not directly related to each unit is coded as described for the combined-cycle block.

Cause Codes

Since each unit of the combined-cycle block can affect the generation of the other units, it is possible to have a situation where a derate in a gas turbine or jet engine may have a steam turbine cause code. (See Example 2 below.) In other words, the cause codes for all units will be open to all task-force-approved cause codes for all units within the combined-cycle blocks.

Reporting Event Records

Report events on the unit level only. DO NOT REPORT COMBINED-CYCLE BLOCK EVENTS TO NERC! Since the design data links the units together with the combined-cycle block, the event records of the unit's data will be used to create event records of the combined-cycle block. The unit-level event data will be used by NERC to synthesize block-level data for use in calculating traditional industry statistics. All the normal methods/rules would apply with the exception of cause codes crossing over between dissimilar unit types.

Reporting Performance Records

Report performance records on a unit basis only. DO NOT REPORT COMBINED-CYCLE BLOCK PERFORMANCE RECORDS TO NERC! Since the design data links the units together to the combined-cycle block, the performance records of the individual units will be used by NERC to calculate traditional industry statistics using the synthesis method. The general procedure for combining unit performance records to form a combined-cycle block record will be explained later in this document.

Therefore, if you operate a combined-cycle block with two gas turbines and one steam turbine, you will report 36 performance records annually – one set of 12 performance records for each gas turbine unit and one set of 12 performance records for the steam turbine unit.

Effects on pc-GAR Peer Groups

Reporting the data on the units of a combined-cycle block allows those units to become part of other peer groups. In pc-GAR, the following options could be given when the peer group is created.

- Include units – ex: Create a gas turbine peer group that includes gas turbines in simple-cycle operation with those in combined-cycle blocks.
- Include units only – ex: view gas turbine units in combined-cycle blocks operation only.
- Combined-cycle blocks will be available for each of the three groups shown below or groups 1 and 2 **or** 1 and 3:
  - **Group 1**: Not rolled-up (neither syntheses nor fleet) but used only reported block data as supplied by the reporter (traditional data reporting).
  - **Group 2**: Creating block data using the synthesis event and performance method shown in this document.
  - **Group 3**: Creating block data using the fleet-type roll up method described in a separate document "Calculating Combined-Cycle Block Data Using a Fleet-type Roll up Method When Reporting Each Gas Turbine/Steam Turbine Unit."

Not everyone will wish to use some of these options. However, GADS is committed to providing options to all since the individual needs of GADS data users vary.

Special Rules Used in Calculating Synthesized Combined-Cycle Block Data from Unit-level Data

Some rules for calculating synthesized combined-cycle block data are necessary. The rules will insure uniformity in creating synthesized statistics from the unit-level data.

RULE #1: the outage for the combined-cycle block starts when the breaker of the last of the units is opened and ends when the breaker of the first unit is closed.

RULE #2: the number of attempted and actual starts for the combined-cycle block is determined when the first unit's breaker is closed. If the unit starts without a problem, then there is one attempted and one actual start for the combined-cycle block. If the first unit has a startup failure and a second unit is then started, then the combined-cycle block will have two attempted starts and one actual start.

RULE #3: A unit is on reserve shutdown when it is removed from service for economic reasons or the electricity is not needed on the system (standard RS definition).

The reserve shutdown may affect other units (for example a GT out on reserve shutdown will reduce the steam to the steam turbine). In cases where the steam turbine is still in operation, there would be no event reported because of the reduction in steam flow because the steam turbine is operating as if in load following and can return to full capacity as soon as the GT unit is returned to service.

RULE #4: A combined-cycle block is on reserve shutdown if one or more of the gas turbine/jet engine units are also on reserve shutdown and the combined-cycle block is not in operation. That means other units of the combined-cycle block may be on forced, maintenance, or planned outage, but the combined-cycle block still has the capability to produce electricity with the one or more units on reserve shutdown.

RULE #5: As reported for other unit types, coast down to outages is not reported to GADS. Therefore, the orderly removing of units towards an outage (standard outage procedure) is considered a coast down and is not reported as a penalty against the combined-cycle block (See Example #7).

Examples in Synthesizing Block Outages and Deratings from Reported Unit-level Data

In each example, the status of each unit is discussed. Some units are not impacted at all by an outage or derate. The only reason they are listed is to show they are not impacted and have no impact on available electricity production. In actual reporting, the unaffected units would not be reported or even mentioned.

Please Note: These examples are created to simply illustrate specific cause-and-effect relationships for discussion purposes only and may or may not be real world equipment designs, installations, configurations, or actual outage occurrences. The purpose of these examples is to illustrate how the outage of one unit affects other units and the entire combined-cycle block.

Our Example Combined-Cycle Block – Big Jumbo, the combined-cycle block, consists of two gas turbines, each with its own generator. Each GT has its own HRSG. The two GT/HRSG trains are connected through a manifold to a single steam turbine that also has its own generator. The total electrical combined capacity of this fictitious combination is 710 MW.

- Units – The units which make up the example combined-cycle block are as follows –
  - Two 225 MW Gas Turbines numbered 301 & 302
  - One 260 MW Steam Turbine numbered 101
- Combined-cycle block – The combined-cycle block is a 710 MW combined cycle numbered 801

Example 1 - Three Reserve Shutdowns (RS) on different units.

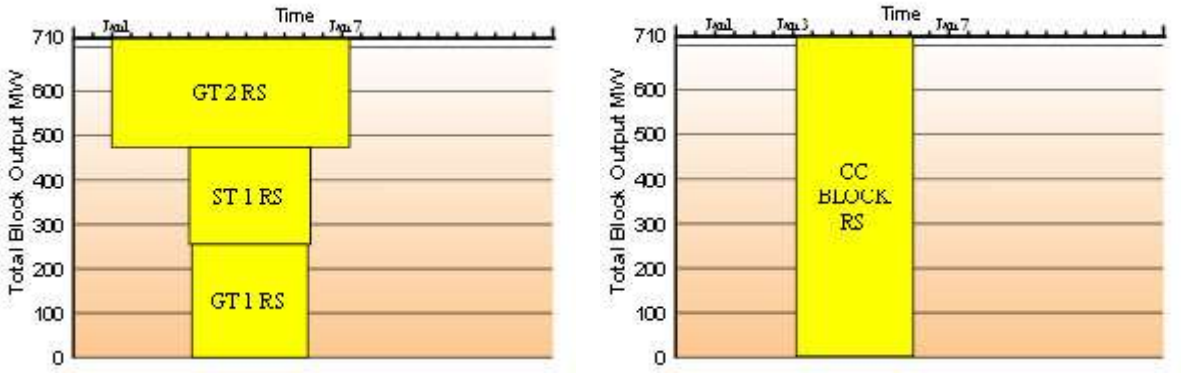
Unit Event Report

- GT #2 placed on RS from January 1 at 0000 until January 7 at 0315. GT #2 was capable of providing 225 MW during this period.
- ST #1 placed on RS from January 3 at 0010 to January 6 at 0230. The steam turbine was capable of providing 260 MW during this period.
- GT #1 placed on RS from January 3 at 0015 to January 6 at 0215. GT #1 was capable of providing 225 MW during this period.

Combined-Cycle Block Impact

- Big Jumbo Block placed on RS from January 3 at 0015 to January 6 at 0215. The combined-cycle block had the capability to provide 710 MW during this period.
- Please note that only three events were reported: one for each unit. During the RS outages, the combined-cycle block was not showing any derates because the block was still capable of generating the full 710 MW but was not required to do so. There were no equipment restrictions; there were only load requirements causing the reduced loading.

Diagrams of the units and combined-cycle block during this period are shown in Figure L1.1.



Combined Unit Event Single Block Event

Figure L1.1: Concurrent RS

Summary of Example #1:

- GT #1 on Reserve Shutdown for 74.00 hours.
- GT #2 on Reserve Shutdown for 147.25 hours.
- ST #1 on Reserve Shutdown for 74.33 hours.
- Combined-cycle block on Reserve Shutdown for 74.00 hours.

Example 2 – Single cause of derates on all units.

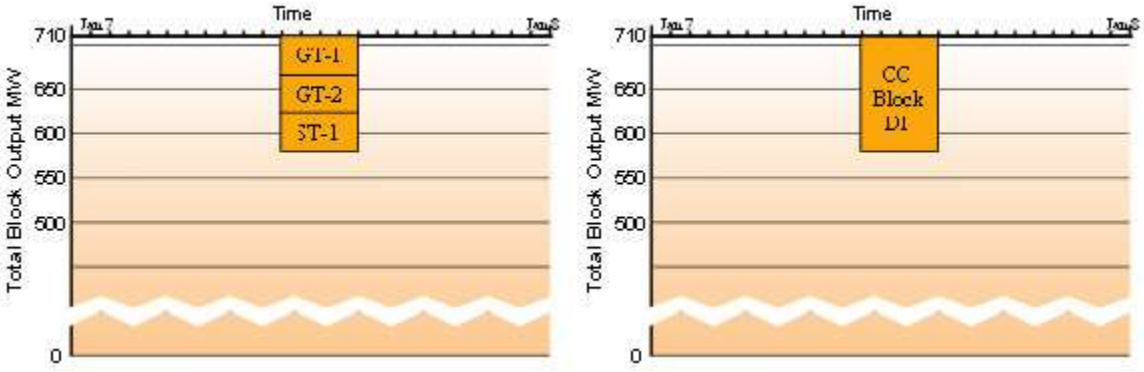
Unit Event Report

- GT #1 on D1 derate from January 7 at 1000 until January 7 at 1400. GT #1 was capable of providing 180 MW during this period. Cause code 3620 – Main Transformer.
- GT #2 on D1 derate from January 7 at 1000 to January 7 at 1400. GT #2 was capable of providing 180 MW during this period. Cause code 3620 – Main Transformer.
- ST #1 on D1 derate from January 7 at 1000 to January 7 at 1400. ST #1 was capable of providing 208 MW during this period. Cause code 3620 – Main Transformer.

Combined-Cycle Block Impact

- Big Jumbo Block was on D1 derate from January 7 at 1000 to January 7 at 1400. Cause code 3620 – Main Transformer. The combined-cycle block was capable of generating 568 MW.

Diagrams of the units and combined-cycle block during this period are shown in Figure L1.2.



Combined Unit Event Single Block Event

Figure L1.2: Single Cause of Derates

Summary of Example #2:

- GT #1 on forced derate for 4 hours (or 0.80 Equivalent Forced Derated Hours.)
- GT #2 on forced derate for 4 hours (or 0.80 Equivalent Forced Derated Hours.)
- ST #1 on forced derate for 4 hours (or 0.80 Equivalent Forced Derated Hours.)
- Combined-cycle block on forced derate for 4 hours (or 0.80 Equivalent Forced Derated Hours.)

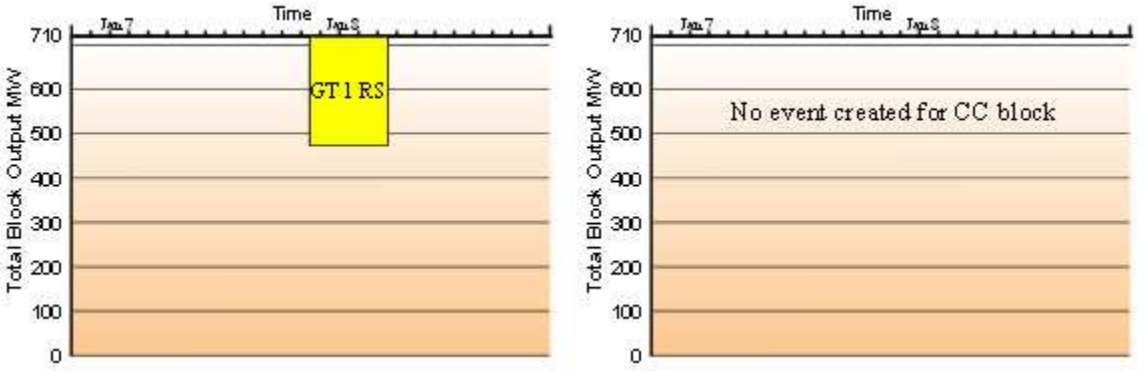
Example 3 – Single unit on Reserve Shutdown.

Unit Event Report

- GT #1 placed on RS from January 7 at 2115 to January 8 at 0500. GT #1 was capable of providing 225 MW during this period.

Combined-Cycle Block Impact

- No impact on Big Jumbo Block. The combined-cycle block was capable of generating 710 MW during the full period.
- Diagrams of the units and combined-cycle block during this period are shown in Figure L1.3:



Combined Unit Events CC Block Events

Figure L1.3: Single Unit on RS

Summary of Example #3:

- GT #1 on Reserve Shutdown 7.75 hours
- Combined-cycle block – no impact

Example 4 – Single unit on outage, affecting other units and then changing event types.

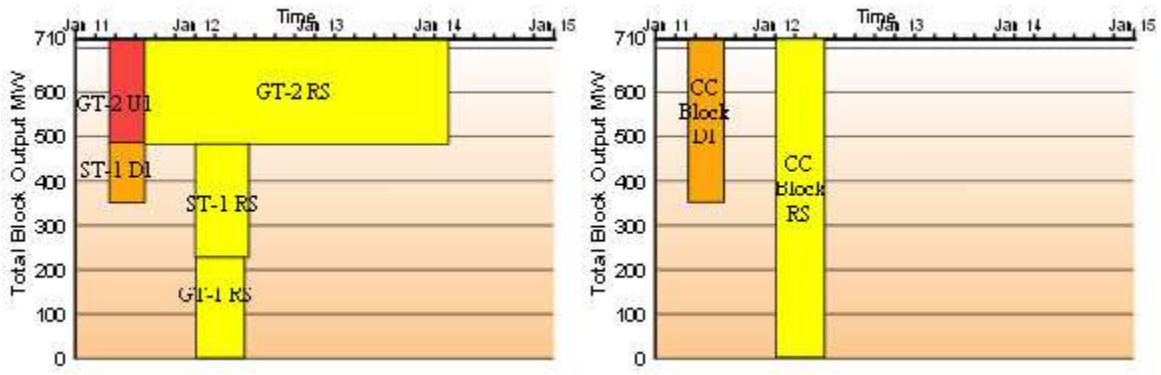
Unit Event Report

- GT #2 on Forced Outage (U1) from January 11 at 0700 to January 11 at 14:45 (cause code 5030 – supercharging fans). No supplemental firing of HRSG. GT #2 was capable of providing no MW during this period.
- As a result, ST #1 on forced derate (D1) from January 11 at 0700 to January 11 at 14:45 (cause code 5030 – supercharging fans). The steam turbine unit was capable of providing 130 MW during this period.
- GT #2 was placed on RS from January 11 at 1445 to January 14 at 0330. GT #2 was capable of providing 225 MW during this period.
- ST #1 was placed on reserve shutdown from January 12 at 0000 to January 12 at 11:20. ST #1 was capable of providing 260 MW during this period.
- GT #1 was placed on RS from January 12 at 0015 to January 12 at 0930. GT #1 was capable of providing 225 MW during this period.

Combined-Cycle Block Impact

- The combined-cycle block was on derate from January 11 at 0700 to January 11 at 14:45. The combined-cycle block was capable of generating 355 MW during the full period.
- The combined-cycle block was on RS from January 12 at 0015 until January 12 at 0930. The combined-cycle block was capable of generating 710 MW during the full period.

Diagrams of the units and combined-cycle block during this period are shown in Figure L1.4:



Combined Unit Events CC Block Events

Figure L1.4: Single Unit Outage, Other Events

Summary of Example #4:

- GT #1 on Reserve Shutdown for 9.25 hours.
- GT #2 on forced outage for 7.75 hours and on Reserve Shutdown for 60.75 hours.

- ST #1 on forced derate for 7.75 hours (or 3.88 Equivalent Forced Derated Hours) and on Reserve Shutdown for 11.33 hours.
- Combined-cycle block on forced derate for 7.75 hours (or 3.88 Equivalent Forced Derated Hours) and on Reserve Shutdown for 9.25 hours.

Example 5 – Reserve Shutdowns of unit followed by a startup failure of one unit.

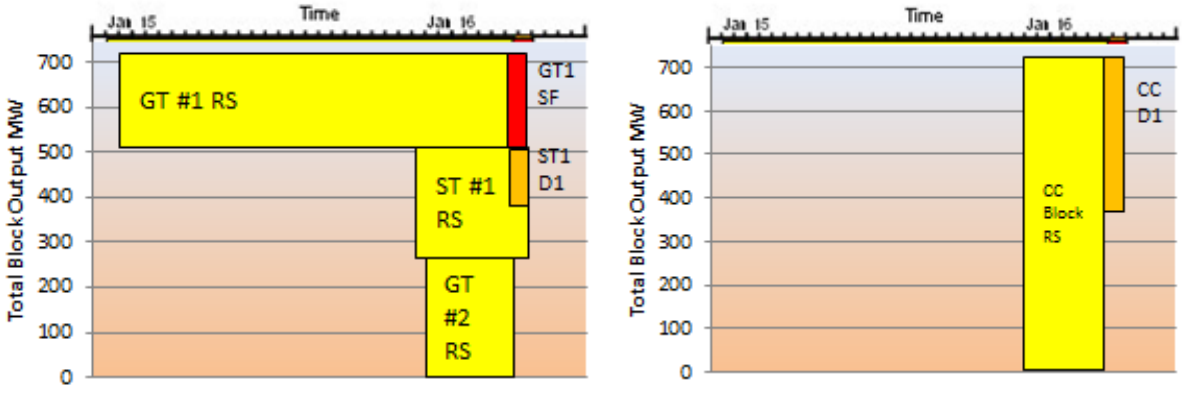
Unit Event Report

- GT #1 was placed on RS from January 14 at 2215 to January 16 at 0445. GT #1 was capable of providing 225 MW during this period.
- ST #1 was placed on reserve shutdown from January 15 at 2300 to January 16 at 0600. ST #1 was capable of providing 260 MW during this period.
- GT #2 was placed on RS from January 15 at 2310 to January 16 at 0545. GT #2 was capable of providing 225 MW during this period.
- GT #1 on Startup Failure outage (SF) from January 16 at 0445 to January 16 at 0600 (cause code 5030 – supercharging fans). No supplemental firing of HRSG. GT #1 was capable of providing no MW during this period.
- As a result of the GT #1 SF, ST #1 on forced derate (D1) from January 16 at 0445 to January 16 at 0600 (cause code 5030 – supercharging fans). ST #1 was capable of providing 130 MW during this period. (Note: ST #1 was on RS but it is treated as if it were in service.)

Combined-Cycle Block Impact

- The combined-cycle block was on RS from January 15 at 2310 until January 16 at 0445 (when GT #1 went on SF). The combined-cycle block was capable of generating 710 MW during the full period.
- The combined-cycle block was on derate from January 16 at 0445 to January 16 at 0600 caused by the SF of GT #1 and no potential steam flow to ST #1 (cause code 5030). The combined-cycle block was capable of generating 355 MW during the full period.

Diagrams of the units and combined-cycle block during this period are shown in Figure L1.5:



Combined Unit Events CC Block Events

Figure L1.5: RS Followed by SF

Summary of Example #5:

- GT #1 on Reserve Shutdown for 30.50 hours and on Forced Outage for 1.25 hours.
- GT #2 on Reserve Shutdown for 6.58 hours.
- ST #1 on Reserve Shutdown for 7.00 hours and on forced derate for 1.25 hours with a loss of capacity of 130MW (or 0.63 Equivalent Forced Derated Hours)
- Combined-cycle block on forced derate for 1.25 hours with a loss of capacity of 355MW (or 0.63 Equivalent Forced Derated Hours) and on Reserve Shutdown for 5.58 hours.

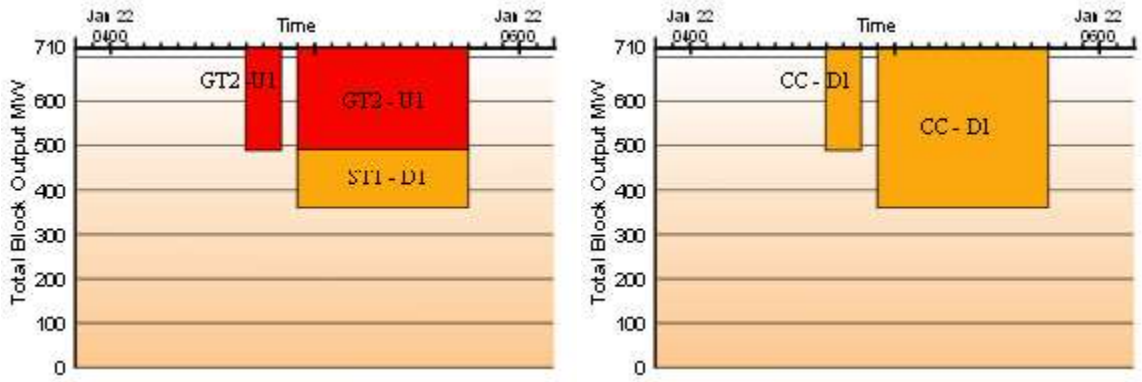
Example 6 – Unit outage to unit outage affecting other units.

Unit Event Report

- GT #2 on Forced Outage (U1) from January 22 at 0440 to January 22 at 0450 (cause code 5250 – Other Controls and instrumentation Problems).
- NOTE: Because the FO on GT#2 was so short, there was no loss of steam flow to ST #1. Therefore, ST #1 was capable of providing 260 MW during this period.
- GT #2 on Forced Outage (U1) from January 22 at 0455 to January 22 at 0545 (cause code 5250)
- As a result of GT #2 not providing steam service, ST #1 on forced derate (D1) from January 22 at 0455 to January 22 at 0545 (cause code 5250 – Other Controls and instrumentation Problems). ST #1 was capable of providing 130 MW during this period.

Combined-Cycle Block Impact

- The combined-cycle block was on derate (D1 – cause code 5250 – Other Controls and instrumentation Problems) from January 22 at 0440 until January 22 at 0450 (when GT #2 came on line). The combined-cycle block was capable of generating 485 MW during the full period.
- The combined-cycle block was on derate (D1 – cause code 5250 – Other Controls and instrumentation Problems) from January 22 at 0455 to January 22 at 0545 caused by the U1 of GT #2 and no steam for ST #1. The combined-cycle block was capable of generating 355 MW during the full period.



Combined Unit Events CC Block Events

Figure L1.6: Multiple Unit Outages

Summary of Example #6:

- GT #2 on forced outage for 1.00 hours (0.17 + 0.83 hours)
- ST #1 on forced derate for 0.83 hours (or 0.42 Equivalent Forced Derated Hours).
- Combined-cycle block on forced derate for 1.00 hour (0.17 + 0.83 hours or 0.47 [0.05 + 0.42] Equivalent Forced Derated Hours).

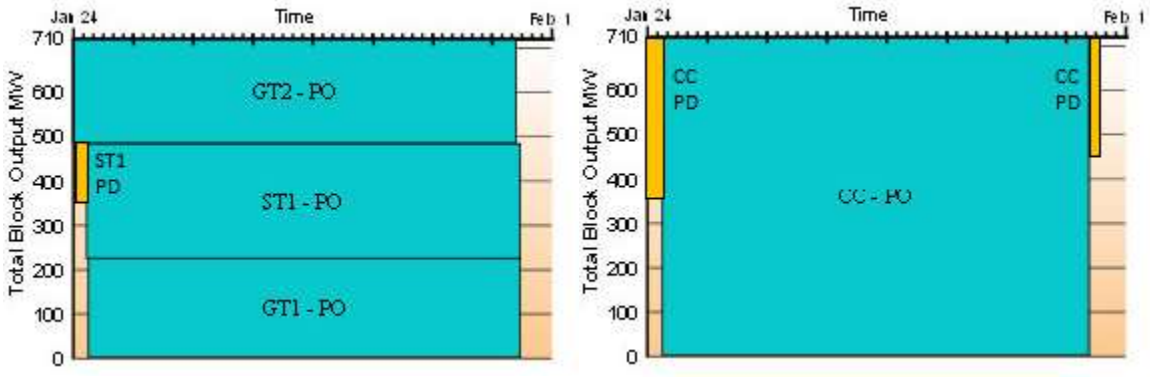
Example 7 – Combined-Cycle Block annual planned outage.

Unit Event Report

- GT #2 placed on Planned Outage from January 24 at 0000 until January 31 at 1000 (cause code 5260 – Major Gas Turbine Overhaul). GT #2 was not capable of providing power during this period.
- As a result of GT #2 not providing steam service, ST #1 on Planned Derate (PD) from January 24 at 0000 to January 24 at 0515 (cause code 5260). The steam turbine was capable of providing 130 MW during this period.
- ST #1 unit placed on Planned Overhaul from January 24 at 0515 to January 31 at 1130 (cause code 4240 – Low-pressure steam turbine bearings). The steam turbine was not capable of providing power during this period.
- GT #1 placed on Planned Outage January 24 at 0530 to January 31 at 1015 (cause code 5272 - Borescope inspection). GT #1 was not capable of providing power during this period.

Combined-Cycle Block Impact

- The combined-cycle block was placed on Planned Derate from January 24 at 0000 (when GT #2 came off-line) to January 24 at 0515 (cause code 5260). The combined-cycle block was capable of generating 355 MW during this period.
- The combined-cycle block was placed on Planned Derate from January 24 at 0515 to January 24 at 0530, when ST #1 was placed on Planned Outage (cause codes 5260 and 4240). The combined-cycle block was capable of generating 225 MW during this period.
- The combined-cycle block was placed on Planned Outage from January 24 at 0530 (when GT #1 came off-line) to January 31 at 1000 (when GT #2 came on line) (cause codes 5260, 4240, and 5272). The combined-cycle block has the capability to provide no power during this period.
- The combined-cycle block was placed on Planned Derate from January 31 at 1000 to January 31 at 1015, when GT #2 came on-line. The combined-cycle block was capable of generating 225 MW during this period.
- The combined-cycle block was placed on Planned Derate from January 31 at 1015 to January 31 at 1130, when GT #1 came on-line. The combined-cycle block was capable of generating 450 MW during this period.



Combined Unit Events CC Block Events

Figure L1.7: CC Block Annual Outage

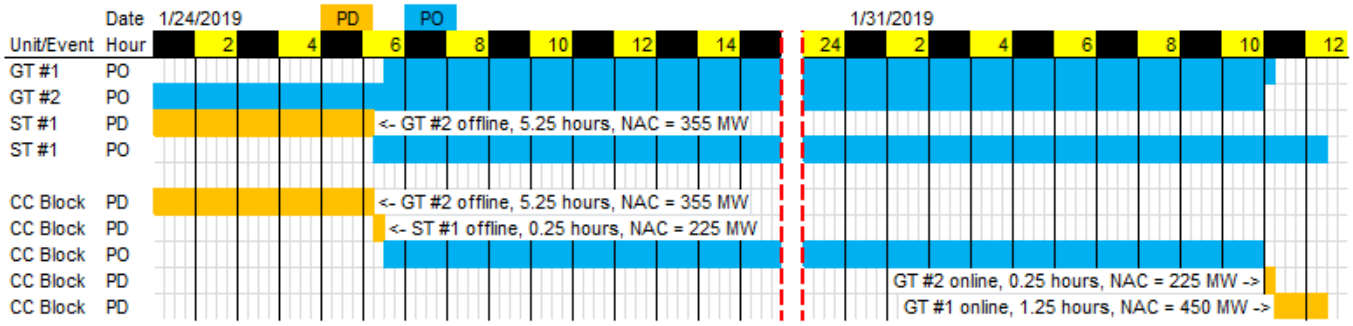


Figure L1.8: CC Block Annual Outage – Start/End Details
(0.25 hour PD too small to see in Figure L1.7: CC Block Events but shown here)

Summary of Example #7:

- GT #1 on Planned Outage for 172.75 hours.
- GT #2 on Planned Outage for 178.00 hours.
- ST #1 on Planned Derate for 5.25 hours.
- ST #1 on Planned Outage for 174.25 hours.
- Combined-cycle block on Planned Outage for 172.50 hours.
- Combined-cycle block on Planned Derating for 7.00 hours.

Statistics from Unit Event and Performance Reports

There will be other outages, deratings and reserve shutdown periods at a real combined-cycle block. We could list more but they would just be a repeat of what is shown in the seven examples shown above. So to test the data collection methodology, we will calculate statistics for each unit and the combined-cycle block using the data from the seven examples.

The time period with be January 1 at 0000 to January 31 at 2400. This is a total of 744 hours during the month of January.

Table L.1: Statistics from Unit Event and Performance Reports				
Statistic	**GT #1**	**GT #2**	**ST #1**	**CC Block**
Net Maximum Capacity	225	225	260	710
Period Hrs	744	744	744	744
Forced Outage Hrs	1.25	8.75	0.00	0.00
Planned Outage Hrs	172.75	178.00	174.25	172.50
Maintenance Outage Hrs	0.00	0.00	0.00	0.00
Reserve Shutdown Hrs	121.50	214.58	92.67	88.83
Service Hrs	448.50	342.67	477.08	482.67
Equiv. Forced Derated Hrs	0.80	0.80	5.72	5.77
EFDH During RS Hrs	0.00	0.00	0.63	0.00
Equiv. Planned Derated Hrs	0.00	0.00	2.63	3.42
Net Actual Generation	100,000	77,000	124,000	301,000.00
Attempted Starts	6.00	7.00	4.00	4.00
Actual Starts	5.00	7.00	4.00	4.00
Equiv. Availability Factor	76.51%	74.79%	75.46%	75.58%
Equiv. Forced Outage Rate	0.46%	2.72%	1.20%	1.20%
Forced Outage Factor	0.17%	1.18%	0.00%	0.00%
Forced Outage Rate	0.28%	2.49%	0.00%	0.00%
Scheduled Outage Factor	23.22%	23.92%	23.42%	23.19%
Net Capacity Factor	59.74%	46.00%	64.10%	56.98%
Starting Reliability	83.33%	100.00%	100.00%	100.00%

Table L.2: Sample Data Summary								
Event #	**Unit**	**Event Type**	**Start Date**	**End Date**	**Duration**	**Loss MW**	**EDH**	**Example**
1	GT #2	RS	01/01/0000	01/07/0315	147.25	225		1
2	ST #1	RS	01/03/0010	01/06/0230	74.33	260		
3	GT #1	RS	01/03/0015	01/06/0215	74	225		
Syn. 1	CC	RS	01/03/0015	01/06/0215	74	710		
4	GT #1	D1	01/07/1000	01/07/1400	4	45	0.8	2
5	GT #2	D1	01/07/1000	01/07/1400	4	45	0.8	
6	ST #1	D1	01/07/1000	01/07/1400	4	52	0.8	
Syn. 2	CC	D1	01/07/1000	01/07/1400	4	142	0.8	
7	GT #1	RS	01/07/2115	01/08/0500	7.75	225		3
Syn. 3	CC	NC						
8	GT #2	U1	01/11/0700	01/11/1445	7.75	225		4
9	ST #1	D1	01/11/0700	01/11/1445	7.75	130	3.88	
10	GT #2	RS	01/11/1445	01/14/0330	60.75	225		
11	ST #1	RS	01/12/0000	01/12/1120	11.33	260		
12	GT #1	RS	01/12/0015	01/12/0930	9.25	225		
Syn. 4	CC	D1	01/11/0700	01/11/1445	7.75	355	3.88	
Syn. 5	CC	RS	01/12/0015	01/12/0930	9.25	710		
13	GT #1	RS	01/14/2215	01/16/0445	30.5	225		5
14	ST #1	RS	01/15/2300	01/16/0600	7	260		
15	GT #2	RS	01/15/2310	01/16/0545	6.58	225		

Table L.2: Sample Data Summary								
Event #	**Unit**	**Event Type**	**Start Date**	**End Date**	**Duration**	**Loss MW**	**EDH**	**Example**
16	GT #1	SF	01/16/0445	01/16/0600	1.25	225		
17	ST #1	D1	01/16/0445	01/16/0600	1.25	130	0.63	
Syn. 6	CC	RS	01/15/2310	01/16/0445	5.58	710		
Syn. 7	CC	D1	01/16/0445	01/16/0600	1.25	355	0.63	
18	GT #2	U1	01/22/0440	01/22/0450	0.17	225		6
19	GT #2	U1	01/22/0455	01/22/0545	0.83	225		
20	ST #1	D1	01/22/0455	01/22/0545	0.83	130	0.42	
Syn. 8	CC	D1	01/22/0440	01/22/0450	0.17	225	0.05	
Syn. 9	CC	D1	01/22/0455	01/22/0545	0.83	355	0.42	
21	GT #2	PO	01/24/0000	01/31/1000	178	225		7
22	ST #1	PD	01/24/0000	01/24/0515	5.25	130	2.63	
23	ST #1	PO	01/24/0515	01/31/1130	174.25	260		
24	GT #1	PO	01/24/0530	01/31/1015	172.75	225		
Syn. 10	CC	PD	01/24/0000	01/24/0515	5.25	355	2.63	
Syn. 11	CC	PD	01/24/0515	01/24/0530	0.25	485	0.17	
Syn. 12	CC	PO	01/24/0530	01/31/1000	172.5	710		
Syn. 13	CC	PD	01/31/1000	01/31/1015	0.25	485	0.17	
Syn. 14	CC	PD	01/31/1015	01/31/1130	1.25	260	0.46	

Appendix L2: Calculating Combined Cycle and Co-Generation Block Data Using the Fleet-type Roll-up Method

Overview

This document will explain the fleet-type roll-up method for collecting combined-cycle data on a unit level basis and creating combined-cycle block statistics from the unit level event and performance information.

This document applies only to reporters who wish to report event and performance data for each generating unit individually. This document does not apply to reporters wishing to continue reporting combined-cycle data to GADS as a 'single unit' (or traditional method). GADS will still accept the traditional method, but this is not favored over the reporting of each generating unit within the block.

Please Note: *The majority of this document is the same as the synthesis method. The basic data gathering process on a unit level basis is* ***identical*** *in all respects. The differences will be in creating block statistics from the unit level data.*

IEEE 762 does not address reporting separate units and bringing the components together to create combined-cycle block statistics. Therefore, we are establishing a NERC methodology based on the generally accepted industry practice of fleet-type roll-up calculations for a group of units – in this case, the group of units consists of the individual generating units that make up the combined-cycle block.

Terms

To insure proper documentation some terms must be agreed on to eliminate some of the ambiguity concerning combined-cycle blocks in general.

- **Combined-cycle Block (also known in the industry as a "Block")** –By definition, a combined cycle is a process for generating energy (either electricity or steam) constituted by the marriage of a Brayton Cycle (expand hot gas to turn a gas turbine) with a Rankine Cycle (use heat to boil water to make steam to turn a steam turbine). A combined-cycle block employs electric generating technology in which electricity and process steam are produced from otherwise lost waste heat exiting from one or more combustion turbines. In most situations, the exiting waste heat is routed to a conventional boiler or to a heat recovery steam generator (HRSG) for use by a steam turbine in the production of electricity. Therefore, the combined-cycle block consists of one or more gas turbines/jet engines, one or more steam turbines, and balance of plant equipment supporting the production of electricity or steam energy.

There may be more than one combined-cycle block at a plant site. Our discussion relates to each individual combined-cycle block reporting, not the process of reporting several combined-cycle blocks as one plant site.

- **Units** – Each generator set is considered a "unit." Typically in combined cycle, each gas turbine or jet engine and each steam turbine are considered a "unit." Each unit contributes to the total electric generation of the combined-cycle block, and each unit has one or more of its own generators for providing electric power.
- **Heat Recovery Steam Generator (HRSG)** – There may be one or more HRSG or waste-heat boilers in a combined-cycle block. Some units may have a single HRSG per GT/jet engine; others may have several GT/jet engine feeding a single HRSG. The HRSG does not contribute electricity to the output of the combined-cycle block, so is considered a component rather than a unit.
- **Other Balance of Plant Equipment** – These are the other pieces of equipment in the combined-cycle block used to support the production of electricity. They are not related to any specific part of the block and are also considered as components.

Combined-Cycle block/Unit Numbering

The combined-cycle block and unit numbering system should be straightforward and follow the usual guidelines. The combined-cycle block is identified by the range 800-899 and is used to relate the individual units to the block level. The GT/jet engine units are numbered in the range 300-399 or 700-799. The steam turbine units are numbered in the range of 100-199.

Impact on Design Data

It will be necessary for each generating company to provide new and/or additional design data for the combined-cycle blocks that is submitting GADS data to NERC. This new design data will allow NERC to identify the specific units that make up each combined-cycle block for the purposes of creating fleet-type calculations of the unit level data that is submitted to NERC.

- **Units** - The design data is reported as though each unit were a separate generator, this meaning that each unit would have its own unit number and design data as described in the NERC guidelines for each unit type. In addition to this, the unit should be marked as being part of a combined-cycle block by a field that would hold the identifying 800 series unit code of the combined-cycle block.
- **Combined-Cycle block** – Balance of plant and other equipment not directly related to each unit should be coded as described for the combined-cycle block.

Cause Codes

Since each unit of the combined-cycle block can affect the generation of the other units, it is possible to have a situation where a derate in a gas turbine or jet engine may have a steam turbine cause code. (See Example 2 below). In other words, the cause codes for all units will be open to all task-force-approved cause codes for all units within the combined-cycle blocks.

Reporting Event Records

Report events on the unit level only. NO COMBINED-CYCLE BLOCK EVENTS ARE REPORTED TO NERC! Since the design data links the units together with the combined-cycle block, NERC will use the unit level to perform block-level roll-up statistics using the fleet-type (sum of hours) method to calculate traditional industry statistics. All the normal methods/rules would apply with the exception of cause codes crossing over between dissimilar unit types.

Reporting Performance Records

Report performance records on a unit basis only. YOU SHOULD NOT REPORT COMBINED-CYCLE BLOCK PERFORMANCE RECORDS TO NERC! Since the design data links the units together to the combined-cycle block, NERC will use the performance records of the individual units to calculate traditional industry statistics using the fleet-type roll-up method.

Therefore, if you operate a combined-cycle block with two gas turbines and one steam turbine, you will report 36 performance records annually – one set of 12 performance records for each gas turbine unit and one set of 12 performance records for the steam turbine unit.

Effects on pc-GAR Peer Groups

Exposing the data on the units of combined-cycle block allows those units to become part of other peer groups. In pc-GAR, the following options are given when the peer group is created.

- Include units of combined-cycle blocks – create a gas turbine peer group that includes gas turbines in simple cycle operation with those in combined-cycle blocks.

- Include units of combined-cycle blocks only – i.e. view gas turbine units in combined-cycle blocks operation only.
- Combined-cycle blocks are available for each of the three groups shown below or groups 1 and 2 **or** 1 and 3:
  - **Group 1:** Not rolled up (neither syntheses nor fleet) but used only reported block data as supplied by the reporter (traditional data reporting).
  - **Group 2:** Creating block data using the synthesis event and performance method shown in this document.
  - **Group 3:** Creating block data using the fleet-type roll-up method described in a separate document "Calculating Combined-cycle block Data Using a Fleet-type Roll-up Method When Reporting Each Gas Turbine/Steam Turbine Unit."

Not everyone will wish to use some of these options. However, GADS is committed to providing options to all since the individual needs of GADS data users also vary.

Calculating Fleet-type Combined-Cycle Block Statistics from the Unit Event & Performance Records

Do not report combined-cycle block event and performance records to NERC. NERC only needs the individual unit event and performance records.

Illustrated below are examples of how to create a block performance record using the fleet-type roll-up calculation. Please note that there is no double counting of penalties on the combined-cycle block; we are actually maintaining the impact of the problem of one unit on another unit. The addition of the two units affects the overall electric production of the block.

There will be times when the cause code of one unit (GT#1 for example) will also be shown on a second unit (the steam turbine for example). That is because the resultant outage of the GT affected the steam production on the steam turbine, resulting in the steam turbine's inability to provide full capacity. This may look as if it were "double" counting (see Example #2); however, the steam turbine itself is not in need of repairs and the cause of the reduction in steam-turbine production to the steam turbine points to a GT (doesn't say which GT, just "a" GT). Therefore, the GT gets two penalties against it: one for the outage (to the GT#1 itself) and another for the derate (to the steam turbine.) which may appear as a "double counting," but is not. This is because the GT actually caused the entire shortage. This type of event is called a concurrent derate.

Please note two things:

- When GT#1 is on outage, the outage time and cause is related to GT#1 via the event record (only the outage is related to GT#1), and
- The derate to the steam turbine is NOT related to GT#1 "directly" because the derate is shown to be caused by a GT cause code but not identifying which GT (assuming there is more than one GT unit). Therefore, when the computer calculates the statistics of GT#1, it only sees the outage, not the derate. When the computer calculates the statistics on the steam turbine, it sees the derate caused by a GT. Therefore, GT#1 is not penalized twice, but only the one time.

In the NERC performance statistics, you would see the following:

GT#1 EAF=…, EFOR=…., etc.
GT#2 EAF=…., EFOR = …., etc.

Steam Turbine EAF= …., EFOR = …., etc.

These values are calculated based only on the performance and event records directly attributed to each of the individual units. However, when you report on cause code based values, the entire effect of the outage will be taken into account. With the effect of the outage being attributed to the cause code and not the unit, the unit is not penalized.

Equivalent Fleet Roll-up Calculations

The equivalent-fleet-type roll-up of combine-cycle units is based on the energy generated or lost as a result of the time that the unit is available or unavailable. By weighting the hours of the time-based calculations by the capacity of each unit, you are able to add the energy of each unit to create the rolled-up statistics needed for the block. You can then use the roll-up of unit hours to determine the rates and factors of the block.

You do need to keep in mind that, when using the equivalent fleet roll-up method, you are working with energy in MWh and not capacity and hours as separate entities. In all calculations, we can substitute the energy based number for a particular statistic by multiplying the hours by the unit's maximum capacity (Net Maximum Capacity). So, for instance, service hours become service MWh.

As an example of this, consider this simple relationship:

Service Hours = Period Hours – Outage Hours – Reserve Shutdown Hours

This works for a single unit, but, if period hours are used for the block, the following relationship doesn't work –

$(SH_{unit1} + SH_{unit2}) = PH – (OH_{unit1} + OH_{unit2}) – (RSH_{unit1} + RSH_{unit2})$

The relationship of service hours to period and outage hours needs to remain constant for the individual unit and for the block when all units are added together. By multiplying each element by the capacity of the related unit, we keep the relationship stable.

So, for each unit in the block we have:

SMWh = SH x Capacity

PMWh = PH x Capacity

OHMWh = OH x Capacity

RSHMWh = RSH x Capacity

Now you can sum the MWh for all units to create the values for the block

$\Sigma(SMWh) = \Sigma(PMWh) - \Sigma(OHMWh) - \Sigma(RSHMWh)$

Special Rules Used in Calculating Combined-Cycle Block and Units Using Fleet-type Roll-up Method

There is a need to establish some rules for fleet-type combined-cycle blocks. The rules will insure uniformity in creating fleet-type statistics from the unit level data.

- The number of attempted and actual starts for the combined-cycle block is determined by the sum of all attempted and actual starts of the units. Due to this, all unit events transfer directly to the block without interpretation to the cumulative status of the block. In other words, if a unit is on forced outage, the

forced outage event is also posted to the block even though the other units in the block may be producing power. In this way, a total count of all events that occur within the block can be maintained.

- A unit is on reserve shutdown when it is removed from service for economic reasons or the electricity is not needed on the system (standard RS definition.) The reserve shutdown may affect other units (for example a GT out on reserve shutdown will reduce the steam to the steam turbine). In such cases where the steam turbine is still in operation, there would be no concurrent event reported because of the reduction in steam flow because the steam turbine is operating as if in load-following and can return to full capacity as soon as the GT unit is returned to service.
- As reported for other unit types, coast down to outages is not reported to GADS. Therefore, the orderly removing of units towards an outage (standard outage procedure) is considered a coast down and is not reported as a penalty against the combined-cycle block. (See Example #7).

Examples in Fleet-Type Block Outages and Deratings from Reported Unit level Data

In each example, the status of each unit is discussed. Some units are not impacted at all by the outages or derates. The only reason they are listed is to show they are not impacted and have no impact on available electricity production. In actual reporting, the unaffected units would not be reported or even mentioned.

Please Note: *These examples are created simply to illustrate specific cause-and-effect relationships for discussion purposes only, and may or may not be real world equipment designs, installations, configurations or actual outage occurrences. The purpose of these examples is to illustrate how the outage of one unit affects other units and the entire combined-cycle block.*

Our example Combined-Cycle block – Big Jumbo, the combined-cycle block, consists of two gas turbines, each with its own generator. Each GT has its own HRSG. The two GT/HRSG trains are connected through a manifold to a single steam turbine that also has its own generator. The total electrical combined capacity of this fictitious combination is 710 MW.

- Units – The units which make up the example combined-cycle block are as follows –
  - Two 225 MW Gas Turbines numbered 301 & 302
  - One 260 MW Steam Turbine numbered 101
- Combined-cycle block – The combined-cycle block is a 710 MW combined cycle numbered 801

Example 1 – Three Reserve Shutdowns (RS) on Different Units.

Unit Event Report

- GT #2 placed on RS from January 1 at 0000 until January 7 at 0315. GT #2 was capable of providing 225 MW during this period.
- ST #1 placed on RS from January 3 at 0010 to January 6 at 0230. The steam turbine was capable of providing 260 MW during this period.
- GT #1 placed on RS from January 3 at 0015 to January 6 at 0215. GT #1 was capable of providing 225 MW during this period.

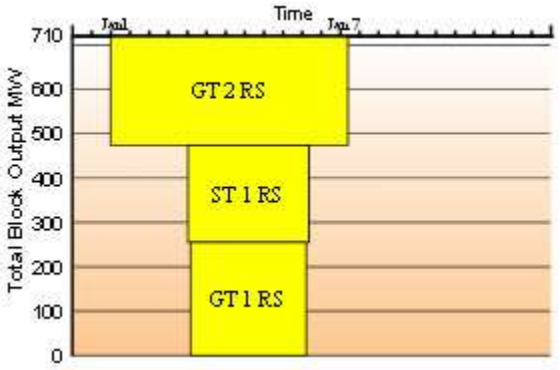


Figure L2.1: Concurrent RS

Summary of Example #1:

- GT #1 on Reserve Shutdown for 74.00 hrs x 225MW = 16,650 MWh.
- GT #2 on Reserve Shutdown for 147.25 hrs x 225 MW = 33,131.25 MWh.
- ST #1 on Reserve Shutdown for 74.33 hrs x 260 MW = 19.326.67 MWh.
- Combined-cycle block records 3 events:
  - RS of 16,650 MWh
  - RS of 33,131.25 MWh
  - RS of 19,326.67 MWh

Please note that only three events were reported: one for each unit. The block impact is the sum of each RS event by each of the three units. The equivalent block hours (69,107.92 MWh / 710MWh) are 97.34 hours.

Example 2 – Single Cause of Derates on All Units.

Unit Event Report

- GT #1 on D1 derate from January 7 at 1000 until January 7 at 1400. GT #1 was capable of providing 180 MW during this period. Cause code 3620 – Main Transformer.
- GT #2 on D1 derate from January 7 at 1000 to January 7 at 1400. GT #2 was capable of providing 180 MW during this period. Cause code 3620 – Main Transformer.
- ST #1 on D1 derate from January 7 at 1000 to January 7 at 1400. The steam turbine was capable of providing 208 MW during this period. Cause code 3620 – Main Transformer.

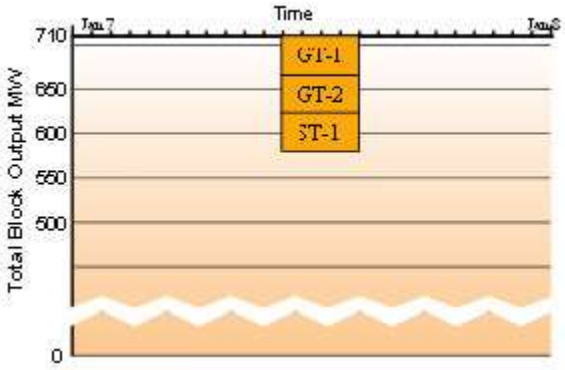


Figure L2.2: Single Cause of Derates

Summary of Example #2:

- GT #1 reports forced derate for 4Hrs x 45MW = 180 MWh.
- GT #2 reports forced derate for 4Hrs x 45MW = 180 MWh.
- ST #1 reports forced derate for 4Hrs x 52MW = 208 MWh.
- Combined-cycle block reports 3 overlapping derates:
  - Forced derate of 4hrs x 45MW = 180MWh
  - Forced derate of 4hrs x 45MW = 180MWh
  - Forced derate of 4hrs x 52MW = 208MWh

Total Block derated 568MWh (568 / 710 =0.80 Equivalent Hours)

Example 3 – Single Unit on Reserve Shutdown.

Unit Event Report

- GT #1 placed on RS from January 7 at 2115 to January 8 at 0500. GT #1 was capable of providing 225 MW during this period.

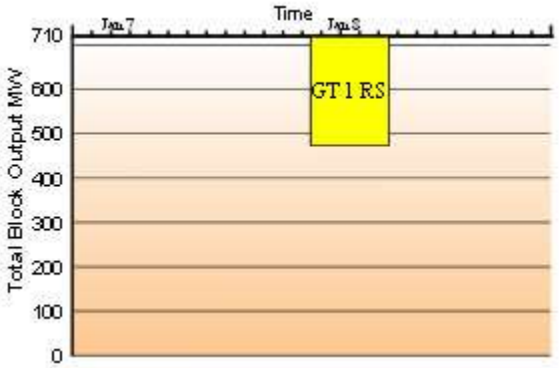


Figure L2.3: Single Unit on RS

Summary of Example #3:

- GT #1 on reserve shutdown 7.75 hours x 225MW = 1,743.75 MWh.
- Combined-cycle block reports reserve shutdown for 1,743.75 MWh (1,743.75 / 710 = 2.46 Equiv. Hours)

Example 4 - Single Unit on Outage, Affecting Other Units and Then Changing Event Types.

Unit Event Report

- GT #2 on Forced Outage (U1) from January 11 at 0700 to January 11 at 14:45 (cause code 5030 – supercharging fans). No supplemental firing of HRSG. GT #2 was capable of providing no MW during this period.
- As a result, ST #1 on forced derate (D1) from January 11 at 0700 to January 11 at 14:45 (cause code 5030 – supercharging fans). The steam turbine unit was capable of providing 130 MW during this period.
- GT #2 was placed on RS from January 11 at 1445 to January 14 at 0330. GT #2 was capable of providing 225 MW during this period.
- ST #1 was placed on reserve shutdown from January 12 at 0000 to January 12 at 11:20. The steam turbine unit was capable of providing 260 MW during this period.
- GT #1 was placed on RS from January 12 at 0015 to January 12 at 0930. GT #1 was capable of providing 225 MW during this period.

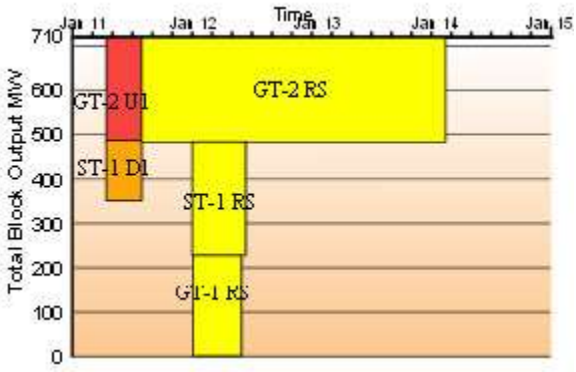


Figure L2.4: Single Unit Outage, Other Events

Summary of Example #4:

- GT #1 on Reserve Shutdown for 9.25 hrs x 225 MW = 2,081.25 MWh.
- GT #2 on forced outage for 7.75 hrs x 225 MW = 1,743.75 MWh.
- GT #2 on Reserve Shutdown for 60.75 hrs x 225 MW = 13,668.75 MWh.
- ST #1 on forced derate for 7.75 hrs x 130 MW = 1,007.50 MWh.
- ST #1 on Reserve Shutdown for 11.33 hrs x 260MW = 2,946.67 MWh.
- Combined-cycle block reports 5 events:
  - RS of 2,081.25 MWh
  - FO of 1,743.75 MWh
  - RS of 13,668.75 MWh
  - FO of 1,007.50 MWh
  - RS of 2,946.67 MWh

Example 5 – Reserve Shutdowns of unit followed by a startup failure of one unit.

Unit Event Report

- GT #1 was placed on RS from January 14 at 2215 to January 16 at 0445. GT #1 was capable of providing 225 MW during this period.
- ST #1 was placed on reserve shutdown from January 15 at 2300 to January16 at 0600. The steam turbine unit was capable of providing 260 MW during this period.
- GT #2 was placed on RS from January 15 at 2310 to January 16 at 0545. GT #2 was capable of providing 225 MW during this period.
- GT #1 on Startup Failure outage (SF) from January 16 at 0445 to January 6 at 0600 (cause code 5030 – supercharging fans). No supplemental firing of HRSG. GT #1 was capable of providing no MW during this period.
- As a result of the GT#1 SF, ST #1 on forced derate (D1) from January 16 at 0445 to January 16 at 0600 (cause code 5030 – supercharging fans). ST #1 was capable of providing 130 MW during this period. (Note: ST #1 was on RS but it is treated as if it were in service.)

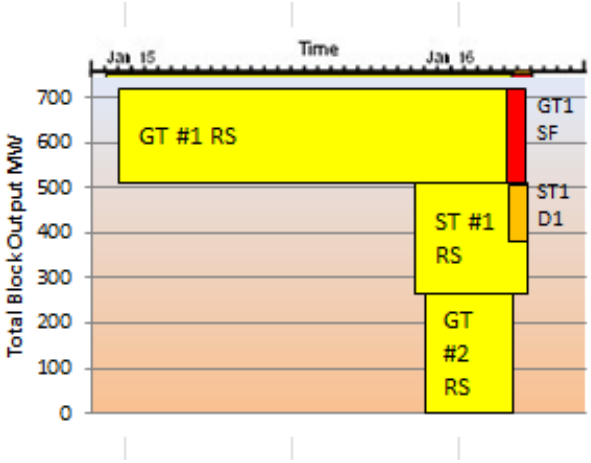


Figure L2.5: RS Followed by SF

Summary of Example #5:

- GT #1 on reserve shutdown for 30.50 hrs x 225 MW = 6,862.50 MWh.
- GT #1 on Forced Outage for 1.25 hrs x 225 MW = 281.25 MWh.
- GT #2 on reserve shutdown for 6.58 hrs x 225 MW = 1,481.25 MWh.
- ST #1 on reserve shutdown for 7.00 hrs x 260 MW = 1,820 MWh.
- ST #1 on forced derate for 1.25 hours with a loss of capacity of 130MW or 1.25 hrs x 130 MW = 162.50 MWh.
- Combined-cycle block reports the 5 events:
  - RS of 6,862.50 MWh
  - FO of 281.25 MWh
  - RS of 1,481.25 MWh
  - RS of 1,820.00 MWh

- D1 of 162.50 MWh

Example 6 – Unit outage to unit outage affecting other units.

Unit Event Report

- GT #2 on Forced Outage (U1) from January 22 at 0440 to January 22 at 0450 (cause code 5250 – Other Controls and instrumentation Problems).

Note: Because the FO on GT#2 was so short, there was no loss of steam flow to ST #1. Therefore, the steam turbine unit was capable of providing 260 MW during this period.

- GT #2 on Forced Outage (U1) from January 22 at 0455 to January 22 at 0545 (cause code 5250 – Other Controls and instrumentation Problems).
- As a result of GT #2 not providing steam service, ST #1 on forced derate (D1) from January 22 at 0455 to January 22 at 0545 (cause code 5250 – Other Controls and Instrumentation Problems). ST #1 was capable of providing 130 MW during this period.

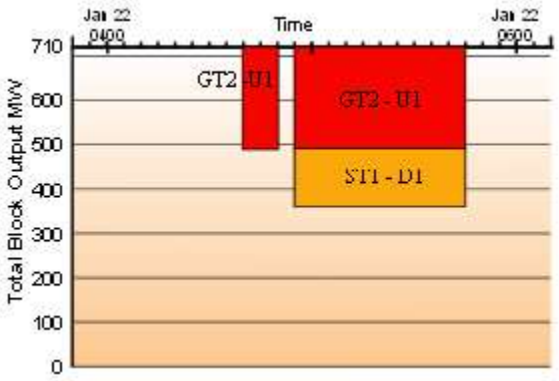


Figure L2.6: Multiple Unit Outages

Summary of Example #6:

- GT #2 reports 2 forced outages for 0.17 hrs x 225MW = 37.50 MWh. and 0.83 hrs x 225 MW = 187.50 MWh.
- ST #1 on forced derate for 0.83 hours (or 0.42 Equivalent Forced Derated Hours) or 0.83 hr x 130 MW = 108.33 MWh.
- Combined-cycle block reports the 3 events:
  - FO of 37.50 MWh
  - FO of 187.50 MWh
  - D1 of 108.33 MWh

Example 7 – Combined-Cycle Block Annual Planned Outage.

Unit Event Report

- GT #2 placed on Planned Outage from January 24 at 0000 until January 31 at 1000 (cause code 5260 – Major Gas Turbine Overhaul). GT #2 was not capable of providing power during this period.

- As a result of GT #2 not providing steam service, ST #1 was placed on Planned derate (PD) from January 24 at 0000 to January 24 at 0515 (cause code 5260 – Major Gas Turbine Overhaul). ST #1 was capable of providing 130 MW during this period.
- ST #1 placed on Planned Overhaul from January 24 at 0515 to January 31 at 1130 (cause code 4240 – low-pressure steam-turbine bearings). ST #1 was not capable of providing power during this period.
- GT #1 placed on Planned Outage January 24 at 0530 to January 31 at 1015 (cause code 5272 - Borescope inspection). GT #1 was not capable of providing power during this period.

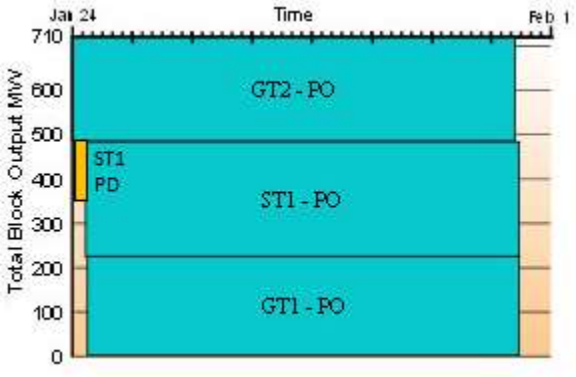


Figure L2.7: CC Block Annual PO

Summary of Example #7:

- GT #1 on Planned Outage for 172.75 hrs x 225 MW = 38,868.75 MWh.
- GT #2 on Planned Outage for 178.00 hrs x 225 MW = 40,050 MWh.
- ST #1 on Planned Derate for 5.25 hours with a loss of capacity of 130MW or 5.25 hrs x 130 MW = 682.50 MWh.
- ST #1 on Planned Outage for 174.25 hrs x 260 MW = 45,305 MWh.
- Combined-cycle block reports 4 events:
  - PO of 38,868.75 MWh
  - PO of 40,050 MWh
  - D1 of 682.50 MWh
  - PO of 45,305 MWh

Statistics from Unit Event and Performance Reports

There will be other outages, deratings, and reserve shutdown periods at a real combined-cycle block. We could list more, but they would just be repeats of the seven earlier examples. So to test the data collection methodology, we will calculate statistics for each unit and the combined-cycle block using the data from the seven examples.

The time period will be January 1 at 0000 to January 31 at 2400. This is a total of 744 hours during the month of January.

Net Actual Generation would be taken from the meters. Values stated here are for demonstration purposes only.

Table L2.1: Statistics from Unit Event and Performance Reports				
Statistic	**GT #1**	**GT #2**	**ST #1**	**CC Block**
Net Maximum Capacity	225	225	260	710
Period MWh	167,400	167,400	193,440	528,240.00
Forced Outage MWh	281.25	1,968.75	0	2,250.00
Planned Outage MWh	38,868.75	40,050.00	45,305.00	124,223.75
Maintenance Outage MWh	0	0	0	0.00
Reserve Shutdown MWh	27,337.50	48,281.25	24,093.33	99,712.08
Service MWh	100,912.50	77,100.00	124,041.67	302,054.17
Equiv. Forced Derated MWh	180.00	180.00	1486.33	1846.33
EFDH During RS MWh	0	0	162.50	162.50
Equiv. Plan. Derated MWh	0	0	682.50	682.50
Net Actual Generation	100,000	77,000	124,000	301,000.00
Attempted Starts	6	7	4	17.00
Actual Starts	5	7	4	16.00
Equiv. Availability Factor	76.51%	74.79%	75.46%	75.58%
Equiv. Forced Outage Rate	0.46%	2.72%	1.20%	1.36%
Forced Outage Factor	0.17%	1.18%	0.00%	0.43%
Forced Outage Rate	0.28%	2.49%	0.00%	0.74%
Scheduled Outage Factor	23.22%	23.92%	23.42%	23.52%
Net Capacity Factor	59.74%	46.00%	64.10%	56.98%
Starting Reliability	83.33%	100.00%	100.00%	94.12%

Table L2.2: Sample Data Summary									
Event #	**Unit**	**Event Type**	**Start Date**	**End Date**	**Duration**	**Loss MW**	**Loss MWh**	**Equiv. Blk Hrs**	**Example**
1	GT #2	RS	01/01/0000	01/07/0315	147:15:00	225	33,131.25	46.66	1
2	ST #1	RS	01/03/0010	01/06/0230	74:20:00	260	19326.67	27.22	
3	GT #1	RS	01/03/0015	01/06/0215	74:00:00	225	16,650.00	23.45	
4	GT #1	D1	01/07/1000	01/07/1400	4:00:00	45	180.00	0.25	2
5	GT #2	D1	01/07/1000	01/07/1400	4:00:00	45	180.00	0.25	
6	ST #1	D1	01/07/1000	01/07/1400	4:00:00	52	208.00	0.29	
7	GT #1	RS	01/07/2115	01/08/0500	7:45:00	225	1,743.75	2.46	3
8	GT #2	U1	01/11/0700	01/11/1445	7:45:00	225	1,743.75	2.46	4
9	ST #1	D1	01/11/0700	01/11/1445	7:45:00	130	1,007.50	1.42	
10	GT #2	RS	01/11/1445	01/14/0330	60:45:00	225	13,668.75	19.25	
11	ST #1	RS	01/12/0000	01/12/1120	11:20:00	260	2946.67	4.15	
12	GT #1	RS	01/12/0015	01/12/0930	9:15:00	225	2,081.25	2.93	
13	GT #1	RS	01/14/2215	01/16/0445	30:30:00	225	6,862.50	9.67	5
14	ST #1	RS	01/15/2300	01/16/0600	7:00:00	260	1,820.00	2.56	
15	GT #2	RS	01/15/2310	01/16/0545	6:35:00	225	1,481.25	2.09	
16	GT #1	SF	01/16/0445	01/16/0600	1:15:00	225	281.25	0.40	
17	ST #1	D1	01/16/0445	01/16/0600	1:15:00	130	162.50	0.23	
18	GT #2	U1	01/22/0440	01/22/0450	0:10:00	225	37.50	0.05	6
19	GT #2	U1	01/22/0455	01/22/0545	0:50:00	225	187.50	0.26	
20	ST #1	D1	01/22/0455	01/22/0545	0:50:00	130	108.33	0.15	

Table L2.2: Sample Data Summary									
Event #	Unit	Event Type	Start Date	End Date	Duration	Loss MW	Loss MWh	Equiv. Blk Hrs	Example
21	GT #2	PO	01/24/0000	01/31/1000	178:00:00	225	40,050.00	56.41	7
22	ST #1	PD	01/24/0000	01/24/0515	5:15:00	130	682.50	0.96	
23	ST #1	PO	01/24/0515	01/31/1130	174:15:00	260	45,305.00	63.81	
24	GT #1	PO	01/24/0530	01/31/1015	172:45:00	225	38,868.75	54.74	

Appendix M: Differences Between NERC-GADS and ISO-GADS Data Collection and Uses

There are a number of differences between the NERC GADS and the GADS run by Independent System Operators (ISOs), known as ISO GADS. Some of these differences are minor; others are not.

NERC GADS collects equipment outage data on a national basis. NERC GADS is an equipment outage system with a focus on plant reliability and assessments. The ISOs are charged with the reliability of the bulk electrical grid, dispatching generating units in an economical manner, and running their electric markets. In order to do this the ISO's, in some cases, follow their own definitions for things like OMC events, as specified in their market rules, which may differ from the way NERC GADS defines the same things. As a result, there are differences between the NERC GADS DRI and the various ISO GADS data reporting instructions as per their market rules. This means that reporting companies in some cases have to report their GADS data as per the ISO rules rather than the NERC rules. NERC will accept either with the understanding that generating unit histories reported under the ISO rules are inconsistent with those reported under NERC rules.

Listed below are brief descriptions on how certain ISOs utilize GADS data to support their marketing functions, reliability calculations, and specifically how their GADS procedures differ from those established by NERC.

PJM Interconnection (PJM) – Uses GADS data for ISO reliability studies and determining capacity payments to the Generator Owners. Significant features of the PJM GADS are:

- PJM uses the GADS data to determine capacity payments. These payments are based on the following equation:

  Capacity Payment = ICAP x Market Capacity Payment Price x (1 - EFORd of unit)

- Any generator that participates in the PJM Capacity Market must report GADS data irrespective of capability.
- PJM provides an optional service to report GADS data entered in the PJM eGADS application to OATI/NERC.
- Commencing June 1, 2018, PJM will not recognize any events as OMC. Although OMC event cause codes can be used, they will be treated as non-OMC in all calculations for the markets and reliability calculations. Data forwarded to OATI/NERC will include the original OMC cause codes.
- GADS data is reported and calculated against the unit's NET DEPENDABLE CAPACITY (NDC), not its NET MAXIMUM CAPACITY (NMC). Many companies ensure that their generator NET DEPENDABLE CAPCITY (NDC) is equal to the respective generator's PJM ICAP value and its NMC.
- Maintenance Outages and Derates (Event Types MO & D4) are limited to 9 days duration during the PJM Peak Maintenance Season. The PJM Peak Maintenance Season is defined in PJM Manual 10.
- Planned Outages and Derates (Event Types PO & PD) are prohibited during the PJM Peak Maintenance Season.
- All Planned and Maintenance Outages and Derates must be scheduled in advance per PJM Manual 10.
- MB and IR events must be approved by PJM and require removing the respective generators ICAP from the PJM Capacity Markets for the duration of the respective event. MB events are considered deactivations by PJM and have further market and reliability implications.
- Data must be submitted monthly to PJM on or before the 20th of the following month.
- Errors in a previously submitted month require access approval from PJM to correct data.

- Generator Owners must submit summer and winter capability verification tests twice a year via the PJM eGADS application. Winter and summer test periods are defined in PJM Manual 21. Hydroelectric and pumped storage generators are required to conduct and report one capability verification test per year in the summer period.

New York Independent System Operations (NYISO) – Uses GADS data for calculation of derating factors for the Installed Capacity (ICAP) Market, NYISO, the New York State Reliability Council's (NYSRC) Reliability Studies, and the determination of the Installed Reserve Margin (IRM) for the New York Control Area (NYCA). Differences between NERC GADS and NYISO generating unit reporting instructions include:

Item	NERC	NYISO	Implications
Weekend Definition	Friday at 2400 hours through Sunday at 2400 hours	Friday at 10:01:00 PM through Monday at 8:00:59 AM.	This impacts the determination of whether an event is categorized as a MO as opposed to a FO; EFORd
Plant boundary	High side of unit transformer	Generator Owner responsibility ends at the low side bushings of the generator step-up transformer	This impacts the applicability of the OMC code - 9300
Outside Management Control (OMC)		Exception permitted for equipment failure that involves equipment located on the electric network beyond the generator step-up transformer, and including the step-up transformer on the output side of the Generator (9300). This exception does not apply to fuel related outages or derates or other cause codes that might be classified as Outside Management Control (OMC) in the NERC GADS Data Reporting Instructions (DRI).	Only transmission related events (9300) are excluded from consideration in the EFORd calculation for ICAP
Maintenance Outage Definition (MO)	An outage that can be deferred beyond the end of the next weekend (Sunday at 2400 hours), but requires that the unit be removed from service, another outage state, or	An outage that received NYISO's approval (with minimum two days notice) and there are no reliability issues if the unit is removed from service.	

Item	NERC	NYISO	Implications
	Reserve Shutdown state before the next Planned Outage (PO). Characteristically, a MO can occur any time during the year, has a flexible start date, may or may not have a predetermined duration, and is usually much shorter than a PO.		
Planned Derate (PD)	A derating that is scheduled well in advance and is of a predetermined duration.	Planned/maintenance deratings must be coordinated by NYISO Operations with at least 2 days notice from unit's owner/operator.	
Maintenance Derating (D4)	A derating that can be deferred beyond the end of the next weekend but requires a reduction in capacity before the next Planned Outage (PO). A D4 can have a flexible start date and may or may not have a predetermined duration.	Approved by NYISO, and there are no reliability issues when the unit's output is reduced, flexible start time and does not require a predetermined duration	
Derate	Derates must be reported for capacity loss > 2% or capacity loss lasting more than 30 minutes	Derates must be reported for capacity loss > 3% or capacity loss lasting more than 15 minutes	
Event Contribution Code		NYISO only receives contribution code 1	
Submission requirements	Mandatory for 20 MW or larger conventional units in 2013	Required for ICAP suppliers	
Weekend Definition	Friday at 2400 hours through Sunday at 2400 hours	Friday at 10:01:00 PM through Monday at 8:00:59 AM.	This impacts the determination of whether an event is categorized as a MO as opposed to a FO; EFORd

Appendix N: GADS DRI Changes from 2023 to 2024

Introduction

- No major changes.

Table of Contents

- No major changes.

Section I – Introduction

- No major changes.

Section II – Data Scope and Transmittal

- No major changes.

Section III – Event Reporting

- Added Contributing Operating Condition field, descriptions

Section IV – Performance

- No major changes

Section V – Design Data Reporting

- See Appendix E

Appendix A – Change in Unit Status Report Form

- No major changes

Appendix B – Cause Codes

New Cause Codes – apply to all unit types:

- 9090 Physical security incident
- 9091 Physical security incident (OMC)
- 9092 Cyber security incident
- 9093 Cyber security incident (OMC)

Appendix C – Utility and Unit Identification Codes

- No major changes.

Appendix D – Cause Code Cross Reference

- No major changes.

Appendix E – Unit Design Data Forms

- Completely re-written for Mandatory Design Data (formerly Voluntary)

Appendix F – Performance Indexes and Equations

- No major changes.

Appendix G – Examples and Recommended Methods

- No major changes.

Appendix H – Failure Mechanism Codes

- No major changes.

Appendix I – GADS Data Release Guidelines

- No major changes.

Appendix J – Cause Code Amplification Codes

- No major changes.

Appendix K – Outside Management Control

- 9091 Physical security incident (OMC)
- 9093 Cyber security incident (OMC)

Appendix L1 – Calculating Combined-Cycle and Co-generation Block Data

- No major changes.

Appendix L2 – Calculating Combined-Cycle and Co-generation Block Data

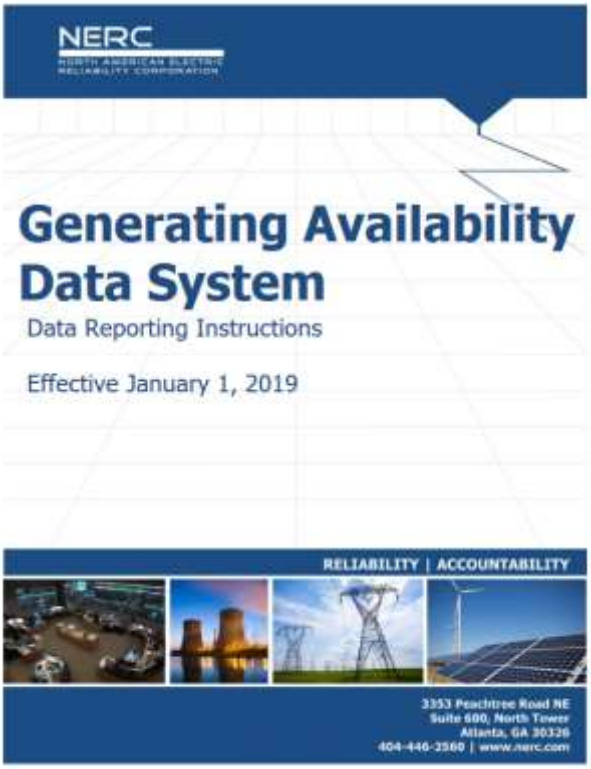
- No major changes.

Appendix M – Differences Between NERC-GADS and ISO-GADS Data Collection and Uses

- No major changes.

Hydro GADS

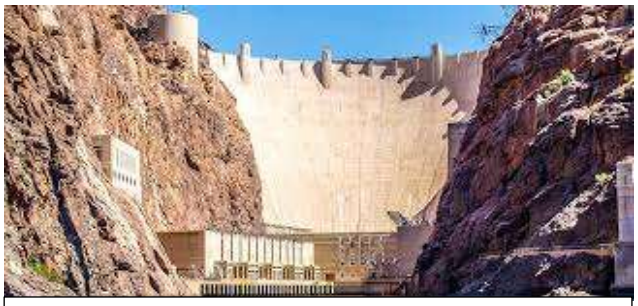
Introduction



Hydro Generating assets are included as part of the conventional GADS reporting system. These assets have been included in GADS reporting since very early on in the evolution of GADS. With the mandatory GADS reporting requirements, it became clear that different owners were reporting their unit status differently for some common operating conditions encountered with hydro units.

There were different methods used by owners to report on unit status when river flows were not high enough for all of the units in a powerhouse to operate. Some owners were recording this as forced outage due to lack of water, even though the units were run daily because the reservoir behind the dam had storage that was used. (These units would be cycled or pulsed.) Some owners reported the status of the units that were not able to run as Reserve Shutdown while some characterized this as Planned Outages because this was a known condition that repeated every year. Some owners did not report anything.

In other instances, hydro assets were attached to a reservoir that had no active storage so units could not be cycled. When these plants did not have enough water, units would be shut down for an extended period of time and not run at all. As with units capable of cycling, owners would report their unit status in a variety of ways: Forced Outage due to lack of water, Reserve Shutdown, Planned Outage, etc. In addition, because the units would be shut down for extended periods of time, there were some owners that would perform maintenance on their units when they were in this condition, but not report this as a Maintenance or Planned outage.



Hoover Dam

There are other operating scenarios that are relatively common with hydro units that are different than fossil/steam, gas turbines, combined cycle, and reciprocating engines. Specifically, these can include changes in head (fluctuating reservoir level) that cause a change in plant output that occur over hours, days, or seasonally. While this can be analogous to temperature impacts to gas turbine output, it is not a constant that can be used to predict the output deviation. Additionally, hydro units can be run as synchronous condensers (a.k.a. “motored”), and in the case of pump/turbines, pumping modes.

Also, hydro units are generally inspected on a periodic basis by their owners with no real identified maintenance need. Results of these Planned Outage inspections can identify other needs that may not have been expected. As with the cases above, inconsistency in reporting on the status of these units was a problem.

In an effort to gain better consistency in reporting, a Hydro Task Group was formed within the GADS User Group. This group was originally mobilized in 2013. The Task Group was expanded with the support of CEATI to create a larger hydro owner interest to identify issues and to provide input into the process. This effort led to

recommendations that have been moved forward to the GADS User Group. These have been vetted by that group and have been approved.

The next steps are to summarize these recommendations and institute them in a revision to the Data Reporting Instructions.

Hydro Inspection Cause Code 7300

The group adopted the cause code 7300 to represent periodic inspections. This code is intended to be used for Planned Outage events for periodic (i.e. annual, every four years, etc.) inspections on hydro units. This includes inspection work on turbines, generators, breakers, governors, exciters, etc. Inspection can include minor repair and maintenance. It is recognized that often, hydro units may go several years before a more significant outage is required. For example, many new runners may not require cavitation repair for several years.

Hydro Governor for Servicing

These inspections would include the work to access units (i.e. clearances, installation of scaffolding, removal of covers, etc.) needed to conduct the inspection and minor repairs. If the inspection discovers something that must be replaced or requires significant repair that would extend the inspection in order for the unit to continue normal operations, the outage would move to a Forced Outage and the appropriate cause code would be applied. This is consistent with traditional GADS reporting requirements.

For guidance, when it moves to a Forced Outage, the 7300 can be used as a secondary cause code. The primary cause code for Forced Outage should be assigned to the appropriate cause code for the equipment that is affected.

Additional Note: You can still have a specific Planned Outage to replace or repair an item listed in the cause codes if that is what the outage is started for. For example, if the owner has a four year cavitation repair cycle, the outage for the fourth year would be a Planned Outage for Turbine Runner Cavitation Repair (cause code 7010).

Additional Note: There are Generator Inspection and Turbine Inspection cause codes in the list (4840 – generator and 7201 – turbine). These codes would be used if the outage work is specific to inspect these particular elements. 7300 is for an overall general inspection.

Additional Note: Cause code 7300 is to be used exclusively with hydro assets. It is not to be used for fossil/steam, gas, reciprocating engines, or other conventional generating assets.

Example 1:

An Owner plans to take a hydro unit down for an annual inspection. The scope of this work is to install scaffolding in the runner area to allow crews to inspect the runner for damage and perform any minor repair that is needed. The scope also calls for the generator stator to be air cleaned, and new brushes installed in the existing brush holders. The governor hydraulics are to be flushed and the fluid filtered. Last, the main generator breaker is to be checked for contact timing and adjusted so that it meets original specification. The crews are also to take measurements, and make adjustments as needed over all elements of the unit. This would be coded:

Event: PO Cause Code: 7300

Example 2:

The same annual inspection is planned with the same scope of work. During the inspection, crews discover that the wicket gates have gotten out of timing and one of them has been damaged and requires some significant repair. In this case, the work to correct the wicket gates is out of planned scope. (The scope was to inspect and perform general TLC to the gate system, not repair damage.) The entire outage time for crews to correct this condition and perform the inspection would need to be changed from a Planned Outage to a Forced Outage. In this scenario, you would need to code the entire outage to:

Event: U2 Cause Code: 7141 (wicket gate operating mechanism or positioner)

In this example, the work had intended to be a PO / 7300. However, since significant repair to a system was required to restore the normal and proper operation to the unit, the work had to move to the U2.

Gross Maximum Capacity and Net Maximum Capacity (GMC and NMC)

In surveying hydro owners, strong consensus was provided that indicates that the station service and other parasitic loads at a hydro station are extremely small when compared to the output of the plant. For most, the difference between the gross and net is less than 0.1%. This contrasts to a typical 4-5% for a fossil/steam unit.

For this reason, the default Capacity Generation Estimation Factor[1] is set to 2.00% Another way to state this is that the GMC = NMC for hydro units.

There may be circumstances where a hydro plant has a relatively large station or parasitic load that needs to be accounted for (i.e. >2%). In those cases, the Owners are strongly encouraged to enter both a Gross and Net capacity so that the unit is properly characterized.

Additional Note: The current GADS data submittal allows owners to submit their Gross and Net numbers separately and many owners do this. The above discussion only applies to the default value in Table IV-4. These values are applied when an owner only submits a Gross or a Net capability in which case the GADS system calculates the missing Gross or Net based on the table.

Gross Dependable Capacity and Net Dependable Capacity (NMC and NDC)

Discussion of these parameters is the same as the GMC and NMC above. GDC = NDC. This is the default if no other data is given. As above, owners are encouraged to fill in the specific data if this difference is greater than 2%.

Change in Operating Head

At many hydro stations, the dependable capacity is related to the head, or difference in water level of the forebay or reservoir to the tailrace. The most common influence is the level of the forebay. During normal operation, many forebay levels will change daily or even hourly. If a project is used for flood control, the forebay may be “drafted” to a low level and held there for several months in anticipation of snow melt or for other flood control purposes. Even though these fluctuations can result in a representative decrease in output, it was concluded by the GADS User Group that these changes do not need to be taken into account when reporting capabilities for hydro units.

[1] Data Reporting Instructions, Page IV-5, Table IV-4: Unit Capacity Generation Factors and MW Multipliers.

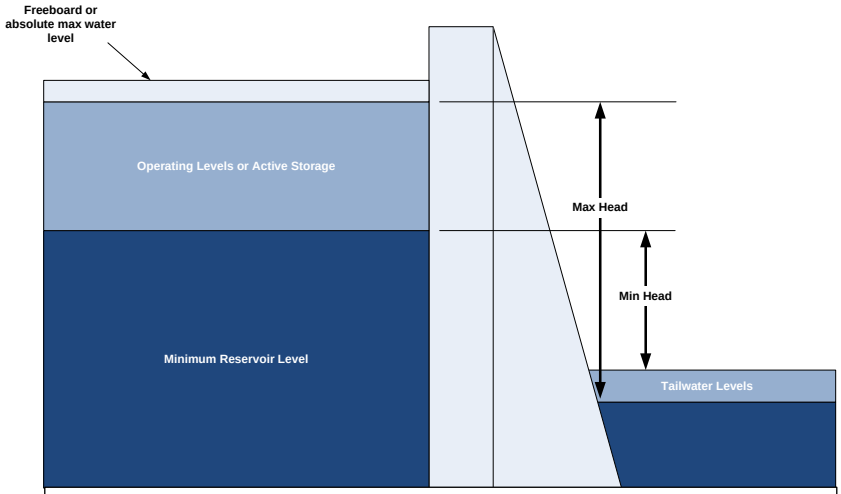
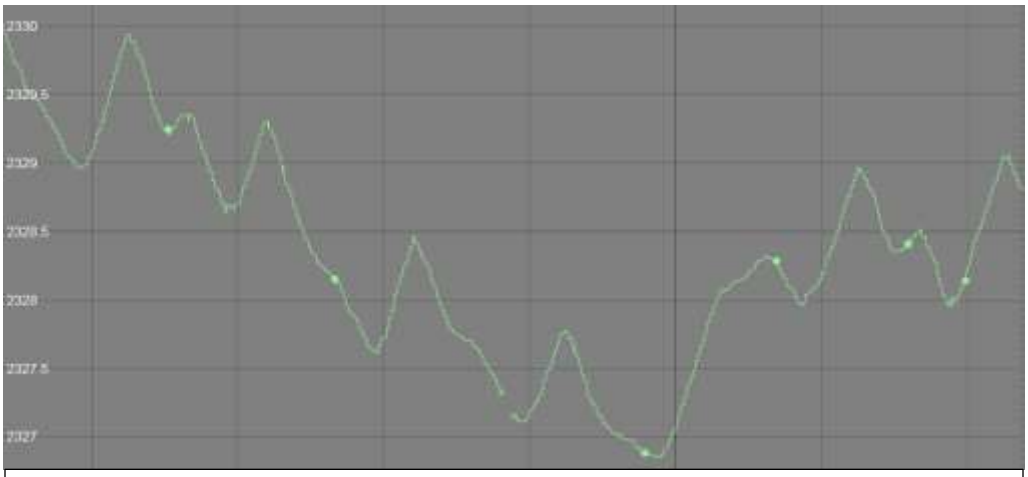


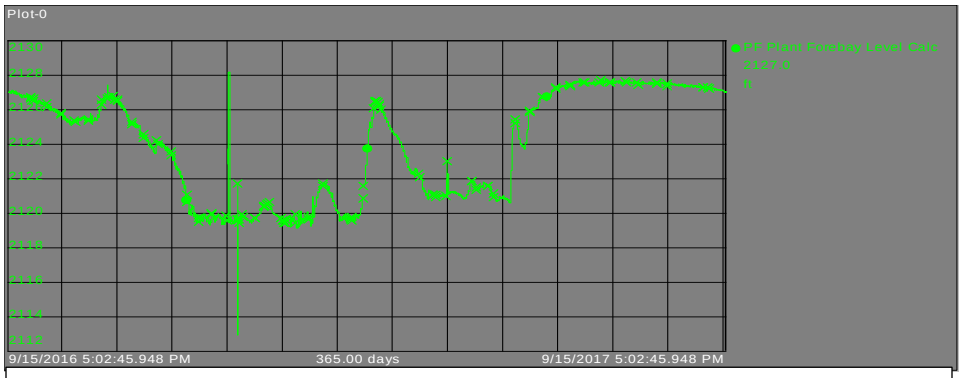
Illustration of Head Differences

The screen capture below is an illustration of how a hydro project forebay may cycle during a week. As just mentioned, while the loss of three feet of head in this example results in a drop in capacity of about 26MW's, at this particular project, it is not constant. As a practical matter, trying to collect this data and report an average or attempting to project this type of operation is a lot of effort for little benefit from a reporting (or planning) perspective. Most hydro owners will realize that every day may result in a different pattern for operation. It depends on system needs and markets that are unique for any time.



Example of Weekly Head Change
(Each vertical line is one day)

The exception here is if there is a seasonal draft for the reservoir. In some cases, where flood control is the primary mission of a dam, and power generation secondary, the reservoir is drafted, or partially emptied, to create storage for a future water surge. (This can be snow melt, rain storm or other weather event.) For these seasonal conditions that may last for a month or more, the owner is encouraged to report an estimated decrease in dependable capability.



Seasonal Change in Forebay Level
(Each vertical line is one month)

Additional Note: A similar condition exists for gas turbines in which ambient air conditions can affect the dependable capability of those units. Gas turbines are required to report any change in dependable capability due to changes in ambient temperatures. This can be argued as analogous to forebay fluctuations in hydro. While this may seem to be a similar situation, hydro reporting does not require these adjustments. (The possible exception is for seasonal changes as discussed above.)

Lack of Water for Peaking/Pulsing Units

Hydro plants that have active storage behind them and have a range of reservoir levels that they are allowed to operate within should be categorized as Peaking or Pulsing (Shaping, Regulating, Load Following, etc.) These can be characterized as plants that may be shut down (or mostly shut down) during some parts of the day or week, and then run at nearly full output for some parts of the day or week. Another description can be when units are shut down so that water can be stored (or restored) for a later operation – that day or tomorrow.

These types of plants would normally have a range of allowed forebay levels that they are required to operate within. These can be in the form of daily, weekly, or even monthly requirements. As an example, a plant can draft from the reservoir up to three feet as long as the operator never goes below the three foot limit in any given day. Another example is three feet in any given day and no more than four feet in a week. (In this last example, you could draft three feet in day one, one foot in day two, refill in day three and four, and then draft two feet in day five, and another two feet in day six, refilling in day seven.)

Peaking plants like these are typically designed to have enough water to run at full, or near full, capability for two to four months. After that, units are shut down for periods of time and then started to meet peak loads or market demands. Often these are for relatively short duration. As the water into the reservoir continues to decrease as the drier season sets in, multiple units can be shut down for periods of time. However, their status is still available as they may be called on to provide short duration capacity/energy into the system. There is no set definition of the duration of capacity they must provide as that can be determined by regional needs and ISO/RTO/Markets but usually these are two to four hours.

As these units are shut down so that water can be stored or restored, the units are to be placed in a Reserve Shutdown state. This means they are capable of operating at full load when called upon. The only issue is a dispatch issue on how much and how long.

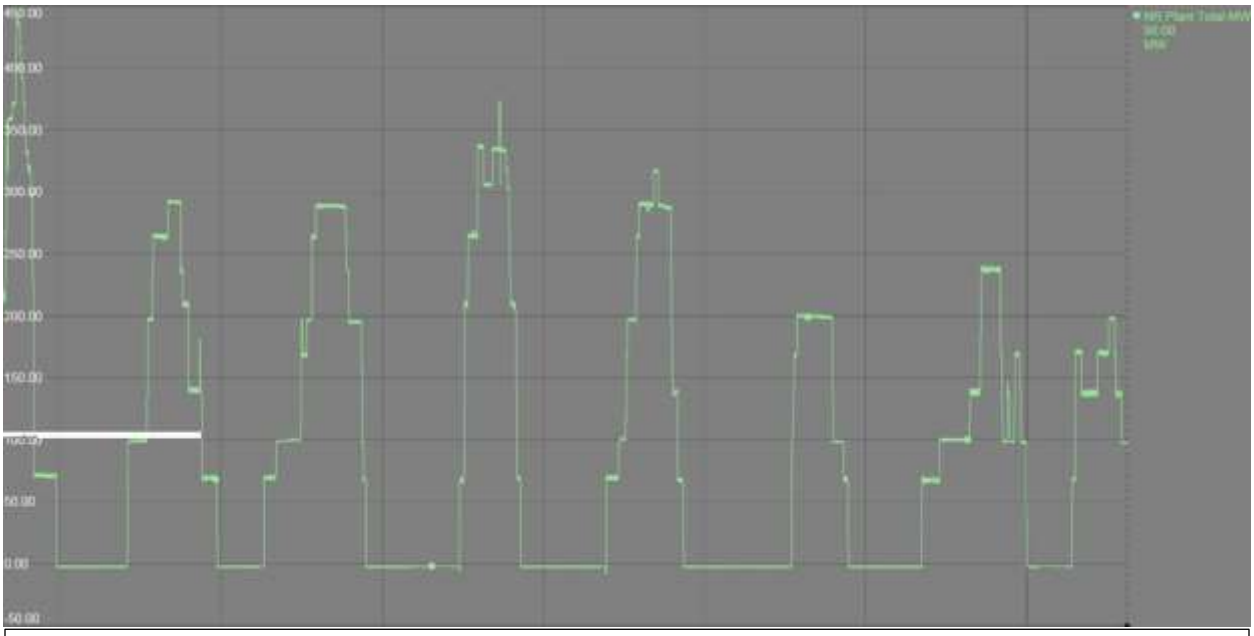


Illustration of a multiple unit Plant in a Peaking or Pulsing Mode
When units are shut down, they are placed in RS

It is possible with this type of operation that a unit can be in an RS state for several days without running. What is important to understand in this operational mode is that if needed, the unit(s) can be all turned on without violation of FERC license or other operational agreements, or imposing emergency measures that warrant a deviation of these licenses or agreements.

If a unit is placed in Reserve Shutdown due to water being stored or restored, and the decision is made to take the unit out of service for Planned Outage or Maintenance Outage work, the Reserve Shutdown would need to transition to a PO or MO with the appropriate cause code.

Example 3:

A four unit powerhouse is running one unit constantly, but it is changing output continuously due to AGC controls. During the day, to meet peak loads, the other three units are started at 1000 hours and then shut down at 1800 hours.

The next day, because the reservoir did not fill to the same level as the previous day, the unit schedule changed some. One unit is still used for AGC. Two of the units come on at 1000 hours and the last unit comes on at 1200 hours. The three units are all shut down at 1800 hours.

												Hours											
Day 1	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	00
Unit 1																								
Unit 2	RS	RS	RS	RS	RS	RS	RS	RS	RS										RS	RS	RS	RS	RS	RS
Unit 3	RS	RS	RS	RS	RS	RS	RS	RS	RS										RS	RS	RS	RS	RS	RS
Unit 4	RS	RS	RS	RS	RS	RS	RS	RS	RS										RS	RS	RS	RS	RS	RS
Day 2																								
Unit 1																								
Unit 2	RS	RS	RS	RS	RS	RS	RS	RS	RS										RS	RS	RS	RS	RS	RS
Unit 3	RS	RS	RS	RS	RS	RS	RS	RS	RS										RS	RS	RS	RS	RS	RS
Unit 4	RS	RS	RS	RS	RS	RS	RS	RS	RS	RS	RS								RS	RS	RS	RS	RS	RS

This would be coded:

Day 1
Unit 1: no events – the unit is running.
Unit 2: hours 01 to 09 - RS; no event between hours 10 to 18; hours 19 to 00 - RS
Unit 3: hours 01 to 09 - RS; no event between hours 10 to 18; hours 19 to 00 - RS
Unit 4: hours 01 to 09 - RS; no event between hours 10 to 18; hours 19 to 00 - RS

Day 2
Unit 1: no events – the unit is running.
Unit 2: hours 01 to 09 - RS; no event between hours 10 to 18; hours 19 to 00 - RS
Unit 3: hours 01 to 09 - RS; no event between hours 10 to 18; hours 19 to 00 - RS
Unit 4: hours 01 to 11 - RS; no event between hours 12 to 18; hours 19 to 00 - RS

Even though there is not enough water to run all of the units all the time, there is no lack of water cause code used here as the unit could be run if needed. (This does not include extreme measures which may be allowed by license or regulatory agencies agreeing to waive their requirements for the greater good.)

Example 4:

This example is similar except that late at night, a sudden loss or a generating unit somewhere on the system requires an injection of additional capacity. In this case, at the end of Day 1, two units are operated for four hours to cover this unexpected loss.

Because two units had to be run unplanned, the decision by dispatch for the next day is to keep one of the units shut down all day to allow for the reservoir to re-fill. This dispatch is illustrated below.

Hours

Day 1	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	00
Unit 1																								
Unit 2	RS	RS	RS	RS	RS	RS	RS	RS	RS										RS	RS	RS	RS		
Unit 3	RS	RS	RS	RS	RS	RS	RS	RS	RS										RS	RS	RS	RS		
Unit 4	RS	RS	RS	RS	RS	RS	RS	RS	RS										RS	RS	RS	RS	RS	RS

Day 2																								
Unit 1																								
Unit 2			RS	RS	RS	RS	RS	RS	RS										RS	RS	RS	RS	RS	RS
Unit 3			RS	RS	RS	RS	RS	RS	RS										RS	RS	RS	RS	RS	RS
Unit 4	RS	RS	RS	RS	RS	RS	RS	RS	RS	RS	RS	RS	RS	RS	RS	RS	RS	RS	RS	RS	RS	RS	RS	RS

This would be coded:

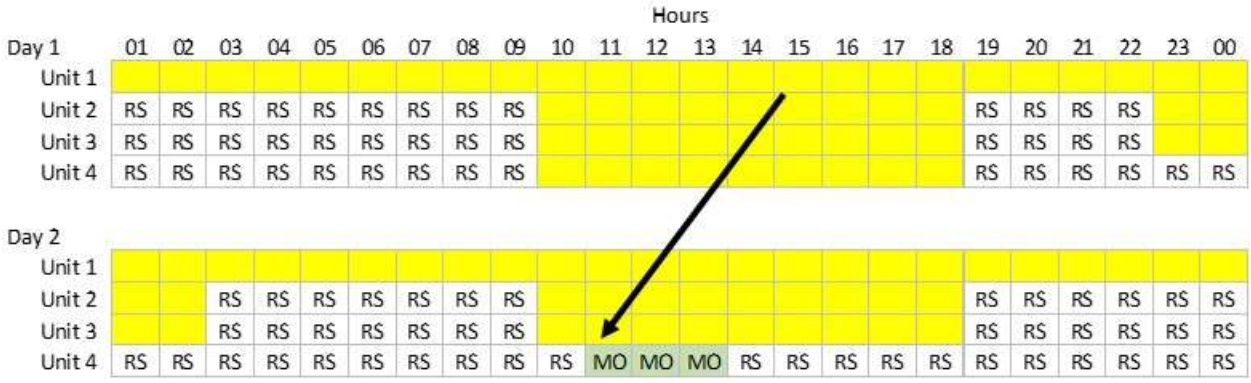
Day 1
Unit 1: no events – the unit is running.
Unit 2: hours 01 to 09 - RS; no event between hours 10 to 18; hours 19 to 22 - RS;
No event between hours 23 and 00
Unit 3: hours 01 to 09 - RS; no event between hours 10 to 18; hours 19 to 22 - RS;
No event between hours 23 and 00
Unit 4: hours 01 to 09 - RS; no event between hours 10 to 18; hours 19 to 00 - RS

Day 2
Unit 1: no events – the unit is running.

Unit 2: no event between hours 01 to 02; hours 03 to 09 - RS; no event between hours 10 to 18; hours 19 to 00 - RS
Unit 3: no event between hours 01 to 02; hours 03 to 09 - RS; no event between hours 10 to 18; hours 19 to 00 - RS
Unit 4: hours 01 to 00 - RS

Example 5:

This is the same as Example 4 except that with the knowledge that the fourth unit will not be run that day, the decision is made to take the unit out of service to address some minor problems with sticking that is occurring on the unit brakes. The unit is cleared for this work at 1100 hrs and is returned three hours later at 1300 hrs.

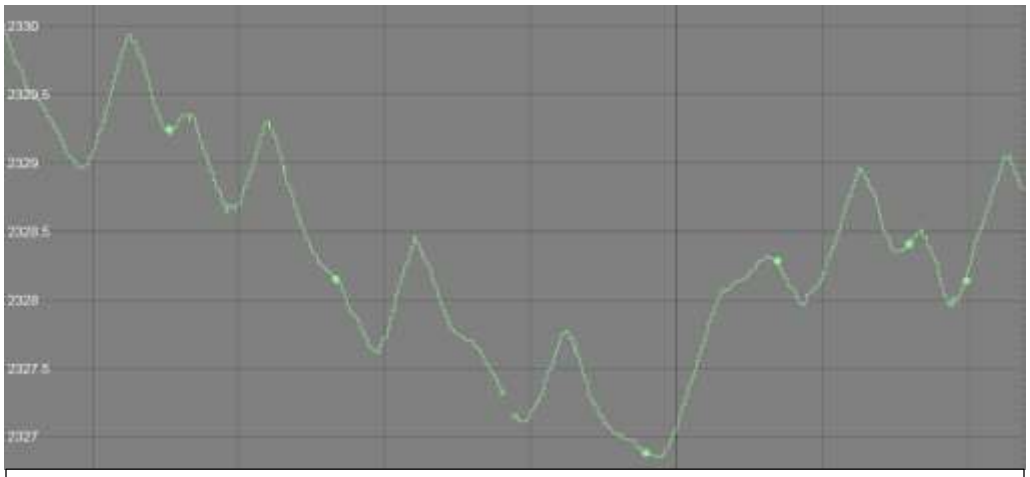


This would be coded:

Day 1
Unit 1: no events – the unit is running.
Unit 2: hours 01 to 09 - RS; no event between hours 10 to 18; hours 19 to 22 - RS;
No event between hours 23 and 00
Unit 3: hours 01 to 09 - RS; no event between hours 10 to 18; hours 19 to 22 - RS;
No event between hours 23 and 00
Unit 4: hours 01 to 09 - RS; no event between hours 10 to 18; hours 19 to 00 - RS

Day 2
Unit 1: no events – the unit is running.
Unit 2: no event between hours 01 to 02; hours 03 to 09 - RS; no event between hours 10 to 18; hours 19 to 00 - RS
Unit 3: no event between hours 01 to 02; hours 03 to 09 - RS; no event between hours 10 to 18; hours 19 to 00 - RS
Unit 4: hours 01 to 10 - RS; hours 11 to 13 event: MO, cause code: 4590 (generator brakes); hours 14 to 00 - RS

In these examples, unless the unit is removed from service for a Forced Outage, Maintenance Outage, or a Planned Outage, the units would be in Reserve Shutdown mode and fully capable to run, but dispatch is not asking them to run. This is true even though the water in the reservoir may be filling. The purpose of Example 4 is to give the sense that these units could be called on if the system needed the energy or market opportunities presented themselves.



Example of Weekly Head Change
(Each vertical line is one day)

Additional Note: It is possible that a plant like this might go one or two days without any unit actually generating as its reservoir is re-filling. However, these units would still be in Reserve Shutdown and they could be called to run. This illustration shows a plant that may be in this cicumstance. The reservoir storage was used heavily for several days and now plant operation is being limited to allow the reservoir to increase storage indicated by the rising level.

Additional Note: If a peaking plant is drafted for reasons (i.e. flood control) and the reservoir reaches a low limit and the reservoir must be maintained at that low level, the plant then enters a "run of river" mode and the events will also need to reflect that operating mode. This is described in the next section.

Lack of Water for Run of River Plants

Many hydro plants do not have active storage that allows the type of operation described in the Peaking/Pulsing type of plant operation. For many plants, a reservoir level is established as part of their FERC operating License or other Regulatory agency operating requirements. In these cases, the output of the plant can be described as "whatever is coming into the reservoir, must continuously go out" at the same rate. This places the plant output at whatever the natural stream flows are or in many cases, what the release of any upstream plants might be.

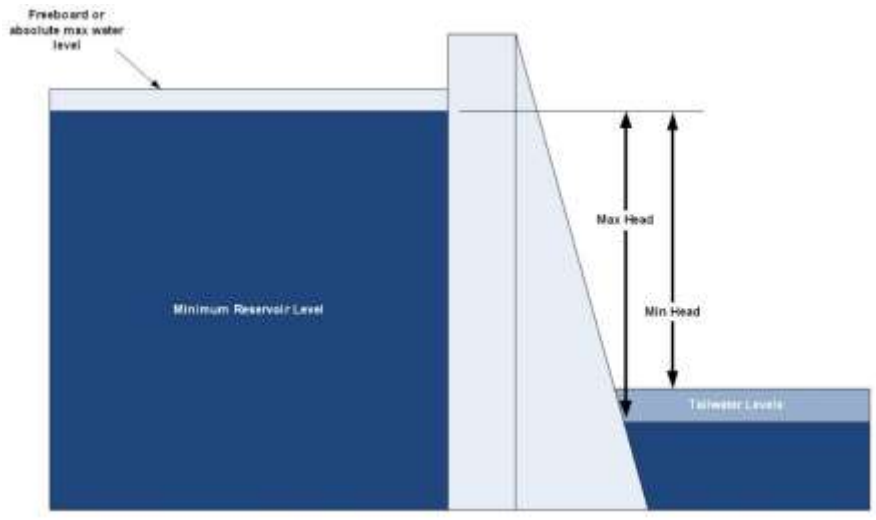
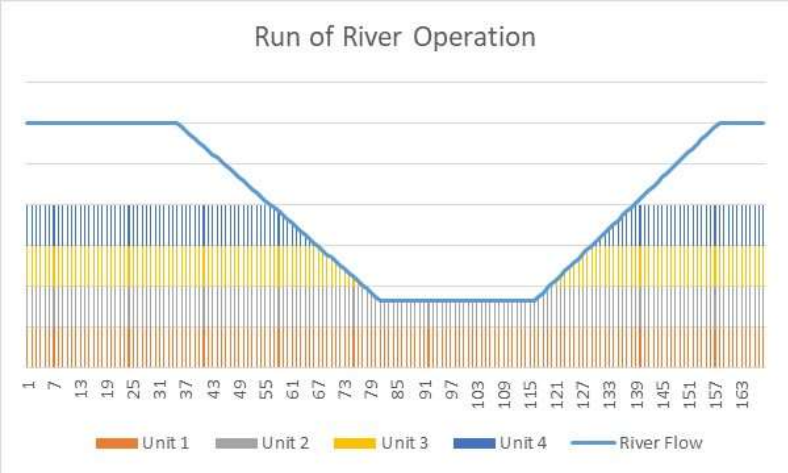


Illustration for Run of River Plant
Note the Reservoir Level has no latitude for fluctuation

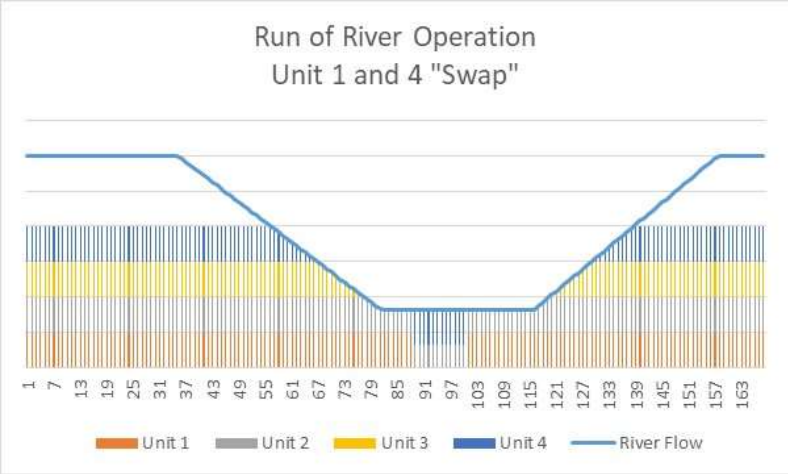
For these plants, as the stream flow decreases, units are required to be backed off and shut down in order to keep the reservoir level (i.e. forebay) at a constant elevation. In general, plant operators will gradually reduce the output of one unit until there is not enough water to operate the unit. At the time, the one unit will be shut down

and another unit will be gradually reduced, and then another, etc. When there is no longer enough water, the unit would be placed in a Forced Outage condition due to lack of water.



This is illustrated in the graphic below. In this illustration, Unit 4 runs until the water is insufficient and it is shut down. Unit 3 is the same, and Unit 2 is required to run at part load.

As a practical matter, many operations practice “swapping” units so that operating hours tend to balanced out between the units. Using the illustration here, when there is only enough water to run two units, the operator may choose to run Unit 4 and shut down Unit 1. This is illustrated in the graph below. You can see around time tag 91 that Unit 1 was taken off and Unit 4 was turned on. Around time tag 100, the units were again swapped.



For all of these conditions described, when a unit must be shut down because there is insufficient water to run all the units and there is no reservoir that would allow the units to run, these shut downs are to be categorized as a Forced Outage due to a lack of water.

There is a similar condition that can occur when units are shut down due to diversion of water to another channel for fish, wildlife, recreation, aesthetics, water supply, irrigation, or other purposes. In these types of operations, FERC License conditions or other regulatory requirements dictate that water priority is to be served to another use other than energy production. In some instances, this may require the entire plant to be shut down and all available water is diverted. In other cases, there may still be enough water to operate one or more units and still fulfill the regulatory obligations. Similar to the scenarios described above, when units need to be shut down due

to water being diverted away for power production reasons, the unit is to be categorized as a Forced Outage due to a lack of water due to regulatory requirements.

In both of these instances, the reason for the lack of water is considered to be outside management control. For those plants that are exclusively run of river, if stream flows fall to where units must be shut down, these would be characterized by:

> U3 (Forced Outage that could have been delayed over the weekend) and cause code 9135 – Lack of Water.

For those unit outages that are due to water being diverted away from the generating units for regulatory purposes, they would be characterized by:

> U3 and cause code 9696 – Other miscellaneous operational environmental limits – hydro and pumped storage.

(Note: while 9696 is not precisely the description, it is representative for this event.)

Lack of Water Amplification Code – WC - Water Condition

With the development and evolution of Wind GADS reporting, the concept of Resource Unavailable Turbine Hours was created. This was created to address those times where there was nothing wrong with the equipment, but it was not producing because there was no wind blowing (i.e. no resource). The lack of wind is clearly outside management's control, just like stream flow levels and regulatory requirements for hydro plants. The acronym RUTH is used to identify this event in Wind GADS.

After much discussion, it was determined that a new event type that could be used for hydro was not practical for several reasons. It would create a new event that is different from historical events and would therefore compromise some of the data integrity of the existing data sets. Also, there was the matter of GADS software suppliers and ISO/RTO groups and the modifications to their code that would have to be implemented to create a new Event Code for hydro.

It was finally determined that a new Amplification Code (Amp Code or AC) could be identified and used in conjunction with the conventional GADS reporting criteria that would meet the requirements outlined above. It was determined to use the Amplification Code WC = "water condition" to describe these times when there is a lack of water for natural or regulator reasons at a run of river plant.

An additional benefit of this method is that if Planned Outage work or Maintenance Outage work was scheduled during this period of time – which would make the most sense – it would provide a way to identify the work being done in this lack of water condition.

Similar to RUTH in wind, the use of this amplification code provides a mechanism for hydro owners to characterize their units from an "equipment" perspective and allows planners and reliability operators to characterize the units from a "resource" perspective. In simple terms, if a unit is shut down due to lack of water, from a "resource" perspective that unit is not available for production and is viewed as a forced outage, due to lack of fuel and outside of management control. However, from an "equipment" perspective, the hours that the unit does not have water would not affect the unit reliability for plant performance metrics purposes used by the owner.

This concept is already covered in the conventional GADS equations. These are referred to as the "X" Equations in Appendix F of the DRI.[2] These "X" equations are presented to allow owners to remove those events that are

[2] Data Reporting Instructions (DRI); Appendix F: Performance Indexes and Equations; 2021 version

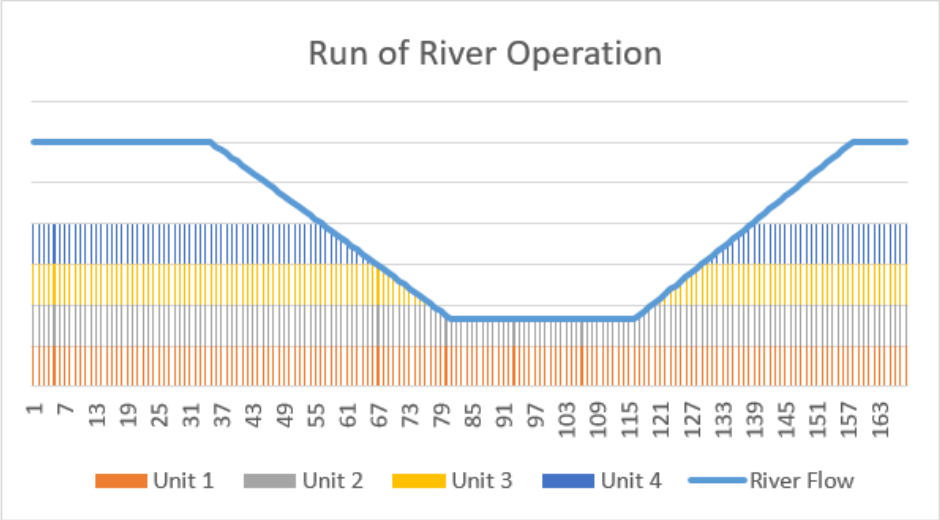
outside management control (OMC). Lack of Water (9135) and Regulatory (9405) are two of several OMC events that can be carved out by the definitions used for these "X" equations.

Using a similar logic as presented above, in order to keep the integrity of the existing system in place, it was determined that a separate set of equations for hydro assets that use this amplification code would be developed. The primary rationale for this is the correlation this event has with RUTH in the wind GADS reporting, the result being the ability to define "resource" and "equipment" performance metrics which are appropriately representative for their respective purposes.

Additionally, this provides a way for owners to place units in a Planned or Maintenance Outage when there is no water available and capture that event. Owners can then take units out of service without impacting their operating requirements.

Example 6:

The plant in the illustration below is a four unit plant. Due to reducing water releases from an upstream plant, the stream flows fall below the full capacity of the four units. Unit 4 is shut off on June 1 at 1400 hours (time tag 61 on the graph). Flows are high enough on November 1 at 2200 hours (time tag 127) and the unit is successfully started up and returns to normal operating service - at less than full load, but the unit is capable of full load.



This would be coded:

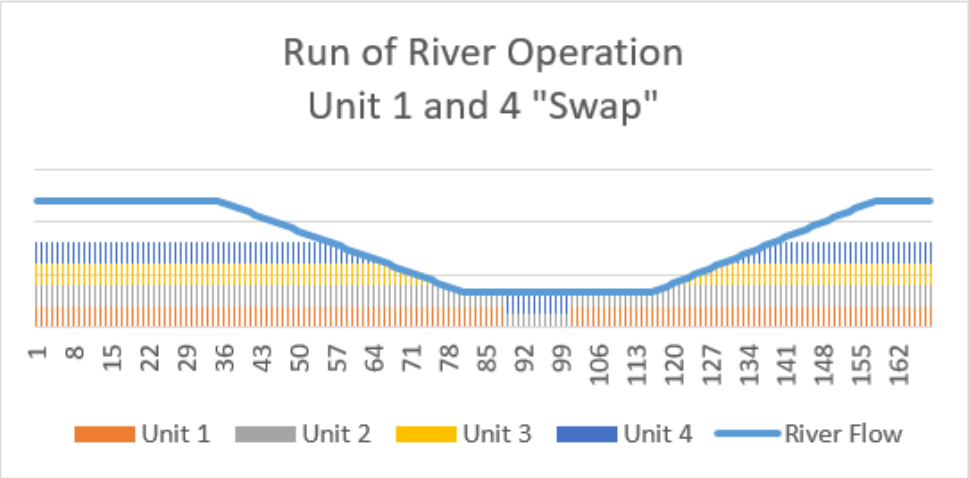
On June 1 at 1400 hours, Event: U3 Cause Code: 9135 Amp Code: WC

Unit 4 would remain in this status until November 1 at 2200 hours at which time this event ends.

Example 7:

The illustration below is for the same plant. As before, water conditions due to upstream releases do not allow all of the units to operate any longer due to lack of water. As before, Unit 4 is shut off on June 1 at 1400 hours (time tag 61 on the graph). On August 1 at 0600 hours (time tag 92) operations decides to reduce the operating hours on Unit 1 and shuts down Unit 1 and successfully starts up Unit 4. Now Unit 2 and Unit 4 are the operating units. Unit 4 is run for one month and on August 31 at 0600 hours Unit 1 is successfully returned to service and Unit 4 is shut down.

Flows are high enough on November 1 at 2200 hours (time tag 127) and Unit 4 is successfully started up and returns to normal operating service – at less than full load, but the unit is capable of full load



This should be coded:

Unit 1:

August 1 at 0600 hours; Event: U3, Cause Code: 9135, Amp Code: WC
August 31 at 0600 hours - Returned to Service (no event)

Unit 4:

June 1 at 1400 hours; Event: U3, Cause Code: 9135, Amp Code: WC
August 1 at 0600 hours - Returned to Service (no event)
August 31 at 0600 hours; Event: U3, Cause Code: 9135, Amp Code: WC
November 1 at 2200 hours - Returned to Service (no event)

Example 8:

This is exactly the same as Example 7 except that this time, Unit 1 is taken out of service and some Maintenance Work is performed on the fuses in the excitation rectifier bridge (Cause Code 4609)

This should be coded:

Unit 1:

August 1 at 0600 hours; Event: MO, Cause Code: 4609, Amp Code: WC
August 31 at 0600 hours - Returned to Service (no event)

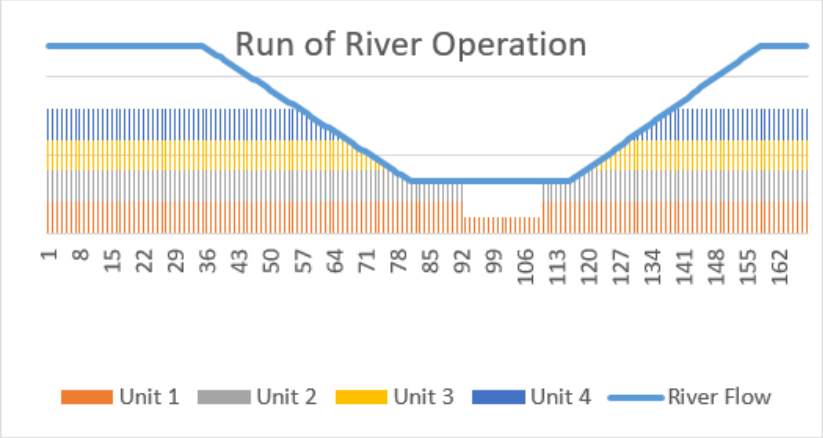
Unit 4 (no difference from above):

June 1 at 1400 hours; Event: U3, Cause Code: 9135, Amp Code: WC
August 1 at 0600 hours - Returned to Service (no event)
August 31 at 0600 hours; Event: U3, Cause Code: 9135, Amp Code: WC
November 1 at 2200 hours - Returned to Service (no event)

Importantly, note that the Maintenance Outage event (MO) still has the Amp Code WC attached to it as this maintenance work was performed when there was not enough water to operate this run of river plant. The implications of this are to be covered in the Equations section.

Example 9:

This is a similar situation as Example 7 above. In this example, a local agreement requires that on June 1 at 0600 hours until July 15 at 2200 hours the plant provide a minimum flow into a bypass reach to accommodate fish passage. This requires Unit 2 to be shut down and Unit 1 to be run at reduced load during this period of time.



This should be coded:

Unit 1:

June 1 at 0600 hours - No event, the plant continues to run Unit 1 at reduced load

Unit 2:

June 1 at 0600 hours, Event: U3, Cause Code: 9696, Amp Code: WC
July 15 2200 hours - Returned to Service (no event)

Unit 4:

June 1 at 1400 hours, Event: U3, Cause Code: 9135, Amp Code: WC
August 1 0600 hours - Returned to Service (no event)

Additional Note: For a complete description/coding for this event, Unit 3 would also be moved to a U3/9135/WC record with the appropriate time stamp. It would mimic the record for Unit 4. It was not included in the examples to shorten the example.

Additional Note: Some hydro plants experience times where the river flows are too high and units must be shut down due to lack of operating head. (These would typically be plants that are relatively low gross head with tail water conditions that rise when river flows are high. The combination creates a condition where there is not enough operating head (i.e. pressure to the runner) for the unit to produce power.) In these cases, the cause code 9000 – Flood along with the Amp Code WC should be used.

Tailwater Too High (cause code 9138 – High Water Level in Tailrace)

There are operating conditions with hydro turbines that can occur where the tailwater elevation becomes too high and the turbine does not have enough head (i.e. elevation difference between the forebay and tailwater levels) to operate reliably and the unit is shut down. This is not a common issue but does come up with some plants. When this operating condition occurs, the shutdown should be coded as a forced outage, U3, and given the cause code 9138.

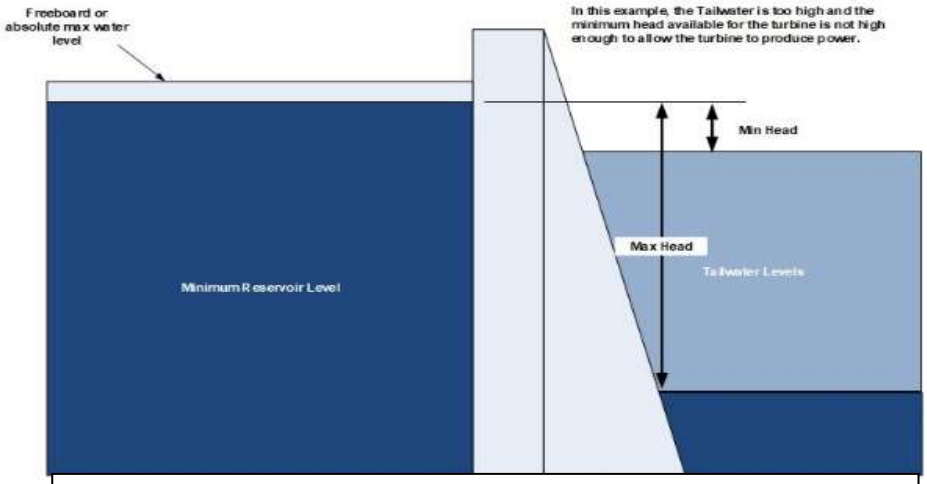


Illustration of High Tailwater Condition

Generally, this condition can occur when river flows are high due to flooding conditions that could be caused by severe rain storms or spring freshets when snow melt causes rivers to swell. If the tailwater channel below the turbine discharge area is constrained or the tailwater channel below the dam is constrained, the water is "backed up" and the tailwater level will rise. On a relatively low head dam, it is possible that the tailwater elevation rises to the point where there is not enough net head for the turbine to run. It is also possible that the turbines are unstable during these low head conditions which would also cause a shutdown.

Tailrace or Tailwater Issues (Cause Code 7180 – Tailrace)

GADS also has Tailrace cause code 7180. This is intended for a different purpose than code 9138. Another potential problem that is sometimes encountered at hydro plants is if the tailrace is too low to allow backpressure to build up on the turbine discharge that can cause water pressure fluctuations and an unstable turbine. While this condition can be alleviated with vacuum break valves or similar, some plants are not equipped with these devices and a lack of tailwater can prevent the unit from being placed on-line due to the instability. This should be coded as U1 or U2, cause code 7180.

Another use for this cause code would be if there was construction in the tailrace area to remove restrictions caused by debris in the tail channel. (I.e. a dredging project or debris removal project). In these cases, this could be a Planned Outage (PO) or could be a Maintenance Outage (MO) if it is in response to a land slide or other natural event.

Powerhouse Derate with Multiple Units

(This discussion can apply to any power station that has multiple Units and an overall station output limit is directed by an outside entity, typically it would be a transmission limitation.)

In a multiple unit powerhouse, there can be a limitation placed on the total output of the powerhouse that is not to be exceeded. There are many times where this limit may not pose a practical limit from an operational limit due to a lack of water. When this occurs, the limitation is to be stated as a derate on a unit or combination of units until the amount of the derate of the units is matched with the limit imposed on the powerhouse.

The examples below are set up to help illustrate how this is handled. There are some imbedded assumptions in this example. The first is that the plant is a peaking or pulsing plant. The second assumption is all units are fully available to generate to their full capability if called upon.

In the examples below, there is a three unit powerhouse with each unit's net dependable capacity (NDC=GDC) is 100 MW. There are two examples, one is the plant is limited to 240 MW output even though the plant could produce 300 MW. The other example is the plant is limited to 180 MW even though the plant could produce 300 MW.

There are three circumstances that are used to illustrate how a derate would be applied. These do not represent all of the possible combinations, but are intended to show the intent of how a plant limitation would be handled.

Constraint	Unit Size			
	100 MW	100 MW	100MW	
240 MW	On	Off	Off	A derate is required note 1
	On	On	Off	A derate is required note 2
	On	On	On	A derate is required note 3
180 MW	Off	On	Off	A derate is required note 4
	On	Off	On	A derate is required note 5
	On	On	On	A derate is required note 6

note 1	In this case, the plant needs to be derated 60 MW. You could choose to derate one off-line unit 60 MW, or split the derate between the two off-line units (i.e. derate 30 MW each, 20 MW on one unit or 40 MW on the other, etc.)
note 2	This is similar to note 1 except in this case the unit that is not operating would carry the full 60 MW derate. (However, you could elect to derate the two operating units and limit their output and reduce the amount of derate on the non-operating unit.)
note 3	As above, this would be spread according to how the units are operated. You may choose to limit the output of Unit 3 to only 40 MW. Alternatively, you could de-rate each of the units to 80 MW output.
note 4	Similar to Note 1, this would require the derate be set on one or split between both of the units.
note 5	In this case, there is not enough capacity available for the two units to operate so a derate would have to be set on the non-operating unit and the remainder either assigned or divided to the other two operating units.
note 6	As above, this would be spread according to how the units are operated.

In these examples, the derate would be coded as an immediate forced derate, D1, as this is imposed by an authority, not equipment condition. The most likely cause code would be 3619 – Other switchyard equipment – external (OMC). No Amp Code would be required.

Additional Note: If the same 300 MW plant is a run of river plant, the units would only be coded this way if there was water available that would allow generation to be above the 240 MW limit. If river flows are low enough so that only two units could operate, as an example, there would be no derate necessary. Using the 180 MW example above, if the river flows would only allow 200 MW of output, the plant would be derated by 20 MW over its current circumstance. The units would be coded:

Unit 1 – no events, operating as normal

Unit 2 – D1 (20MW), cause code 3619- Other switchyard equipment – external (OMC), no Amp Code

Unit 3 - U3, cause code 9135 – Lack of Water, Amp Code WC – Water Conditions

Hydro Equations

As stated above, there are times for run of river projects when units are out of service due to a lack of water. However, these units could be operated so their capability from an equipment perspective should reflect the lack of water condition. The circumstances here mirror the concept of RUTH in the Wind GADS reporting. In Wind, two sets of parallel equations were developed. One to report performance on the resource (includes RUTH hours), and one to report performance on the equipment (excludes RUTH hours). This same concept is currently being considered with Solar GADS as well. (How to account for hours when the sun is not shining.)

The current GADS system provides for a system of "X" equations that are specifically designed to create the performance measures that exclude those events that are outside management control (OMC). In concept, these are similar to the resource or equipment perspectives that are captured in Wind GADS using RUTH. However, these "X" equations would include all OMC events (such as the transmission limit discussed above) and it would be extra effort for both programmers and users to extract those "Water Condition" outages from the equations.

After considerable deliberation and vetting by different groups, it was determined that two sets of equations should be developed for hydro, one for "equipment" and one for "resource", to determine the appropriate measures that would use the WC amp code as the qualifier. In short, the equipment equations would remove those hours when water was not available to operate the units, but the units were fully capable. With this methodology, it provides for outages during water conditions to not count against the equipment but still clearly assess the resources true availability from a planning or analysis perspective.

This method will also preserve the historically reported GADS data of the hydro assets. Data will continue to be reported as it had before. Only the new amp code will be added for those specific water conditions.

A series of equations for hydro will be developed that reflect the energy time diagram below. As can be seen, for run of river hydro stations there are the WC events as well.

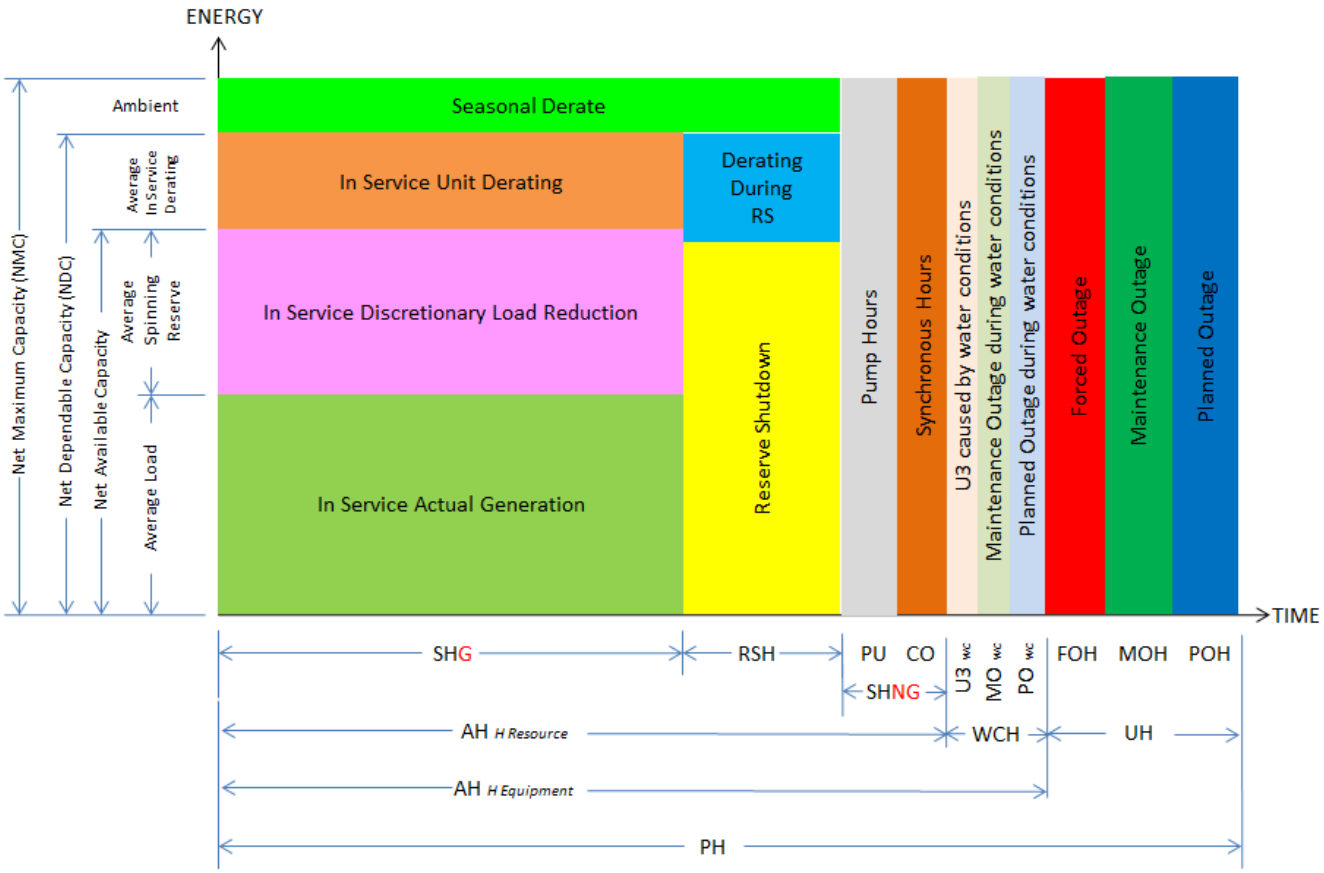


Figure 1: Hydro Unit Energy-Time Diagram

Abbreviations:

AH $_{H\ Resource}$ – Available Hours, hydro resource
AH $_{H\ Equipment}$ – Available Hours, hydro equipment
CO – Synchronous Condensing Hours
FOH – Forced Outage Hours
MOH – Maintenance Outage Hours
MO $_{wc}$ – Maintenance Outage Hours during water conditions
PH – Period Hours
POH – Planned Outage Hours
PO $_{wc}$ – Planned Outage Hours during water conditions
PU – Pumping Hours
RSH – Reserve Shutdown Hours
SHG – Service Hours generating
SHNG – Service Hours non-generating
U3 $_{wc}$ – U3 forced outage during water conditions
UH - Unplanned Hours
WCH – Water Condition Hours

As an example, in conventional GADS the Availability Factor (AF) is defined as:

$$AF = \frac{AH}{PH} X100\%$$

AH – Available Hours

PH – Period hours

$$AH = RSH + SH + +Sync\ Cond\ Hours + Pumping\ Hours$$

Substituting

$$AF = \frac{RSH + SH + +Sync\ Cond\ Hours + Pumping\ Hours}{PH} X100\%$$

This is as defined in Appendix F of the GADS DRI.

For run of river hydro, the Availability Factor from a resource perspective would be identical

$$AF_{h\ Resource} = \frac{RSH + SH + +Sync\ Cond\ Hours + Pumping\ Hours}{PH} X100\%$$

With the WC amp code, there are now some hours which would be counted as available for run of river hydro plants. For Run of River, those hours that are separated by the WC amp code would also be considered available hours. With this stipulation, the Available Hours for equipment would be:

$$AH_{h\ Equipment} = RSH + SH + Sync\ Cond\ hours + Pumping\ Hours + U3_{WC} + PO_{WC} + MO_{WC}$$

Substituting this into the equation for Availability Factor for hydro equipment:

$$AF_{h\ Equipment} = \frac{RSH + SH + Sync\ Cond\ hours + Pumping\ Hours + U3_{WC} + PO_{WC} + MO_{WC}}{PH} X100\%$$

A set of equations that characterize run of river hydro in this way would be developed similarly.

Additional Note: For peaking or pulsing hydro plants, the traditional equations would apply and these equations that account for water conditions would not be used.

IN THE MATTER OF:
ELECTRONIC 2023 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2023-00310

BIG RIVERS ELECTRIC CORPORATION'S RESPONSES TO
SIERRA CLUB'S POST-HEARING DATA REQUESTS

REQUEST NO. PH-4: ***Please refer to Sierra Club's cross-examination of Big Rivers witness Michael Mizell beginning at approximately 4:18 PM on May 22, 2024.***

a. Please update BREC's Response to Sierra Club Data Request 1-11 to incorporate analysis of EPA's final Clean Air Act Section 111(D) Greenhouse Gas Pollution Rule.

b. Please share any analysis Big Rivers has conducted on the cost of complying with the rule and please share any analysis Big Rivers has conducted on retirement scenarios based on different compliance dates with the rule.

RESPONSE:

a. Big Rivers' analysis of the EPA's final rule is ongoing and will likely continue throughout 2024. Big Rivers is consulting with other utilities and various industry groups to gain a better analysis of options. Additionally, Big Rivers has met with the Kentucky Energy and Environment Cabinet's Division for Air Quality to discuss its plans for the development of the Kentucky State Implementation Plan.

b. Please see the response to subpart a., above. Big Rivers has not conducted the analyses described, as it continues to review the EPA's final rule and evaluate the Commonwealth's approach to development of the Kentucky State Implementation Plan.

Witness: Michael S. Mizell

IN THE MATTER OF:
ELECTRONIC 2023 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2023-00310

BIG RIVERS ELECTRIC CORPORATION'S RESPONSES TO
SIERRA CLUB'S POST-HEARING DATA REQUESTS

REQUEST NO. PH-5: ***Please refer to Sierra Club's cross-examination of Big Rivers witness Michael Mizell beginning at approximately 4:20 PM on May 22, 2024. Please also refer to Sierra Club Exhibit SC-6 EPA MATS Technical Analysis (Unit-Level).***

a. In SC-6, in analyzing compliance costs with the final MATS rule, EPA identifies the "Lowest Achieved fPM Rate (lowest 99th percentile, lb/MMBtu)" for DB Wilson as 0.10 lb/MMBtu.

i. Does Big Rivers dispute this data point? If so, please provide data, analysis, and workpapers showing why it is inaccurate.

ii. Based on this fPM rate, EPA calculates an annualized cost in 2019 dollars of complying with the 0.10 lb/MMBtu limit of $88,162.55. Please explain why this is inaccurate, providing all workpapers for analysis disputing EPA's analysis.

iii. Based on this fPM rate, EPA calculates an annualized cost in 2019 dollars of complying with the 0.06 lb/MMBtu limit of $10,776,749. Please explain why this is inaccurate, providing all workpapers for analysis disputing EPA's analysis.

iv. Mr. Mizell referred to "numerous operational data" and "EPA's own data" as disputing EPA's analysis in SC-6. Please provide that data as well as an explanation as to why that data renders EPA's analysis in SC-6 inaccurate.

b. Please share any analysis Big Rivers has conducted on the cost of complying with the final MATS rule.

RESPONSE:

a.

i. The correct data point established by EPA in the referenced Sierra Club Exhibit SC-6 as the "Lowest Achieved fPM Rate (lowest 99th percentile, lb/MMBtu)" is 0.010. Big Rivers continues to analyze the "Lowest Achieved fPM Rate (lowest 99th percentile, lb/MMBtu)" for DB Wilson. Please see below responses.

ii. As noted in EPA's January 2024 memorandum to which Exhibit SC-6 serves as an attachment (the "EPA 2024 Technical Memo"),[1] Wilson as currently operated has achieved a fPM rate of 0.010 "on multiple occasions for long periods of time." Utilizing the Commission-approved upgrades to the Wilson Flue Gas Desulfurization (FGD) system completed in 2023, Big Rivers believes it can continue to achieve the fPM rate of 0.010 without the need for additional upgrades or O&M expenses not already modeled in the existing O&M cost estimates for the unit.[2]

[1] Exhibit SC-6 is an EPA spreadsheet utilized by the Sierra Club as part of its cross-examination of Mr. Mizell during the hearing in this matter. The spreadsheet is actually "Attachment 1" to the EPA 2024 Technical Memo, "2024 Update to the 2023 Proposed Technology Review for the Coal- and Oil-Fired EGU Source Category," a copy of which (without the attachments) was utilized by Joint Intervenors in connection with their cross-examination of Mr. Michael S. Mizell during the hearing, but apparently not formally identified or introduced. *See* 2023 IRP Hearing, Testimony of Michael S. Mizzell (May 22, 2024) at 3:00:45 p.m.; 4:20:35 p.m. A copy of the EPA 2024 Technical Memo, excluding its attachments (as provided by Joint Intervenors' counsel the morning of the hearing), is provided as an attachment hereto..

[2] *See* 2023 IRP Hearing, Testimony of Michael S. Mizell (May 22, 2024), 3:04:45 p.m. – 3:08:17 p.m.

iii. As discussed in subpart ii., above, the upgraded Wilson FGD system was only recently placed into operation, and Big Rivers is still trying to determine what additional efficiencies can be achieved by the new unit. It is premature for EPA to conclude that Wilson will be unable to achieve the 0.006 limit until additional operation information is available.

iv. Both Sierra Club Exhibit SC-6 and the EPA 2024 Technical Memo contain the operational data showing, as noted by EPA, that Wilson has "on multiple occasions for long periods of time" met the 0.010 limit. Additionally, EPA's cost assumptions were based on operational data that does not recognize the upgraded Wilson FGD, and there is not yet sufficient operational data to determine the extent to which the Wilson FGD unit can meet the identified standards without additional investment.

b. As discussed above and at the hearing, Big Rivers continues to analyze the final MATS rule and its potential impacts on Wilson. At this time, costs analyses have not been undertaken as Big Rivers evaluates whether the upgraded Wilson FGD unit can meet the updated standards.

Witness: Michael S. Mizell

MEMORANDUM

FROM:	Sarah Benish, Nick Hutson, Erich Eschmann U.S. EPA/OAR
TO:	Docket ID. No: EPA-HQ-OAR-2018-0794
DATE:	January 2024
SUBJECT:	2024 Update to the 2023 Proposed Technology Review for the Coal- and Oil-Fired EGU Source Category (2024 Technical Memo)

This memorandum documents the updates and revisions to the 2023 technology review the U.S. Environmental Protection Agency (EPA) conducted in accordance with section 112(d)(6) of the Clean Air Act to identify developments in practices, processes, and control technologies applicable to sources subject to the National Emission Standards for Hazardous Air Pollutants (NESHAP) for coal- and oil-fired electric utility steam generating units (EGUs) (40 CFR 63, subpart UUUUU).[1] Most of the updates presented in this memorandum to the 2023 Proposed Technology Review are the result of information received in public comments. This memorandum is organized as follows:

1. Filterable Particulate Matter (fPM) Emission Limit
    a. Assessment of Additional Data
    b. Unit List Review
    c. PM Controls Upgrade Costs and Emission Reductions
2. Oil-fired EGU Emission Limits
    a. Summary
    b. Background on Winter Storm Elliot
    c. Emission Performance Evaluation of Oil EGUs Operating in New England During Winter Storm Elliot
3. Mercury Limit for Lignite-Fired EGUs
    a. Hg Emissions from Coal-fired EGUs
    b. Review of the Hg Emission Standard for Lignite-Fired EGUs

[1] 88 FR 24854; April 14, 2023.

c. Determination of an Achievable Hg Emission Standard for Lignite-Fired EGUs
d. Cost of Meeting the Revised Emission Standard

4. Transparency of PM CEMS
    a. Case Study 1
    b. Case Study 2

The following attachments supporting the analysis presented in this memorandum are available in the docket:

- Attachment 1: Excel spreadsheet with unit list of EGUs, cost and emission reduction assumptions, and calculations for the assessed limits. Note: this file contains rounded numbers;
- Attachment 2: pdf of Jupyter notebook plotting additional fPM data; and
- Attachment 3: Excel spreadsheet of hourly PM CEMS data shown in section 4.

Acronyms:

Btu	British Thermal Units
C2G	Coal to gas conversion
CAA	Clean Air Act
CEDRI	Compliance and Emissions Data Reporting Interface
CEMS	continuous emission monitoring systems
DFO	Distillate fuel oil
EGU	electric utility steam generating unit
EIA	Energy Information Administration
ESP	electrostatic precipitator
FERC	Federal Energy Regulatory Commission
FF	fabric filter
FGD	flue gas desulfurization
fPM	filterable particulate matter
GWh	gigawatt-hour
HAP	hazardous air pollutants(s)
HCl	hydrogen chloride
HF	hydrogen flouride
Hg	mercury
Hg^0	elemental Hg vapor
ICR	Information Collection Request
IPM	Integrated Planning Model

ISO	Independent system operator
ISO-NE	Independent system operator New England
lbs/yr	pounds per year
LEE	low emitting EGU
MATS	Mercury and Air Toxics Standards
MM	million
MW	megawatt
NEEDS	National Electric Energy Data System
NERC	North American Electric Reliability Corporation
NESHAP	national emission standards for hazardous air pollutants
OAQPS	Office of Air Quality Planning and Standards
PM	particulate matter
RFO	Residual fuel oil
RTO	Regional transmission organization
RTR	risk and technology review
SO_2	sulfur dioxide
TBtu	trillion British thermal units
tpy	tons per year
WebFIRE	Web Factor Information Retrieval System

1. Filterable Particulate Matter (fPM) Emission Limit

a. Assessment of Additional Data

Commenters noted that the Agency's fPM review only included one to two quarters of data for a vast majority of EGUs. As described in the 2023 Technology Review memorandum (Docket ID No. EPA-HQ-OAR-2018-0794-5789), data selection aimed to include recent compliance years during quarters with typically higher electricity demand (winter and summer). Since proposal, the EPA reviewed all available historical fPM compliance data for 62 EGUs at 33 facilities.[2] The additional data are available in the docket[3]. While the Agency collects quarterly compliance reports across the fleet, obtaining the data available on WebFIRE or CEDRI is time-consuming, requiring separate file downloads for each quarter for each EGU and

[2] Revised data for 2019 Q3 submitted by White Bluff Unit 1 were also updated.

[3] Excel spreadsheets for each facility are available in Docket ID No. EPA-HQ-OAR-2018-0794 at *regulations.gov*. A subset of available data for nine facilities in Region 7 (George Neal North, George Neal South, Gerald Gentleman, John Twitty Energy Center, Louisa, Nebraska City, Sheldon, Walter Scott Jr Energy, and Whelan Energy Center) are provided in one Excel spreadsheet (only passing test results were used in the updated analysis).

transcribing the data from a portable document format (pdf) file into an Excel file. Data reviewed includes EGUs identified in the 2023 Proposal as needing to install fPM upgrades to meet the proposed fPM limit of 0.010 lb/MMBtu. The Agency acknowledges that this revised analysis was based on one quarter of data for 48 EGUs and two quarters of data for 155 EGUs. The vast majority of these EGUs with one or two quarters of data indicate average fPM rates below 0.010 lb/MMBtu and therefore have very low or minimal costs estimated to meet the proposed and finalized fPM limit. However, if the Agency were able to pull data for every quarter for every EGU in this analysis, it would only lower the lowest achieved fPM rate, therefore potentially decreasing PM upgrade costs to meet a lower fPM limit. This is because we select the lowest value of all quarterly 99th percentiles as the lowest achieved fPM rate. For example, if we were to calculate the 99th percentile for an additional quarter of data and that new value is less than the previous lowest achieved fPM rate, we would then select the new value as the lowest achieved fPM rate. Attachment 1 contains a spreadsheet with a column indicating which EGUs had additional data reviewing (see "Additional Data Review since Proposal" column (either yes or no) in the "Unit-Level Information and Inputs" sheet) and Attachment 2 includes the Python plotting code written to plot and assess the additional data that is presented below. During this additional review, the Agency was unable to locate some fPM compliance reports or specific information, as identified in Table 1.

Table 1. EGUs with unavailable data or other missing information encountered during the EPA's review of additional fPM compliance data.

Plant Name	**NEEDS[4] Unique ID**	**Description**
Big Stone	6098_B_1	2017 & 2018 fPM compliance reports contain stack averages and not individual stack test runs
Colver Power	10143_B_ABB01	Complete test reports after 2019 not found in CEDRI; June 2022 test result indicates 0.000859 lb/MMBtu
Coronado	6177_B_U1B, 6177_B_U2B	fPM continuous emission monitoring system (CEMS) compliance reports do not contain 30-day running average for certain days: 5/31/21, 5/31/22, and 8/31/22
D B Wilson	6823_B_W1	Unable to locate 2017 Q2 and Q3 fPM compliance reports

[4] The National Electric Energy Data System (NEEDS) database contains generation unit information used in the EPA's power sector modeling. See *https://www.epa.gov/power-sector-modeling/national-electric-energy-data-system-needs*.

Foster Wheeler	10343_B_SG-101	Unable to locate fPM compliance reports in CEDRI after 2020
Gavin Power, LLC	8102_B_1, 8102_B_2	Unable to locate additional fPM compliance data in CEDRI
Martin Lake	6146_B_1	Unable to locate 2019 Q1 fPM CEMS compliance data
Red Hills	55076_B_AA01, 55076_B_AA02	Unable to locate several quarters of quarterly stack test fPM compliance data
San Miguel	6183_B_SM-1	Unable to locate quarterly stack test fPM compliance data in CEDRI after 2018 Q1
St Nicholas Cogen	54634_B_1	Unable to locate fPM compliance data for 2022 and 2023 in CEDRI
Westwood Generation	50611_B_031	Unable to locate individual stack test runs as compliance reports only contain stack averages
Whelan Energy	60_B_1	Unable to locate additional fPM compliance data in CEDRI

The review of the additional compliance data reveal most EGUs had previously demonstrated much lower fPM rates than estimated for the 2023 Proposal, but also exhibited large variability within quarters and annually. Commenters similarly conveyed their observations that the data illustrate a large degree of temporal variation in the 30-day averages, and the fact that the emissions happened to be low during a single quarter does not indicate that that same level of performance can be consistently achieved over time. For instance, at D B Wilson, as shown in Figure 1 (as well as Case Study #16 in Attachment 2), the PM CEMS 30-boiler operating day rolling average fPM data show consistent quarterly emission rates of approximately 0.016 lb/MMBtu from mid-2020 to the end of 2022, well below the 0.030 lb/MMBtu standard. After this time, 30-day rolling average fPM rates dropped sharply in early 2023 to approximately 0.007 lb/MMBtu. Data from D B Wilson also show rapidly decreasing 30 boiler operating day rolling average fPM rates from approximately 0.025 lb/MMBtu in mid-2017 to approximately 0.009 lb/MMBtu in early 2019. The average and median of the PM CEMS data are very close to the 2023 Proposal fPM assumption for D B Wilson of 0.015 lb/MMBtu. The review of additional fPM compliance data find a revised lowest achieved fPM rate for the 2024 Final Rule of 0.010 lb/MMBtu, a fPM rate this facility has achieved on multiple occasions for long periods of time. However, as the average fPM rate of all available data is 0.0148 lb/MMBtu,

it is likely this EGU will need to invest in some O&M of its ESP in order to reduce the fPM rate variability to meet a lower limit consistently.

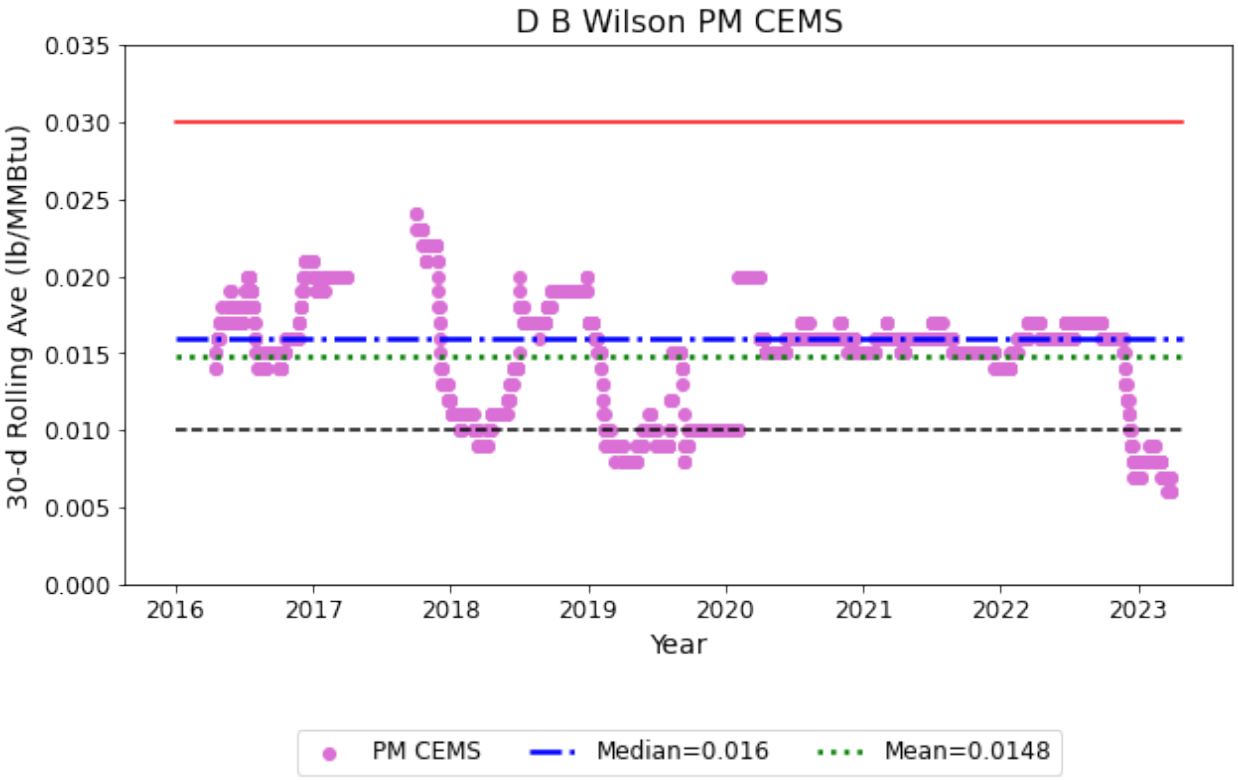


Figure 1. fPM compliance data from D B Wilson from 2016-2023.

Similarly, PM CEMS data from Marion, as shown in Figure 2 (Case Study #14 in Attachment 2), show 30 boiler operating day rolling average values ranging from less than 0.005 lb/MMBtu to approximately 0.026 lb/MMBtu from 2017 to 2023, but the data are highly variable within a quarter, rapidly ramping up and down. The median and mean of the PM CEMS data is approximately 0.014 lb/MMBtu, slightly lower than the 2023 Proposal assumption of 0.017 lb/MMBtu. The revised lowest achieved fPM rate is 0.005 lb/MMBtu, but it is clear that this rate is not representative of its "normal" average operating conditions.

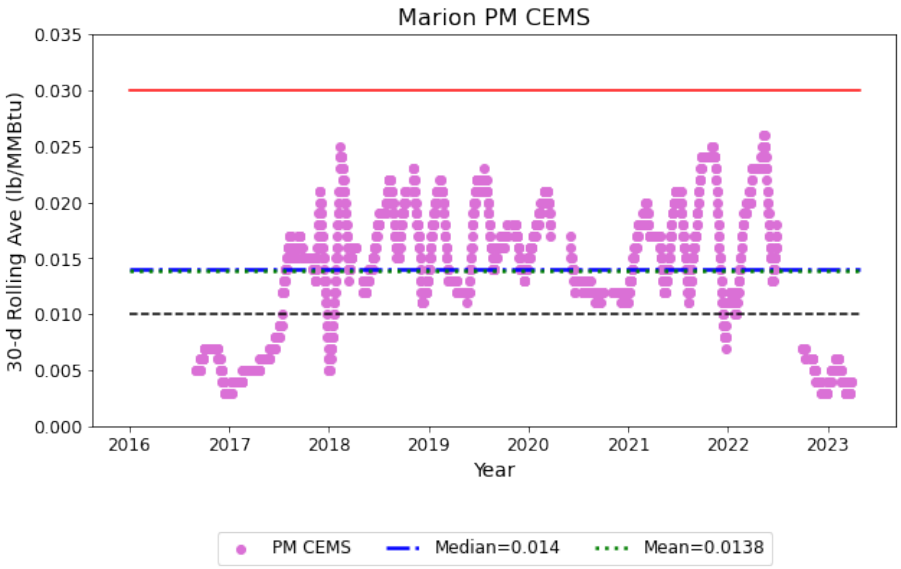


Figure 2. fPM CEMS compliance data for Marion from mid-2016 through the beginning of 2023.

Intermittent stack testing data also reveal highly variable fPM averages. For instance, data from Red Hills, shown in Figure 3 (Case Study #29 in Attachment 2), reveal variable fPM rates, especially in the last several quarters: as low as 0.003 lb/MMBtu in 2021 Q1 to approximately 0.027 lb/MMBtu in 2022 Q3. The 2023 Proposal assumption for Red Hills was 0.004 lb/MMBtu and the revised assumption for the 2024 Final Rule is 0.0037 lb/MMBtu. However, these proposed and revised lowest demonstrated fPM rates are not met consistently, even with controlled "snapshot" testing conditions during stack testing.

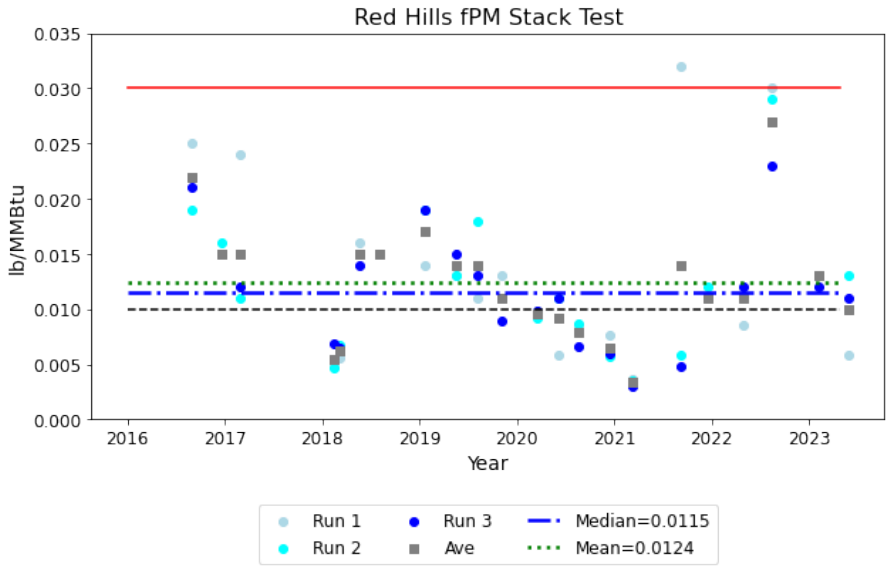


Figure 3. Red Hills fPM stack test data from mid-2016 to early 2023.

As a result of the additional data review, the Agency determined that the lowest achieved fPM rate is not representative of actual emissions on average for use in emission reduction and cost-effectiveness calculations. However, the lowest achieved fPM rate remains effective for identifying EGUs that have historically achieved lower fPM rates, despite not being required to do so and without additional capital investments. The updated analysis first, identifies EGUs that have not previously demonstrated an ability to meet a lower fPM limit using the lowest achieved fPM rate or average fPM rate; and second, uses the average fPM rate calculated from all available data (either 30-boiler operating day rolling averages or individual stack test runs depending on compliance method) to account for unit variability and to determine emission reductions on average anticipated from a lower fPM limit. The revised lowest achieved fPM rate and average fPM rate for each EGU, as well as the number of quarters these rates are based on, are located in the "Unit-Level Information and Inputs" sheet of Attachment 1.

b. Unit List Review

The analysis for the proposal considered 275 coal-fired EGUs expected to be operational on January 1, 2029. In reviewing the unit list for the final rule, the EPA considered comments submitted to the docket. Commenters on the proposal stated the analysis supporting the proposed fPM limit of 0.010 lb/MMBtu and the more stringent option of 0.006 lb/MMBtu excluded EGUs that may not have retired or ceased burning coal by the compliance deadline of 2029, which

commenters claimed have generally higher PM rates compared to the assessed fleet. Commenters also noted the analysis included some units that have plans to convert to gas in 2025, excluded some EGUs with no current plans to retire or switch to gas, and included some EGUs with federally enforceable retirement dates of December 31, 2028. Commenters correctly stated there was no 2017 data for Entergy's five EGUs (RS Nelson, White Bluff, and Independence), but mistakenly stated only White Bluff Unit 1 had 2021 Q1 data. Commenters from Louisville Gas and Electric Company and Kentucky Utilities Company (LGE-KU, part of Docket ID No. EPA-HQ-OAR-2018-0794-5989) noted that the last 30-boiler operating day rolling average or average of the 30-day rolling averages was used for their facilities, however this was not the case as 99th percentiles of each quarter of data were computed and coincidently matched the last 30-day rolling average.

In updating this analysis for the final rule, the Agency used the most recent version of the National Electric Energy Data System (NEEDS) available at the time (see 8-7-23 version at https://www.epa.gov/power-sector-modeling/national-electric-energy-data-system-needs), which incorporates comments received on the proposed rule. This version excludes 29 EGUs with plans to convert to gas or retire by 2029 and adds 51 EGUs that were not included in the proposal analysis (either due to changes in announced retirement dates or errors in the original analysis) if subject to MATS and operating on January 1, 2029. Table 2 summaries the EGUs that were removed or added for the final PM analysis. Units identified in Appendix A from the 2023 Technology Review memorandum (Docket ID No. EPA-HQ-OAR-2018-0794-5789) were added to the analysis unless the EGU has announced plans to retire or convert to gas before 2029 or if no data were available in CEDRI. The revised analysis considers 296 coal-fired EGUs expected to burn coal by the start of the compliance period. Attachment 1, accompanying this 2024 Technical Memo docket entry, includes a list of the EGUs in the "Unit-Level Information & Inputs" sheet.

Table 2. EGUs that were added or removed from the final PM analysis since proposal.

Plant Name	**NEEDS Unique ID**	**Added or Removed?**	**Notes**
AES Petersburg	994_B_3, 994_B_4	Removed	C2G conversion in 2025

Allen S King	1915_B_1	Added	Retirement date changed from 2028 to 2029
Barry	3_B_5	Added	No longer retiring in 2028
Belle River	6034_B_1, 6034_B_2	Removed	C2G conversion in 2026, 2025
Big Cajun 2	6055_B_2B3	Added	Retirement date changed from 2027 to 2032
Bowen	703_B_1BLR, 703_B_2BLR	Added	No longer retiring in 2028
Brame Energy Center	6190_B_2	Removed	C2G/Retiring in 2028
Brame Energy Center	6190_B_3-1, 6190_B_3-2	Added	No longer retiring in 2027
Brunner Island	3140_B_1, 3140_B_2	Removed	C2G conversion in 2021
Cayuga	1001_B_1, 1001_B_2	Added	Retirement date changed from 2028 to 2029
Clay Boswell	1893_B_3	Added	Historical compliance for multiple units that have since retired
Colstrip	10784_B_BLR1	Added	Data were not available for proposal
Cope	7210_B_COP1	Removed	C2G conversion in 2019
Craig	6021_B_C2	Added	Retirement date changed from 2028 to 2029
Cross	130_B_2	Added	Reviewed CPMS data
Dave Johnston	4158_B_BW43	Removed	Retiring in 2027
E C Gaston	26_B_5	Removed	C2G conversion in 2028
E W Brown	1355_B_3	Added	Retirement date changed from 2028 to 2029
FirstEnergy Bay Shore	2878_B_1	Added	Converted lb/MWh
FirstEnergy Harrison Power Station	3944_B_1, 3944_B_2, 3944_B_3	Added	Converted lb/MWh
FirstEnergy Fort Martin Power Station	3943_B_1, 3943_B_2	Added	Converted lb/MWh
Harrington	6193_B_063B	Removed	C2G conversion in 2024
Hayden	525_B_H1	Added	Retirement date changed from 2028 to 2029

John W Turk Jr Power Plant	56564_G_SN-01	Added	Misnamed unit ID led to data unable to be pulled for proposal
La Cygne	1241_B_1	Added	Retirement date changed from 2025 to 2032
Marshall	2727_B_1, 2727_B_2	Added	Retirement date changed from 2026 to 2029
Mayo	6250_B_1A, 6250_B_1B	Added	Retirement updated to 2029
Morgantown Energy	10743_B_CFB1, 10743_B_CFB2	Removed	Not subject to MATS (capacity is 25 MW)
Muscatine Plant #1	1167_B_8	Added	No longer retiring in 2023
Muskogee	2952_B_6	Added	Converted CPMS data, started stack testing in 2020
Naughton	4162_B_1, 4162_B_2	Removed	Retiring in 2025
North Omaha	2291_B_5	Removed	Switching to gas in 2026
Pawnee	6248_B_1	Removed	C2G conversion in 2026
Prairie State Generating Station	55856_G_PC1, 55856_G_PC2	Added	Misnamed unit ID led to data unable to be pulled for proposal
R D Green	6639_B_G1, 6639_B_G2	Removed	C2G conversion in 2022
Roxboro	2712_B_4A, 2712_B_4B, 2712_B_1, 2712_B_2, 2712_B_3A, 2712_B_3B	Added	1, 2: Retirement date changed from 2028 to 2029 3A, 3B: Retirement date changed from 2027 to 2034 4A, 4B: Retirement date changed from 2027 to 2034
Scherer	6257_G_1, 6257_B_3	Added	Retirement date changed from 2028 to 2029
Sooner	6095_B_1	Added	Converted CPMS data
Talen Energy Montour	3149_B_1, 3149_B_2	Removed	C2G conversion in 2025
TES Filer City Station	50835_B_1, 50835_B_2	Removed	Retiring in 2025
T S Power Plant	56224_B_BLR100	Removed	C2G conversion in 2022

Virginia City Hybrid Energy Center	56808_G_1, 56808_G_2	Added	Misnamed unit ID led to data unable to be pulled for proposal
Wateree	3297_B_WAT1, 3297_B_WAT2	Added	Retirement date changed from 2028 to 2029
Welsh	6139_B_1, 6139_B_3	Removed	Retiring in 2028
White Bluff	6009_B_1, 6009_B_2	Removed	According to Attachment B from the Class of 85 comments, both units at White Bluff are subject to federally enforceable requirements to cease coal combustion no later than December 31, 2028.
Williams	3298_B_WIL1	Added	Retirement changed from 2028 to 2029
Winyah	6249_B_1, 6249_B_2, 6249_B_3, 6249_B_4	Added	Converted CPMS data

The EPA previously evaluated select quarterly fPM compliance data for coal-fired EGUs from 2017 to 2021. For each quarter of data for an EGU, the 99th percentile of 30-day rolling average fPM rates (for EGUs demonstrating compliance with PM CEMS, removing invalid data flags) or 99th percentile of all individual test runs (for EGUs using stack testing) was computed. A scatterplot ranking the assessed fPM rates for the coal-fired EGU fleet was shown in Figure 1 in the 2023 Proposal, showing EGUs are reporting fPM emissions well below the 0.030 lb/MMBtu fPM limit. Using the expanded compliance data described above, this figure was updated, as shown in Figure 4 in this document. This updated figure shows that 93 percent of EGUs have previously demonstrated an ability to meet a fPM limit of 0.010 lb/MMBtu, up from 91 percent shown in the 2023 Proposal.

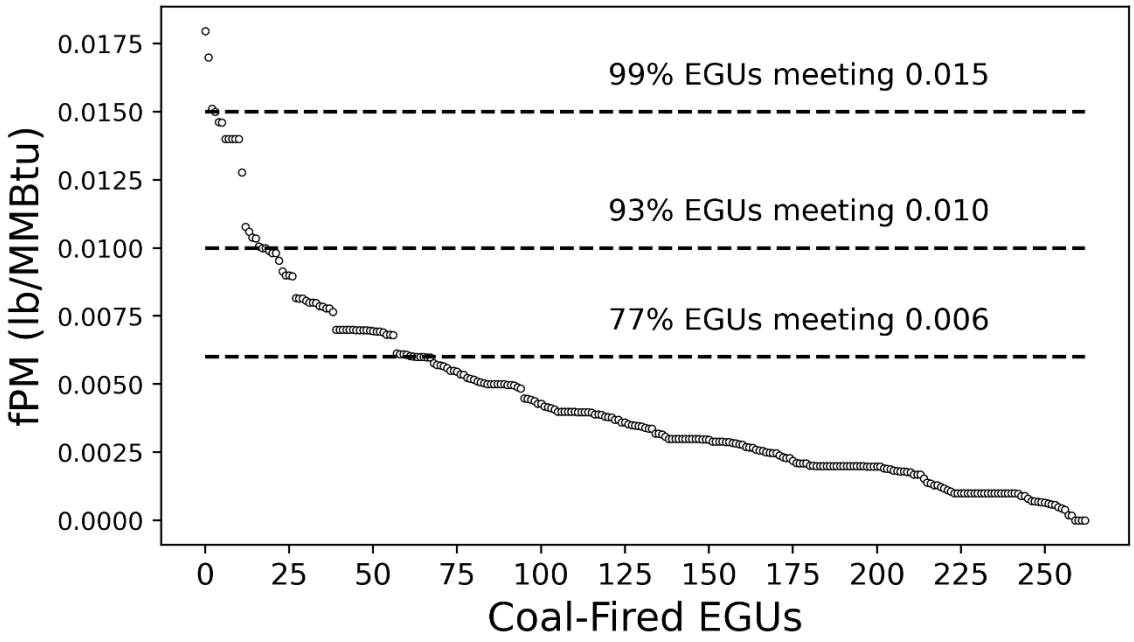


Figure 4. fPM emission rates from coal-fired EGUs ranked, from left to right, from highest fPM emitting to lowest fPM emitting. The dashed lines show the percentage of units that have previously demonstrated emission rates below 0.015, 0.010, and 0.006 lb/MMBtu.

The fPM rate used in the costs, emission reduction, and cost effectiveness calculations in the proposal for each EGU was defined as the minimum value of all available quarterly 99th percentile values (*e.g.*, "lowest quarter's 99th percentile"). While called the "baseline fPM rate" or "baseline," this rate more accurately represents the largest fPM rate in the lowest-emitting quarter with its current control configuration. As commenters noted, and the EPA agrees with based on the data review conducted in section 1a of this technical memorandum, the "baseline fPM rate" is not representative of average operations for most EGUs. Therefore, for this final rule, we redefine the "baseline fPM rate" as the "lowest achieved fPM rate." The "lowest achieved rate" represents the highest fPM rates observed in the lowest-emitting quarter (not the lowest fPM rate measured during the quarter) and thus may overestimate the "lowest achieved rate" in reality for some EGUs since the EPA was unable to review all historical fPM compliance data. As described above, if the Agency evaluated all historical fPM compliance data, the "lowest achieved fPM rate" could only be potentially lower.

c. PM Controls Upgrade Costs and Emission Reductions

Information submitted to the docket during the public comment period informed the revisions in PM control costs. The schematic in Figure 5 summarizes the PM upgrades assumed in the cost-effectiveness analysis and modeling of the final rule based on how the lowest achieved fPM rate and average fPM rate relate to the fPM rate being analyzed.

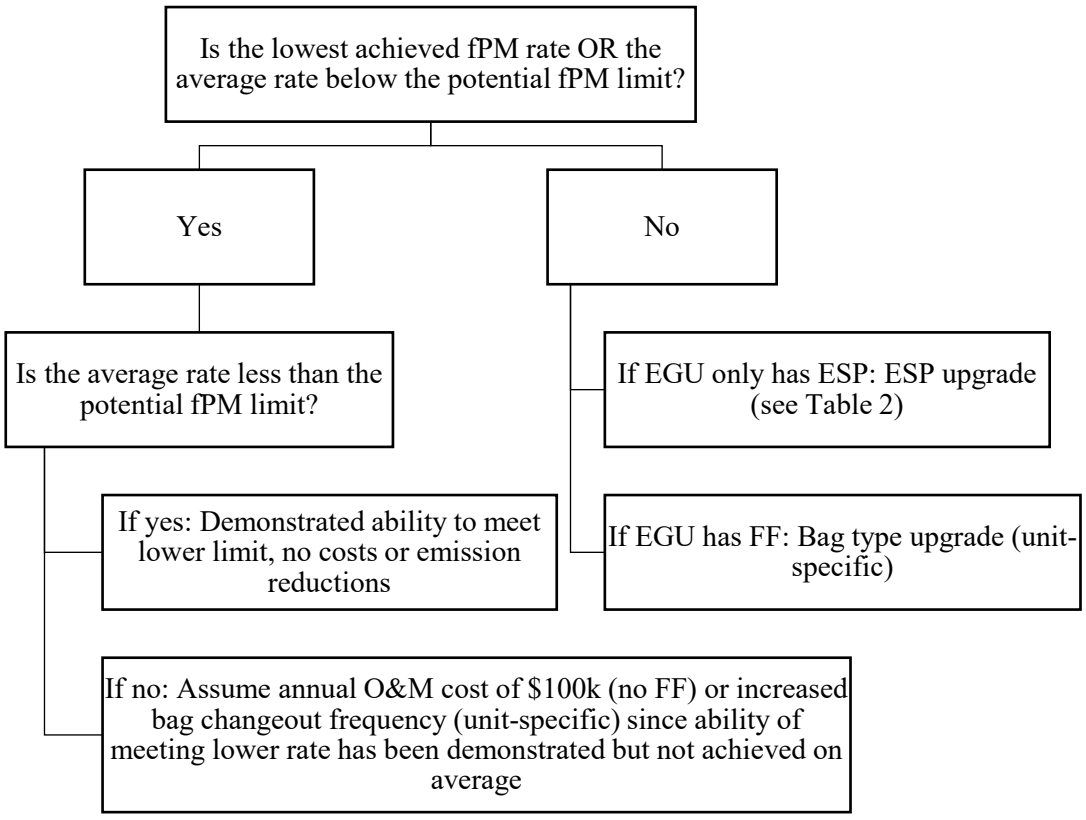


Figure 5. Updated PM control assumptions.

The updated costs for ESP upgrades and new FF installations and comparison to those from the proposal are summarized in Table 3 (all 2019$ unless otherwise noted). The EPA's assumptions for upgrades to existing ESPs for the proposal were based on a report prepared by Sargent and Lundy for the EPA titled "PM Incremental Improvement Memo" (Docket ID No. EPA-HQ-OAR-2018-0794-5836). For this final rule, the ESP upgrade costs and effectiveness were updated based on comments submitted to the docket. For the fPM limit of 0.006 lb/MMBtu,

we have updated the control assumptions to upgrade the existing PM controls instead of assuming all EGUs without FFs to install FFs.

For EGUs with existing ESPs that have demonstrated an ability to meet a lower fPM rate but do not do so on average, the EPA included an "Additional O&M" cost assumption in this final rule. This analysis assumes that this group of EGUs would be able to comply with the final rule at a cost of $100,000 per year (2022$). This additional cost represents increased vigilance in maintaining ESP performance and includes technician labor to monitor performance of the ESP and to periodically make typical repairs (*e.g.*, replacement of failed insulators, damaged electrodes or other internals that might fail, repairing leaks in the ESP casing, ductwork or expansion joints, and periodic testing of ESP flow balance and any needed adjustments). This cost estimate is based on an assumption of 20 labor hours per week at $65/hour dedicated specifically to ESP monitoring and maintenance, plus an additional 50 percent for materials. Materials might include insulators, electrodes or other ESP internal parts, material needed to repair leaks in ductwork or casings, or equipment and materials to test and address flow imbalances.

Table 3. Cost Assumptions in the Proposed and Final rule.

	Without Existing FF					With Existing FF
	Additional O&M	Minor ESP Upgrades	Typical ESP Upgrades	ESP Rebuild	New FF (6.0A/C Ratio)	Upgrade FF Bags
Proposal (reduce to limit)	--	$16.5/kW 7.5% reduction	$55/kW 15% reduction	$88/kW 40% reduction	Unit-specific	Unit-specific
Final (reduce to limit)	$100,000/yr (2022$)	$20/kW 20% reduction	$40/kW 40% reduction	$80/kW 55% reduction	Unit-specific (no change)	Unit-specific (no change)

For units with an existing ESP and without an existing FF, we assumed the ESP upgrades in Table 3 would be necessary to reduce fPM by the levels specified in Table 3.

For EGUs with an existing FF demonstrating the ability to meet a lower limit but not meeting the potential limit on average, we assumed an increased bag changeout frequency (unit-specific) capable of reducing fPM to the limit. Some EGUs that have a FF in addition to other PM controls that have demonstrated an ability to meet a lower limit but are not doing so on average were erroneously excluded from increased bag changeout frequency cost calculations. In these instances, a value of $100,000 is used. This error is limited to the analysis of the 0.006 lb/MMBtu limit and impacts two units: Walter Scott (1082_B_3) and Trimble County (6071_B_1). The $100,000 estimate assumed here is likely conservative, however, as the mean (approximately $44,000) and median (approximately $22,000) costs for increased bag change frequency calculated for the EGUs (see "FF Upgrade Estimated Costs" tab in Attachment 1) are much lower than $100,000.

For EGUs with an existing FF that have not previously demonstrated an ability to meet a lower limit, we assumed a unit-specific bag upgrade to reduce fPM to the limit. These costs are listed in the "FF Upgrade Estimated Costs" sheet of Attachment 1.

For EGUs without an existing FF or ESP that have not previously demonstrated to meet a lower limit, we assumed a FF install would be necessary, reducing average fPM rates by 90 percent, down to a lowest possible rate of 0.002 lb/MMBtu. These FF-specific costs assumptions for EGUs requiring them are provided in the "FF Install Estimated Costs" sheet of Attachment 1.

Filterable PM emission reductions were calculated using the difference between the unit-specific average fPM rate and the various fPM limits (or new assumed fPM rate, using the assumptions above), as shown in Equation 1:

$$fPM\ reductions\ (tons) = \left[Average\ fPM\ rate\ \left(\frac{lb}{mmBtu}\right) - new\ fPM\ rate\left(\frac{lb}{mmBtu}\right)\right] * Average\ Annual\ Heat\ Input\ \left(\frac{mmBtu}{year}\right) * \frac{1\ ton}{2000\ lb}$$

These fPM reductions were translated into non-Hg HAP metals using emission factors, available in the "Metals Ratios" sheet of Attachment 1. Table 4 summarizes the updated PM analysis, including total emission reductions obtained at affected units for fPM, fPM2.5, and speciated non-Hg HAP metals for the three potential limits, as well as cost-effectiveness.

Table 4. Results of Updated PM analysis for three potential limits

Assessed Limits (lb/MMBtu)	**0.015**	**0.010**	**0.006**

Number of EGUs		11	33	94
Capacity (GW)		4.7	14.1	41.3
Annualized Costs ($M)		38.8	87.2	398.8
Emission Reductions (tons/year)	fPM	1258	2526	5849
	fPM2.5	676	1307	2951
	Total non-Hg metal HAP	3.0	8.3	22.7
	As	0.17	0.36	0.87
	Be	0.01	0.02	0.05
	Cd	0.03	0.05	0.11
	Co	0.03	0.09	0.27
	Cr	0.49	2.11	5.99
	Mn	0.83	1.43	3.72
	Ni	0.32	0.98	2.71
	Pb	0.25	0.43	0.95
	Sb	0.06	0.13	0.29
	Se	0.80	2.66	7.67
Cost-Effectiveness ($/lb)	fPM	15.4	17.3	34.0
	fPM2.5	28.7	33.4	67.5
	Total non-Hg metal HAP	6,500	5,280	8,790
	As	117,000	121,000	228,000
	Be	2,560,000	2,140,000	3,680,000
	Cd	689,000	868,000	1,800,000
	Co	734,000	465,000	727,000
	Cr	39,400	20,600	33,200
	Mn	23,400	30,500	53,500
	Ni	60,100	44,600	73,400
	Pb	79,000	102,000	209,000
	Sb	310,000	346,000	681,000
	Se	24,300	16,300	26,000

2. **Oil-Fired EGU Emission Limits**

a. Background

The Agency finalized the limited-use oil-fired subcategory in the 2012 MATS Final Rule (77 FR 9304). The limited-use liquid oil-fired subcategory is defined in 40 CFR 63.10042 as an electric utility steam generating unit with an annual capacity factor when burning oil of less than 8 percent of its maximum or nameplate heat input, whichever is greater, averaged over a 24-

month block contiguous period commencing on the first of the month following the compliance date. The limited-use oil-fired subcategory was finalized because commenters indicated these units were a different class and type because many of them were only called to service to address reliability issues associated with, for example, natural gas curtailments. Commenters further indicated these units are different because of the generally infrequent use and the sporadic, and at times frequent, start-up and shut down periods (*e.g.,* they are often only required to run a couple of hours). These factors would lead to differences in emission characteristics for these units such that a numeric standard based on base load units would not likely be achievable during the very limited time these limited use oil-fired units operate. Instead, the Agency finalized work practice standards consisting of burner tune-ups, keeping records of activity and fuel usage, and submitting a report for each tune-up conducted.

In the 2023 Proposal, the EPA found the annual capacity factors of most continental liquid oil-fired EGUs to be low (3 percent in 2021). Additionally, there were only two continental liquid oil-fired EGUs with 2-year capacity factors greater than 8 percent. These two units primarily fire natural gas but had heat input-based percentages of fuel oil firing that were about 16 percent in at least one of the years from 2019 through 2021 (*i.e.,* slightly above the 15 percent that would qualify them as oil-fired units). The Agency concluded that there are very few continental liquid oil-fired units that are outside the definition of the limited-use liquid oil-fired subcategory. Since the capacity factors of liquid oil-fired EGUs are low, and most combustion by these units relies on fuel (*i.e.,* natural gas) with low metallic HAP emission rates, the Agency did not propose any changes to the total HAP metals, nor to the standards for the individual HAP metals, nor to the HAP metal surrogate fPM emission standards for continental liquid oil-fired EGUs. However, the Agency solicited comment on the appropriateness of including new HAP standards for EGUs in the limited use liquid oil-fired subcategory, as well as the means of demonstrating compliance with the new HAP standards.

Commenters to the 2023 Proposal urged the EPA to retain the current definition of the limited use liquid oil-fired subcategory and not impose new HAP standards on EGUs in this subcategory given that there are already limits on the amount of fuel oil that can be burned. Commenters alleged that changes to the existing HAP standards for EGUs in this subcategory may lead to reliability issues, as these units are crucial to maintaining grid reliability during cold winter spells, other extreme weather events, or when natural gas is curtailed.

One recent extreme weather event impacting the grid was the December 2022 Winter Storm Elliot. Winter Storm Elliott, a bomb cyclone[5] that started to form on December 21, 2022, plunged vast areas of the U.S. into freezing temperatures, inches of snow, and high wind speeds. Due to the extreme winter storm conditions, natural gas production and EGU performance and operation was limited or brought to a halt, resulting in an estimated 1.7 million people losing power from rolling blackouts and loss of generation capacity. According to an October 2023 FERC and NERC report on Winter Storm Elliot[6], there were 90,500 MW in coincident unplanned outages across the U.S. Eastern Interconnection, an unprecedented amount of lost generation.

The extreme cold weather conditions caused by Winter Storm Elliot had the greatest impact on gas facilities due to mechanical issues. According to PJM Interconnection, a regional electric power transmission system operator, gas plants and dual-fuel gas plants accounted for approximately 70 percent of outages, coal comprised 16 percent, and the remainder were oil, nuclear, hydro, wind, and solar. According to the America's Power report on Winter Storm Elliot, the Northeast region averaged approximately 14 GW on December 21 and 22, shown in Figure 5, while 10.6 GW was supplied between December 23 and 26 as plants struggled to operate due to the storm conditions.[7] To compensate for the loss of natural gas generation, ISONE and NYISO, independent electric power transmission system operators in New England and New York, called on oil-fired backup generators and dual-fueled (natural gas and fuel oil) power plants, which supplied an average of 4.3 GW between December 23 and 26, also shown in Figure 6.

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[5] A bomb cyclone is a mid-latitude storm that forms when a cold airmass collides with a warm airmass and undergoes rapid intensification.

[6] "Inquiry into Bulk-Power System Operations During December 2022 Winter Storm Elliot,' FERC, NERC, and Regional Entity Staff Report. October 2023. *https://www.ferc.gov/news-events/news/ferc-nerc-release-final-report-lessons-winter-storm-elliott.*

[7] "Operation of the U.S. Power Generation Fleet During Winter Storm Elliot." Energy Ventures Analysis Report for America's Power. February 2023. *https://www.evainc.com/wp-content/uploads/2023/02/2023_02_23-EVA-Winter-Storm-Elliott-Report.pdf.*

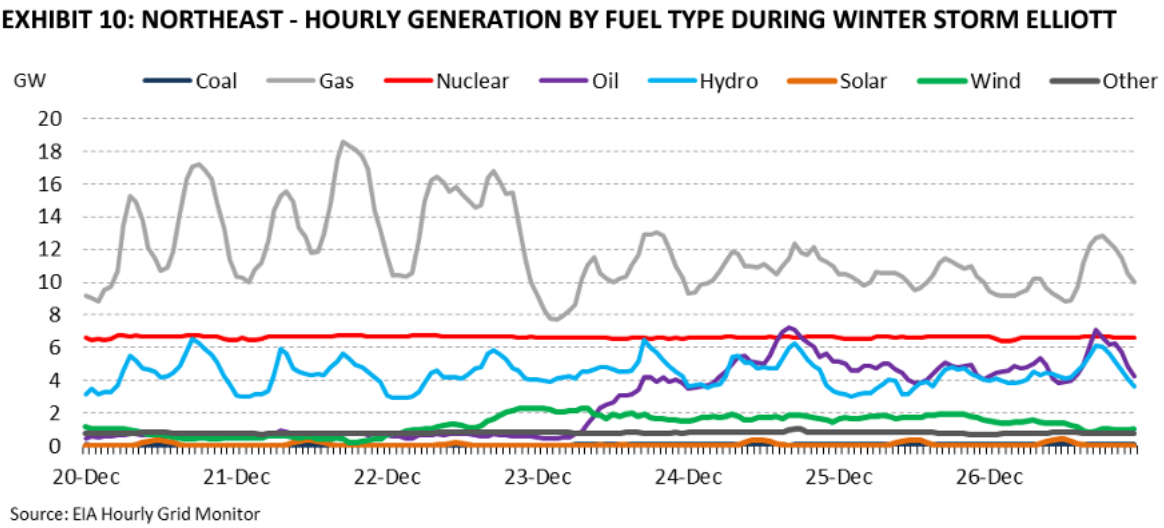

Figure 6. Northeast hourly generation by fuel type during Winter Storm Elliot. Screenshot from America's Power 2023 Report on Winter Storm Elliot.

b. Emission Performance Evaluation of Oil EGUs Operating in New England During Winter Storm Elliot

The rapid increase of oil-fired EGU generation during Winter Storm Elliott is of interest to the EPA due to the possible increase of HAP emissions released into the atmosphere. Emissions from fuel oil combustion depend on the grade and composition of the fuel, type and size of the boiler, the firing and loading practices used, as well as the level of equipment maintenance.[8] Generally, combustion of lighter distillate fuel oils (DFOs) results in significantly lower PM formation, and thus lower non-Hg HAP metals, as compared to that from combustion of heavier residual fuel oils (RFOs). Among RFOs, firing of Nos. 4 and 5 usually produces less PM than firing of heavier No. 6.[9]

The EPA assessed total non-Hg HAP emissions from calendar year 2022 from 11 oil-fired EGUs across New England that were operated to meet the energy demands brought on by Winter Storm Elliott. In addition to Winter Storm Elliot, a nor'easter dumped one to two feet of

[8] AP 42, Fifth Edition, Volume I, Chapter 1.3: External Combustion Sources. US EPA. 1999, corrected May 2010. *https://www.epa.gov/sites/default/files/2020-09/documents/1.3_fuel_oil_combustion.pdf.*

[9] "Report on Revisions to 5th Edition AP-42, Section 1.3: Fuel Oil Combustion." US EPA. 1998. *https://www.epa.gov/sites/default/files/2020-09/documents/background_document_ap-42_section_1.3_fuel_oil_combustion.pdf.*

snow across the Mid-Atlantic and Northeast on January 28-30, 2022, causing widespread power outages in Massachusetts.[10] The oil-fired EGUs located in Maine are William F Wyman Units 3 and 4 (ORIS id: 1507). The oil-fired EGU located in New Hampshire is Newington Unit 1 (ORIS id: 8002). The oil-fired EGUs located in Connecticut are New Haven Harbor Unit NHB1 (ORIS id: 6156), Montville Units 5 and 6 (ORIS id: 546), and Middletown Units 2, 3, and 4 (ORIS id: 562). The oil-fired EGUs located in Massachusetts are Canal Units 1 and 2 (ORIS id: 1599). All the listed oil-fired EGUs were running during Winter Storm Elliott. Figure 7 shows the location of all 11 oil-fired EGUs.

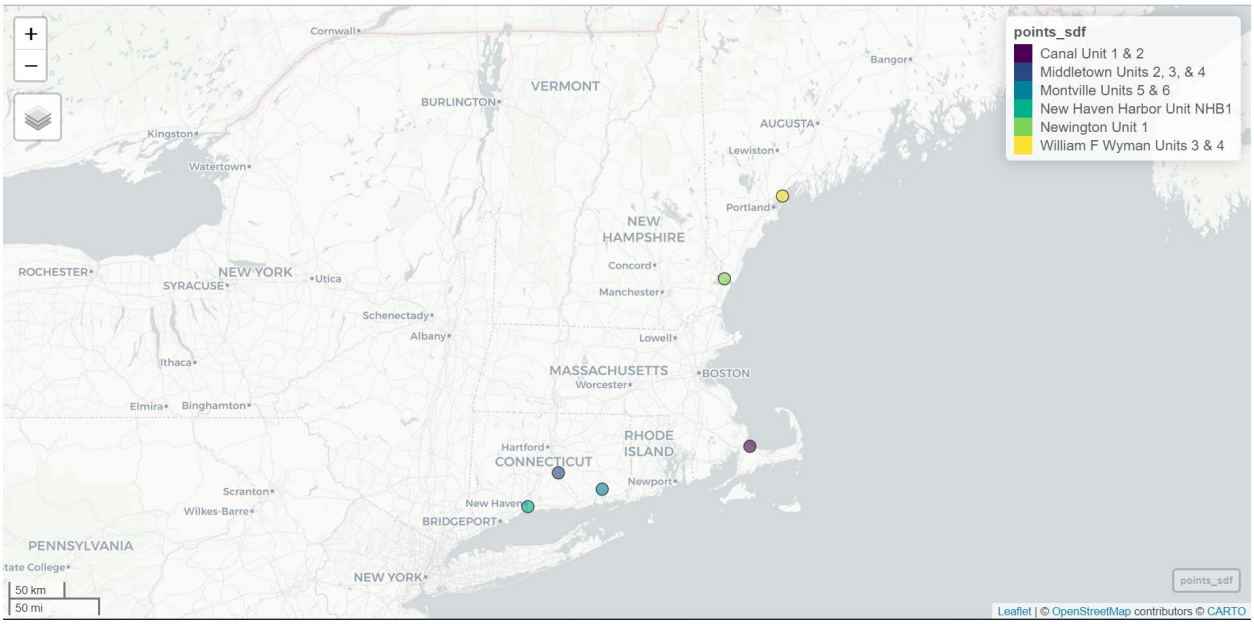

Figure 7. Map showing the location of the 11 oil-fired EGUs in New England during Winter Storm Elliot.

i. Methodology

This section describes the methodology to estimate the 2022 non-Hg metal HAP emissions from the 11 oil-fired EGUs due to burning RFO. Monthly fuel use information for RFO (barrels) was obtained for each EGU from EIA-923 data (https://www.eia.gov/electricity/data/eia923/) and summed to find annual fuel use. AP-42 emission factors for the "external combustion; electric generation; boilers" category burning

[10] "January 2022 National Climate Report." National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information. February 2022. *https://www.ncei.noaa.gov/access/monitoring/monthly-report/national/202201.*

RFO were downloaded from WebFIRE (https://cfpub.epa.gov/webfire/SearchEmissionFactor/searchpage.cfm).[11] These emission factors were developed for EGUs without any PM controls. Since the majority of the oil-fired EGUs assessed here have PM controls (*i.e.,* ESPs), we conservatively assumed 96% fPM control for the units with PM controls and applied this reduction to these emission factors. Emission factors were downloaded for the 10 non-Hg HAP metals assessed in the preamble, including arsenic (As), beryllium (Be), cadmium (Cd), cobalt (Co), chromium (Cr), manganese (Mn), nickel (Ni), lead (Pb), antimony (Sb), and selenium (Se). Emission factors for No. 6 fuel oil, in units of lb/1000 gal of fuel oil, were converted into lb/barrels (1000 gal = 23.8095 barrels of oil) of fuel oil. These emission factors had control ratings of C, D, and E. Emissions for each non-Hg HAP metal were calculated using Equation 2:

$$(2)\ X_F \frac{tons}{month} = EF_{x,F} \frac{lb\ non{-}Hg\ metal}{1000\ gallons} \times \frac{1000\ gallons}{23.8095\ barrel} \times Q \frac{barrels}{month} (1 - 0.96) \frac{ton}{2000\ lbs}$$

Where x is the specific non-Hg HAP metal and F is the specific fuel type (barrels of RFO). The total non-Hg HAP metal emissions were calculated by summing the 10 individual metal emissions.

c. Results and Conclusions

Emission estimates from 2022 are compared to results from the modeling of 2017 emissions conducted for the 2020 risk review.[12] The 2020 risk review concluded the residual risks due to emissions of air toxics from the coal- and oil-fired EGU source category are acceptable and that the current standards provide an ample margin of safety to protect human health and prevent an adverse environmental effect. The estimated maximum lifetime individual cancer risk (cancer MIR) posed by the 322 facilities[13] was 9-in-1 million, with nickel compounds from oil fuel sources in Puerto Rico as the largest contributor to the risk. The total estimated cancer incidence from this source category was 0.04 excess cancer cases per year, or one excess case in every 25 years. Approximately 193,000 people were estimated to have cancer risks at or

[11] Unit-specific emission factors, provided by testing data from previous ICRs, would yield more accurate emission estimates for the unit's configuration. The approach presented here uses average oil-fired EGU emission factors, instead of emission factors specific to individual EGUs.
[12] See "Residual Risk Assessment for the Coal- and Oil-Fired EGU Source Category in Support of the 2019 Risk and Technology Review Proposed Rule" (Docket ID No. EPA-HQ-OAR-2018-0794-0014).
[13] One facility in Guam is beyond the geographic range of the model used to estimate risks.

above 1-in-1 million from HAP emitted from the facilities in this source category. The estimated maximum chronic noncancer TOSHI for the source category was 0.2 (respiratory), which was driven by emissions of nickel and cobalt from the oil-fired EGUs.

As mentioned in the 2023 Proposal, these EGUs in Puerto Rico do not have emission controls for NOx, PM, or SO_2 and at least 2 have dual fuel capabilities and operated on high levels of natural gas. Limited stack testing done in 2021 and 2022 indicate fPM emission rates ranging from 0.026 to 0.029 lb/MMBtu, just below the emission standard for non-continental liquid oil-fired EGUs of 0.030 lb/MMBtu. Since these EGUs do not have installed control devices for HAP metals (*i.e.,* PM controls), there is no opportunity to improve their performance in the same way the EPA found available for coal-fired EGUs.

The 2017 emissions from the Puerto Rico facilities are listed in Table 5, cumulatively 54,520 lb/year of non-Hg HAP metals. Emissions of total non-Hg HAP metals across the 11 EGUs ranges from 0.0 to 12,483 lb/year, with nickel the dominant contributor. The Puerto Rico Electric Power Authority has recently proposed near-term retirement dates (by 2026) for 10 of the 14 oil-fired EGUs with 2 of the other remaining four boilers burning mostly natural gas. Therefore, emissions from these oil-fired EGUs in Puerto Rico are expected to decrease over the next few years, further reducing risk from HAP exposure.

Table 5. 2017 RFO fuel use (barrels) and HAP metals emissions (lbs/year) from oil-fired power plants in Puerto Rico.

EGU	**2017 RFO (barrels)**	**2017 Cobalt Emissions (lbs/year)**	**2017 Nickel Emissions (lbs/year)**	**2017 Total non-Hg HAP metals Emissions (lbs/year)**
Aguirre Steam Power Plant (AG1)	4,432,735	1783.3	8937.3	12482.8
Aguirre Steam Power Plant (AG2)		0.0	0.0	0.0

Costa Sur Steam Plant (COS3)	1,479,369	474.2	2376.6	3319.4
Costa Sur Steam Plant (COS4)		474.2	2376.6	3319.4
Costa Sur Steam Plant (COS5)		563.3	2823.2	3943.2
Costa Sur Steam Plant (COS6)		305.2	1529.7	2136.5
Palo Seco Steam Power Plant (PS1)	822,599	432.1	2165.7	3024.8
Palo Seco Steam Power Plant (PS2)		0.0	0.0	0.0
Palo Seco Steam Power Plant (PS3)		1624.3	8140.6	11370.0
Palo Seco Steam Power Plant (PS4)		0.0	0.0	0.0
San Juan Steam Power Plant (SJ7)	1,572,662	779.9	3908.4	5458.9
San Juan Steam Power Plant (SJ8)		892.8	4474.5	6249.6

San Juan Steam Power Plant (SJ9)		217.9	1092.0	1525.2
San Juan Steam Power Plant (SJ10)		241.5	1210.1	1690.2

Next, we assess total non-Hg HAP metals emission estimates from the 11 oil-fired EGUs in the Northeast called upon during Winter Storm Elliot. Cumulative total emissions in 2022 were 779 lb/year, 70 times lower than the total emissions from Puerto Rico. All but one of these EGUs employ ESPs for PM controls. ESPs are capable of collection efficiencies greater than 99 percent[14], but we conservatively assume 96 percent collection efficiencies here for units with ESPs. Compared to oil-fired EGUs in Puerto Rico, the Northeast oil-fired EGUs burned less RFO in 2022. In addition, cobalt and nickel emissions from the Northeast EGUs in 2022 were one to four orders of magnitude lower than the 2017 emissions in Puerto Rico. Total 2022 non-Hg HAP metal emissions from the 11 Northeast EGUs ranged from 4.8 to 526.0 lb/year (median=21.7 lb/year), whereas 2017 emissions from the Puerto Rico oil-fired boilers were much higher, ranging from 0 to 12,483 tons/year (median=3,172 lb/year).

Table 6. 2022 RFO fuel use (barrels) and HAP metal emissions (tons/year) from 11 oil-fired EGUs called to operate during Winter Storm Elliot.

Name	**PM Control**	**2022 RFO (barrels)**	**2022 Cobalt Emissions (lb/year)**	**2022 Nickel Emissions (lb/year)**	**2022 Total non-Hg HAP metals Emissions (lb/year)**

[14] Technology Review for the Coal- and Oil-Fired EGU Source Category, July 2018. Document ID EPA-HQ-OAR-2018-0794-0015 at *regulations.gov.*

William Wyman 3 (1507)	ESP	35,633	0.4	5.1	6.2
William Wyman 4 (1507)	ESP	378,758	3.8	53.8	65.9
Newington (8002)	ESP	193,901	2.0	27.5	33.7
New Haven Harbor (6156)	ESP	62,674	0.6	8.9	10.9
Montville 5 (546)	ESP	61,007	0.6	8.7	10.6
Montville 6 (546)	ESP	124,763	1.3	17.7	21.7
Middletown 2 (562)	ESP	98,570	1.0	14.0	17.1
Middletown 3 (562)	ESP	27,582	0.3	3.9	4.8
Middletown 4 (562)	None	120,936	30.6	429.2	526.0
Canal 1 (1599)	ESP	279,988	2.8	39.7	48.7
Canal 2 (1599)	ESP	191,389	1.9	27.2	33.3

As described in the proposal preamble, the annual capacity factors of most continental liquid oil-fired EGUs are low and fall within the limited-use liquid oil-fired subcategory, and therefore are not subject to emission limits. However, if 24-month average heat input due to oil increases such that the unit falls out of the limited-use liquid oil subcategory, the unit would become subject to numeric emission limits. As the majority of the continental liquid-oil fired EGUs employ PM controls, their non-Hg HAP emissions are controlled with efficiencies greater

than 99 percent. In the tables presented above, we find 2022 non-Hg HAP metals emissions from the 11 Northeast oil-fired EGUs are about 70 times lower than 2017 emissions from the oil-fired units in Puerto Rico. The facilities in Puerto Rico were among the facilities with the highest (but acceptable) residual risk in the 2020 residual risk review and the Northeast oil-fired EGUs are better controlled and operate with shorter durations than the oil-fired EGUs in Puerto Rico. As the 2020 risk review found risk from continental and non-continental EGUs acceptable, the EPA did not propose and is not finalizing any changes to the limited-use liquid-oil subcategory. However, as mentioned elsewhere, the Agency has an obligation to conduct technology reviews at least every 8 years and the EPA will continue to evaluate whether any revisions to the emission standards for liquid oil-fired EGUs are warranted.

3. Mercury Limit for Lignite-Fired EGUs

a. Hg Emissions from Coal-fired EGUs

The EPA estimated Hg emissions from coal-fired power plants in 2010 (pre-MATS) to be 29 tons.[15] The EPA estimated that 2021 Hg emissions from coal-fired EGUs were 3 tons (a 90 percent decrease compared to pre-MATS levels).[16] This decline was not entirely due to an increased use of Hg controls as there have also been significant changes in the power sector (*e.g.*, coal plant retirements, increase use of natural gas and renewable energy, *etc*.) in the same time period.

However, as noted in the 2023 Proposal, units burning lignite coal (or units that are permitted to burning lignite) accounted for a disproportionate amount of the total Hg emissions in 2021. As shown in Table 7 below, EGUs permitted to fire lignite, were the top 18 highest Hg emitting EGUs. Overall, in 2021, EGUs permitted to burn lignite were responsible for almost 30 percent of all Hg emitted from coal-fired EGUs, while generating about 7 percent of total megawatt-hours. Lignite accounted for 8 percent of total U.S. coal production in 2021.

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[15] Memorandum: Emissions Overview: Hazardous Air Pollutants in Support of the Final Mercury and Air Toxics Standard. EPA–454/R–11–014. November 2011; Docket ID No. EPA–HQ–OAR– 2009–0234–19914.

[16] 2021 Power Sector Programs Progress Report; available at *https://www3.epa.gov/airmarkets/progress/reports/pdfs/2021_report.pdf* and in the rulemaking docket.

Table 7. Top Hg-emitting EGUs in 2021.

Rank	EGU	2021 Hg Emissions (lb)	State
1	Coal Creek 2	181.8	ND
2	Coal Creek 1	175.6	ND
3	Oak Grove 2	149.8	TX
4	Martin Lake 3	134.4	TX
5	Oak Grove 1	112.7	TX
6	Martin Lake 2	111.0	TX
7	Milton R Young B2	103.1	ND
8	Martin Lake 1	100.7	TX
9	Antelope Valley B2	89.8	ND
10	Coyote B1	79.9	ND
11	H W Pirkey Power Plant 1	71.1	TX
12	Antelope Valley B1	69.6	ND
13	San Miguel SM-1	64.6	TX
14	Sandy Creek Energy Station S01	53.5	TX
15	Limestone LIM2	52.5	TX
16	Milton R Young B1	52.4	ND
17	Comanche 3	50.3	ND
18	Leland Olds 2	50.1	ND
19	James H Miller Jr 3	42.9	AL
20	Labadie 2	42.5	MO

In May 2021, pursuant to authority in section 114 of the CAA, 42 U.S.C. §7414(a), the EPA solicited information related to Hg emissions and Hg control technologies from certain lignite-fired EGUs to inform this CAA section 112(d)(6) technology review. The selected lignite-fired EGUs were asked to provide information on their control configuration for Hg and for other air pollutants (*e.g.*, criteria pollutants such as PM, NO_X, SO_2). Selected information on lignite-fired EGU control configurations that was obtained from the CAA section 114 information request is shown below in Table 8. Additional information on the location, size (capacity), firing configuration, and control configuration of lignite-fired EGUs (including those few that were not included in the CAA section 114 information request) is also included. The additional information was obtained from the EPA's NEEDS database.[17]

[17] National Electric Energy Data System (NEEDS) v621 rev: 10-14-22, available at: *https://www.epa.gov/power-sector-modeling/national-electric-energy-data-system-needs-v6*.

Most, but not all, of the EGUs utilized a combination of sorbent injection plus a chemical additive (oxidizing agent) as their primary Hg control strategy. One facility in North Dakota (Antelope Valley) uses a liquid sorbent that is injected to the SO_2 scrubber (spray dryer absorber, SDA). Many of the EGUs used "refined coal." Refined coal is typically produced by mixing proprietary additives to feedstock coal to help capture emissions when the coal is burned. For example, these additives may promote the oxidation of Hg to Hg^{2+} compounds for capture in downstream control equipment (*e.g.*, FGD scrubbers, PM control devices). Several of the facilities noted that use of refined coal as a part of their Hg control strategy was discontinued at the end of 2021 when the refined coal production tax credit (created by the American Jobs Creation Act of 2004) expired. According to a U.S. Government Accountability Office audit report, refined coal producers claimed approximately $8.9 billion in tax credits between 2010 and 2020.

Table 8. Control configurations for lignite-fired EGUs.

Plant Name	State	Capacity (MW)	Firing	Control Configuration	Hg Control Description	Hg Control
Antelope Valley #1	ND	450	tangent	ACI + SDA + FF	Does not use activated carbon as its sorbent, instead **injects a liquid sorbent** to the scrubber. The facility stopped using refined coal in December 2021.	Nalco non-carbon, **non-halogenated liquid sorbent** added to dry scrubber; M-Sorb additive (bromide)
Antelope Valley #2	ND	450	tangent	ACI + SDA + FF		
Coal Creek #1	ND	574	tangent	ACI + ESPC + WFGD	Information not collected in the CAA 114 request	
Coal Creek #2	ND	573	tangent	ACI + ESPC + WFGD		
Coyote	ND	429	cyclone	ACI + SDA + FF	Information not collected in the CAA 114 request	
Leland Olds #1	ND	222	wall	SNCR + ACI + ESPC + WFGD	Activated carbon and oxidizer injections for Hg control	ME2C SEA SF10 Oxidizer and SB24 Activated Carbon
Leland Olds #2	ND	445	cyclone	SNCR + ACI + ESPC + WFGD		
Milton R Young #1	ND	237	cyclone	SNCR + ACI + ESPC + WFGD	Hg controlled by Powdered Activated Carbon Injection plus Oxidizing Agent/Halogen Injection System	DARCO Hg-H **non-halogenated** Powdered Activated Carbon + ADA M-Prove additive
Milton R Young #2	ND	447	cyclone	SNCR + ACI + ESPC + WFGD		
Spiritwood Station	ND	92	FBC	SNCR + ACI + SDA + FF	Hg emissions are controlled by **activated carbon injection system** and a continuous emissions monitoring system (CEMS). The activated carbon injection feed rate is adjusted to maintain emissions below the 4.0 lb/TBtu standard.	Activated Carbon sorbent (not specified)
Limestone #1	TX	831	tangent	SNCR + ACI + ESPC + WFGD	Information not collected in the CAA 114 request	
Limestone #2	TX	858	tangent	SNCR + ACI + ESPC + WFGD		

Major Oak #1	TX	152	FBC	Reagent Injection + SNCR + ACI + FF	Hg is controlled by the **introduction of activated carbon** into each boiler duct directly in front of the baghouse. A **halogen fuel additive is also applied** to the lignite before it enters the day silos.	Cabot DARCO Hg-H **non-Brominated AC** + ADA-ES M-Prove additive
Major Oak #2	TX	153	FBC	Reagent Injection + SNCR + ACI + FF		
Martin Lake #1	TX	800	tangent	ACI + ESPC + WFGD	**Brominated additive injected** into the furnace and **activated carbon injected** upstream of the air heater. In 2020 and 2021 **Refined Coal System** applied an aqueous bromine salt solution to the coal.	ME2C SEA process (**non-Brominated AC** + chemical additive)
Martin Lake #2	TX	805	tangent	ACI + ESPC + WFGD		
Martin Lake #3	TX	805	tangent	ACI + ESPC + WFGD		
Oak Grove #1	TX	855	tangent	SCR + ACI + FF + WFGD	**Brominated activated carbon injected** downstream of the air heater. From 2018 to 2021, the unit was equipped with a **Refined Coal System** for Hg control. This system applied an aqueous bromine salt solution to the coal downstream of the crusher. The refined coal system is no longer in service.	ADA-CS Br-AC
Oak Grove #2	TX	855	wall	SCR + ACI + FF + WFGD		

Red Hills #1	MS	220	FBC	Reagent Injection + ACI + FF	Hg is controlled by **injection of activated carbon** into each boiler duct directly in front of the baghouse. A **fuel additive is also applied to the lignite** before it enters the day silos. The application of fuel additives ended in December 2021.	ADA-CS non-Br AC + ADA-ES M45 liquid additive
Red Hills #2	MS	220	FBC	Reagent Injection + ACI + FF		
San Miguel	TX	391	wall	SNCR + ACI + ESPC + WFGD	Hg is captured using a sorbent enhanced additive (SEA) injected onto the lignite at the pulverizer feeders or directly into the furnace to promote the oxidation and capture of Hg. This is followed by an ACI system located in the boiler exit duct work upstream of the air heaters. The scrubber system also reduces Hg emissions.	ME2C SEA process (non-Br AC + powder-based chemical additive)

Note: ACI = activated carbon injection; SDA = spray dryer absorber (dry scrubber); FF = fabric filter; ESPC = cold side electrostatic precipitator; WFGD = wet flue gas desulfurization scrubber; SNCR = selective non-catalytic reduction (NOx control); reagent injection = sorbent injection into fluidized bed combustor

According to fuel use information supplied to EIA (on form 923), in 2021, 13 of 22 EGUs that were designed to burn lignite utilized refined coal to some extent. However, in 2022, as summarized in Table 9 below, most sources had stopped using refined coal (as mentioned earlier, the federal tax credit for refined coal use expired at the end of 2021). As in 2021, several EGUs located in Texas that are permitted to fire lignite reported use of subbituminous coal in 2021 (ranging from 76 percent up to > 99 percent).

Table 9. 2022 fuel use at lignite-fired EGUs.

Plant Name	Distillate Fuel Oil (%)	Natural Gas (%)	Lignite Coal (%)	Refined Coal (%)	Subbituminous Coal (%)
Antelope Valley 1	0.0%	0.7%	99.3%	0.0%	0.0%
Antelope Valley 2	0.0%	0.7%	99.3%	0.0%	0.0%
Coal Creek 1	0.1%	0.0%	99.9%	0.0%	0.0%
Coal Creek 2	0.1%	0.0%	99.9%	0.0%	0.0%
Coyote 1	0.4%	0.0%	91.2%	0.0%	0.0%
Leland Olds 1	0.2%	0.0%	99.8%	0.0%	0.0%
Leland Olds 2	0.2%	0.0%	99.8%	0.0%	0.0%
Milton R Young 1	0.3%	0.0%	99.7%	0.0%	0.0%
Milton R Young 2	0.3%	0.0%	99.7%	0.0%	0.0%
Spiritwood Station 1	0.0%	5.1%	0.0%	94.9%	0.0%
Limestone 1	0.5%	0.0%	0.0%	0.0%	99.5%
Limestone 2	0.5%	0.0%	0.0%	0.0%	99.5%
Major Oak Power 1	0.0%	0.3%	99.7%	0.0%	0.0%
Major Oak Power 2	0.0%	0.3%	99.7%	0.0%	0.0%
Martin Lake 1	0.1%	0.0%	0.0%	0.0%	99.9%
Martin Lake 2	0.1%	0.0%	0.0%	0.0%	99.9%
Martin Lake 3	0.1%	0.0%	0.0%	0.0%	99.9%
Oak Grove 1	0.0%	0.7%	99.3%	0.0%	0.0%
Oak Grove 2	0.0%	0.7%	99.3%	0.0%	0.0%
Red Hills Generating Facility 1	0.0%	8.2%	91.7%	0.0%	0.0%
Red Hills Generating Facility 2	0.0%	8.2%	91.7%	0.0%	0.0%
San Miguel 1	0.2%	0.0%	99.8%	0.0%	0.0%

b. Review of the Hg Emission Standard for Non-Lignite-Fired EGUs

The final MATS Hg emission limit for EGUs firing non-lignite coals (*i.e.*, bituminous and subbituminous coals) is 1.2 lb Hg/TBtu. To review that emission standard, the EPA

evaluated the 2021 performance of EGUs firing non-lignite coals and found that EGUs firing primarily bituminous coal emitted Hg at an average annual rate of 0.4 lb Hg/TBtu (with a range of roughly 0.2 to 1.2 lb Hg/TBtu). EGUs firing primarily subbituminous coal in 2021 (not including those EGUs that are permitted to burn lignite but burned a significant amount of subbituminous coal) emitted Hg at an average annual rate of 0.6 lb Hg/TBtu (with a range of 0.1 to 1.2 lb/TBtu). This represents a control range of 98 to 79 percent (assuming an average inlet concentration of 5.8 lb/TBtu). The EPA has information on the control configurations of these non-lignite EGUs but does not have detailed information on the type of sorbent injected (*e.g.*, activated carbon or non-carbonaceous; pre-halogenated, *etc.*). The EPA also does not have detailed information on the injection rate of sorbents used for Hg control (if any). Similarly, the EPA does not have information on the type of quantity of chemical additives used (if any). However, the bituminous coal-fired EGUs are already achieving an average annual rate of 0.4 lb/TBtu and the subbituminous coal-fired EGUs are already achieving an average annual rate of 0.6 lb/TBtu and a level of control of ranging 79 to 98 percent. The typical Hg control performance curves for sorbent injection show a leveling off such that increasing the amount of sorbent results in diminishing improvement in Hg control. Based on full-scale demonstration testing of Hg sorbents, this leveling off takes place somewhere greater than 90 percent capture. Without knowing the type of sorbent being injected or the rate of the sorbent injection, it is difficult to determine whether additional emissions can be achieved in a cost-effective manner. For bituminous coal-fired EGUs that do not utilize sorbent injection but rely on co-benefit control from equipment installed for criteria pollutants, it is difficult to determine whether additional Hg emission reduction could be obtained in a cost-effective manner with knowledge of the levels of Hg control achieved in each of the installed controls and, if chemical additives are injected, the type and rate of chemical additive injection. For those reasons, the EPA is not proposing to adjust the Hg emission standard for non-lignite-fired EGUs.

b. Review of the Hg Emission Standard for Lignite-Fired EGUs

The 2012 Final MATS Rule established an Hg emission limit of 4.0 lb/TBtu for EGUs firing lignite. To review that emission standard, the EPA evaluated the 2021 performance of lignite-fired EGUs (including those permitted to burn lignite but that utilized significant amounts of subbituminous coal in 2021) (as shown in Table 11 of the 2023 Technical Memo accompanying the 2023 Proposal). The EPA has updated that information to 2022 emissions and

is shown in Table 10, below). In response to comments received during the public comment period, the EPA updated assumptions regarding the Hg content of the various fuels (which is summarized in the 'Mercury Content of Coals' technical support document available in the rulemaking docket).[18] The table shows a "Hg Inlet" level which reflects the maximum Hg content of the range of feedstock coals that the EPA assumes is available to each of the plants in the Integrated Planning Model, IPM,[19] the estimated control (percentage) needed to meet an emission standard of 4.0 lb Hg/TBtu (the current standard for lignite-fired EGUs) and the estimated control (percentage) to meet an emission standard of 1.2 lb Hg/TBtu (the current standard for non-lignite-fired EGUs). The table also shows the estimated 2021 Hg inlet concentration from actual 2021 fuel usage (as mentioned earlier, some units utilized significant quantities of non-lignite fuel, *e.g.*, subbituminous coal, natural gas, *etc.*) and the 2021 Hg emissions reported to the EPA. The EPA then estimated the apparent level of Hg control for 2021 and the level of control that would been needed to achieve the emission standard applicable to the non-lignite-firing EGUs (1.2 lb Hg/TBtu).

Table 10. Measured Hg emissions and estimated control performance of lignite-fired EGUs in 2022.

Plant Name	Estimated 2022 Hg Inlet (lb/TBtu)	Estimated Hg Control at 4.0 lb/TBtu (%)	Estimated Hg Control at 1.2 lb/TBtu (%)	2022 Hg Emission Rate (lb/TBtu)	Estimated 2022 Hg Control (%)
Antelope Valley 1	11.2	64.4	89.3	3.03	73.0
Antelope Valley 2	11.2	64.4	89.3	3.00	73.3
Coal Creek 1	9.7	58.7	87.6	3.43	64.6
Coal Creek 2	9.7	58.7	87.6	3.87	60.1
Coyote 1	9.7	58.6	87.6	2.28	76.4
Leland Olds 1	11.3	64.5	89.4	2.34	79.3
Leland Olds 2	11.3	64.5	89.4	3.10	72.5
Milton R Young 1	9.7	58.6	87.6	3.02	68.8

[18] Technical Support Document "*1998 ICR Coal Data Analysis Summary of Findings"* available in the rulemaking docket at EPA-HQ-OAR-2018-0794.
[19] Discussion of how these assumptions were developed for use in the EPA's IPM modeling is available in Chapter 7 of the IPM Documentation.

Milton R Young 2	9.7	58.6	87.6	3.00	69.0
Spiritwood Station 1	9.2	56.5	87.0	2.14	76.8
Limestone 1*	5.8	30.7	79.2	0.78	86.5
Limestone 2*	5.8	30.7	79.2	0.85	85.3
Major Oak Power 1	24.9	84.0	95.2	0.86	96.5
Major Oak Power 2	24.9	84.0	95.2	0.63	97.5
Martin Lake 1*	5.8	31.0	79.3	1.53	73.6
Martin Lake 2*	5.8	31.0	79.3	2.50	56.9
Martin Lake 3*	5.8	31.0	79.3	2.36	59.3
Oak Grove 1	24.8	83.9	95.2	2.53	89.8
Oak Grove 2	24.8	83.9	95.2	2.23	91.0
San Miguel 1	28.9	86.2	95.9	3.03	89.5
Red Hills 1	22.9	82.6	94.8	1.73	92.5
Red Hills 2	22.9	82.6	94.8	1.75	92.4

* These EGUs are permitted to fire lignite but fired subbituminous coal in 2022.

As can be seen in the table, all the North Dakota lignite-fired EGUs are estimated to meet the current standard by achieving a level of control of 70 percent or less. The average reported 2022 Hg emission rate for lignite-fired EGUs located in North Dakota was 2.92 lb/TBtu with an average control of 71.4 percent. The average reported 2022 Hg emission rate for lignite-permitted EGUs located in Texas was 1.73 lb/TBtu (with an average control of 82.6 percent). The average reported 2022 Hg emission rate for lignite-fired EGUs (*i.e.*, excluding those that fired subbituminous coal in 2022) located in Texas was 1.86 lb/TBtu (with an average control of 92.9 percent). The average reported 2022 Hg emission rate for lignite-fired EGUs located in Mississippi was 1.74 lb/TBtu (with an average control of 92.4 percent).

c. Determination of an Achievable Hg Emission Standard for Lignite-Fired EGUs

After reviewing the available literature and other studies and available information, the assumptions made regarding Hg control in the final MATS rule, and the information obtained from compliance reports and the 2022 CAA section 114 information collection, the EPA has determined that there are available controls and methods of operation that will allow lignite-fired EGUs to meet an Hg emission standard of 1.2E-06 lb/MMBtu, which is the same emission standard that is being met by EGUs firing on non-lignite coals

i. Both Lignite and Subbituminous Coal are Low Rank Coals with Low Halogen Content

Coal is classified into four main types, or ranks:[20] anthracite, bituminous, subbituminous, and lignite. The ranking depends on heating value of the coal. Anthracite has the highest heating value of all ranks of coal and is mostly used by the metals industry (it is rarely using for power production). Anthracite accounted for less than 1 percent of the coal mined in the U.S. in 2021. Bituminous coal is also considered a "high rank coal" because of its higher heating value. It is the most abundant rank of domestic coal and accounted for about 45 percent of total U.S. coal production in 2021. Bituminous coal is used to generate electricity and in other industries.

Subbituminous coal and lignite are referred to as "low rank coals". They both have lower heating values than bituminous coal. Subbituminous coal accounted for about 46 percent of total U.S. coal production in 2021, with the vast majority produced in the Powder River Basin (PRB) of Wyoming and Montana. Lignite has the lowest energy content of all coal ranks. Lignite accounted for about 8 percent of total U.S. coal production in 2021. About 56 percent was mined in North Dakota (Fort Union lignite) and about 36 percent was mined in Texas (Gulf Coast lignite).

Chlorine is the most abundant halogen in coal. Bromine may also be present in coal but is typically in much lower concentrations than chlorine.[21] Low-rank coals such as lignite and subbituminous generally have lower chlorine contents than higher rank coals such as bituminous coal.[22]

As mentioned earlier, the halogen content of the coal — especially chlorine — largely influences the oxidation state of Hg in the flue gas stream. As a result, the halogen content of the coal directly influences the ability to capture and contain the Hg before it is emitted into the atmosphere. As explained earlier, ash from lignite and subbituminous coals tends to be more alkaline (relative to that from bituminous coal) due to the lower amounts of sulfur and halogen and the presence of a more alkaline and reactive (non-glassy) form of calcium in the ash. The natural alkalinity of the subbituminous and lignite fly ash can effectively neutralize the limited free halogen in the flue gas and prevent oxidation of the Hg^0. This makes control of Hg from

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[20] "Coal Explained, Types of Coal" Energy Information Administration, available at *www.eia.gov/energyexplained/coal* and in the rulemaking docket.
[21] See Figure 5 in the U.S. Geological Survey publication "Mercury and Halogens in Coal—Their Role in Determining Mercury Emissions From Coal Combustion" available at *https://pubs.usgs.gov/fs/2012/3122/pdf/FS2012-3122_Web.pdf*.
[22] *Ibid*.

both subbituminous coal-fired EGUs and lignite-fired EGUs more challenging than the control of Hg from bituminous coal-fired EGUs. However, because control strategies and technologies were developed to introduce halogens to the flue gas stream, EGUs firing subbituminous coals have been able to meet the 1.2 lb/TBtu emission standard in the final MATS rule. As mentioned earlier, EGUs firing subbituminous coal in 2021 emitted Hg at an average annual rate of 0.6 lb Hg/TBtu with measured values as low as 0.1 lb/TBtu. Clearly EGUs firing subbituminous coal have found control options to demonstrate compliance with the 1.2 lb/TBtu emission standard despite the challenges presented by the low natural halogen content of the coal and production of difficult-to-control elemental Hg vapor in the flue gas stream.

ii. The Hg Content of North Dakota Lignite and PRB Subbituminous Coal are Similar

As explained in the 'Mercury Content of Coal' technical support memorandum[23], the EPA assumed the average Hg content of North Dakota lignite to be 9.7 lb/TBtu and assumed the Hg average content of subbituminous coal (from the Wyoming PRB)- to be 5.8 lb/TBtu. These values are very similar to results from a published study that found the average Hg concentration of North Dakota lignite and PRB subbituminous coals to be very similar. The study found that the North Dakota lignite samples contained an average of 8.5 lb/TBtu and the PRB subbituminous coal samples contained an average of 7.5 lb/TBtu.[24] Despite the similarities in Hg content, halogen content, and alkalinity between North Dakota lignite and PRB subbituminous coal, EGUs firing subbituminous coal in 2021 emitted Hg at an average annual rate of 0.6 lb Hg/TBtu while those firing on North Dakota lignite emitted Hg at an average annual rate of 3.0 lb Hg/TBtu. While the EGUs firing North Dakota lignite at an average emission rate of 3.0 lb Hg/TBtu are complying with the final MATS emission standard of 4.0 lb Hg/TBtu, it is difficult to explain why those units could not meet a similar level of Hg control as that of the EGUs firing PRB subbituminous coal given the similarities between the two fuels – especially the similarities in Hg content, halogen content, and alkalinity. Numerous commenters noted the difference in sulfur content between lignite and Wyoming subbituminous. Sulfur in the coal can lead to formation of sulfur trioxide (SO_3), which is known to negatively affect Hg control using certain

[23] Technical Support Document "*1998 ICR Coal Data Analysis Summary of Findings"* available in the rulemaking docket at EPA-HQ-OAR-2018-0794.

[24] "Mercury in North Dakota lignite", Katrinak, K. A.; Benson, S.A.; Henke, K. R.; Hassett, D. J.; *Fuel Processing Technology*, 39, 35, 1994.

technologies (especially sorbent injection). But, as explained in the final preamble for this rulemaking, numerous control technology vendors and developers have introduced "sulfur tolerant" sorbents and other control technologies to address this concern. And EGUs firing bituminous coals are much more prone to produce SO_3 than those firing lignite (due to the higher levels of sulfur in most bituminous coals and the presence of SCR systems for NOx control, which are uncommon with lignite-fired EGUs in the U.S.).

The Hg content of Gulf Coast lignite tends to be higher than that of the North Dakota lignite. As explained in the 'Mercury Content of Coal' technical support memorandum[25], the EPA assumed the average Hg content of Texas lignite to be 25.0 lb/TBtu and assumed the average Hg content of Mississippi lignite to be 34.3 lb/TBtu. Despite the higher Hg content, EGUs permitted as lignite-fired had, in 2021, an average Hg emission rate of 2.0 lb/TBtu – below the 2021 average emission rate of EGUs firing North Dakota lignite (at 3.0 lb/TBtu). This is due, in part, because some EGUs in Texas that are permitted as lignite-fired units (and thus subject to the Hg emission standard of 4.0 lb/TBtu) were, in 2021 (and also in 2022 and beyond), firing significant amounts of subbituminous coal. Firing high levels of non-lignite coal (in some cases greater than 99 percent non-lignite coal), while remaining subject to the less stringent Hg emission standard for the subcategory of lignite-fired EGUs seems to fit the scenario that the EPA expressed concern about in the final MATS rule preamble – that "sources to potentially meet the definition by combusting very small amounts of low rank virgin coal [lignite]." *See* 77 FR 9379.

d. Cost of Meeting the Revised Emission Standard

For the final MATS rule, the EPA calculated beyond-the-floor costs for Hg controls by assuming injection of brominated activated carbon at a rate of 3.0 lb/MMacf for units with ESPs and injection rates of 2.0 lb/MMacf for units with baghouses (also known as FF). Yet, in responses to the CAA section 114 information survey, only one facility (Oak Grove) explicitly indicated use of brominated activated carbon. Oak Grove units #1 and #2 (both using FF for PM control) reported use of brominated activated carbon at an average injection rate of less than 0.5 lb/MMacf for operation at capacity factor greater than 70 percent. The Oak Grove units fired, in

[25] Technical Support Document "*1998 ICR Coal Data Analysis Summary of Findings"* available in the rulemaking docket at EPA-HQ-OAR-2018-0794.

2021, using mostly refined coal.[26] That injection rate is considerably less than the 2.0 lb/MMacf assumed.

From the CAA 114 information survey, the average injection rate reported for non-halogenated sorbents was 2.5 lb/MMacf. As mentioned earlier, most sources utilized a control strategy of sorbent injection coupled with chemical (usually halogenated) additives. In the beyond-the-floor analysis in the final MATS rule, we noted that the results from various demonstration projects suggest that greater than 90 percent Hg control can be achieved at lignite-fired units using brominated activated carbon sorbent at an injection rate of 2.0 lb/MMacf for units with installed FFs for PM control and at an injection rate of 3.0 lb/MMacf for units with installed ESPs for PM control. As shown in Table 10 above, all units (in 2022) would have needed to control their Hg emissions to less than 95 percent to meet an emission standard of 1.2 lb/TBtu. Based on this, we expect that the units could meet the proposed, more stringent, emission standard of 1.2 lb/TBtu by utilizing brominated activated carbon at the injection rates suggested in the beyond-the-floor memorandum from the final MATS rule.

i. Cost-effectiveness for a Model Plant

To determine the cost-effectiveness of that strategy, we calculated the cost-effectiveness (cost per lb of Hg controlled) for a model 800 MW lignite-fired EGU. We calculated the cost of injecting non-brominated activated carbon sorbent at a conservative injection rate of 5.0 lb/MMacf to achieve an emission rate of 1.2 lb/TBtu versus the cost to meet an emission rate of 4.0 lb/TBtu using non-brominated activated carbon sorbent at an emission rate of 2.5 lb/MMacf.

This calculation assumes a model 800 MW EGU with a heat rate of 11,000 Btu/kWh operating at an 80 percent capacity factor fires Gulf Coast lignite with a Hg concentration of 25.0 lb/TBtu. It also assumes that the unit meets a Hg emission standard of 4.0 lb/TBtu using an injection rate of 2.5 lb/MMacf of non-brominated activated carbon at a sorbent cost of $0.80/lb and that the unit can meet a Hg emission standard of 1.2 lb/TBtu using an injection rate of 5.0 lb/MMacf of brominated activated carbon at a sorbent cost of $1.15/lb.

[26] EIA form 923 does not specify the rank of coal that is "refined." For this technology review, the EPA has assumed that facilities reporting the use of refined coal have utilized "refined lignite."

$$800\ MW\ x\ \left(\frac{8{,}760\ hr}{year}\right) x(80\%\ CF) = 5{,}606{,}400\ \frac{MWh}{year}$$

$$5{,}606{,}400\ \frac{MWh}{year}\ x\ 11\ \frac{mmBtu}{MWh}\ = 61{,}670{,}400\ \frac{mmBtu}{year} = 8{,}880\ \frac{mmBtu}{hr}$$

$$61{,}670{,}400\ \frac{mmBtu}{year}\ x\ \left(25.0\ x\ 10^{6}\ \frac{lb\ Hg}{mmBtu}\right) = 1{,}542\ \frac{lb\ Hg\ in}{year}$$

$$At\ an\ emission\ standard\ of\ 4.0\ \frac{lb\ Hg}{TBtu} = 247\ \frac{lb\ Hg}{year}\ emitted\ (84\%\ control)$$

$$2.5\ \frac{lb\ sorbent}{MMacf} x\ 9{,}860\ \frac{scf}{mmBtu} x\ \left(\frac{785\ R}{520\ R}\right)\ x\ (1 - 0.06)\ x\ \left(\frac{20.9 - 7.0}{20.9}\right)\ x\ 8{,}880\ \frac{mmBtu}{hr}\ x\ \frac{1\ MMacf}{1{,}000{,}000\ acf} =\ 463\ \frac{lb\ sorbent}{hr}$$

$$Sorbent\ cost =\ \frac{463\ lb}{hr}\ x\ \frac{8{,}760\ hr}{year}\ x\ 80\%\ CF\ x\ \frac{\$0.80}{lb} = \$2{,}594{,}832\ per\ year$$

$$Cost\ effectiveness = \left(\frac{\$2{,}594{,}832}{(1{,}542 - 247)\ lb\ Hg\ removed}\right) = \frac{\$2{,}004}{lb\ Hg\ removed}$$

$$At\ an\ emission\ standard\ of\ 1.2\ \frac{lb\ Hg}{TBtu} = 95\ \frac{lb\ Hg}{year}\ emitted\ (95\%\ control)$$

$$5.0\ \frac{lb\ sorbent}{MMacf} x\ 9{,}860\ \frac{scf}{mmBtu} x\ \left(\frac{785\ R}{520\ R}\right)\ x\ (1 - 0.06)\ x\ \left(\frac{20.9 - 7.0}{20.9}\right)\ x\ 8{,}880\ \frac{mmBtu}{hr}\ x\ \frac{1\ MMacf}{1{,}000{,}000\ acf} =\ 926\ \frac{lb\ sorbent}{hr}$$

$$Sorbent\ cost =\ \frac{926\ lb}{hr}\ x\ \frac{8760\ hr}{year}\ x\ 80\%\ CF\ x\ \frac{\$1.15}{lb} = \$7{,}460{,}143\ per\ year$$

$$Cost\ effectiveness = \left(\frac{\$7{,}460{,}143}{(1{,}542 - 95)\ lb\ Hg\ removed}\right) = \frac{\$5{,}083}{lb\ Hg\ removed}$$

$$Incremental\ cost\ effectiveness = \frac{(\$7{,}460{,}143 - \$2{,}594{,}832)}{(1{,}468 -\ 1{,}295)\ lb\ Hg\ controlled}$$

$$= \$28{,}176\ per\ lb\ Hg\ removed$$

This is a conservative value as it is unlikely that sources will need to inject brominated activated carbon sorbent at rates as high as 5.0 lb/MMacf (the Oak Grove units were injecting less than 0.5 lb/MMacf) and is consistent with the cost-effectiveness that the EPA has found to be acceptable in previous rulemakings.

4. Transparency of PM CEMS

Continuous monitoring of fPM required in this rule provides several unquantifiable benefits, including greater certainty, accuracy, transparency, and granularity in fPM emissions information as compared to the intermittent stack testing that most affected sources employ. Here, we show fPM emissions for EGUs for which both intermittent stack testing and continuous monitoring data are available, supporting the discussion provided in section IV.D.2 of the preamble.

Hourly PM CEMS data were filtered to remove fPM data during periods of startup and shutdown and offline/invalid periods if indicated by the facility in the hourly PM CEMS file. If these periods were not indicated, hourly operational data from the EPA's Clean Air Markets Program Division (CAMPD)[27] were used to flag and remove hours where the EGU was not running the entire hour, where the hourly heat input was zero, and where the gross load was low to remove periods of startup and shutdown. The 30-boiler operating day average, which is required for demonstrating compliance with the fPM limit using PM CEMS, was calculated by dividing the sum of quality-assured hourly emissions obtained over the hours of operation in 30 days by the number of hourly rate values collected over 30 days of operation, as shown in equation 8 in 40 CFR 63.10021(b).

Hourly heat input data were downloaded from EPA's CAMPD website, included in Attachment 3 to this memorandum's docket entry, to calculate annual emissions from stack testing and hourly PM CEMS data. Emissions estimates for a fPM limit of 0.010 lb/MMBtu and stack testing were calculated by multiplying the specific fPM rate (lb/MMBtu) by the heat input

[27] *campd.epa.gov*.

(MMBtu) and converted into tons. All hourly PM CEMS data were used to calculate the annual emissions (*i.e.,* did not remove data flags indicating periods of startup and shutdown)[28].

a. Case Study 1

The first case study focuses on a 1,200 MW facility with three coal-fired EGUs located in the Midwest. Units 1A and 1B are both 585 MW bituminous-fired EGUs, with cold-side ESPs for PM control. Unit 1C is a 620 MW bituminous-fired EGU, with a hot-side ESP for PM control. Hourly average PM CEMS data for Units 1A and 1B were submitted to EPA as part of obligations under a consent decree and not used for compliance demonstration purposes and are available in the docket as an attachment to this technical memorandum. Units 1A and 1B have achieved LEE status for fPM and are currently required to demonstrate compliance with an emission standard of 0.015 lb/MMBtu using intermittent stack testing every three years. Submittal of hourly fPM CEMS data for Unit 1C was not required by the consent decree.

Figure 8 shows the PM CEMS data below 0.110 lb/MMBtu available for Units 1A and 1B from 2019 to mid-2023. During the reporting period, hourly PM CEMS data for Unit 1A (N=40,060) range from near-zero to 1.33 lb/MMBtu, with average and median values of 0.0028 and 0.0020 lb/MMBtu, respectively. For Unit 1B, the hourly PM CEMS data range from near-zero to 0.070 lb/MMBtu, with average and median values of 0.0023 and 0.0020 lb/MMBtu, respectively. The 25th and 75th percentiles of the hourly PM CEMS fPM rates for both Units 1A and 1B are 0.0010 and 0.0030 lb/MMBtu, respectively. The highest daily averages, which are less variable than the hourly data, are 0.104 lb/MMBtu for Unit 1A and 0.033 lb/MMBtu for Unit 1B.

[28] Note this case was developed to show EGU fPM variability of PM CEMS values over a year, not to demonstrate compliance with the MATS fPM emission limit.

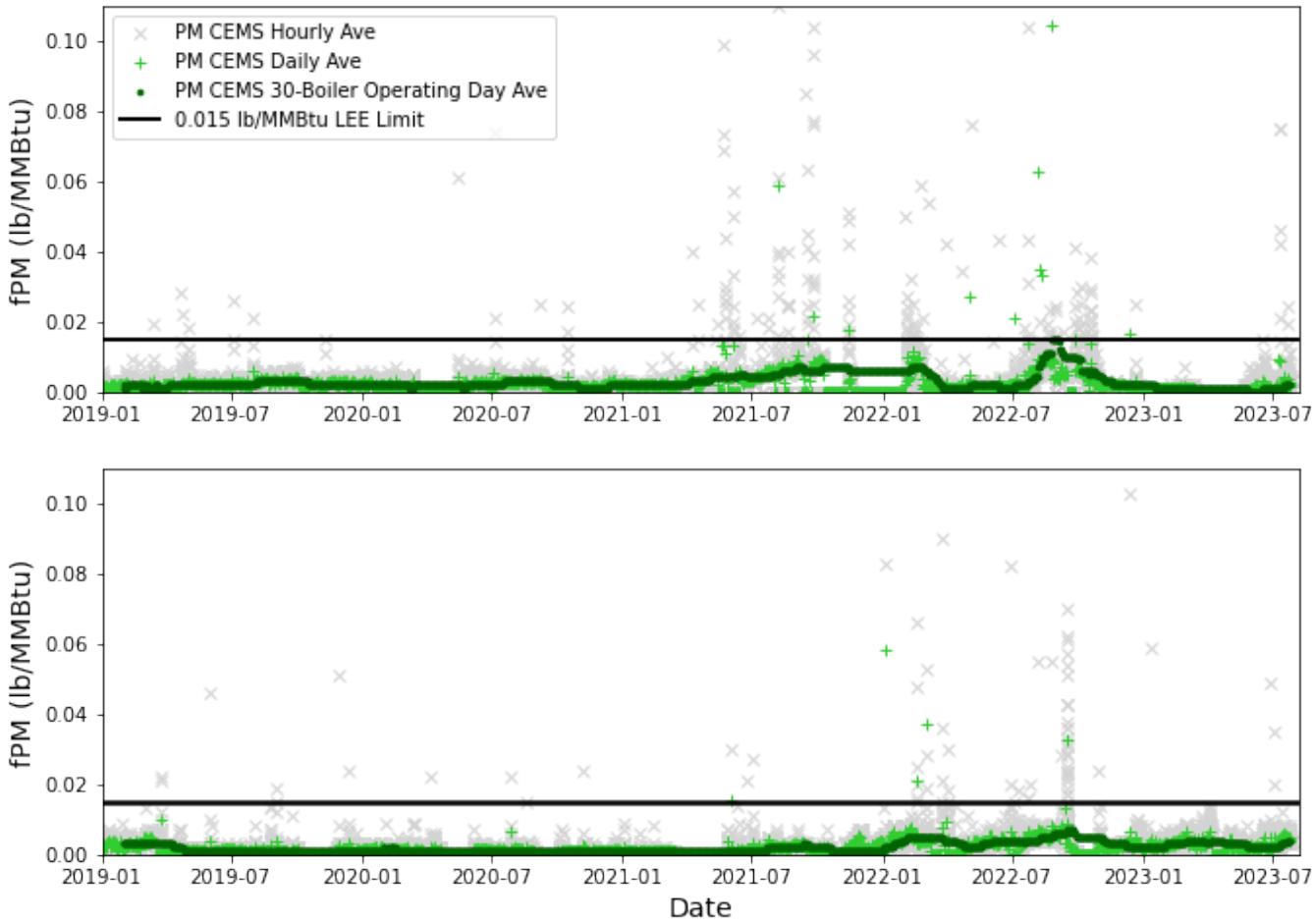

Figure 8. PM CEMS data for Units 1A (top) and 1B (bottom) between 2019 and mid-2023 below 0.11 lb/MMBtu.

Figure 9 highlights the time period from the last two LEE intermittent stack testing reports submitted by the unit, showing 30-boiler operating day averages from mid-September 2019 to January 2023. The compliance reports provide September 18, 2019, stack test averages for Units 1A and 1B of 0.0079 and 0.0068 lb/MMBtu, respectively. Over the subsequent 36 months over which these units were not subject to any further compliance stack testing, continuous monitoring demonstrates that the 30-boiler operating day average fPM emission rates were two to six times lower than the rate measured during the LEE stack test. Next, in the most recent LEE compliance report, Units 1A and 1B measured a February 25, 2021, intermittent stack test average emission rate of 0.0017 and 0.0010 lb/MMBtu, respectively. After this LEE test in February 2021, continuous monitoring shows the 30-boiler operating day average fPM emission rates increased substantially from the emission rates measured during the 2021 stack

test. At one point in mid-2022, the continuously monitored 30-boiler operating day average fPM emissions rate for Unit 1A was about nine times higher than the 2021 intermittent stack test average, reaching the fPM LEE limit of 0.015 lb/MMBtu. Upon reaching the 0.015 lb/MMBtu fPM LEE limit, the 30-boiler operating day average for Unit 1A decreased sharply and stabilized again toward the end of 2022 near the February 2021 LEE test average value. This case study illustrates the potential benefit of having continuous, quality-assured PM CEMS data that inform owners and operators that their fPM rates are rising, prompting corrective action. In the absence of this continuous information, EGUs have the potential to emit above their applicable emission standards for periods of months or years between intermittent stack tests.

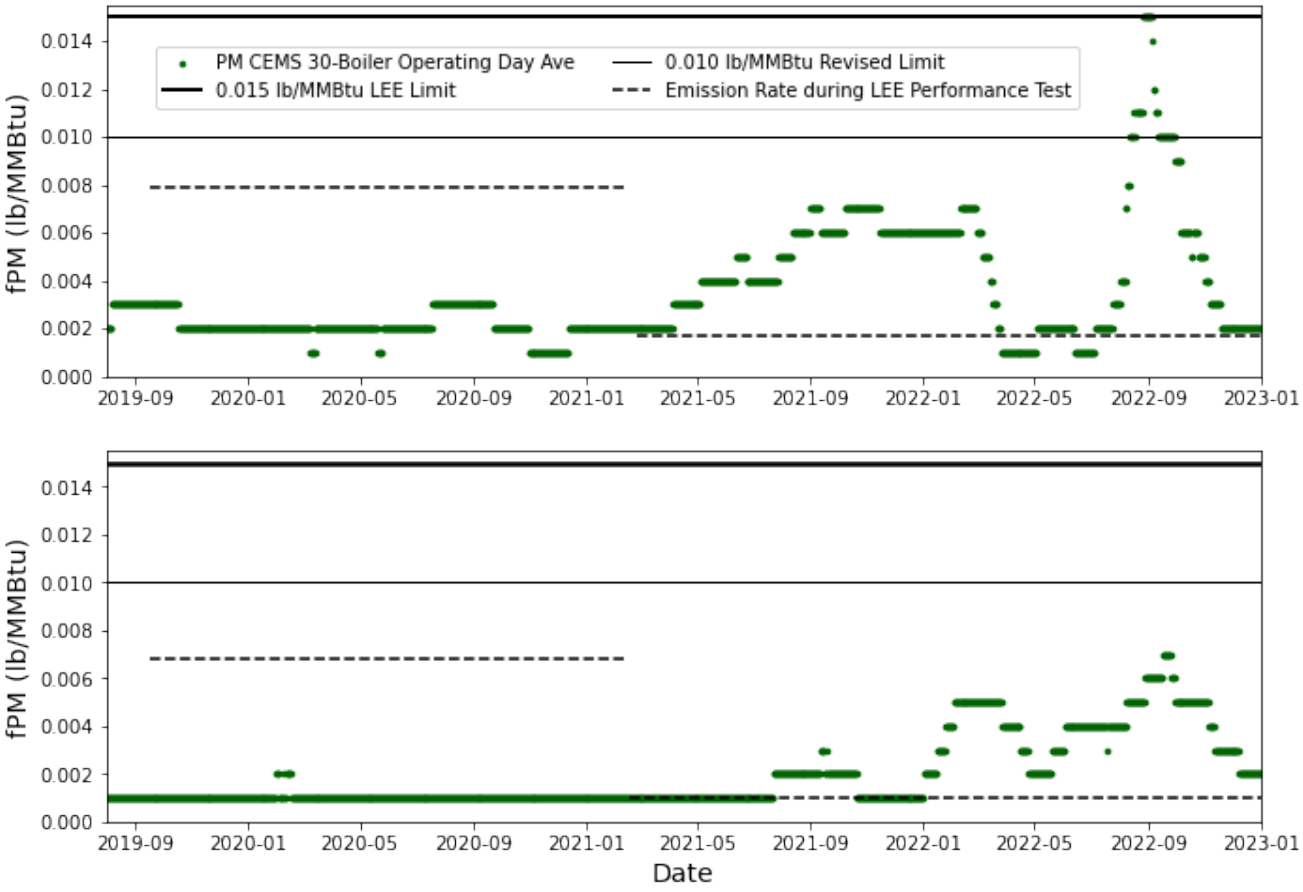

Figure 9. PM CEMS 30-boiler operating day averages and LEE stack test averages for Units 1A (top) and 1B (bottom) from September 2019 to the end of 2022.

In addition to providing EGU owner/operators with the ability to quickly detect, identify, and correct potential control device or operational problems, CEMS provide greater accuracy and transparency regarding the actual emissions from the units, which provides benefits to regulators as well as other stakeholders such as communities near these sources. To illustrate this point, EPA performed a comparison of the differences in 2022 annual fPM emissions for Units 1A and 1B estimated using the rate measured during the most recent stack test with 2022 annual fPM emissions based on hourly fPM rates recorded by the PM CEMS. The comparison shows that the use of the fPM rate measured during the stack test to determine annual emissions significantly underestimates the actual annual fPM emissions. Table 11 summarizes the estimated annual emissions based on stack testing and the actual emissions measured using the PM CEMS. For Unit 1A, 2022 emissions based on PM CEMS are approximately 2.5 times higher than emission estimates based on the average emission rate during the most recent stack test, whereas for Unit 1B, the emissions based on continually measured data from PM CEMS are approximately 4 times higher than emission estimates based on the average emission rate during the most recent stack The results also show annual emissions estimates using both stack testing and PM CEMS for both units are well below the annual emissions estimate assuming a constant fPM emission rate of 0.010 lb/MMBtu (184 and 159 tons/year for Units 1A and 1B, respectively). If this unit, using intermittent stack testing for compliance, was aiming to meet a fPM limit of 0.010 lb/MMBtu,[29] these emission results would indicate compliance. However, revisions under MATS will require continuous compliance using PM CEMS on a 30-boiler operating day average, and Figure 8 illustrates that there were 25 days with averages above the revised fPM limit of 0.010 lb/MMBtu for Unit 1A, ranging from 0.011 to 0.015 lb/MMBtu. Therefore, while the annual emissions estimates from stack testing and PM CEMS both indicate compliance with the revised fPM limit of 0.010 lb/MMBtu on an annual basis, only utilizing PM CEMS for compliance would show that the EGU approached and exceeded 0.010 lb/MMBtu for 25 days during the time period reviewed. Lastly, continuous measurements determine accurate real-world emissions, especially when compared to emission factors, and are usually the

[29] Note that this is for demonstration purposes only, as this unit was not trying to meet this lower fPM limit, and was not subject to a fPM limit of 0.010 lb/MMBtu.

preferred way to establish emissions.[30] More accurate emission inventories are beneficial when determining permit classifications and fees, performing air quality modeling for criteria pollutant attainment and maintenance plans, and monitoring progress and trends of emissions. Additionally, the recent Air Emissions Reporting Requirements (AERR) proposal (88 FR 54118) specified that owners or operators should estimate emissions with the best available data for reporting to EPA for the National Emissions Inventory. The proposal cited CEMS-based emissions as the best to use and noted past EPA guidance in AP-42 that indicated this preference. By requiring CEMS, this rule will additionally provide better emissions data, which in turn provides better data for States to use for State Implementation Plans and the many other benefits of improved emissions data cited in the AERR proposal.

Table 11. 2022 fPM emissions calculations for Case Study 1.

	Unit 1A 2022 fPM Emissions (tons/year)	Unit 1B 2022 fPM Emissions (tons/year)
2022 Annual Emissions Calculated from Hourly PM CEMS Data	77	67
2022 Annual Emissions Calculated from Most Recent Stack Test (current compliance method)	31	16

b. Case Study 2

Case Study 2 reviews data from 2018 to 2022 at a 1,600 MW facility with 2 coal-fired EGUs located in the Midwest. Units 2A and 2B are both 815 MW bituminous-fired EGUs, with cold-side ESPs and wet ESPs for PM control. Units 2A and 2B use PM CEMS for compliance with an emission standard of 0.030 lb/MMBtu on a 30-boiler operating day rolling average basis. The EPA received the hourly PM CEMS data with QA flags from a CAA section 114 request submitted to Region 5 and compared them to results from the facility's PM CEMS relative

[30] "General Information for Emission Inventories." North Carolina Department of Environmental Quality. Accessed on April 5, 2024. *https://www.deq.nc.gov/about/divisions/air-quality/outreach-education-engagement/air-quality-science-and-data/emission-inventories/general-information-emission-inventories*.

response audits (RRAs) submitted to WebFIRE as the facility does not undergo quarterly stack testing. The RRA results during the time period evaluated here are 0.0050 lb/MMBtu (February 2018) and 0.0079 lb/MMBtu (March 2019) for Unit 2A and 0.0027 lb/MMBtu (February 2018) and 0.0069 lb/MMBtu (March 2019) for Unit 2B.

As shown in Figure 10, the highly variable PM CEMS hourly and daily average data from Units 2A and 2B are smoothed out in the 30-boiler operating day averages used for compliance. Hourly PM CEMS data for Unit 2A range from near-zero to 0.026 lb/MMBtu, with mean and median values both about 0.005 lb/MMBtu. Similarly, the hourly PM CEMS data for Unit 2B range from near-zero to 0.039 lb/MMBtu, with mean and median values also about 0.005 lb/MMBtu. Over the 2018 to 2021 time period, the 30-boiler operating day averages from Units 2A and 2B were well below the 0.030 lb/MMBtu limit (with compliance margins of approximately 80 percent on average) and met but did not exceed the revised 0.010 lb/MMBtu limit (with compliance margins of approximately 50 percent on average). Comparisons to the 2 RRAs conducted over this time period indicate emissions measured by PM CEMS were, at their peak, about 2 to 3 times higher than the RRA results in 2018 to, at their trough, about 3 to 4 times lower than the RRA results from 2019 to 2021. This case study illustrates how infrequent stack testing, unlike PM CEMS, cannot reflect EGU operational variability. Infrequent stack testing occurs over normal operating conditions, generally between 90 and 110 percent of the EGU's load.[31] However, as shown in the data, actual operating load—and accompanying emissions—vary from around 60 to 110 percent load. Stack testing is incapable of capturing emissions between the quarterly or triannual period between retests, mainly because no stack testing measurements are made during those periods. On the other hand, PM CEMS captures, collects, and calculates actual emissions at least every 15 minutes, so actual EGU operational variability is captured. This case study highlights the potential benefits of continuous, quality-

[31] See 40 CFR 63.10007(a)(2) on performance testing demonstration requirements. "If you conduct performance testing with methods in lieu of continuous monitoring, operate the unit at maximum normal operating load conditions during each periodic (*e.g.*, quarterly) performance test. Maximum normal operating load will be generally between 90 and 110 percent of design capacity but should be representative of site specific normal operating conditions during each test run."

assured PM CEMS data over a range of operating conditions, including startup and shutdown periods.[32]

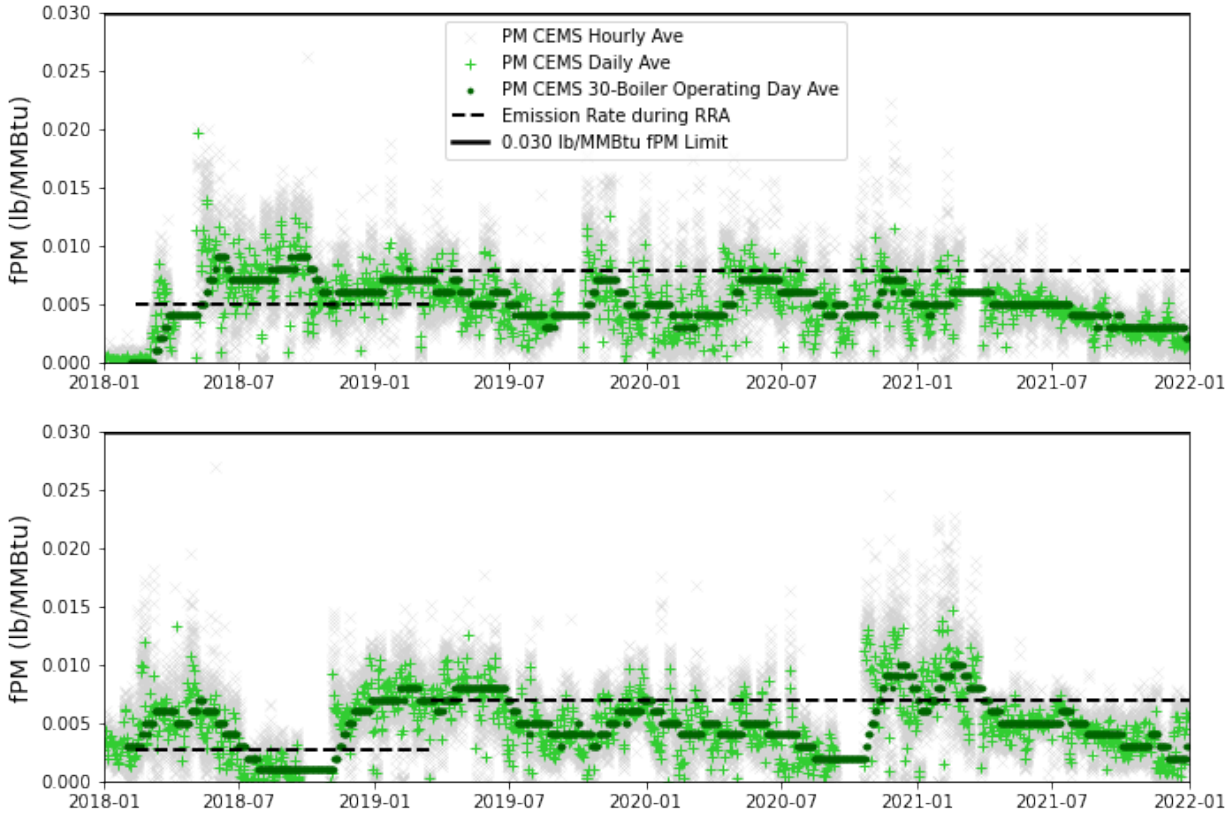

Figure 10. PM CEMS data and comparison to results from the facility's RRAs for Units 2A (top) and 2B (bottom) between 2018 and 2022.

Annual calculated emissions for 2018 and 2021 for Units 2A and 2B are shown in Table 12. Since this facility does not use stack testing for compliance demonstration purposes, we use results from the most recent RRA as a proxy to determine stack testing emissions. Similar to Case Study 1, the results show emissions calculations using both RRAs and PM CEMS are well below the annual emissions calculation assuming a constant fPM emission rate of 0.010 lb/MMBtu (327 and 328 tons/year for Units 2A and 318 and 335 tons/year for Unit 2B, for 2018 and 2021, respectively). Unlike Case Study 1, however, data from PM CEMS for Units 2A and

[32] See 40 CFR 63.10007(a)(1) on PM CEMS demonstration requirements. "Emission rates determined during startup periods and shutdown periods (as defined in 40 CRF part 63.10042) are not to be included in the compliance determinations."

2B illustrate the annual emissions variability between compliance demonstration options. For example, 2018 PM CEMS emissions for Unit 2B are about 1.5 times higher than what emissions estimated using stack testing values from the corresponding RRA, while 2021 PM CEMS emissions for this unit are about 1.3 times lower than stack testing indicates. As continuous measurements provide an accurate accounting of emissions, as opposed to the estimates that can be calculated from RRA stack testing values, this case study highlights that if this facility relied on stack testing alone for its compliance demonstration with the fPM standard, emissions could be overestimated or underestimated. The increased transparency provided by PM CEMS is of critical importance for EGU owners and operators, regulators, and nearby communities.

Table 12. 2018 and 2021 fPM emission calculations for Case Study 2.

	Unit 2A		Unit 2B	
	2018 Annual Emissions (tons/year)	2021 Annual Emissions (tons/year)	2018 Annual Emissions (tons/year)	2021 Annual Emissions (tons/year)
Annual Emissions Calculated from Hourly PM CEMS Data	181	134	129	172
Annual Emissions Calculated from Most Recent RRA	163	259	86	231

IN THE MATTER OF:
ELECTRONIC 2023 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2023-00310

BIG RIVERS ELECTRIC CORPORATION'S RESPONSES TO
SIERRA CLUB'S POST-HEARING DATA REQUESTS

REQUEST NO. PH-6: ***Please refer to Sierra Club's cross-examination of Big Rivers witness Michael Mizell beginning at approximately 4:33 PM on May 22, 2024, and the Big Rivers Coal Combustion Residual ("CCR") Rule Compliance and Data Information website was identified as down on May 21 in Sierra Club Exhibit SC-4 Big Rivers CCR Compliance Website. As of May 31, 2024, it is still down: https://www.bigrivers.com/environmental-services/big-rivers-electric-corporation-ccr-rule-compliance-and-data-information/.***

a. Please provide the date on which the CCR Compliance website was taken down.

b. Please explain how Big Rivers is complying with federal CCR law while the site is down.

c. Please provide the update that Mr. Mizell states he asked to be placed on the CCR Compliance website on May 21, 2024.

RESPONSE:

a. Big Rivers' CCR Compliance website was not taken down. CCR Rule Compliance and Data Information continue to be available on Big Rivers' website (https://www.bigrivers.com). On May 20, 2024, Big Rivers' redesigned website went online. As of that date, the information that was previously available through the link referenced in this request, is available at https://www.bigrivers.com/sustainable-power.html.

b. See response to subpart a., above.

c. Upon further investigation, the update had already been placed on the website in February of 2024. It had been overlooked when reviewing the redesigned website on May 21, 2024. Please also see the responses to subparts a and b, above.

Witness: Michael S. Mizell

IN THE MATTER OF
ELECTRONIC 2023 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2023-00310

BIG RIVERS ELECTRIC CORPORATION'S RESPONSES TO SIERRA CLUB'S POST-HEARING REQUESTS FOR INFORMATION

I, Jason Burden, verify, state, and affirm that the information request responses filed with this verification for which I am listed as a witness are true and accurate to the best of my knowledge, information, and belief formed after a reasonable inquiry.

Jason C. Burden

Jason Burden
Director of Production Services
Big Rivers Electric Corporation

STATE OF KENTUCKY)
) ss:
COUNTY OF DAVIESS)

SUBSCRIBED AND SWORN TO before me by Jason Burden this the 18th day of June, 2024.

My commission expires: October 31, 2024

Kathrine Pusley

Notary Public

Notary ID: KYNP16841

IN THE MATTER OF
ELECTRONIC 2023 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2023-00310

BIG RIVERS ELECTRIC CORPORATION'S RESPONSES TO SIERRA CLUB'S POST-HEARING REQUESTS FOR INFORMATION

I, Michael S. Mizell, verify, state, and affirm that the information request responses filed with this verification for which I am listed as a witness are true and accurate to the best of my knowledge, information, and belief formed after a reasonable inquiry.

Michael S. Mizell
Chief Administrative Officer
Big Rivers Electric Corporation

STATE OF KENTUCKY)
) ss:
COUNTY OF DAVIESS)

18th SUBSCRIBED AND SWORN TO before me by Michael S. Mizell on this the 18th day of June, 2024.

My commission expires: October 31, 2024

Notary Public

Notary ID: KYNP16841