EXHIBIT 1-1
Design Basis /Criteria (by AEP)

[Refer to the Big Sandy Plant Combined Cycle Brownfield Build Cost Estimate Study Exhibit 1-1. The same Design Criteria applies to this Study.]

EXHIBIT 1-2
AACE International
Recommended Practice No. 18R-97,
February 2, 2005

AACE International Recommended Practice No. 18R-97

COST ESTIMATE CLASSIFICATION SYSTEM – AS APPLIED IN ENGINEERING, PROCUREMENT, AND CONSTRUCTION FOR THE PROCESS INDUSTRIES

TCM Framework: 7.3 – Cost Estimating and Budgeting

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COST ESTIMATE CLASSIFICATION SYSTEM – AS APPLIED IN ENGINEERING, PROCUREMENT, AND CONSTRUCTION FOR THE PROCESS INDUSTRIES

February 2, 2005

PURPOSE

As a recommended practice of AACE International, the Cost Estimate Classification System provides guidelines for applying the general principles of estimate classification to project cost estimates (i.e., cost estimates that are used to evaluate, approve, and/or fund projects). The Cost Estimate Classification System maps the phases and stages of project cost estimating together with a generic maturity and quality matrix, which can be applied across a wide variety of industries.

This addendum to the generic recommended practice provides guidelines for applying the principles of estimate classification specifically to project estimates for engineering, procurement, and construction (EPC) work for the process industries. This addendum supplements the generic recommended practice (17R-97) by providing:

- a section that further defines classification concepts as they apply to the process industries;
- charts that compare existing estimate classification practices in the process industry; and
- a chart that maps the extent and maturity of estimate input information (project definition deliverables) against the class of estimate.

As with the generic standard, an intent of this addendum is to improve communications among all of the stakeholders involved with preparing, evaluating, and using project cost estimates specifically for the process industries.

It is understood that each enterprise may have its own project and estimating processes and terminology, and may classify estimates in particular ways. This guideline provides a generic and generally acceptable classification system for process industries that can be used as a basis to compare against. It is hoped that this addendum will allow each user to better assess, define, and communicate their own processes and standards in the light of generally-accepted cost engineering practice.

INTRODUCTION

For the purposes of this addendum, the term process industries is assumed to include firms involved with the manufacturing and production of chemicals, petrochemicals, and hydrocarbon processing. The common thread among these industries (for the purpose of estimate classification) is their reliance on process flow diagrams (PFDs) and piping and instrument diagrams (P&IDs) as primary scope defining documents. These documents are key deliverables in determining the level of project definition, and thus the extent and maturity of estimate input information.

Estimates for process facilities center on mechanical and chemical process equipment, and they have significant amounts of piping, instrumentation, and process controls involved. As such, this addendum may apply to portions of other industries, such as pharmaceutical, utility, metallurgical, converting, and similar industries. Specific addendums addressing these industries may be developed over time.

This addendum specifically does not address cost estimate classification in nonprocess industries such as commercial building construction, environmental remediation, transportation infrastructure, “dry” processes such as assembly and manufacturing, “soft asset” production such as software development, and similar industries. It also does not specifically address estimates for the exploration, production, or transportation of mining or hydrocarbon materials, although it may apply to some of the intermediate processing steps in these systems.

The cost estimates covered by this addendum are for engineering, procurement, and construction (EPC) work only. It does not cover estimates for the products manufactured by the process facilities, or for research and development work in support of the process industries. This guideline does not cover the

significant building construction that may be a part of process plants. Building construction will be covered in a separate addendum.

This guideline reflects generally-accepted cost engineering practices. This addendum was based upon the practices of a wide range of companies in the process industries from around the world, as well as published references and standards. Company and public standards were solicited and reviewed by the AACE International Cost Estimating Committee. The practices were found to have significant commonalities that are conveyed in this addendum.

COST ESTIMATE CLASSIFICATION MATRIX FOR THE PROCESS INDUSTRIES

The five estimate classes are presented in figure 1 in relationship to the identified characteristics. Only the level of project definition determines the estimate class. The other four characteristics are secondary characteristics that are generally correlated with the level of project definition, as discussed in the generic standard. The characteristics are typical for the process industries but may vary from application to application.

This matrix and guideline provide an estimate classification system that is specific to the process industries. Refer to the generic standard for a general matrix that is non-industry specific, or to other addendums for guidelines that will provide more detailed information for application in other specific industries. These will typically provide additional information, such as input deliverable checklists to allow meaningful categorization in those particular industries.

	Primary Characteristic	***Secondary Characteristic***			
ESTIMATE CLASS	**LEVEL OF PROJECT DEFINITION** Expressed as % of complete definition	**END USAGE** Typical purpose of estimate	**METHODOLOGY** Typical estimating method	**EXPECTED ACCURACY RANGE** Typical variation in low and high ranges [a]	**PREPARATION EFFORT** Typical degree of effort relative to least cost index of 1 [b]
Class 5	0% to 2%	Concept Screening	Capacity Factored, Parametric Models, Judgment, or Analogy	L: -20% to -50% H: +30% to +100%	1
Class 4	1% to 15%	Study or Feasibility	Equipment Factored or Parametric Models	L: -15% to -30% H: +20% to +50%	2 to 4
Class 3	10% to 40%	Budget, Authorization, or Control	Semi-Detailed Unit Costs with Assembly Level Line Items	L: -10% to -20% H: +10% to +30%	3 to 10
Class 2	30% to 70%	Control or Bid/ Tender	Detailed Unit Cost with Forced Detailed Take-Off	L: -5% to -15% H: +5% to +20%	4 to 20
Class 1	50% to 100%	Check Estimate or Bid/Tender	Detailed Unit Cost with Detailed Take-Off	L: -3% to -10% H: +3% to +15%	5 to 100

Notes: [a] The state of process technology and availability of applicable reference cost data affect the range markedly. The +/- value represents typical percentage variation of actual costs from the cost estimate after application of contingency (typically at a 50% level of confidence) for given scope.

[b] If the range index value of "1" represents 0.005% of project costs, then an index value of 100 represents 0.5%. Estimate preparation effort is highly dependent upon the size of the project and the quality of estimating data and tools.

Figure 1. – Cost Estimate Classification Matrix for Process Industries

CHARACTERISTICS OF THE ESTIMATE CLASSES

The following charts (figures 2a through 2e) provide detailed descriptions of the five estimate classifications as applied in the process industries. They are presented in the order of least-defined estimates to the most-defined estimates. These descriptions include brief discussions of each of the estimate characteristics that define an estimate class.

For each chart, the following information is provided:

- **Description:** a short description of the class of estimate, including a brief listing of the expected estimate inputs based on the level of project definition.
- **Level of Project Definition Required:** expressed as a percent of full definition. For the process industries, this correlates with the percent of engineering and design complete.
- **End Usage:** a short discussion of the possible end usage of this class of estimate.
- **Estimating Methods Used:** a listing of the possible estimating methods that may be employed to develop an estimate of this class.
- **Expected Accuracy Range:** typical variation in low and high ranges after the application of contingency (determined at a 50% level of confidence). Typically, this results in a 90% confidence that the actual cost will fall within the bounds of the low and high ranges.
- **Effort to Prepare:** this section provides a typical level of effort (in hours) to produce a complete estimate for a US$20,000,000 plant. Estimate preparation effort is highly dependent on project size, project complexity, estimator skills and knowledge, and on the availability of appropriate estimating cost data and tools.
- **ANSI Standard Reference (1989) Name:** this is a reference to the equivalent estimate class in the existing ANSI standards.
- **Alternate Estimate Names, Terms, Expressions, Synonyms:** this section provides other commonly used names that an estimate of this class might be known by. These alternate names are not endorsed by this Recommended Practice. The user is cautioned that an alternative name may not always be correlated with the class of estimate as identified in the chart.

CLASS 5 ESTIMATE	
Description: Class 5 estimates are generally prepared based on very limited information, and subsequently have wide accuracy ranges. As such, some companies and organizations have elected to determine that due to the inherent inaccuracies, such estimates cannot be classified in a conventional and systemic manner. Class 5 estimates, due to the requirements of end use, may be prepared within a very limited amount of time and with little effort expended—sometimes requiring less than an hour to prepare. Often, little more than proposed plant type, location, and capacity are known at the time of estimate preparation. **Level of Project Definition Required:** 0% to 2% of full project definition. **End Usage:** Class 5 estimates are prepared for any number of strategic business planning purposes, such as but not limited to market studies, assessment of initial viability, evaluation of alternate schemes, project screening, project location studies, evaluation of resource needs and budgeting, long-range capital planning, etc.	**Estimating Methods Used:** Class 5 estimates virtually always use stochastic estimating methods such as cost/capacity curves and factors, scale of operations factors, Lang factors, Hand factors, Chilton factors, Peters-Timmerhaus factors, Guthrie factors, and other parametric and modeling techniques. **Expected Accuracy Range:** Typical accuracy ranges for Class 5 estimates are - 20% to -50% on the low side, and +30% to +100% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances. **Effort to Prepare (for US$20MM project):** As little as 1 hour or less to perhaps more than 200 hours, depending on the project and the estimating methodology used. **ANSI Standard Reference Z94.2-1989 Name:** Order of magnitude estimate (typically -30% to +50%). **Alternate Estimate Names, Terms, Expressions, Synonyms:** Ratio, ballpark, blue sky, seat-of-pants, ROM, idea study, prospect estimate, concession license estimate, guesstimate, rule-of-thumb.

Figure 2a. – Class 5 Estimate

CLASS 4 ESTIMATE	
Description: Class 4 estimates are generally prepared based on limited information and subsequently have fairly wide accuracy ranges. They are typically used for project screening, determination of feasibility, concept evaluation, and preliminary budget approval. Typically, engineering is from 1% to 15% complete, and would comprise at a minimum the following: plant capacity, block schematics, indicated layout, process flow diagrams (PFDs) for main process systems, and preliminary engineered process and utility equipment lists. **Level of Project Definition Required:** 1% to 15% of full project definition. **End Usage:** Class 4 estimates are prepared for a number of purposes, such as but not limited to, detailed strategic planning, business development, project screening at more developed stages, alternative scheme analysis, confirmation of economic and/or technical feasibility, and preliminary budget approval or approval to proceed to next stage.	**Estimating Methods Used:** Class 4 estimates virtually always use stochastic estimating methods such as equipment factors, Lang factors, Hand factors, Chilton factors, Peters-Timmerhaus factors, Guthrie factors, the Miller method, gross unit costs/ratios, and other parametric and modeling techniques. **Expected Accuracy Range:** Typical accuracy ranges for Class 4 estimates are -15% to -30% on the low side, and +20% to +50% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances. **Effort to Prepare (for US$20MM project):** Typically, as little as 20 hours or less to perhaps more than 300 hours, depending on the project and the estimating methodology used. **ANSI Standard Reference Z94.2-1989 Name:** Budget estimate (typically -15% to + 30%). **Alternate Estimate Names, Terms, Expressions, Synonyms:** Screening, top-down, feasibility, authorization, factored, pre-design, pre-study.

Figure 2b. – Class 4 Estimate

CLASS 3 ESTIMATE	
Description: Class 3 estimates are generally prepared to form the basis for budget authorization, appropriation, and/or funding. As such, they typically form the initial control estimate against which all actual costs and resources will be monitored. Typically, engineering is from 10% to 40% complete, and would comprise at a minimum the following: process flow diagrams, utility flow diagrams, preliminary piping and instrument diagrams, plot plan, developed layout drawings, and essentially complete engineered process and utility equipment lists. **Level of Project Definition Required:** 10% to 40% of full project definition. **End Usage:** Class 3 estimates are typically prepared to support full project funding requests, and become the first of the project phase "control estimates" against which all actual costs and resources will be monitored for variations to the budget. They are used as the project budget until replaced by more detailed estimates. In many owner organizations, a Class 3 estimate may be the last estimate required and could well form the only basis for cost/schedule control.	**Estimating Methods Used:** Class 3 estimates usually involve more deterministic estimating methods than stochastic methods. They usually involve a high degree of unit cost line items, although these may be at an assembly level of detail rather than individual components. Factoring and other stochastic methods may be used to estimate less-significant areas of the project. **Expected Accuracy Range:** Typical accuracy ranges for Class 3 estimates are -10% to -20% on the low side, and +10% to +30% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances. **Effort to Prepare (for US$20MM project):** Typically, as little as 150 hours or less to perhaps more than 1,500 hours, depending on the project and the estimating methodology used. **ANSI Standard Reference Z94.2-1989 Name:** Budget estimate (typically -15% to + 30%). **Alternate Estimate Names, Terms, Expressions, Synonyms:** Budget, scope, sanction, semi-detailed, authorization, preliminary control, concept study, development, basic engineering phase estimate, target estimate.

Figure 2c. – Class 3 Estimate

CLASS 2 ESTIMATE	
Description: Class 2 estimates are generally prepared to form a detailed control baseline against which all project work is monitored in terms of cost and progress control. For contractors, this class of estimate is often used as the "bid" estimate to establish contract value. Typically, engineering is from 30% to 70% complete, and would comprise at a minimum the following: process flow diagrams, utility flow diagrams, piping and instrument diagrams, heat and material balances, final plot plan, final layout drawings, complete engineered process and utility equipment lists, single line diagrams for electrical, electrical equipment and motor schedules, vendor quotations, detailed project execution plans, resourcing and work force plans, etc. **Level of Project Definition Required:** 30% to 70% of full project definition. **End Usage:** Class 2 estimates are typically prepared as the detailed control baseline against which all actual costs and resources will now be monitored for variations to the budget, and form a part of the change/variation control program.	**Estimating Methods Used:** Class 2 estimates always involve a high degree of deterministic estimating methods. Class 2 estimates are prepared in great detail, and often involve tens of thousands of unit cost line items. For those areas of the project still undefined, an assumed level of detail takeoff (forced detail) may be developed to use as line items in the estimate instead of relying on factoring methods. **Expected Accuracy Range:** Typical accuracy ranges for Class 2 estimates are -5% to -15% on the low side, and +5% to +20% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances. **Effort to Prepare (for US$20MM project):** Typically, as little as 300 hours or less to perhaps more than 3,000 hours, depending on the project and the estimating methodology used. Bid estimates typically require more effort than estimates used for funding or control purposes. **ANSI Standard Reference Z94.2-1989 Name:** Definitive estimate (typically -5% to + 15%). **Alternate Estimate Names, Terms, Expressions, Synonyms:** Detailed control, forced detail, execution phase, master control, engineering, bid, tender, change order estimate.

Figure 2d. – Class 2 Estimate

CLASS 1 ESTIMATE	
Description: Class 1 estimates are generally prepared for discrete parts or sections of the total project rather than generating this level of detail for the entire project. The parts of the project estimated at this level of detail will typically be used by subcontractors for bids, or by owners for check estimates. The updated estimate is often referred to as the current control estimate and becomes the new baseline for cost/schedule control of the project. Class 1 estimates may be prepared for parts of the project to comprise a fair price estimate or bid check estimate to compare against a contractor's bid estimate, or to evaluate/dispute claims. Typically, engineering is from 50% to 100% complete, and would comprise virtually all engineering and design documentation of the project, and complete project execution and commissioning plans. **Level of Project Definition Required:** 50% to 100% of full project definition. **End Usage:** Class 1 estimates are typically prepared to form a current control estimate to be used as the final control baseline against which all actual costs and resources will now be monitored for variations to the budget, and form a part of the change/variation control program. They may be used to evaluate bid checking, to support vendor/contractor negotiations, or for claim evaluations and dispute resolution.	**Estimating Methods Used:** Class 1 estimates involve the highest degree of deterministic estimating methods, and require a great amount of effort. Class 1 estimates are prepared in great detail, and thus are usually performed on only the most important or critical areas of the project. All items in the estimate are usually unit cost line items based on actual design quantities. **Expected Accuracy Range:** Typical accuracy ranges for Class 1 estimates are -3% to -10% on the low side, and +3% to +15% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances. **Effort to Prepare (for US$20MM project):** Class 1 estimates require the most effort to create, and as such are generally developed for only selected areas of the project, or for bidding purposes. A complete Class 1 estimate may involve as little as 600 hours or less, to perhaps more than 6,000 hours, depending on the project and the estimating methodology used. Bid estimates typically require more effort than estimates used for funding or control purposes. **ANSI Standard Reference Z94.2 Name:** Definitive estimate (typically -5% to + 15%). **Alternate Estimate Names, Terms, Expressions, Synonyms:** Full detail, release, fall-out, tender, firm price, bottoms-up, final, detailed control, forced detail, execution phase, master control, fair price, definitive, change order estimate.

Figure 2e. – Class 1 Estimate

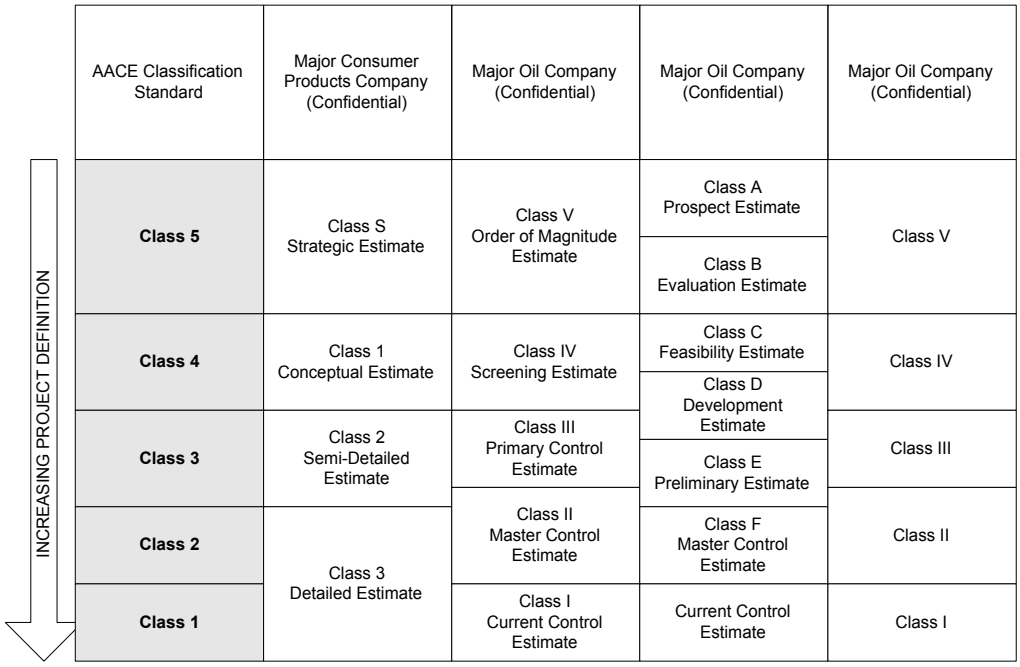
COMPARISON OF CLASSIFICATION PRACTICES

Figures 3a through 3c provide a comparison of the estimate classification practices of various firms, organizations, and published sources against one another and against the guideline classifications. These tables permits users to benchmark their own classification practices.

INCREASING PROJECT DEFINITION

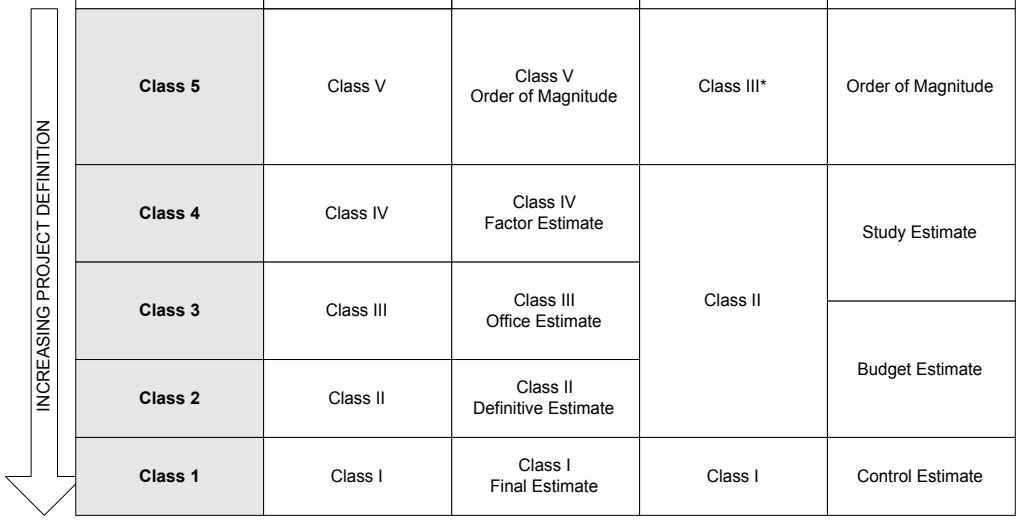
AACE Classification Standard	ANSI Standard Z94.0	AACE Pre-1972	Association of Cost Engineers (UK) ACostE	Norwegian Project Management Association (NFP)	American Society of Professional Estimators (ASPE)
Class 5	Order of Magnitude Estimate -30/+50	Order of Magnitude Estimate	Order of Magnitude Estimate Class IV -30/+30	Concession Estimate	Level 1
				Exploration Estimate	
				Feasibility Estimate	
Class 4	Budget Estimate -15/+30	Study Estimate	Study Estimate Class III -20/+20	Authorization Estimate	Level 2
Class 3		Preliminary Estimate	Budget Estimate Class II -10/+10	Master Control Estimate	Level 3
Class 2	Definitive Estimate -5/+15	Definitive Estimate	Definitive Estimate Class I -5/+5	Current Control Estimate	Level 4
Class 1		Detailed Estimate			Level 5
					Level 6

Figure 3a. – Comparison of Classification Practices



AACE Classification Standard	Major Consumer Products Company (Confidential)	Major Oil Company (Confidential)	Major Oil Company (Confidential)	Major Oil Company (Confidential)
Class 5	Class S Strategic Estimate	Class V Order of Magnitude Estimate	Class A Prospect Estimate	Class V
			Class B Evaluation Estimate	
Class 4	Class 1 Conceptual Estimate	Class IV Screening Estimate	Class C Feasibility Estimate	Class IV
			Class D Development Estimate	
Class 3	Class 2 Semi-Detailed Estimate	Class III Primary Control Estimate		Class III
			Class E Preliminary Estimate	
Class 2	Class 3 Detailed Estimate	Class II Master Control Estimate	Class F Master Control Estimate	Class II
Class 1		Class I Current Control Estimate	Current Control Estimate	Class I

Figure 3b. – Comparison of Classification Practices



AACE Classification Standard	J.R. Heizelman, 1988 AACE Transactions [1]	K.T. Yeo, The Cost Engineer, 1989 [2]	Stevens & Davis, 1988 AACE Transactions [3]	P. Behrenbruck, Journal of Petroleum Technology, 1993 [4]
Class 5	Class V	Class V Order of Magnitude	Class III*	Order of Magnitude
Class 4	Class IV	Class IV Factor Estimate	Class II	Study Estimate
Class 3	Class III	Class III Office Estimate		Budget Estimate
Class 2	Class II	Class II Definitive Estimate		
Class 1	Class I	Class I Final Estimate	Class I	Control Estimate

[1] John R. Heizelman, ARCO Oil & Gas Co., 1988 AACE Transactions, Paper V3.7
[2] K.T. Yeo, The Cost Engineer, Vol. 27, No. 6, 1989
[3] Stevens & Davis, BP International Ltd., 1988 AACE Transactions, Paper B4.1 (* Class III is inferred)
[4] Peter Behrenbruck, BHP Petroleum Pty., Ltd., article in Petroleum Technology, August 1993

Figure 3c. – Comparison of Classification Practices

ESTIMATE INPUT CHECKLIST AND MATURITY MATRIX

Figure 4 maps the extent and maturity of estimate input information (deliverables) against the five estimate classification levels. This is a checklist of basic deliverables found in common practice in the process industries. The maturity level is an approximation of the degree of completion of the deliverable. The degree of completion is indicated by the following letters.

- None (blank): development of the deliverable has not begun.
- Started (S): work on the deliverable has begun. Development is typically limited to sketches, rough outlines, or similar levels of early completion.
- Preliminary (P): work on the deliverable is advanced. Interim, cross-functional reviews have usually been conducted. Development may be near completion except for final reviews and approvals.
- Complete (C): the deliverable has been reviewed and approved as appropriate.

	ESTIMATE CLASSIFICATION				
General Project Data:	**CLASS 5**	**CLASS 4**	**CLASS 3**	**CLASS 2**	**CLASS 1**
Project Scope Description	General	Preliminary	Defined	Defined	Defined
Plant Production/Facility Capacity	Assumed	Preliminary	Defined	Defined	Defined
Plant Location	General	Approximate	Specific	Specific	Specific
Soils & Hydrology	None	Preliminary	Defined	Defined	Defined
Integrated Project Plan	None	Preliminary	Defined	Defined	Defined
Project Master Schedule	None	Preliminary	Defined	Defined	Defined
Escalation Strategy	None	Preliminary	Defined	Defined	Defined
Work Breakdown Structure	None	Preliminary	Defined	Defined	Defined
Project Code of Accounts	None	Preliminary	Defined	Defined	Defined
Contracting Strategy	Assumed	Assumed	Preliminary	Defined	Defined
Engineering Deliverables:					
Block Flow Diagrams	S/P	P/C	C	C	C
Plot Plans		S	P/C	C	C
Process Flow Diagrams (PFDs)		S/P	P/C	C	C
Utility Flow Diagrams (UFDs)		S/P	P/C	C	C
Piping & Instrument Diagrams (P&IDs)		S	P/C	C	C
Heat & Material Balances		S	P/C	C	C
Process Equipment List		S/P	P/C	C	C
Utility Equipment List		S/P	P/C	C	C
Electrical One-Line Drawings		S/P	P/C	C	C
Specifications & Datasheets		S	P/C	C	C
General Equipment Arrangement Drawings		S	P/C	C	C
Spare Parts Listings			S/P	P	C
Mechanical Discipline Drawings			S	P	P/C
Electrical Discipline Drawings			S	P	P/C
Instrumentation/Control System Discipline Drawings			S	P	P/C
Civil/Structural/Site Discipline Drawings			S	P	P/C

Figure 4. – Estimate Input Checklist and Maturity Matrix

REFERENCES

ANSI Standard Z94.2-1989. **Industrial Engineering Terminology: Cost Engineering**.
AACE International Recommended Practice No.17R-97, **Cost Estimate Classification System**.

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EXHIBIT 1-3
Union Labor Rate Summary

Big Sandy Plant
Unit 1 Repowering
Cost Estimate Study
June 29, 2011
Rev. 1

Union Labor Rate Summary

2011 BIG SANDY 90% NMA Wage Union Labor Rates

				7.62%			18.45%	7.65%	10%	0.80%	
			Craft Rates								
Craft	Means Title	S&L Title	Base	W. Comp	Fringes	Travel	Payroll Taxes	Soc Sec	SUI	FUI	Craft Total
1	Insulation Worker		27.00	2.06	17.34	0.00	4.98	2.0655	2.7000	0.2160	51.38
2	Boilermaker		30.91	2.36	20.51	0.00	5.70	2.3646	3.0910	0.2473	59.48
3	Bricklayer		24.98	1.90	16.37	0.00	4.61	1.9110	2.4980	0.1998	47.86
4	Carpenter		26.30	2.00	14.31	0.00	4.85	2.0120	2.6300	0.2104	47.46
5	Cement Finisher	Cement Mason	25.25	1.92	15.22	0.00	4.66	1.9316	2.5250	0.2020	47.05
6	Electrician		28.68	2.19	19.71	0.00	5.29	2.1940	2.8680	0.2294	55.87
7	Elevator Constr		34.68	2.64	23.12	0.00	6.40	2.6530	3.4680	0.2774	66.84
8	Glazier		25.65	1.95	5.70	0.00	4.73	1.9622	2.5650	0.2052	38.03
9	Structural Steel Worker	Ironworker	26.63	2.03	18.04	0.00	4.91	2.0372	2.6630	0.2130	51.61
10	Common Bldg Laborer	Laborer, Bulding	22.74	1.73	12.37	0.00	4.20	1.7396	2.2740	0.1819	41.04
11	Common Bldg Laborer	Laborer, Chimney	22.74	1.73	12.37	0.00	4.20	1.7396	2.2740	0.1819	41.04
12	Com Bldg Lab, Air Tool	Laborer, Jackhammer	22.74	1.73	12.37	0.00	4.20	1.7396	2.2740	0.1819	41.04
13	Plasterers Helper	Laborer, Plasterer	21.92	1.67	12.37	0.00	4.04	1.6769	2.1920	0.1754	40.00
14	Lather		24.70	1.88	14.51	0.00	4.56	1.8896	2.4700	0.1976	45.65
15	Equip Oper - Med	Lineman	27.84	2.12	15.79	0.00	5.14	2.1298	2.7840	0.2227	50.89
16	Mill Wright		28.04	2.14	14.86	0.00	5.17	2.1451	2.8040	0.2243	50.21
17	Equip Oper - Light	Oper Engr, Air Comp.	19.58	1.49	13.02	0.00	3.61	1.4979	1.9580	0.1566	37.70
18	Equip Oper - Oiler	Oper Eng, Oiler	20.65	1.57	13.02	0.00	3.81	1.5797	2.0650	0.1652	39.05
19	Equip Oper - Heavy	Loader > 2.5 Cu Yds	24.32	1.85	13.02	0.00	4.49	1.8605	2.4320	0.1946	43.68
20	Equip Oper - Med	Loader < 2.5 Cu Yds	20.65	1.57	13.02	0.00	3.81	1.5797	2.0650	0.1652	39.05
21	Equip Oper - Heavy	Oper Eng, Crane	24.32	1.85	13.02	0.00	4.49	1.8605	2.4320	0.1946	43.68
22	Painter, Struct Steel	Painter	22.76	1.73	12.57	0.00	4.20	1.7411	2.2760	0.1821	41.26
23	Pipefitter		24.63	1.88	19.35	0.00	4.54	1.8842	2.4630	0.1970	50.40
24	Plumber		24.63	1.88	19.35	0.00	4.54	1.8842	2.4630	0.1970	50.40
25	Roofer, Composition		24.30	1.85	11.18	0.00	4.48	1.8590	2.4300	0.1944	41.81
26	Sheet Metal Worker		23.18	1.77	19.37	0.00	4.28	1.7733	2.3180	0.1854	48.60
27	Tile Layer		23.32	1.78	16.98	0.00	4.30	1.7840	2.3320	0.1866	46.38
28	Truck Driver - Heavy	Teamster	29.39	2.24	14.30	0.00	5.42	2.2483	2.9390	0.2351	51.35
29	Waterproofer		24.30	1.85	11.18	0.00	4.48	1.8590	2.4300	0.1944	41.81
30	Plasterer		25.95	1.98	14.06	0.00	4.79	1.9852	2.5950	0.2076	46.78
							Average				46.58

Union Labor Rate Summary

2011 BIG SANDY 90% NMA Wage Union Labor Rates

																																					10.35%			38%	
Crew Rates			Crew Mix																																						
Crew	Title	Base	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		Comp	Fringes	Travel	Other	Equipment (1)	Payroll Taxes	Site OH	Total
BAGH	BAGHOUSE	29.60		0.75		0.02		0.02			0.07	0.03											0.09							0.02			1.00	2.25	19.15	0.00	3.06	19.56	5.47	30.05	109.14
BCSE	BASE COURSE	22.15										0.30								0.15		0.45								0.10			1.00	1.69	12.95	0.00	2.29	30.45	4.08	27.97	101.58
CARP	CARPENTRY	25.94				0.90						0.10																					1.00	1.97	14.12	0.00	2.68	1.58	4.79	19.41	70.49
CLHG	COAL HANDLING	26.98		0.05		0.05	0.01	0.02			0.13	0.10						0.50					0.10					0.01		0.03			1.00	2.06	15.23	0.00	2.79	14.11	4.99	25.14	91.30
CNDR	CONDENSER	29.20		0.70		0.07		0.01				0.07						0.02					0.07		0.04					0.02			1.00	2.22	18.70	0.00	3.02	9.53	5.37	25.86	93.90
CONB	CONCRETE BUCKET	23.89				0.10	0.14				0.10	0.51								0.05			0.10										1.00	1.82	13.62	0.00	2.47	14.37	4.41	23.02	83.60
CONC	CONCRETE CHIMNEY	23.26									0.10	0.15	0.55							0.05			0.15										1.00	1.77	13.06	0.00	2.41	9.11	4.29	20.48	74.38
COND	CONCRETE DIRECT	23.91				0.10	0.17				0.10	0.63																					1.00	1.82	13.61	0.00	2.47	3.44	4.42	18.87	68.54
CONP	CONCRETE PUMP	23.52				0.10	0.14				0.10	0.56							0.10														1.00	1.79	13.59	0.00	2.43	10.83	4.34	21.47	77.97
CTMC	COOL. TWR. CONCRETE	25.05				0.17	0.30	0.01			0.10	0.26						0.04					0.10							0.02			1.00	1.91	14.40	0.00	2.59	14.13	4.62	23.83	86.53
CTMW	COOLING TWR. WOOD	25.66				0.60	0.02	0.01				0.15						0.05					0.05		0.10					0.02			1.00	1.95	14.57	0.00	2.66	14.67	4.72	24.41	88.64
CURB	CURB AND GUTTER	24.15				0.28	0.29					0.28										0.15											1.00	1.84	13.83	0.00	2.50	2.50	4.46	18.73	68.01
CYNC	COOLING TWR. NATURAL	25.03				0.22	0.30	0.01			0.10	0.25											0.10							0.02			1.00	1.90	14.40	0.00	2.59	8.93	4.62	21.84	79.31
DCKG	DECKING STEEL	26.43									0.90									0.02			0.06							0.02			1.00	2.01	17.57	0.00	2.74	3.66	4.88	21.77	79.06
DINS	DUCT THERM. INSUL.	25.61	0.55									0.10											0.05					0.25		0.05			1.00	1.94	16.99	0.00	2.65	6.87	4.72	22.34	81.12
DWTR	DEWATERING	20.21										0.20							0.80														1.00	1.54	12.89	0.00	2.09	5.22	3.73	17.36	63.04
ECND	CONDUITS AND TRAYS	26.61				0.25		0.50				0.25																					1.00	2.03	16.53	0.00	2.75	1.16	4.91	20.52	74.51
EDCO	ELECTRICAL DUCTS	26.02				0.18		0.28			0.09	0.10								0.09			0.18							0.08			1.00	1.97	15.61	0.00	2.69	6.45	4.79	21.86	79.39
EDEX	EXCAVATION DUCTRUNS	25.54				0.22					0.11	0.12								0.11			0.22							0.22			1.00	1.94	14.05	0.00	2.64	4.60	4.71	20.32	73.80
EHEA	ELEC. HEAVY EQ. 1	27.23						0.40			0.10	0.20						0.20												0.10			1.00	2.08	16.55	0.00	2.82	2.71	5.02	21.44	77.85
EHEB	ELEC. HEAVY EQ. 2&3	26.15						0.30			0.30	0.15								0.05			0.15							0.05			1.00	2.00	16.50	0.00	2.71	4.03	4.82	21.36	77.57
EHEC	ELEC. HEAVY EQ. 4	26.15						0.30			0.30	0.15								0.05			0.15							0.05			1.00	2.00	16.50	0.00	2.71	5.63	4.82	21.97	79.78
ELEV	ELEVATORS	34.68							1.00																								1.00	2.64	23.12	0.00	3.59	0.28	6.40	26.87	97.58
ESSW	ELEC. SWITCHYARD	24.29									0.38	0.39								0.08			0.15										1.00	1.85	14.67	0.00	2.51	4.03	4.48	19.70	71.53
ETEX	EXCAVATION TRENCHES	24.27										0.30								0.30			0.10							0.30			1.00	1.85	13.21	0.00	2.51	9.95	4.48	21.38	77.65
ETRL	TRANSMISSION LINES	24.83										0.25					0.38			0.12	0.25												1.00	1.89	13.91	0.00	2.57	6.02	4.58	20.44	74.24
ETWK	EARTHWORK	24.27										0.07								0.15			0.66							0.12			1.00	1.85	13.13	0.00	2.51	80.87	4.47	48.30	175.40
EXFD	EXCAVATION	26.42																		0.12			0.38							0.50			1.00	2.01	13.66	0.00	2.73	14.70	4.88	24.47	88.87
FLDU	FLUES AND DUCTS	29.33		0.72		0.05					0.05	0.04											0.12							0.02			1.00	2.23	18.73	0.00	3.04	19.99	5.41	29.92	108.65
FORM	FORMWORK	25.30				0.65						0.25								0.02			0.05							0.03			1.00	1.92	13.73	0.00	2.62	22.79	4.66	26.99	98.01
GALL	GALLERY WORK	26.43									0.90									0.02			0.06							0.02			1.00	2.01	17.57	0.00	2.74	6.67	4.88	22.91	83.21
HVAC	HVAC	24.31	0.10			0.02		0.06				0.06						0.02							0.16			0.57		0.01			1.00	1.85	18.52	0.00	2.52	6.34	4.49	22.05	80.08
INEL	INSTRUMENTATION ELEC	28.68						1.00																									1.00	2.19	19.71	0.00	2.97	4.22	5.29	23.96	87.02
INPE	PNEUMATIC INSTRUMENT	24.63																							1.00								1.00	1.88	19.35	0.00	2.55	2.56	4.54	21.09	76.60
INSL	INSULATION	25.39	0.60									0.20																0.20					1.00	1.94	16.74	0.00	2.63	2.60	4.69	20.52	74.51
LAND	LAND	22.74										1.00																					1.00	1.73	12.37	0.00	2.35	0.00	4.20	16.49	59.88
MECH	MISC. MECHANICAL EQ.	26.08		0.05		0.01	0.03	0.05				0.01						0.24							0.59					0.02			1.00	1.99	18.02	0.00	2.70	9.98	4.81	24.16	87.74
MSRY	MASONRY	24.24			0.67							0.33																					1.00	1.84	15.05	0.00	2.51	4.05	4.48	19.82	71.99
MSTR	SEEDING & MULCHING	22.74										1.00																					1.00	1.73	12.37	0.00	2.35	13.47	4.20	21.61	78.47
PBIT	PAVING BITUMINOUS	23.37										0.60									0.40												1.00	1.78	12.63	0.00	2.42	19.41	4.32	24.29	88.22
PCON	PAVING CONCRETE	23.82					0.31					0.50									0.19												1.00	1.82	13.38	0.00	2.47	6.84	4.39	20.03	72.75
PCRF	PRECAST CONCRETE	24.36					0.15				0.30	0.32								0.08			0.15										1.00	1.86	14.64	0.00	2.52	0.50	4.48	18.38	66.74
PILE	SHEET PILING	23.09										0.50								0.12			0.38										1.00	1.76	12.70	0.00	2.39	38.57	4.27	31.46	114.24
PINS	PIPE INSULATION	24.20	0.23			0.12						0.55																0.10					1.00	1.84	14.45	0.00	2.50	2.07	4.47	18.82	68.35
PLAS	PLASTERING	23.94													0.50																	0.50	1.00	1.83	13.22	0.00	2.48	1.86	4.42	18.15	65.90
PLMB	PLUMBING	24.63																								1.00							1.00	1.88	19.35	0.00	2.55	3.65	4.54	21.51	78.11
PNTR	PAINTING	22.76																						1.00									1.00	1.73	12.57	0.00	2.36	5.27	4.20	18.58	67.47
PREC	PRECIPITATOR	29.06		0.62		0.04		0.08			0.05	0.04						0.03					0.07		0.02			0.03		0.02			1.00	2.21	18.88	0.00	3.01	18.58	5.36	29.30	106.40
PUMP	PUMPS AND DRIVES	25.68				0.01	0.01	0.05			0.03	0.01						0.21					0.07		0.59					0.02			1.00	1.96	17.68	0.00	2.66	9.73	4.74	23.73	86.18
REIN	REINFORCING CADWELDS	26.63									1.00																						1.00	2.03	18.04	0.00	2.76	1.37	4.91	21.18	76.92
ROOF	ROOFING MEMBRANE	24.30																									1.00						1.00	1.85	11.18	0.00	2.52	4.82	4.48	18.68	67.83
RRAP	RIP RAP	23.01										0.60								0.10			0.30										1.00	1.76	12.63	0.00	2.38	6.66	4.25	19.26	69.95
RRTK	RAILROAD TRACK	23.77										0.55								0.08			0.25							0.12			1.00	1.81	12.82	0.00	2.46	17.54	4.38	23.86	86.64
SCRB	SCR BACKFIT WORK	29.33		0.72		0.05					0.05	0.04											0.12							0.02			1.00	2.23	18.73	0.00	3.04	39.99	5.41	37.52	136.25
SDNG	SIDING	23.18																										1.00					1.00	1.77	19.37	0.00	2.40	15.77	4.28	25.37	92.14
SDWK	SIDEWALK	23.60				0.10	0.20					0.70																					1.00	1.79	13.13	0.00	2.44	2.50	4.36	18.17	65.99
SGEN	STEAM GENERATOR	28.34	0.12	0.51		0.02		0.02			0.05	0.02						0.01					0.10		0.10			0.03		0.02			1.00	2.15	18.63	0.00	2.93	20.75	5.24	29.66	107.70
SPNG	STATION PIPING	24.87				0.07		0.02				0.07											0.06		0.74					0.04			1.00	1.89	17.93	0.00	2.57	15.56	4.59	25.62	93.03
SSCL	SUSPENSION SYSTEM	24.70														1.00																	1.00	1.88	14.51	0.00	2.56	2.32	4.56	19.20	69.73
STST	STRUCTURAL STEEL	25.75									0.75									0.08			0.17										1.00	1.96	16.78	0.00	2.67	23.53	4.74	28.66	104.09
TANK	TANKS	25.45				0.01	0.01	0.05				0.11						0.21							0.59					0.02			1.00	1.94	17.47	0.00	2.63	11.45	4.70	24.18	87.82
TILE	TILE CERAMIC	23.32																											1.00				1.00	1.78	16.98	0.00	2.41	2.06	4.30	19.32	70.17
TKFE	TANKS FIELD ERECTED	29.14		0.68		0.05	0.01				0.04	0.06						0.02					0.11							0.03			1.00	2.21	18.44	0.00	3.02	16.40	5.37	28.34	102.92
TRZO	TERRAZZO	25.00					0.90					0.10																					1.00	1.90	14.94	0.00	2.59	7.15	4.61	21.35	77.54
TURB	TURBINE GENERATOR	26.80	0.04			0.02	0.01	0.04			0.08	0.02						0.49					0.08		0.20					0.02			1.00	2.04	16.09	0.00	2.77	2.65	4.94	21.01	76.30
WIRE	WIREMEN	28.03						0.85															0.15										1.00	2.14	18.70	0.00	2.90	13.52	5.17	26.77	97.23
WNDW	WINDOWS GLAZED	25.84								0.45	0.45									0.03			0.07										1.00	1.97	11.99	0.00	2.67	4.52	4.76	19.67	71.42
WRKG	WRECKING	24.28												0.55						0.05			0.20							0.20			1.00	1.85	12.91	0.00	2.51	40.31	4.48	32.81	119.15
WTRP	WATERPROOFING	24.30																													1.00		1.00	1.85	11.18	0.00	2.52	5.37	4.48	18.89	68.59
WTRT	WATER TREATMENT	26.14		0.05		0.01	0.03	0.14			0.01	0.01						0.14							0.59					0.02			1.00	2.00	18.48	0.00	2.71	10.86	4.82	24.70	89.71
YDPP	YARD PIPING	24.65				0.07		0.02				0.07								0.06					0.74					0.04			1.00	1.87	17.93	0.00	2.55	12.83	4.55	24.46	88.84
YDRN	YARD DRAINAGE	22.55										0.70								0.08		0.17								0.05			1.00	1.72	12.63	0.00	2.33	12.21	4.16	21.13	76.73

Note 1: Equipment includes small tools and equipment such as air compressors, welding machines, JLG's, forklifts, chain hoists, etc. Heavy cranes and crawlers are not included in the wage rates but are included as separate line items in the cost estimate.

Average 84.47

Sargent & Lundy Labor Rate Make-Up and Calculations

Indirect Cost Items

Total Payroll Wages

Base Hourly Rate			
Payroll Taxes			
Social Security - FICA		Calculated as a percent of Base	(Set by the Federal Government Annually)
State Unemployment - SUI		Calculated as a percent of Base	(Set by each State Government and adjusted periodically)
Federal Unemployment - FUI		Calculated as a percent of Base	(Set by the Federal Government and adjusted periodically)
Total Payroll Taxes			
Insurance			
Workmen's Compensation		Calculated as a percent of Base	(Set by each State for each contractor. Average rate for AEP projects provided to S&L by AEP)
Total Insurance Burden			
Fringe Benefits		Calculated as a percent of Base	(Set By Union/Project Agreements)

Other

Other			
Expendable/Small Tools	6.00%	Calculated as a percent of Base	(Set By Contractor)
Show-up Time	2%	Allowance	
Working Foreman	0%	Calculated as a percent of Base	
General Liability	2.35%	Calculated as a percent of Base	(Set by Contractor)

Construction Equipment	Fixed	Calculation based on Required Equipment x Rental Rate. Rental rate is based on monthly rate/173 to arrive at an hourly rate

Site Overheaeds

38% - This item is strictly all field overheads.

Overheads (38% of Total Payroll Wages + Other + Construction Equipment)

Indirects	**Percentage breakdown of Site Overhead Factor**
Job Supervision-Field Staff	4.29
Administration-Field Staff	6.67
Personnel Hiring	4.29
Craft Superintendents	12.87
Safety	4.17
Purchasing/Expediting-Field Staff	2.98
Material Control-Field Staff	1.40
Engineering Liaison-Field Staff	0.53
Project Controls-Field Staff	6.61
Cost/Schedule Controls-Field Staff	4.41
Quality Control Inspection-Field Staff	5.54
Project Office Supplies-Field Staff	1.10
Computer Expenses	2.58
Service Trucks/Supplies	2.57
Field and Shop Mechanics and Supplies	2.77
Subcontract Administration	1.63
Warehousing-Field Staff	1.46
Field Surveying	2.66
Water & Ice	0.44
Sanitation and Cleanup	2.15
Move In/Move Out	3.52
Detours/Barricades/Flags	0.22
Security	3.13
Temp. Utilities/Distr/Hookup	1.47
Temporary Site Improvement	0.39
Temporary Facilities/Buildings	0.80
Utilities Consumption	2.19
Employee Expenses	16.31
Legal Expenses/Claims	0.52
Permits and Fees	0.07
Timekeeping	0.26
Total Indirect Labor Burdened	100.00

EXHIBIT 1-4
Project Deliverable Index

EXHIBIT 1-4
PROJECT DELIVERABLE INDEX

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EXHIBIT 1-5
Capital Cost Estimate Outline

CAPITAL COST ESTIMATE OUTLINE

Account No.	Description
10.0	General Site Work
11.0	Underground
21.0	CTG A
22.0	CTG B
31.0	HRSG A
32.0	HRSG B
41.0	Steam Turbine
50.0	Cooling Tower
55.0	Water Treatment
56.0	River Water Pre-Treatment
60.0	Pipe Rack
70.0	Electrical Power Distribution
75.0	DCS
80.0	BOP
90.0	Common
OP.89	Direct Cost Subtotal
OP.90	Construction Indirects Subtotal
OP.99	Subcontracts Subtotal
OP.00	Subtotal Project Costs
P1.00	Overall Project Indirect Costs
	Spare Parts
	Contingency
	Escalation
	Total Project Cost
A	Demolition & Removal

The following pages provide descriptions of each account scope definition.

COST ESTIMATE ACCOUNT SCOPE DEFINITIONS

Cost Estimate Organization

The cost estimate will be organized by Accounts (Areas) and then by Discipline. The codes used for Areas and Disciplines are tabulated at the end of this document. Each account will include direct and indirect costs. The Accounts included in the Cost Estimate and the scope of each account is defined below and in the attached Mechanical and Electrical Equipment Lists.

Account 10.00: General Site Work

This account includes all work associated with initial and final site development, including site clearing, grubbing, storm water pond, roads, laydown area, craft parking area, etc. Perimeter site fencing (temporary and permanent) and other security fencing (laydown, craft parking area, etc.) are included in this account. Provisions for temporary construction guard house and site offices are included in this account.

Account 11.00: Underground

This account includes all work associated with installation of underground civil, mechanical piping, electrical duct banks and cathodic protection, including the cost of materials (piping, fittings, coatings, concrete, conduit, grounding, etc.). Cable routed through underground duct bank is excluded (included in Account 70.00). Excavation quantities are based on the initial site development elevation.

This account includes the furnishing and installation of the storm sewer system and the oil water separator system.

All equipment foundations (including piles, embedded pipe, conduit and grounding) are part of the respective equipment accounts.

Account 21.00: CTG A

This account includes the CTG A equipment and related appurtenances that are typically furnished with the CTG. This account includes the furnishing and installation of the CTG A foundation.

If supplied equipment is common to both CTGs, it will be included in account CTG A.

Account 22.00: CTG B

This account includes the CTG B equipment and related appurtenances that are typically furnished with the CTG. This account includes the furnishing and installation of the CTG B foundation.

Account 31.00: HRSG A

This account includes the HRSG A equipment and related appurtenances that are typically furnished with the HRSG. This account includes the furnishing and installation of the HRSG A foundation.

This account includes the cost of the BFP enclosure for HRSG A.

If supplied equipment is common to both HRSG's, it will be included in account HRSG A.

Account 32.00: HRSG B

This account includes the HRSG B equipment and related appurtenances that are typically furnished with the HRSG. This account includes the furnishing and installation of the HRSG B foundation.

This account includes the cost of the BFP enclosure for HRSG B.

Account 41.00: STG

This account includes the STG equipment modification and related existing equipment reused, modified or replaced.

Account 50.00: Cooling Tower

This account includes the Cooling Tower equipment and related existing equipment reused, modified or replaced.

Account 55.00: Water Treatment

This account includes the Water Treatment System equipment and related appurtenances that are typically furnished with the Water Treatment System. Any related existing equipment reused, modified or replaced will be included in this account. This account includes the furnishing and installation of the Water Treatment System equipment foundations.

This account includes the cost of the pre-engineered water treatment building and foundation. Building services (lighting, convenience outlets, HVAC) are included.

Account 56.00: Pre-Treatment

This account includes the River Water Pre-Treatment System equipment and related appurtenances that are typically furnished with the River Water Pre-Treatment System. Any related existing equipment reused, modified or replaced will be included in this account. This account includes the furnishing and installation of the River Water Pre-Treatment System equipment foundations.

This account includes the cost of the pre-engineered pre-treatment building and the filter press building and foundations. Building services (lighting, convenience outlets, HVAC) are included.

Account 60.00: Pipe Rack

This account includes all work associated with the furnishing and installation of the pipe rack, including the foundation for the pipe rack. All miscellaneous steel for pipe rack platforms, walkways, ladders and stairs are included. All miscellaneous steel required to support piping within the existing unit is included in this account. All piping to be installed on the pipe rack and within the existing unit is included in Account 80.00 BOP. All cables and raceway to be installed on the pipe rack is included in Account 70.00 Electrical.

Account 70.00: Electrical

This account includes all electrical work for the project, except for the work included in Account 11.00 Underground and Account 75.00 DCS. This account also includes all cable routed in underground duct bank and aboveground grounding systems.

Any related existing equipment reused, modified or replaced will be included in this account.

This account includes all electrical heat tracing work, excluding insulation and lagging (included in Account 80.0 BOP).

This account includes the lightning protection system.

This account includes all plant lighting (except for lighting furnished with pre-engineered buildings in other accounts).

Account 75.00: DCS

This account will include all DCS work for the project including all cable and raceway associated with implementing the I/O for the DCS. For I/O modules/cabinets located in the PDC enclosures the installation costs will be included in Account 70.00 Electrical.

Existing Main Control Room modifications related to the installation of the DCS are included in Account 90:00 Common.

This account includes the cost of the high fidelity simulator and the continuous emission monitors (CEMS).

This account includes the cost of all BOP instrumentation (except for in-line piping instrumentation), heated enclosures, tubing, fittings and valves, but excludes the associated electrical installation costs (in Account 70.00 Electrical).

Account 80.00: BOP

This account includes the cost of all BOP equipment not related entirely to the accounts defined above. Any existing BOP equipment reused, modified or replaced will be included in this account.

This account includes all BOP piping, fittings and valves, itemized by system. All BOP piping insulation and lagging is included in this account.

Account 90.00: Common

This account includes all other costs that would be considered common to the plant and are not related entirely to the accounts defined above.

This account includes the cost of the CT building including siding, roofing, platforms, walkways, stairs, ladders, etc. Building HVAC costs are included.

Existing Main Control Room modifications and additions are included in this account.

This account includes the CT bridge crane.

Account A: Demolition & Removal

Any costs related to demolition and removal (as required for the project) will be included in an individual account separate from the total project costs (provided below the bottom line). The installed costs related to Relocations of equipment reused, modified, or replaced would be included in the applicable accounts above.

Excluded Owners Costs

The following Owner Costs are excluded from the cost estimate.

Costs related to existing transmission line relocation costs.

Transmission line costs up to the power block interface point.

Gas line transmission cost up to the power block interface point.

Area/Discipline Dictionary

Area	Description
10.00	General Site Work
11.00	Underground
21.00	CTG A
22.00	CTG B
31.00	HRSG A
32.00	HRSG B
41.00	STG
50.00	Cooling Tower
55.00	Water Treatment
56.00	Pre-Treatment
60.00	Pipe Rack
70.00	Electrical
75.00	Distributed Control System (DCS)
80.00	Balance of Plant (BOP)
90.00	Common
A	Demolition & Removal

Discipline	Description
10	Civil
20	Concrete
30	Structural Steel
40	Architectural
45	Painting/Coating
50	Electrical
55	Instrumentation
60	Mechanical
70	Piping
80	Insulation
90	Indirects
99	Subcontracts

COST ESTIMATE ACCOUNT SCOPE DEFINITIONS MECHANICAL EQUIPMENT

	EQUIPMENT or SYSTEM	COST ESTIMATE ACCOUNT	REV
	MECHANICAL	**AREA**	
1	**Aqueous Ammonia**		
	19% Aqueous Ammonia Storage Tank	80 - BOP	
	Aqueous Ammonia Forwarding Pumps and Motors	80 - BOP	
2	**Boiler Blowdown - HRSG**		
	Boiler Blowdown tank	31 - HRSG A 32 - HRSG B	
	Blowdown Water Sump Pumps and Motors (Common to A & B)	31 - HRSG A	
3	**Bulk Gas Storage**		
	Hydrogen Storage	80 - BOP	
	Carbon Dioxide Storage	80 - BOP	
	Nitrogen Storage	80 - BOP	
4	**Chemical Feed for Boiler Feedwater**		
	Caustic injection pump skid	80 - BOP	
	Amine injection pump skid	80 - BOP	
	Chemical storage facilities	80 - BOP	
5	**Chemical Feed for Circulating Water**		
	Existing Equipment Reused	50 - Cooling Tower	

COST ESTIMATE ACCOUNT SCOPE DEFINITIONS MECHANICAL EQUIPMENT

	EQUIPMENT or SYSTEM	COST ESTIMATE ACCOUNT	REV
	MECHANICAL	**AREA**	
6	**Circulating Water**		
	Natural Draft Cooling Tower	50 - Cooling Tower	
	Main Circulating Water Pumps and Motors	50 - Cooling Tower	
	Main Circulating Water Piping and Components	50 - Cooling Tower	
	Cooling Tower Blowdown	50 - Cooling Tower	
	Cooling Tower Makeup Pumps and Motors	50 - Cooling Tower	
	Large CW Butterfly Valves	80 - BOP	
7	**Closed Cooling Water**		
	Auxiliary Cooling Water Pumps and Motors	80 - BOP	
	Shell and Tube Heat Exchangers (316SS tubes)	80 - BOP	
	Head Tank/Chemical Addition Tank	80 - BOP	
	Closed Cooling Water Pumps and Motors	80 - BOP	
	Hydrogen Cooler Pumps and Motors	80 - BOP	
	Duplex Strainers	80 - BOP	
8	**Condensate System**		
	Hotwell Pumps and Motors	41 - STG	
	Condensate Booster Pumps and Motors	41 - STG	
	Duplex Suction Strainers	41 - STG	
	Steam Surface Condenser	41 - STG	
	Condensate Polisher	80 - BOP	
	LP Heaters No. 1 & 2	41 - STG	
	Heater Drain Pumps and Motors	41 - STG	
	Vacuum Pumps and Motors	41 - STG	

COST ESTIMATE ACCOUNT SCOPE DEFINITIONS MECHANICAL EQUIPMENT

	EQUIPMENT or SYSTEM	COST ESTIMATE ACCOUNT	REV
	MECHANICAL	**AREA**	
9	**Combustion Turbine-Generator**	Refer to Note 1	
	Combustion System	21 - CTG A 22 - CTG B	
	Fire Protection System	21 - CTG A 22 - CTG B	
	Fuel System	21 - CTG A 22 - CTG B	
	Inlet and Exhaust System	21 - CTG A 22 - CTG B	
	Lube Oil and Lube Oil Cooling System	21 - CTG A 22 - CTG B	
	Enclosure HVAC System	21 - CTG A 22 - CTG B	
	Generator	21 - CTG A 22 - CTG B	
	Inlet Air Chiller Coils	21 - CTG A 22 - CTG B	
	CT Wash Water Skid (Common to A & B)	21 - CTG A	
	CT Wash Water Drains Tank	21 - CTG A 22 - CTG B	
	CTG Air Cooling	21 - CTG A 22 - CTG B	
10	**CT Inlet Air Chillers**		
	Package Chiller	80 - BOP	
	Chilled Water Pumps and Motors	80 - BOP	
	Cooling Water Pumps and Motors	80 - BOP	
	Cooling Fans	80 - BOP	
11	**Demineralized Water**		
	Demineralized Water Storage Tank	55 - Water Treatment	
	Demin Water Pumps and Motors	55 - Water Treatment	

COST ESTIMATE ACCOUNT SCOPE DEFINITIONS MECHANICAL EQUIPMENT

	EQUIPMENT or SYSTEM	COST ESTIMATE ACCOUNT	REV
	MECHANICAL	**AREA**	
12	**Fire Protection**		
	Service/Fire Water Storage Tank	90 - Common	
	Electric Motor Driven Fire Pump	90 - Common	
	Diesel Driven Fire Pump	90 - Common	
	Jockey Pump and Motor	90 - Common	
	Fire Protection and Detection	90 - Common	
13	**Feedwater**		
	Boiler Feed Pumps and Motors	31 - HRSG A 32 - HRSG B	
	Duplex Suction Strainers	31 - HRSG A 32 - HRSG B	
14	**Fuel Gas**		
	Conditioning Skid	21 - CTG A 22 - CTG B	
	Check Metering Station	80 - BOP	
15	**Fuel Oil**		
	Fuel Oil Storage Tank	80 - BOP	
	Fuel Oil Fire Protection	80 - BOP	
	Demin Water Storage Tank	80 - BOP	
	Fuel Oil Forwarding Pumps and Motors	80 - BOP	
	Fuel Oil Demin Water Injection Pumps and Motors	80 - BOP	
	Fuel Oil Truck Unloading Skid	80 - BOP	

COST ESTIMATE ACCOUNT SCOPE DEFINITIONS MECHANICAL EQUIPMENT

	EQUIPMENT or SYSTEM	COST ESTIMATE ACCOUNT	REV
	MECHANICAL	**AREA**	
16	**Heat Recovery Steam Generator**	Refer to Note 1	
	3-pressure with reheat	31 - HRSG A 32 - HRSG B	
	Inlet ductwork from the CT to the HRSG	31 - HRSG A 32 - HRSG B	
	Reheater with inter-stage desuperheater	31 - HRSG A 32 - HRSG B	
	High Pressure Superheater with inter-stage desuperheater	31 - HRSG A 32 - HRSG B	
	High Pressure Evaporator	31 - HRSG A 32 - HRSG B	
	High Pressure Economizer	31 - HRSG A 32 - HRSG B	
	Intermediate Pressure Superheater	31 - HRSG A 32 - HRSG B	
	Intermediate Pressure Evaporator	31 - HRSG A 32 - HRSG B	
	Intermediate Pressure Economizer	31 - HRSG A 32 - HRSG B	
	Low Pressure Superheater	31 - HRSG A 32 - HRSG B	
	Low Pressure Evaporator	31 - HRSG A 32 - HRSG B	
	Steam Spargers	31 - HRSG A 32 - HRSG B	
	Feedwater Preheater with 2 x 100% recirculation pumps and motors	31 - HRSG A 32 - HRSG B	
	Exhaust Ductwork to the HRSG exhaust stack	31 - HRSG A 32 - HRSG B	
	Exhaust Stack	31 - HRSG A 32 - HRSG B	
	Stack Isolation Damper	31 - HRSG A 32 - HRSG B	
	Duct Burners	31 - HRSG A 32 - HRSG B	
	SCR	31 - HRSG A 32 - HRSG B	
	CO catalyst	31 - HRSG A 32 - HRSG B	

COST ESTIMATE ACCOUNT SCOPE DEFINITIONS MECHANICAL EQUIPMENT

	EQUIPMENT or SYSTEM	COST ESTIMATE ACCOUNT	REV
	MECHANICAL	**AREA**	
17	**Plant/Instrument Air**		
	Air Compressors and Motors	80 - BOP	
	Air Receiver Tanks	80 - BOP	
	Air Dryers	80 - BOP	
	Prefilters	80 - BOP	
	Afterfilters	80 - BOP	
18	**Potable Water**		
	Tepid Water Recirculation System	90 - Common	
	Tepid Water Pumps and Motors	90 - Common	
19	**Raw Water**		
	Raw Water Storage Tank	56 - Pretreatment	
	Raw Water Pumps and Motors	56 - Pretreatment	
	River Water Intake	56 - Pretreatment	
	River Water Intake Screens	56 - Pretreatment	
20	**Service Water**		
	Service/Fire Water Storage Tank	90 - Common	
	Service Water Pumps and Motors	90 - Common	

COST ESTIMATE ACCOUNT SCOPE DEFINITIONS MECHANICAL EQUIPMENT

	EQUIPMENT or SYSTEM	COST ESTIMATE ACCOUNT	REV
	MECHANICAL	**AREA**	
21	**Steam System Components**		
	Desuperheaters	80 - BOP	
	Flow elements	80 - BOP	
	Large Bore HP Valves	80 - BOP	
	Non-return valves	80 - BOP	
	Reheater Overpressurization Protection	80 - BOP	
	Vents including silencers/mufflers	80 - BOP	
	Main Cycle Sample Panel	80 - BOP	
	Steam turbine bypass valves	80 - BOP	
	Steam Turbine Drains Tank	80 - BOP	
	Packaged Aux Boiler	80 - BOP	
	Miscellaneous Drains Tank	80 - BOP	
22	**Steam Turbine Generator**	Refer to Note 1	
	Steam Turbine Generator	41 - STG	
	Shaft sealing system	41 - STG	
	Lubricating oil system	41 - STG	
	Hydraulic power unit	41 - STG	
	Turning gear	41 - STG	
	Hydrogen cooled synchronous generator	41 - STG	
	Steam seal regulator valves	41 - STG	
	Lube Oil/Hydraulic Oil Storage Tank	41 - STG	

COST ESTIMATE ACCOUNT SCOPE DEFINITIONS MECHANICAL EQUIPMENT

	EQUIPMENT or SYSTEM	COST ESTIMATE ACCOUNT	REV
	MECHANICAL	**AREA**	
	Hydrogen Purge Valves	41 - STG	
	Hydrogen Control System	41 - STG	
	Steam turbine control system	41 - STG	
	Gland Steam Condenser	41 - STG	
23	**Water Treatment**		
	River Water Pretreatment (Clarification and Upflow Filters)	56 - Pretreatment	
	Water Treatment System	55 - Water Treatment	
	Mixed Bed System	55 - Water Treatment	
24	**Wastewater**		
	WTB Sump Pumps and Motors	55 - Water Treatment	
	Pretreatment Area Sump Pumps and Motors	56 - Pretreatment	
	Turbine Building Sump Pumps and Motors	41 - STG	
	Oil/Water Separator	11 - Underground	
	Sanitary Sewage Treatment	90 - Common	
25	**PIPE Supports**		
	Engineered & Non-Engineered for BOP Piping	80 - BOP	
26	**Piping Specialties**		
	Various - Including Eye Wash Stations	80 - BOP	
27	**Control Valves**		
	Control Valves for BOP Piping	80 - BOP	

COST ESTIMATE ACCOUNT SCOPE DEFINITIONS MECHANICAL EQUIPMENT

	EQUIPMENT or SYSTEM	COST ESTIMATE ACCOUNT	REV
	MECHANICAL	**AREA**	
28	**Instrumentation**		
	In-Line Piping Instrumentation (ie., flow nozzles)	80 - BOP	
	Local Instrumentation, Panels & Heated Enclosures (including tubing, fittings, valves)	75 - DCS	

Notes:

1 The scope of the CTG, HRSG and the STG are well defined in the technical specifications prepared for the Combined Cycle Brownfield Build Cost Estimate Study.
Equipment listed here is for information only as to the applicable cost estimate account.

2 This list applies to Option 1 and 2.

COST ESTIMATE ACCOUNT SCOPE DEFINITIONS ELECTRICAL EQUIPMENT

	EQUIPMENT or SYSTEM	COST ESTIMATE ACCOUNT	REV
	ELECTRICAL	AREA	
1	**BOP Electrical**		
	CTG Generator Step Up Transformer	70 - Electrical	
	Unit Auxiliary Transformer	70 - Electrical	
	Generator Circuit Breaker	70 - Electrical	
	CTG Isophase Bus Duct	70 - Electrical	
	Medium Voltage Cable Bus Duct	70 - Electrical	
	Medium Voltage Switchgear/MCCs	70 - Electrical	
	Low Voltage Transformers	70 - Electrical	
	Low Voltage Switchgear	70 - Electrical	
	Low Voltage Bus Duct	70 - Electrical	
	480 Volt Motor Control Centers	70 - Electrical	
	Protective Relay Panel	70 - Electrical	
	Batteries	70 - Electrical	
	Battery Chargers	70 - Electrical	
	UPS	70 - Electrical	
	UPS Switchboard	70 - Electrical	
	UPS Panelboard	70 - Electrical	
	DC Switchboard	70 - Electrical	
	DC Panels	70 - Electrical	
	Alternate Source Transformer	70 - Electrical	
	Alternate Source Panels	70 - Electrical	
	Satellite UPS	70 - Electrical	
	Transformer Power Distribution Center (PDC)	70 - Electrical	

COST ESTIMATE ACCOUNT SCOPE DEFINITIONS ELECTRICAL EQUIPMENT

	EQUIPMENT or SYSTEM	COST ESTIMATE ACCOUNT	REV
	ELECTRICAL	**AREA**	
	HRSG Power Distribution Center (PDC)	70 - Electrical	
	HRSG Power Distribution Center (Upper) (PDC)	70 - Electrical	
	Chiller Power Distribution Center (PDC)	70 - Electrical	
	STG (PDC)	70 - Electrical	
	Fuel Oil (PDC)	70 - Electrical	
	Mimic Panels	70 - Electrical	
	Grounding Distribution Transformer	70 - Electrical	
	DFR	70 - Electrical	
	Communication System	70 - Electrical	
	Plant Security System	70 - Electrical	
2	**Steam Turbine Generator**		
	Existing Equipment Reused	41 - STG	
3	**Combustion Turbine Generator**	Refer to Note 1	
	Excitation Transformer	21 - CTG A 22 - CTG B	
	Isolation Transformer	21 - CTG A 22 - CTG B	
	LCI Starter	21 - CTG A 22 - CTG B	
	Generator protection panel	21 - CTG A 22 - CTG B	
	Generator neutral grounding transformer & resistor	21 - CTG A 22 - CTG B	
	VT Cubicle	21 - CTG A 22 - CTG B	
	Motor Control Center	21 - CTG A 22 - CTG B	
	Battery	21 - CTG A 22 - CTG B	
	Power Distribution Center	21 - CTG A 22 - CTG B	

COST ESTIMATE ACCOUNT SCOPE DEFINITIONS ELECTRICAL EQUIPMENT

	EQUIPMENT or SYSTEM	COST ESTIMATE ACCOUNT	REV
	ELECTRICAL	**AREA**	
4	**Replaced Existing Electrical Equipment**		
	Medium Voltage Cable Bus Duct	70 - Electrical	
	Medium Voltage Switchgear/MCCs	70 - Electrical	
	Low Voltage Transformers	70 - Electrical	
	Low Voltage Switchgear	70 - Electrical	
	Low Voltage Bus Duct	70 - Electrical	
	Protective Relay Panels	70 - Electrical	
5	**Existing Electrical Equipment**		
	STG Generator Step Up Transformer	70 - Electrical	
	Unit Auxiliary Transformer	70 - Electrical	
	Reserve Auxiliary Transformer	70 - Electrical	
	STG Isophase Bus Duct	70 - Electrical	
	600V Switchgear	70 - Electrical	
	600V MCCs	70 - Electrical	
	Battery	70 - Electrical	
	Battery Chargers	70 - Electrical	
	UPS	70 - Electrical	
	UPS Switchboard	70 - Electrical	
	UPS Panelboards	70 - Electrical	
	DC Switchboard	70 - Electrical	
	DC Panels	70 - Electrical	

COST ESTIMATE ACCOUNT SCOPE DEFINITIONS ELECTRICAL EQUIPMENT

	EQUIPMENT or SYSTEM		COST ESTIMATE ACCOUNT	REV
	ELECTRICAL		**AREA**	
6	**Miscellaneous Electrical**			
	Grounding System (underground)		11 - Underground	
	Grounding System (aboveground)		70 - Electrical	
	Cathodic Protection		11 - Underground	
	Lightning Protection		70 - Electrical	
	Plant Lighting (excluding lighting in pre-engineered buildings)		70 - Electrical	
	Temporary Construction Power System		70 - Electrical	
7	**I&C Systems**			
	Distributed Control System		75 - DCS	
	High Fidelity Simulator		75 - DCS	
	Continuous Emission Monitors (CEMS)		75 - DCS	

Notes:

1 The scope of the CTG, HRSG and the STG are well defined in the technical specifications prepared for the Combined Cycle Brownfield Build Cost Estimate Study.
Equipment listed here is for information only as to the applicable cost estimate account.

2 This list applies to Option 1 and 2.

EXHIBIT 1-6
Contingency Analysis

AEP
BIG SANDY PLANT UNIT 1 REPOWERING COST ESTIMATE STUDY
OPTION 1 - 2X2X1 MHI 501GAC C/T'S - REV. B

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Risk Analysis and Simulation Add-In for Microsoft EXCEL
Version 5.0
Palisade Corporation

ANALYSIS INPUT

Values in Thousands

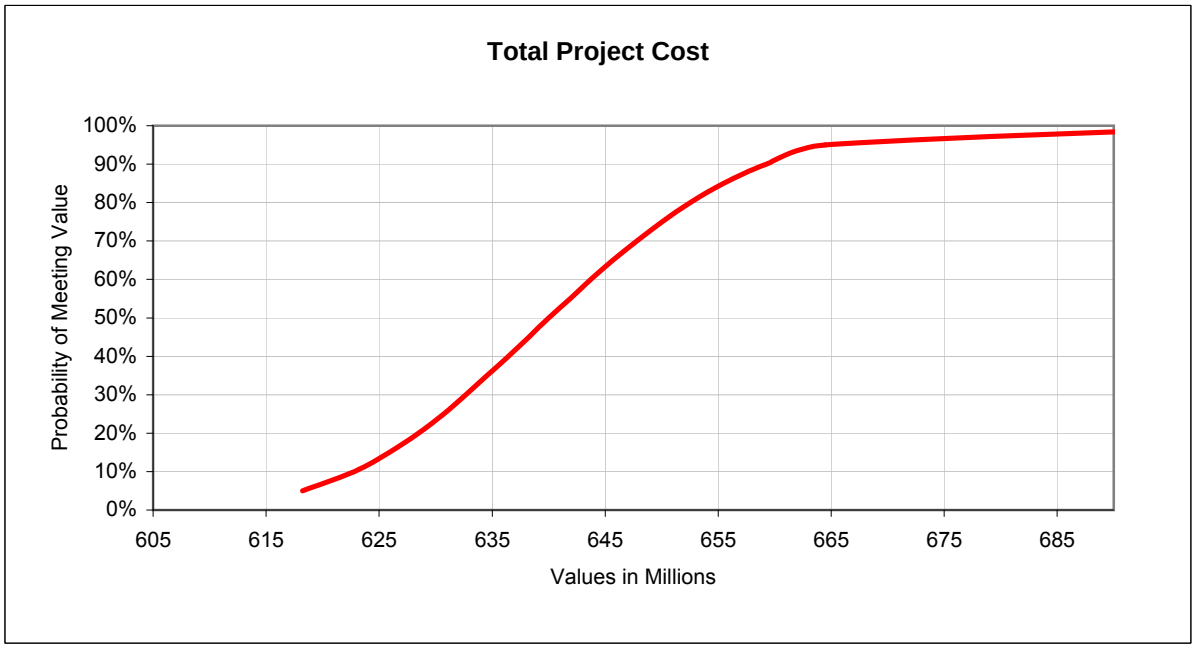
Accnt. No.	Cost Elements	Target Value $k	Minimum	Maximum	Minimum	Maximum
10.0	GENERAL SITE WORK	$11,520,704	95%	140%	$10,944,669	$16,128,986
11.0	UNDERGROUND	$18,145,879	95%	130%	$17,238,585	$23,589,643
21.0	CTG A	$76,687,444	95%	120%	$72,853,072	$92,024,933
22.0	CTG B	$76,684,417	95%	120%	$72,850,196	$92,021,300
31.0	HRSG A	$39,947,125	95%	135%	$37,949,769	$53,928,619
32.0	HRSG B	$39,822,259	95%	135%	$37,831,146	$53,760,050
41.0	STEAM TURBINE	$4,173,402	95%	135%	$3,964,732	$5,634,093
50.0	COOLING TOWER	$303,982	95%	130%	$288,783	$395,177
55.0	WATER TREATMENT	$7,404,836	95%	135%	$7,034,594	$9,996,529
56.0	PRE-TREATMENT	$10,563,897	95%	135%	$10,035,702	$14,261,261
60.0	PIPE RACK	$6,436,142	95%	125%	$6,114,335	$8,045,178
70.0	ELECTRICAL POWER DISTRIBUTION	$46,459,443	95%	135%	$44,136,471	$62,720,248
75.0	DCS	$11,208,690	95%	135%	$10,648,256	$15,131,732
80.0	BOP	$70,873,275	95%	135%	$67,329,611	$95,678,921
90.0	COMMON	$16,702,340	95%	145%	$15,867,223	$24,218,393
OP.90	CONSTRUCTION INDIRECTS	$63,580,011	95%	140%	$60,401,010	$89,012,015
OP.99	SUBCONTRACTS	$44,204,000	95%	135%	$41,993,800	$59,675,400
PI.00	OVERALL PROJECT INDIRECT COSTS	$38,334,200	95%	140%	$36,417,490	$53,667,880
	SPARE PARTS	$4,612,800	95%	130%	$4,382,160	$5,996,640
	Total Base Case	**$587,664,846**				

AEP
BIG SANDY PLANT UNIT 1 REPOWERING COST ESTIMATE STUDY
OPTION 1 - 2X2X1 MHI 501GAC C/T'S - REV. B

ANALYSIS OUTPUT

Probability of meeting "Total Base Case" value: 587,664,846 0.0%

Total Budget Required ($k)	% Confidence Level	Confidence Level Risk	Contingency % of Base
703,786,958	100.0%	116,122,100	19.760%
664,475,382	95.0%	76,810,500	13.070%
659,288,202	90.0%	71,623,400	12.188%
655,493,061	85.0%	67,828,200	11.542%
652,527,788	80.0%	64,862,900	11.037%
650,048,581	75.0%	62,383,700	10.616%
647,824,671	70.0%	60,159,800	10.237%
645,676,515	65.0%	58,011,700	9.872%
643,740,749	60.0%	56,075,900	9.542%
641,927,588	55.0%	54,262,700	9.234%
640,020,917	50.0%	52,356,100	8.909%
638,232,109	45.0%	50,567,300	8.605%
636,434,008	40.0%	48,769,200	8.299%
634,535,851	35.0%	46,871,000	7.976%
632,655,965	30.0%	44,991,100	7.656%
630,697,817	25.0%	43,033,000	7.323%
628,479,396	20.0%	40,814,600	6.945%
625,906,904	15.0%	38,242,100	6.507%
622,822,087	10.0%	35,157,200	5.983%
618,223,465	5.0%	30,558,600	5.200%



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AEP
BIG SANDY PLANT UNIT 1 REPOWERING COST ESTIMATE STUDY
OPTION 2 - 2X2X1 GE 7FA.05 C/T'S - REV. B

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Risk Analysis and Simulation Add-In for Microsoft EXCEL
Version 5.0
Palisade Corporation

ANALYSIS INPUT

Values in Thousands

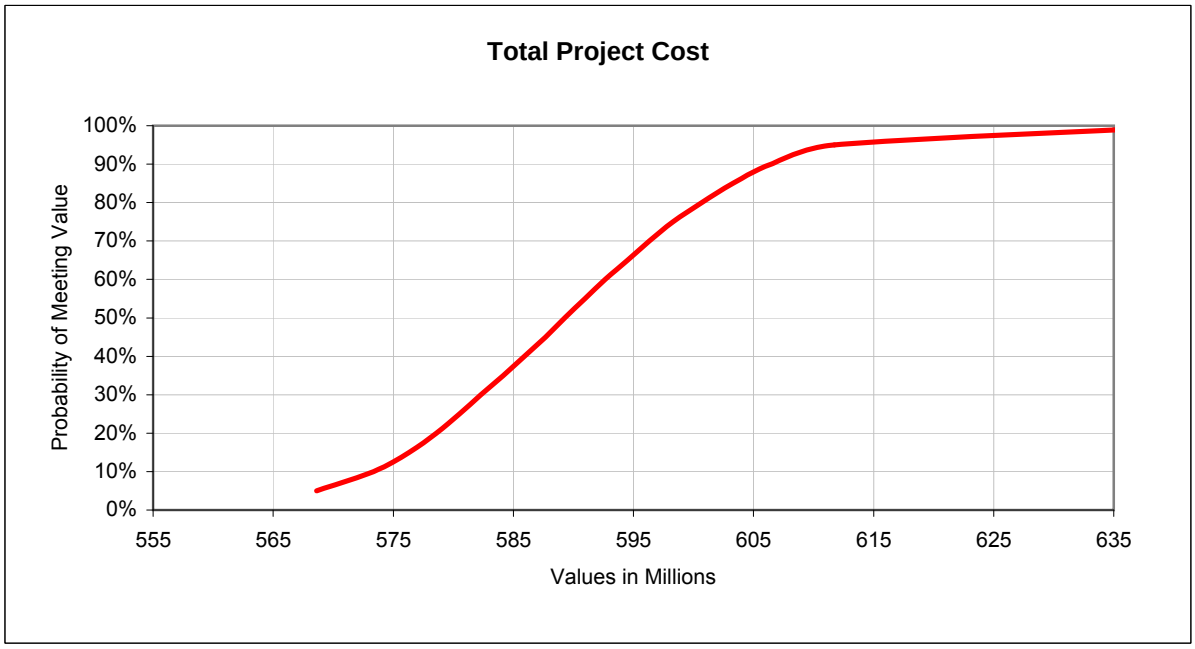
Accnt. No.	Cost Elements	Target Value $k	Minimum	Maximum	Minimum	Maximum
10.0	GENERAL SITE WORK	$11,520,704	95%	140%	$10,944,669	$16,128,986
11.0	UNDERGROUND	$18,127,477	95%	130%	$17,221,103	$23,565,720
21.0	CTG A	$60,052,991	95%	120%	$57,050,341	$72,063,589
22.0	CTG B	$60,049,964	95%	120%	$57,047,466	$72,059,957
31.0	HRSG A	$37,409,766	95%	135%	$35,539,278	$50,503,184
32.0	HRSG B	$37,284,900	95%	135%	$35,420,655	$50,334,615
41.0	STEAM TURBINE	$4,163,402	95%	135%	$3,955,232	$5,620,593
50.0	COOLING TOWER	$303,982	95%	130%	$288,783	$395,177
55.0	WATER TREATMENT	$7,404,836	95%	135%	$7,034,594	$9,996,529
56.0	PRE-TREATMENT	$10,563,897	95%	135%	$10,035,702	$14,261,261
60.0	PIPE RACK	$6,207,879	95%	125%	$5,897,485	$7,759,849
70.0	ELECTRICAL POWER DISTRIBUTION	$44,886,383	95%	135%	$42,642,064	$60,596,617
75.0	DCS	$11,083,349	95%	135%	$10,529,182	$14,962,521
80.0	BOP	$67,107,661	95%	135%	$63,752,278	$90,595,342
90.0	COMMON	$16,702,340	95%	145%	$15,867,223	$24,218,393
OP.90	CONSTRUCTION INDIRECTS	$60,806,236	95%	140%	$57,765,924	$85,128,730
OP.99	SUBCONTRACTS	$43,964,000	95%	135%	$41,765,800	$59,351,400
PI.00	OVERALL PROJECT INDIRECT COSTS	$38,192,900	95%	140%	$36,283,255	$53,470,060
	SPARE PARTS	$4,061,800	95%	130%	$3,858,710	$5,280,340
	Total Base Case	**$539,894,467**				

AEP
BIG SANDY PLANT UNIT 1 REPOWERING COST ESTIMATE STUDY
OPTION 2 - 2X2X1 GE 7FA.05 C/T'S - REV. B

ANALYSIS OUTPUT

Probability of meeting "Total Base Case" value: 539,894,467 0.0%

Total Budget Required ($k)	% Confidence Level	Confidence Level Risk	Contingency % of Base
642,219,444	100.0%	102,325,000	18.953%
611,728,615	95.0%	71,834,100	13.305%
606,492,518	90.0%	66,598,100	12.335%
603,299,392	85.0%	63,404,900	11.744%
600,701,462	80.0%	60,807,000	11.263%
598,307,611	75.0%	58,413,100	10.819%
596,336,905	70.0%	56,442,400	10.454%
594,530,005	65.0%	54,635,500	10.120%
592,649,105	60.0%	52,754,600	9.771%
590,984,009	55.0%	51,089,500	9.463%
589,294,760	50.0%	49,400,300	9.150%
587,663,791	45.0%	47,769,300	8.848%
585,923,070	40.0%	46,028,600	8.525%
584,149,230	35.0%	44,254,800	8.197%
582,277,768	30.0%	42,383,300	7.850%
580,506,749	25.0%	40,612,300	7.522%
578,592,540	20.0%	38,698,100	7.168%
576,313,813	15.0%	36,419,300	6.746%
573,348,188	10.0%	33,453,700	6.196%
568,625,836	5.0%	28,731,400	5.322%



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AEP
BIG SANDY PLANT UNIT 1 REPOWERING COST ESTIMATE STUDY
OPTION 1 or 2 DEMOLITION & REMOVAL COSTS - REV. B

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Risk Analysis and Simulation Add-In for Microsoft EXCEL
Version 5.0
Palisade Corporation

ANALYSIS INPUT

Values in Thousands

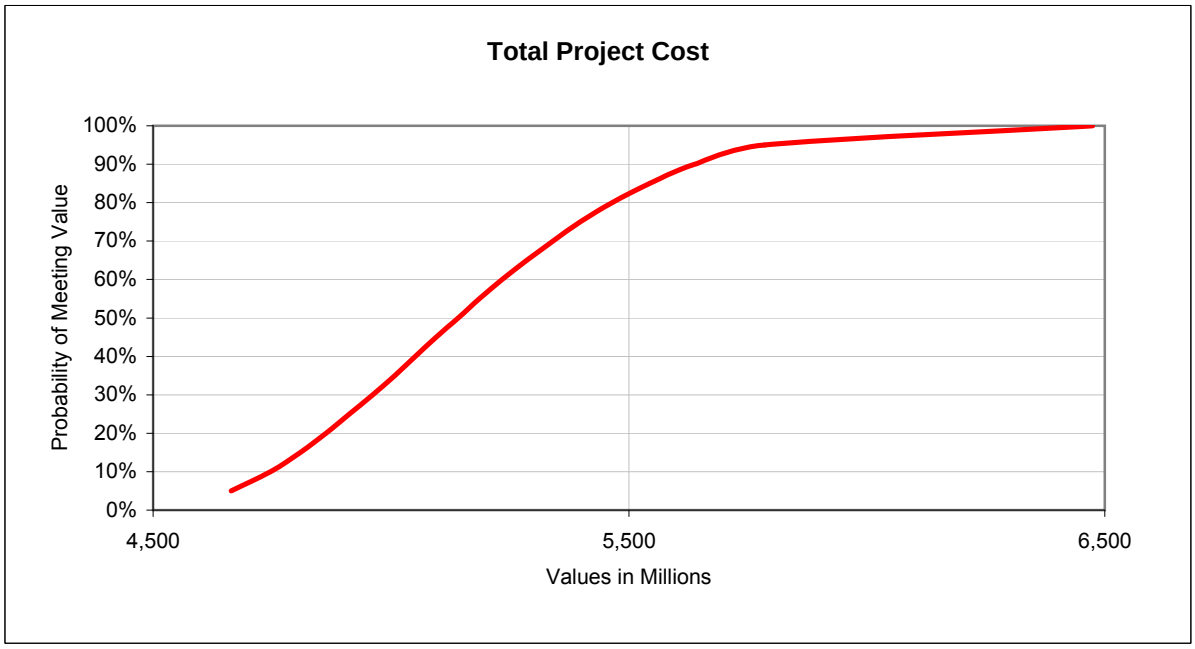
Accnt. No.	Cost Elements	Target Value $k	Minimum	Maximum	Minimum	Maximum
90.0	DIRECT COSTS	$2,216,858	95%	150%	$2,106,015	$3,325,287
OP.90	CONSTRUCTION INDIRECTS	$798,220	95%	140%	$758,309	$1,117,508
OP.99	SUBCONTRACTS	$1,504,100	95%	150%	$1,428,895	$2,256,150
	Total Base Case	**$4,519,178**				

AEP
BIG SANDY PLANT UNIT 1 REPOWERING COST ESTIMATE STUDY
OPTION 1 or 2 DEMOLITION & REMOVAL COSTS - REV. B

ANALYSIS OUTPUT

Probability of meeting "Total Base Case" value: 4,519,178 0.5%

Total Budget Required ($k)	% Confidence Level	Confidence Level Risk	Contingency % of Base
6,474,690	100.0%	1,955,500	43.271%
5,784,862	95.0%	1,265,700	28.007%
5,638,553	90.0%	1,119,400	24.770%
5,543,832	85.0%	1,024,700	22.674%
5,465,227	80.0%	946,000	20.933%
5,397,606	75.0%	878,400	19.437%
5,340,815	70.0%	821,600	18.180%
5,285,200	65.0%	766,000	16.950%
5,233,411	60.0%	714,200	15.804%
5,186,058	55.0%	666,900	14.757%
5,141,616	50.0%	622,400	13.772%
5,094,288	45.0%	575,100	12.726%
5,050,516	40.0%	531,300	11.757%
5,007,937	35.0%	488,800	10.816%
4,961,555	30.0%	442,400	9.789%
4,912,288	25.0%	393,100	8.698%
4,862,970	20.0%	343,800	7.608%
4,809,522	15.0%	290,300	6.424%
4,746,928	10.0%	227,700	5.039%
4,663,887	5.0%	144,700	3.202%



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AEP
BIG SANDY PLANT UNIT 1 REPOWERING COST ESTIMATE STUDY
FUEL OIL OPTION - REV. A

@RISK
Risk Analysis and Simulation Add-In for Microsoft EXCEL
Version 5.0
Palisade Corporation

ANALYSIS INPUT

Values in Thousands

Accnt. No.	Cost Elements	Target Value $k	Minimum	Maximum	Minimum	Maximum
10.0	GENERAL SITE WORK	$171,064	95%	140%	$162,511	$239,490
11.0	UNDERGROUND	$290,169	95%	130%	$275,661	$377,220
55.0	WATER TREATMENT	$642,201	95%	135%	$610,091	$866,971
70.0	ELECTRICAL POWER DISTRIBUTION	$1,564,878	95%	135%	$1,486,634	$2,112,585
75.0	DCS	$366,252	95%	135%	$347,939	$494,440
80.0	BOP	$3,985,915	95%	135%	$3,786,619	$5,380,985
OP.90	CONSTRUCTION INDIRECTS	$1,818,629	95%	140%	$1,727,698	$2,546,081
OP.99	SUBCONTRACTS	$4,360,000	95%	135%	$4,142,000	$5,886,000
	SPARE PARTS	$90,700	95%	130%	$86,165	$117,910
	Total Base Case	**$13,289,808**				

AEP
BIG SANDY PLANT UNIT 1 REPOWERING COST ESTIMATE STUDY
FUEL OIL OPTION - REV. A

ANALYSIS OUTPUT

Probability of meeting "Total Base Case" value: 13,289,808 0.2%

Total Budget Required ($k)	% Confidence Level	Confidence Level Risk	Contingency % of Base
16,859,569	100.0%	3,569,800	26.861%
15,649,871	95.0%	2,360,100	17.759%
15,420,435	90.0%	2,130,600	16.032%
15,262,472	85.0%	1,972,700	14.844%
15,137,245	80.0%	1,847,400	13.901%
15,033,216	75.0%	1,743,400	13.118%
14,940,164	70.0%	1,650,400	12.419%
14,855,565	65.0%	1,565,800	11.782%
14,769,820	60.0%	1,480,000	11.136%
14,694,802	55.0%	1,405,000	10.572%
14,616,382	50.0%	1,326,600	9.982%
14,541,591	45.0%	1,251,800	9.419%
14,464,143	40.0%	1,174,300	8.836%
14,387,035	35.0%	1,097,200	8.256%
14,302,921	30.0%	1,013,100	7.623%
14,220,841	25.0%	931,000	7.005%
14,137,165	20.0%	847,400	6.376%
14,032,534	15.0%	742,700	5.588%
13,923,017	10.0%	633,200	4.765%
13,742,170	5.0%	452,400	3.404%

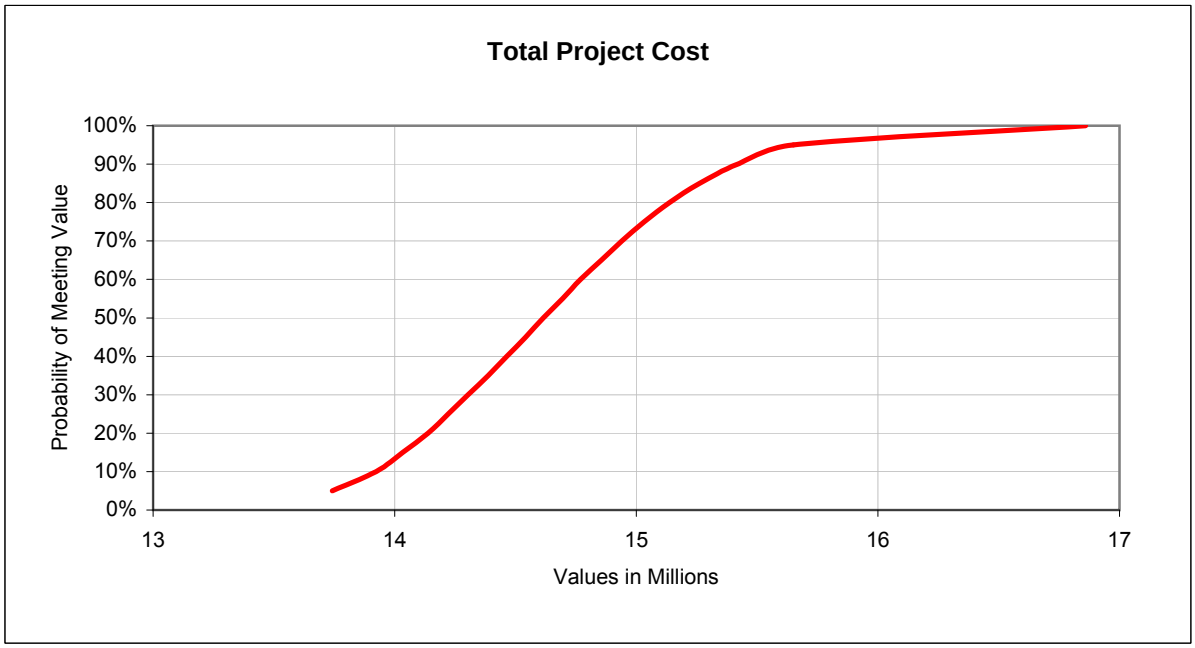

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EXHIBIT 1-7
Capital Cost Estimate Comparisons

Sargent & Lundy, LLC

AEP

Big Sandy Plant Unit 1 Repowering Cost Estimate Study

Cost Comparison

Conceptual Project Cost Estimate

Cost Estimate Summary

Comparison,

Repower Option 1 to

Repower Option 2

Account No.	Item Description	31238B Total Projected Cost - OPTION 1	31239B Total Projected Cost - OPTION 2	DELTA COST - OPTION 2-1	REMARKS
10.00	**GENERAL SITE WORK**				
10.10	CIVIL				
10.10.1	Relocate Existing Metal Cleaning Waste Tank and Pumphouse	$ 579,425	$ 579,425	$ -	
10.10.2	Relocate Existing RSO Trailers	$ 30,270	$ 30,270	$ -	
10.10.3	Construction Parking & Laydown Areas Preparation	$ 4,334,666	$ 4,334,666	$ -	
10.10.4	Erosion & Sediment Control - New Power Block Area	$ 104,538	$ 104,538	$ -	
10.10.5	Site Clearing & Stripping	$ 518,395	$ 518,395	$ -	
10.10.6	Roads & Surfacing	$ 1,755,490	$ 1,755,490	$ -	
10.10.7	Fencing	$ 168,096	$ 168,096	$ -	
10.10.8	Stormwater Drainage Trench	$ 2,147,784	$ 2,147,784	$ -	
10.10.9	Stormwater Runoff Pond	$ 74,441	$ 74,441	$ -	
10.10.10	Stormwater Pond Outlet Structure	$ 604,902	$ 604,902	$ -	
10.10.11	Temporary Construction Guard House	$ 60,532	$ 60,532	$ -	
10.10.12	Concrete Filled Pipe Bollards	$ 25,000	$ 25,000	$ -	
10.10.13	Spur Track Upgrade	$ 1,110,173	$ 1,110,173	$ -	
10.10.14	Install New Stops at Track Sections Being Demolished	$ 6,993	$ 6,993	$ -	
10.89	SUBTOTAL - DIRECT COSTS, GENERAL SITE WORK	$ 11,520,704	$ 11,520,704	$ -	
10.90	CONSTRUCTION INDIRECTS, GENERAL SITE WORK	$ 3,531,911	$ 3,531,911	$ -	
10.99	SUBCONTRACTS	$ -	$ -	$ -	
10.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, GENERAL SITE WORK**	$ 15,052,615	$ 15,052,615	$ -	

Sargent & Lundy, LLC

AEP

Big Sandy Plant Unit 1 Repowering Cost Estimate Study

Cost Comparison

Conceptual Project Cost Estimate

Cost Estimate Summary

Comparison,

Repower Option 1 to

Repower Option 2

Account No.	Item Description	31238B Total Projected Cost - OPTION 1	31239B Total Projected Cost - OPTION 2	DELTA COST - OPTION 2-1	REMARKS
11.00	**UNDERGROUND**				
11.10	CIVIL				
11.10.1	Oily Water Sewer System	$ 1,035,711	$ 1,035,711	$ -	
11.10.2	Modifications to Existing Storm Sewers	$ 682,279	$ 682,279	$ -	
11.10.3	Stormwater Drainage System	$ 290,203	$ 290,203	$ -	
11.10.4	Sanitary Sewer System	$ -	$ -	$ -	
11.10.5	Mechanical Excavation (for process pipe trenches)	$ 1,076,938	$ 1,076,938	$ -	
11.10.6	Hydro Excavation for Mechanical and Electrical Services	$ 195,846	$ 195,846	$ -	
11.10.7	Relocation of Miscellaneous Underground Utilities	$ 253,530	$ 253,530	$ -	
11.20	CONCRETE				
11.20.1	Concrete Thrust Blocks for Piping Systems	$ 32,646	$ 32,646	$ -	
11.50	ELECTRICAL				
11.50.1	Electrical Ductbanks & Trenches	$ 3,684,022	$ 3,684,022	$ -	
11.50.2	Conduits	$ 1,638,567	$ 1,638,567	$ -	
11.50.3	Grounding	$ 602,252	$ 602,252	$ -	
11.50.4	Cathodic Protection	$ 199,794	$ 199,794	$ -	
11.60	MECHANICAL				
11.60.1	Oil/Water Separator Including Lift Stations	$ 214,426	$ 214,426	$ -	
11.60.2	Sanitary Sewage Treatment Plant	Existing	Existing		
11.70	PIPING				
11.70.1	Large Bore BOP Pipe 2-1/2" & Larger - Below Ground	$ 8,239,664	$ 8,221,262	$ (18,402)	Minor Pipe Length Reductions, Fuel Oil System.
11.89	SUBTOTAL - DIRECT COSTS, UNDERGROUND	$ 18,145,879	$ 18,127,477	$ (18,402)	
11.90	CONSTRUCTION INDIRECTS, UNDERGROUND	$ 5,884,880	$ 5,879,100	$ (5,781)	
11.99	SUBCONTRACTS	$ 500,000	$ 500,000	$ -	
11.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, UNDERGROUND**	$ 24,530,759	$ 24,506,577	$ (24,183)	

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21.00	**CTG A**				
21.20	CONCRETE				
21.20.1	Combustion Turbine A Foundation	$ 610,764	$ 508,855	$ (101,909)	Smaller C/T.
21.20.2	Combustion Turbine A Piers / Pedestal	$ 633,016	$ 422,027	$ (210,989)	Smaller C/T.
21.20.3	Combustion Turbine A Excitation & Isolation Transformer	$ 91,222	$ 91,222	$ -	
21.20.4	Combustion Turbine A Miscellaneous Equipment Pads	$ 21,411	$ 21,411	$ -	
21.30	STRUCTURAL STEEL				
21.30.1	Miscellaneous Steel for Transformer Containments	$ 12,048	$ 12,048	$ -	
21.45	PAINTING / COATING				
21.45.1	Touch Up Painting, CTG A	$ 81,470	$ 76,582	$ (4,888)	Smaller C/T.
21.60	MECHANICAL				
21.60.1	Combustion Turbine & Accessories	$ 73,950,417	$ 57,483,751	$ (16,466,667)	Smaller C/T.
21.60.2	Fuel Gas Conditioning	$ 1,220,631	$ 1,220,631	$ -	
21.60.3	Heat Exchangers	$ 45,405	$ 195,405	$ 150,000	Performance Heater Not Furnished by GE.
21.60.4	Shop Fabricated Tanks	$ 21,060	$ 21,060	$ -	
21.89	SUBTOTAL - DIRECT COSTS, CTG A	$ 76,687,444	$ 60,052,991	$ (16,634,453)	
21.90	CONSTRUCTION INDIRECTS, CTG A	$ 1,784,591	$ 1,594,350	$ (190,241)	
21.99	SUBCONTRACTS	$ 1,000,000	$ 1,000,000	$ -	
21.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, CTG A**	$ 79,472,035	$ 62,647,341	$ (16,824,694)	

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22.00	**CTG B**				
22.20	CONCRETE				
22.20.1	Combustion Turbine B Foundation	$ 610,764	$ 508,855	$ (101,909)	Smaller C/T.
22.20.2	Combustion Turbine B Piers / Pedestal	$ 633,016	$ 422,027	$ (210,989)	Smaller C/T.
22.20.3	Combustion Turbine B Excitation & Isolation Transformer	$ 91,222	$ 91,222	$ -	
22.20.4	Combustion Turbine B Miscellaneous Equipment Pads	$ 21,411	$ 21,411	$ -	
22.30	STRUCTURAL STEEL				
22.30.1	Miscellaneous Steel for Transformer Containments	$ 12,048	$ 12,048	$ -	
22.45	PAINTING / COATING				
22.45.1	Touch Up Painting, CTG B	$ 81,470	$ 76,582	$ (4,888)	Smaller C/T.
22.60	MECHANICAL				
22.60.1	Combustion Turbine & Accessories	$ 73,947,390	$ 57,480,724	$ (16,466,667)	Smaller C/T.
22.60.2	Fuel Gas Conditioning	$ 1,220,631	$ 1,220,631	$ -	
22.60.3	Heat Exchangers	$ 45,405	$ 195,405	$ 150,000	Performance Heater Not Furnished by GE.
22.60.4	Shop Fabricated Tanks	$ 21,060	$ 21,060	$ -	
22.89	SUBTOTAL - DIRECT COSTS, CTG B	$ 76,684,417	$ 60,049,964	$ (16,634,453)	
22.90	CONSTRUCTION INDIRECTS, CTG B	$ 1,782,755	$ 1,593,513	$ (189,241)	
22.99	SUBCONTRACTS	$ 1,000,000	$ 1,000,000	$ -	
22.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, CTG B**	$ 79,467,172	$ 62,643,477	$ (16,823,694)	

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31.00	**HRSG A**				
31.20	CONCRETE				
31.20.1	HRSG A Foundation (Incl. Stack)	$ 1,136,042	$ 1,013,370	$ (122,672)	Shorter HRSG Foundation
31.20.2	Boiler Feed Pump Enclosure Foundation	$ 162,554	$ 162,554	$ -	
31.20.3	Misc HRSG Equipment Pads / Foundations	$ 117,261	$ 117,261	$ -	
31.30	STRUCTURAL STEEL				
31.30.1	Blowdown Tant Pit / Trenches	$ 80,799	$ 80,799	$ -	
31.40	ARCHITECTURAL				
31.40.1	Boiler Feed Pump Enclosure	$ 147,560	$ 147,560	$ -	
31.45	PAINTING / COATING				
31.45.1	Touch Up Painting, HRSG A	$ 218,611	$ 190,640	$ (27,971)	Smaller HRSG
31.60	MECHANICAL		$ -		
31.60.1	HRSG & Accessories	$ 35,734,328	$ 33,358,621	$ (2,375,707)	Smaller HRSG
31.60.2	Boiler Feed Pumps & Accessories	$ 2,118,035	$ 2,118,035	$ -	
31.60.3	Shop Fabricated Tanks	$ 57,070	$ 46,060	$ (11,010)	Smaller Blowdown Tank
31.60.4	Miscellaneous Pumps	$ 124,866	$ 124,866	$ -	
31.89	SUBTOTAL - DIRECT COSTS, HRSG A	$ 39,947,125	$ 37,409,766	$ (2,537,360)	
31.90	CONSTRUCTION INDIRECTS, HRSG A	$ 5,390,675	$ 4,835,303	$ (555,372)	
31.99	SUBCONTRACTS	$ 850,000	$ 730,000	$ (120,000)	Reduced Heavy Haul Costs
31.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, HRSG A**	$ 46,187,800	$ 42,975,069	$ (3,212,732)	

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32.00	**HRSG B**				
32.20	CONCRETE				
32.20.1	HRSG B Foundation (Incl. Stack)	$ 1,136,042	$ 1,013,370	$ (122,672)	Shorter HRSG Foundation
32.20.2	Boiler Feed Pump Enclosure Foundation	$ 162,554	$ 162,554	$ -	
32.20.3	Misc HRSG Equipment Pads / Foundations	$ 117,261	$ 117,261	$ -	
32.30	STRUCTURAL STEEL				
32.30.1	Blowdown Tank Pit / Trenches	$ 80,799	$ 80,799	$ -	
32.40	ARCHITECTURAL				
32.40.1	Boiler Feed Pump Enclosure	$ 147,560	$ 147,560	$ -	
32.45	PAINTING / COATING				
32.45.1	Touch Up Painting, HRSG B	$ 218,611	$ 190,640	$ (27,971)	Smaller HRSG
32.60	MECHANICAL				
32.60.1	HRSG & Accessories	$ 35,734,328	$ 33,358,621	$ (2,375,707)	Smaller HRSG
32.60.2	Boiler Feed Pumps & Accessories	$ 2,118,035	$ 2,118,035	$ -	
32.60.3	Shop Fabricated Tanks	$ 57,070	$ 46,060	$ (11,010)	Smaller Blowdown Tank
32.60.4	Miscellaneous Pumps	$ -	$ -	$ -	
32.89	SUBTOTAL - DIRECT COSTS, HRSG B	$ 39,822,259	$ 37,284,900	$ (2,537,360)	
32.90	CONSTRUCTION INDIRECTS, HRSG B	$ 5,381,167	$ 4,825,795	$ (555,372)	
32.99	SUBCONTRACTS	$ 850,000	$ 730,000	$ (120,000)	Reduced Heavy Haul Costs
32.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, HRSG B**	$ 46,053,426	$ 42,840,694	$ (3,212,732)	

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41.00	**STEAM TURBINE**				
41.20	CONCRETE				
41.20.1	STG Pedestal Foundation	Existing	Existing		
41.20.2	STG Pedestal	Existing	Existing		
41.20.3	STG Excitation Transformer Foundation	Existing	Existing		
41.20.4	STG Equipment Pads	Existing	Existing		
41.60	MECHANICAL				
41.60.1	Steam Turbine Modifications	$ 180,270	$ 180,270	$ -	
41.60.2	Condenser Modifications	$ 257,985	$ 257,985	$ -	
41.60.3	Pumps	$ 988,661	$ 978,661	$ (10,000)	Reduced Capacity Condensate Pumps
41.60.4	Condensate Polishing Equipment	$ 2,651,352	$ 2,651,352	$ -	
41.60.5	Gland Steam Condenser	$ 95,135	$ 95,135	$ -	
41.89	SUBTOTAL - DIRECT COSTS, STEAM TURBINE	$ 4,173,402	$ 4,163,402	$ (10,000)	
41.90	CONSTRUCTION INDIRECTS, STEAM TURBINE	$ 378,044	$ 377,544	$ (500)	
41.99	SUBCONTRACTS	$ 23,200,000	$ 23,200,000	$ -	
41.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, STEAM TURBINE**	$ 27,751,446	$ 27,740,946	$ (10,500)	

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50.00	**COOLING TOWER**				
50.20	CONCRETE				
50.20.1	Cooling Tower Pump Structure	Existing	Existing		
50.20.2	Natural Draft Cooling Tower Basin	Existing	Existing		
50.30	STRUCTURAL STEEL				
50.30.1	Miscellaneous Steel for Cooling Tower Pump Intake	Existing	Not Required		
50.60	MECHANICAL				
50.60.1	Cooling Tower Fire Protection System	Not Included	Not Included		
50.60.2	Trash Screens	Not Included	Not Included		
50.60.3	Circulating Water Chemical Feed System	Existing	Existing		
50.60.4	Pumps	$ 303,982	$ 303,982	$ -	
50.89	SUBTOTAL - DIRECT COSTS, COOLING TOWER	$ 303,982	$ 303,982	$ -	
50.90	CONSTRUCTION INDIRECTS, COOLING TOWER	$ 84,895	$ 84,895	$ -	
50.99	SUBCONTRACTS	$ 11,850,000	$ 11,850,000	$ -	
50.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, COOLING TOWER**	$ 12,238,877	$ 12,238,877	$ -	

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55.00	**WATER TREATMENT**				
55.20	CONCRETE				
55.20.1	Water Treatment Building Foundation	$ 1,148,699	$ 1,148,699	$ -	
55.20.2	Misc. Equipment Pads in Building	$ 41,550	$ 41,550	$ -	
55.20.3	Chemical Storage Foundation	$ 52,852	$ 52,852	$ -	
55.20.4	Water Treatment Laboratory Foundation	$ 47,077	$ 47,077	$ -	
55.20.5	Demin Water Storage Tank Foundation	$ 52,852	$ 52,852	$ -	
55.40	ARCHITECTURAL				
55.40.1	Water Treatment Building	$ 1,676,264	$ 1,676,264	$ -	
55.40.2	Water Treatment Laboratory Building	$ 75,600	$ 75,600	$ -	
55.45	PAINTING / COATING				
55.45.1	Special Coatings	$ 216,217	$ 216,217	$ -	
55.60	MECHANICAL				
55.60.1	Water Treatment Equipment	$ 3,934,099	$ 3,934,099	$ -	
55.60.2	Miscellaneous Pumps	$ 124,527	$ 124,527	$ -	
55.60.3	Shop Fabricated Tanks	$ 35,099	$ 35,099	$ -	
55.89	SUBTOTAL - DIRECT COSTS, WATER TREATMENT	$ 7,404,836	$ 7,404,836	$ -	
55.90	CONSTRUCTION INDIRECTS, WATER TREATMENT	$ 1,410,270	$ 1,410,270	$ -	
55.99	SUBCONTRACTS	$ -	$ -	$ -	
55.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, WATER TREATMENT**	$ 8,815,107	$ 8,815,107	$ -	

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56.00	**PRE-TREATMENT**				
56.20	CONCRETE				
56.20.1	Clarifier Foundations (2 Total)	$ 1,027,590	$ 1,027,590	$ -	
56.20.2	Sludge Holding Tank Foundations (2 Total)	$ 319,789	$ 319,789	$ -	
56.20.3	Raw Water Storage Tank Foundation	$ 208,217	$ 208,217	$ -	
56.20.4	Clearwell Tank Foundations (2 Total)	$ 319,789	$ 319,789	$ -	
56.20.5	Filter Press Building Foundation	$ 392,906	$ 392,906	$ -	
56.20.6	Filter Press Building Equipment Pads	$ 17,013	$ 17,013	$ -	
56.20.7	Pre-Treatment Building Foundation	$ 1,074,924	$ 1,074,924	$ -	
56.20.8	Pre-Treatment Building Equipment Pads	$ 87,420	$ 87,420	$ -	
56.30	STRUCTURAL STEEL				
56.30.1	Filter Press Building Steel	$ 217,596	$ 217,596	$ -	
56.40	ARCHITECTURAL				
56.40.1	Pre-Treatment Building	$ 1,211,907	$ 1,211,907	$ -	
56.40.2	Filter Press Building	$ 477,628	$ 477,628	$ -	
56.40.3	Interior Finishes	$ 336,236	$ 336,236	$ -	
56.40.4	River Water Intake Structure Building	Existing	Existing		
56.45	PAINTING / COATING				
56.45.1	Special Coatings	$ 144,145	$ 144,145	$ -	
56.60	MECHANICAL			$ -	
56.60.1	Water Pre-Treatment Equipment	$ 4,458,331	$ 4,458,331	$ -	
56.60.2	Miscellaneous Pumps	$ 69,866	$ 69,866	$ -	
56.60.3	River Water Intake Screens	$ 200,541	$ 200,541	$ -	
56.89	SUBTOTAL - DIRECT COSTS, PRE-TREATMENT	$ 10,563,897	$ 10,563,897	$ -	
56.90	CONSTRUCTION INDIRECTS, PRE-TREATMENT	$ 2,345,095	$ 2,345,095	$ -	
56.99	SUBCONTRACTS	$ 700,000	$ 700,000	$ -	
56.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, PRE-TREATMENT**	$ 13,608,992	$ 13,608,992	$ -	

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60.00	**PIPE RACK**				
60.20	CONCRETE				
60.20.1	Piperack Foundations @ New Powerblock	$ 760,641	$ 760,641	$ -	
60.20.2	Piperack Foundations @ Exterior Rack East & South of Unit 1	$ 334,767	$ 334,767	$ -	
60.30	STRUCTURAL STEEL				
60.30.1	Structural Steel, Pipe Rack @ New Power Block	$ 3,590,159	$ 3,361,896	$ (228,263)	Lighter Pipe Rack Loads.
60.30.2	Structural Steel Framing Inside Existing Boiler Room	$ 473,596	$ 473,596	$ -	
60.30.3	Exterior Structural Steel Framing East & South of Unit 1	$ 764,629	$ 764,629	$ -	
60.45	PAINTING / COATING				
60.45.1	Touch-up Painting	$ 512,350	$ 512,350	$ -	
60.89	SUBTOTAL - DIRECT COSTS, PIPE RACK	$ 6,436,142	$ 6,207,879	$ (228,263)	
60.90	CONSTRUCTION INDIRECTS, PIPE RACK	$ 1,907,896	$ 1,842,295	$ (65,601)	
60.99	SUBCONTRACTS	$ -	$ -	$ -	
60.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, PIPE RACK**	$ 8,344,038	$ 8,050,174	$ (293,863)	

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70.00	**ELECTRICAL POWER DISTRIBUTION**				
70.20	CONCRETE				
70.20.1	GSU Foundations (2 Total)	$ 722,912	$ 627,976	$ (94,936)	Slightly Smaller Foundations.
70.20.2	Aux Transformer Foundations (2 Total)	$ 282,060	$ 282,060	$ -	
70.20.3	Transformer PDC Foundation	$ 328,622	$ 328,622	$ -	
0.00	STG PDC Foundation	$ 248,553	$ 248,553	$ -	
70.20.5	HRSG PDC Foundations (2 Total)	$ 309,308	$ 309,308	$ -	
70.20.6	CT Chiller PDC Foundations	$ 248,553	$ 248,553	$ -	
70.20.7	Iso-Phase Bus / Cable Bus Foundations	$ 20,391	$ 20,391	$ -	
70.20.8	Emergency Diesel Generator Foundation	$ 36,703	$ 36,703	$ -	
70.30	STRUCTURAL STEEL				
70.30.1	Miscellaneous Steel for GSU Containments (2 Total)	$ 81,376	$ 81,376	$ -	
70.30.2	Miscellaneous Steel for Aux Transformer Containments (2 Total)	$ 42,274	$ 42,274	$ -	
70.30.3	STG PDC Galleries	$ 22,120	$ 22,120	$ -	
70.30.4	HRSG PDC Galleries (2 Total)	$ 37,897	$ 37,897	$ -	
70.30.5	Transformer PDC Galleries	$ 37,897	$ 37,897	$ -	
70.30.6	HVAC PDC Support Framing & Galleries	$ 41,151	$ 41,151	$ -	
70.30.7	CT Chiller PDC Galleries	$ 22,120	$ 22,120	$ -	
70.50	ELECTRICAL			$ -	
70.50.1	Generator Circuit Breakers (18KV)	$ 1,200,922	$ 1,100,922	$ (100,000)	Lower Capacity Breaker.
70.50.2	Generator Step Up Transformers	$ 5,748,905	$ 4,480,317	$ (1,268,588)	Smaller Transformers.
70.50.3	Unit Substation Transformers	$ 266,066	$ 266,066	$ -	
70.50.4	Unit Auxiliary Transformers (UAT: 1A, 1B)	$ 1,479,824	$ 1,469,824	$ (10,000)	Lower Capacity.
70.50.5	4.16kV Switchgear	$ 3,444,200	$ 3,444,200	$ -	
70.50.6	480V Switchgear	$ 3,075,317	$ 3,075,317	$ -	
70.50.7	Isolated Phase Bus Duct	$ 1,227,469	$ 1,227,469	$ -	
70.50.8	480V-800A, Motor Control Centers	$ 1,353,973	$ 1,353,973	$ -	
70.50.9	Non-Seg/Cable Bus	$ 1,866,952	$ 1,866,952	$ -	
70.50.10	Emergency Power System	$ 297,787	$ 297,787	$ -	

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70.50.11	PDCs	$ 4,017,238	$ 4,017,238	$ -	
70.50.12	Panelboards	$ 167,220	$ 167,220	$ -	
70.50.13	Generator/Transformer Relay & Protection Panels	$ 337,043	$ 337,043	$ -	
70.50.14	Communication	$ 92,578	$ 92,578	$ -	
70.50.15	Digital Fault Recorder	$ 143,586	$ 143,586	$ -	
70.50.16	Diesel Generator	$ 639,528	$ 639,528	$ -	
70.50.17	Security System	$ 189,726	$ 189,726	$ -	
70.50.18	Cable Splice Boxes	$ 259,365	$ 259,365	$ -	
70.50.19	Cable	$ 10,177,180	$ 10,129,359	$ (47,821)	Reduced Quantities for Small Power Cables.
70.50.20	Heat Tracing	$ 1,733,666	$ 1,733,666	$ -	
70.50.21	Conduit-Above Ground	$ 1,104,789	$ 1,056,832	$ (47,957)	Reduced Quantities.
70.50.22	Embedded Conduits	$ 84,725	$ 80,966	$ (3,759)	Reduced Quantities.
70.50.23	Cable Tray	$ 2,318,247	$ 2,318,247	$ -	
70.50.24	Lighting and Distribution	$ 2,210,589	$ 2,210,589	$ -	
70.50.25	Laydown Area Lighting	$ -	$ -	$ -	
70.50.26	Miscellaneous Electrical Devices	$ 323,629	$ 323,629	$ -	
70.50.27	Lightning Protection	$ 100,394	$ 100,394	$ -	
70.50.28	Above Ground Grounding	$ 95,114	$ 95,114	$ -	
70.50.29	Electrical Allowance for Relocated Bulk Gas Storage Facility	$ 21,477	$ 21,477	$ -	
70.89	SUBTOTAL - DIRECT COSTS, ELECTRICAL POWER DISTRIBUTION	$ 46,459,443	$ 44,886,383	$ (1,573,061)	
70.90	CONSTRUCTION INDIRECTS, ELECTRICAL POWER DISTRIBUTION	$ 9,061,691	$ 8,908,930	$ (152,761)	
70.99	SUBCONTRACTS	$ 250,000	$ 250,000	$ -	
70.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, ELECTRICAL POWER DISTRIBUTION**	$ 55,771,135	$ 54,045,313	$ (1,725,822)	

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75.00	**DCS**				
75.20	CONCRETE				
75.20.1	CEMS Foundation (2 Total)	$ 25,545	$ 25,545	$ -	
75.50	ELECTRICAL				
75.50.1	600V Small Power Cable	$ 1,890,601	$ 1,808,426	$ (82,175)	Reduced Cable Quantities.
75.50.2	Conduit-Above Ground	$ 707,117	$ 676,343	$ (30,774)	Reduced Quantities.
75.50.3	Embedded Conduits	$ 286,144	$ 273,752	$ (12,392)	Reduced Quantities.
75.55	INSTRUMENTATION				
75.55.1	DCS	$ 3,235,245	$ 3,235,245	$ -	
75.55.2	High Fidelity Simulator	$ 1,496,110	$ 1,496,110	$ -	
75.55.3	CEMS	$ 780,088	$ 780,088	$ -	
75.55.4	BOP Field Mounted Instruments	$ 2,097,276	$ 2,097,276	$ -	
75.55.5	Vendor Furnished Field Mounted Instruments	$ 690,566	$ 690,566	$ -	
75.89	SUBTOTAL - DIRECT COSTS, DCS	$ 11,208,690	$ 11,083,349	$ (125,340)	
75.90	CONSTRUCTION INDIRECTS, DCS	$ 2,118,939	$ 2,076,589	$ (42,350)	
75.99	SUBCONTRACTS	$ -	$ -	$ -	
75.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, DCS**	$ 13,327,629	$ 13,159,938	$ (167,690)	

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80.00	**BOP**				
80.20	CONCRETE				
80.20.1	CTG Inlet Air Chiller Foundations	$ 40,569	$ 40,569	$ -	
80.20.2	Ammonia Storage Tank Foundation	$ 169,986	$ 169,986	$ -	
80.20.3	HRSG Blowdown Sump	$ 242,889	$ 242,889	$ -	
80.20.4	Aux Boiler Foundation	$ 153,299	$ 153,299	$ -	
80.20.5	Bulk Gas Storage Pad	$ 90,171	$ 90,171	$ -	
80.20.6	CO2 Storage Tank (Relocated)	$ 5,212	$ 5,212	$ -	
80.20.7	BOP Foundation Embedments	$ 147,276	$ 147,276	$ -	
80.30	STRUCTURAL STEEL				
80.30.1	HRSG Blowdown Sump Handrails	$ 4,307	$ 4,307	$ -	
80.40	ARCHITECTURAL				
80.40.1	Bulk Gas Storage Enclosure	$ 123,750	$ 123,750	$ -	
80.45	PAINTING / COATING				
80.45.1	Touch-up & Finish Painting	$ 731,929	$ 731,929	$ -	
80.60	MECHANICAL				
80.60.1	CTG Inlet Air Chiller Equipment Package	$ 9,706,307	$ 9,105,406	$ (600,901)	Reduced Chiller Capacity.
80.60.2	Auxiliary Boiler	$ 2,494,130	$ 2,494,130	$ -	
80.60.3	Heat Exchangers	$ 580,541	$ 540,541	$ (40,000)	Reduced Closed Cooling Loads.
80.60.4	Miscellaneous Pumps	$ 283,428	$ 243,428	$ (40,000)	Reduced Closed Cooling Loads.
80.60.5	Shop Fabricated Tanks	$ 47,070	$ 47,070	$ -	
80.60.6	Bulk Gas Storage Provisions	$ 120,360	$ 120,360	$ -	
80.60.7	Ammonia Storage & Forwarding Equipment	$ 535,766	$ 482,739	$ (53,027)	Reduced Capacity.
80.60.8	Air Compressors & Accessories	$ 22,070	$ 22,070	$ -	
80.60.9	Chemical Feed & Sample Systems	$ 802,375	$ 749,280	$ (53,095)	Reduced Capacity.
80.60.10	Relocate Existing CO2 Storage Tank	$ 25,225	$ 25,225	$ -	
80.70	PIPING			$ -	
80.70.1	Alloy Piping	$ 15,213,172	$ 15,251,727	$ 38,554	Revised Cold Reheat Sizing.

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80.70.2	BOP Piping	$ 17,630,354	$ 14,625,949	$ (3,004,405)	Reduced Quantities and Sizes.
80.70.3	Pipe Supports, HP (Engineered Supports)	$ 2,425,233	$ 2,425,233	$ -	
80.70.4	Pipe Supports, LP	$ 1,417,018	$ 1,252,827	$ (164,191)	Adjusted for Reduced Pipe Lengths.
80.70.5	C/T Interconnecting Piping	$ 427,938	$ 707,938	$ 280,000	Not Furnished by GE.
80.70.6	Valves & Specialties	$ 10,474,240	$ 10,454,240	$ (20,000)	Reduced Strainer Costs for Lower Capacities.
80.80	INSULATION			$ -	
80.80.1	Thermal Insulation/Lagging	$ 5,362,855	$ 5,362,855	$ -	
80.80.2	HRSG Piping & Drum Insulation and Lagging	$ 1,085,492	$ 976,943	$ (108,549)	Reduced for Smaller HRSG's.
80.80.3	HRSG Stack Insulation to Damper Elevation	$ 510,313	$ 510,313	$ -	
80.89	SUBTOTAL - DIRECT COSTS, BOP	$ 70,873,275	$ 67,107,661	$ (3,765,614)	
80.90	CONSTRUCTION INDIRECTS, BOP	$ 16,315,540	$ 15,298,985	$ (1,016,555)	
80.99	SUBCONTRACTS	$ -	$ -	$ -	
80.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, BOP**	$ 87,188,815	$ 82,406,646	$ (4,782,169)	

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90.00	**COMMON**				
90.20	CONCRETE				
90.20.1	Combustion Turbine Building Foundation	$ 3,125,507	$ 3,125,507	$ -	
90.20.2	Steam Turbine Building Foundation	$ 15,744	$ 15,744	$ -	
90.20.3	Steam Turbine Building Elevated Slabs	$ 1,206	$ 1,206	$ -	
90.20.4	Boiler Building Concrete Work	$ 6,177	$ 6,177	$ -	
90.20.5	Admin / Warehouse / Storage Building Foundation	Not Included	Not Included		
90.20.6	Fire Water Pumphouse Foundation	Existing	Existing		
90.20.7	Service Water Pump Foundation	Existing	Existing		
90.20.8	Tower Crane Foundation	$ 294,149	$ 294,149	$ -	
90.20.9	New Foundation for Fire House (Truck Parking)	$ 14,835	$ 14,835	$ -	
90.20.10	Overflow Sump	$ 140,909	$ 140,909	$ -	
90.30	STRUCTURAL STEEL				
90.30.1	Combustion Turbine Building Steel	$ 6,593,661	$ 6,593,661	$ -	
90.30.2	Steam Turbine Building Steel	$ 166,138	$ 166,138	$ -	
90.30.3	Boiler Building Steel	$ 332,949	$ 332,949	$ -	
90.40	ARCHITECTURAL				
90.40.1	Combustion Turbine Building	$ 2,310,079	$ 2,310,079	$ -	
90.40.2	Steam Turbine Building	$ -	$ -	$ -	
90.40.3	Boiler Building	$ 298,780	$ 298,780	$ -	
90.40.4	Admin / Warehouse / Storage Building	Not Included	Not Included		
90.40.5	Relocate Existing Warehouse Building	Not Required	Not Required		
90.40.6	New Metal Cleaning Waste Pumphouse	$ 40,000	$ 40,000	$ -	
90.40.7	New Fire House (Truck Parking)	$ 60,000	$ 60,000	$ -	
90.45	PAINTING / COATING				
90.45.1	Touch-up & Finish Painting	$ 487,953	$ 487,953	$ -	
90.60	MECHANICAL				
90.60.1	Diesel Driven Fire Pump Package	$ 179,821	$ 179,821	$ -	

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90.60.2	Miscellaneous Pumps	$ 3,964	$ 3,964	$ -	
90.60.3	Cranes & Hoists	$ 1,031,446	$ 1,031,446	$ -	
90.60.4	Fuel Gas Check Metering Station	$ 951,352	$ 951,352	$ -	
90.60.5	Potable Water Tepid Recirculation System	$ 310,541	$ 310,541	$ -	
90.60.6	HVAC for New Control Room Extension	$ 98,674	$ 98,674	$ -	
90.60.7	Plumbing & Fixtures	$ 158,381	$ 158,381	$ -	
90.60.8	Install Blanking Plate at Existing Chimney	$ 80,076	$ 80,076	$ -	
90.89	SUBTOTAL - DIRECT COSTS, COMMON	$ 16,702,340	$ 16,702,340	$ -	
90.90	CONSTRUCTION INDIRECTS, COMMON	$ 6,201,660	$ 6,201,660	$ -	
90.99	SUBCONTRACTS	$ 4,004,000	$ 4,004,000	$ -	
90.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, COMMON**	$ 26,908,001	$ 26,908,001	$ -	

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Account No.	Item Description	Total Projected Cost - OPTION 1	Total Projected Cost - OPTION 2	DELTA COST - OPTION 2-1	REMARKS
	OVERALL PROJECT SUBTOTALS				
OP.89	**DIRECT COSTS**	$ 436,933,835	$ 392,869,531	$ (44,064,304)	
OP.90	**CONSTRUCTION INDIRECTS**	$ 63,580,011	$ 60,806,236	$ (2,773,775)	
OP.99	**SUBCONTRACTS**	$ 44,204,000	$ 43,964,000	$ (240,000)	
OP.00	**SUBTOTAL PROJECT COSTS**	$ 544,717,846	$ 497,639,767	$ (47,078,079)	
PI.00	**OVERALL PROJECT INDIRECT COSTS**	$ 38,334,200	$ 38,192,900	$ (141,300)	
	Spare Parts	$ 4,612,800	$ 4,061,800	$ (551,000)	
	Contingency	$ 76,810,500	$ 71,834,100	$ (4,976,400)	
	Escalation	$ 56,305,259	$ 51,986,300	$ (4,318,959)	
	Subtotal Project Cost	$ 720,780,605	$ 663,714,867	$ (57,065,738)	
	Owner's Costs	$ -	$ -	$ -	
	AFUDC (Interest During Construction)	$ -	$ -	$ -	
	Total Project Cost	$ 720,780,605	$ 663,714,867	$ (57,065,738)	

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Account No.	Item Description	Total Projected Cost - OPTION 1	Total Projected Cost - OPTION 2	DELTA COST - OPTION 2-1	REMARKS
	ADDITIONAL REFERENCE COSTS:				
A	**Demolition & Removal**				
A.1	Existing Metal Cleaning Waste Tank Area Restoration	$ 58,398	$ 58,398	$ -	
A.2	Demolish Existing Fire House (Truck Parking)	$ 5,919	$ 5,919	$ -	
A.3	Demolish Existing Coal Handling Structures	$ 333,672	$ 333,672	$ -	
A.4	Demolish Existing Railroad Tracks	$ 41,249	$ 41,249	$ -	
A.5	Demolish Existing Helipad	$ -	$ -	$ -	
A.6	Demolish Existing Sun Shelter	$ 13,154	$ 13,154	$ -	
A.7	Demolish Unit 1 Boiler Building Combustion Air Coil Room	$ 68,388	$ 68,388	$ -	
A.8	Demolish Unit 1 Boiler Building Platform at El. 586'-9" (Row 8 to 12)	$ 10,606	$ 10,606	$ -	
A.9	Secure Existing Track Hopper for Abandonment	$ 152,872	$ 152,872	$ -	
A.10	Demolish Gas Cylinder Storage Shed	$ 9,208	$ 9,208	$ -	
A.11	Demolish CO2 Storage Tank Foundation	$ 3,289	$ 3,289	$ -	
A.12	Remove & Dispose of Existing Relays serving ST GSU, UAT, RAT, and Generator Protection	$ 13,702	$ 13,702	$ -	
A.13	Remove & Dispose of Existing 4.16 kV Switchgear Sections in Existing STG Building	$ 172,648	$ 172,648	$ -	
A.14	Remove & Dispose of Existing 600V Switchgear Sections in Existing STG Building	$ 312,411	$ 312,411	$ -	
A.15	Remove & Dispose of Existing Oil Filled 4.16kV/600V 1.5 MVA Transformers in Existing STG Building	$ 54,809	$ 54,809	$ -	
A.16	Control Room Demolition & Removals	$ 123,320	$ 123,320	$ -	
A.17	Remove Existing Pumps	$ 112,982	$ 112,982	$ -	
A.18	Remove & Dispose of Existing Gland Steam Condenser	$ 19,821	$ 19,821	$ -	
A.19	Remove & Dispose of Existing ST Turning Gear Assembly	$ 20,180	$ 20,180	$ -	
A.20	Remove & Dispose of Existing Raw Water Intake Screens	$ 40,360	$ 40,360	$ -	

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Account No.	Item Description	31238B Total Projected Cost - OPTION 1	31239B Total Projected Cost - OPTION 2	DELTA COST - OPTION 2-1	REMARKS
A.21	Remove & Dispose of Existing Insulation & Lagging on Ductwork Above Boiler Room Roof	$ 158,590	$ 158,590	$ -	
A.22	Remove & Dispose of Existing Piping & Mechanical Items In Existing Powerhouse As Required	$ 267,461	$ 267,461	$ -	
A.23	Remove & Dispose of Existing Conduits & Electrical Items In Existing Powerhouse As Required	$ 223,819	$ 223,819	$ -	
A.89	SUBTOTAL - DIRECT COSTS, Demolition & Removal	$ 2,216,858	$ 2,216,858	$ -	
A.90	CONSTRUCTION INDIRECTS, Demolition & Removal	$ 798,220	$ 798,220	$ -	
A.99	SUBCONTRACTS	$ 1,504,100	$ 1,504,100	$ -	
A.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, Demolition & Removal**	$ 4,519,178	$ 4,519,178	$ -	
PI.00	**Indirect Costs**				
	Contingency	$ 1,265,700	$ 1,265,700	$ -	
	Escalation	$ 356,557	$ 356,557	$ (0)	
	Total Demolition & Removal Cost	$ 6,141,435	$ 6,141,435	$ (0)	

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Account No.	Item Description	31238B Total Projected Cost - REPOWER OPTION 1	31118B Total Projected Cost - BROWNFIELD OPTION 2	DELTA COST - BROWNFIELD - REPOWER	REMARKS
10.00	**GENERAL SITE WORK**				
10.10	CIVIL				
10.10.1	Relocate Existing Metal Cleaning Waste Tank and Pumphouse	$ 579,425	$ -	$ (579,425)	Not req'd for brownfield
10.10.2	Relocate Existing RSO Trailers	$ 30,270	$ -	$ (30,270)	Not req'd for brownfield
10.10.3	Construction Parking & Laydown Areas Preparation	$ 4,334,666	$ 4,434,700	$ 100,035	Labor rate difference
10.10.4	Erosion & Sediment Control - New Power Block Area	$ 104,538	$ 108,206	$ 3,668	Labor rate difference
10.10.5	Site Grading & Stripping	$ 518,395	$ 531,333	$ 12,938	Larger power block area for brownfield
10.10.6	Roads & Surfacing	$ 1,755,490	$ 1,971,868	$ 216,378	More roadwork for brownfield
10.10.7	Fencing	$ 168,096	$ 262,290	$ 94,194	Larger power block area for brownfield
	New Concrete Encasement	$ -	$ 72,746	$ 72,746	For Existing Ash Pipe Road Crossing, NA for repower
10.10.8	Stormwater Drainage Trench	$ 2,147,784	$ 2,268,537	$ 120,752	Quantity & labor cost differences
10.10.9	Stormwater Runoff Pond	$ 74,441	$ 266,397	$ 191,956	Excavation included in repower earthwork account
10.10.10	Stormwater Pond Outlet Structure	$ 604,902	$ -	$ (604,902)	Allowance for pumping or gravity drains
	Stormwater Pond Pump Structure	$ -	$ 437,941	$ 437,941	Pump structure only
10.10.11	Temporary Construction Guard House	$ 60,532	$ 63,666	$ 3,134	Labor rate difference
10.10.12	Concrete Filled Pipe Bollards	$ 25,000	$ 25,000	$ -	
10.10.13	Spur Track Upgrade	$ 1,110,173	$ -	$ (1,110,173)	N/A for brownfield
10.10.14	Install New Stops at Track Sections Being Demolished	$ 6,993	$ -	$ (6,993)	N/A for brownfield
10.89	SUBTOTAL - DIRECT COSTS, GENERAL SITE WORK	$ 11,520,704	$ 10,442,683	$ (1,078,021)	
10.90	CONSTRUCTION INDIRECTS, GENERAL SITE WORK	$ 3,531,911	$ 3,171,538	$ (360,373)	
10.99	SUBCONTRACTS	$ -	$ -	$ -	
10.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, GENERAL SITE WORK**	$ 15,052,615	$ 13,614,221	$ (1,438,394)	

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11.00	**UNDERGROUND**				
11.10	CIVIL				
11.10.1	Oily Water Sewer System	$ 1,035,711	$ 1,254,199	$ 218,489	Quantities higher for brownfield
11.10.2	Modifications to Existing Storm Sewers	$ 682,279	$ 81,253	$ (601,027)	Repower includes reroutes with hydroexcavation vs simple removal in brownfield
11.10.3	Stormwater Drainage System	$ 290,203	$ -	$ (290,203)	Only surface trenches used in brownfield vs trenches and buried piping in repower
11.10.4	Sanitary Sewer System	$ -	$ 603,567	$ 603,567	Use existing in repower
11.10.5	Mechanical Excavation (for process pipe trenches)	$ 1,076,938	$ 1,810,647	$ 733,709	More buried pipe (incl CW) in brownfield
11.10.6	Hydro Excavation for Mechanical and Electrical Services	$ 195,846	$ -	$ (195,846)	N/A for brownfield
11.10.7	Relocation of Miscellaneous Underground Utilities	$ 253,530	$ 263,173	$ 9,643	Labor rate difference
11.20	CONCRETE				
11.20.1	Concrete Thrust Blocks for Piping Systems	$ 32,646	$ 34,382	$ 1,735	Labor rate difference
11.50	ELECTRICAL				
11.50.1	Electrical Ductbanks & Trenches	$ 3,684,022	$ 3,733,728	$ 49,706	Quantity & labor cost differences
11.50.2	Conduits	$ 1,638,567	$ 2,356,999	$ 718,432	Quantity & labor cost differences
11.50.3	Grounding	$ 602,252	$ 892,713	$ 290,461	Quantity & labor cost differences
11.50.4	Cathodic Protection	$ 199,794	$ 315,991	$ 116,197	Quantity & labor cost differences
11.60	MECHANICAL				
11.60.1	Oil/Water Separator Including Lift Stations	$ 214,426	$ 331,743	$ 117,317	2 in repower, 3 in brownfield
11.60.2	Sanitary Sewage Treatment Plant	$ -	$ 143,751	$ 143,751	Existing for repower
11.70	PIPING				
11.70.1	Large Bore BOP Pipe 2-1/2" & Larger - Below Ground	$ 8,239,664	$ 11,082,794	$ 2,843,129	Quantity & labor cost differences
	New Buried Hydrogen Line from Relocated Hydrogen Storage Area to Existing Plant	$ -	$ 219,341	$ 219,341	N/A for repower
11.89	SUBTOTAL - DIRECT COSTS, UNDERGROUND	$ 18,145,879	$ 23,124,280	$ 4,978,401	
11.90	CONSTRUCTION INDIRECTS, UNDERGROUND	$ 5,884,880	$ 7,476,289	$ 1,591,408	
11.99	SUBCONTRACTS	$ 500,000	$ 500,000	$ -	
11.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, UNDERGROUND**	$ 24,530,759	$ 31,100,569	$ 6,569,810	

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21.00	**CTG A**				
21.20	CONCRETE				
21.20.1	Combustion Turbine A Foundation	$ 610,764	$ 633,582	$ 22,818	Labor rate difference
21.20.2	Combustion Turbine A Piers / Pedestal	$ 633,016	$ 663,812	$ 30,796	Labor rate difference
21.20.3	Combustion Turbine A Excitation & Isolation Transformer	$ 91,222	$ 95,525	$ 4,303	Labor rate difference
21.20.4	Combustion Turbine A Miscellaneous Equipment Pads	$ 21,411	$ 22,393	$ 982	Labor rate difference
21.30	STRUCTURAL STEEL				
21.30.1	Miscellaneous Steel for Transformer Containments	$ 12,048	$ 12,383	$ 335	Labor rate difference
21.45	PAINTING / COATING				
21.45.1	Touch Up Painting, CTG A	$ 81,470	$ -	$ 81,470	Not included in brownfield
21.60	MECHANICAL				
21.60.1	Combustion Turbine & Accessories	$ 73,950,417	$ 74,140,788	$ 190,370	Labor rate difference
21.60.2	Fuel Gas Conditioning	$ 1,220,631	$ 1,225,010	$ 4,379	Labor rate difference
21.60.3	Heat Exchangers	$ 45,405	$ 48,221	$ 2,815	Labor rate difference
21.60.4	Shop Fabricated Tanks	$ 21,060	$ 21,427	$ 367	Labor rate difference
21.89	SUBTOTAL - DIRECT COSTS, CTG A	$ 76,687,444	$ 76,863,139	$ 175,695	
21.90	CONSTRUCTION INDIRECTS, CTG A	$ 1,784,591	$ 1,851,506	$ 66,915	
21.99	SUBCONTRACTS	$ 1,000,000	$ 1,000,000	$ -	
21.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, CTG A**	$ 79,472,035	$ 79,714,645	$ 242,610	

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22.00	**CTG B**				
22.20	CONCRETE				
22.20.1	Combustion Turbine B Foundation	$ 610,764	$ 633,582	$ 22,818	Labor rate difference
22.20.2	Combustion Turbine B Piers / Pedestal	$ 633,016	$ 663,812	$ 30,796	Labor rate difference
22.20.3	Combustion Turbine B Excitation & Isolation Transformer	$ 91,222	$ 95,525	$ 4,303	Labor rate difference
22.20.4	Combustion Turbine B Miscellaneous Equipment Pads	$ 21,411	$ 22,393	$ 982	Labor rate difference
22.30	STRUCTURAL STEEL				
22.30.1	Miscellaneous Steel for Transformer Containments	$ 12,048	$ 12,383	$ 335	Labor rate difference
22.45	PAINTING / COATING				
22.45.1	Touch Up Painting, CTG B	$ 81,470	$ -	$ 81,470	Not included in brownfield
22.60	MECHANICAL				
22.60.1	Combustion Turbine & Accessories	$ 73,947,390	$ 74,137,573	$ 190,182	Labor rate difference
22.60.2	Fuel Gas Conditioning	$ 1,220,631	$ 1,225,010	$ 4,379	Labor rate difference
22.60.3	Heat Exchangers	$ 45,405	$ 48,221	$ 2,815	Labor rate difference
22.60.4	Shop Fabricated Tanks	$ 21,060	$ 21,427	$ 367	Labor rate difference
22.89	SUBTOTAL - DIRECT COSTS, CTG B	$ 76,684,417	$ 76,859,924	$ 175,507	
22.90	CONSTRUCTION INDIRECTS, CTG B	$ 1,782,755	$ 1,850,616	$ 67,861	
22.99	SUBCONTRACTS	$ 1,000,000	$ 1,000,000	$ -	
22.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, CTG B**	$ 79,467,172	$ 79,710,540	$ 243,368	

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31.00	**HRSG A**				
31.20	CONCRETE				
31.20.1	HRSG A Foundation (Incl. Stack)	$ 1,136,042	$ 1,176,909	$ 40,867	Labor rate difference
31.20.2	Boiler Feed Pump Enclosure Foundation	$ 162,554	$ 168,499	$ 5,946	Labor rate difference
31.20.3	Misc HRSG Equipment Pads / Foundations	$ 117,261	$ 122,814	$ 5,553	Labor rate difference
31.30	STRUCTURAL STEEL				
31.30.1	Blowdown Tant Pit / Trenches	$ 80,799	$ 82,665	$ 1,866	Labor rate difference
31.40	ARCHITECTURAL				
31.40.1	Boiler Feed Pump Enclosure	$ 147,560	$ 147,560	$ -	
31.45	PAINTING / COATING				
31.45.1	Touch Up Painting, HRSG A	$ 218,611	$ -	$ (218,611)	Not included in brownfield
31.60	MECHANICAL				
31.60.1	HRSG & Accessories	$ 35,734,328	$ 36,333,297	$ 598,970	Labor rate difference
31.60.2	Boiler Feed Pumps & Accessories	$ 2,118,035	$ 2,445,546	$ 327,510	6.9kV vs 4.16kV and labor rate difference
31.60.3	Shop Fabricated Tanks	$ 57,070	$ 57,498	$ 428	Labor rate difference
31.60.4	Miscellaneous Pumps	$ 124,866	$ 125,787	$ 921	Labor rate difference
31.89	SUBTOTAL - DIRECT COSTS, HRSG A	$ 39,947,125	$ 40,660,575	$ 713,450	
31.90	CONSTRUCTION INDIRECTS, HRSG A	$ 5,390,675	$ 5,557,608	$ 166,933	
31.99	SUBCONTRACTS	$ 850,000	$ 850,000	$ -	
31.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, HRSG A**	$ 46,187,800	$ 47,068,183	$ 880,382	

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32.00	**HRSG B**				
32.20	CONCRETE				
32.20.1	HRSG B Foundation (Incl. Stack)	$ 1,136,042	$ 1,176,909	$ 40,867	Labor rate difference
32.20.2	Boiler Feed Pump Enclosure Foundation	$ 162,554	$ 168,499	$ 5,946	Labor rate difference
32.20.3	Misc HRSG Equipment Pads / Foundations	$ 117,261	$ 122,814	$ 5,553	Labor rate difference
32.30	STRUCTURAL STEEL				
32.30.1	Blowdown Tank Pit / Trenches	$ 80,799	$ 82,665	$ 1,866	Labor rate difference
32.40	ARCHITECTURAL				
32.40.1	Boiler Feed Pump Enclosure	$ 147,560	$ 147,560	$ -	
32.45	PAINTING / COATING				
32.45.1	Touch Up Painting, HRSG B	$ 218,611	$ -	$ (218,611)	Not included in brownfield
32.60	MECHANICAL				
32.60.1	HRSG & Accessories	$ 35,734,328	$ 36,333,297	$ 598,970	Labor rate difference
32.60.2	Boiler Feed Pumps & Accessories	$ 2,118,035	$ 2,445,546	$ 327,510	6.9kV vs 4.16kV and labor rate difference
32.60.3	Shop Fabricated Tanks	$ 57,070	$ 57,498	$ 428	Labor rate difference
32.60.4	Miscellaneous Pumps	$ -	$ -	$ -	
32.89	SUBTOTAL - DIRECT COSTS, HRSG B	$ 39,822,259	$ 40,534,788	$ 712,529	
32.90	CONSTRUCTION INDIRECTS, HRSG B	$ 5,381,167	$ 5,546,833	$ 165,666	
32.99	SUBCONTRACTS	$ 850,000	$ 850,000	$ -	
32.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, HRSG B**	$ 46,053,426	$ 46,931,621	$ 878,195	

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41.00	**STEAM TURBINE**				
41.20	CONCRETE				
41.20.1	STG Pedestal Foundation	$ -	$ 864,713	$ 864,713	Existing for repower
41.20.2	STG Pedestal	$ -	$ 1,997,687	$ 1,997,687	Existing for repower
41.20.3	STG Excitation Transformer Foundation	$ -	$ 43,371	$ 43,371	Existing for repower
41.20.4	STG Equipment Pads	$ -	$ 20,884	$ 20,884	Existing for repower
41.60	MECHANICAL				
	Steam Turbine	$ -	$ 62,985,545	$ 62,985,545	Existing for repower
41.60.1	Steam Turbine Modifications	$ 180,270	$ -	$ (180,270)	N/A for brownfield
	Condenser & Accessories	$ -	$ 6,434,929	$ 6,434,929	Existing for repower
41.60.2	Condenser Modifications	$ 257,985	$ -	$ (257,985)	N/A for brownfield
41.60.3	Pumps	$ 988,661	$ 718,782	$ (269,879)	Add CD booster and heater drain pumps for repower
41.60.4	Condensate Polishing Equipment	$ 2,651,352	$ 3,060,736	$ 409,384	Updated price and labor rate difference
41.60.5	Gland Steam Condenser	$ 95,135	$ -	$ (95,135)	N/A for brownfield
41.89	SUBTOTAL - DIRECT COSTS, STEAM TURBINE	$ 4,173,402	$ 76,126,646	$ 71,953,244	
41.90	CONSTRUCTION INDIRECTS, STEAM TURBINE	$ 378,044	$ 5,552,610	$ 5,174,567	
41.99	SUBCONTRACTS	$ 23,200,000	$ 750,000	$ (22,450,000)	Turbine & condenser mods in repower vs ST heavy haul in brownfield
41.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, STEAM TURBINE**	$ 27,751,446	$ 82,429,256	$ 54,677,810	

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50.00	**COOLING TOWER**				
50.20	CONCRETE				
50.20.1	Cooling Tower Pump Structure	$ -	$ 1,422,288	$ 1,422,288	Existing for repower
50.20.2	Natural Draft Cooling Tower Basin	$ -	$ 3,167,166	$ 3,167,166	Existing for repower
50.30	STRUCTURAL STEEL				
50.30.1	Miscellaneous Steel for Cooling Tower Pump Intake	$ -	$ 11,569	$ 11,569	Existing for repower
50.60	MECHANICAL				
50.60.1	Cooling Tower Fire Protection System	Not Included	Not Included		
50.60.2	Trash Screens	$ -	$ 92,147	$ 92,147	Existing for repower
50.60.3	Circulating Water Chemical Feed System	$ -	$ 56,284	$ 56,284	Existing for repower
50.60.4	Pumps	$ 303,982	$ 1,822,761	$ 1,518,779	New CW pumps for brownfield
50.89	SUBTOTAL - DIRECT COSTS, COOLING TOWER	$ 303,982	$ 6,572,215	$ 6,268,234	
50.90	CONSTRUCTION INDIRECTS, COOLING TOWER	$ 84,895	$ 1,623,468	$ 1,538,573	
50.99	SUBCONTRACTS	$ 11,850,000	$ 9,314,000	$ (2,536,000)	Fill replacement & Pump Refurbishment for repower vs new MD cooling tower
50.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, COOLING TOWER**	$ 12,238,877	$ 17,509,684	$ 5,270,807	

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55.00	**WATER TREATMENT**				
55.20	CONCRETE				
55.20.1	Water Treatment Building Foundation	$ 1,148,699	$ 1,013,125	$ (135,573)	Larger building in repower
55.20.2	Misc. Equipment Pads in Building	$ 41,550	$ 37,821	$ (3,729)	Larger building in repower & labor rate differences
55.20.3	Chemical Storage Foundation	$ 52,852	$ 55,173	$ 2,321	Labor rate difference
55.20.4	Water Treatment Laboratory Foundation	$ 47,077	$ -	$ (47,077)	N/A for brownfield
55.20.5	Demin Water Storage Tank Foundation	$ 52,852	$ 214,493	$ 161,641	Small shop fab tank for repower
	Demin. Pump Foundation	$ -	$ 11,778	$ 11,778	Incl w/ tank for repower
55.40	ARCHITECTURAL				
55.40.1	Water Treatment Building	$ 1,676,264	$ 1,422,190	$ (254,073)	Larger building in repower
55.40.2	Water Treatment Laboratory Building	$ 75,600	$ -	$ (75,600)	N/A for brownfield
55.45	PAINTING / COATING				
55.45.1	Special Coatings	$ 216,217	$ 229,382	$ 13,165	Labor rate difference
55.60	MECHANICAL				
55.60.1	Water Treatment Equipment	$ 3,934,099	$ 3,989,989	$ 55,890	Labor rate difference
55.60.2	Miscellaneous Pumps	$ 124,527	$ 127,781	$ 3,255	Labor rate difference
55.60.3	Shop Fabricated Tanks	$ 35,099	$ -	$ (35,099)	Small demin tank for repower
55.89	SUBTOTAL - DIRECT COSTS, WATER TREATMENT	$ 7,404,836	$ 7,101,734	$ (303,102)	
55.90	CONSTRUCTION INDIRECTS, WATER TREATMENT	$ 1,410,270	$ 1,351,275	$ (58,995)	
55.99	SUBCONTRACTS	$ -	$ 930,000	$ 930,000	Large demin tank for brownfield
55.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, WATER TREATMENT**	$ 8,815,107	$ 9,383,009	$ 567,903	

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56.00	**PRE-TREATMENT**				
56.20	CONCRETE				
56.20.1	Clarifier Foundations (2 Total)	$ 1,027,590	$ 1,061,393	$ 33,803	Labor rate difference
56.20.2	Sludge Holding Tank Foundations (2 Total)	$ 319,789	$ 330,776	$ 10,988	Labor rate difference
56.20.3	Raw Water Storage Tank Foundation	$ 208,217	$ 510,802	$ 302,585	Smaller tank for repower
56.20.4	Clearwell Tank Foundations (2 Total)	$ 319,789	$ 330,776	$ 10,988	Labor rate difference
56.20.5	Filter Press Building Foundation	$ 392,906	$ 406,428	$ 13,522	Labor rate difference
56.20.6	Filter Press Building Equipment Pads	$ 17,013	$ 17,802	$ 789	Labor rate difference
56.20.7	Pre-Treatment Building Foundation	$ 1,074,924	$ 1,461,249	$ 386,324	Larger building in brownfield
56.20.8	Pre-Treatment Building Equipment Pads	$ 87,420	$ 120,513	$ 33,093	Larger building in brownfield
56.30	STRUCTURAL STEEL				
56.30.1	Filter Press Building Steel	$ 217,596	$ 222,441	$ 4,844	Labor rate difference
56.40	ARCHITECTURAL				
56.40.1	Pre-Treatment Building	$ 1,211,907	$ 1,588,289	$ 376,382	Larger building in brownfield
56.40.2	Filter Press Building	$ 477,628	$ 479,391	$ 1,763	Labor rate difference
56.40.3	Interior Finishes	$ 336,236	$ 377,891	$ 41,655	Larger pre-treatment building in brownfield
56.40.4	River Water Intake Structure Building	$ -	$ 91,843	$ 91,843	Existing for repower
56.45	PAINTING / COATING				
56.45.1	Special Coatings	$ 144,145	$ 152,922	$ 8,777	Labor rate difference
56.60	MECHANICAL			$ -	
56.60.1	Water Pre-Treatment Equipment	$ 4,458,331	$ 5,707,775	$ 1,249,444	Smaller capacity for repower
56.60.2	Miscellaneous Pumps	$ 69,866	$ 212,522	$ 142,656	Raw water pumps existing for repower
56.60.3	River Water Intake Screens	$ 200,541	$ -	$ (200,541)	N/A for brownfield
56.89	SUBTOTAL - DIRECT COSTS, PRE-TREATMENT	$ 10,563,897	$ 13,072,811	$ 2,508,914	
56.90	CONSTRUCTION INDIRECTS, PRE-TREATMENT	$ 2,345,095	$ 2,883,348	$ 538,253	
56.99	SUBCONTRACTS	$ 700,000	$ 7,320,000	$ 6,620,000	Smaller raw water tank & existing intake structure for repower
56.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, PRE-TREATMENT**	$ 13,608,992	$ 23,276,160	$ 9,667,168	

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60.00	**PIPE RACK**				
60.20	CONCRETE				
60.20.1	Piperack Foundations @ New Powerblock	$ 760,641	$ 344,195	$ (416,446)	Longer pipe rack for repower
60.20.2	Piperack Foundations @ Exterior Rack East & South of Unit 1	$ 334,767	$ -	$ (334,767)	N/A for brownfield
60.30	STRUCTURAL STEEL				
60.30.1	Structural Steel, Pipe Rack @ New Power Block	$ 3,590,159	$ 2,583,903	$ (1,006,256)	Longer pipe rack for repower
60.30.2	Structural Steel Framing Inside Existing Boiler Room	$ 473,596	$ -	$ (473,596)	N/A for brownfield
60.30.3	Exterior Structural Steel Framing East & South of Unit 1	$ 764,629	$ -	$ (764,629)	N/A for brownfield
60.45	PAINTING / COATING				
60.45.1	Touch-up Painting	$ 512,350	$ 386,535	$ (125,815)	Longer pipe rack for repower
60.89	SUBTOTAL - DIRECT COSTS, PIPE RACK	$ 6,436,142	$ 3,314,633	$ (3,121,509)	
60.90	CONSTRUCTION INDIRECTS, PIPE RACK	$ 1,907,896	$ 983,978	$ (923,918)	
60.99	SUBCONTRACTS	$ -	$ -	$ -	
60.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, PIPE RACK**	$ 8,344,038	$ 4,298,611	$ (4,045,427)	

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70.00	**ELECTRICAL POWER DISTRIBUTION**				
70.20	CONCRETE				
70.20.1	GSU Foundations	$ 722,912	$ 1,122,524	$ 399,613	2 GSU's for repower vs 3 for brownfield
70.20.2	Aux Transformer Foundations (2 Total)	$ 282,060	$ 294,596	$ 12,536	Labor rate difference
70.20.3	Transformer PDC Foundation	$ 328,622	$ 340,590	$ 11,968	Labor rate difference
0.00	STG PDC Foundation	$ 248,553	$ -	$ (248,553)	N/A for brownfield
70.20.5	HRSG PDC Foundations (2 Total)	$ 309,308	$ 321,724	$ 12,416	Labor rate difference
70.20.6	CT Chiller PDC Foundations	$ 248,553	$ 258,475	$ 9,922	Labor rate difference
70.20.7	Iso-Phase Bus / Cable Bus Foundations	$ 20,391	$ 21,292	$ 901	Labor rate difference
70.20.8	Emergency Diesel Generator Foundation	$ 36,703	$ 38,418	$ 1,715	Labor rate difference
70.30	STRUCTURAL STEEL				
70.30.1	Miscellaneous Steel for GSU Containments	$ 81,376	$ 123,826	$ 42,450	2 GSU's for repower vs 3 for brownfield
70.30.2	Miscellaneous Steel for Aux Transformer Containments (2 Total)	$ 42,274	$ 43,436	$ 1,162	Labor rate difference
	Miscellaneous Steel for Excitation Transformer Containment	$ -	$ 12,383	$ 12,383	N/A for repower
70.30.3	STG PDC Galleries	$ 22,120	$ -	$ (22,120)	N/A for brownfield
70.30.4	HRSG PDC Galleries (2 Total)	$ 37,897	$ 38,829	$ 932	Labor rate difference
70.30.5	Transformer PDC Galleries	$ 37,897	$ 38,829	$ 932	Labor rate difference
70.30.6	HVAC PDC Support Framing & Galleries	$ 41,151	$ 42,097	$ 947	Labor rate difference
70.30.7	CT Chiller PDC Galleries	$ 22,120	$ 22,655	$ 535	Labor rate difference
70.50	ELECTRICAL			$ -	
70.50.1	Generator Circuit Breakers (18KV)	$ 1,200,922	$ 1,207,854	$ 6,932	Labor rate difference
70.50.2	Generator Step Up Transformers	$ 5,748,905	$ 9,437,803	$ 3,688,899	2 GSU's for repower vs 3 for brownfield, lower voltage
70.50.3	Unit Substation Transformers	$ 266,066	$ 293,167	$ 27,100	Capacity and labor rate difference
70.50.4	Unit Auxiliary Transformers (UAT: 1A, 1B)	$ 1,479,824	$ 1,572,176	$ 92,352	Capacity and labor rate difference
	6.9kV Switchgear	$ -	$ 4,754,430	$ 4,754,430	N/A for repower
70.50.5	4.16kV Switchgear	$ 3,444,200	$ -	$ (3,444,200)	N/A for brownfield
70.50.6	480V Switchgear	$ 3,075,317	$ 2,982,925	$ (92,392)	Scope and labor rate differences
70.50.7	Isolated Phase Bus Duct	$ 1,227,469	$ 2,181,462	$ 953,993	STG leads existing in repower
70.50.8	480V-800A, Motor Control Centers	$ 1,353,973	$ 1,955,000	$ 601,027	Reusing some existing for repower
70.50.9	Non-Seg/Cable Bus	$ 1,866,952	$ 1,581,322	$ (285,630)	Longer runs to existing equipment in repower

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70.50.10	Emergency Power System	$ 297,787	$ 504,730	$ 206,943	Reusing some existing for repower
70.50.11	PDCs	$ 4,017,238	$ 3,769,578	$ (247,660)	Add STG PDC for repower
70.50.12	Panelboards	$ 167,220	$ 233,021	$ 65,801	Reusing some existing for repower
70.50.13	Generator/Transformer Relay & Protection Panels	$ 337,043	$ 199,217	$ (137,826)	Repower includes mods to existing
70.50.14	Communication	$ 92,578	$ 182,209	$ 89,631	Reusing some existing for repower
70.50.15	Digital Fault Recorder	$ 143,586	$ 174,464	$ 30,878	Reusing some existing for repower
70.50.16	Diesel Generator	$ 639,528	$ 945,103	$ 305,576	Smaller capacity in repower, Labor rate difference
70.50.17	Security System	$ 189,726	$ 192,426	$ 2,700	Labor rate difference
70.50.18	Cable Splice Boxes	$ 259,365	$ -	$ (259,365)	N/A for brownfield
70.50.19	Cable	$ 10,177,180	$ 14,489,609	$ 4,312,429	Reusing some existing for repower
70.50.20	Heat Tracing	$ 1,733,666	$ 2,390,086	$ 656,420	Reusing some existing for repower
70.50.21	Conduit-Above Ground	$ 1,104,789	$ 2,000,977	$ 896,188	Reusing some existing for repower
70.50.22	Embedded Conduits	$ 84,725	$ 316,318	$ 231,593	Reusing some existing for repower
70.50.23	Cable Tray	$ 2,318,247	$ 3,447,911	$ 1,129,664	Reusing some existing for repower
70.50.24	Lighting and Distribution	$ 2,210,589	$ 2,171,847	$ (38,741)	Repower includes upgrades of existing in control room
70.50.25	Laydown Area Lighting	$ -	$ -	$ -	
70.50.26	Miscellaneous Electrical Devices	$ 323,629	$ 337,130	$ 13,501	Labor rate difference
70.50.27	Lightning Protection	$ 100,394	$ 215,061	$ 114,667	Reusing some existing for repower
70.50.28	Above Ground Grounding	$ 95,114	$ -	$ (95,114)	Incl w/ cable tray for brownfield
70.50.29	Electrical Allowance for Relocated Bulk Gas Storage Facility	$ 21,477	$ -	$ (21,477)	N/A for brownfield
	Electrical Allowance for Relocated Hydrogen Storage Facility	$ -	$ 22,321	$ 22,321	N/A for repower
70.89	SUBTOTAL - DIRECT COSTS, ELECTRICAL POWER DISTRIBUTION	$ 46,459,443	$ 60,277,817	$ 13,818,374	
70.90	CONSTRUCTION INDIRECTS, ELECTRICAL POWER DISTRIBUTION	$ 9,061,691	$ 12,091,640	$ 3,029,949	
70.99	SUBCONTRACTS	$ 250,000	$ 250,000	$ -	
70.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, ELECTRICAL POWER DISTRIBUTION**	$ 55,771,135	$ 72,619,457	$ 16,848,322	

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75.00	**DCS**				
75.20	CONCRETE				
75.20.1	CEMS Foundation (2 Total)	$ 25,545	$ 26,719	$ 1,175	Labor rate difference
75.50	ELECTRICAL				
75.50.1	600V Small Power Cable	$ 1,890,601	$ 4,798,004	$ 2,907,402	Reusing some existing for repower
75.50.2	Conduit-Above Ground	$ 707,117	$ 2,027,783	$ 1,320,666	Reusing some existing for repower
75.50.3	Embedded Conduits	$ 286,144	$ -	$ (286,144)	Incl w/ electrical (70) for brownfield
75.55	INSTRUMENTATION				
75.55.1	DCS	$ 3,235,245	$ 3,111,652	$ (123,593)	Repower includes turbine controls upgrade
75.55.2	High Fidelity Simulator	$ 1,496,110	$ 1,506,477	$ 10,367	Labor rate difference
75.55.3	CEMS	$ 780,088	$ 788,381	$ 8,294	Labor rate difference
75.55.4	BOP Field Mounted Instruments	$ 2,097,276	$ 2,327,469	$ 230,193	Reusing some existing for repower
75.55.5	Vendor Furnished Field Mounted Instruments	$ 690,566	$ 796,551	$ 105,986	Reusing some existing for repower
75.89	SUBTOTAL - DIRECT COSTS, DCS	$ 11,208,690	$ 15,383,036	$ 4,174,346	
75.90	CONSTRUCTION INDIRECTS, DCS	$ 2,118,939	$ 3,517,462	$ 1,398,523	
75.99	SUBCONTRACTS	$ -	$ -	$ -	
75.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, DCS**	$ 13,327,629	$ 18,900,497	$ 5,572,869	

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80.00	**BOP**				
80.20	CONCRETE				
80.20.1	CTG Inlet Air Chiller Foundations	$ 40,569	$ 42,283	$ 1,714	Labor rate difference
80.20.2	Ammonia Storage Tank Foundation	$ 169,986	$ 176,744	$ 6,758	Labor rate difference
80.20.3	HRSG Blowdown Sump	$ 242,889	$ 254,808	$ 11,919	Labor rate difference
80.20.4	Aux Boiler Foundation	$ 153,299	$ 157,961	$ 4,662	Labor rate difference
80.20.5	Bulk Gas Storage Pad	$ 90,171	$ 94,107	$ 3,936	Labor rate difference
	New Foundation for Relocated Hydrogen Storage Facility	$ -	$ 25,817	$ 25,817	N/A for repower
80.20.6	CO2 Storage Tank (Relocated)	$ 5,212	$ -	$ (5,212)	N/A for brownfield
80.20.7	BOP Foundation Embedments	$ 147,276	$ 154,797	$ 7,521	Labor rate difference
80.30	STRUCTURAL STEEL				
80.30.1	HRSG Blowdown Sump Handrails	$ 4,307	$ 4,370	$ 63	Labor rate difference
80.40	ARCHITECTURAL				
80.40.1	Bulk Gas Storage Enclosure	$ 123,750	$ 123,750	$ -	
80.45	PAINTING / COATING				
80.45.1	Touch-up & Finish Painting	$ 731,929	$ 773,070	$ 41,141	Labor rate difference
80.60	MECHANICAL				
80.60.1	CTG Inlet Air Chiller Equipment Package	$ 9,706,307	$ 10,470,099	$ 763,792	Updated pricing for repower
80.60.2	Auxiliary Boiler	$ 2,494,130	$ 2,535,047	$ 40,917	Labor rate difference
80.60.3	Heat Exchangers	$ 580,541	$ 684,294	$ 103,754	Smaller capacity for repower
80.60.4	Miscellaneous Pumps	$ 283,428	$ 728,408	$ 444,980	Aux cooling not req'd, add hydrogen cooler for repower
80.60.5	Shop Fabricated Tanks	$ 47,070	$ 17,142	$ (29,927)	Add ST drains tank for repower
80.60.6	Bulk Gas Storage Provisions	$ 120,360	$ 138,221	$ 17,860	Reduce hydrogen storage for repower
80.60.7	Ammonia Storage & Forwarding Equipment	$ 535,766	$ 541,083	$ 5,318	Labor rate difference
80.60.8	Air Compressors & Accessories	$ 22,070	$ 559,304	$ 537,235	Receiver only for repower
80.60.9	Chemical Feed & Sample Systems	$ 802,375	$ 807,032	$ 4,658	Labor rate difference

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	Relocate Existing Hydrogen Storage Facility	$ -	$ 53,579	$ 53,579	N/A for repower
80.60.10	Relocate Existing CO2 Storage Tank	$ 25,225	$ -	$ (25,225)	N/A for brownfield
80.70	PIPING			$ -	
80.70.1	Alloy Piping	$ 15,213,172	$ 11,219,152	$ (3,994,020)	Longer runs to existing ST for repower
80.70.2	BOP Piping	$ 17,630,354	$ 17,641,814	$ 11,460	Scope and labor rate differences
80.70.3	Pipe Supports, HP (Engineered Supports)	$ 2,425,233	$ 2,210,811	$ (214,422)	Longer runs to existing ST for repower
80.70.4	Pipe Supports, LP	$ 1,417,018	$ 1,365,110	$ (51,908)	Scope and labor rate differences
80.70.5	C/T Interconnecting Piping	$ 427,938	$ 452,088	$ 24,150	Labor rate difference
80.70.6	Valves & Specialties	$ 10,474,240	$ 11,195,478	$ 721,239	Scope and labor rate differences
80.80	INSULATION			$ -	
80.80.1	Thermal Insulation/Lagging	$ 5,362,855	$ 5,107,473	$ (255,381)	Increased for more alloy piping in repower
80.80.2	HRSG Piping & Drum Insulation and Lagging	$ 1,085,492	$ 1,133,976	$ 48,484	Labor rate difference
80.80.3	HRSG Stack Insulation to Damper Elevation	$ 510,313	$ 531,148	$ 20,834	Labor rate difference
80.89	SUBTOTAL - DIRECT COSTS, BOP	$ 70,873,275	$ 69,198,968	$ (1,674,307)	
80.90	CONSTRUCTION INDIRECTS, BOP	$ 16,315,540	$ 15,492,943	$ (822,597)	
80.99	SUBCONTRACTS	$ -	$ -	$ -	
80.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, BOP**	$ 87,188,815	$ 84,691,911	$ (2,496,904)	

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90.00	**COMMON**				
90.20	CONCRETE				
90.20.1	Combustion Turbine Building Foundation	$ 3,125,507	$ 3,241,393	$ 115,886	Labor rate difference
90.20.2	Steam Turbine Building Foundation	$ 15,744	$ 2,684,777	$ 2,669,033	Existing for repower
90.20.3	Steam Turbine Building Elevated Slabs	$ 1,206	$ 234,568	$ 233,363	Existing for repower
90.20.4	Boiler Building Concrete Work	$ 6,177	$ -	$ (6,177)	N/A for brownfield
90.20.5	Admin / Warehouse / Storage Building Foundation	$ -	$ 414,567	$ 414,567	N/A for repower
	Service / Fire Water Storage Tank Foundation	$ -	$ 222,689	$ 222,689	N/A for repower
90.20.6	Fire Water Pumphouse Foundation	$ -	$ 24,049	$ 24,049	N/A for repower
90.20.7	Service Water Pump Foundation	$ -	$ 14,275	$ 14,275	N/A for repower
90.20.8	Tower Crane Foundation	$ 294,149	$ 300,150	$ 6,001	Labor rate difference
	New Foundation for Relocated Warehouse	$ -	$ 963,813	$ 963,813	N/A for repower
90.20.9	New Foundation for Fire House (Truck Parking)	$ 14,835	$ -	$ (14,835)	N/A for brownfield
90.20.10	Overflow Sump	$ 140,909	$ -	$ (140,909)	N/A for brownfield
90.30	STRUCTURAL STEEL				
90.30.1	Combustion Turbine Building Steel	$ 6,593,661	$ 6,744,211	$ 150,550	Labor rate difference
90.30.2	Steam Turbine Building Steel	$ 166,138	$ 5,842,065	$ 5,675,927	Existing for repower
90.30.3	Boiler Building Steel	$ 332,949	$ -	$ (332,949)	N/A for brownfield
90.40	ARCHITECTURAL				
90.40.1	Combustion Turbine Building	$ 2,310,079	$ 2,363,505	$ 53,426	Labor rate difference
90.40.2	Steam Turbine Building	$ -	$ 2,512,157	$ 2,512,157	Existing for repower
90.40.3	Boiler Building	$ 298,780	$ -	$ (298,780)	N/A for brownfield
90.40.4	Admin / Warehouse / Storage Building	$ -	$ 935,836	$ 935,836	Existing for repower
90.40.5	Relocate Existing Warehouse Building	$ -	$ 1,257,495	$ 1,257,495	N/A for repower
90.40.6	New Metal Cleaning Waste Pumphouse	$ 40,000	$ -	$ (40,000)	N/A for brownfield
90.40.7	New Fire House (Truck Parking)	$ 60,000	$ -	$ (60,000)	N/A for brownfield

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90.45	PAINTING / COATING				
90.45.1	Touch-up & Finish Painting	$ 487,953	$ 1,159,605	$ 671,653	Reduced for fewer buildings in repower
90.60	MECHANICAL				
90.60.1	Diesel Driven Fire Pump Package	$ 179,821	$ -	$ (179,821)	N/A for brownfield
	Fire Pumps w/ Enclosure, Fire Protection and Detection	$ -	$ 894,198	$ 894,198	N/A for repower
90.60.2	Miscellaneous Pumps	$ 3,964	$ 32,630	$ 28,665	Relocate metal cleaning vs new service water
90.60.3	Cranes & Hoists	$ 1,031,446	$ 1,792,683	$ 761,238	Existing ST crane in repower
90.60.4	Fuel Gas Check Metering Station	$ 951,352	$ 960,736	$ 9,384	Labor rate difference
90.60.5	Potable Water Tepid Recirculation System	$ 310,541	$ 314,294	$ 3,754	Labor rate difference
90.60.6	HVAC for New Control Room Extension	$ 98,674	$ -	$ (98,674)	N/A for brownfield
90.60.7	Plumbing & Fixtures	$ 158,381	$ 165,626	$ 7,245	Labor rate difference
90.60.8	Install Blanking Plate at Existing Chimney	$ 80,076	$ -	$ (80,076)	N/A for brownfield
90.89	SUBTOTAL - DIRECT COSTS, COMMON	$ 16,702,340	$ 33,075,322	$ 16,372,981	
90.90	CONSTRUCTION INDIRECTS, COMMON	$ 6,201,660	$ 10,869,082	$ 4,667,422	
90.99	SUBCONTRACTS	$ 4,004,000	$ 3,934,000	$ (70,000)	New metal cleaning tank vs new service/fire water tank
90.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, COMMON**	$ 26,908,001	$ 47,878,404	$ 20,970,403	

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Account No.	Item Description	Total Projected Cost - REPOWER OPTION 1	Total Projected Cost - BROWNFIELD OPTION 2	DELTA COST - BROWNFIELD - REPOWER	REMARKS
	OVERALL PROJECT SUBTOTALS				
OP.89	**DIRECT COSTS**	$ 436,933,835	$ 552,608,571	$ 115,674,736	
OP.90	**CONSTRUCTION INDIRECTS**	$ 63,580,011	$ 79,820,198	$ 16,240,187	
OP.99	**SUBCONTRACTS**	$ 44,204,000	$ 26,698,000	$ (17,506,000)	
OP.00	**SUBTOTAL PROJECT COSTS**	$ 544,717,846	$ 659,126,769	$ 114,408,923	
PI.00	**OVERALL PROJECT INDIRECT COSTS**	$ 38,334,200	$ 37,677,400	$ (656,800)	
	Spare Parts	$ 4,612,800	$ 5,541,900	$ 929,100	
	Contingency	$ 76,810,500	$ 87,906,100	$ 11,095,600	
	Escalation	$ 56,305,259	$ 66,888,756	$ 10,583,497	
	Subtotal Project Cost	$ 720,780,605	$ 857,140,925	$ 136,360,320	
	Owner's Costs	$ -	$ -	$ -	
	AFUDC (Interest During Construction)	$ -	$ -	$ -	
	Total Project Cost	$ 720,780,605	$ 857,140,925	$ 136,360,320	

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Account No.	Item Description	Total Projected Cost - REPOWER OPTION 1	Total Projected Cost - BROWNFIELD OPTION 2	DELTA COST - BROWNFIELD - REPOWER	REMARKS
	ADDITIONAL REFERENCE COSTS:				
A	**Demolition & Removal**				
A	Removal of Existing Fuel Oil Tank	$ -	$ 1,757,370	$ 1,757,370	N/A for repower
A.1	Existing Metal Cleaning Waste Tank Area Restoration	$ 58,398	$ -	$ (58,398)	N/A for brownfield
A.2	Demolish Existing Fire House (Truck Parking)	$ 5,919	$ -	$ (5,919)	N/A for brownfield
A.3	Demolish Existing Coal Handling Structures	$ 333,672	$ -	$ (333,672)	N/A for brownfield
A.4	Demolish Existing Railroad Tracks	$ 41,249	$ -	$ (41,249)	N/A for brownfield
A.5	Demolish Existing Helipad	$ -	$ -	$ -	
A.6	Demolish Existing Sun Shelter	$ 13,154	$ -	$ (13,154)	N/A for brownfield
A.7	Demolish Unit 1 Boiler Building Combustion Air Coil Room	$ 68,388	$ -	$ (68,388)	N/A for brownfield
A.8	Demolish Unit 1 Boiler Building Platform at El. 586'-9" (Row 8 to 12)	$ 10,606	$ -	$ (10,606)	N/A for brownfield
A.9	Secure Existing Track Hopper for Abandonment	$ 152,872	$ -	$ (152,872)	N/A for brownfield
A.10	Demolish Gas Cylinder Storage Shed	$ 9,208	$ -	$ (9,208)	N/A for brownfield
A.11	Demolish CO2 Storage Tank Foundation	$ 3,289	$ -	$ (3,289)	N/A for brownfield
A.12	Remove & Dispose of Existing Relays serving ST GSU, UAT, RAT, and Generator Protection	$ 13,702	$ -	$ (13,702)	N/A for brownfield
A.13	Remove & Dispose of Existing 4.16 kV Switchgear Sections in Existing STG Building	$ 172,648	$ -	$ (172,648)	N/A for brownfield
A.14	Remove & Dispose of Existing 600V Switchgear Sections in Existing STG Building	$ 312,411	$ -	$ (312,411)	N/A for brownfield
A.15	Remove & Dispose of Existing Oil Filled 4.16kV/600V 1.5 MVA Transformers in Existing STG Building	$ 54,809	$ -	$ (54,809)	N/A for brownfield
A.16	Control Room Demolition & Removals	$ 123,320	$ -	$ (123,320)	N/A for brownfield
A.17	Remove Existing Pumps	$ 112,982	$ -	$ (112,982)	N/A for brownfield

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A.18	Remove & Dispose of Existing Gland Steam Condenser	$ 19,821	$ -	$ (19,821)	N/A for brownfield
A.19	Remove & Dispose of Existing ST Turning Gear Assembly	$ 20,180	$ -	$ (20,180)	N/A for brownfield
A.20	Remove & Dispose of Existing Raw Water Intake Screens	$ 40,360	$ -	$ (40,360)	N/A for brownfield
A.21	Remove & Dispose of Existing Insulation & Lagging on Ductwork Above Boiler Room Roof	$ 158,590	$ -	$ (158,590)	N/A for brownfield
A.22	Remove & Dispose of Existing Piping & Mechanical Items In Existing Powerhouse As Required	$ 267,461	$ -	$ (267,461)	N/A for brownfield
A.23	Remove & Dispose of Existing Conduits & Electrical Items In Existing Powerhouse As Required	$ 223,819	$ -	$ (223,819)	N/A for brownfield
A.89	SUBTOTAL - DIRECT COSTS, Demolition & Removal	$ 2,216,858	$ -	$ (2,216,858)	
A.90	CONSTRUCTION INDIRECTS, Demolition & Removal	$ 798,220	$ -	$ (798,220)	
A.99	SUBCONTRACTS	$ 1,504,100	$ -	$ (1,504,100)	N/A for brownfield (remediation)
A.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, Demolition & Removal**	$ 4,519,178	$ 1,757,370	$ (2,761,809)	
PI.00	**Indirect Costs**				
	Contingency	$ 1,265,700	$ -	$ (1,265,700)	
	Escalation	$ 356,557	$ -	$ (356,557)	
	Total Demolition & Removal Cost	$ 6,141,435	$ 1,757,370	$ (4,384,066)	

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Brownfield F-Class Iteration

Account No.	Item Description	31239B Total Projected Cost - REPOWER OPTION 2 (F-CLASS)	31155C Total Projected Cost - BROWNFIELD F-CLASS ITERATION	DELTA COST - BROWNFIELD - REPOWER	REMARKS
10.00	**GENERAL SITE WORK**				
10.10	CIVIL				
10.10.1	Relocate Existing Metal Cleaning Waste Tank and Pumphouse	$ 579,425		$ (579,425)	Not req'd for brownfield
10.10.2	Relocate Existing RSO Trailers	$ 30,270		$ (30,270)	Not req'd for brownfield
10.10.3	Construction Parking & Laydown Areas Preparation	$ 4,334,666	$ 4,434,700	$ 100,035	Labor rate difference
10.10.4	Erosion & Sediment Control - New Power Block Area	$ 104,538	$ 108,206	$ 3,668	Labor rate difference
10.10.5	Site Grading & Stripping	$ 518,395	$ 531,333	$ 12,938	Larger power block area for brownfield
10.10.6	Roads & Surfacing	$ 1,755,490	$ 1,971,868	$ 216,378	More roadwork for brownfield
10.10.7	Fencing	$ 168,096	$ 262,290	$ 94,194	Larger power block area for brownfield
	New Concrete Encasement	$ -	$ 72,746	$ 72,746	For Existing Ash Pipe Road Crossing, NA for repower
10.10.8	Stormwater Drainage Trench	$ 2,147,784	$ 2,268,537	$ 120,752	Quantity & labor cost differences
10.10.9	Stormwater Runoff Pond	$ 74,441	$ 266,397	$ 191,956	Excavation included in repower earthwork account
10.10.10	Stormwater Pond Outlet Structure	$ 604,902	$ -	$ (604,902)	Allowance for pumping or gravity drains
	Stormwater Pond Pump Structure	$ -	$ 437,941	$ 437,941	Pump structure only
10.10.11	Temporary Construction Guard House	$ 60,532	$ 63,666	$ 3,134	Labor rate difference
10.10.12	Concrete Filled Pipe Bollards	$ 25,000	$ 25,000	$ -	
10.10.13	Spur Track Upgrade	$ 1,110,173	$ -	$ (1,110,173)	N/A for brownfield
10.10.14	Install New Stops at Track Sections Being Demolished	$ 6,993	$ -	$ (6,993)	N/A for brownfield
10.89	SUBTOTAL - DIRECT COSTS, GENERAL SITE WORK	$ 11,520,704	$ 10,442,683	$ (1,078,021)	
10.90	CONSTRUCTION INDIRECTS, GENERAL SITE WORK	$ 3,531,911	$ 3,171,538	$ (360,373)	
10.99	SUBCONTRACTS	$ -	$ -	$ -	
10.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, GENERAL SITE WORK**	$ 15,052,615	$ 13,614,221	$ (1,438,394)	

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Brownfield F-Class Iteration

Account No.	Item Description	31239B Total Projected Cost - REPOWER OPTION 2 (F-CLASS)	31155C Total Projected Cost - BROWNFIELD F-CLASS ITERATION	DELTA COST - BROWNFIELD - REPOWER	REMARKS
11.00	**UNDERGROUND**				
11.10	CIVIL				
11.10.1	Oily Water Sewer System	$ 1,035,711	$ 1,254,199	$ 218,489	Quantities higher for brownfield
11.10.2	Modifications to Existing Storm Sewers	$ 682,279	$ 81,253	$ (601,027)	Repower includes reroutes with hydroexcavation vs simple removal in brownfield
11.10.3	Stormwater Drainage System	$ 290,203		$ (290,203)	Only surface trenches used in brownfield vs trenches and buried piping in repower
11.10.4	Sanitary Sewer System	$ -	$ 603,567	$ 603,567	Use existing in repower
11.10.5	Mechanical Excavation (for process pipe trenches)	$ 1,076,938	$ 1,810,647	$ 733,709	More buried pipe (incl CW) in brownfield
11.10.6	Hydro Excavation for Mechanical and Electrical Services	$ 195,846		$ (195,846)	N/A for brownfield
11.10.7	Relocation of Miscellaneous Underground Utilities	$ 253,530	$ 263,173	$ 9,643	Labor rate difference
11.20	CONCRETE				
11.20.1	Concrete Thrust Blocks for Piping Systems	$ 32,646	$ 34,382	$ 1,735	Labor rate difference
11.50	ELECTRICAL				
11.50.1	Electrical Ductbanks & Trenches	$ 3,684,022	$ 3,733,728	$ 49,706	Quantity & labor cost differences
11.50.2	Conduits	$ 1,638,567	$ 2,356,999	$ 718,432	Quantity & labor cost differences
11.50.3	Grounding	$ 602,252	$ 892,713	$ 290,461	Quantity & labor cost differences
11.50.4	Cathodic Protection	$ 199,794	$ 315,991	$ 116,197	Quantity & labor cost differences
11.60	MECHANICAL				
11.60.1	Oil/Water Separator Including Lift Stations	$ 214,426	$ 331,743	$ 117,317	2 in repower, 3 in brownfield
11.60.2	Sanitary Sewage Treatment Plant	$ -	$ 143,751	$ 143,751	Existing for repower
11.70	PIPING				
11.70.1	Large Bore BOP Pipe 2-1/2" & Larger - Below Ground	$ 8,221,262	$ 10,561,814	$ 2,340,552	Quantity & labor cost differences
	New Buried Hydrogen Line from Relocated Hydrogen Storage Area to Existing Plant	$ -	$ 219,341	$ 219,341	N/A for repower
11.89	SUBTOTAL - DIRECT COSTS, UNDERGROUND	$ 18,127,477	$ 22,603,301	$ 4,475,824	
11.90	CONSTRUCTION INDIRECTS, UNDERGROUND	$ 5,879,100	$ 7,327,257	$ 1,448,157	
11.99	SUBCONTRACTS	$ 500,000	$ 500,000	$ -	
11.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, UNDERGROUND**	$ 24,506,577	$ 30,430,557	$ 5,923,980	

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Brownfield F-Class Iteration

Account No.	Item Description	Total Projected Cost - REPOWER OPTION 2 (F-CLASS)	Total Projected Cost - BROWNFIELD F-CLASS ITERATION	DELTA COST - BROWNFIELD - REPOWER	REMARKS
21.00	**CTG A**				
21.20	CONCRETE				
21.20.1	Combustion Turbine A Foundation	$ 508,855	$ 633,582	$ 124,727	Reduced for repower & labor rate difference
21.20.2	Combustion Turbine A Piers / Pedestal	$ 422,027	$ 663,812	$ 241,785	Reduced for repower & labor rate difference
21.20.3	Combustion Turbine A Excitation & Isolation Transformer Foundations	$ 91,222	$ 95,525	$ 4,303	Labor rate difference
21.20.4	Combustion Turbine A Miscellaneous Equipment Pads	$ 21,411	$ 22,393	$ 982	Labor rate difference
21.30	STRUCTURAL STEEL				
21.30.1	Miscellaneous Steel for Transformer Containments	$ 12,048	$ 12,383	$ 335	Labor rate difference
21.45	PAINTING / COATING				
21.45.1	Touch Up Painting, CTG A	$ 76,582	$ -	$ (76,582)	Not included in brownfield
21.60	MECHANICAL				
21.60.1	Combustion Turbine & Accessories	$ 57,483,751	$ 62,062,547	$ 4,578,796	Vendor price received for repower & labor rate difference
21.60.2	Fuel Gas Conditioning	$ 1,220,631	$ 1,069,652	$ (150,979)	Equipment price reduced in brownfield for smaller capacity
21.60.3	Heat Exchangers	$ 195,405	$ 48,221	$ (147,185)	Performance heater assumed to be provided with major equipment in brownfield
21.60.4	Shop Fabricated Tanks	$ 21,060	$ 21,427	$ 367	Labor rate difference
21.89	SUBTOTAL - DIRECT COSTS, CTG A	$ 60,052,991	$ 64,629,541	$ 4,576,550	
21.90	CONSTRUCTION INDIRECTS, CTG A	$ 1,594,350	$ 1,744,586	$ 150,237	
21.99	SUBCONTRACTS	$ 1,000,000	$ 1,000,000	$ -	
21.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, CTG A**	$ 62,647,341	$ 67,374,127	$ 4,726,786	

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Account No.	Item Description	31239B Total Projected Cost - REPOWER OPTION 2 (F-CLASS)	31155C Total Projected Cost - BROWNFIELD F-CLASS ITERATION	DELTA COST - BROWNFIELD - REPOWER	REMARKS
22.00	**CTG B**				
22.20	CONCRETE				
22.20.1	Combustion Turbine B Foundation	$ 508,855	$ 633,582	$ 124,727	Reduced for repower & labor rate difference
22.20.2	Combustion Turbine B Piers / Pedestal	$ 422,027	$ 663,812	$ 241,785	Reduced for repower & labor rate difference
22.20.3	Combustion Turbine B Excitation & Isolation Transformer Foundations	$ 91,222	$ 95,525	$ 4,303	Labor rate difference
22.20.4	Combustion Turbine B Miscellaneous Equipment Pads	$ 21,411	$ 22,393	$ 982	Labor rate difference
22.30	STRUCTURAL STEEL				
22.30.1	Miscellaneous Steel for Transformer Containments	$ 12,048	$ 12,383	$ 335	Labor rate difference
22.45	PAINTING / COATING				
22.45.1	Touch Up Painting, CTG B	$ 76,582	$ -	$ (76,582)	Not included in brownfield
22.60	MECHANICAL				
22.60.1	Combustion Turbine & Accessories	$ 57,480,724	$ 62,059,332	$ 4,578,609	Vendor price received for repower & labor rate difference
22.60.2	Fuel Gas Conditioning	$ 1,220,631	$ 1,069,652	$ (150,979)	Equipment price reduced in brownfield for smaller capacity
22.60.3	Heat Exchangers	$ 195,405	$ 48,221	$ (147,185)	Performance heater assumed to be provided with major equipment in brownfield
22.60.4	Shop Fabricated Tanks	$ 21,060	$ 21,427	$ 367	Labor rate difference
22.89	SUBTOTAL - DIRECT COSTS, CTG B	$ 60,049,964	$ 64,626,326	$ 4,576,362	
22.90	CONSTRUCTION INDIRECTS, CTG B	$ 1,593,513	$ 1,743,695	$ 150,182	
22.99	SUBCONTRACTS	$ 1,000,000	$ 1,000,000	$ -	
22.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, CTG B**	$ 62,643,477	$ 67,370,021	$ 4,726,544	

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Account No.	Item Description	31239B Total Projected Cost - REPOWER OPTION 2 (F-CLASS)	31155C Total Projected Cost - BROWNFIELD F-CLASS ITERATION	DELTA COST - BROWNFIELD - REPOWER	REMARKS
31.00	**HRSG A**				
31.20	CONCRETE				
31.20.1	HRSG A Foundation (Incl. Stack)	$ 1,013,370	$ 1,049,744	$ 36,373	Labor rate difference
31.20.2	Boiler Feed Pump Enclosure Foundation	$ 162,554	$ 168,499	$ 5,946	Labor rate difference
31.20.3	Misc HRSG Equipment Pads / Foundations	$ 117,261	$ 122,814	$ 5,553	Labor rate difference
31.30	STRUCTURAL STEEL				
31.30.1	Blowdown Tant Pit / Trenches	$ 80,799	$ 82,665	$ 1,866	Labor rate difference
31.40	ARCHITECTURAL				
31.40.1	Boiler Feed Pump Enclosure	$ 147,560	$ 147,560	$ -	
31.45	PAINTING / COATING				
31.45.1	Touch Up Painting, HRSG A	$ 190,640	$ -	$ (190,640)	Not included in brownfield
31.60	MECHANICAL		$ -		
31.60.1	HRSG & Accessories	$ 33,358,621	$ 31,673,350	$ (1,685,271)	HRSG price reduced in brownfield for smaller capacity
31.60.2	Boiler Feed Pumps & Accessories	$ 2,118,035	$ 2,144,181	$ 26,146	Labor rate difference
31.60.3	Shop Fabricated Tanks	$ 46,060	$ 57,498	$ 11,438	Blowdown tank price reduced in repower for smaller capacity
31.60.4	Miscellaneous Pumps	$ 124,866	$ 125,787	$ 921	Labor rate difference
31.89	SUBTOTAL - DIRECT COSTS, HRSG A	$ 37,409,766	$ 35,572,098	$ (1,837,668)	
31.90	CONSTRUCTION INDIRECTS, HRSG A	$ 4,835,303	$ 4,874,795	$ 39,492	
31.99	SUBCONTRACTS	$ 730,000	$ 730,000	$ -	
31.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, HRSG A**	$ 42,975,069	$ 41,176,893	$ (1,798,176)	

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Account No.	Item Description	Total Projected Cost - REPOWER OPTION 2 (F-CLASS)	Total Projected Cost - BROWNFIELD F-CLASS ITERATION	DELTA COST - BROWNFIELD - REPOWER	REMARKS
32.00	**HRSG B**				
32.20	CONCRETE				
32.20.1	HRSG B Foundation (Incl. Stack)	$ 1,013,370	$ 1,049,744	$ 36,373	Labor rate difference
32.20.2	Boiler Feed Pump Enclosure Foundation	$ 162,554	$ 168,499	$ 5,946	Labor rate difference
32.20.3	Misc HRSG Equipment Pads / Foundations	$ 117,261	$ 122,814	$ 5,553	Labor rate difference
32.30	STRUCTURAL STEEL				
32.30.1	Blowdown Tank Pit / Trenches	$ 80,799	$ 82,665	$ 1,866	Labor rate difference
32.40	ARCHITECTURAL				
32.40.1	Boiler Feed Pump Enclosure	$ 147,560	$ 147,560	$ -	
32.45	PAINTING / COATING				
32.45.1	Touch Up Painting, HRSG B	$ 190,640	$ -	$ (190,640)	Not included in brownfield
32.60	MECHANICAL				
32.60.1	HRSG & Accessories	$ 33,358,621	$ 31,673,350	$ (1,685,271)	HRSG price reduced in brownfield for smaller capacity
32.60.2	Boiler Feed Pumps & Accessories	$ 2,118,035	$ 2,144,181	$ 26,146	Labor rate difference
32.60.3	Shop Fabricated Tanks	$ 46,060	$ 57,498	$ 11,438	Blowdown tank price reduced in repower for smaller capacity
32.60.4	Miscellaneous Pumps	$ -	$ -	$ -	
32.89	SUBTOTAL - DIRECT COSTS, HRSG B	$ 37,284,900	$ 35,446,311	$ (1,838,589)	
32.90	CONSTRUCTION INDIRECTS, HRSG B	$ 4,825,795	$ 4,865,020	$ 39,225	
32.99	SUBCONTRACTS	$ 730,000	$ 730,000	$ -	
32.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, HRSG B**	$ 42,840,694	$ 41,041,331	$ (1,799,363)	

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Account No.	Item Description	Total Projected Cost - REPOWER OPTION 2 (F-CLASS)	Total Projected Cost - BROWNFIELD F-CLASS ITERATION	DELTA COST - BROWNFIELD - REPOWER	REMARKS
41.00	**STEAM TURBINE**				
41.20	CONCRETE				
41.20.1	STG Pedestal Foundation	$ -	$ 864,713	$ 864,713	Existing for repower
41.20.2	STG Pedestal	$ -	$ 1,750,439	$ 1,750,439	Existing for repower
41.20.3	STG Excitation Transformer Foundation	$ -	$ 43,371	$ 43,371	Existing for repower
41.20.4	STG Equipment Pads	$ -	$ 20,884	$ 20,884	Existing for repower
41.60	MECHANICAL				
41.60.1	Steam Turbine	$ -	$ 50,711,191	$ 50,711,191	Existing for repower
	Steam Turbine Modifications	$ 180,270	$ -	$ (180,270)	N/A for brownfield
41.60.2	Condenser & Accessories	$ -	$ 5,551,954	$ 5,551,954	Existing for repower
	Condenser Modifications	$ 257,985	$ -	$ (257,985)	N/A for brownfield
41.60.3	Pumps	$ 978,661	$ 635,573	$ (343,087)	Add CD booster and heater drain pumps for repower
41.60.4	Condensate Polishing Equipment	$ 2,651,352	$ 2,694,662	$ 43,310	Labor rate difference
41.60.5	Gland Steam Condenser	$ 95,135	$ -	$ (95,135)	N/A for brownfield
41.89	SUBTOTAL - DIRECT COSTS, STEAM TURBINE	$ 4,163,402	$ 62,272,786	$ 58,109,384	
41.90	CONSTRUCTION INDIRECTS, STEAM TURBINE	$ 377,544	$ 4,688,208	$ 4,310,664	
41.99	SUBCONTRACTS	$ 23,200,000	$ 750,000	$ (22,450,000)	Turbine & condenser mods in repower vs ST heavy haul in brownfield
41.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, STEAM TURBINE**	$ 27,740,946	$ 67,710,994	$ 39,970,048	

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50.00	**COOLING TOWER**				
50.20	CONCRETE				
50.20.1	Cooling Tower Pump Structure	$ -	$ 1,422,288	$ 1,422,288	Existing for repower
50.20.2	Natural Draft Cooling Tower Basin	$ -	$ 2,619,983	$ 2,619,983	Existing for repower
50.30	STRUCTURAL STEEL				
50.30.1	Miscellaneous Steel for Cooling Tower Pump Intake	$ -	$ 11,569	$ 11,569	Existing for repower
50.60	MECHANICAL				
50.60.1	Cooling Tower Fire Protection System	Not Included	Not Included		
50.60.2	Trash Screens	$ -	$ 92,147	$ 92,147	Existing for repower
50.60.3	Circulating Water Chemical Feed System	$ -	$ 56,284	$ 56,284	Existing for repower
50.60.4	Pumps	$ 303,982	$ 1,611,712	$ 1,307,730	New CW pumps for brownfield
50.89	SUBTOTAL - DIRECT COSTS, COOLING TOWER	$ 303,982	$ 5,813,983	$ 5,510,001	
50.90	CONSTRUCTION INDIRECTS, COOLING TOWER	$ 84,895	$ 1,437,283	$ 1,352,388	
50.99	SUBCONTRACTS	$ 11,850,000	$ 8,150,000	$ (3,700,000)	Fill replacement & Pump Refurbishment for repower vs new MD cooling tower
50.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, COOLING TOWER**	$ 12,238,877	$ 15,401,266	$ 3,162,389	

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55.00	**WATER TREATMENT**				
55.20	CONCRETE				
55.20.1	Water Treatment Building Foundation	$ 1,148,699	$ 864,790	$ (283,909)	Larger building in repower
55.20.2	Misc. Equipment Pads in Building	$ 41,550	$ 37,821	$ (3,729)	Larger building in repower & labor rate differences
55.20.3	Chemical Storage Foundation	$ 52,852	$ 55,173	$ 2,321	Labor rate difference
55.20.4	Water Treatment Laboratory Foundation	$ 47,077	$ -	$ (47,077)	N/A for brownfield
55.20.5	Demin Water Storage Tank Foundation	$ 52,852	$ 214,493	$ 161,641	Small shop fab tank for repower
	Demin. Pump Foundation	$ -	$ 11,778	$ 11,778	Incl w/ tank for repower
55.40	ARCHITECTURAL				
55.40.1	Water Treatment Building	$ 1,676,264	$ 1,243,690	$ (432,573)	Larger building in repower
55.40.2	Water Treatment Laboratory Building	$ 75,600	$ -	$ (75,600)	N/A for brownfield
55.45	PAINTING / COATING				
55.45.1	Special Coatings	$ 216,217	$ 229,382	$ 13,165	Labor rate difference
55.60	MECHANICAL				
55.60.1	Water Treatment Equipment	$ 3,934,099	$ 3,447,668	$ (486,431)	Equipment price reduced in brownfield for smaller capacity
55.60.2	Miscellaneous Pumps	$ 124,527	$ 127,781	$ 3,255	Labor rate difference
55.60.3	Shop Fabricated Tanks	$ 35,099	$ -	$ (35,099)	Small demin tank for repower
55.89	SUBTOTAL - DIRECT COSTS, WATER TREATMENT	$ 7,404,836	$ 6,232,578	$ (1,172,258)	
55.90	CONSTRUCTION INDIRECTS, WATER TREATMENT	$ 1,410,270	$ 1,193,762	$ (216,509)	
55.99	SUBCONTRACTS	$ -	$ 930,000	$ 930,000	Large demin tank for brownfield
55.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, WATER TREATMENT**	$ 8,815,107	$ 8,356,339	$ (458,767)	

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56.00	**PRE-TREATMENT**				
56.20	CONCRETE				
56.20.1	Clarifier Foundations (2 Total)	$ 1,027,590	$ 915,139	$ (112,451)	Equipment price reduced in brownfield for smaller capacity
56.20.2	Sludge Holding Tank Foundations (2 Total)	$ 319,789	$ 330,776	$ 10,988	Labor rate difference
56.20.3	Raw Water Storage Tank Foundation	$ 208,217	$ 510,802	$ 302,585	Smaller tank for repower
56.20.4	Clearwell Tank Foundations (2 Total)	$ 319,789	$ 330,776	$ 10,988	Labor rate difference
56.20.5	Filter Press Building Foundation	$ 392,906	$ 406,428	$ 13,522	Labor rate difference
56.20.6	Filter Press Building Equipment Pads	$ 17,013	$ 17,802	$ 789	Labor rate difference
56.20.7	Pre-Treatment Building Foundation	$ 1,074,924	$ 1,232,187	$ 157,263	Larger building in brownfield
56.20.8	Pre-Treatment Building Equipment Pads	$ 87,420	$ 120,513	$ 33,093	Larger building in brownfield
56.30	STRUCTURAL STEEL				
56.30.1	Filter Press Building Steel	$ 217,596	$ 222,441	$ 4,844	Labor rate difference
56.40	ARCHITECTURAL				
56.40.1	Pre-Treatment Building	$ 1,211,907	$ 1,346,789	$ 134,882	Larger building in brownfield
56.40.2	Filter Press Building	$ 477,628	$ 479,391	$ 1,763	Labor rate difference
56.40.3	Interior Finishes	$ 336,236	$ 377,891	$ 41,655	Larger pre-treatment building in brownfield
56.40.4	River Water Intake Structure Building	$ -	$ 91,843	$ 91,843	Existing for repower
56.45	PAINTING / COATING				
56.45.1	Special Coatings	$ 144,145	$ 152,922	$ 8,777	Labor rate difference
56.60	MECHANICAL				
56.60.1	Water Pre-Treatment Equipment	$ 4,458,331	$ 4,942,209	$ 483,878	Smaller capacity for repower
56.60.2	Miscellaneous Pumps	$ 69,866	$ 212,522	$ 142,656	Raw water pumps existing for repower
56.60.3	River Water Intake Screens	$ 200,541	$ -	$ (200,541)	N/A for brownfield
56.89	SUBTOTAL - DIRECT COSTS, PRE-TREATMENT	$ 10,563,897	$ 11,690,430	$ 1,126,533	
56.90	CONSTRUCTION INDIRECTS, PRE-TREATMENT	$ 2,345,095	$ 2,595,740	$ 250,645	
56.99	SUBCONTRACTS	$ 700,000	$ 6,520,000	$ 5,820,000	Smaller raw water tank & existing intake structure for repower
56.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, PRE-TREATMENT**	$ 13,608,992	$ 20,806,170	$ 7,197,179	

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60.00	**PIPE RACK**				
60.20	CONCRETE				
60.20.1	Piperack Foundations @ New Powerblock	$ 760,641	$ 344,195	$ (416,446)	Longer pipe rack for repower
60.20.2	Piperack Foundations @ Exterior Rack East & South of Unit 1	$ 334,767	$ -	$ (334,767)	N/A for brownfield
60.30	STRUCTURAL STEEL				
60.30.1	Structural Steel, Pipe Rack @ New Power Block	$ 3,361,896	$ 2,397,297	$ (964,600)	Longer pipe rack for repower
60.30.2	Structural Steel Framing Inside Existing Boiler Room	$ 473,596	$ -	$ (473,596)	N/A for brownfield
60.30.3	Exterior Structural Steel Framing East & South of Unit 1	$ 764,629	$ -	$ (764,629)	N/A for brownfield
60.45	PAINTING / COATING				
60.45.1	Touch-up Painting	$ 512,350	$ 386,535	$ (125,815)	Longer pipe rack for repower
60.89	SUBTOTAL - DIRECT COSTS, PIPE RACK	$ 6,207,879	$ 3,128,026	$ (3,079,853)	
60.90	CONSTRUCTION INDIRECTS, PIPE RACK	$ 1,842,295	$ 929,731	$ (912,565)	
60.99	SUBCONTRACTS	$ -	$ -	$ -	
60.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, PIPE RACK**	$ 8,050,174	$ 4,057,757	$ (3,992,417)	

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70.00	**ELECTRICAL POWER DISTRIBUTION**				
70.20	CONCRETE				
70.20.1	GSU Foundations (2 Total)	$ 627,976	$ 980,725	$ 352,749	2 GSU's for repower vs 3 for brownfield
70.20.2	Aux Transformer Foundations (2 Total)	$ 282,060	$ 294,596	$ 12,536	Labor rate difference
70.20.3	Transformer PDC Foundation	$ 328,622	$ 340,590	$ 11,968	Labor rate difference
70.20.4	STG PDC Foundation	$ 248,553	$ -	$ (248,553)	N/A for brownfield
70.20.5	HRSG PDC Foundations (2 Total)	$ 309,308	$ 321,724	$ 12,416	Labor rate difference
70.20.6	CT Chiller PDC Foundations	$ 248,553	$ 258,475	$ 9,922	Labor rate difference
70.20.7	Iso-Phase Bus / Cable Bus Foundations	$ 20,391	$ 21,292	$ 901	Labor rate difference
70.20.8	Emergency Diesel Generator Foundation	$ 36,703	$ 38,418	$ 1,715	Labor rate difference
70.30	STRUCTURAL STEEL				
70.30.1	Miscellaneous Steel for GSU Containments (2 Total)	$ 81,376	$ 123,826	$ 42,450	2 GSU's for repower vs 3 for brownfield
70.30.2	Miscellaneous Steel for Aux Transformer Containments (2 Total)	$ 42,274	$ 43,436	$ 1,162	Labor rate difference
	Miscellaneous Steel for Excitation Transformer Containment	$ -	$ 12,383	$ 12,383	N/A for repower
70.30.3	STG PDC Galleries	$ 22,120	$ -	$ (22,120)	N/A for brownfield
70.30.4	HRSG PDC Galleries (2 Total)	$ 37,897	$ 38,829	$ 932	Labor rate difference
70.30.5	Transformer PDC Galleries	$ 37,897	$ 38,829	$ 932	Labor rate difference
70.30.6	HVAC PDC Support Framing & Galleries	$ 41,151	$ 42,097	$ 947	Labor rate difference
70.30.7	CT Chiller PDC Galleries	$ 22,120	$ 22,655	$ 535	Labor rate difference
70.50	ELECTRICAL				
70.50.1	Generator Circuit Breakers (18KV)	$ 1,100,922	$ 1,207,854	$ 106,932	Equipment price reduced in repower for smaller capacity
70.50.2	Generator Step Up Transformers	$ 4,480,317	$ 7,731,446	$ 3,251,129	2 GSU's for repower vs 3 for brownfield, lower voltage
70.50.3	Unit Substation Transformers	$ 266,066	$ 293,167	$ 27,100	Capacity and labor rate difference
70.50.4	Unit Auxiliary Transformers (UAT: 1A, 1B)	$ 1,469,824	$ 1,572,176	$ 102,352	Capacity and labor rate difference
	6.9kV Switchgear	$ -	$ 4,754,430	$ 4,754,430	N/A for repower
70.50.5	4.16kV Switchgear	$ 3,444,200	$ -	$ (3,444,200)	N/A for brownfield
70.50.6	480V Switchgear	$ 3,075,317	$ 2,982,925	$ (92,392)	Scope and labor rate differences
70.50.7	Isolated Phase Bus Duct	$ 1,227,469	$ 2,181,462	$ 953,993	STG leads existing in repower
70.50.8	480V-800A, Motor Control Centers	$ 1,353,973	$ 1,955,000	$ 601,027	Reusing some existing for repower
70.50.9	Non-Seg/Cable Bus	$ 1,866,952	$ 1,581,322	$ (285,630)	Longer runs to existing equipment in repower

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70.50.10	Emergency Power System	$ 297,787	$ 504,730	$ 206,943	Reusing some existing for repower
70.50.11	PDCs	$ 4,017,238	$ 3,769,578	$ (247,660)	Add STG PDC for repower
70.50.12	Panelboards	$ 167,220	$ 233,021	$ 65,801	Reusing some existing for repower
70.50.13	Generator/Transformer Relay & Protection Panels	$ 337,043	$ 199,217	$ (137,826)	Repower includes mods to existing
70.50.14	Communication	$ 92,578	$ 182,209	$ 89,631	Reusing some existing for repower
70.50.15	Digital Fault Recorder	$ 143,586	$ 174,464	$ 30,878	Reusing some existing for repower
70.50.16	Diesel Generator	$ 639,528	$ 945,103	$ 305,576	Smaller capacity in repower, Labor rate difference
70.50.17	Security System	$ 189,726	$ 192,426	$ 2,700	Labor rate difference
70.50.18	Cable Splice Boxes	$ 259,365	$ -	$ (259,365)	N/A for brownfield
70.50.19	Cable	$ 10,129,359	$ 13,990,433	$ 3,861,074	Reusing some existing for repower
70.50.20	Heat Tracing	$ 1,733,666	$ 2,390,086	$ 656,420	Reusing some existing for repower
70.50.21	Conduit-Above Ground	$ 1,056,832	$ 2,000,977	$ 944,145	Reusing some existing for repower
70.50.22	Embedded Conduits	$ 80,966	$ 316,318	$ 235,352	Reusing some existing for repower
70.50.23	Cable Tray	$ 2,318,247	$ 3,447,911	$ 1,129,664	Reusing some existing for repower
70.50.24	Lighting and Distribution	$ 2,210,589	$ 2,171,847	$ (38,741)	Repower includes upgrades of existing in control room
70.50.25	Laydown Area Lighting	$ -	$ -	$ -	
70.50.26	Miscellaneous Electrical Devices	$ 323,629	$ 337,130	$ 13,501	Labor rate difference
70.50.27	Lightning Protection	$ 100,394	$ 215,061	$ 114,667	Reusing some existing for repower
70.50.28	Above Ground Grounding	$ 95,114	$ -	$ (95,114)	Incl w/ cable tray for brownfield
70.50.29	Electrical Allowance for Relocated Bulk Gas Storage Facility	$ 21,477	$ -	$ (21,477)	N/A for brownfield
	Electrical Allowance for Relocated Hydrogen Storage Facility	$ -	$ 22,321	$ 22,321	N/A for repower
70.89	SUBTOTAL - DIRECT COSTS, ELECTRICAL POWER DISTRIBUTION	$ 44,886,383	$ 57,930,484	$ 13,044,101	
70.90	CONSTRUCTION INDIRECTS, ELECTRICAL POWER DISTRIBUTION	$ 8,908,930	$ 11,759,172	$ 2,850,242	
70.99	SUBCONTRACTS	$ 250,000	$ 250,000	$ -	
70.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, ELECTRICAL POWER**	$ 54,045,313	$ 69,939,656	$ 15,894,343	

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Brownfield F-Class Iteration

Account No.	Item Description	Total Projected Cost - REPOWER OPTION 2 (F-CLASS)	Total Projected Cost - BROWNFIELD F-CLASS ITERATION	DELTA COST - BROWNFIELD - REPOWER	REMARKS
75.00	**DCS**				
75.20	CONCRETE				
75.20.1	CEMS Foundation (2 Total)	$ 25,545	$ 26,719	$ 1,175	Labor rate difference
75.50	ELECTRICAL				
75.50.1	600V Small Power Cable	$ 1,808,426	$ 4,798,004	$ 2,989,578	Reusing some existing for repower
75.50.2	Conduit-Above Ground	$ 676,343	$ 2,027,783	$ 1,351,440	Reusing some existing for repower
75.50.3	Embedded Conduits	$ 273,752	$ -	$ (273,752)	Incl w/ electrical (70) for brownfield
75.55	INSTRUMENTATION				
75.55.1	DCS	$ 3,235,245	$ 3,111,652	$ (123,593)	Repower includes turbine controls upgrade
75.55.2	High Fidelity Simulator	$ 1,496,110	$ 1,506,477	$ 10,367	Labor rate difference
75.55.3	CEMS	$ 780,088	$ 788,381	$ 8,294	Labor rate difference
75.55.4	BOP Field Mounted Instruments	$ 2,097,276	$ 2,327,469	$ 230,193	Reusing some existing for repower
75.55.5	Vendor Furnished Field Mounted Instruments	$ 690,566	$ 796,551	$ 105,986	Reusing some existing for repower
75.89	SUBTOTAL - DIRECT COSTS, DCS	$ 11,083,349	$ 15,383,036	$ 4,299,687	
75.90	CONSTRUCTION INDIRECTS, DCS	$ 2,076,589	$ 3,517,462	$ 1,440,872	
75.99	SUBCONTRACTS	$ -	$ -	$ -	
75.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, DCS**	$ 13,159,938	$ 18,900,497	$ 5,740,559	

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Account No.	Item Description	Total Projected Cost - REPOWER OPTION 2 (F-CLASS)	Total Projected Cost - BROWNFIELD F-CLASS ITERATION	DELTA COST - BROWNFIELD - REPOWER	REMARKS
80.00	**BOP**				
80.20	CONCRETE				
80.20.1	CTG Inlet Air Chiller Foundations	$ 40,569	$ 42,283	$ 1,714	Labor rate difference
80.20.2	Ammonia Storage Tank Foundation	$ 169,986	$ 176,744	$ 6,758	Labor rate difference
80.20.3	HRSG Blowdown Sump	$ 242,889	$ 254,808	$ 11,919	Labor rate difference
80.20.4	Aux Boiler Foundation	$ 153,299	$ 157,961	$ 4,662	Labor rate difference
80.20.5	Bulk Gas Storage Pad	$ 90,171	$ 94,107	$ 3,936	Labor rate difference
	New Foundation for Relocated Hydrogen Storage Facility	$ -	$ 25,817	$ 25,817	N/A for repower
80.20.6	CO2 Storage Tank (Relocated)	$ 5,212	$ -	$ (5,212)	N/A for brownfield
80.20.7	BOP Foundation Embedments	$ 147,276	$ 154,797	$ 7,521	Labor rate difference
80.30	STRUCTURAL STEEL				
80.30.1	HRSG Blowdown Sump Handrails	$ 4,307	$ 4,370	$ 63	Labor rate difference
80.40	ARCHITECTURAL				
80.40.1	Bulk Gas Storage Enclosure	$ 123,750	$ 123,750	$ -	
80.45	PAINTING / COATING				
80.45.1	Touch-up & Finish Painting	$ 731,929	$ 773,070	$ 41,141	Labor rate difference
80.60	MECHANICAL				
80.60.1	CTG Inlet Air Chiller Equipment Package	$ 9,105,406	$ 9,042,942	$ (62,464)	Slightly larger reduction applied to brownfield for reduced capacity
80.60.2	Auxiliary Boiler	$ 2,494,130	$ 2,134,906	$ (359,224)	Capacity reduction assumed for brownfield
80.60.3	Heat Exchangers	$ 540,541	$ 684,294	$ 143,754	Smaller capacity for repower
80.60.4	Miscellaneous Pumps	$ 243,428	$ 663,588	$ 420,160	Aux cooling not req'd, add hydrogen cooler for repower
80.60.5	Shop Fabricated Tanks	$ 47,070	$ 17,142	$ (29,927)	Add ST drains tank for repower
80.60.6	Bulk Gas Storage Provisions	$ 120,360	$ 138,221	$ 17,860	Reduce hydrogen storage for repower
80.60.7	Ammonia Storage & Forwarding Equipment	$ 482,739	$ 541,083	$ 58,345	Capacity reduction assumed for repower
80.60.8	Air Compressors & Accessories	$ 22,070	$ 559,304	$ 537,235	Receiver only for repower
80.60.9	Chemical Feed & Sample Systems	$ 749,280	$ 807,032	$ 57,752	Capacity reduction assumed for repower

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Account No.	Item Description	Total Projected Cost - REPOWER OPTION 2 (F-CLASS)	Total Projected Cost - BROWNFIELD F-CLASS ITERATION	DELTA COST - BROWNFIELD - REPOWER	REMARKS
	Relocate Existing Hydrogen Storage Facility	$ -	$ 53,579	$ 53,579	N/A for repower
80.60.10	Relocate Existing CO2 Storage Tank	$ 25,225	$ -	$ (25,225)	N/A for brownfield
80.70	PIPING				
80.70.1	Alloy Piping	$ 15,251,727	$ 10,147,194	$ (5,104,533)	Longer runs to existing ST for repower
80.70.2	BOP Piping	$ 14,625,949	$ 17,198,745	$ 2,572,795	Reductions applied for repower, not assumed for brownfield
80.70.3	Pipe Supports, HP (Engineered Supports)	$ 2,425,233	$ 1,989,729	$ (435,503)	Longer runs to existing ST for repower
80.70.4	Pipe Supports, LP	$ 1,252,827	$ 1,330,982	$ 78,155	Reductions applied for repower, not assumed for brownfield
80.70.5	C/T Interconnecting Piping	$ 707,938	$ 452,088	$ (255,850)	Material assumed to not be supplied with major equipment for repower
80.70.6	Valves & Specialties	$ 10,454,240	$ 10,730,652	$ 276,413	Scope and labor rate differences
80.80	INSULATION				
80.80.1	Thermal Insulation/Lagging	$ 5,362,855	$ 4,852,100	$ (510,755)	Increased for more alloy piping in repower
80.80.2	HRSG Piping & Drum Insulation and Lagging	$ 976,943	$ 1,020,578	$ 43,636	Labor rate difference
80.80.3	HRSG Stack Insulation to Damper Elevation	$ 510,313	$ 531,148	$ 20,834	Labor rate difference
80.89	SUBTOTAL - DIRECT COSTS, BOP	$ 67,107,661	$ 64,703,016	$ (2,404,645)	
80.90	CONSTRUCTION INDIRECTS, BOP	$ 15,298,985	$ 14,680,519	$ (618,466)	
80.99	SUBCONTRACTS	$ -	$ -	$ -	
80.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, BOP**	$ 82,406,646	$ 79,383,535	$ (3,023,111)	

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Account No.	Item Description	31239B Total Projected Cost - REPOWER OPTION 2 (F-CLASS)	31155C Total Projected Cost - BROWNFIELD F-CLASS ITERATION	DELTA COST - BROWNFIELD - REPOWER	REMARKS
90.00	**COMMON**				
90.20	CONCRETE				
90.20.1	Combustion Turbine Building Foundation	$ 3,125,507	$ 3,241,393	$ 115,886	Labor rate difference
90.20.2	Steam Turbine Building Foundation	$ 15,744	$ 2,684,777	$ 2,669,033	Existing for repower
90.20.3	Steam Turbine Building Elevated Slabs	$ 1,206	$ 234,568	$ 233,363	Existing for repower
90.20.4	Boiler Building Concrete Work	$ 6,177		$ (6,177)	N/A for brownfield
90.20.5	Admin / Warehouse / Storage Building Foundation	$ -	$ 414,567	$ 414,567	N/A for repower
	Service / Fire Water Storage Tank Foundation	$ -	$ 222,689	$ 222,689	N/A for repower
90.20.6	Fire Water Pumphouse Foundation	$ -	$ 24,049	$ 24,049	N/A for repower
90.20.7	Service Water Pump Foundation	$ -	$ 14,275	$ 14,275	N/A for repower
90.20.8	Tower Crane Foundation	$ 294,149	$ 300,150	$ 6,001	Labor rate difference
	New Foundation for Relocated Warehouse	$ -	$ 963,813	$ 963,813	N/A for repower
90.20.9	New Foundation for Fire House (Truck Parking)	$ 14,835	$ -	$ (14,835)	N/A for brownfield
90.20.10	Overflow Sump	$ 140,909	$ -	$ (140,909)	N/A for brownfield
90.30	STRUCTURAL STEEL				
90.30.1	Combustion Turbine Building Steel	$ 6,593,661	$ 6,744,211	$ 150,550	Labor rate difference
90.30.2	Steam Turbine Building Steel	$ 166,138	$ 5,842,065	$ 5,675,927	Existing for repower
90.30.3	Boiler Building Steel	$ 332,949	$ -	$ (332,949)	N/A for brownfield
90.40	ARCHITECTURAL				
90.40.1	Combustion Turbine Building	$ 2,310,079	$ 2,363,505	$ 53,426	Labor rate difference
90.40.2	Steam Turbine Building	$ -	$ 2,512,157	$ 2,512,157	Existing for repower
90.40.3	Boiler Building	$ 298,780		$ (298,780)	N/A for brownfield
90.40.4	Admin / Warehouse / Storage Building	$ -	$ 935,836	$ 935,836	Existing for repower
90.40.5	Relocate Existing Warehouse Building	$ -	$ 1,257,495	$ 1,257,495	N/A for repower
90.40.6	New Metal Cleaning Waste Pumphouse	$ 40,000	$ -	$ (40,000)	N/A for brownfield

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Account No.	Item Description	31239B Total Projected Cost - REPOWER OPTION 2 (F-CLASS)	31155C Total Projected Cost - BROWNFIELD F-CLASS ITERATION	DELTA COST - BROWNFIELD - REPOWER	REMARKS
90.40.7	New Fire House (Truck Parking)	$ 60,000	$ -	$ (60,000)	N/A for brownfield
90.45	PAINTING / COATING				
90.45.1	Touch-up & Finish Painting	$ 487,953	$ 1,159,605	$ 671,653	Reduced for fewer buildings in repower
90.60	MECHANICAL				
90.60.1	Diesel Driven Fire Pump Package	$ 179,821	$ -	$ (179,821)	N/A for brownfield
	Fire Pumps w/ Enclosure, Fire Protection and Detection	$ -	$ 894,198	$ 894,198	N/A for repower
90.60.2	Miscellaneous Pumps	$ 3,964	$ 32,630	$ 28,665	Relocate metal cleaning vs new service water
90.60.3	Cranes & Hoists	$ 1,031,446	$ 1,726,252	$ 694,806	Existing ST crane in repower
90.60.4	Fuel Gas Check Metering Station	$ 951,352	$ 960,736	$ 9,384	Labor rate difference
90.60.5	Potable Water Tepid Recirculation System	$ 310,541	$ 314,294	$ 3,754	Labor rate difference
90.60.6	HVAC for New Control Room Extension	$ 98,674	$ -	$ (98,674)	N/A for brownfield
90.60.7	Plumbing & Fixtures	$ 158,381	$ 165,626	$ 7,245	Labor rate difference
90.60.8	Install Blanking Plate at Existing Chimney	$ 80,076	$ -	$ (80,076)	N/A for brownfield
90.89	SUBTOTAL - DIRECT COSTS, COMMON	$ 16,702,340	$ 33,008,890	$ 16,306,550	
90.90	CONSTRUCTION INDIRECTS, COMMON	$ 6,201,660	$ 10,858,893	$ 4,657,233	
90.99	SUBCONTRACTS	$ 4,004,000	$ 3,934,000	$ (70,000)	New metal cleaning tank vs new service/fire water tank
90.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, COMMON**	$ 26,908,001	$ 47,801,784	$ 20,893,783	

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Repower Option 2 (F-Class) to

Brownfield F-Class Iteration

Account No.	Item Description	Total Projected Cost - REPOWER OPTION 2 (F-CLASS)	Total Projected Cost - BROWNFIELD F-CLASS ITERATION	DELTA COST - BROWNFIELD - REPOWER	REMARKS
	OVERALL PROJECT SUBTOTALS				
OP.89	**DIRECT COSTS**	$ 392,869,531	$ 493,483,488	$ 100,613,957	
OP.90	**CONSTRUCTION INDIRECTS**	$ 60,806,236	$ 75,387,661	$ 14,581,425	
OP.99	**SUBCONTRACTS**	$ 43,964,000	$ 24,494,000	$ (19,470,000)	
OP.00	**SUBTOTAL PROJECT COSTS**	$ 497,639,767	$ 593,365,149	$ 95,725,382	
PI.00	**OVERALL PROJECT INDIRECT COSTS**	$ 38,192,900	$ 37,480,100	$ (712,800)	
	Spare Parts	$ 4,061,800	$ 4,761,500	$ 699,700	
	Contingency	$ 71,834,100	$ 79,552,900	$ 7,718,800	
	Escalation	$ 51,986,300	$ 60,782,016	$ 8,795,716	
	Subtotal Project Cost	$ 663,714,867	$ 775,941,665	$ 112,226,798	
	Owner's Costs	$ -	$ -	$ -	
	AFUDC (Interest During Construction)	$ -	$ -	$ -	
	Total Project Cost	$ 663,714,867	$ 775,941,665	$ 112,226,798	

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Account No.	Item Description	31239B Total Projected Cost - REPOWER OPTION 2 (F-CLASS)	31155C Total Projected Cost - BROWNFIELD F-CLASS ITERATION	DELTA COST - BROWNFIELD - REPOWER	REMARKS
	ADDITIONAL REFERENCE COSTS:				
A	**Demolition & Removal**				
A	Removal of Existing Fuel Oil Tank	$ -	$ 1,757,370	$ 1,757,370	N/A for repower
A.1	Existing Metal Cleaning Waste Tank Area Restoration	$ 58,398	$ -	$ (58,398)	N/A for brownfield
A.2	Demolish Existing Fire House (Truck Parking)	$ 5,919	$ -	$ (5,919)	N/A for brownfield
A.3	Demolish Existing Coal Handling Structures	$ 333,672	$ -	$ (333,672)	N/A for brownfield
A.4	Demolish Existing Railroad Tracks	$ 41,249	$ -	$ (41,249)	N/A for brownfield
A.5	Demolish Existing Helipad	$ -	$ -	$ -	
A.6	Demolish Existing Sun Shelter	$ 13,154	$ -	$ (13,154)	N/A for brownfield
A.7	Demolish Unit 1 Boiler Building Combustion Air Coil Room	$ 68,388	$ -	$ (68,388)	N/A for brownfield
A.8	Demolish Unit 1 Boiler Building Platform at El. 586'-9" (Row 8 to 12)	$ 10,606	$ -	$ (10,606)	N/A for brownfield
A.9	Secure Existing Track Hopper for Abandonment	$ 152,872	$ -	$ (152,872)	N/A for brownfield
A.10	Demolish Gas Cylinder Storage Shed	$ 9,208	$ -	$ (9,208)	N/A for brownfield
A.11	Demolish CO2 Storage Tank Foundation	$ 3,289	$ -	$ (3,289)	N/A for brownfield
A.12	Remove & Dispose of Existing Relays serving ST GSU, UAT, RAT, and Generator Protection	$ 13,702	$ -	$ (13,702)	N/A for brownfield
A.13	Remove & Dispose of Existing 4.16 kV Switchgear Sections in Existing STG Building	$ 172,648	$ -	$ (172,648)	N/A for brownfield
A.14	Remove & Dispose of Existing 600V Switchgear Sections in Existing STG Building	$ 312,411	$ -	$ (312,411)	N/A for brownfield
A.15	Remove & Dispose of Existing Oil Filled 4.16kV/600V 1.5 MVA Transformers in Existing STG Building	$ 54,809	$ -	$ (54,809)	N/A for brownfield
A.16	Control Room Demolition & Removals	$ 123,320	$ -	$ (123,320)	N/A for brownfield
A.17	Remove Existing Pumps	$ 112,982	$ -	$ (112,982)	N/A for brownfield

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Account No.	Item Description	Total Projected Cost - REPOWER OPTION 2 (F-CLASS)	Total Projected Cost - BROWNFIELD F-CLASS ITERATION	DELTA COST - BROWNFIELD - REPOWER	REMARKS
A.18	Remove & Dispose of Existing Gland Steam Condenser	$ 19,821	$ -	$ (19,821)	N/A for brownfield
A.19	Remove & Dispose of Existing ST Turning Gear Assembly	$ 20,180	$ -	$ (20,180)	N/A for brownfield
A.20	Remove & Dispose of Existing Raw Water Intake Screens	$ 40,360	$ -	$ (40,360)	N/A for brownfield
A.21	Remove & Dispose of Existing Insulation & Lagging on Ductwork Above Boiler Room Roof	$ 158,590	$ -	$ (158,590)	N/A for brownfield
A.22	Remove & Dispose of Existing Piping & Mechanical Items In Existing Powerhouse As Required	$ 267,461	$ -	$ (267,461)	N/A for brownfield
A.23	Remove & Dispose of Existing Conduits & Electrical Items In Existing Powerhouse As Required	$ 223,819	$ -	$ (223,819)	N/A for brownfield
A.89	SUBTOTAL - DIRECT COSTS, Demolition & Removal	$ 2,216,858	$ -	$ (2,216,858)	
A.90	CONSTRUCTION INDIRECTS, Demolition & Removal	$ 798,220	$ -	$ (798,220)	
A.99	SUBCONTRACTS	$ 1,504,100	$ -	$ (1,504,100)	N/A for brownfield (remediation)
A.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, Demolition & Removal**	$ 4,519,178	$ 1,757,370	$ (2,761,809)	
PI.00	**Indirect Costs**				
	Contingency	$ 1,265,700	$ -	$ (1,265,700)	
	Escalation	$ 356,557	$ -	$ (356,557)	
	Total Demolition & Removal Cost	$ 6,141,435	$ 1,757,370	$ (4,384,066)	

		Option 1	Option 2
Total Repowering Project Cost		$720,780,605	$663,714,867
Items not included in AEP estimate			
	Escalation	$56,305,259	$51,986,300
	Spare Parts	$4,612,800	$4,061,800
	STG Rewind	$6,000,000	$6,000,000
	STG Switchgear Replacement	$3,300,000	$3,300,000
	Condensate Polisher	$3,824,847	$3,824,847
	Aux Boiler	$4,561,756	$4,561,756
	Make-up Water Pre-Treatment	$13,608,992	$13,426,052
	Inlet Air Chillers	$22,512,740	$21,012,740
	DCS Simulator	$1,617,450	$1,617,450
Major differences between estimates			
	CTG Costs	$31,760,000	$10,200,000
	CTG Building	$1,180,250	$1,180,250
	HRSG	$8,781,000	$6,491,000
	Steam Turbine Modifications	$7,000,000	$7,000,000
	Cooling Tower Modifications	$10,000,000	$10,000,000
	Water Treatment	$2,000,000	$2,000,000
	Feedwater Pumps	$3,000,000	$3,000,000
	BOP Piping & Components	$35,000,000	$30,000,000
	General Sitework	$10,000,000	$10,000,000
	Concrete	$9,000,000	$9,000,000
	Piperack	$5,500,000	$5,500,000
	DCS Eqp	$1,100,000	$1,100,000
	Engineering	$7,385,640	$7,385,640
	Contingency	$49,631,030	$46,005,380
Items not included in S&L estimate			
	Evap Coolers	$1,400,000	$1,200,000
	NG Regulating Station	$2,000,000	$2,000,000
Adjusted Repowering Total Project Cost		$426,498,841	$408,261,652
AEP Feasibility Estimate		$389,572,397	$370,211,647

EXHIBIT 1-8
O&M Cost Estimate Summary

EXHIBIT 1-8
OPTION 1 NON-FUEL O&M COST ESTIMATE SUMMARY

Option 1 **Mitsubishi M501GAC** **Combustion Turbines**	**Levelized Cost (30 years)** **Unfired** **(745 MW)**	 **Fired** **(802 MW)**
Fixed O&M Cost ($/kW/Yr)	$20.64	$19.18
Fixed O&M Cost ($/MWh)	$3.79	$3.52
Variable O&M Cost ($/MWh)	$3.59	$3.34
Total O&M Cost ($/MWh)	$7.39	$6.86

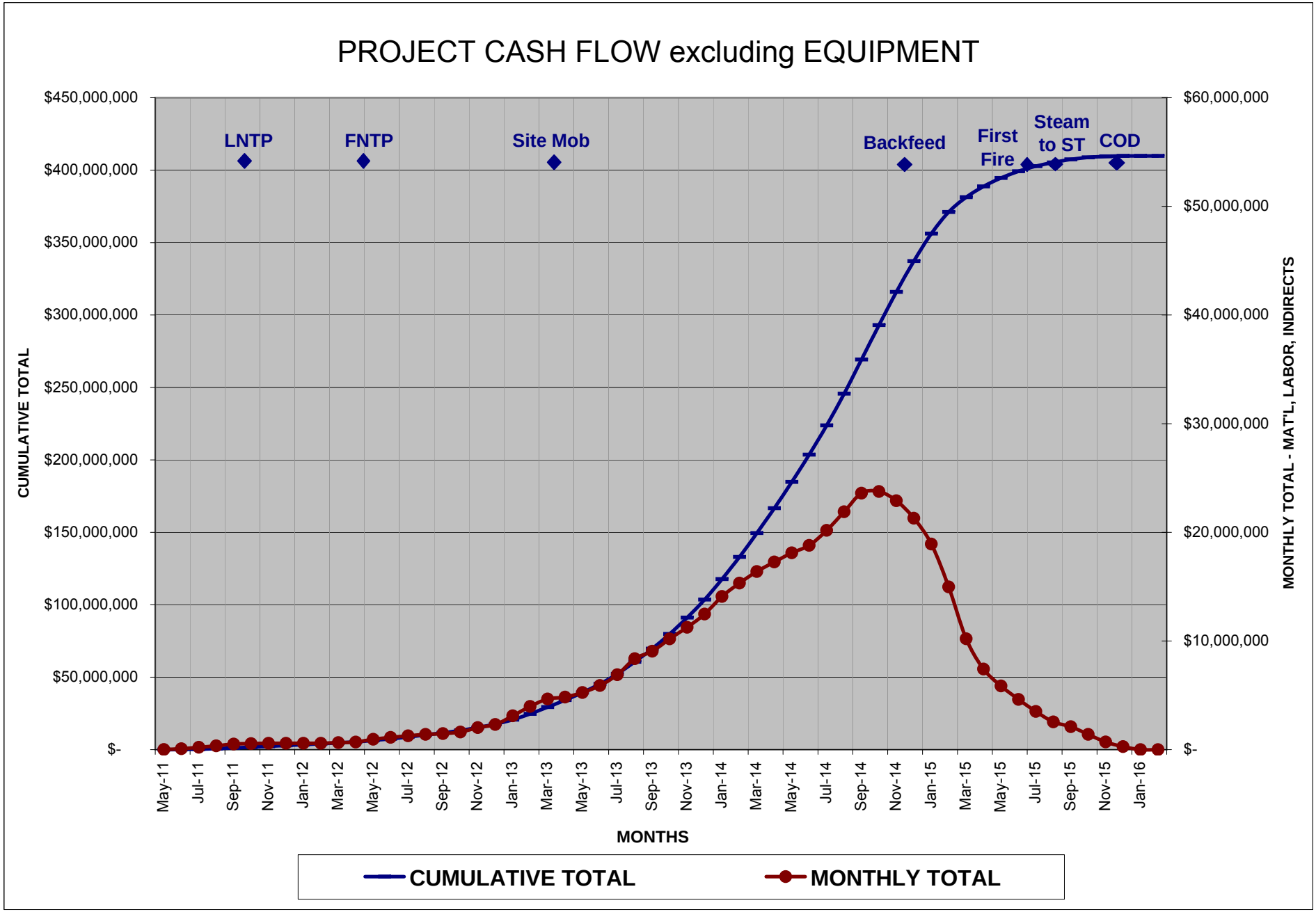
EXHIBIT 1-8
OPTION 2 NON-FUEL O&M COST ESTIMATE SUMMARY

Option 2 **GE 7FA.05** **Combustion Turbines**	**Levelized Cost (30 years)** **Unfired** **(602 MW)**	 **Fired** **(710 MW)**
Fixed O&M Cost ($/kW/Yr)	$24.26	$20.55
Fixed O&M Cost ($/MWh)	$4.46	$3.78
Variable O&M Cost ($/MWh)	$3.83	$3.24
Total O&M Cost ($/MWh)	$8.28	$7.02

EXHIBIT 1-9
Project Cash Flow

Kentucky Power Company & American Electric Power Service Corporation
Big Sandy U1 Repowering Study
(Option 1)

Sargent & Lundy
July 29, 2011
Rev: 0



Kentucky Power Company & American Electric Power Service Corporation
Big Sandy U1 Repowering Study
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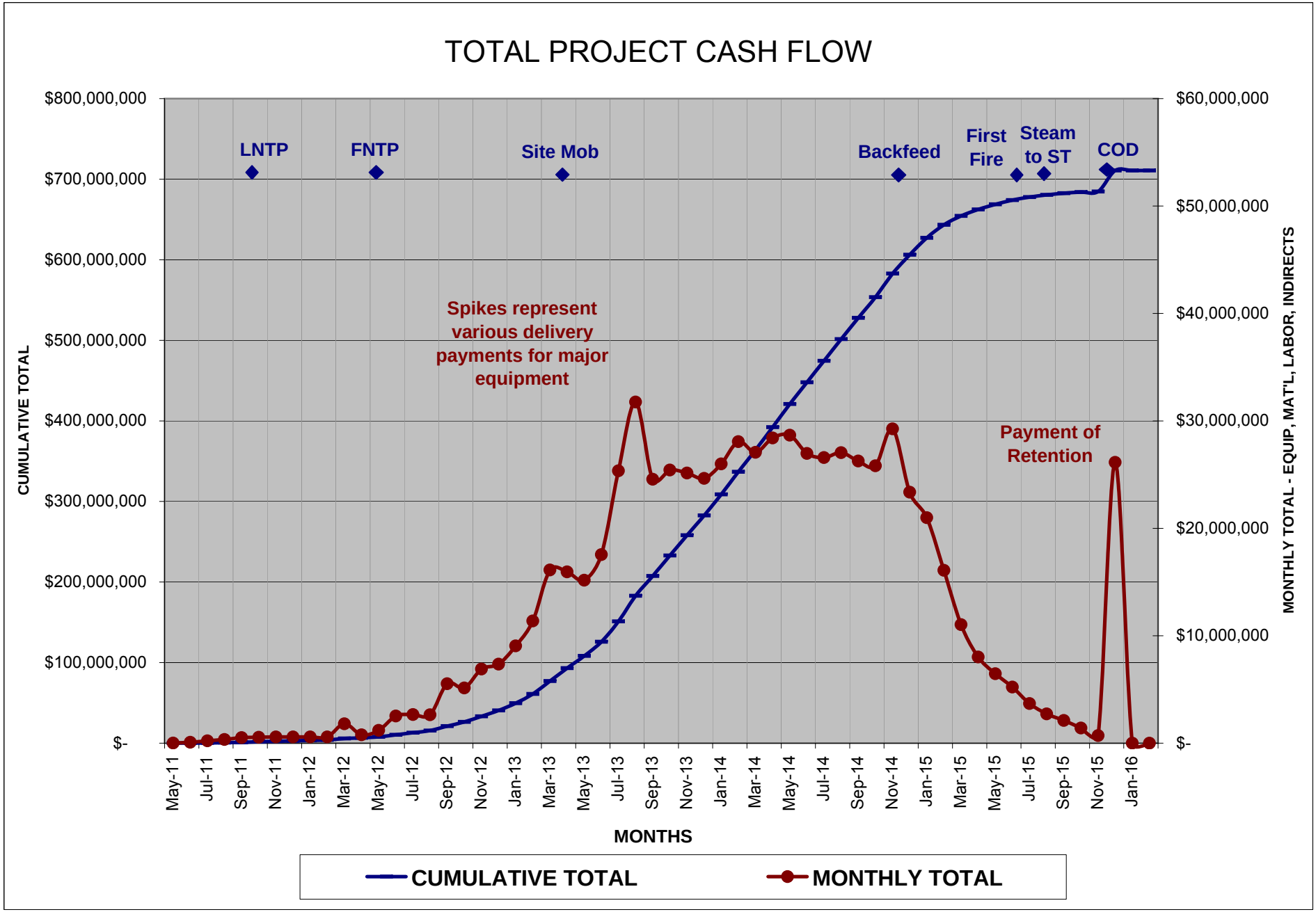
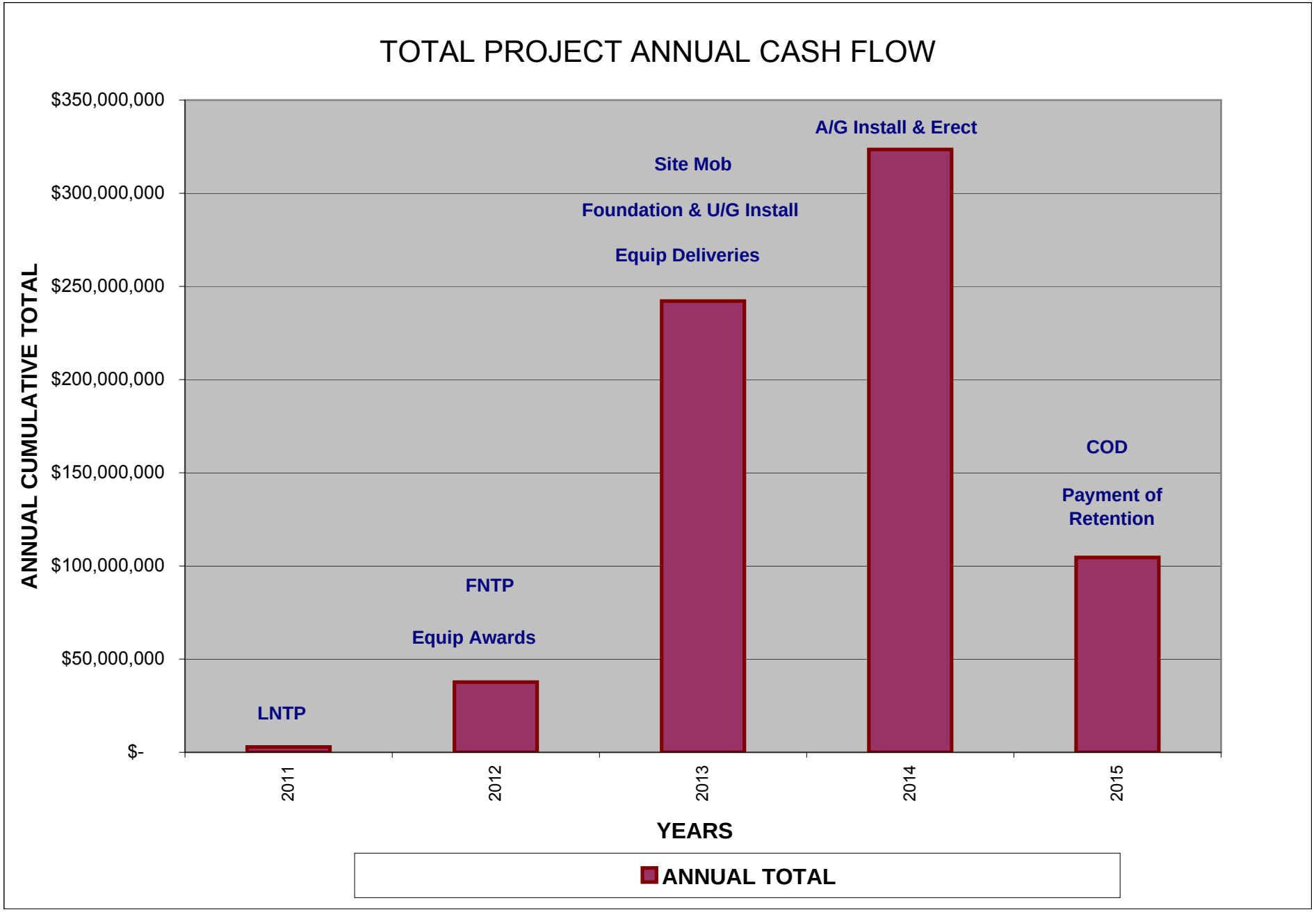
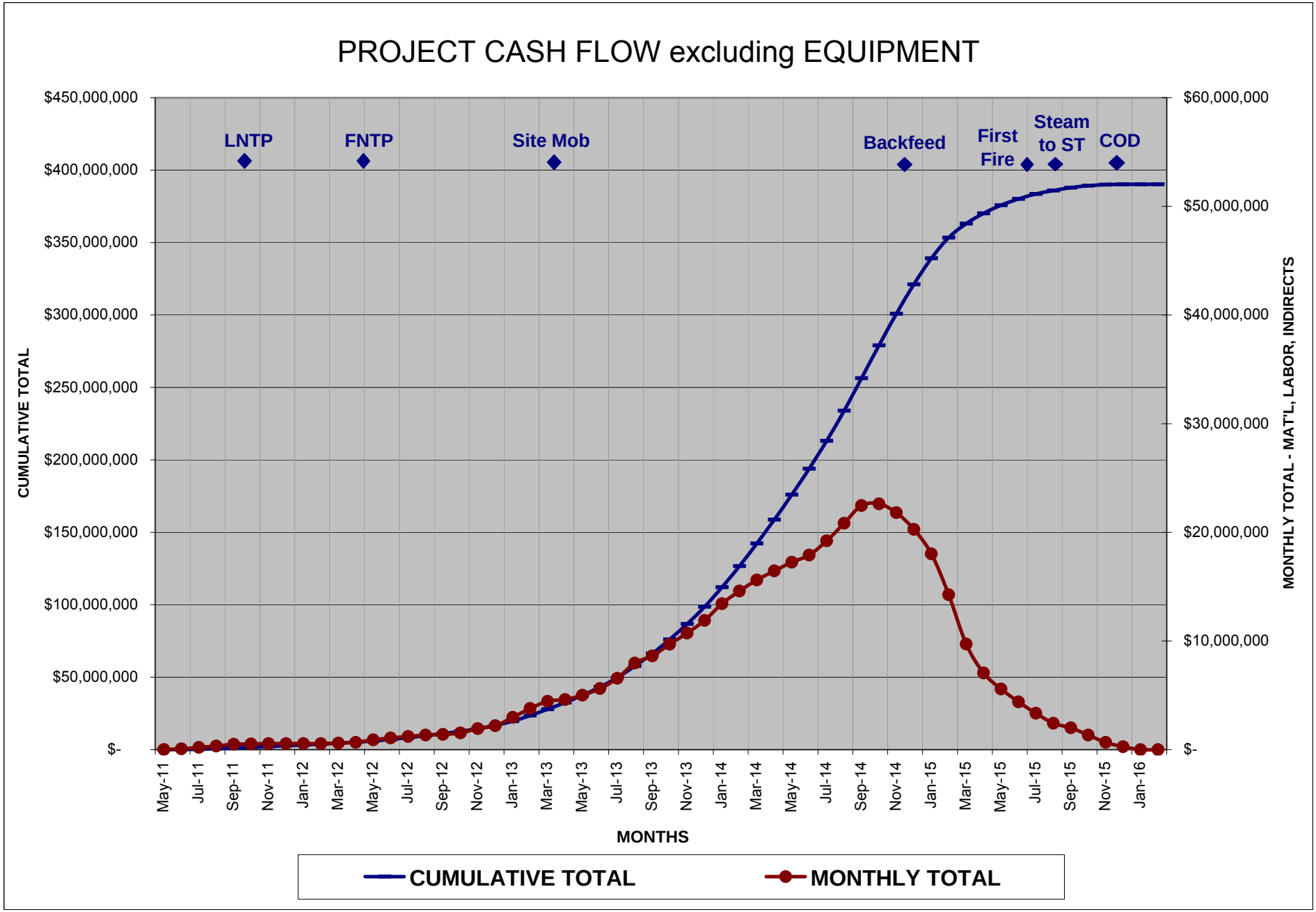
Rev: 0




TOTAL PROJECT ANNUAL CASH FLOW
ANNUAL CUMULATIVE TOTAL
$350,000,000
$300,000,000
$250,000,000
$200,000,000
$150,000,000
$100,000,000
$50,000,000
$-
LNTP
FNTP
Equip Awards
Site Mob
Foundation & U/G Install
Equip Deliveries
A/G Install & Erect
COD
Payment of Retention
2011
2012
2013
2014
2015
YEARS
ANNUAL TOTAL

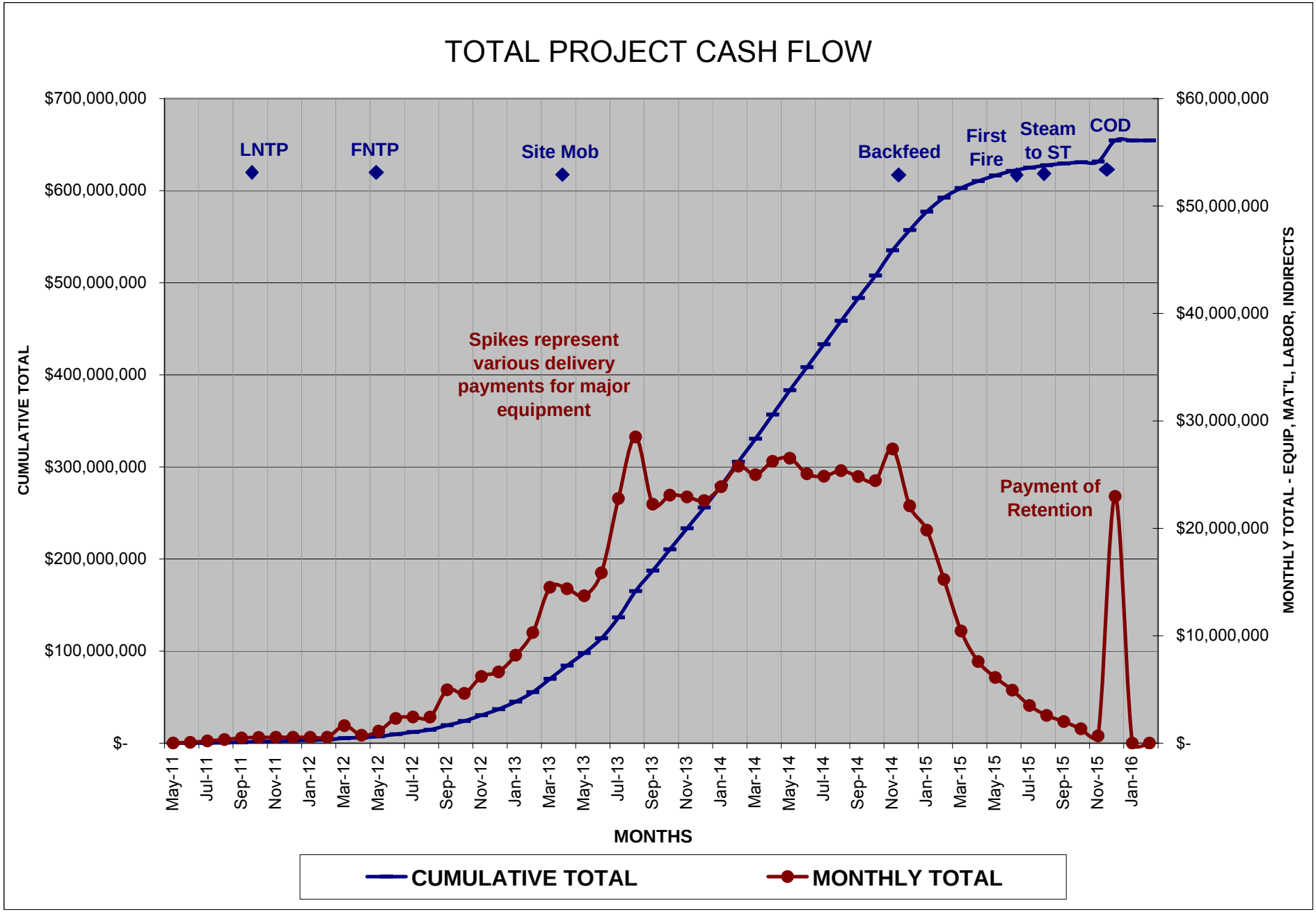
Kentucky Power Company & American Electric Power Service Corporation
Big Sandy U1 Repowering Study
(Option 2)

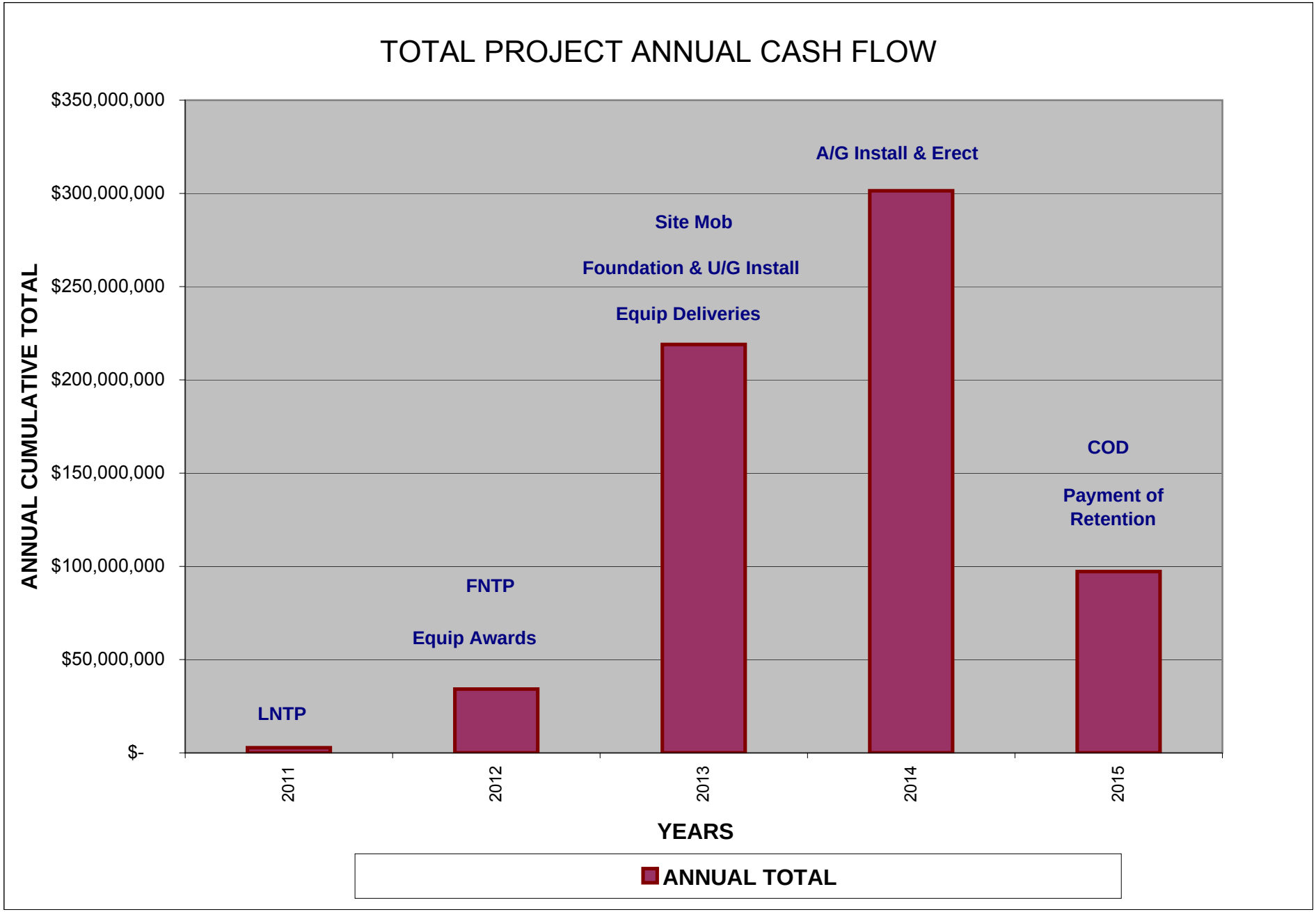
Sargent & Lundy
July 29, 2011
Rev: 0



Kentucky Power Company & American Electric Power Service Corporation
Big Sandy U1 Repowering Study
(Option 2)

Sargent & Lundy
July 29, 2011
Rev: 0




TOTAL PROJECT ANNUAL CASH FLOW
ANNUAL CUMULATIVE TOTAL
$350,000,000
$300,000,000
$250,000,000
$200,000,000
$150,000,000
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$50,000,000
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LNTP
FNTP
Equip Awards
Site Mob
Foundation & U/G Install
Equip Deliveries
A/G Install & Erect
COD
Payment of Retention
2011
2012
2013
2014
2015
YEARS
ANNUAL TOTAL

ATTACHMENT 1-1
Site Plan and General Arrangements Drawings

DWG. NO. RPSK-OPT1-GA-M-001

138kv TRANSMISSION LINE (EXISTING)

FUEL OIL PDC

FUEL OIL UNLOADING

DEMINERALIZED WATER TANK

FIRE TRUCK HOUSE

RSO TRAILERS (RELOCATED)

HELIPAD

DUCTBANK (EXISTING)

4.16kv LINE

138kv LINE

138kv TRANSMISSION LINE (RELOCATED)

NATURAL GAS YARD

FUEL OIL STORAGE

DUCTBANK (EXISTING)

METAL WASTE CLEANING TANK

METAL WASTE CLEANING PUMPHOUSE (RELOCATED)

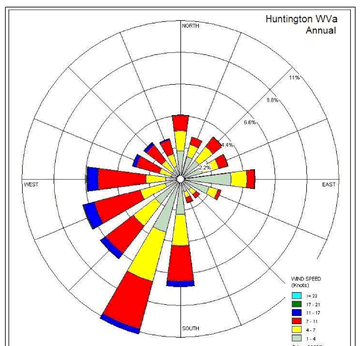
345KV TRANSMISSION LINE (EXISTING)

BULK GAS STORAGE

CO2 STORAGE (RELOCATED)

SPUR TRACK UPGRADE FOR EQUIPMENT UNLOADING

Huntington WVa
Annual



Directions are those from which winds were blowing
Calms = 24.93%
Period of record = 2001-2010

13.00°

NORTH

PLANT NORTH

0' 100' 200' 300'

GRAPHIC SCALE: 1"= 100'-0"

NOTES

DATE	NO.	DESCRIPTION	APPD.
		REVISIONS	

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

COMBINED CYCLE U1 REPOWERING COST ESTIMATE STUDY

OPTION 1 SITE PLAN

DWG. NO. RPSK-OPT1-GA-M-001

SCALE: 1"=100'-0"

DRN

CHK

APPROVED BY

DATE

FILE NAME: RPSK-OPT1-GA-M-001.DGN

REV	DATE RELEASED	PURPOSE	
D	07/14/2011	ISSUED FOR USE	R. MILLER / C. WOODS
C	06/30/2011	FOR CLIENT COMMENTS	R. MILLER / C. WOODS
F	08/23/2011	ISSUED FOR USE	R. MILLER / C. WOODS
E	07/19/2011	ISSUED FOR USE	R. MILLER / C. WOODS

DRAWING RELEASE RECORD — PREPARED / REVIEWED / APPROVED

PROFESSIONAL ENGINEER'S STAMP

Bargent & Lundy

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PERSONS LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL FOR THAT OF ITS SUBCONTRACTORS PERFORMING THE WORK.

AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOUR:MINUTE

IGS0694

DWG. NO. RPSK-OPT1-GA-M-002

MAJOR EQUIPMENT AND BALANCE OF PLANT							
ITEM	DESCRIPTION	14	WATER TREATMENT FACILITY WITH EE ROOM	28	STORM WATER POND	42	CONDENSATE POLISHING
1	MHI 501 GAC COMBUSTION TURBINE	15	HRSG PENTHOUSE ENCLOSURE	29	TRANSMISSION CORRIDOR	43	RAW WATER STORAGE TANK
2	HEAT RECOVERY STEAM GENERATOR	16	HRSG BLOWDOWN SUMP	30	CTG BUILDING PDC	44	CHEMICAL STORAGE AND UNLOADING
3	HRSG STACK	17	AUXILIARY BOILER	31	SFC CHANGEOVER SWITCH PANEL	45	EXISTING STEAM TURBINE GENERATOR
4	BOILER FEED PUMP ENCLOSURE	18	CT INLET CHILLERS	32	GT SFC INVERTER/CONVERTER	46	PIPE CORRIDOR
5	CEMS ENCLOSURE	19	FUEL GAS CONDITIONING SKID	33	CTG EXCITATION CUBICLE	47	EMERGENCY DIESEL GENERATOR
6	PIPERACK	20	ISOLATION TRANSFORMER	34	GROUNDING TRANSFORMER		
7	INLET AIR FILTER	21	138KV CONTROL HOUSE	35	CHILLER PDC		
8	EXCITATION TRANSFORMER	22	HRSG BLOWDOWN TANK	36	CIRCUIT BREAKER		
9	GENERATOR STEP-UP TRANSFORMER	23	HRSG PDC	37	DEADEND STRUCTURE WITH SWITCHES		
10	AUXILIARY TRANSFORMER	24	GT COOLING AIR COOLER	38	PRETREATMENT WATER FACILITY WITH EE ROOM		
11	TRANSFORMER PDC	25	AMMONIA SKID	39	CHEMICAL FEED & SAMPLE PANEL ENCLOSURE		
12	OILY WATER SEPARATOR	26	DUCT BURNER AND BLOWER SKIDS	40	CLARIFIERS		
13	AMMONIA STORAGE TANK AND UNLOADING	27	DROP AREA AND MAINTENANCE	41	STG PDC		

NOTES

DATE	NO.	DESCRIPTION	APPD.
		REVISIONS	

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

COMBINED CYCLE U1 REPOWERING COST ESTIMATE STUDY

OPTION 1 PLAN

DWG. NO. RPSK-OPT1-GA-M-002

SCALE: 1"=30'-0"

DR: CH:

APPROVED BY:

DATE:

FILE NAME: RPSK-OPT1-GA-M-002.DGN

PROFESSIONAL ENGINEER'S STAMP

Sargent & Lundy

AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

REV	DATE RELEASED	PURPOSE	
D	07/14/2011	ISSUED FOR USE	R. MILLER / C. WOODS
C	06/30/2011	FOR CLIENT COMMENTS	R. MILLER / C. WOODS
B	06/21/2011	FOR CLIENT COMMENTS	R. MILLER / C. WOODS
E	08/23/2011	ISSUED FOR USE	R. MILLER / C. WOODS

DRAWING RELEASE RECORD

PREPARED
REVIEWED
APPROVED

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PERSONS LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL OR THAT OF ITS SUBCONTRACTORS PERFORMING THE WORK.

GRAPHIC SCALE: 1"= 30'-0"

0' 30' 60' 90'

PLANT NORTH

IGS0694

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOUR:MINUTE

DWG. NO. RPSK-OPT2-GA-M-001

138kv TRANSMISSION LINE (EXISTING)

FUEL OIL PDC

FUEL OIL UNLOADING

DEMINERALIZED WATER TANK

FIRE TRUCK HOUSE

RSO TRAILERS (RELOCATED)

HELIPAD

DUCTBANK (EXISTING)

4.16kv LINE

138kv LINE

138kv TRANSMISSION LINE (RELOCATED)

NATURAL GAS YARD

FUEL OIL STORAGE

DUCTBANK (EXISTING)

METAL WASTE CLEANING TANK

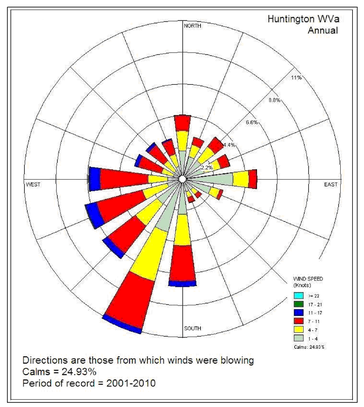
METAL WASTE CLEANING PUMPHOUSE (RELOCATED)

345KV TRANSMISSION LINE (EXISTING)

BULK GAS STORAGE

CO2 STORAGE (RELOCATED)

SPUR TRACK UPGRADE FOR EQUIPMENT UNLOADING



Directions are those from which winds were blowing
Calms = 24.93%
Period of record = 2001-2010

13.00°

NORTH

PLANT NORTH

0' 100' 200' 300'

GRAPHIC SCALE: 1"= 100'-0"

NOTES

REV	DATE RELEASED	PURPOSE	
D	08/23/2011	ISSUED FOR USE	R. MILLER / C. WOODS
C	07/19/2011	ISSUED FOR USE	R. MILLER / C. WOODS
B	07/14/2011	ISSUED FOR USE	R. MILLER / C. WOODS
A	06/30/2011	FOR CLIENT COMMENTS	R. MILLER / C. WOODS
			PREPARED
			REVIEWED
			APPROVED

DRAWING RELEASE RECORD

DATE NO.	DESCRIPTION	APPD.
	REVISIONS	

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

COMBINED CYCLE U1 REPOWERING COST ESTIMATE STUDY

OPTION 2 SITE PLAN

FILE NAME: RPSK-OPT2-GA-M-001.DGN

DWG. NO. RPSK-OPT2-GA-M-001

SCALE: 1"=100'-0"

DRN

CHK

APPROVED BY

DATE

PROFESSIONAL ENGINEER'S STAMP

Bangert & Lundy

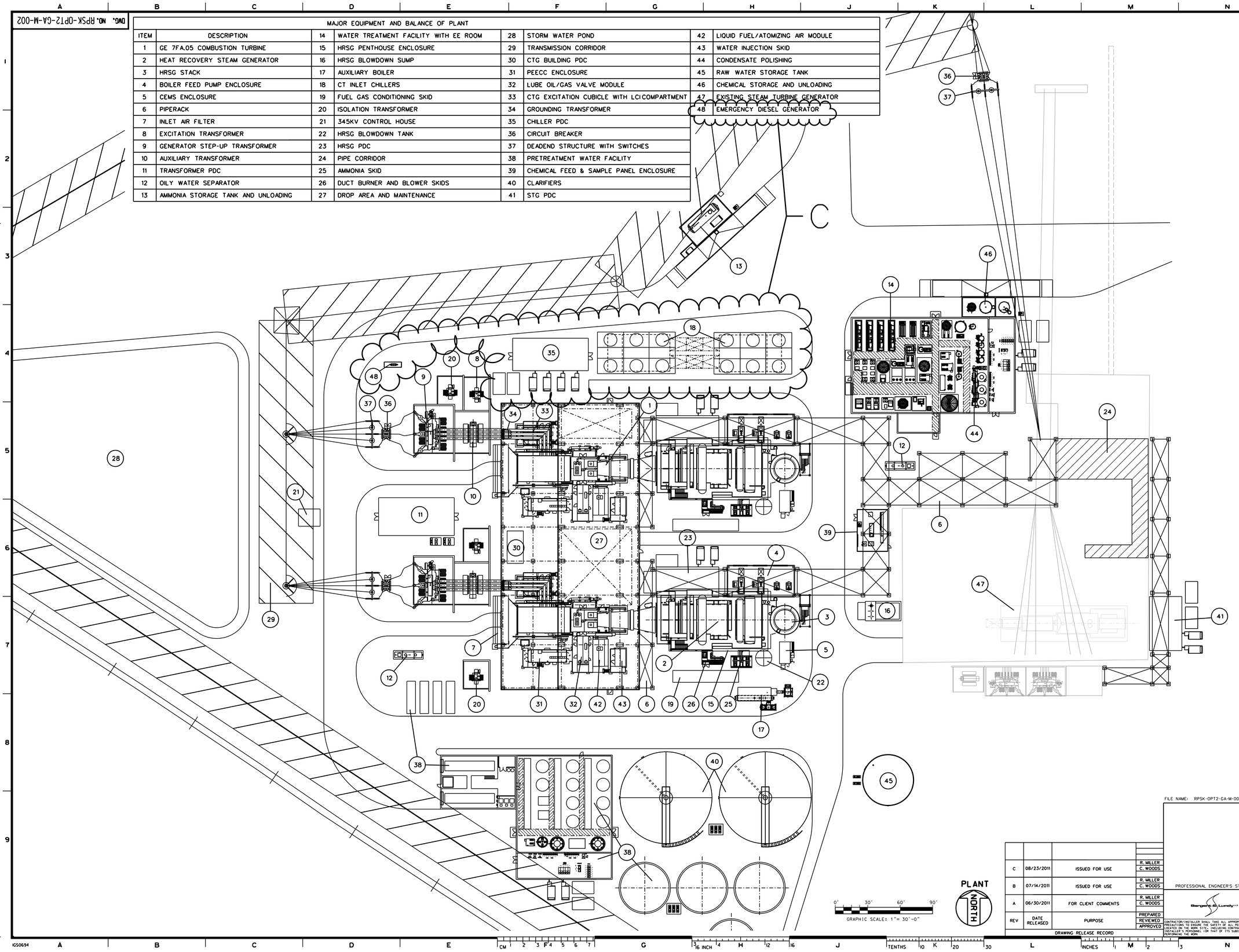
AEP AMERICAN ELECTRIC POWER
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

IGS0694

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOUR:MINUTE

DWG. NO. RPSK-OPT2-GA-M-002

MAJOR EQUIPMENT AND BALANCE OF PLANT							
ITEM	DESCRIPTION	14	WATER TREATMENT FACILITY WITH EE ROOM	28	STORM WATER POND	42	LIQUID FUEL/ATOMIZING AIR MODULE
1	GE 7FA.05 COMBUSTION TURBINE	15	HRSG PENTHOUSE ENCLOSURE	29	TRANSMISSION CORRIDOR	43	WATER INJECTION SKID
2	HEAT RECOVERY STEAM GENERATOR	16	HRSG BLOWDOWN SUMP	30	CTG BUILDING PDC	44	CONDENSATE POLISHING
3	HRSG STACK	17	AUXILIARY BOILER	31	PEECC ENCLOSURE	45	RAW WATER STORAGE TANK
4	BOILER FEED PUMP ENCLOSURE	18	CT INLET CHILLERS	32	LUBE OIL/GAS VALVE MODULE	46	CHEMICAL STORAGE AND UNLOADING
5	CEMS ENCLOSURE	19	FUEL GAS CONDITIONING SKID	33	CTG EXCITATION CUBICLE WITH LCI COMPARTMENT	47	EXISTING STEAM TURBINE GENERATOR
6	PIPERACK	20	ISOLATION TRANSFORMER	34	GROUNDING TRANSFORMER	48	EMERGENCY DIESEL GENERATOR
7	INLET AIR FILTER	21	345KV CONTROL HOUSE	35	CHILLER PDC		
8	EXCITATION TRANSFORMER	22	HRSG BLOWDOWN TANK	36	CIRCUIT BREAKER		
9	GENERATOR STEP-UP TRANSFORMER	23	HRSG PDC	37	DEADEND STRUCTURE WITH SWITCHES		
10	AUXILIARY TRANSFORMER	24	PIPE CORRIDOR	38	PRETREATMENT WATER FACILITY		
11	TRANSFORMER PDC	25	AMMONIA SKID	39	CHEMICAL FEED & SAMPLE PANEL ENCLOSURE		
12	OILY WATER SEPARATOR	26	DUCT BURNER AND BLOWER SKIDS	40	CLARIFIERS		
13	AMMONIA STORAGE TANK AND UNLOADING	27	DROP AREA AND MAINTENANCE	41	STG PDC		



NOTES

REVISIONS			
DATE	NO.	DESCRIPTION	APPD.

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

COMBINED CYCLE U1 REPOWERING COST ESTIMATE STUDY

OPTION 2 PLAN

DWG. NO. RPSK-OPT2-GA-M-002

SCALE: 1"=30'-0"

DR: R. MILLER

CH: C. WOODS

APPROVED BY:

DATE:

FILE NAME: RPSK-OPT2-GA-M-002.DGN

REV	DATE RELEASED	PURPOSE	
C	08/23/2011	ISSUED FOR USE	R. MILLER / C. WOODS
B	07/14/2011	ISSUED FOR USE	R. MILLER / C. WOODS
A	06/30/2011	FOR CLIENT COMMENTS	R. MILLER / C. WOODS

DRAWING RELEASE RECORD

PREPARED / REVIEWED / APPROVED

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL, FOR THAT OF ITS SUBCONTRACTORS PERFORMING THE WORK.

PROFESSIONAL ENGINEER'S STAMP

Sargent & Lundy

AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

GRAPHIC SCALE: 1"= 30'-0" (0' 30' 60' 90')

PLANT NORTH

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOUR:MINUTE

IGS0694

DWG. NO. RPSK-GA-M-003

ROADWAY

PRE TREATMENT BUILDING WITH EE ROOM

FACE PIPING SKID

70'

89

50'

115'

UPFLOW FILTER

BLOWER SKID

BACKWASH PUMP SKID

FILTER PRESS BUILDING

DOUBLE DOOR

WALKWAY

CHEMICAL FEED & STORAGE AREA

SUMP

UPS PANEL

ALT UPS PANEL

DC PANEL

MCC

MCC

MCC

MCC

LTG XFMR

LTG PNL

480V SWGR

MIMIC

DCS

TRANSFORMERS

HVAC EQUIPMENT

CLARIFIER (85 Ø)

CLARIFIER (85 Ø)

SLUDGE PUMPS

SLUDGE HOLDING TANK

SLUDGE HOLDING TANK

CLEARWELL TANK

SLUDGE PUMPS

CLEARWELL TANK

BIN STORAGE

RAW WATER STORAGE TANK

ROADWAY

NOTES

PLAN VIEW

EL. 140'-0"

EL. 125'-0"

FILTER PRESS BUILDING

PRE TREATMENT BUILDING

GRADE EL. 100'-0"

ELEVATION VIEW
LOOKING NORTH

GRAPHIC SCALE: 1"= 10'-0"

PLANT NORTH

DATE	NO.	DESCRIPTION	APPD.
07/14/2011	B	ISSUED FOR USE	R. MILLER / C. WOODS
06/30/2011	A	FOR CLIENT COMMENTS	R. MILLER / C. WOODS

REVISIONS

DRAWING RELEASE RECORD

REV	DATE RELEASED	PURPOSE	
			PREPARED
			REVIEWED
			APPROVED

PROFESSIONAL ENGINEER'S STAMP

Burgess & Lundy

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO PROTECT ALL PERSONS AND PROPERTY LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL FOR THAT OF ITS SUBCONTRACTORS IS PERFORMING THE WORK.

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

COMBINED CYCLE U1 REPOWERING COST ESTIMATE STUDY

PRETREATMENT WATER FACILITY

DWG. NO. RPSK-GA-M-003

SCALE: 1"=0'-0"

DR:

CK:

APPROVED BY:

DATE:

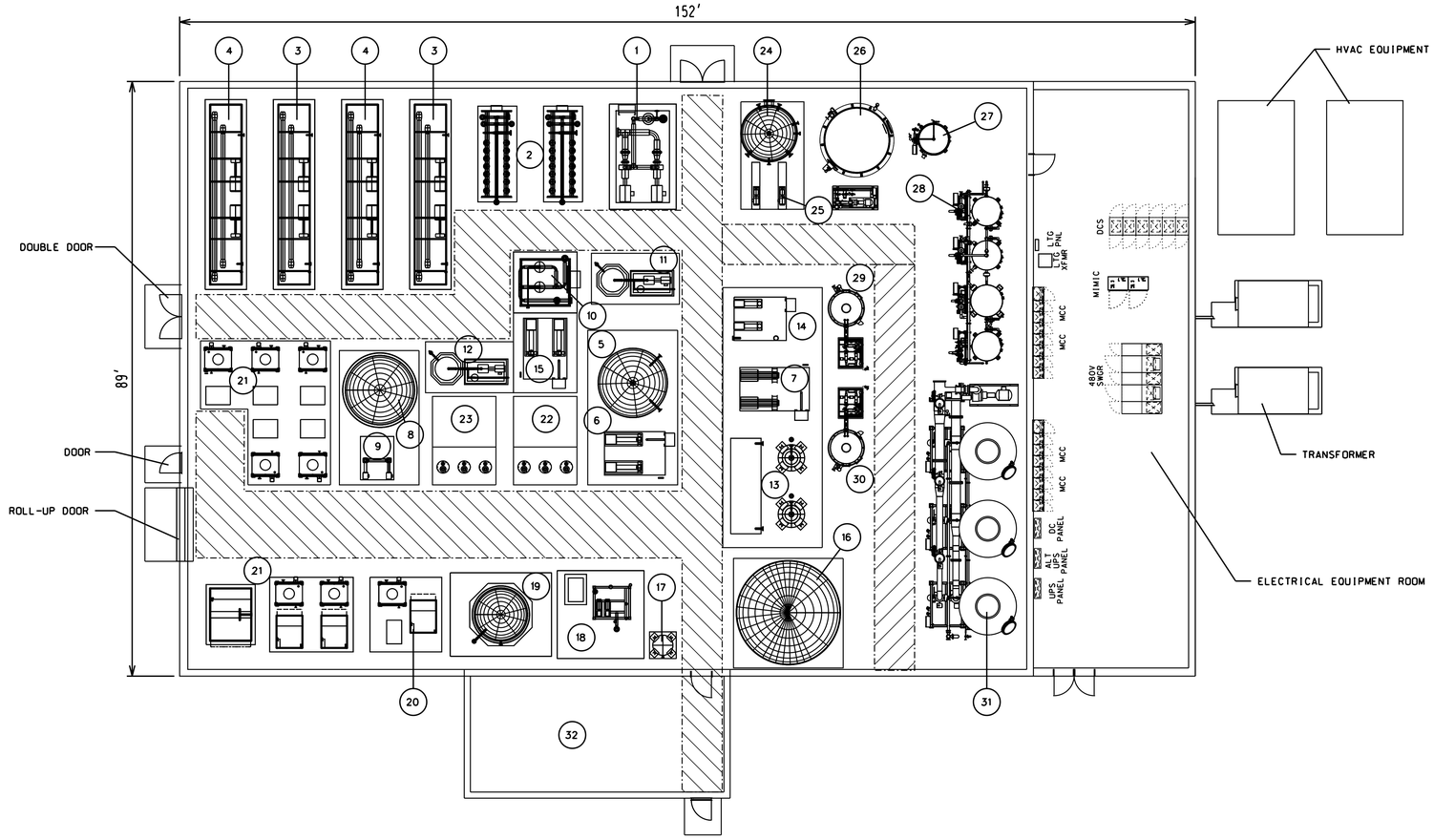
FILE NAME: RPSK-GA-M-003.DGN

AEP AMERICAN ELECTRIC POWER
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

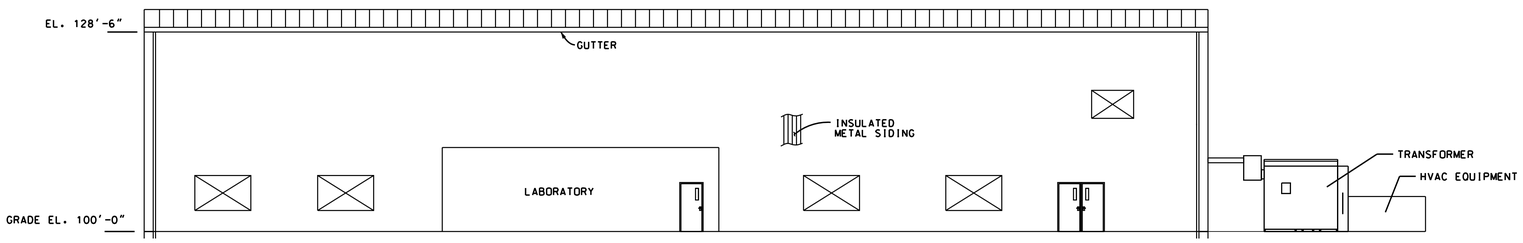
SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOUR:MINUTE

IGS0694

DWG. NO. RPSK-GA-M-004



PLAN VIEW



ELEVATION VIEW
LOOKING NORTH

WATER TREATING EQUIPMENT	
ITEM	DESCRIPTION
1	UF FEED PUMPS
2	UF SKIDS
3	1ST PASS RO SKID
4	2ND PASS RO SKID
5	UF PRODUCT WATER TANK
6	UF PRODUCT WATER TRANSFER PUMPS
7	UF BACKWASH PUMPS
8	RO PRODUCT WATER TANK
9	RO PRODUCT WATER TRANSFER PUMPS
10	CARTRIDGE FILTER SKID
11	UF CIP SKID
12	RO CIP SKID
13	MIXED BEDS AND FACE PIPING SKIDS
14	MIXED BED AIR BLOWER
15	REGENERATION WATER PUMPS
16	NEUTRALIZATION TANK
17	WATER HEATER
18	CAUSTIC FEED SKID
19	CAUSTIC STORAGE TANK
20	ACID FEED SKID
21	CHEMICAL FEED AREA
22	CHEMICAL DRAIN SUMP
23	PROCESS WATER SUMP
24	TEPID WATER TANK
25	TEPID WATER PUMPS
26	NEUTRALIZATION TANK
27	CAUSTIC DILUTION WATER HEATER TANK
28	REGENERATION TANKS
29	CAUSTIC DAY TANK
30	ACID DAY TANK
31	CONDENSATE POLISHING TANKS AND PIPING
32	LABORATORY

NOTES

GRAPHIC SCALE: 1"= 1/8'-0"

PLANT NORTH

REV	DATE RELEASED	PURPOSE	
			R. MILLER
B	07/14/2011	ISSUED FOR USE	C. WOODS
			R. MILLER
A	06/30/2011	FOR CLIENT COMMENTS	C. WOODS
			PREPARED
			REVIEWED
			APPROVED

DRAWING RELEASE RECORD

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE INCLUDING, BUT NOT LIMITED TO, EMPLOYEES/CONTRACTOR'S/ INSTALLER'S, PERSONNEL FOR THAT OF ITS SUBCONTRACTORS PERFORMING THE WORK.

PROFESSIONAL ENGINEER'S STAMP

Sargent & Lundy

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

COMBINED CYCLE U1 REPOWERING COST ESTIMATE STUDY

WATER TREATMENT BUILDING

FILE NAME: RPSK-GA-M-004.DGN

DWG. NO. RPSK-GA-M-004

SCALE: 1"=1'-0"

DR: CK: APPROVED BY:

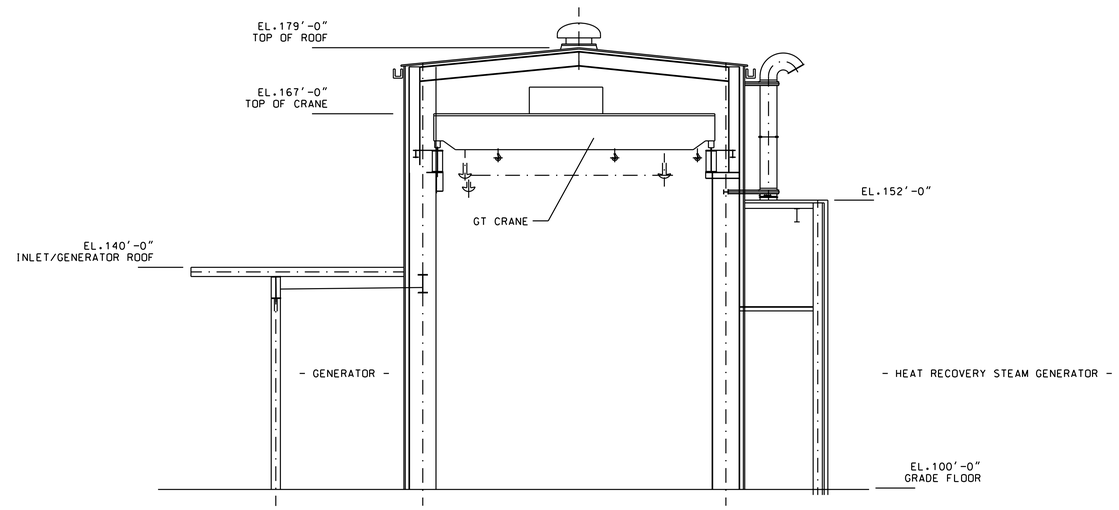
DATE:

AEP AMERICAN ELECTRIC POWER
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE- DD-MMM-YYYY
SYSTEM TIME- HOUR:MIN:SS

IGS0694

DWG. NO. RPSK-GA-M-005



COMBUSTION TURBINE BUILDING ELEVATION VIEW

LOOKING NORTH

NOTES

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

COMBINED CYCLE U1 REPOWERING COST ESTIMATE STUDY

CT BUILDING ELEVATION LAYOUT

DWG. NO. RPSK-GA-M-005

SCALE: 1"=0"

DR:

CH:

APPROVED BY

DATE:

FILE NAME: RPSK-GA-M-005.DGN

REV	DATE RELEASED	PURPOSE	
B	07/14/2011	ISSUED FOR USE	R. MILLER / C. WOODS
A	06/30/2011	FOR CLIENT COMMENTS	R. MILLER / C. WOODS
			PREPARED
			REVIEWED
			APPROVED

DRAWING RELEASE RECORD

PROFESSIONAL ENGINEER'S STAMP

Burns & Lundy

GRAPHIC SCALE: 1"= 10'-0"

PLANT NORTH

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL OR THAT OF ITS SUBCONTRACTORS PERFORMING THE WORK.

AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

IGS0694

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOURMINUTE

ATTACHMENT 1-2
Equipment Lists

OPTION 1
MECHANICAL EQUIPMENT LIST

		2011 ESTIMATE				
	EQUIPMENT or SYSTEM	QUANTITY / REDUNDANCY / CRITERIA	ESTIMATED HORSEPOWER (bhp)	PRICING BASIS	S&L SPEC	REMARKS
	MECHANICAL					
	Aqueous Ammonia					
1	19% Aqueous Ammonia Storage Tank	20,000 gallon CS tank for 10 day storage with leak detection	N/A	S&L Database		Stall - Adjusted for size
2	Aqueous Ammonia Forwarding Pumps and Motors	Complete skid with 2 x 100% forwarding pumps	<5			
	Boiler Blowdown - HRSG					
3	Boiler Blowdown tank	1 X 100% per HRSG 15.000 gallon CS tank with alloy wear plates.	N/A	S&L Database		Stall - Adjusted for size
4	Blowdown Water Sump Pumps and Motors	3 x 50%	90	Email Budgetary Quote		Flowserve
	Bulk Gas Storage					
5	Hydrogen Storage	DOT ground storage tubes with manifold and regulators	N/A	S&L Database		New tubes will be added for CTG.
6	Carbon Dioxide Storage	10,000 gallon CS tank with manifold and regulators	N/A	S&L Database		
7	Nitrogen Storage	10,000 gallon CS tank with manifold and regulators	N/A	S&L Database		
	Chemical Feed for Boiler Feedwater					
8	Caustic injection pump skid	Complete skid with 1 batch tank and 4x100% metering pumps	<5	S&L Database		Stall - Adjusted for size
9	Amine injection pump skid	Complete skid with 2x100% metering	<5			
10	Chemical storage facilities	Totes	N/A			
	Chemical Feed for Circulating Water	**Existing**				
	Circulating Water					
11	Natural Draft Cooling Tower	Existing				
12	Main Circulating Water Pumps and Motors	Existing				
13	Main Circulating Water Piping and Components	Existing				
14	Cooling Tower Blowdown	1 x 100% Control Valve Station	N/A			Included in the control valve totals.
15	Cooling Tower Makeup Pumps and Motors	2 x 100% horizontal pumps	125			Make-up pumps will be used to pump river water to Pre-Treatment.
16	Large CW Butterfly Valves	Existing				

OPTION 1
MECHANICAL EQUIPMENT LIST

		2011 ESTIMATE				
	EQUIPMENT or SYSTEM	QUANTITY / REDUNDANCY / CRITERIA	ESTIMATED HORSEPOWER (bhp)	PRICING BASIS	S&L SPEC	REMARKS
	Closed Cooling Water					
17	Auxiliary Cooling Water Pumps and Motors	Not Required - CW will be used to cool new closed cooling water heat exchangers.				
18	Shell and Tube Heat Exchangers (316SS tubes)	2 x 100%	N/A	Email / S&L Database		System will be sized for CT/HRSG loads only.
19	Head Tank/Chemical Addition Tank	1 - 2,000 gallon horizontal CS tank	N/A	S&L Database		
20	Closed Cooling Water Pumps and Motors	2 x 100% horizontal pumps	600			System will be sized for CT/HRSG loads only.
20A	Hydrogen Cooler Pumps and Motors	2 x 100% horizontal pumps	100	S&L Database		
21	Duplex Strainers	1 x 100% per heat exchanger (2 total)	N/A	S&L Database		Adjusted for flow.
	Condensate System					
22	Hotwell Pumps and Motors	2 x 100%	230	S&L Database		
23	Condensate Booster Pumps and Motors	2 x 100%	865	S&L Database		Adjusted for flow
24	Duplex Suction Strainers	2 x 100%	N/A	S&L Database		Existing piping is being replaced so new strainers will be added.
25	Steam Surface Condenser	Existing				
26	Condensate Polisher	Full Flow Deep Bed Polisher with 3 x 50% vessels		S&L Database		Updated verbal adjusted for flow
27	NOT USED					
28	LP Heaters No. 1 & 2	Existing				
28A	Heater Drain Pumps and Motors	2 x 100%	150	S&L Database		Existing pumps obsolete
29	Vacuum Pumps and Motors	Existing				
	Combustion Turbine-Generator	MHI 501GAC		RFQ	BSCC-1	MHI total adjusted bid price.
30	Combustion System					
31	Fire Protection System					
32	Fuel System	Dual Fuel				
33	Inlet and Exhaust System	Pulse Air Filter on Inlet. Straightening vanes on exhaust transition.				
34	Lube Oil and Lube Oil Cooling System					
35	Enclosure HVAC System					
36	Generator					
37	Inlet Air Chiller Coils			S&L Database		
38	CT Wash Water Skid	w/CT - 1 Total				
39	CT Wash Water Drains Tank	1x100% per CT (buried) - 3000 gallons		S&L Database		
40	CTG Air Cooling	1 x 100% RAC per CT cooled by FW	N/A			

OPTION 1
MECHANICAL EQUIPMENT LIST

		2011 ESTIMATE				
	EQUIPMENT or SYSTEM	QUANTITY / REDUNDANCY / CRITERIA	ESTIMATED HORSEPOWER (bhp)	PRICING BASIS	S&L SPEC	REMARKS
	CT Inlet Air Chillers					
41	Package Chiller	2 x 50% - Package unit with cooling tower.	5.9 MW Incl 480v	Email / S&L Database		TAS - verbal
42	Chilled Water Pumps and Motors	3 x 50% per packaged Unit	250 hp			
43	Cooling Water Pumps and Motors	3 x 50% per packaged Unit	200 hp			
44	Cooling Fans	6 x 17% per packaged Unit	100 hp			
	Demineralized Water					
45	Demineralized Water Storage Tank	1 x 100% 12,000 Gallon FRP		S&L Database		12,000 gallons will be used as a surge volume to supply the existing 300,000 gallon condensate tank.
46	Demin Water Pumps and Motors	2 x 100%	50	Email / S&L Database		Pumps will be used to transfer water to the existing condenser make-up line from the condensate tank.
	Fire Protection					
47	Service/Fire Water Storage Tank	Not Required - Existing FP pumps installed in the Cooling Tower Basin.				
48	Electric Motor Driven Fire Pump	Existing				
49	Diesel Driven Fire Pump	1 x 100% 3,500 GPM				New pump required to replace existing 1500 gpm pump.
50	Jockey Pump and Motor	Existing				
51	Fire Protection and Detection	Complete scope of supply for the CT/HRSG area and updates to the existing ST	N/A	S&L Database Adjusted		FP Costs
	Feedwater					
52	Boiler Feed Pumps and Motors	2 x 100% (per HRSG), horizontal multistage ring section with VFD	3550	Email Budgetary Quote		Adjusted for flow
53	Duplex Suction Strainers	1 x 100% per pump (4 total)	N/A	S&L Database		
	Fuel Gas					
54	Conditioning Skid	1 x 100% per CT with 2 x 100% Coalescing filters, 1 x 50% electric start-up heater, 1 x 100% drain tank, and 1 x 100% scrubber.	TBD kw heater	S&L Database		
55	Check Metering Station	1 x 100% flow meter, gas chromatograph, and emergency stop valve	N/A	S&L Database		

OPTION 1
MECHANICAL EQUIPMENT LIST

		2011 ESTIMATE				
	EQUIPMENT or SYSTEM	QUANTITY / REDUNDANCY / CRITERIA	ESTIMATED HORSEPOWER (bhp)	PRICING BASIS	S&L SPEC	REMARKS
	Fuel Oil					
56	Fuel Oil Storage Tank	2 x 50% 1,250,000 gallons (3 days storage) CS non-insulated with electric heaters	TBD kw heater	S&L Database		
57	Fuel Oil Fire Protection	Foam (fluoroprotein foam) skid and accessories		S&L Database Adjusted		FP Costs
58	Demin Water Storage Tank	1 x 100% 1,350,000 Gallons (3 days storage) CS epoxy lined non-insulated with electric heaters	TBD kw heater	S&L Database		
59	Fuel Oil Forwarding Pumps and Motors	2 x 100%	400	S&L Database		
60	Fuel Oil Demin Water Injection Pumps and Motors	2 x 100%	75	S&L Database		
61	Fuel Oil Truck Unloading Skid	1 x 100%	N/A	S&L Database		
	Heat Recovery Steam Generator			RFQ	BSCC-2	Vogt total adjusted bid price
62	3-pressure with reheat	Integral dearator, 3-wide construction, 2 elevators				
63	Inlet ductwork from the CT to the HRSG	Diffusion Plate				
64	Reheater with inter-stage desuperheater					
65	High Pressure Superheater with inter-stage desuperheater					
66	High Pressure Evaporator					
67	High Pressure Economizer					
68	Intermediate Pressure Superheater					
69	Intermediate Pressure Evaporator					
70	Intermediate Pressure Economizer					
71	Low Pressure Superheater					
72	Low Pressure Evaporator					
73	Steam Spargers	Spargers and associated valves and controls for HRSG Winterization				
74	Feedwater Preheater with 2 x 100% recirculation pumps and motors					
75	Exhaust Ductwork to the HRSG exhaust stack					
76	Exhaust Stack	200' above grade fully insulated up to isolation damper				
77	Stack Isolation Damper					
78	Duct Burners	Complete gas fired system for max ST output				
79	SCR	Includes catalyst with monorail and aqueous ammonia injection system				
80	CO catalyst					

OPTION 1
MECHANICAL EQUIPMENT LIST

		2011 ESTIMATE				
	EQUIPMENT or SYSTEM	QUANTITY / REDUNDANCY / CRITERIA	ESTIMATED HORSEPOWER (bhp)	PRICING BASIS	S&L SPEC	REMARKS
	Plant/Instrument Air					
81	Air Compressors and Motors	Existing				
82	Air Receiver Tanks	Existing and 1x100% CS Epoxy Coated		S&L Database		New reciever will be added to help reduce the cycling of the existing compressors.
83	Air Dryers	Existing				
84	Prefilters	Existing				
85	Afterfilters	Existing				
	Potable Water					
86	Tepid Water Recirculation System	Complete system with tank, heater, and mixing valves.	50kw	Estimated Cost		New system provided for CT/HRSG area.
87	Tepid Water Pumps and Motors		25			
	Raw Water					
88	Raw Water Storage Tank	1 x 100% 500,000 gallons CS non-insulated with electric heaters	TBD kw heater	S&L Database		Tank will be used as a break tank prior to the Pre-Treatment system.
89	Raw Water Pumps and Motors	Existing				
90	River Water Intake	Existing				
91	River Water Intake Screens	1x100%	N/A	S&L Database		A new 316.b (Johnson) screen will be installed to replace the existing screen.
	Service Water					
92	Service/Fire Water Storage Tank	Not Required				
93	Service Water Pumps and Motors	Existing				

OPTION 1
MECHANICAL EQUIPMENT LIST

		2011 ESTIMATE				
	EQUIPMENT or SYSTEM	QUANTITY / REDUNDANCY / CRITERIA	ESTIMATED HORSEPOWER (bhp)	PRICING BASIS	S&L SPEC	REMARKS
	Steam System Components					
94	Desuperheaters	included with HRSG and specialties	N/A			
95	Flow elements	included with HRSG	N/A			
96	Large Bore HP Valves	As required by code and double block and bleed for HRSG Isolation	N/A	S&L Database		
97	Non-return valves	Air operated valve on Cold Reheat steam header	N/A	S&L Database		
98	Reheater Overpressurization Protection	4@25% 6x8 Safety Relief Valves	N/A	Email Budgetary Quote		Tyco
99	Vents including silencers/mufflers	included with equipment as required	N/A			
100	Main Cycle Sample Panel	Complete water/steam sample panel with chiller	50	S&L Database		Stall - Adjusted for size
101	Steam turbine bypass valves	1 x 100% CT bypass system to condenser	N/A	Email Budgetary Quote		CCI - Adjusted for scope
102	Steam Turbine Drains Tank	10,500 gallon CS tank drained/vented to condenser	N/A	S&L Database		
103	Packaged Aux Boiler	80,0000 lbs/hr sized to maintain ST steam seals	300 (total load)	RFQ	BSCC-10	B&W PG total adjusted bid price.
104	Miscellaneous Drains Tank	Existing				
	Steam Turbine Generator	**Existing**				
105	Steam Turbine Generator					
106	Shaft sealing system					
107	Lubricating oil system					
108	Hydraulic power unit					
109	Turning gear	Replacement Gear and associated equipment required.		S&L Database		
110	Hydrogen cooled synchronous generator					
111	Steam seal regulator valves					
112	Lube Oil/Hydraulic Oil Storage Tank					
113	Hydrogen Purge Valves					
114	Hydrogen Control System					
115	Steam turbine control system					
116	Gland Steam Condenser	New gland steam condenser is required.		MHI Email		

OPTION 1
MECHANICAL EQUIPMENT LIST

		2011 ESTIMATE				
	EQUIPMENT or SYSTEM	QUANTITY / REDUNDANCY / CRITERIA	ESTIMATED HORSEPOWER (bhp)	PRICING BASIS	S&L SPEC	REMARKS
	Water Treatment					
117	River Water Pretreatment (Clarification and Upflow Filters)	Complete 4500 gpm system with chemical dosing and filter presses	300 (total load)	RFQ	BSCC-7	Graver total adjusted bid price adjusted for flow rate.
118	Water Treatment System	Complete 150 gpm system with 2 x 100% UF with 2 pass RO system complete with cartridge filters, feed pumps, chemical injection, break tank, and 2 x 100% clean in-place skids	200 (total load) + 80 kW	RFQ	BSCC-8	IDI total adjusted bid price.
119	Mixed Bed System	2 x 100% capacity mixed bed exchangers complete with regeneration equipment and tanks	Included above			
	Wastewater					
120	WTB Sump Pumps and Motors	3 x 50%	25	Email Budgetary Quote		Flowserve
121	Pretreatment Area Sump Pumps and Motors	3 x 50%	100	Email Budgetary Quote		Flowserve
121	Turbine Building Sump Pumps and Motors	Existing				Sump discharge will be rerouted to new OWS and/or overflow structure.
122	Oil/Water Separator	2 @ 500 gpm with 2 x 100% pumps and motors	25	S&L Database		
123	Sanitary Sewage Treatment	Existing				
124	**PIPE Supports**	All pipe support materials.	N/A	S&L Database Adjusted		
125	**Piping Specialties**	Typical 700MW pipe specialties as specified by S&L.	N/A	S&L Database Adjusted		
126	**Control Valves**	Typical 700 MW scope of valves as specified by S&L	N/A	S&L Database Adjusted		

OPTION 1
MECHANICAL EQUIPMENT LIST

		2011 ESTIMATE				
	EQUIPMENT or SYSTEM	QUANTITY / REDUNDANCY / CRITERIA	ESTIMATED HORSEPOWER (bhp)	PRICING BASIS	S&L SPEC	REMARKS
	Note: Refer to the Combined Cycle Brownfield Build Cost Estimate Study, Volume 2, for the RFQ's referenced in this equipment list.					

OPTION 2
MECHANICAL EQUIPMENT LIST

		2011 ESTIMATE				
	EQUIPMENT or SYSTEM	QUANTITY / REDUNDANCY / CRITERIA	ESTIMATED HORSEPOWER (bhp)	PRICING BASIS	S&L SPEC	REMARKS
	MECHANICAL					
	Aqueous Ammonia					
1	19% Aqueous Ammonia Storage Tank	15,000 gallon CS tank for 10 day storage with leak detection	N/A	S&L Database		Stall
2	Aqueous Ammonia Forwarding Pumps and Motors	Complete skid with 2 x 100% forwarding pumps	<5			
	Boiler Blowdown - HRSG					
3	Boiler Blowdown tank	1 X 100% per HRSG 12.000 gallon CS tank with alloy wear plates.	N/A	S&L Database		Stall - Adjusted for size
4	Blowdown Water Sump Pumps and Motors	3 x 50%	90	Email Budgetary Quote		Flowserve
	Bulk Gas Storage					
5	Hydrogen Storage	DOT ground storage tubes with manifold and regulators	N/A	S&L Database		
6	Carbon Dioxide Storage	10,000 gallon CS tank with manifold and regulators	N/A	S&L Database		
7	Nitrogen Storage	10,000 gallon CS tank with manifold and regulators	N/A	S&L Database		
	Chemical Feed for Boiler Feedwater					
8	Caustic injection pump skid	Complete skid with 1 batch tank and 4x100% metering pumps	<5	S&L Database		Stall
9	Amine injection pump skid	Complete skid with 2x100% metering	<5			
10	Chemical storage facilities	Totes	N/A			
	Chemical Feed for Circulating Water	**Existing**				
	Circulating Water					
11	Natural Draft Cooling Tower	Existing				
12	Main Circulating Water Pumps and Motors	Existing				
13	Main Circulating Water Piping and Components	Existing				
14	Cooling Tower Blowdown	1 x 100% control valve station	N/A			Included in control valve totals.
15	Cooling Tower Makeup Pumps and Motors	2 x 100% horizontal pumps	125			Make-up pumps will be used to pump river water to Pre-Treatment.
16	Large CW Butterfly Valves	Existing				

OPTION 2
MECHANICAL EQUIPMENT LIST

		2011 ESTIMATE				
	EQUIPMENT or SYSTEM	QUANTITY / REDUNDANCY / CRITERIA	ESTIMATED HORSEPOWER (bhp)	PRICING BASIS	S&L SPEC	REMARKS
	Closed Cooling Water					
17	Auxiliary Cooling Water Pumps and Motors	Not Required - CW will be used to cool the new closed cooling water heat exchangers				
18	Shell and Tube Heat Exchangers (316SS tubes)	2 x 100%	N/A	Email / S&L Database		System will be sized for CT/HRSG loads only.
19	Head Tank/Chemical Addition Tank	1 - 2,000 gallon horizontal CS tank	N/A	S&L Database		
20	Closed Cooling Water Pumps and Motors	2 x 100% horizontal pumps	380	S&L Database		System will be sized for CT/HRSG loads only.
20A	Hydrogen Cooler Pumps and Motors	2 x 100% horizontal pumps	100	S&L Database		Existing pumps obsolete
21	Duplex Strainers	1 x 100% per heat exchanger (2 total)	N/A	S&L Database		
	Condensate System					
22	Hotwell Pumps and Motors	2 x 100%	230			
23	Condensate Booster Pumps and Motors	2 x 100%	865	S&L Database		
24	Duplex Suction Strainers	2 x 100%	N/A	S&L Database		Existing piping is being replaced so new strainers will be added.
25	Steam Surface Condenser	Existing				
26	Condensate Polisher	Full Flow Deep Bed Polisher with 3 x 50% vessels		S&L Database		Updated verbal adjusted for flow.
27	Not Used					
28	LP Heaters No. 1 & 2	Existing				
28A	Heater Drain Pumps and Motors	2 x 100%	150	S&L Database		Existing pumps obsolete
29	Vacuum Pumps and Motors	Existing				
	Combustion Turbine-Generator	GE 7FA.05		S&L Database / Email		
30	Combustion System					
31	Fire Protection System					
32	Fuel System	Dual Fuel				
33	Inlet and Exhaust System	Pulse Air Filter on Inlet.				
34	Lube Oil and Lube Oil Cooling System					
35	Enclosure HVAC System					
36	Generator					
37	Inlet Air Chiller Coils			S&L Database		
38	CT Wash Water Skid	w/CT - 1 Total				
39	CT Wash Water Drains Tank	1x100% per CT (buried) - 2500 gallons		S&L Database		

OPTION 2
MECHANICAL EQUIPMENT LIST

		2011 ESTIMATE				
	EQUIPMENT or SYSTEM	QUANTITY / REDUNDANCY / CRITERIA	ESTIMATED HORSEPOWER (bhp)	PRICING BASIS	S&L SPEC	REMARKS
	CT Inlet Air Chillers					
40	Package Chiller	2 x 50% - Package unit with cooling tower.	5.5 MW Incl 480v	S&L Database		TAS - verbal adjusted for size
41	Chilled Water Pumps and Motors	3 x 50% per packaged Unit	250 hp			
42	Cooling Water Pumps and Motors	3 x 50% per packaged Unit	200 hp			
43	Cooling Fans	6 x 17% per packaged Unit	100 hp			
	Demineralized Water					
44	Demineralized Water Storage Tank	1 12,000 Gallon FRP		S&L Database		12,000 Gallons will be used as a surge volume to supply the existing 300,000 gallon condensate tank.
45	Demin Water Pumps and Motors	2 x 100%	50	Email / S&L Database		Pumps will be used to transfer water to the existing condenser make-up line from the condensate tank.
	Fire Protection					
46	Service/Fire Water Storage Tank	Not Required - Existing FP pumps installed in the Cooling Tower Basin				
47	Electric Motor Driven Fire Pump	Existing				
48	Diesel Driven Fire Pump	1 x 100% 3,500 GPM				New pump required to replace exsisting 1,500 gpm pump.
49	Jockey Pump and Motor	Existing				
50	Fire Protection and Detection	Complete scope of supply for the CT/HRSG area and updates to the existing ST	N/A	S&L Database Adjusted		FP Costs
	Feedwater					
51	Boiler Feed Pumps and Motors	2 x 100% (per HRSG), horizontal multistage ring section with VFD	3480	Email Budgetary Quote		Adjusted for flow
52	Duplex Suction Strainers	1 x 100% per pump (4 total)	N/A	S&L Database		
	Fuel Gas					
53	Conditioning Skid	1 x 100% per CT with 2 x 100% Coalescing filters, 1 x 100% performance heater, 1 x 50% electric start-up heater, 1 x 100% drain tank, and 1 x 100% scrubber.	TBD kw heater	S&L Database		
54	Check Metering Station	1 x 100% flow meter, gas chromatograph, and emergency stop valve	N/A	S&L Database		

OPTION 2
MECHANICAL EQUIPMENT LIST

		2011 ESTIMATE				
	EQUIPMENT or SYSTEM	QUANTITY / REDUNDANCY / CRITERIA	ESTIMATED HORSEPOWER (bhp)	PRICING BASIS	S&L SPEC	REMARKS
	Fuel Oil					
55	Fuel Oil Storage Tank	2 x 50% 1,250,000 gallons (3 days storage) CS non-insulated with electric heaters	TBD kw heater	S&L Database		
56	Fuel Oil Fire Protection	Foam (fluoroprotein foam) skid and accessories		S&L Database Adjusted		FP Costs
57	Demin Water Storage Tank	1 x 100% 1,350,000 Gallons (3 days storage) CS epoxy lined non-insulated with electric heaters	TBD kw heater	S&L Database		
58	Fuel Oil Forwarding Pumps and Motors	2 x 100%	400	S&L Database		
59	Fuel Oil Demin Water Injection Pumps and Motors	2 x 100%	75	S&L Database		
60	Fuel Oil Truck Unloading Skid	1 x 100%	N/A	S&L Database		
	Heat Recovery Steam Generator			S&L Database		
61	3-pressure with reheat	Integral dearator, 2-wide construction, 2 elevators				
62	Inlet ductwork from the CT to the HRSG	Diffusion Plate				
63	Reheater with inter-stage desuperheater					
64	High Pressure Superheater with inter-stage desuperheater					
65	High Pressure Evaporator					
66	High Pressure Economizer					
67	Intermediate Pressure Superheater					
68	Intermediate Pressure Evaporator					
69	Intermediate Pressure Economizer					
70	Low Pressure Superheater					
71	Low Pressure Evaporator					
72	Steam Spargers	Spargers and associated valves and controls for HRSG Winterization				
73	Feedwater Preheater with 2 x 100% recirculation pumps					
74	Exhaust Ductwork to the HRSG exhaust stack					
75	Exhaust Stack	200' above grade fully insulated up to isolation damper				
76	Stack Isolation Damper					
77	Duct Burners	Complete gas fired system for max ST output				
78	SCR	Includes catalyst with monorail and aqueous ammonia injection system				
79	CO catalyst					

OPTION 2
MECHANICAL EQUIPMENT LIST

		2011 ESTIMATE				
	EQUIPMENT or SYSTEM	QUANTITY / REDUNDANCY / CRITERIA	ESTIMATED HORSEPOWER (bhp)	PRICING BASIS	S&L SPEC	REMARKS
	Plant/Instrument Air					
80	Air Compressors and Motors	Existing				
81	Air Receiver Tanks	Existing and 1x100% CS Epoxy Coated		S&L Database		New receiver will be added to help reduce the cycling of the existing compressors.
82	Air Dryers	Existing				
83	Prefilters	Existing				
84	Afterfilters	Existing				
	Potable Water					
85	Tepid Water Recirculation System	Complete system with tank, heater, and mixing valves.	50kw	Estimated Cost		New system provided for CT/HRSG area.
86	Tepid Water Pumps and Motors		25			
	Raw Water					
87	Raw Water Storage Tank	1 x 100% 500,000 gallons CS non-insulated with electric heaters	TBD kw heater	S&L Database		Tank will be used as a break tank prior to the Pre-Treatment system.
88	Raw Water Pumps and Motors	Existing		S&L Database		
89	River Water Intake	Existing Structure with river water pumps				
90	River Water Intake Screens	1x100%		S&L Database		A new 316.b (Johnson) screen will be installed to replace the existing screen.
	Service Water					
91	Service/Fire Water Storage Tank	Not Required				
92	Service Water Pumps and Motors	Existing				

OPTION 2
MECHANICAL EQUIPMENT LIST

		2011 ESTIMATE				
	EQUIPMENT or SYSTEM	QUANTITY / REDUNDANCY / CRITERIA	ESTIMATED HORSEPOWER (bhp)	PRICING BASIS	S&L SPEC	REMARKS
	Steam System Components					
93	Desuperheaters	included with HRSG and specialties	N/A			
94	Flow elements	included with HRSG	N/A			
95	Large Bore HP Valves	As required by code and double block and bleed for HRSG Isolation	N/A	S&L Database		
96	Non-return valves	Air operated valve on Cold Reheat steam header	N/A	S&L Database		
97	Reheater Overpressurization Protection	4@25% 6x8 Safety Relief Valves	N/A	S&L Database		
98	Vents including silencers/mufflers	included with equipment as required	N/A			
99	Main Cycle Sample Panel	Complete water/steam sample panel with chiller	50	S&L Database		Stall - Adjusted for size
100	Steam turbine bypass valves	1 x 100% CT bypass system to condenser	N/A	Email Budgetary Quote		CCI - Adjusted for scope
101	Steam Turbine Drains Tank	10,500 gallon CS tank drained/vented to condenser	N/A	S&L Database		
102	Packaged Aux Boiler	80,0000 lbs/hr sized to maintain ST steam seals	300 (total load)	RFQ	BSCC-10	B&W PG total adjusted bid price.
103	Miscellaneous Drains Tank	Existing				
	Steam Turbine Generator	Existing				
104	Steam Turbine Generator					
105	Shaft sealing system					
106	Lubricating oil system					
107	Hydraulic power unit					
108	Turning gear	Reaplacement Gear and associated equipment required.		S&L Database		
109	Hydrogen cooled synchronous generator					
110	Steam seal regulator valves					
111	Lube Oil/Hydraulic Oil Storage Tank					
112	Hydrogen Purge Valves					
113	Hydrogen Control System					
114	Steam turbine control system					
115	Gland Steam Condenser	New gland steam condenser is required.		MHI Email		

OPTION 2
MECHANICAL EQUIPMENT LIST

		2011 ESTIMATE				
	EQUIPMENT or SYSTEM	QUANTITY / REDUNDANCY / CRITERIA	ESTIMATED HORSEPOWER (bhp)	PRICING BASIS	S&L SPEC	REMARKS
	Water Treatment					
116	River Water Pretreatment (Clarification and Upflow Filters)	Complete 4500 gpm system with chemical dosing and filter presses	300 (total load)	RFQ	BSCC-7	Graver total adjusted bid price adjusted for flow rate.
117	Water Treatment System	Complete 150 gpm system with 2 x 100% UF with 2 pass RO system complete with cartridge filters, feed pumps, chemical injection, break tank, and 2 x 100% clean in-place skids	200 (total load) + 80 kW	RFQ	BSCC-8	IDI total adjusted bid price.
118	Mixed Bed System	2 x 100% capacity mixed bed exchangers complete with regeneration equipment and tanks	Included above			
	Wastewater					
119	WTB Sump Pumps and Motors	3 x 50%	25	Email Budgetary Quote		Flowserve
120	Pretreatment Area Sump Pumps and Motors	3 x 50%	100	Email Budgetary Quote		Flowserve
120	Turbine Building Sump Pumps and Motors	Existing				Sump discharge will be rerouted to new OWS and/or overflow structure.
121	Oil/Water Separator	2 @ 500 gpm with 2 x 100% pumps and motors	25	S&L Database		
122	Sanitary Sewage Treatment	Existing				
123	**PIPE Supports**	All pipe support materials.	N/A	S&L Database		
124	**Piping Specialties**	Typical 700 MW pipe specialties as specified by S&L.	N/A	S&L Database		
125	**Control Valves**	Typical 700 MW scope of valves as specified by S&L	N/A	S&L Database		
	Note: Refer to the Combined Cycle Brownfield Build Cost Estimate Study, Volume 2, for the RFQ's referenced in this equipment list.					

ELECTRICAL EQUIPMENT LIST
OPTION 1

		2011 ESTIMATE				
	EQUIPMENT or SYSTEM	**QUANTITY / REDUNDANCY / CRITERIA**	**ESTIMATED HORSEPOWER (bhp)**	**PRICING BASIS**	**S&L SPEC**	**REMARKS**
	ELECTRICAL					
	CTG Generator Step Up Transformer	1 @ each CTG (Total 2)	N/A	S&L Database		
	Unit Auxiliary Transformer	1 @ each CTG (Total 2)	N/A	S&L Database		
	Generator Circuit Breaker	1 @ each CTG (Total 2)	N/A	S&L Database		
	CTG Isophase Bus Duct		N/A	S&L Database		
	Medium Voltage Cable Bus Duct		N/A	S&L Database		
	Medium Voltage Switchgear/MCCs	2 - Double Ended Main-Tie-Main type 2 - Single Ended type	N/A	S&L Database		
	Low Voltage Transformers	14 - Outdoor Cast Coil Type	N/A	S&L Database		
	Low Voltage Switchgear	7 - Double Ended Type	N/A	S&L Database		
	Low Voltage Bus Duct	Various services	N/A	S&L Database		
	480 Volt Motor Control Centers	24 - MCC Lineups	N/A	S&L Database		
	Protective Relay Panel	1 @ each CTG (Total 2)	N/A	S&L Database		
	Batteries	1 - 125 VDC (Lead Antimony)	N/A	S&L Database		
	Battery Chargers	2 - 480V 3 Phase input, 125VDC Output	N/A	S&L Database		
	UPS	1- Inverter	N/A	S&L Database		
	UPS Switchboard	1 - panel	N/A	S&L Database		
	UPS Panelboard	7 - panels	N/A	S&L Database		
	DC Switchboard	1 - 125DC	N/A	S&L Database		
	DC Panels	7 - panels	N/A	S&L Database		

ELECTRICAL EQUIPMENT LIST
OPTION 1

		2011 ESTIMATE				
	EQUIPMENT or SYSTEM	QUANTITY / REDUNDANCY / CRITERIA	ESTIMATED HORSEPOWER (bhp)	PRICING BASIS	S&L SPEC	REMARKS
	ELECTRICAL					
	Alternate Source Transformer	1 - Controlled Voltage Tranformer	N/A	S&L Database		
	Alternate Source Panels	7 - panels	N/A	S&L Database		
	Satellite UPS	1	N/A	S&L Database		
	Transformer Power Distribution Center (PDC)	1	N/A	S&L Database		
	HRSG Power Distribution Center (PDC)	2	N/A	S&L Database		
	HRSG Power Distribution Center (Upper) (PDC)	2	N/A	S&L Database		
	Chiller Power Distribution Center (PDC)	1	N/A	S&L Database		
	STG (PDC)	1	N/A	S&L Database		
	Fuel Oil (PDC)	1	N/A	S&L Database		
	Mimic Panels	9	N/A	S&L Database		
	Grounding Distribution Transformer	1 @ each CTG Isophase bus duct (Total 2)	N/A	S&L Database		
	DFR	1 @ each CTG ; 1 @ each STG (Total 3)	N/A	S&L Database		
	Communication System	Lan and Phone for each electrical room or PDC	N/A	S&L Database		
	Plant Security System	Security cameras and video management system, card readers and intercom	N/A	S&L Database		
	Emergency Diesel Generator	1 - 1000 kW (includes Synchronizing breaker)	N/A	S&L Database		

ELECTRICAL EQUIPMENT LIST
OPTION 1

		2011 ESTIMATE				
	EQUIPMENT or SYSTEM	QUANTITY / REDUNDANCY / CRITERIA	ESTIMATED HORSEPOWER (bhp)	PRICING BASIS	S&L SPEC	REMARKS
	ELECTRICAL					
	Combustion Turbine Generator					
	Excitation Transformer	1 @ each CTG (Total 2)		Included in CTG RFQ		
	Isolation Transformer	1 @ each CTG (Total 2)		Included in CTG RFQ		
	LCI Starter	1 @ each CTG (Total 2)		Included in CTG RFQ		
	Generator protection panel	1 @ each CTG (Total 2)		Included in CTG RFQ		
	Generator neutral grounding transformer & resistor	1 @ each CTG (Total 2)		Included in CTG RFQ		
	VT Cubicle	1 @ each CTG (Total 2)		Included in CTG RFQ		
	Motor Control Center	3 @ each CTG for CTG auxiliary loads (Total 6)		Included in CTG RFQ		
	Battery	1 @ each CTG - 125VDC Supply for CTG emergency loads (Total 2)		Included in CTG RFQ		
	Power Distribution Center	1 @ each CTG to house CTG vendor supplied electrical equipment (Total 2)		Included in CTG RFQ		
	Replaced Existing Electrical Equipment					
	Medium Voltage Cable Bus Duct	Bus duct from Existing UAT and RAT to new STG PDC building	N/A	S&L Database		
	Medium Voltage Switchgear/MCCs	2 - Double Ended Main-Main type	N/A	S&L Database		
	Low Voltage Transformers	2 - Outdoor Cast Coil Type	N/A	S&L Database		
	Low Voltage Switchgear	1 - Double Ended Main-Tie-Main type	N/A	S&L Database		
	Low Voltage Bus Duct	Various services	N/A	S&L Database		
	Protective Relay Panels	Replace GSU, UAT, RAT, and Generator protection relays.	N/A	S&L Database		

ELECTRICAL EQUIPMENT LIST
OPTION 1

		2011 ESTIMATE				
	EQUIPMENT or SYSTEM	**QUANTITY / REDUNDANCY / CRITERIA**	**ESTIMATED HORSEPOWER (bhp)**	**PRICING BASIS**	**S&L SPEC**	**REMARKS**
	ELECTRICAL					
	Existing Electrical Equipment					
	STG Generator Step Up Transformer	2	N/A	N/A		
	Unit Auxiliary Transformer	1	N/A	N/A		
	Reserve Auxiliary Transformer	1	N/A	N/A		
	STG Isophase Bus Duct		N/A	N/A		
	600V Switchgear	Various @ River Water Intake Structures	N/A	N/A		
	600V	Various	N/A	N/A		
	Battery	1 - 250 VDC	N/A	N/A		
	Battery Chargers		N/A	N/A		
	UPS		N/A	N/A		
	UPS Switchboard		N/A	N/A		
	UPS Panelboards	Various	N/A	N/A		
	DC Switchboard		N/A	N/A		
	DC Panels	Various	N/A	N/A		

ELECTRICAL EQUIPMENT LIST
OPTION 2

		2011 ESTIMATE				
	EQUIPMENT or SYSTEM	**QUANTITY / REDUNDANCY / CRITERIA**	**ESTIMATED HORSEPOWER (bhp)**	**PRICING BASIS**	**S&L SPEC**	**REMARKS**
	ELECTRICAL					
	CTG Generator Step Up Transformer	1 @ each CTG (Total 2)	N/A	S&L Database		
	Unit Auxiliary Transformer	1 @ each CTG (Total 2)	N/A	S&L Database		
	Generator Circuit Breaker	1 @ each CTG (Total 2)	N/A	S&L Database		
	CTG Isophase Bus Duct		N/A	S&L Database		
	Medium Voltage Cable Bus Duct		N/A	S&L Database		
	Medium Voltage Switchgear/MCCs	2 - Double Ended Main-Tie-Main type 2 - Single Ended type	N/A	S&L Database		
	Low Voltage Transformers	14 - Outdoor Cast Coil Type	N/A	S&L Database		
	Low Voltage Switchgear	7 - Double Ended Type	N/A	S&L Database		
	Low Voltage Bus Duct	Various services	N/A	S&L Database		
	480 Volt Motor Control Centers	24 - MCC Lineups	N/A	S&L Database		
	Protective Relay Panel	1 @ each CTG (Total 2)	N/A	S&L Database		
	Batteries	1 - 125 VDC (Lead Antimony)	N/A	S&L Database		
	Battery Chargers	2 - 480V 3 Phase input, 125VDC Output	N/A	S&L Database		
	UPS	1- Inverter	N/A	S&L Database		
	UPS Switchboard	1 - panel	N/A	S&L Database		
	UPS Panelboard	7 - panels	N/A	S&L Database		
	DC Switchboard	1 - 125DC	N/A	S&L Database		
	DC Panels	7 - panels	N/A	S&L Database		

ELECTRICAL EQUIPMENT LIST
OPTION 2

		2011 ESTIMATE				
	EQUIPMENT or SYSTEM	QUANTITY / REDUNDANCY / CRITERIA	ESTIMATED HORSEPOWER (bhp)	PRICING BASIS	S&L SPEC	REMARKS
	ELECTRICAL					
	Alternate Source Transformer	1 - Controlled Voltage Tranformer	N/A	S&L Database		
	Alternate Source Panels	7 - panels	N/A	S&L Database		
	Satellite UPS	1	N/A	S&L Database		
	Transformer Power Distribution Center (PDC)	1	N/A	S&L Database		
	HRSG Power Distribution Center (PDC)	2	N/A	S&L Database		
	HRSG Power Distribution Center (Upper) (PDC)	2	N/A	S&L Database		
	Chiller Power Distribution Center (PDC)	1	N/A	S&L Database		
	STG (PDC)	1	N/A	S&L Database		
	Fuel Oil (PDC)	1	N/A	S&L Database		
	Mimic Panels	9	N/A	S&L Database		
	Grounding Distribution Transformer	1 @ each CTG Isophase bus duct (Total 2)	N/A	S&L Database		
	DFR	1 @ each CTG ; 1 @ each STG (Total 3)	N/A	S&L Database		
	Communication System	Lan and Phone for each electrical room or PDC	N/A	S&L Database		
	Plant Security System	Security cameras and video management system, card readers and intercom	N/A	S&L Database		
	Emergency Diesel Generator	1 - 1000 kW (includes Synchronizing breaker)	N/A	S&L Database		

ELECTRICAL EQUIPMENT LIST
OPTION 2

		2011 ESTIMATE				
	EQUIPMENT or SYSTEM	QUANTITY / REDUNDANCY / CRITERIA	ESTIMATED HORSEPOWER (bhp)	PRICING BASIS	S&L SPEC	REMARKS
	ELECTRICAL					
	Combustion Turbine Generator					
	Excitation Transformer	1 @ each CTG (Total 2)		Included in CTG RFQ		
	Isolation Transformer	1 @ each CTG (Total 2)		Included in CTG RFQ		
	LCI Starter	1 @ each CTG (Total 2)		Included in CTG RFQ		
	Generator protection panel	1 @ each CTG (Total 2)		Included in CTG RFQ		
	Generator neutral grounding transformer & resistor	1 @ each CTG (Total 2)		Included in CTG RFQ		
	VT Cubicle	1 @ each CTG (Total 2)		Included in CTG RFQ		
	Motor Control Center	3 @ each CTG for CTG auxiliary loads (Total 6)		Included in CTG RFQ		
	Battery	1 @ each CTG - 125VDC Supply for CTG emergency loads (Total 2)		Included in CTG RFQ		
	Power Distribution Center	1 @ each CTG to house CTG vendor supplied electrical equipment (Total 2)		Included in CTG RFQ		
	Replaced Existing Electrical Equipment					
	Medium Voltage Cable Bus Duct	Bus duct from Existing UAT and RAT to new STG PDC building	N/A	S&L Database		
	Medium Voltage Switchgear/MCCs	2 - Double Ended Main-Main type	N/A	S&L Database		
	Low Voltage Transformers	2 - Outdoor Cast Coil Type	N/A	S&L Database		
	Low Voltage Switchgear	1 - Double Ended Main-Tie-Main type	N/A	S&L Database		
	Low Voltage Bus Duct	Various services	N/A	S&L Database		
	Protective Relay Panels	Replace GSU, UAT, RAT, and Generator protection relays.	N/A	S&L Database		

ELECTRICAL EQUIPMENT LIST
OPTION 2

		2011 ESTIMATE				
	EQUIPMENT or SYSTEM	**QUANTITY / REDUNDANCY / CRITERIA**	**ESTIMATED HORSEPOWER (bhp)**	**PRICING BASIS**	**S&L SPEC**	**REMARKS**
	ELECTRICAL					
	Existing Electrical Equipment					
	STG Generator Step Up Transformer	2	N/A	N/A		
	Unit Auxiliary Transformer	1	N/A	N/A		
	Reserve Auxiliary Transformer	1	N/A	N/A		
	STG Isophase Bus Duct		N/A	N/A		
	600V Switchgear	Various @ River Water Intake Structures	N/A	N/A		
	600V	Various	N/A	N/A		
	Battery	1 - 250 VDC	N/A	N/A		
	Battery Chargers		N/A	N/A		
	UPS		N/A	N/A		
	UPS Switchboard		N/A	N/A		
	UPS Panelboards	Various	N/A	N/A		
	DC Switchboard		N/A	N/A		
	DC Panels	Various	N/A	N/A		

OPTION 1 & 2
I&C EQUIPMENT LIST

		2011 ESTIMATE				
	EQUIPMENT or SYSTEM	QUANTITY / REDUNDANCY / CRITERIA	ESTIMATED HORSEPOWER (bhp)	PRICING BASIS	S&L SPEC	REMARKS
	I&C					
1	Distributed Control System	(4480) IO Points (53) Controller / IO / Marshalling Cabinets	N/A	RFQ	BSCC-11	
2	CEMS	1 @ each HRSG Stack (Total 2)	N/A	E-mail / S&L Database		
3	BOP Instrumentation	(513) BOP Instruments (133) BOP Instrument Racks & Enclosures	N/A	S&L Database		
	Combustion Turbine Generator					
4	Combustion Turbine Control System	1 @ each CTG (Total 2)		Included in CTG RFQ	BSCC-1	
5	Combustion Turbine Supervisory Instrumentation	1 @ each CTG (Total 2)		Included in CTG RFQ	BSCC-1	
6	Combustion Turbine Excitation Control System	1 @ each CTG (Total 2)		Included in CTG RFQ	BSCC-1	
7	Combustion Turbine Instrumentation	1 @ each CTG (Total 2)		Included in CTG RFQ	BSCC-1	
	Heat Recovery Steam Generator					
8	HRSG Instrumentation	1 @ each HRSG (Total 2)		Included in HRSG RFQ	BSCC-2	
	Steam Turbine Generator					
9	Steam Turbine Control System	1 @ STG		Existing	Existing	IO count and cabinet count included in DCS totals above
10	Steam Turbine Supervisory Instrumentation	1 @ STG		Existing	Existing	
11	Steam Turbine Excitation Control System	1 @ STG		Existing	Existing	
12	Steam Turbine Instrumentation	1 @ STG		Existing	Existing	
	Auxiliary Boiler					
13	Aux Boiler PLC	1 @ Aux Boiler		Included in Aux Blr RFQ	BSCC-10	
14	Aux Boiler Instrumentation	1 @ Aux Boiler		Included in Aux Blr RFQ	BSCC-10	

Refer to the Combined Cycle Brownfield Build Cost Estimate Study, Volume 2, for the RFQ's referenced in this equipment list.

ATTACHMENT 1-3
Existing System/Equipment Assessment Report

EXISTING SYSTEM/EQUIPMENT ASSESSMENT REPORT MECHANICAL

ITEM	DESCRIPTION	ORIGINAL SIZE/CAPACITY OTHER DATA	REPOWERED SIZE/CAPACITY/ OTHER DATA	MODIFICATIONS REQUIRED	REFERENCE DRAWING/ DOCUMENT	CONDITION ASSESSMENT	NOTES	REV
1	**Steam Turbine & Auxiliaries**							
A	Steam Turbine	The current steam turbine has been upgraded to allow a MS flow of 2.08M lbs/hr, a HR flow of 1.68M lbs/hr, and a LPT exhaust flow to the condenser of 1.25 lbs/hr.	Mitsubishi evaluated two steam flow conditions. The first considered a maximum flow to the condenser of 1.25M lbs/hr and the second was 1.634M lbs/hr. All steam extraction points, except for those supplying the No. 1 & 2 LP Heaters will not be used.	As described in Mitsubishi report. The turning gear is obsolete. A new turning gear with associated components has been added to equipment list.	Mitsubishi Report: MPSA # PA-00045	As described in Mitsubishi report.	The selection of the steam flows for the repowered Unit 1 will be assessed in the final version of the AEP Repowering Report. The Final version of the Mitsubishi report will document the required modifications for the ST to operate with the new steam flows including the new LP Steam admission point. Turning Gear (Maintenance) Cost Estimate = $180,270	E
B	Gland Steam System	The gland steam condenser is designed for 300 psi pressure. It will handle 2,560 gpm of condensate flow with a pressure drop of 2 psi.	The design condensate flowrate for the repowered unit is 3500 gpm.	The gland steam condenser will be replaced to accommodate the higher flow.	GSLO Descriptive Article	The plant has noted that the existing system is in need of replacement.	Gland Steam Condenser (Repowering) Cost Estimate = $95,135	E
C	Turbine Lube/Seal Oil		Existing storage, treatment, supply, and return design will not be changed.	Equipment will be reused				
2	**Condensate System**							
A	Steam Surface Condenser	The condenser has 130,000 ft2 of surface area originally designed for 1.122M lbs/hr of steam. The condenser is designed for 98,750 gpm of circulating water flow at 22 ftH2O of pressure drop. The condenser was retubed in 2005 with 90-10 Cu/Ni in the condensing section and 70-30 Cu/Ni in the air removal section.	The condenser will see increased flows rates ranging from the current 1.25M lbs/hr up to 1.634M lbs/hr with conditions as shown on the heat balances. Bypass capability is limited by physical constraints at the condenser.	SPX has determined that the condenser can handle the new LP ST exhaust steam flow rates. There is an increased risk of vibration that can be reduced by staking the tube bundle. SPX also confirmed that the condenser can accept a 1 x 100% CT bypass system. SPX recommends the installation of grating plates to the top of the top bundles to act as impingement plates.	Surface Condenser Data Sheet SPX Report No. 11-9226	The main condenser has 1% of its tubes plugged and the tube sheets was reported to be in good condition.	The bypass dump tubes will be in close proximity to some of the condenser support steel and transition section. Inspections should be performed to determine the extent or erosion caused by the bypass steam. Additional impingement plates may be required. Turbine Bypass Spargers (Repowering) Cost Estimate = $257,985 Condenser Modifications (Repowering) Cost Estimate = $200,000	E
B	Vacuum Pumps and Motors			Equipment will be reused				
C	Hotwell Pumps and Motors	3,000 gpm @ 145' TDH	3,500 gpm @ 180' TDH	Existing pumps are expected to be acceptable for the 1.25M lbs/hr but pump and motor replacement is required for 1.634M lbs/hr (3500 gpm).	Flow Diagram 1-5017-17		Hotwell Pumps & Motors (Repowering) Cost Estimate = $324,554	E
D	Condensate Booster Pumps and Motors	3,000 gpm @ 555' TDH	3,500 gpm @ 690' TDH	Pump and motor replacement is required for 1.634M lbs/hr (3500 gpm).	Flow Diagram 1-5017-17		Condensate Booster Pumps & Motors (Repowering) Cost Estimate = $494,375	E

EXISTING SYSTEM/EQUIPMENT ASSESSMENT REPORT MECHANICAL

ITEM	DESCRIPTION	ORIGINAL SIZE/CAPACITY OTHER DATA	REPOWERED SIZE/CAPACITY/ OTHER DATA	MODIFICATIONS REQUIRED	REFERENCE DRAWING/ DOCUMENT	CONDITION ASSESSMENT	NOTES	REV
E	LP Heater No. 1	71,422 lbs/hr steam 128,279 lbs/hr drains 1.37M lbs/hr condensate	142,609 lbs/hr steam 1.62M lbs/hr condensate	Heater bypass may be required based on the repowered condensate flow rate. Drain flow will be reduced based on the removal of LP Heater No. 3.	FW Heater Spec Sheet			
F	LP Heater No. 1 Drain Pumps and Motors	700 gpm @ 530' TDH				Heater Drain Pumps are obsolete.	New pumps and motors have been added to the equipment list. LP Heater No. 1 Drain Pumps & Motors (Maintenance) Cost Estimate = $169,732	E
G	LP Heater No. 2	45,179 lbs/hr steam 83,100 lbs/hr drains 1.498M lbs/hr condensate	77,510 lbs/hr steam 1.74M lbs/hr condensate	Heater bypass may be required based on the repowered condensate flow rate. Drain flow will be reduced based on the removal of LP Heater No. 3.	FW Heater Spec Sheet			
3	**Circulating Water System**							
A	Natural Draft Cooling Tower	Need Data	SPX proposal lists a CW flowrate of 116,000 gpm with a Hot Water temperature of 115.9F and a Cold Water temperature of 87.7F at a Wet Bulb temperature of 76.0F	Install 7.88' depth of Marley DF254 fill. Installation includes new supporting structure, drift eliminator system, and distribution system.	SPX Proposal # B03297		Cooling Tower Fill Replacement (Maintenance) Cost = $10,000,000 Cooling Tower Fill Replacement With High Efficiency Fill (Repowering) Cost Estimate = $1,450,000	E
B	CW Pumps & Motors	2 x 50% @ 60,000 gpm	116,000 gpm total flow	Pumps will need to be recoated and motors refurbished.		Pumps are in good working condition but they are obsolete.	CW Pumps & Motors Refurbishment (Maintenance) Cost Estimate = $400,000	E
C	CW Piping & Components			Equipment will be reused				
D	Large CW Butterfly Valves			Equipment will be reused				
E	Chemical Feed			Equipment will be reused				
4	**Compressed Air System**							
A	Plant Air Compressors and Motors	1650 CFM		Equipment will be reused			The majority of the plant air users will be abandoned as part of the repowering project. The compressors may be over sized for the repowered configuration.	
B	Plant Air Receivers	150 cu.ft		Equipment will be reused				
C	Control Air Receiver	150 cu.ft		Equipment will be reused			A new receiver has been added to the equipment list to avoid excessive cycle of the compressors. New Control Air Receiver (Repowering) Cost Estimate = $22,070	E
D	Control Air Prefilters			Equipment will be reused				
E	Control Air 500 CFM Dryer			Equipment will be reused				
F	Control Air 150 CFM Dryer			Equipment will be reused				
G	Control Air Afterfilters			Equipment will be reused				

EXISTING SYSTEM/EQUIPMENT ASSESSMENT REPORT MECHANICAL

ITEM	DESCRIPTION	ORIGINAL SIZE/CAPACITY OTHER DATA	REPOWERED SIZE/CAPACITY/ OTHER DATA	MODIFICATIONS REQUIRED	REFERENCE DRAWING/ DOCUMENT	CONDITION ASSESSMENT	NOTES	REV
5	**Fire Protection**							
A	Motor Driven Fire Pump	1,500 gpm @ 350' TDH		Equipment will be reused			AEP and S&L FP Engineers will perform a complete review of the Big Sany Plant Unit 1 fire protection system.	
B	Diesel Engine Driven Fire Pump	2,000 gpm @ 350' TDH	3,500 gpm			A new Diesel Driven Fire Pump is required.	The new pump has been added to the equipment list. Diesel Driven Fire Pump (Maintenance) Cost Estimate = $179,821	E
C	Pegging Pump	50 gpm @ 125' TDH		Equipment will be reused				
6	**River Water Intake**							
A	River Intake Screens			Low velocity Johnson screens will be required to meet 316.b requirements			New Johnson screens will be installed on the existing intake pipes. River Water Intake Screens (Repowering) Cost Estimate = $200,541	E
B	River Water Make-up Pumps and Motors	6,750 gpm @ 100' TDH		Equipment will be reused			Piping to Cooling Tower should be inspected prior to re-use.	
C	Self Cleaning Strainers			Equipment will be reused				
D	Jetting Pumps	650 gpm @ 225' TDH		Equipment will be reused				
7	**Service Water**							
A	LP Service Water Pumps and Motors	600 gpm @ 105' TDH		Equipment will be reused			The SW header will be extended into the CT/HRSG area. SW will be used for BD quench and hose stations.	
8	**Wastewater**							
A	Sanitary Waste Water Treatment			Equipment will be reused			Repowering project does not affect this system.	
B	Turbine Building Sump Pumps and Motors			Equipment will be reused				

Notes

1 Replacement, upgrade or refurbishment costs included in the cost estimates are tabulated in the "Notes" field.
Costs either are associated with "maintenance" or "repowering" as identified.
The costs specified do not include any direct or indirect cost adders - refer to cost estimates.

EXISTING SYSTEM/EQUIPMENT ASSESSMENT REPORT ELECTRICAL

ITEM	DESCRIPTION	ORIGINAL SIZE/CAPACITY OTHER DATA	REPOWERED SIZE/CAPACITY/ OTHER DATA	MODIFICATIONS REQUIRED	REFERENCE DRAWING/ DOCUMENT	CONDITION ASSESSMENT	NOTES	REV
1	**Main Power System**							
A	ST Generator	The current generator has been upgraded to produce an output of 330 MVA.	330 MVA	Rated @ 330 MVA. Equipment will be reused. Based on information from the site, the generator stator and rotor are over due to be rewound. AEP's plans, in addition to the rewinding, to restack or repair the stator core as well as to upgrade the machine to a 350 MVA rating.	AEP document sent by Brian Puckett on 6/20/2011 and Brian Puckett 7/13/2011 email. In addition an email from Brian Puckett dated 8/1/2011 discusses the possible plan to rewind and upgrade the machine.		Generator Rewind (Repowering) Cost Estimate = $6,000,000	E
B	Isolated Phase Bus	393 MVA	393 MVA	Equipment will be reused.	AEP document sent by Brian Puckett on 6/20/2011	Assumed to be good based on discussion with plant personnel.		
C	Generator Step-Up Transformers	350 MVA after additional coolers were added.	350 MVA	Equipment will be reused.	AEP document sent by Brian Puckett on 6/20/2011	Assumed to be good based on discussion with plant personnel.		
D	OH Line to 138 KV Switchyard	447 MVA	447 MVA	Equipment will be reused.	AEP document sent by Brian Puckett on 6/20/2011	Assumed to be good based on discussion with plant personnel.		
E	138 KV Circuit Breakers			New generator circuit breaker to be added. Existing circuit breaker in the switchyard will be replaced to carry the output of the complete combined cycle facility.				
2	**Auxiliary Power System**							
A	Unit Auxiliary Transformer	12000/16000 MVA	12000/16000 MVA transformer will be reused but will be significantly unloaded due to the boiler loads being disconnected.	Equipment will be reused.	1-1200A-18	Assumed to be good based on discussion with plant personnel.		
B	Reserve Auxiliary Transformer	12000/16000 MVA	12000/16000 MVA transformer will be reused but will be significantly unloaded due to the boiler loads being disconnected.	Equipment will be reused.	1-1200A-18	Assumed to be good based on discussion with plant personnel.		
C	4.16 KV Switchgear	1600 A, 4.16 KV Switchgear	Original switchgear will be de-commissioned. New switchgear will be added to match the load requirements of the STG and cooling tower.	De-commission the existing switchgear due to it being outdated and not arc resistant type.	1-1200A-18	Switchgear cannot be reused because it is outdated and not arc resistant.	For 4.16 KV Switchgear (Repowering) Cost Estimate Refer to Cost Estimates.	E
D	600 V Main Switchgear 11A/B	1600 A, 600V	Original switchgear will be de-commissioned. New switchgear will be added to match the load requirements of the STG, cooling tower and other ventilation and lighting loads.	De-commission the existing switchgear due to it being outdated and not arc resistant type.	1-1200A-18	Switchgear cannot be reused because it is outdated and not arc resistant.	For 600 V Main Switchgear (Repowering) Cost Estimate Refer to Cost Estimates.	E

EXISTING SYSTEM/EQUIPMENT ASSESSMENT REPORT ELECTRICAL

ITEM	DESCRIPTION	ORIGINAL SIZE/CAPACITY OTHER DATA	REPOWERED SIZE/CAPACITY/ OTHER DATA	MODIFICATIONS REQUIRED	REFERENCE DRAWING/ DOCUMENT	CONDITION ASSESSMENT	NOTES	REV
E	600 V MCCs	Varies	Varies	Equipment will be reused.	1-1200A-18	Assumed to be good based on discussion with plant personnel. MCCs cannot be equipped with remote racking.		
3	**DC System**		Planned to be reused.	Equipment will be reused.				
4	**Protective Relays**	Electromechanical relays for STG, GSU, UAT and RAT.		Replace relays with new microprocessor based relays		Existing relays are outdated. Relays will be replaced with state of the art microprocessor based relays.	Protective Relays (Maintenance) Cost Estimate = $27,018	E
5	**Power Cable**	Asbestos clad	Varies	Existing power cable will be retained and spliced to new cable from new switchgear.		Assumed to be good based on discussion with plant personnel.		
6	**DFR**	Outdated DFR for the STG	DFR not adequate for the CTGs	DFR will be replaced with state of the art high speed microprocessor device. The master will be loacted in the transformer PDC and will service both CTGs. The slave will be for the STG and will be located in the relay panel in the control room. The slave will communicate with the master.		Existing DFR is outdated. DFR will be replaced with state of the art microprocessor based high speed device	DFR (Repowering) Cost Estimate = $143,586	E

Notes

1 Replacement, upgrade or refurbishment costs included in the cost estimates are tabulated in the "Notes" field.
Costs either are associated with "maintenance" or "repowering" as identified.
The costs specified do not include any direct or indirect cost adders - refer to cost estimates.

EXISTING SYSTEM/EQUIPMENT ASSESSMENT REPORT I&C

ITEM	DESCRIPTION	ORIGINAL SIZE/CAPACITY OTHER DATA	REPOWERED SIZE/CAPACITY/ OTHER DATA	MODIFICATIONS REQUIRED	REFERENCE DRAWING/ DOCUMENT	CONDITION ASSESSMENT	NOTES	REV
1	**Ovation DCS**							
A	Network Equipment	Primary and Backup Root switches, with one communication switch	Primary and Backup Root switches, redundant communication switches	All existing parts will be used as spare for new project or demolished.	1-92204	Equipment will be replaced as part of repowering project.		
B	Operator Consoles	2 quad screen operator stations	3 quad screen operator stations for Unit Control, HRSG, BOP, and STG. 1 quad screen operator station for both CTG's.	All existing parts will be used as spare for new project or demolished.	1-92204	Equipment will be replaced as part of repowering project.		
C	Engineering Workstation	1 dual screen engineer workstation / database server	1 dual screen engineer workstation / database server	All existing parts will be used as spare for new project or demolished.	1-92204	Equipment will be replaced as part of repowering project.		
D	AV Server & Domain Controller	1 dual screen AV Server & 1 dual screen Domain Controller	1 dual screen AV Server & 1 dual screen Domain Controller	All existing parts will be used as spare for new project or demolished.	1-92204	Equipment will be replaced as part of repowering project.		
E	Turbine Control System	Upgraded in 2008 - includes 1 controller cabinet, 2 IO exp cabinets, 1 field term cabinet.	Same	Equipment will be reused. Addition of Synchronization module and logic revisions as required for modified turbine controls	1-92410, 1-92411, 1-92412, 1-92413	Turbine control system was purchased in 2008, and is still the latest offering from Emerson. These controllers will plug in directly to the new repowered control network. There is adequate space in the existing cabinets to add IO points and cards if necessary. This equipment will be reused as part of repowering project.	Turbine Control System Upgrade (Repowering) Cost Estimate = $345,033	E
F	BFP Turbine Control System & Turbine Aux Controls	Upgraded in 2008 - includes 2 controller cabinets, 2 IO exp cabinets, 3 field term cabinets, 3 relay term cabinets.	Not Required	Applicable equipment will be reused.	1-92414 thru1-92424	BFP Turbine & Turbine Aux Control Systems were purchased in 2008, and is still the latest offering from Emerson. These controllers, IO Cards, and Cabinets can be used as spare parts for the repower project. Some of the Turbine Aux circuits will have to remain in service for the repower project. This equipment will be reused as part of repowering project for spare parts.		
G	Boiler Control System	3 Ovation cabinets	Not Required	Not Required	1-92201A/B/C, 1-92202A/B/C, 1-92203A/B/C	Equipment will be demolished as part of repowering project.		

Notes

1 Replacement, upgrade or refurbishment costs included in the cost estimates are tabulated in the "Notes" field.
Costs either are associated with "maintenance" or "repowering" as identified.
The costs specified do not include any direct or indirect cost adders - refer to cost estimates.

ATTACHMENT 1-4
Heat Balances

Design Basis for S&L Heat Balances

- Plant configuration – 2x2x1
- Gas Turbines
  - MHI 501GAC – Option 1
    - Performance data to be obtained from MHI
  - GE 7FA.05 – Option 2
    - Performance data to be obtained from GE
  - All heat balance cases (listed below) will be completed for both gas turbine models
- Inlet Air Cooling
  - Chillers used for base design cases
    - Electric refrigerant cycle chillers with fin-fan cooling
  - Evaporative coolers used for alternate cases for comparison purposes
- Fuel
  - Natural Gas is primary fuel, No. 2 distillate is backup
  - Use typical compositions for both fuels
- HRSG
  - 3-Pressure reheat
  - Duct burners
    - Duct firing adjusted to set LP exhaust steam flow to 1.6 MMlb/hr for both Options 1&2
  - SCR and CO catalysts
  - Deaerator integral with LP Evaporator
  - LP FWHs 1&2 remain in operation
    - Based on datasheets “2733-01-004-R2.pdf” and “2733-02-004-R2.pdf”
- Steam Turbine
  - Based on MHI heat balance diagram including HP and IP/SFLP replacement
    - Dwg. No. KA3-0071-4

        - Based on MHI input (teleconference on July 18, 2011), HP steam (Main Steam) temperature is reduced to 950°F; IP steam (Hot Reheat) temperature is reduced to 1000°F.

- Heat Rejection System
    - Surface Condenser
        - Based on datasheet "BS1 Main Condenser Data, Dwgs.pdf"
    - Natural Draft Cooling Tower
        - Based on report "110512 SPX Proposal B03297 to American Electric Power for Big Sandy Unit 1 Upgrade.pdf"

- Site Ambient Conditions
    - Elevation: 625 ft AMSL
    - 99% Winter: 5°F db / 3.5°F wb
    - Annual Average: 55°F db / 49°F wb
    - 1% Summer Wet Bulb: 85°F db / 76°F wb
    - PJM Design: 91°F db / 45% RH (74°F wb)
    - Summer Extreme: 105°F db / 84°F wb

- Priority Heat Balance Cases – for equipment sizing
    - Natural Gas fuel
        - Annual Average – 100% load (case #1)
        - 99% Winter – 100% load (case #3)
        - 1% Summer Wet Bulb – 100% load (case #5)
        - Summer Extreme – 100% load with inlet chillers and duct firing (case #6)
        - PJM Design – 100% load with inlet chillers and duct firing (case #7)
        - 1% Summer Wet Bulb – 100% load with inlet chillers and duct firing (case #2)
        - Annual Average – 100% load with inlet chillers and duct firing (case #8)
        - 99% Winter – 100% load with duct firing (case #9)
        - PJM Design – 100% load with inlet chillers (case #10)
        - PJM Design – 100% load with inlet evaporative coolers (case #11)
        - PJM Design – 100% load with inlet evaporative coolers and duct firing (case #12)

        - 1% Summer Wet Bulb – Turbine Bypass, 100% load with inlet chillers (case #13)
    - Distillate Oil fuel
        - Annual Average – 100% load (case #29)
        - 99% Winter – 100% load (case #30)

- Secondary Heat Balance Cases – for air permit preparation and information
    - Natural Gas fuel
        - Summer Extreme – 100%, 75%, 50% load (cases #14-16)
        - 1% Summer Wet Bulb – 75%, 50% load (cases #17-18)
        - Annual Average – 75%, 50% load (cases #19-20)
        - 99% Winter – 75%, 50% load (cases #21-22)
        - Summer Extreme – 100% load with inlet chillers (case #23)
        - 1% Summer Wet Bulb – 100% load with inlet chillers (case #4)
        - Annual Average – 100% load with inlet chillers (case #24)
        - PJM Design – 100% load (case #25)
        - PJM Design – 100% load with duct firing (case #26)
        - 1% Summer Wet Bulb – with inlet evaporative coolers (case #27)
        - Annual Average – 100% load with duct firing (case #28)
    - Distillate Oil fuel
        - Summer Extreme – 100%, 85%, 70% load (cases #31-33)
        - 1% Summer Wet Bulb – 100%, 85%, 70% load (cases #34-36)
        - Annual Average – 85%, 70% load (cases #37-38)
        - 99% Winter – 85%, 70% load (cases #39-40)

- Computer Program
    - Use GateCycle Version 5.5
    - Utilize existing model for MHI 501GAC from previous project
    - GateCycle Version 6.0 has known issues that require modeling work-arounds and runs slower.
    - Due to the time constraints and fast-track schedule, Version 5.5 is preferred as it is quicker with the same accuracy.

- Steam Properties – IAPWS-IF97 steam tables

- Results Deliverables
    - Summary table with complete performance data for all cases
    - Generic flow diagram with stream numbers to use with summary table

PRELIMINARY
Estimated Performance Summary
2x2x1 MHI M501GAC

Notes and Assumptions:

1. Ambient conditions per S&L Report and ASHRAE data.
   - Winter Extreme: -23°F db / -23°F wb
   - 99% Winter: 5°F db / 3.5°F wb
   - Annual Average: 55°F db / 49°F wb
   - 1% Summer Wet Bulb: 85°F db / 76°F wb
   - 1% Summer Dry Bulb: 89°F db / 74°F wb
   - PJM Design: 91°F db / 45% RH (74°F wb)
   - Summer Extreme: 105°F db / 84°F wb
   - Site elevation: 625 ft AMSL
2. Combustion Turbine performance based on data provided by MHI dated 14-Apr-11, 27-Apr-11, and 23-May-11.
   - Exhaust gas constituents were provided on a mass percent basis, and were converted to a volume percent basis.
3. HRSG design is based on Annual Average ambient conditions without duct firing.
   - Main Steam and Hot Reheat Steam design temperatures are 960°F and 1010°F respectively to avoid exceeding the stress limits of the turbine blades. (see Note 4)
   - Exhaust gas temperature loss is 2°F in the transtion from CT to HRSG.
   - Miscellaneous casing heat losses are 1.0%.
   - Evaporators use a 15°F pinch temperature.
   - Reheat superheater waterside pressure loss is 2% on design case. Waterside pressure loss is 1% on design case for all other superheaters.
   - Economizer waterside pressure loss is 1% on design case.
   - Stack temperature is maintained at 185°F minimum for natural gas cases / 285°F minimum for distillate oil cases using condensate preheater bypass when necessary for off-design cases.
4. Steam Turbine design is based on MHI heat balance diagram after HP and IP/SFLP turbine replacement.
   - Dwg. # KA3-0071-4 dated 2006/12/15 - Maximum Mechanical Design Point
   - Steam Turbine has a 3-flow LP section with a 25" last stage blade per Client email dated 23-Jun-11.
   - Exhaust losses based on curve CT-11679 dated 10/10/60. (filename: BS1 DFLP EL CT11679 001.pdf)
   - Performance based on new and clean conditions (i.e., no degradation).
   - Performance matched based on the ASME 1967 Steam Tables.
     - Main Steam and Hot Reheat Steam temperatures are limited to 950°F and 1000°F respectively in combined cycle operation to avoid exceeding the stress limits of the turbine blades.
     - This is based on a conference call with MHI on 18-Jul-11 (filename: BS1 Repowering CE Study Project_Mitsubishi TC_07-18-11.doc)
     - Floor pressure for part load cases is assumed to be half of the maximum ST inlet pressure (1732 psia / 2 = 866 psia).
5. Steam Turbine generator efficiency is 98.8%.
6. Condenser design is based on Worthington Corporation datasheet for serial number 1 589 669. (filename: BS1 Main Condenser Data, Dwgs.pdf)
   - HEI cleanliness factor = 0.85
   - Performance based on new and clean conditions aside from above HEI cleanliness factor (i.e., no degradation).
   - Performance matched based on the ASME 1967 Steam Tables.
     - Minimum condenser pressure = 1.0 in HgA based on the typical limit of air removal equipment.
7. Cooling Tower design is based on SPX proposal for BS U1 repairs and upgrade. (filename: 110512 SPX Proposal B03297 to American Electric Power for Big Sandy Unit 1 Upgrade.pdf)
   - Performace based on Option 3 per Client email dated 07-Jun-11.
   - Drift loss = 0.005%, which is typical for a natural draft cooling tower.
   - Performance based on new and clean conditions (i.e., no degradation).
   - Performance matched based on the ASME 1967 Steam Tables.
     - Cooling water outlet minimum temperature in winter cases is 65°F based on Client email dated 5-Jul-11.
     - Some cooling tower operating parameters can not be calculated in cases where the minimum cooling water temperature is reached
8. Feedwater Heaters #1&2 design are based on American Exchanger Services datasheets AM-EX Nos. 2733-01 and 2733-02 respectively. (filenames: 2733-01-004-R2.pdf & 2733-02-004-R2.pdf)
   - Performance based on new and clean conditions (i.e., no degradation).
   - Performance matched based on the ASME 1967 Steam Tables.
9. Turbine Cooling Air (TCA) Cooler design conditions based on MHI document IBO-09121.
   - TCA heat rejection loads included with Combustion Turbine performance.
   - HP drum inlet valve used to maintain TCA Cooler water outlet pressure above 2400 psig to prevent flashing
10. Fuel Gas Performance Heater fuel outlet temperature = 392°F per MHI performance data.
    - Design fuel outlet temperature may not be achievable for part load cases.
11. Duct burner fuel flow rate adjusted to achieve 1.6 MMlb/hr Steam Turbine exhaust flow rate for fired cases per Client direction.
    - The exhaust flow rate limit is due to the limitations of the existing condenser.
12. Natural Gas lower heating value (LHV) = 19,954 Btu/lb with ratio HHV/LHV = 1.11 based on MHI standard natural gas fuel.
13. Piping Line Losses:
    - Main Steam - 100 psi pressure loss and 10°F temperature drop
    - Cold Reheat - 6% pressure loss and 4°F temperature drop
    - Hot Reheat - 6% pressure loss and 10°F temperature drop
    - LP Admission Line - 10% pressure loss and 4°F temperature drop
    - Condensate Line - 140 psi pressure loss per project team and 2°F temperature drop
14. Combustion Turbine inlet pressure drop including chiller coils is 4.0 inches H2O at ISO conditions.
15. HRSG gas side pressure drop is 16.0 inches H2O at ISO conditions.
16. HRSG blowdown is 1% for HP and IP.
17. Deaerator is integral with LP evaporator of HRSG.
18. To approximate flows in gpm, flows calculated in lb/hr are divided by the conversion factor of 500.
19. Condensate Pump will be replaced to account for additional piping and equipment for the repowered combined cycle plant that is not in the existing plant.
    - New Condensate Pump discharge pressure per input from project team.
20. Feedpump discharge characteristics do not account for piping and valving losses between control valve and HRSG economizer inlet.
21. BOP Auxiliary Power percentage is approximately 2.20% which accounts for auxiliaries in combined cycle.
22. Temperature change across the SCR is assumed to be zero.
23. Chiller outlet air temperature is 50°F, which is the industry standard value.
24. Evaporative cooler water flow rate does not include blowdown flow, only evaporation.
25. Makeup water flow rate to the steam cycle does not include the water flow to the evaporative coolers or to the CT for water injection.
26. Steam property method is IAPWS-IF97 (ASME 1999 steam tables) for the overall combined cycle model.
27. Heat balance results determined using GateCycle program, Version 5.52.

PRELIMINARY

Estimated Performance Summary
2x2x1 MHI M501GAC

CASE DESCRIPTION	Stream No.	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8
Equipment Design		HRSG							
Ambient Dry Bulb Temperature	G1	55°F	85°F	5°F	85°F	85°F	105°F	91°F	55°F
Relative Humidity	G1	66%	67%	68%	67%	67%	43%	45%	66%
Ambient Wet Bulb Temperature	G1	49°F	76°F	3.5°F	76°F	76°F	84°F	74°F	49°F
Site Elevation (ft AMSL)		625	625	625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2	2	2
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
COMBUSTION TURBINE CHARACTERISTICS (per CT)									
CT Frame		M501GAC	M501GAC	M501GAC	M501GAC	M501GAC	M501GAC	M501GAC	M501GAC
Load Condition		100%	100%	100%	100%	100%	100%	100%	100%
Inlet Air Cooling		NONE	CHILLER ON	NONE	CHILLER ON	NONE	CHILLER ON	CHILLER ON	CHILLER ON
Chiller Cooling Capacity (ton)		0.	8,067.	0.	8,067.	0.	11,569.	6,929.	447.
Chiller Air Outlet Temperature (°F)		-	50.	-	50.	-	50.	50.	50.
Evaporative Cooler Water Flow Rate (Evaporation only) (lb//hr)		0.	0.	0.	0.	0.	0.	0.	0.
Evaporative Cooler Air Outlet Temperature (°F)		-	-	-	-	-	-	-	-
Fuel Lower Heating Value (Btu/lb)	G2, G4, O1	19,954.	19,954.	19,954.	19,954.	19,954.	19,954.	19,954.	19,954.
Fuel Flow Rate (lb/hr)	G2, O1	115,370.	116,990.	129,670.	116,990.	107,040.	116,990.	116,990.	116,950.
Fuel Inlet Temperature (°F)	G2, O1	392.	392.	392.	392.	392.	392.	392.	392.
Heat Input to CT, LHV (MMBtu/hr)	D1	2,302.1	2,334.5	2,587.5	2,334.5	2,135.9	2,334.5	2,334.5	2,333.7
Combustor NOx Water Injection Flow Rate (lb/hr)	W1	0	0	0	0	0	0	0	0
Exhaust Gas Flow Rate (lb/hr)	G3	4,638,902.	4,680,000.	5,105,804.	4,680,000.	4,324,400.	4,680,000.	4,680,000.	4,681,400.
Exhaust Gas Temperature (°F)	G3	1,134.	1,132.	1,113.	1,132.	1,156.	1,132.	1,132.	1,132.
Exhaust Analysis, % Vol.									
Argon	G3	0.93	0.93	0.94	0.93	0.92	0.93	0.93	0.93
Nitrogen	G3	74.20	73.99	74.79	73.99	72.89	73.99	73.99	74.07
Oxygen	G3	11.99	11.89	11.95	11.89	11.73	11.89	11.89	11.92
Carbon Dioxide	G3	4.15	4.16	4.24	4.16	4.10	4.16	4.16	4.16
Water	G3	8.73	9.02	8.08	9.02	10.37	9.02	9.02	8.93
CT Gross Output (kW)	E1	263,200.	267,500.	300,500.	267,500.	238,600.	267,500.	267,500.	267,500.
CT Gross Heat Rate, LHV (Btu/kWh)		8,747.	8,727.	8,611.	8,727.	8,952.	8,727.	8,727.	8,724.
CT Gross Heat Rate, HHV (Btu/kWh)		9,709.	9,687.	9,558.	9,687.	9,937.	9,687.	9,687.	9,684.
HRSG CHARACTERISTICS (per HRSG)									
Heat Input to Duct Burner, LHV (MMBtu/hr)	D2	0.0	187.5	0.0	0.0	0.0	178.3	187.8	208.8
Heat Input to Duct Burner, HHV (MMBtu/hr)		0.0	208.1	0.0	0.0	0.0	197.9	208.4	231.7
Duct Burner Fuel Flow Rate (lb/hr)	G4	0	9,394	0	0	0	8,934	9,411	10,462
Duct Burner Gas Exit Temperature (°F)		1,072.3	1,205.0	1,054.4	1,070.6	1,084.7	1,198.5	1,205.1	1,219.7
Main Steam Flow Rate (lb/hr)	S1	595,163.	741,376.	630,953.	599,048.	574,763.	734,361.	741,557.	757,789.
Main Steam Pressure (psia)	S1	1,456.7	1,794.0	1,528.1	1,464.6	1,409.2	1,777.9	1,794.5	1,831.4
Main Steam Temperature (°F)	S1	960.0	960.0	942.2	958.0	960.0	960.0	960.0	960.0
Main Steam Enthalpy (Btu/lb)	S1	1,468.0	1,456.2	1,454.5	1,466.5	1,469.6	1,456.8	1,456.2	1,454.9
Hot Reheat Flow Rate (lb/hr)	S5	676,271.	808,705.	718,981.	680,757.	659,430.	802,446.	808,778.	823,167.
Hot Reheat Pressure (psia)	S5	452.7	540.3	478.2	455.4	441.5	536.1	540.2	549.8
Hot Reheat Temperature (°F)	S5	1,010.0	1,010.0	994.8	1,008.4	1,010.0	1,010.0	1,010.0	1,010.0
Hot Reheat Enthalpy (Btu/lb)	S5	1,527.7	1,525.2	1,518.7	1,526.7	1,528.0	1,525.3	1,525.2	1,524.9
IP Superheater Flow Rate (lb/hr)	S4	95,101.	83,701.	102,864.	95,794.	90,821.	84,418.	83,624.	81,917.
IP Superheater Pressure (psia)	S4	471.3	562.6	497.9	474.1	459.4	558.2	562.6	572.5
IP Superheater Temperature (°F)	S4	590.0	623.2	595.1	590.4	585.7	621.7	623.2	626.9
IP Superheater Enthalpy (Btu/lb)	S4	1,295.0	1,307.7	1,295.8	1,295.0	1,293.4	1,307.1	1,307.7	1,309.2
LP Superheater Flow Rate (lb/hr)	S7	66,451.	55,777.	73,876.	67,363.	62,089.	56,595.	55,834.	54,145.
LP Superheater Pressure (psia)	S7	99.9	111.6	106.4	100.7	96.4	111.1	111.6	112.7
LP Superheater Temperature (°F)	S7	520.0	558.3	522.2	519.7	517.9	556.0	558.2	563.4
LP Superheater Enthalpy (Btu/lb)	S7	1,289.4	1,307.7	1,289.9	1,289.2	1,288.7	1,306.5	1,307.6	1,310.2
Condensate Preheater Inlet Flow Rate (lb/hr)	W2	840,789.	962,375.	900,089.	847,198.	814,080.	956,758.	962,532.	975,465.
Condensate Preheater Inlet Pressure (psia)	W2	209.2	169.5	194.1	207.3	215.1	171.2	169.5	165.4
Condensate Preheater Inlet Temperature (°F)	W2	209.0	216.0	210.5	210.0	208.8	216.3	216.3	216.1
Condensate Preheater Inlet Enthalpy (Btu/lb)	W2	177.6	184.5	179.1	178.6	177.4	184.9	184.8	184.6
HRSG Exhaust Stack Gas Characteristics									
HRSG Exhaust Gas Temperature (°F)	G5	275.9	280.0	280.3	276.8	273.5	280.2	280.2	280.1
HRSG Exhaust Gas Flow Rate (lb/hr)	G5	4,638,902.	4,689,395.	5,105,804.	4,680,000.	4,324,400.	4,688,934.	4,689,412.	4,691,863.
HRSG BLOWDOWN CHARACTERISTICS (Per HRSG)									
HP Evaporator Blowdown Flow Rate (lb/hr)		6,012.	7,416.	6,373.	6,051.	5,744.	7,348.	7,418.	7,576.
IP Evaporator Blowdown Flow Rate (lb/hr)		961.	845.	1,039.	968.	917.	853.	845.	827.
DEAERATOR CHARACTERISTICS (Per HRSG)									
DA Operating Pressure (psia)		102.0	112.9	108.7	102.8	98.3	112.4	112.9	113.9
Main Boiler Feedwater Inlet Flow Rate (lb/hr)		840,789.	962,375.	900,089.	847,198.	814,080.	956,758.	962,532.	975,465.
Main Boiler Feedwater Inlet Temperature (°F)		303.0	303.4	307.7	303.6	299.6	303.6	303.5	303.1
Main Boiler Feedwater Outlet Flow Rate (lb/hr)		772,237.	904,187.	823,964.	777,717.	749,955.	897,763.	904,294.	918,882.
Main Boiler Feedwater Outlet Temperature (°F)		329.2	336.7	333.9	329.8	326.6	336.4	336.7	337.4
BFW Temperature Rise (°F)		26.2	33.3	26.3	26.2	27.0	32.8	33.2	34.3
Primary Pegging Steam Flow Rate (lb/hr)		27,617.	39,955.	29,814.	27,794.	27,351.	39,102.	39,867.	41,629.
Auxiliary Pegging Steam Flow Rate (lb/hr)		0.	0.	0.	0.	0.	0.	0.	0.
Vent Steam Flow Rate (lb/hr)		2,102.	2,406.	2,250.	2,118.	2,035.	2,392.	2,406.	2,439.

PRELIMINARY

Estimated Performance Summary
2x2x1 MHI M501GAC

CASE DESCRIPTION	Stream No.	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8
Equipment Design		HRSG							
Ambient Dry Bulb Temperature	G1	55°F	85°F	5°F	85°F	85°F	105°F	91°F	55°F
Relative Humidity	G1	66%	67%	68%	67%	67%	43%	45%	66%
Ambient Wet Bulb Temperature	G1	49°F	76°F	3.5°F	76°F	76°F	84°F	74°F	49°F
Site Elevation (ft AMSL)		625	625	625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2	2	2
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
PUMP CHARACTERISTICS									
HP Feedpump Control Valve Discharge									
Total Flow Rate per HRSG (lb/hr)		601,175.	748,794.	637,326.	605,099.	580,507.	741,710.	748,975.	765,365.
Pressure (psia)		2,550.8	2,587.0	2,563.4	2,552.2	2,541.8	2,585.1	2,587.1	2,591.7
Temperature (°F)		335.4	343.1	340.2	336.0	332.7	342.8	343.1	343.8
Enthalpy (Btu/lb)		310.6	318.5	315.5	311.2	307.8	318.2	318.5	319.3
IP Feedpump Control Valve Discharge									
Total Flow Rate per HRSG (lb/hr)		171,061.	155,393.	186,638.	172,618.	169,447.	156,053.	155,319.	153,516.
Pressure (psia)		480.9.	569.6.	508.9.	483.8.	468.2.	565.4.	569.6.	579.2.
Temperature (°F)		330.2.	337.9.	335.0.	330.8.	327.5.	337.6.	337.9.	338.6.
Enthalpy (Btu/lb)		301.7.	309.8.	306.7.	302.3.	298.9.	309.5.	309.8.	310.6.
HRSG Preheater Recirculation Pump CV Discharge									
Total Flow Rate per HRSG (lb/hr)		0.	0.	0.	0.	0.	0.	0.	0.
Pressure (psia)		-	-	-	-	-	-	-	-
Temperature (°F)		-	-	-	-	-	-	-	-
Enthalpy (Btu/lb)		-	-	-	-	-	-	-	-
Condensate Pump Discharge									
Total Flow Rate from Condenser (lb/hr)		1,375,209.	1,624,019.	1,460,406.	1,405,600.	1,356,075.	1,623,840.	1,623,835.	1,624,375.
Pressure (psia)		350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
Temperature (°F)		103.5	125.3	100.6	120.4	119.3	132.4	125.4	109.7
Enthalpy (Btu/lb)		72.4	94.2	69.6	89.3	88.2	101.3	94.3	78.6
STEAM TURBINE CHARACTERISTICS		TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB
Main Steam Throttle Flow Rate (lb/hr)	S2	1,190,327.	1,482,754.	1,261,906.	1,198,096.	1,149,526.	1,468,723.	1,483,114.	1,515,577.
Main Steam Throttle Pressure (psia)	S2	1,374.7	1,693.2	1,442.3	1,382.2	1,329.9	1,678.0	1,693.6	1,728.5
Main Steam Throttle Temperature (°F)	S2	950.0	950.0	932.2	948.0	950.0	950.0	950.0	950.0
Main Steam Throttle Enthalpy (Btu/lb)	S2	1,464.7	1,453.5	1,451.4	1,463.2	1,466.3	1,454.0	1,453.4	1,452.2
Cold Reheat Steam Flow Rate (lb/hr)	S3	1,162,339.	1,447,892.	1,232,235.	1,169,925.	1,122,498.	1,434,190.	1,448,242.	1,479,943.
Cold Reheat Steam Pressure (psia)	S3	500.5.	599.3.	528.3.	503.4.	487.4.	594.6.	599.3.	610.1.
Cold Reheat Steam Temperature (°F)	S3	685.3.	675.7.	670.6.	683.6.	687.3.	676.1.	675.7.	674.8.
Cold Reheat Steam Enthalpy (Btu/lb)	S3	1,348.6.	1,336.7.	1,338.4.	1,347.5.	1,350.6.	1,337.3.	1,336.7.	1,335.5.
Hot Reheat Steam Flow Rate (lb/hr)	S6	1,352,541.	1,617,412.	1,437,962.	1,361,514.	1,318,860.	1,604,891.	1,617,556.	1,646,334.
Hot Reheat Steam Pressure (psia)	S6	425.4.	507.8.	449.5.	428.0.	414.9.	503.9.	507.8.	516.8.
Hot Reheat Steam Temperature (°F)	S6	1,000.0.	1,000.0.	984.8.	998.4.	1,000.0.	1,000.0.	1,000.0.	1,000.0.
Hot Reheat Steam Enthalpy (Btu/lb)	S6	1,523.1.	1,520.7.	1,514.2.	1,522.1.	1,523.4.	1,520.8.	1,520.7.	1,520.4.
SFLP Turbine Inlet Steam Flow (lb/hr)	S8	447,971	521,248	475,717	451,199	435,115	517,924	521,313	528,965
SFLP Turbine Inlet Steam Pressure (psia)	S8	90.8	105.5	95.7	91.4	88.1	104.8	105.5	107.1
SFLP Turbine Inlet Steam Temperature (°F)	S8	589.6	587.4	577.4	588.5	589.0	587.6	587.4	587.1
SFLP Turbine Inlet Steam Enthalpy (Btu/lb)	S8	1,324.9	1,322.8	1,318.5	1,324.3	1,324.8	1,322.9	1,322.8	1,322.5
SFLP Turbine Exhaust Steam Flow Rate (lb/hr)	S10	461,729.	538,046.	490,323.	465,048.	448,466.	534,576.	538,113.	546,099.
SFLP Turbine Exhaust UEEP (Btu/lb)	S10	1,039.9	1,051.2	1,034.9	1,053.1	1,053.7	1,059.9	1,051.3	1,038.3
SFLP Turbine Exhaust Loss (Btu/lb)		17.3	7.6	21.9	7.5	7.5	6.4	7.6	16.8
SFLP Turbine Exhaust Annulus Velocity (ft/sec)		914.5	596.8	1,037.6	588.9	585.6	498.2	595.7	904.8
SFLP Turbine Exhaust Sonic Velocity (ft/sec)		1,439.2	1,467.1	1,435.8	1,460.9	1,459.5	1,476.1	1,467.2	1,447.2
DFLP Turbine Inlet Steam Flow (lb/hr)	S9	1,047,966	1,221,202	1,112,837	1,055,601	1,017,980	1,213,495	1,221,400	1,239,482
DFLP Turbine Inlet Steam Pressure (psia)	S9	89.0	103.5	93.9	89.6	86.5	102.8	103.5	105.0
DFLP Turbine Inlet Steam Temperature (°F)	S9	589.3	587.1	577.2	588.2	588.7	587.3	587.1	586.8
DFLP Turbine Inlet Steam Enthalpy (Btu/lb)	S9	1,324.9	1,322.8	1,318.5	1,324.3	1,324.8	1,322.9	1,322.8	1,322.5
DFLP Turbine Second Extraction Steam Flow (lb/hr)	S12	57,499	64,437	63,472	54,451	52,047	62,661	65,030	70,481
DFLP Turbine Second Extraction Steam Pressure (psia)	S12	18.0	21.0	19.0	18.3	17.6	21.0	21.0	21.2
DFLP Turbine Second Extraction Steam Temperature (°F)	S12	299.1	295.4	290.2	296.7	297.2	294.7	295.3	296.5
DFLP Turbine Second Extraction Steam Enthalpy (Btu/lb)	S12	1,191.5	1,189.1	1,187.1	1,190.3	1,190.7	1,188.8	1,189.0	1,189.6
DFLP Turbine Third Extraction Steam Flow (lb/hr)	S13	97,304	94,803	109,167	81,056	77,818	85,412	94,652	115,136
DFLP Turbine Third Extraction Steam Pressure (psia)	S13	8.72	10.40	9.13	9.01	8.70	10.46	10.39	10.28
DFLP Turbine Third Extraction Steam Temperature (°F)	S13	193.9	195.0	188.9	194.1	194.6	195.3	195.0	194.5
DFLP Turbine Third Extraction Steam Enthalpy (Btu/lb)	S13	1,144.0	1,142.8	1,139.9	1,144.0	1,144.3	1,143.1	1,142.8	1,142.3
DFLP Turbine Exhaust Steam Flow Rate (lb/hr)	S11	893,475.	1,062,343.	940,530.	920,409.	888,417.	1,065,801.	1,062,100.	1,054,255.
DFLP Turbine Exhaust UEEP (Btu/lb)	S11	1,041.0	1,053.4	1,035.4	1,055.2	1,055.7	1,062.2	1,053.5	1,039.4
DFLP Turbine Exhaust Loss (Btu/lb)		16.3	7.5	20.4	7.5	7.4	6.4	7.5	15.8
DFLP Turbine Exhaust Annulus Velocity (ft/sec)		886.8	590.6	997.4	584.0	581.3	497.9	589.3	875.4
DFLP Turbine Exhaust Sonic Velocity (ft/sec)		1,439.2	1,467.1	1,435.8	1,460.9	1,459.5	1,476.1	1,467.2	1,447.2
Turbine Backpressure (In. HgA)	S10, S11	2.15	4.02	1.98	3.51	3.40	4.88	4.03	2.58
Gross Steam Turbine Output (kW)	E2	235,158.	274,905.	246,835.	231,427.	223,607.	269,096.	274,894.	285,251.

PRELIMINARY

Estimated Performance Summary
2x2x1 MHI M501GAC

CASE DESCRIPTION	Stream No.	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8
Equipment Design		HRSG							
Ambient Dry Bulb Temperature	G1	55°F	85°F	5°F	85°F	85°F	105°F	91°F	55°F
Relative Humidity	G1	66%	67%	68%	67%	67%	43%	45%	66%
Ambient Wet Bulb Temperature	G1	49°F	76°F	3.5°F	76°F	76°F	84°F	74°F	49°F
Site Elevation (ft AMSL)		625	625	625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2	2	2
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
FEEDWATER HEATER CHARACTERISTICS									
Feedwater Heater #2									
Extraction Steam Flow Rate (lb/hr)		57,499	64,437	63,472	54,451	52,047	62,661	65,030	70,481
Extraction Line Pressure Drop (%)		4.9	4.5	5.3	4.3	4.2	4.3	4.6	5.2
Extraction Enthalpy (Btu/lb)		1,191.5	1,189.1	1,187.1	1,190.3	1,190.7	1,188.8	1,189.0	1,189.6
Feedwater Inlet Temperature (°F)		178.3	187.2	179.2	181.8	180.5	188.5	187.3	184.4
Feedwater Outlet Temperature (°F)		215.5	222.6	217.4	216.7	215.1	223.1	222.9	222.5
Drain Pressure (psia)		17.2	20.1	18.0	17.5	16.9	20.1	20.1	20.1
Drain Temperature (°F)		219.9	228.2	222.3	220.8	219.0	228.1	228.1	228.2
Feedwater Heater #1									
Extraction Steam Flow Rate, includes SSR Flow (lb/hr)		98,871	96,716	110,829	82,632	79,338	87,308	96,565	117,087
Extraction Line Pressure Drop (%)		7.6	5.1	8.7	5.0	4.9	4.1	5.1	7.7
Extraction Enthalpy (Btu/lb)		1,147.4	1,147.0	1,143.1	1,148.1	1,148.5	1,147.6	1,146.9	1,145.8
Feedwater Inlet Temperature (°F)		105.1	127.0	102.3	122.1	120.9	134.1	127.1	111.5
Feedwater Outlet Temperature (°F)		177.7	186.7	178.4	181.3	180.1	188.0	186.7	183.6
Drain Pressure (psia)		8.06	9.86	8.34	8.56	8.27	10.03	9.86	9.49
Drain Temperature (°F)		183.1	192.5	184.7	185.9	184.3	193.3	192.5	190.7
TURBINE BYPASS SYSTEM CHARACTERISTICS (per HRSG)									
MS Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-	-	-	-	-
MS Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W8	-	-	-	-	-	-	-	-
MS Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S14	-	-	-	-	-	-	-	-
MS Bypass Attemporator Outlet Steam Pressure (psia)	S14	-	-	-	-	-	-	-	-
MS Bypass Attemporator Outlet Steam Temperature (°F)	S14	-	-	-	-	-	-	-	-
MS Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S14	-	-	-	-	-	-	-	-
HRH Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-	-	-	-	-
HRH Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W9	-	-	-	-	-	-	-	-
HRH Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S15	-	-	-	-	-	-	-	-
HRH Bypass Attemporator Outlet Steam Pressure (psia)	S15	-	-	-	-	-	-	-	-
HRH Bypass Attemporator Outlet Steam Temperature (°F)	S15	-	-	-	-	-	-	-	-
HRH Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S15	-	-	-	-	-	-	-	-
LP Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-	-	-	-	-
LP Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W10	-	-	-	-	-	-	-	-
LP Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S16	-	-	-	-	-	-	-	-
LP Bypass Attemporator Outlet Steam Pressure (psia)	S16	-	-	-	-	-	-	-	-
LP Bypass Attemporator Outlet Steam Temperature (°F)	S16	-	-	-	-	-	-	-	-
LP Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S16	-	-	-	-	-	-	-	-
CONDENSER CHARACTERISTICS									
Operating Pressure (psia)		1.054	1.975	0.973	1.724	1.670	2.395	1.979	1.268
Operating Pressure (in Hg Abs.)		2.15	4.02	1.98	3.51	3.40	4.88	4.03	2.58
Temperature of Condensing Steam (°F)		103.5	125.6	100.8	120.6	119.5	132.7	125.6	109.8
CW Flow Rate Through Condenser (gpm)	W3	98,750	98,750	98,750	98,750	98,750	98,750	98,750	98,750
CW Temperature Into Condenser (°F)	W3	69.9	87.4	65.0	87.3	87.3	94.8	87.5	70.6
CW Temperature Out Of Condenser (°F)	W4	96.6	118.6	93.1	114.5	113.6	126.0	118.6	101.8
Circulating Water Temperature Rise (°F)		26.7	31.2	28.1	27.2	26.3	31.2	31.2	31.2
Terminal Temperature Difference, TTD (°F)		6.8	7.0	7.7	6.1	5.9	6.7	7.0	8.0
Total Condenser Heat Rejection (MMBtu/hr)		1,313.6	1,535.1	1,383.0	1,338.3	1,293.7	1,537.6	1,535.0	1,538.5
AUXILIARY COOLING SYSTEM									
Auxiliary Cooling Water Flow Rate Through Heat Exchangers (gpm)	W5	17,250	17,250	17,250	17,250	17,250	17,250	17,250	17,250
Auxiliary Cooling Water Temperature Rise (°F)		20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Auxiliary Cooling Heat Rejection (MMBtu/hr)		172.2	172.1	172.3	172.1	172.1	172.1	172.1	172.2
COOLING TOWER CHARACTERISTICS									
CW Flow Rate Into Cooling Tower (gpm)	W6	116,000	116,000	116,000	116,000	116,000	116,000	116,000	116,000
CW Temperature Into Cooling Tower (°F)	W6	95.6	116.9	91.9	113.4	112.6	124.4	117.0	100.1
Air Inlet Wet Bulb Temperature (°F)		49.0	76.0	3.7	76.0	76.0	84.0	73.7	49.0
Current Approach Temperature (°F)		21.1	12.2	*	12.1	12.0	12.0	14.7	21.8
Current Range Temperature (°F)		25.6	28.8	27.2	25.5	24.7	28.5	28.7	29.4
Drift Rate (%)		0.005	0.005	*	0.005	0.005	0.005	0.005	0.005
Cycles of Concentration		4	4	4	4	4	4	4	4
Evaporation Loss (gpm)		2,079	2,793	*	2,480	2,409	3,073	2,947	2,400
Drift Loss (gpm)		5.8	5.8	*	5.8	5.8	5.8	5.8	5.8
Blowdown (gpm)		687	925	*	821	797	1,019	976	794
Blowdown Temperature (°F)		69.9	87.3	*	87.3	87.2	94.7	87.4	70.5
Makeup (gpm)		2,772	3,725	*	3,307	3,212	4,098	3,929	3,200
Makeup Temperature (°F)		60.0	60.0	*	60.0	60.0	60.0	60.0	60.0
Total Cooling Tower Heat Rejection (MMBtu/hr)		1,496.2	1,717.6	1,556.9	1,520.8	1,476.2	1,720.2	1,717.5	1,721.1

PRELIMINARY
Estimated Performance Summary
2x2x1 MHI M501GAC

CASE DESCRIPTION	Stream No.	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8
Equipment Design		HRSG							
Ambient Dry Bulb Temperature	G1	55°F	85°F	5°F	85°F	85°F	105°F	91°F	55°F
Relative Humidity	G1	66%	67%	68%	67%	67%	43%	45%	66%
Ambient Wet Bulb Temperature	G1	49°F	76°F	3.5°F	76°F	76°F	84°F	74°F	49°F
Site Elevation (ft AMSL)		625	625	625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2	2	2
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
FUEL GAS PERFORMANCE HEATER CHARACTERISTICS (Per CT)									
Natural Gas Flow Rate (lb/hr)	G2	115,370.	116,990.	129,670.	116,990.	107,040.	116,990.	116,990.	116,950.
Natural Gas Inlet Temperature (°F)		60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Natural Gas Outlet Temperature (°F)	G2	392.0	392.0	392.1	391.8	392.0	391.8	392.1	391.8
Heating Water Inlet Flow Rate (lb/hr)		75,000.	69,790.	82,736.	75,856.	70,349.	69,850.	69,816.	69,493.
Heating Water Inlet Temperature (°F)		457.0	475.6	462.0	457.4	454.2	474.8	475.6	477.5
Heating Water Outlet Temperature (°F)		161.5	154.9	161.2	161.3	161.7	154.5	154.9	156.0
TURBINE COOLING AIR COOLER CHARACTERISTICS (Per CT)									
Cooling Water Inlet Flow Rate (lb/hr)	W11	145,232	142,889	127,000	142,889	160,891	142,889	142,889	142,889
Cooling Water Inlet Temperature (°F)	W11	335.4	343.1	340.2	336.0	332.7	342.8	343.1	343.8
Cooling Water Outlet Temperature (°F)		542.7	546.6	554.1	540.5	527.2	546.3	546.6	547.2
Turbine Cooling Air Cooler Heat Rejection (MMBtu/hr)		33.0	32.0	30.0	32.0	34.0	32.0	32.0	32.0
CYCLE MAKEUP CONDITIONS									
Makeup Flow Rate to Steam Cycle (gpm)	W7	36.3.	42.7.	55.2.	36.5.	34.8.	42.4.	42.7.	43.4.
Makeup Temperature (°F)	W7	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
TOTAL PLANT PERFORMANCE									
Total Gross CT Electrical Output (kW)		526,400.	535,000.	601,000.	535,000.	477,200.	535,000.	535,000.	535,000.
Total Gross Steam Turbine Electrical Output (kW)	E2	235,158.	274,905.	246,835.	231,427.	223,607.	269,096.	274,894.	285,251.
Total Gross Plant Electrical Output (kW)	D3	761,558.	809,905.	847,835.	766,427.	700,807.	804,096.	809,894.	820,251.
Auxiliary Power									
BOP Percent Aux Power, Approx. (%)		2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
BOP Auxiliary Power (kW)		16,750.	17,820.	18,650.	16,860.	15,420.	17,690.	17,820.	18,050.
Chiller 0.7327 kW per ton chilling capacity (kW)		0.	11,822.	0.	11,822.	0.	16,953.	10,154.	654.
Total Auxiliary Power (kW)		16,750.	29,642.	18,650.	28,682.	15,420.	34,643.	27,974.	18,704.
Percentage of Gross Electrical Output (%)		2.20	3.66	2.20	3.74	2.20	4.31	3.45	2.28
Net Plant Electrical Output (kW)	D4	744,808.	780,263.	829,185.	737,745.	685,387.	769,453.	781,920.	801,547.
Net Plant Electrical Heat Rate, LHV (Btu/kWh)	D5	6,182.	6,464.	6,241.	6,329.	6,233.	6,531.	6,451.	6,344.
Net Plant Electrical Heat Rate, HHV (Btu/kWh)		6,862.	7,175.	6,928.	7,025.	6,918.	7,250.	7,161.	7,042.

* = Cooling Tower parameter can not be calculated at minimum cooling water temperature condition. (See Note 6)

PRELIMINARY

Estimated Performance Summary
2x2x1 MHI M501GAC

CASE DESCRIPTION	Stream No.	Case 9	Case 10	Case 11	Case 12	Case 13	Case 14	Case 15	Case 16
Equipment Design									
Ambient Dry Bulb Temperature	G1	5°F	91°F	91°F	91°F	85°F	105°F	105°F	105°F
Relative Humidity	G1	68%	45%	45%	45%	67%	43%	43%	43%
Ambient Wet Bulb Temperature	G1	3.5°F	74°F	74°F	74°F	76°F	84°F	84°F	84°F
Site Elevation (ft AMSL)		625	625	625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2	2	2
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
COMBUSTION TURBINE CHARACTERISTICS (per CT)									
CT Frame		M501GAC	M501GAC	M501GAC	M501GAC	M501GAC	M501GAC	M501GAC	M501GAC
Load Condition		100%	100%	100%	100%	100%	100%	75%	50%
Inlet Air Cooling		NONE	CHILLER ON	EVAP ON	EVAP ON	CHILLER ON	NONE	NONE	NONE
Chiller Cooling Capacity (ton)		0.	6,929.	0.	0.	8,067.	0.	0.	0.
Chiller Air Outlet Temperature (°F)		-	50.	-	-	50.	-	-	-
Evaporative Cooler Water Flow Rate (Evaporation only) (lb//hr)		0.	0.	12,183.	12,183.	0.	0.	0.	0.
Evaporative Cooler Air Outlet Temperature (°F)		-	-	76.	76.	-	-	-	-
Fuel Lower Heating Value (Btu/lb)	G2, G4, O1	19,954.	19,954.	19,954.	19,954.	19,954.	19,954.	19,954.	19,954.
Fuel Flow Rate (lb/hr)	G2, O1	129,670.	116,990.	109,650.	109,650.	116,990.	99,850.	80,280.	62,820.
Fuel Inlet Temperature (°F)	G2, O1	392.	392.	392.	392.	392.	392.	392.	380.
Heat Input to CT, LHV (MMBtu/hr)	D1	2,587.5	2,334.5	2,188.0	2,188.0	2,334.5	1,992.4	1,601.9	1,253.5
Combustor NOx Water Injection Flow Rate (lb/hr)	W1	0	0	0	0	0	0	0	0
Exhaust Gas Flow Rate (lb/hr)	G3	5,105,804.	4,680,000.	4,405,404.	4,405,404.	4,680,000.	4,131,200.	3,591,001.	2,788,300.
Exhaust Gas Temperature (°F)	G3	1,113.	1,132.	1,151.	1,151.	1,132.	1,156.	1,101.	1,192.
Exhaust Analysis, % Vol.									
Argon	G3	0.94	0.93	0.92	0.92	0.93	0.91	0.92	0.91
Nitrogen	G3	74.79	73.99	72.86	72.86	73.99	72.61	72.86	72.85
Oxygen	G3	11.95	11.89	11.67	11.67	11.89	11.84	12.62	12.57
Carbon Dioxide	G3	4.24	4.16	4.12	4.12	4.16	3.99	3.63	3.65
Water	G3	8.08	9.02	10.43	10.43	9.02	10.65	9.97	10.02
CT Gross Output (kW)	E1	300,500.	267,500.	246,100.	246,100.	267,500.	218,300.	163,700.	109,100.
CT Gross Heat Rate, LHV (Btu/kWh)		8,611.	8,727.	8,891.	8,891.	8,727.	9,127.	9,786.	11,490.
CT Gross Heat Rate, HHV (Btu/kWh)		9,558.	9,687.	9,869.	9,869.	9,687.	10,131.	10,862.	12,754.
HRSG CHARACTERISTICS (per HRSG)									
Heat Input to Duct Burner, LHV (MMBtu/hr)	D2	143.4	0.0	0.0	217.5	0.0	0.0	0.0	0.0
Heat Input to Duct Burner, HHV (MMBtu/hr)		159.2	0.0	0.0	241.4	0.0	0.0	0.0	0.0
Duct Burner Fuel Flow Rate (lb/hr)	G4	7,186	0	0	10,899	0	0	0	0
Duct Burner Gas Exit Temperature (°F)		1,150.5	1,070.6	1,082.1	1,244.7	1,070.6	1,083.9	1,044.1	1,095.1
Main Steam Flow Rate (lb/hr)	S1	741,213.	599,048.	582,010.	746,882.	632,123.	549,091.	451,591.	397,448.
Main Steam Pressure (psia)	S1	1,781.6	1,464.6	1,426.1	1,806.6	1,120.0	1,348.8	1,115.4	985.3
Main Steam Temperature (°F)	S1	945.2	958.0	960.0	960.0	960.0	960.0	960.0	960.0
Main Steam Enthalpy (Btu/lb)	S1	1,447.2	1,466.5	1,469.0	1,455.8	1,479.3	1,471.6	1,479.4	1,483.7
Hot Reheat Flow Rate (lb/hr)	S5	816,913.	680,752.	665,959.	814,897.	764,027.	632,387.	512,330.	450,987.
Hot Reheat Pressure (psia)	S5	543.1	455.4	445.8	544.2	321.1	423.6	341.9	302.9
Hot Reheat Temperature (°F)	S5	997.6	1,008.4	1,010.0	1,010.0	1,003.2	1,010.0	994.5	1,010.0
Hot Reheat Enthalpy (Btu/lb)	S5	1,518.4	1,526.7	1,527.9	1,525.1	1,527.7	1,528.5	1,522.5	1,531.9
IP Superheater Flow Rate (lb/hr)	S4	93,128.	95,789.	91,919.	78,232.	84,874.	88,858.	71,356.	46,881.
IP Superheater Pressure (psia)	S4	565.5	474.1	463.9	566.5	354.8	440.7	356.3	314.8
IP Superheater Temperature (°F)	S4	619.9	590.4	587.3	625.5	567.2	579.8	560.2	550.7
IP Superheater Enthalpy (Btu/lb)	S4	1,305.5	1,295.0	1,294.0	1,308.8	1,291.8	1,291.5	1,287.6	1,286.0
LP Superheater Flow Rate (lb/hr)	S7	64,901.	67,353.	63,270.	49,544.	42,529.	60,387.	51,359.	34,137.
LP Superheater Pressure (psia)	S7	115.0	100.7	97.6	110.3	69.4	92.8	75.7	63.2
LP Superheater Temperature (°F)	S7	549.9	519.8	518.7	566.0	529.6	512.9	495.4	496.9
LP Superheater Enthalpy (Btu/lb)	S7	1,303.2	1,289.2	1,289.0	1,311.6	1,296.9	1,286.5	1,279.4	1,281.3
Condensate Preheater Inlet Flow Rate (lb/hr)	W2	987,739.	847,270.	823,677.	957,733.	910,301.	780,792.	641,541.	545,128.
Condensate Preheater Inlet Pressure (psia)	W2	164.2	207.3	212.9	169.5	210.4	223.1	255.5	272.0
Condensate Preheater Inlet Temperature (°F)	W2	215.3	210.0	209.2	216.5	146.3	207.7	200.1	193.6
Condensate Preheater Inlet Enthalpy (Btu/lb)	W2	183.9	178.6	177.8	185.1	114.8	176.3	168.7	162.3
HRSG Exhaust Stack Gas Characteristics									
HRSG Exhaust Gas Temperature (°F)	G5	282.8	276.8	274.5	278.6	228.7	271.2	260.1	246.3
HRSG Exhaust Gas Flow Rate (lb/hr)	G5	5,112,990.	4,680,000.	4,405,404.	4,416,302.	4,680,000.	4,131,200.	3,591,001.	2,788,300.
HRSG BLOWDOWN CHARACTERISTICS (Per HRSG)									
HP Evaporator Blowdown Flow Rate (lb/hr)		7,487.	6,051.	5,835.	7,355.	6,350.	5,458.	4,517.	3,824.
IP Evaporator Blowdown Flow Rate (lb/hr)		941.	968.	928.	790.	857.	898.	721.	474.
DEAERATOR CHARACTERISTICS (Per HRSG)									
DA Operating Pressure (psia)		116.7	102.8	99.5	111.4	70.6	94.6	77.3	64.0
Main Boiler Feedwater Inlet Flow Rate (lb/hr)		987,739.	847,270.	823,677.	957,733.	910,301.	780,792.	641,541.	545,128.
Main Boiler Feedwater Inlet Temperature (°F)		307.7	303.6	300.6	300.5	260.8	297.4	287.6	272.6
Main Boiler Feedwater Outlet Flow Rate (lb/hr)		920,369.	777,800.	758,352.	905,795.	865,496.	718,452.	588,578.	509,630.
Main Boiler Feedwater Outlet Temperature (°F)		339.2	329.8	327.4	335.7	303.4	323.8	309.7	297.0
BFW Temperature Rise (°F)		31.5	26.2	26.9	35.2	42.6	26.4	22.1	24.3
Primary Pegging Steam Flow Rate (lb/hr)		39,073.	27,801.	27,587.	41,828.	45,735.	25,637.	17,477.	16,011.
Auxiliary Pegging Steam Flow Rate (lb/hr)		0.	0.	0.	0.	0.	0.	0.	0.
Vent Steam Flow Rate (lb/hr)		2,469.	2,118.	2,059.	2,394.	2,276.	1,952.	1,604.	1,363.

PRELIMINARY

Estimated Performance Summary
2x2x1 MHI M501GAC

CASE DESCRIPTION	Stream No.	Case 9	Case 10	Case 11	Case 12	Case 13	Case 14	Case 15	Case 16
Equipment Design									
Ambient Dry Bulb Temperature	G1	5°F	91°F	91°F	91°F	85°F	105°F	105°F	105°F
Relative Humidity	G1	68%	45%	45%	45%	67%	43%	43%	43%
Ambient Wet Bulb Temperature	G1	3.5°F	74°F	74°F	74°F	76°F	84°F	84°F	84°F
Site Elevation (ft AMSL)		625	625	625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2	2	2
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
PUMP CHARACTERISTICS									
HP Feedpump Control Valve Discharge									
Total Flow Rate per HRSG (lb/hr)		748,700.	605,099.	587,846.	754,237.	685,503.	554,549.	456,108.	401,271.
Pressure (psia)		2,593.8	2,552.2	2,544.8	2,581.8	2,566.0	2,534.6	2,529.2	2,525.4
Temperature (°F)		345.6	336.0	333.6	342.1	309.3	329.9	315.5	302.6
Enthalpy (Btu/lb)		321.1	311.2	308.7	317.5	283.9	304.9	290.2	277.0
IP Feedpump Control Valve Discharge									
Total Flow Rate per HRSG (lb/hr)		171,669.	172,700.	170,507.	151,558.	179,993.	163,903.	132,470.	108,358.
Pressure (psia)		574.2.	483.8.	472.9.	572.6.	365.2.	449.2.	362.7.	318.0.
Temperature (°F)		340.4.	330.8.	328.4.	336.9.	304.1.	324.7.	310.3.	297.5.
Enthalpy (Btu/lb)		312.4.	302.3.	299.8.	308.8.	274.6.	295.9.	280.9.	267.7.
HRSG Preheater Recirculation Pump CV Discharge									
Total Flow Rate per HRSG (lb/hr)		0.	0.	0.	0.	0.	0.	0.	0.
Pressure (psia)		-	-	-	-	-	-	-	-
Temperature (°F)		-	-	-	-	-	-	-	-
Enthalpy (Btu/lb)		-	-	-	-	-	-	-	-
Condensate Pump Discharge									
Total Flow Rate from Condenser (lb/hr)		1,624,453.	1,405,782.	1,370,647.	1,623,536.	2,053,275.	1,311,817.	1,072,362.	926,319.
Pressure (psia)		350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
Temperature (°F)		104.8	120.6	119.8	125.4	143.3	125.9	120.6	117.6
Enthalpy (Btu/lb)		73.8	89.5	88.7	94.3	112.1	94.7	89.5	86.5
STEAM TURBINE CHARACTERISTICS		TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB
Main Steam Throttle Flow Rate (lb/hr)	S2	1,482,426.	1,198,097.	1,164,021.	1,493,763.	0	1,098,183.	903,182.	794,896.
Main Steam Throttle Pressure (psia)	S2	1,681.6	1,382.2	1,345.9	1,705.2	-	1,272.9	1,052.2	929.4
Main Steam Throttle Temperature (°F)	S2	935.2	948.0	950.0	950.0	-	950.0	950.0	950.0
Main Steam Throttle Enthalpy (Btu/lb)	S2	1,444.5	1,463.2	1,465.7	1,453.0	-	1,468.2	1,475.7	1,479.8
Cold Reheat Steam Flow Rate (lb/hr)	S3	1,447,571.	1,169,927.	1,136,652.	1,458,641.	0	1,072,362.	881,946.	776,206.
Cold Reheat Steam Pressure (psia)	S3	601.6.	503.4.	492.4.	603.5.	-	467.6.	378.9.	334.9.
Cold Reheat Steam Temperature (°F)	S3	665.6.	683.6.	686.7.	675.6.	-	688.3.	685.8.	687.1.
Cold Reheat Steam Enthalpy (Btu/lb)	S3	1,330.5.	1,347.5.	1,349.9.	1,336.4.	-	1,352.4.	1,356.3.	1,359.7.
Hot Reheat Steam Flow Rate (lb/hr)	S6	1,633,827.	1,361,505.	1,331,918.	1,629,795.	0	1,264,773.	1,024,659.	901,975.
Hot Reheat Steam Pressure (psia)	S6	510.5.	428.0.	418.9.	511.6.	-	398.0.	321.2.	284.6.
Hot Reheat Steam Temperature (°F)	S6	987.6.	998.4.	1,000.0.	1,000.0.	-	1,000.0.	984.5.	1,000.0.
Hot Reheat Steam Enthalpy (Btu/lb)	S6	1,513.9.	1,522.1.	1,523.3.	1,520.6.	-	1,523.9.	1,517.8.	1,527.1.
SFLP Turbine Inlet Steam Flow (lb/hr)	S8	531,826	451,180	439,791	521,115	0	417,754	339,921	292,483
SFLP Turbine Inlet Steam Pressure (psia)	S8	107.1	91.4	89.1	105.5	-	84.6	68.6	59.4
SFLP Turbine Inlet Steam Temperature (°F)	S8	579.6	588.5	589.1	586.4	-	588.8	577.6	586.4
SFLP Turbine Inlet Steam Enthalpy (Btu/lb)	S8	1,318.7	1,324.3	1,324.8	1,322.3	-	1,325.0	1,320.6	1,325.6
SFLP Turbine Exhaust Steam Flow Rate (lb/hr)	S10	548,704.	465,028.	453,292.	538,038.	0	430,532.	350,352.	301,664.
SFLP Turbine Exhaust UEEP (Btu/lb)	S10	1,034.5	1,053.2	1,053.8	1,051.1	-	1,063.8	1,065.8	1,072.0
SFLP Turbine Exhaust Loss (Btu/lb)		21.7	7.5	7.5	7.6	-	6.3	6.3	6.4
SFLP Turbine Exhaust Annulus Velocity (ft/sec)		1,034.0	586.4	584.1	595.6	-	477.9	447.5	421.7
SFLP Turbine Exhaust Sonic Velocity (ft/sec)		1,440.9	1,461.1	1,460.1	1,467.2	-	1,432.1	1,424.9	1,467.8
DFLP Turbine Inlet Steam Flow (lb/hr)	S9	1,245,179	1,055,592	1,028,871	1,221,349	0	977,371	795,429	684,781
DFLP Turbine Inlet Steam Pressure (psia)	S9	105.1	89.6	87.4	103.4	-	83.0	67.3	58.2
DFLP Turbine Inlet Steam Temperature (°F)	S9	579.2	588.2	588.9	586.1	-	588.6	577.4	586.2
DFLP Turbine Inlet Steam Enthalpy (Btu/lb)	S9	1,318.7	1,324.3	1,324.8	1,322.3	-	1,325.0	1,320.6	1,325.6
DFLP Turbine Second Extraction Steam Flow (lb/hr)	S12	72,236	54,411	52,699	65,005	0	47,991	37,143	30,667
DFLP Turbine Second Extraction Steam Pressure (psia)	S12	21.2	18.3	17.8	21.0	-	17.0	13.8	12.0
DFLP Turbine Second Extraction Steam Temperature (°F)	S12	291.4	296.6	297.2	294.5	-	296.5	288.8	295.7
DFLP Turbine Second Extraction Steam Enthalpy (Btu/lb)	S12	1,187.1	1,190.3	1,190.7	1,188.7	-	1,190.5	1,187.6	1,191.3
DFLP Turbine Third Extraction Steam Flow (lb/hr)	S13	121,667	80,886	78,583	94,616	0	66,720	51,604	42,225
DFLP Turbine Third Extraction Steam Pressure (psia)	S13	10.24	9.02	8.80	10.39	-	8.48	6.93	6.04
DFLP Turbine Third Extraction Steam Temperature (°F)	S13	194.3	194.1	194.6	195.0	-	195.3	189.2	195.7
DFLP Turbine Third Extraction Steam Enthalpy (Btu/lb)	S13	1,140.0	1,144.0	1,144.3	1,142.5	-	1,144.8	1,142.6	1,146.0
DFLP Turbine Exhaust Steam Flow Rate (lb/hr)	S11	1,051,661.	920,610.	897,897.	1,062,112.	0	862,951.	706,919.	612,097.
DFLP Turbine Exhaust UEEP (Btu/lb)	S11	1,035.1	1,055.4	1,055.8	1,053.2	-	1,066.0	1,067.7	1,073.8
DFLP Turbine Exhaust Loss (Btu/lb)		20.2	7.4	7.4	7.5	-	6.4	6.3	6.4
DFLP Turbine Exhaust Annulus Velocity (ft/sec)		993.2	581.8	579.8	589.3	-	480.0	452.4	428.7
DFLP Turbine Exhaust Sonic Velocity (ft/sec)		1,440.9	1,461.1	1,460.1	1,467.2	-	1,432.1	1,424.9	1,467.8
Turbine Backpressure (In. HgA)	S10, S11	2.24	3.53	3.45	4.03	-	4.08	3.53	3.23
Gross Steam Turbine Output (kW)	E2	281,179.	231,358.	225,959.	276,157.	0.	211,013.	170,323.	149,657.

PRELIMINARY

Estimated Performance Summary
2x2x1 MHI M501GAC

CASE DESCRIPTION	Stream No.	Case 9	Case 10	Case 11	Case 12	Case 13	Case 14	Case 15	Case 16
Equipment Design									
Ambient Dry Bulb Temperature	G1	5°F	91°F	91°F	91°F	85°F	105°F	105°F	105°F
Relative Humidity	G1	68%	45%	45%	45%	67%	43%	43%	43%
Ambient Wet Bulb Temperature	G1	3.5°F	74°F	74°F	74°F	76°F	84°F	84°F	84°F
Site Elevation (ft AMSL)		625	625	625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2	2	2
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
FEEDWATER HEATER CHARACTERISTICS									
Feedwater Heater #2									
Extraction Steam Flow Rate (lb/hr)		72,236	54,411	52,699	65,005	0	47,991	37,143	30,667
Extraction Line Pressure Drop (%)		5.5	4.3	4.2	4.6	-	3.9	3.5	3.2
Extraction Enthalpy (Btu/lb)		1,187.1	1,190.3	1,190.7	1,188.7	-	1,190.5	1,187.6	1,191.3
Feedwater Inlet Temperature (°F)		183.5	181.8	180.9	187.2	143.3	180.4	172.7	167.4
Feedwater Outlet Temperature (°F)		222.2	216.7	215.6	222.9	143.3	213.8	204.6	198.4
Drain Pressure (psia)		20.1	17.5	17.1	20.1	-	16.3	13.3	11.6
Drain Temperature (°F)		228.1	220.8	219.6	228.1	-	217.3	207.0	200.2
Feedwater Heater #1									
Extraction Steam Flow Rate, includes SSR Flow (lb/hr)		123,589	82,462	80,120	96,544	0	68,175	52,792	43,271
Extraction Line Pressure Drop (%)		8.6	5.0	4.9	5.1	-	3.8	3.4	3.1
Extraction Enthalpy (Btu/lb)		1,143.3	1,148.1	1,148.5	1,146.7	-	1,149.4	1,147.5	1,151.4
Feedwater Inlet Temperature (°F)		106.6	122.2	121.4	127.1	143.3	127.5	122.3	119.2
Feedwater Outlet Temperature (°F)		182.6	181.4	180.5	186.7	143.3	180.1	172.4	167.3
Drain Pressure (psia)		9.36	8.57	8.36	9.86	-	8.16	6.69	5.86
Drain Temperature (°F)		190.0	185.9	184.8	192.5	-	183.7	174.8	168.9
TURBINE BYPASS SYSTEM CHARACTERISTICS (per HRSG)									
MS Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-	632,123	-	-	-
MS Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W8	-	-	-	-	47,030	-	-	-
MS Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S14	-	-	-	-	679,153	-	-	-
MS Bypass Attemporator Outlet Steam Pressure (psia)	S14	-	-	-	-	354.8	-	-	-
MS Bypass Attemporator Outlet Steam Temperature (°F)	S14	-	-	-	-	758.0	-	-	-
MS Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S14	-	-	-	-	1,396.5	-	-	-
HRH Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-	764,027	-	-	-
HRH Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W9	-	-	-	-	207,851	-	-	-
HRH Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S15	-	-	-	-	971,878	-	-	-
HRH Bypass Attemporator Outlet Steam Pressure (psia)	S15	-	-	-	-	60.0	-	-	-
HRH Bypass Attemporator Outlet Steam Temperature (°F)	S15	-	-	-	-	382.7	-	-	-
HRH Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S15	-	-	-	-	1,225.0	-	-	-
LP Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-	42,529	-	-	-
LP Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W10	-	-	-	-	2,748	-	-	-
LP Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S16	-	-	-	-	45,277	-	-	-
LP Bypass Attemporator Outlet Steam Pressure (psia)	S16	-	-	-	-	60.0	-	-	-
LP Bypass Attemporator Outlet Steam Temperature (°F)	S16	-	-	-	-	382.7	-	-	-
LP Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S16	-	-	-	-	1,225.0	-	-	-
CONDENSER CHARACTERISTICS									
Operating Pressure (psia)		1.098	1.731	1.694	1.979	3.169	2.004	1.734	1.588
Operating Pressure (in Hg Abs.)		2.24	3.53	3.45	4.03	6.45	4.08	3.53	3.23
Temperature of Condensing Steam (°F)		104.8	120.8	120.0	125.6	382.7	126.1	120.8	117.7
CW Flow Rate Through Condenser (gpm)	W3	98,750	98,750	98,750	98,750	98,750	98,750	98,750	98,750
CW Temperature Into Condenser (°F)	W3	65.0	87.5	87.5	87.5	87.2	95.1	95.3	95.4
CW Temperature Out Of Condenser (°F)	W4	96.3	114.7	114.0	118.6	133.2	120.6	116.3	113.7
Circulating Water Temperature Rise (°F)		31.3	27.2	26.5	31.2	46.0	25.5	21.0	18.3
Terminal Temperature Difference, TTD (°F)		8.6	6.1	6.0	7.0	-73.2	5.5	4.5	3.9
Total Condenser Heat Rejection (MMBtu/hr)		1,539.8	1,338.5	1,307.0	1,534.5	2,265.1	1,256.3	1,034.4	902.5
AUXILIARY COOLING SYSTEM									
Auxiliary Cooling Water Flow Rate Through Heat Exchangers (gpm)	W5	17,250	17,250	17,250	17,250	17,250	17,250	17,250	17,250
Auxiliary Cooling Water Temperature Rise (°F)		20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Auxiliary Cooling Heat Rejection (MMBtu/hr)		172.3	172.1	172.1	172.1	172.1	172.1	172.1	172.1
COOLING TOWER CHARACTERISTICS									
CW Flow Rate Into Cooling Tower (gpm)	W6	116,000	116,000	116,000	116,000	116,000	116,000	116,000	116,000
CW Temperature Into Cooling Tower (°F)	W6	94.6	113.6	113.1	117.0	129.4	119.8	116.2	114.0
Air Inlet Wet Bulb Temperature (°F)		3.7	73.7	73.7	73.7	76.0	84.0	84.0	84.0
Current Approach Temperature (°F)		*	14.6	14.6	14.7	12.5	12.1	12.1	12.2
Current Range Temperature (°F)		30.3	25.4	24.9	28.7	41.0	23.8	20.1	17.9
Drift Rate (%)		*	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Cycles of Concentration		4	4	4	4	4	4	4	4
Evaporation Loss (gpm)		*	2,625	2,573	2,946	3,963	2,594	2,214	1,986
Drift Loss (gpm)		*	5.8	5.8	5.8	5.8	5.8	5.8	5.8
Blowdown (gpm)		*	869	852	976	1,315	859	732	656
Blowdown Temperature (°F)		*	87.4	87.4	87.4	87.2	95.0	95.2	95.3
Makeup (gpm)		*	3,500	3,431	3,928	5,283	3,459	2,951	2,648
Makeup Temperature (°F)		*	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Total Cooling Tower Heat Rejection (MMBtu/hr)		1,713.8	1,521.0	1,489.5	1,717.0	2,447.6	1,438.9	1,216.9	1,085.0

PRELIMINARY

Estimated Performance Summary
2x2x1 MHI M501GAC

CASE DESCRIPTION	Stream No.	Case 9	Case 10	Case 11	Case 12	Case 13	Case 14	Case 15	Case 16
Equipment Design									
Ambient Dry Bulb Temperature	G1	5°F	91°F	91°F	91°F	85°F	105°F	105°F	105°F
Relative Humidity	G1	68%	45%	45%	45%	67%	43%	43%	43%
Ambient Wet Bulb Temperature	G1	3.5°F	74°F	74°F	74°F	76°F	84°F	84°F	84°F
Site Elevation (ft AMSL)		625	625	625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2	2	2
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
FUEL GAS PERFORMANCE HEATER CHARACTERISTICS (Per CT)									
Natural Gas Flow Rate (lb/hr)	G2	129,670.	116,990.	109,650.	109,650.	116,990.	99,850.	80,280.	62,820.
Natural Gas Inlet Temperature (°F)		60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Natural Gas Outlet Temperature (°F)	G2	392.1	391.9	392.3	392.1	391.7	392.0	391.8	380.2
Heating Water Inlet Flow Rate (lb/hr)		77,601.	75,944.	71,946.	65,192.	94,262.	66,800.	60,393.	45,000.
Heating Water Inlet Temperature (°F)		475.7	457.4	455.2	476.6	427.4	450.4	431.2	421.2
Heating Water Outlet Temperature (°F)		155.9	161.5	161.9	154.8	188.2	162.8	174.8	161.6
TURBINE COOLING AIR COOLER CHARACTERISTICS (Per CT)									
Cooling Water Inlet Flow Rate (lb/hr)	W11	127,000	142,889	155,464	155,464	114,528	170,000	106,698	60,915
Cooling Water Inlet Temperature (°F)	W11	345.6	336.0	333.6	342.1	309.3	329.9	315.5	302.6
Cooling Water Outlet Temperature (°F)		558.7	540.5	528.7	536.1	563.3	515.1	539.5	570.5
Turbine Cooling Air Cooler Heat Rejection (MMBtu/hr)		30.0	32.0	33.0	33.0	32.0	34.0	26.0	18.0
CYCLE MAKEUP CONDITIONS									
Makeup Flow Rate to Steam Cycle (gpm)	W7	43.6.	36.5.	35.3.	42.2.	37.9.	33.2.	27.4.	22.6.
Makeup Temperature (°F)	W7	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
TOTAL PLANT PERFORMANCE									
Total Gross CT Electrical Output (kW)		601,000.	535,000.	492,200.	492,200.	535,000.	436,600.	327,400.	218,200.
Total Gross Steam Turbine Electrical Output (kW)	E2	281,179.	231,358.	225,959.	276,157.	0.	211,013.	170,323.	149,657.
Total Gross Plant Electrical Output (kW)	D3	882,179.	766,358.	718,159.	768,357.	535,000.	647,613.	497,723.	367,857.
Auxiliary Power									
BOP Percent Aux Power, Approx. (%)		2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
BOP Auxiliary Power (kW)		19,410.	16,860.	15,800.	16,900.	11,770.	14,250.	10,950.	8,090.
Chiller 0.7327 kW per ton chilling capacity (kW)		0.	10,154.	0.	0.	11,822.	0.	0.	0.
Total Auxiliary Power (kW)		19,410.	27,014.	15,800.	16,900.	23,592.	14,250.	10,950.	8,090.
Percentage of Gross Electrical Output (%)		2.20	3.53	2.20	2.20	4.41	2.20	2.20	2.20
Net Plant Electrical Output (kW)	D4	862,769.	739,344.	702,359.	751,457.	511,408.	633,363.	486,773.	359,767.
Net Plant Electrical Heat Rate, LHV (Btu/kWh)	D5	6,331.	6,315.	6,230.	6,402.	9,130.	6,292.	6,582.	6,969.
Net Plant Electrical Heat Rate, HHV (Btu/kWh)		7,027.	7,010.	6,916.	7,106.	10,134.	6,984.	7,306.	7,735.

* = Cooling Tower parameter can not be calculated at minimum cooling water temperature conditi

PRELIMINARY

Estimated Performance Summary
2x2x1 MHI M501GAC

CASE DESCRIPTION	Stream No.	Case 17	Case 18	Case 19	Case 20	Case 21	Case 22
Equipment Design							
Ambient Dry Bulb Temperature	G1	85°F	85°F	55°F	55°F	5°F	5°F
Relative Humidity	G1	67%	67%	66%	66%	68%	68%
Ambient Wet Bulb Temperature	G1	76°F	76°F	49°F	49°F	3.5°F	3.5°F
Site Elevation (ft AMSL)		625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
COMBUSTION TURBINE CHARACTERISTICS (per CT)							
CT Frame		M501GAC	M501GAC	M501GAC	M501GAC	M501GAC	M501GAC
Load Condition		75%	50%	75%	50%	75%	50%
Inlet Air Cooling		NONE	NONE	NONE	NONE	NONE	NONE
Chiller Cooling Capacity (ton)		0.	0.	0.	0.	0.	0.
Chiller Air Outlet Temperature (°F)		-	-	-	-	-	-
Evaporative Cooler Water Flow Rate (Evaporation only) (lb//hr)		0.	0.	0.	0.	0.	0.
Evaporative Cooler Air Outlet Temperature (°F)		-	-	-	-	-	-
Fuel Lower Heating Value (Btu/lb)	G2, G4, O1	19,954.	19,954.	19,954.	19,954.	19,954.	19,954.
Fuel Flow Rate (lb/hr)	G2, O1	85,080.	66,200.	90,730.	69,910.	100,120.	76,190.
Fuel Inlet Temperature (°F)	G2, O1	392.	375.	392.	374.	392.	370.
Heat Input to CT, LHV (MMBtu/hr)	D1	1,697.7	1,321.0	1,810.5	1,395.0	1,997.8	1,520.3
Combustor NOx Water Injection Flow Rate (lb/hr)	W1	0	0	0	0	0	0
Exhaust Gas Flow Rate (lb/hr)	G3	3,771,000.	2,857,701.	3,988,200.	2,990,700.	4,284,000.	3,180,503.
Exhaust Gas Temperature (°F)	G3	1,081.	1,192.	1,057.	1,169.	1,031.	1,138.
Exhaust Analysis, % Vol.							
Argon	G3	0.92	0.92	0.93	0.93	0.94	0.94
Nitrogen	G3	73.22	73.15	74.52	74.46	75.10	75.01
Oxygen	G3	12.65	12.44	12.89	12.67	12.83	12.63
Carbon Dioxide	G3	3.67	3.77	3.72	3.82	3.84	3.93
Water	G3	9.55	9.72	7.94	8.13	7.30	7.49
CT Gross Output (kW)	E1	178,900.	119,300.	197,400.	131,600.	225,300.	150,200.
CT Gross Heat Rate, LHV (Btu/kWh)		9,490.	11,073.	9,172.	10,600.	8,867.	10,122.
CT Gross Heat Rate, HHV (Btu/kWh)		10,534.	12,291.	10,180.	11,766.	9,843.	11,235.
HRSG CHARACTERISTICS (per HRSG)							
Heat Input to Duct Burner, LHV (MMBtu/hr)	D2	0.0	0.0	0.0	0.0	0.0	0.0
Heat Input to Duct Burner, HHV (MMBtu/hr)		0.0	0.0	0.0	0.0	0.0	0.0
Duct Burner Fuel Flow Rate (lb/hr)	G4	0	0	0	0	0	0
Duct Burner Gas Exit Temperature (°F)		1,029.1	1,095.5	1,009.1	1,082.8	987.4	1,067.1
Main Steam Flow Rate (lb/hr)	S1	457,906.	404,462.	460,574.	408,273.	468,498.	415,394.
Main Steam Pressure (psia)	S1	1,130.6	1,002.3	1,131.5	1,011.2	1,143.1	1,028.0
Main Steam Temperature (°F)	S1	960.0	960.0	948.1	960.0	933.1	960.0
Main Steam Enthalpy (Btu/lb)	S1	1,478.9	1,483.2	1,471.9	1,482.9	1,462.7	1,482.3
Hot Reheat Flow Rate (lb/hr)	S5	522,407.	459,594.	528,986.	460,764.	543,065.	464,725.
Hot Reheat Pressure (psia)	S5	347.1	308.7	349.5	309.5	356.3	312.1
Hot Reheat Temperature (°F)	S5	983.1	1,010.0	967.7	1,010.0	950.3	1,010.0
Hot Reheat Enthalpy (Btu/lb)	S5	1,516.3	1,531.7	1,508.1	1,531.7	1,498.6	1,531.6
IP Superheater Flow Rate (lb/hr)	S4	75,268.	48,072.	79,241.	50,323.	85,582.	54,609.
IP Superheater Pressure (psia)	S4	361.8	320.8	364.2	321.9	371.4	325.0
IP Superheater Temperature (°F)	S4	561.2	552.7	560.7	553.2	561.0	554.6
IP Superheater Enthalpy (Btu/lb)	S4	1,287.7	1,286.6	1,287.2	1,286.8	1,286.7	1,287.3
LP Superheater Flow Rate (lb/hr)	S7	54,584.	35,049.	58,187.	37,195.	63,631.	40,859.
LP Superheater Pressure (psia)	S7	77.7	64.5	79.4	65.3	82.6	67.0
LP Superheater Temperature (°F)	S7	495.2	498.3	493.7	497.2	492.6	495.5
LP Superheater Enthalpy (Btu/lb)	S7	1,279.1	1,281.9	1,278.2	1,281.3	1,277.3	1,280.3
Condensate Preheater Inlet Flow Rate (lb/hr)	W2	658,628.	554,916.	673,362.	560,423.	699,889.	571,396.
Condensate Preheater Inlet Pressure (psia)	W2	252.6	270.2	250.5	269.7	245.9	268.2
Condensate Preheater Inlet Temperature (°F)	W2	200.5	193.6	200.2	193.0	201.0	193.1
Condensate Preheater Inlet Enthalpy (Btu/lb)	W2	169.1	162.2	168.9	161.7	169.6	161.8
HRSG Exhaust Stack Gas Characteristics							
HRSG Exhaust Gas Temperature (°F)	G5	262.1	247.2	263.6	248.0	266.7	250.2
HRSG Exhaust Gas Flow Rate (lb/hr)	G5	3,771,000.	2,857,701.	3,988,200.	2,990,700.	4,284,000.	3,180,503.
HRSG BLOWDOWN CHARACTERISTICS (Per HRSG)							
HP Evaporator Blowdown Flow Rate (lb/hr)		4,623.	3,891.	4,652.	3,955.	4,732.	4,065.
IP Evaporator Blowdown Flow Rate (lb/hr)		760.	486.	800.	508.	864.	552.
DEAERATOR CHARACTERISTICS (Per HRSG)							
DA Operating Pressure (psia)		79.5	65.3	81.4	66.3	84.8	68.2
Main Boiler Feedwater Inlet Flow Rate (lb/hr)		658,628.	554,916.	673,362.	560,423.	699,889.	571,396.
Main Boiler Feedwater Inlet Temperature (°F)		290.0	273.8	292.3	275.5	296.0	278.6
Main Boiler Feedwater Outlet Flow Rate (lb/hr)		602,395.	518,480.	613,487.	521,827.	634,509.	529,109.
Main Boiler Feedwater Outlet Temperature (°F)		311.6	298.3	313.2	299.3	316.1	301.1
BFW Temperature Rise (°F)		21.6	24.6	20.9	23.8	20.1	22.5
Primary Pegging Steam Flow Rate (lb/hr)		17,618.	16,454.	17,531.	16,133.	17,649.	15,694.
Auxiliary Pegging Steam Flow Rate (lb/hr)		0.	0.	0.	0.	0.	0.
Vent Steam Flow Rate (lb/hr)		1,647.	1,387.	1,683.	1,401.	1,750.	1,428.

PRELIMINARY

Estimated Performance Summary
2x2x1 MHI M501GAC

CASE DESCRIPTION	Stream No.	Case 17	Case 18	Case 19	Case 20	Case 21	Case 22
Equipment Design							
Ambient Dry Bulb Temperature	G1	85°F	85°F	55°F	55°F	5°F	5°F
Relative Humidity	G1	67%	67%	66%	66%	68%	68%
Ambient Wet Bulb Temperature	G1	76°F	76°F	49°F	49°F	3.5°F	3.5°F
Site Elevation (ft AMSL)		625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
PUMP CHARACTERISTICS							
HP Feedpump Control Valve Discharge							
Total Flow Rate per HRSG (lb/hr)		462,529.	408,353.	465,226.	412,228.	473,230.	419,459.
Pressure (psia)		2,531.4	2,526.7	2,533.2	2,528.4	2,536.0	2,530.8
Temperature (°F)		317.5	304.0	319.1	305.0	322.0	306.9
Enthalpy (Btu/lb)		292.2	278.4	293.8	279.4	296.8	281.3
IP Feedpump Control Valve Discharge							
Total Flow Rate per HRSG (lb/hr)		139,867.	110,127.	148,261.	109,599.	161,279.	109,649.
Pressure (psia)		368.9.	324.1.	372.1.	325.4.	380.6.	329.1.
Temperature (°F)		312.3.	298.9.	313.9.	299.9.	316.8.	301.7.
Enthalpy (Btu/lb)		283.0.	269.1.	284.6.	270.1.	287.6.	272.0.
HRSG Preheater Recirculation Pump CV Discharge							
Total Flow Rate per HRSG (lb/hr)		0.	0.	0.	0.	0.	0.
Pressure (psia)		-	-	-	-	-	-
Temperature (°F)		-	-	-	-	-	-
Enthalpy (Btu/lb)		-	-	-	-	-	-
Condensate Pump Discharge							
Total Flow Rate from Condenser (lb/hr)		1,088,858.	936,830.	1,090,016.	927,989.	1,121,329.	939,580.
Pressure (psia)		350.0	350.0	350.0	350.0	350.0	350.0
Temperature (°F)		113.0	109.5	95.8	91.5	92.9	88.8
Enthalpy (Btu/lb)		81.9	78.5	64.7	60.5	61.9	57.8
STEAM TURBINE CHARACTERISTICS		TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB
Main Steam Throttle Flow Rate (lb/hr)	S2	915,811.	808,925.	921,148.	816,547.	936,996.	830,788.
Main Steam Throttle Pressure (psia)	S2	1,066.5	945.4	1,067.5	953.8	1,078.5	969.6
Main Steam Throttle Temperature (°F)	S2	950.0	950.0	938.1	950.0	923.1	950.0
Main Steam Throttle Enthalpy (Btu/lb)	S2	1,475.3	1,479.3	1,468.3	1,479.0	1,459.1	1,478.5
Cold Reheat Steam Flow Rate (lb/hr)	S3	894,279.	789,905.	899,489.	797,348.	914,965.	811,255.
Cold Reheat Steam Pressure (psia)	S3	384.7.	341.2.	387.1.	342.5.	394.3.	346.0.
Cold Reheat Steam Temperature (°F)	S3	686.0.	687.3.	676.9.	686.0.	665.7.	684.4.
Cold Reheat Steam Enthalpy (Btu/lb)	S3	1,356.1.	1,359.4.	1,351.0.	1,358.6.	1,344.3.	1,357.6.
Hot Reheat Steam Flow Rate (lb/hr)	S6	1,044,815.	919,188.	1,057,971.	921,528.	1,086,129.	929,450.
Hot Reheat Steam Pressure (psia)	S6	326.2.	290.0.	328.3.	290.7.	334.8.	293.2.
Hot Reheat Steam Temperature (°F)	S6	973.1.	1,000.0.	957.7.	1,000.0.	940.3.	1,000.0.
Hot Reheat Steam Enthalpy (Btu/lb)	S6	1,511.6.	1,527.0.	1,503.4.	1,526.9.	1,493.9.	1,526.9.
SFLP Turbine Inlet Steam Flow (lb/hr)	S8	347,978	298,235	354,176	300,288	365,998	304,913
SFLP Turbine Inlet Steam Pressure (psia)	S8	69.9	60.5	70.8	61.0	72.7	61.9
SFLP Turbine Inlet Steam Temperature (°F)	S8	570.1	586.5	559.8	586.9	548.4	587.5
SFLP Turbine Inlet Steam Enthalpy (Btu/lb)	S8	1,316.8	1,325.5	1,311.7	1,325.7	1,305.9	1,326.0
SFLP Turbine Exhaust Steam Flow Rate (lb/hr)	S10	358,584.	307,585.	364,880.	309,694.	376,936.	314,442.
SFLP Turbine Exhaust UEEP (Btu/lb)	S10	1,052.7	1,059.7	1,034.7	1,042.5	1,030.2	1,041.1
SFLP Turbine Exhaust Loss (Btu/lb)		7.0	6.8	16.8	16.0	20.7	19.2
SFLP Turbine Exhaust Annulus Velocity (ft/sec)		556.3	530.0	901.6	877.6	1,005.9	961.9
SFLP Turbine Exhaust Sonic Velocity (ft/sec)		1,461.2	1,457.2	1,451.4	1,446.9	1,429.1	1,423.6
DFLP Turbine Inlet Steam Flow (lb/hr)	S9	814,053	698,182	828,222	702,868	855,521	713,668
DFLP Turbine Inlet Steam Pressure (psia)	S9	68.6	59.4	69.4	59.8	71.3	60.7
DFLP Turbine Inlet Steam Temperature (°F)	S9	569.9	586.3	559.6	586.7	548.2	587.4
DFLP Turbine Inlet Steam Enthalpy (Btu/lb)	S9	1,316.8	1,325.5	1,311.7	1,325.7	1,305.9	1,326.0
DFLP Turbine Second Extraction Steam Flow (lb/hr)	S12	39,533	32,463	43,249	35,000	45,608	36,077
DFLP Turbine Second Extraction Steam Pressure (psia)	S12	14.0	12.2	14.1	12.2	14.5	12.4
DFLP Turbine Second Extraction Steam Temperature (°F)	S12	283.9	296.5	277.9	298.5	269.7	299.2
DFLP Turbine Second Extraction Steam Enthalpy (Btu/lb)	S12	1,185.3	1,191.6	1,182.3	1,192.6	1,178.4	1,192.9
DFLP Turbine Third Extraction Steam Flow (lb/hr)	S13	59,976	49,476	75,795	62,785	81,933	66,050
DFLP Turbine Third Extraction Steam Pressure (psia)	S13	6.95	6.06	6.83	5.92	7.00	5.98
DFLP Turbine Third Extraction Steam Temperature (°F)	S13	183.6	194.8	175.8	193.8	176.8	194.0
DFLP Turbine Third Extraction Steam Enthalpy (Btu/lb)	S13	1,139.9	1,145.6	1,136.2	1,145.2	1,132.8	1,145.3
DFLP Turbine Exhaust Steam Flow Rate (lb/hr)	S11	714,786.	616,457.	709,420.	605,296.	728,230.	611,757.
DFLP Turbine Exhaust UEEP (Btu/lb)	S11	1,054.6	1,061.6	1,035.6	1,043.6	1,030.7	1,041.9
DFLP Turbine Exhaust Loss (Btu/lb)		7.0	6.8	15.9	15.4	19.4	18.3
DFLP Turbine Exhaust Annulus Velocity (ft/sec)		555.5	532.1	878.2	859.2	973.5	937.4
DFLP Turbine Exhaust Sonic Velocity (ft/sec)		1,461.2	1,457.2	1,451.4	1,446.9	1,429.1	1,423.6
Turbine Backpressure (In. HgA)	S10, S11	2.84	2.56	1.69	1.48	1.55	1.36
Gross Steam Turbine Output (kW)	E2	175,745.	155,523.	180,467.	160,753.	183,263.	163,251.

PRELIMINARY

Estimated Performance Summary
2x2x1 MHI M501GAC

CASE DESCRIPTION	Stream No.	Case 17	Case 18	Case 19	Case 20	Case 21	Case 22
Equipment Design							
Ambient Dry Bulb Temperature	G1	85°F	85°F	55°F	55°F	5°F	5°F
Relative Humidity	G1	67%	67%	66%	66%	68%	68%
Ambient Wet Bulb Temperature	G1	76°F	76°F	49°F	49°F	3.5°F	3.5°F
Site Elevation (ft AMSL)		625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
FEEDWATER HEATER CHARACTERISTICS							
Feedwater Heater #2							
Extraction Steam Flow Rate (lb/hr)		39,533	32,463	43,249	35,000	45,608	36,077
Extraction Line Pressure Drop (%)		3.8	3.5	4.4	4.0	4.6	4.1
Extraction Enthalpy (Btu/lb)		1,185.3	1,191.6	1,182.3	1,192.6	1,178.4	1,192.9
Feedwater Inlet Temperature (°F)		171.9	166.8	169.3	164.1	169.6	164.1
Feedwater Outlet Temperature (°F)		205.1	199.0	204.8	198.6	205.7	199.1
Drain Pressure (psia)		13.5	11.7	13.5	11.7	13.8	11.9
Drain Temperature (°F)		207.7	200.9	207.7	200.7	208.8	201.3
Feedwater Heater #1							
Extraction Steam Flow Rate, includes SSR Flow (lb/hr)		61,183	50,540	77,013	63,856	83,178	67,135
Extraction Line Pressure Drop (%)		4.6	4.2	7.4	7.0	8.2	7.6
Extraction Enthalpy (Btu/lb)		1,144.2	1,150.2	1,139.7	1,148.9	1,136.0	1,148.8
Feedwater Inlet Temperature (°F)		114.6	111.2	97.4	93.2	94.5	90.5
Feedwater Outlet Temperature (°F)		171.7	166.6	168.9	163.8	169.2	163.8
Drain Pressure (psia)		6.64	5.80	6.33	5.51	6.43	5.53
Drain Temperature (°F)		174.4	168.6	172.3	166.3	173.0	166.5
TURBINE BYPASS SYSTEM CHARACTERISTICS (per HRSG)							
MS Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-	-	-
MS Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W8	-	-	-	-	-	-
MS Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S14	-	-	-	-	-	-
MS Bypass Attemporator Outlet Steam Pressure (psia)	S14	-	-	-	-	-	-
MS Bypass Attemporator Outlet Steam Temperature (°F)	S14	-	-	-	-	-	-
MS Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S14	-	-	-	-	-	-
HRH Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-	-	-
HRH Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W9	-	-	-	-	-	-
HRH Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S15	-	-	-	-	-	-
HRH Bypass Attemporator Outlet Steam Pressure (psia)	S15	-	-	-	-	-	-
HRH Bypass Attemporator Outlet Steam Temperature (°F)	S15	-	-	-	-	-	-
HRH Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S15	-	-	-	-	-	-
LP Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-	-	-
LP Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W10	-	-	-	-	-	-
LP Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S16	-	-	-	-	-	-
LP Bypass Attemporator Outlet Steam Pressure (psia)	S16	-	-	-	-	-	-
LP Bypass Attemporator Outlet Steam Temperature (°F)	S16	-	-	-	-	-	-
LP Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S16	-	-	-	-	-	-
CONDENSER CHARACTERISTICS							
Operating Pressure (psia)		1.395	1.259	0.832	0.728	0.761	0.669
Operating Pressure (in Hg Abs.)		2.84	2.56	1.69	1.48	1.55	1.36
Temperature of Condensing Steam (°F)		113.1	109.5	95.6	91.3	92.7	88.6
CW Flow Rate Through Condenser (gpm)	W3	98,750	98,750	98,750	98,750	98,750	98,750
CW Temperature Into Condenser (°F)	W3	87.1	86.9	68.9	68.2	65.0	65.0
CW Temperature Out Of Condenser (°F)	W4	108.3	105.4	90.1	86.5	86.8	83.5
Circulating Water Temperature Rise (°F)		21.2	18.5	21.2	18.3	21.8	18.5
Terminal Temperature Difference, TTD (°F)		4.8	4.2	5.5	4.8	6.0	5.1
Total Condenser Heat Rejection (MMBtu/hr)		1,044.4	908.8	1,043.9	900.3	1,071.9	912.4
AUXILIARY COOLING SYSTEM							
Auxiliary Cooling Water Flow Rate Through Heat Exchangers (gpm)	W5	17,250	17,250	17,250	17,250	17,250	17,250
Auxiliary Cooling Water Temperature Rise (°F)		20.0	20.0	20.0	20.0	20.0	20.0
Total Auxiliary Cooling Heat Rejection (MMBtu/hr)		172.1	172.1	172.2	172.3	172.3	172.3
COOLING TOWER CHARACTERISTICS							
CW Flow Rate Into Cooling Tower (gpm)	W6	116,000	116,000	116,000	116,000	116,000	116,000
CW Temperature Into Cooling Tower (°F)	W6	108.1	105.6	90.0	86.8	86.5	83.8
Air Inlet Wet Bulb Temperature (°F)		76.0	76.0	49.0	49.0	3.7	3.7
Current Approach Temperature (°F)		11.7	11.4	20.1	19.3	*	*
Current Range Temperature (°F)		20.6	18.3	21.0	18.5	21.8	18.8
Drift Rate (%)		0.005	0.005	0.005	0.005	*	*
Cycles of Concentration		4	4	4	4	4	4
Evaporation Loss (gpm)		2,012	1,798	1,700	1,501	*	*
Drift Loss (gpm)		5.8	5.8	5.8	5.8	*	*
Blowdown (gpm)		665	593	561	495	*	*
Blowdown Temperature (°F)		87.0	86.9	68.9	68.2	*	*
Makeup (gpm)		2,683	2,397	2,267	2,001	*	*
Makeup Temperature (°F)		60.0	60.0	60.0	60.0	*	*
Total Cooling Tower Heat Rejection (MMBtu/hr)		1,226.9	1,091.3	1,226.5	1,082.9	1,245.8	1,086.4

PRELIMINARY

Estimated Performance Summary
2x2x1 MHI M501GAC

CASE DESCRIPTION	Stream No.	Case 17	Case 18	Case 19	Case 20	Case 21	Case 22
Equipment Design							
Ambient Dry Bulb Temperature	G1	85°F	85°F	55°F	55°F	5°F	5°F
Relative Humidity	G1	67%	67%	66%	66%	68%	68%
Ambient Wet Bulb Temperature	G1	76°F	76°F	49°F	49°F	3.5°F	3.5°F
Site Elevation (ft AMSL)		625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
FUEL GAS PERFORMANCE HEATER CHARACTERISTICS (Per CT)							
Natural Gas Flow Rate (lb/hr)	G2	85,080.	66,200.	90,730.	69,910.	100,120.	76,190.
Natural Gas Inlet Temperature (°F)		60.0	60.0	60.0	60.0	60.0	60.0
Natural Gas Outlet Temperature (°F)	G2	392.1	375.2	392.1	373.6	391.7	370.4
Heating Water Inlet Flow Rate (lb/hr)		63,838.	45,000.	68,220.	47,000.	74,832.	50,000.
Heating Water Inlet Temperature (°F)		432.5	423.1	432.9	423.4	434.4	424.2
Heating Water Outlet Temperature (°F)		175.2	154.2	176.3	153.0	176.7	150.4
TURBINE COOLING AIR COOLER CHARACTERISTICS (Per CT)							
Cooling Water Inlet Flow Rate (lb/hr)	W11	104,338	59,288	97,484	55,649	89,734	52,041
Cooling Water Inlet Temperature (°F)	W11	317.5	304.0	319.1	305.0	322.0	306.9
Cooling Water Outlet Temperature (°F)		545.6	551.3	544.6	551.8	527.7	521.1
Turbine Cooling Air Cooler Heat Rejection (MMBtu/hr)		26.0	16.0	24.0	15.0	20.0	12.0
CYCLE MAKEUP CONDITIONS							
Makeup Flow Rate to Steam Cycle (gpm)	W7	28.1.	23.1.	28.5.	23.5.	29.4.	24.2.
Makeup Temperature (°F)	W7	60.0	60.0	60.0	60.0	60.0	60.0
TOTAL PLANT PERFORMANCE							
Total Gross CT Electrical Output (kW)		357,800.	238,600.	394,800.	263,200.	450,601.	300,400.
Total Gross Steam Turbine Electrical Output (kW)	E2	175,745.	155,523.	180,467.	160,753.	183,263.	163,251.
Total Gross Plant Electrical Output (kW)	D3	533,546.	394,123.	575,267.	423,953.	633,863.	463,651.
Auxiliary Power							
BOP Percent Aux Power, Approx. (%)		2.20	2.20	2.20	2.20	2.20	2.20
BOP Auxiliary Power (kW)		11,740.	8,670.	12,660.	9,330.	13,940.	10,200.
Chiller 0.7327 kW per ton chilling capacity (kW)		0.	0.	0.	0.	0.	0.
Total Auxiliary Power (kW)		11,740.	8,670.	12,660.	9,330.	13,940.	10,200.
Percentage of Gross Electrical Output (%)		2.20	2.20	2.20	2.20	2.20	2.20
Net Plant Electrical Output (kW)	D4	521,806.	385,453.	562,607.	414,623.	619,923.	453,451.
Net Plant Electrical Heat Rate, LHV (Btu/kWh)	D5	6,507.	6,854.	6,436.	6,729.	6,445.	6,706.
Net Plant Electrical Heat Rate, HHV (Btu/kWh)		7,223.	7,608.	7,144.	7,469.	7,154.	7,443.

* = Cooling Tower parameter can not be calculated at minimum cooling water temperature conditi

PRELIMINARY

Estimated Performance Summary
2x2x1 MHI M501GAC

CASE DESCRIPTION	Stream No.	Case 23	Case 24	Case 25	Case 26	Case 27	Case 28
Equipment Design							
Ambient Dry Bulb Temperature	G1	105°F	55°F	91°F	91°F	85°F	55°F
Relative Humidity	G1	43%	66%	45%	45%	67%	66%
Ambient Wet Bulb Temperature	G1	84°F	49°F	74°F	74°F	76°F	49°F
Site Elevation (ft AMSL)		625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
COMBUSTION TURBINE CHARACTERISTICS (per CT)							
CT Frame		M501GAC	M501GAC	M501GAC	M501GAC	M501GAC	M501GAC
Load Condition		100%	100%	100%	100%	100%	100%
Inlet Air Cooling		CHILLER ON	CHILLER ON	NONE	NONE	EVAP ON	NONE
Chiller Cooling Capacity (ton)		11,569.	447.	0.	0.	0.	0.
Chiller Air Outlet Temperature (°F)		50.	50.	-	-	-	-
Evaporative Cooler Water Flow Rate (Evaporation only) (lb//hr)		0.	0.	0.	0.	6,318.	0.
Evaporative Cooler Air Outlet Temperature (°F)		-	-	-	-	77.	-
Fuel Lower Heating Value (Btu/lb)	G2, G4, O1	19,954.	19,954.	19,954.	19,954.	19,954.	19,954.
Fuel Flow Rate (lb/hr)	G2, O1	116,990.	116,950.	104,910.	104,910.	109,340.	115,370.
Fuel Inlet Temperature (°F)	G2, O1	392.	392.	392.	392.	392.	392.
Heat Input to CT, LHV (MMBtu/hr)	D1	2,334.5	2,333.7	2,093.4	2,093.4	2,181.8	2,302.1
Combustor NOx Water Injection Flow Rate (lb/hr)	W1	0	0	0	0	0	0
Exhaust Gas Flow Rate (lb/hr)	G3	4,680,000.	4,681,400.	4,277,600.	4,277,600.	4,388,700.	4,638,902.
Exhaust Gas Temperature (°F)	G3	1,132.	1,132.	1,156.	1,156.	1,152.	1,134.
Exhaust Analysis, % Vol.							
Argon	G3	0.93	0.93	0.92	0.92	0.91	0.93
Nitrogen	G3	73.99	74.07	73.29	73.29	72.70	74.20
Oxygen	G3	11.89	11.92	11.88	11.88	11.62	11.99
Carbon Dioxide	G3	4.16	4.16	4.07	4.07	4.12	4.15
Water	G3	9.02	8.93	9.84	9.84	10.65	8.73
CT Gross Output (kW)	E1	267,500.	267,500.	232,900.	232,900.	245,000.	263,200.
CT Gross Heat Rate, LHV (Btu/kWh)		8,727.	8,724.	8,988.	8,988.	8,905.	8,747.
CT Gross Heat Rate, HHV (Btu/kWh)		9,687.	9,684.	9,977.	9,977.	9,885.	9,709.
HRSG CHARACTERISTICS (per HRSG)							
Heat Input to Duct Burner, LHV (MMBtu/hr)	D2	0.0	0.0	0.0	244.4	0.0	215.9
Heat Input to Duct Burner, HHV (MMBtu/hr)		0.0	0.0	0.0	271.2	0.0	239.7
Duct Burner Fuel Flow Rate (lb/hr)	G4	0	0	0	12,246	0	10,820
Duct Burner Gas Exit Temperature (°F)		1,070.6	1,070.6	1,084.2	1,272.6	1,082.7	1,227.3
Main Steam Flow Rate (lb/hr)	S1	599,011.	598,904.	566,268.	751,885.	581,183.	759,358.
Main Steam Pressure (psia)	S1	1,464.5	1,464.3	1,389.3	1,818.0	1,424.2	1,834.9
Main Steam Temperature (°F)	S1	958.0	958.1	960.0	960.0	960.0	960.0
Main Steam Enthalpy (Btu/lb)	S1	1,466.5	1,466.5	1,470.3	1,455.4	1,469.1	1,454.8
Hot Reheat Flow Rate (lb/hr)	S5	680,761.	680,597.	650,731.	818,571.	665,365.	824,247.
Hot Reheat Pressure (psia)	S5	455.4	455.3	435.7	546.7	445.4	550.5
Hot Reheat Temperature (°F)	S5	1,008.4	1,008.5	1,010.0	1,010.0	1,010.0	1,010.0
Hot Reheat Enthalpy (Btu/lb)	S5	1,526.7	1,526.8	1,528.2	1,525.0	1,527.9	1,524.9
IP Superheater Flow Rate (lb/hr)	S4	95,834.	95,775.	90,250.	75,110.	91,851.	80,718.
IP Superheater Pressure (psia)	S4	474.2	474.1	453.4	569.0	463.5	573.2
IP Superheater Temperature (°F)	S4	590.4	590.3	583.7	627.1	587.1	627.5
IP Superheater Enthalpy (Btu/lb)	S4	1,295.0	1,295.0	1,292.8	1,309.6	1,293.9	1,309.5
LP Superheater Flow Rate (lb/hr)	S7	67,433.	67,165.	61,594.	45,857.	63,100.	52,890.
LP Superheater Pressure (psia)	S7	100.7	100.6	95.3	109.7	97.5	112.5
LP Superheater Temperature (°F)	S7	519.6	520.0	516.4	571.5	518.7	565.1
LP Superheater Enthalpy (Btu/lb)	S7	1,289.1	1,289.3	1,288.0	1,314.4	1,288.9	1,311.0
Condensate Preheater Inlet Flow Rate (lb/hr)	W2	847,248.	846,961.	803,579.	954,777.	822,407.	974,386.
Condensate Preheater Inlet Pressure (psia)	W2	207.1	207.7	217.8	169.5	213.1	165.5
Condensate Preheater Inlet Temperature (°F)	W2	210.4	209.2	208.4	216.7	209.1	216.1
Condensate Preheater Inlet Enthalpy (Btu/lb)	W2	179.0	177.8	177.0	185.3	177.7	184.7
HRSG Exhaust Stack Gas Characteristics							
HRSG Exhaust Gas Temperature (°F)	G5	277.0	276.4	272.6	277.4	274.4	279.7
HRSG Exhaust Gas Flow Rate (lb/hr)	G5	4,680,000.	4,681,400.	4,277,600.	4,289,846.	4,388,700.	4,649,722.
HRSG BLOWDOWN CHARACTERISTICS (Per HRSG)							
HP Evaporator Blowdown Flow Rate (lb/hr)		6,051.	6,050.	5,646.	7,323.	5,825.	7,571.
IP Evaporator Blowdown Flow Rate (lb/hr)		968.	967.	912.	759.	928.	815.
DEAERATOR CHARACTERISTICS (Per HRSG)							
DA Operating Pressure (psia)		102.8	102.7	97.1	110.6	99.4	113.6
Main Boiler Feedwater Inlet Flow Rate (lb/hr)		847,248.	846,961.	803,579.	954,777.	822,407.	974,386.
Main Boiler Feedwater Inlet Temperature (°F)		303.8	303.4	298.9	298.8	300.4	302.6
Main Boiler Feedwater Outlet Flow Rate (lb/hr)		777,696.	777,679.	739,977.	906,533.	757,251.	919,061.
Main Boiler Feedwater Outlet Temperature (°F)		329.8	329.7	325.7	335.2	327.4	337.2
BFW Temperature Rise (°F)		26.1	26.4	26.8	36.3	26.9	34.6
Primary Pegging Steam Flow Rate (lb/hr)		27,693.	27,987.	26,798.	42,916.	27,592.	41,956.
Auxiliary Pegging Steam Flow Rate (lb/hr)		0.	0.	0.	0.	0.	0.
Vent Steam Flow Rate (lb/hr)		2,118.	2,117.	2,009.	2,387.	2,056.	2,436.

PRELIMINARY

Estimated Performance Summary
2x2x1 MHI M501GAC

CASE DESCRIPTION	Stream No.	Case 23	Case 24	Case 25	Case 26	Case 27	Case 28
Equipment Design							
Ambient Dry Bulb Temperature	G1	105°F	55°F	91°F	91°F	85°F	55°F
Relative Humidity	G1	43%	66%	45%	45%	67%	66%
Ambient Wet Bulb Temperature	G1	84°F	49°F	74°F	74°F	76°F	49°F
Site Elevation (ft AMSL)		625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
PUMP CHARACTERISTICS							
HP Feedpump Control Valve Discharge							
Total Flow Rate per HRSG (lb/hr)		605,062.	604,953.	571,914.	759,208.	587,008.	766,929.
Pressure (psia)		2,552.1	2,552.1	2,539.2	2,578.4	2,544.4	2,590.9
Temperature (°F)		336.0	335.9	331.8	341.5	333.5	343.6
Enthalpy (Btu/lb)		311.2	311.1	306.9	316.9	308.6	319.1
IP Feedpump Control Valve Discharge							
Total Flow Rate per HRSG (lb/hr)		172,634.	172,725.	168,062.	147,325.	170,243.	152,132.
Pressure (psia)		483.9.	483.8.	462.1.	574.6.	472.5.	579.7.
Temperature (°F)		330.8.	330.7.	326.6.	336.4.	328.3.	338.4.
Enthalpy (Btu/lb)		302.3.	302.2.	297.9.	308.3.	299.7.	310.4.
HRSG Preheater Recirculation Pump CV Discharge							
Total Flow Rate per HRSG (lb/hr)		0.	0.	0.	0.	0.	0.
Pressure (psia)		-	-	-	-	-	-
Temperature (°F)		-	-	-	-	-	-
Enthalpy (Btu/lb)		-	-	-	-	-	-
Condensate Pump Discharge							
Total Flow Rate from Condenser (lb/hr)		1,415,331.	1,384,389.	1,339,208.	1,623,596.	1,369,008.	1,624,094.
Pressure (psia)		350.0	350.0	350.0	350.0	350.0	350.0
Temperature (°F)		128.0	103.7	119.1	125.4	119.6	109.7
Enthalpy (Btu/lb)		96.9	72.7	88.0	94.3	88.5	78.6
STEAM TURBINE CHARACTERISTICS		TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB
Main Steam Throttle Flow Rate (lb/hr)	S2	1,198,022.	1,197,808.	1,132,537.	1,503,769.	1,162,367.	1,518,716.
Main Steam Throttle Pressure (psia)	S2	1,382.1	1,381.9	1,311.1	1,715.9	1,344.1	1,731.9
Main Steam Throttle Temperature (°F)	S2	948.0	948.1	950.0	950.0	950.0	950.0
Main Steam Throttle Enthalpy (Btu/lb)	S2	1,463.2	1,463.3	1,466.9	1,452.6	1,465.8	1,452.1
Cold Reheat Steam Flow Rate (lb/hr)	S3	1,169,854.	1,169,645.	1,105,908.	1,468,412.	1,135,037.	1,483,007.
Cold Reheat Steam Pressure (psia)	S3	503.5.	503.4.	481.0.	606.2.	491.9.	610.8.
Cold Reheat Steam Temperature (°F)	S3	683.6.	683.7.	687.7.	675.1.	686.8.	674.6.
Cold Reheat Steam Enthalpy (Btu/lb)	S3	1,347.5.	1,347.6.	1,351.2.	1,335.9.	1,350.0.	1,335.3.
Hot Reheat Steam Flow Rate (lb/hr)	S6	1,361,522.	1,361,194.	1,301,462.	1,637,142.	1,330,730.	1,648,494.
Hot Reheat Steam Pressure (psia)	S6	428.0.	427.9.	409.5.	513.9.	418.6.	517.4.
Hot Reheat Steam Temperature (°F)	S6	998.4.	998.5.	1,000.0.	1,000.0.	1,000.0.	1,000.0.
Hot Reheat Steam Enthalpy (Btu/lb)	S6	1,522.1.	1,522.2.	1,523.5.	1,520.5.	1,523.3.	1,520.4.
SFLP Turbine Inlet Steam Flow (lb/hr)	S8	451,243	450,988	429,558	521,086	439,326	528,825
SFLP Turbine Inlet Steam Pressure (psia)	S8	91.4	91.3	87.0	105.4	89.0	107.0
SFLP Turbine Inlet Steam Temperature (°F)	S8	588.4	588.5	588.9	585.8	589.1	586.9
SFLP Turbine Inlet Steam Enthalpy (Btu/lb)	S8	1,324.3	1,324.3	1,324.9	1,321.9	1,324.8	1,322.4
SFLP Turbine Exhaust Steam Flow Rate (lb/hr)	S10	465,091.	464,833.	442,722.	538,105.	452,812.	545,988.
SFLP Turbine Exhaust UEEP (Btu/lb)	S10	1,062.3	1,039.6	1,054.1	1,050.9	1,053.6	1,038.2
SFLP Turbine Exhaust Loss (Btu/lb)		6.4	17.3	7.4	7.6	7.5	16.8
SFLP Turbine Exhaust Annulus Velocity (ft/sec)		486.7	914.4	581.6	595.6	586.5	904.8
SFLP Turbine Exhaust Sonic Velocity (ft/sec)		1,425.4	1,420.1	1,470.6	1,439.5	1,463.1	1,460.0
DFLP Turbine Inlet Steam Flow (lb/hr)	S9	1,055,704	1,055,094	1,004,986	1,221,465	1,027,789	1,239,309
DFLP Turbine Inlet Steam Pressure (psia)	S9	89.6	89.6	85.4	103.4	87.3	105.0
DFLP Turbine Inlet Steam Temperature (°F)	S9	588.2	588.3	588.7	585.5	588.9	586.6
DFLP Turbine Inlet Steam Enthalpy (Btu/lb)	S9	1,324.3	1,324.3	1,324.9	1,321.9	1,324.8	1,322.4
DFLP Turbine Second Extraction Steam Flow (lb/hr)	S12	52,833	57,993	51,187	65,003	52,670	70,468
DFLP Turbine Second Extraction Steam Pressure (psia)	S12	18.3	18.2	17.4	21.0	17.8	21.2
DFLP Turbine Second Extraction Steam Temperature (°F)	S12	295.9	298.3	297.2	294.1	297.2	296.3
DFLP Turbine Second Extraction Steam Enthalpy (Btu/lb)	S12	1,190.0	1,191.1	1,190.8	1,188.5	1,190.7	1,189.5
DFLP Turbine Third Extraction Steam Flow (lb/hr)	S13	73,090	97,998	76,519	94,614	78,663	115,110
DFLP Turbine Third Extraction Steam Pressure (psia)	S13	9.14	8.78	8.60	10.39	8.79	10.28
DFLP Turbine Third Extraction Steam Temperature (°F)	S13	194.7	193.2	194.6	195.0	194.6	194.5
DFLP Turbine Third Extraction Steam Enthalpy (Btu/lb)	S13	1,144.2	1,143.6	1,144.4	1,142.3	1,144.3	1,142.3
DFLP Turbine Exhaust Steam Flow Rate (lb/hr)	S11	930,096.	899,418.	877,579.	1,062,235.	896,762.	1,054,121.
DFLP Turbine Exhaust UEEP (Btu/lb)	S11	1,064.5	1,040.7	1,056.1	1,053.1	1,055.7	1,039.4
DFLP Turbine Exhaust Loss (Btu/lb)		6.4	16.2	7.4	7.5	7.4	15.8
DFLP Turbine Exhaust Annulus Velocity (ft/sec)		487.8	886.6	577.7	589.3	582.1	875.5
DFLP Turbine Exhaust Sonic Velocity (ft/sec)		1,425.4	1,420.1	1,470.6	1,439.5	1,463.1	1,460.0
Turbine Backpressure (In. HgA)	S10, S11	4.33	2.16	3.38	4.03	3.43	2.58
Gross Steam Turbine Output (kW)	E2	227,940.	236,361.	220,553.	277,115.	225,782.	285,527.

PRELIMINARY

Estimated Performance Summary
2x2x1 MHI M501GAC

CASE DESCRIPTION	Stream No.	Case 23	Case 24	Case 25	Case 26	Case 27	Case 28
Equipment Design							
Ambient Dry Bulb Temperature	G1	105°F	55°F	91°F	91°F	85°F	55°F
Relative Humidity	G1	43%	66%	45%	45%	67%	66%
Ambient Wet Bulb Temperature	G1	84°F	49°F	74°F	74°F	76°F	49°F
Site Elevation (ft AMSL)		625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
FEEDWATER HEATER CHARACTERISTICS							
Feedwater Heater #2							
Extraction Steam Flow Rate (lb/hr)		52,833	57,993	51,187	65,003	52,670	70,468
Extraction Line Pressure Drop (%)		4.0	4.9	4.2	4.5	4.2	5.2
Extraction Enthalpy (Btu/lb)		1,190.0	1,191.1	1,190.8	1,188.5	1,190.7	1,189.5
Feedwater Inlet Temperature (°F)		183.3	178.6	180.0	187.3	180.8	184.4
Feedwater Outlet Temperature (°F)		217.1	215.8	214.6	222.9	215.5	222.5
Drain Pressure (psia)		17.6	17.3	16.7	20.1	17.0	20.1
Drain Temperature (°F)		221.1	220.2	218.4	228.1	219.5	228.2
Feedwater Heater #1							
Extraction Steam Flow Rate, includes SSR Flow (lb/hr)		74,666	99,574	78,017	96,552	80,198	117,065
Extraction Line Pressure Drop (%)		4.0	7.7	4.9	5.1	5.0	7.7
Extraction Enthalpy (Btu/lb)		1,148.7	1,147.0	1,148.6	1,146.5	1,148.4	1,145.7
Feedwater Inlet Temperature (°F)		129.7	105.4	120.7	127.1	121.2	111.5
Feedwater Outlet Temperature (°F)		182.9	177.9	179.6	186.7	180.4	183.6
Drain Pressure (psia)		8.77	8.10	8.18	9.86	8.35	9.49
Drain Temperature (°F)		187.0	183.4	183.8	192.5	184.8	190.7
TURBINE BYPASS SYSTEM CHARACTERISTICS (per HRSG)							
MS Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-	-	-
MS Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W8	-	-	-	-	-	-
MS Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S14	-	-	-	-	-	-
MS Bypass Attemporator Outlet Steam Pressure (psia)	S14	-	-	-	-	-	-
MS Bypass Attemporator Outlet Steam Temperature (°F)	S14	-	-	-	-	-	-
MS Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S14	-	-	-	-	-	-
HRH Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-	-	-
HRH Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W9	-	-	-	-	-	-
HRH Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S15	-	-	-	-	-	-
HRH Bypass Attemporator Outlet Steam Pressure (psia)	S15	-	-	-	-	-	-
HRH Bypass Attemporator Outlet Steam Temperature (°F)	S15	-	-	-	-	-	-
HRH Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S15	-	-	-	-	-	-
LP Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-	-	-
LP Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W10	-	-	-	-	-	-
LP Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S16	-	-	-	-	-	-
LP Bypass Attemporator Outlet Steam Pressure (psia)	S16	-	-	-	-	-	-
LP Bypass Attemporator Outlet Steam Temperature (°F)	S16	-	-	-	-	-	-
LP Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S16	-	-	-	-	-	-
CONDENSER CHARACTERISTICS							
Operating Pressure (psia)		2.127	1.061	1.661	1.978	1.684	1.267
Operating Pressure (in Hg Abs.)		4.33	2.16	3.38	4.03	3.43	2.58
Temperature of Condensing Steam (°F)		128.3	103.7	119.3	125.6	119.8	109.8
CW Flow Rate Through Condenser (gpm)	W3	98,750	98,750	98,750	98,750	98,750	98,750
CW Temperature Into Condenser (°F)	W3	95.0	70.0	87.5	87.5	87.3	70.6
CW Temperature Out Of Condenser (°F)	W4	122.4	96.8	113.4	118.6	113.8	101.8
Circulating Water Temperature Rise (°F)		27.4	26.8	26.0	31.2	26.5	31.2
Terminal Temperature Difference, TTD (°F)		5.9	6.9	5.8	7.0	6.0	8.0
Total Condenser Heat Rejection (MMBtu/hr)		1,349.9	1,321.6	1,278.4	1,534.4	1,305.4	1,538.2
AUXILIARY COOLING SYSTEM							
Auxiliary Cooling Water Flow Rate Through Heat Exchangers (gpm)	W5	17,250	17,250	17,250	17,250	17,250	17,250
Auxiliary Cooling Water Temperature Rise (°F)		20.0	20.0	20.0	20.0	20.0	20.0
Total Auxiliary Cooling Heat Rejection (MMBtu/hr)		172.1	172.2	172.1	172.1	172.1	172.2
COOLING TOWER CHARACTERISTICS							
CW Flow Rate Into Cooling Tower (gpm)	W6	116,000	116,000	116,000	116,000	116,000	116,000
CW Temperature Into Cooling Tower (°F)	W6	121.3	95.8	112.6	117.0	112.9	100.1
Air Inlet Wet Bulb Temperature (°F)		84.0	49.0	73.7	73.7	76.0	49.0
Current Approach Temperature (°F)		12.1	21.2	14.5	14.7	12.0	21.8
Current Range Temperature (°F)		25.3	25.7	24.4	28.7	24.9	29.4
Drift Rate (%)		0.005	0.005	0.005	0.005	0.005	0.005
Cycles of Concentration		4	4	4	4	4	4
Evaporation Loss (gpm)		2,754	2,091	2,526	2,946	2,428	2,399
Drift Loss (gpm)		5.8	5.8	5.8	5.8	5.8	5.8
Blowdown (gpm)		912	691	836	976	803	794
Blowdown Temperature (°F)		94.9	69.9	87.4	87.4	87.2	70.5
Makeup (gpm)		3,671	2,788	3,368	3,928	3,237	3,199
Makeup Temperature (°F)		60.0	60.0	60.0	60.0	60.0	60.0
Total Cooling Tower Heat Rejection (MMBtu/hr)		1,532.4	1,504.2	1,460.9	1,716.9	1,487.9	1,720.8

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Estimated Performance Summary
2x2x1 MHI M501GAC

CASE DESCRIPTION	Stream No.	Case 23	Case 24	Case 25	Case 26	Case 27	Case 28
Equipment Design							
Ambient Dry Bulb Temperature	G1	105°F	55°F	91°F	91°F	85°F	55°F
Relative Humidity	G1	43%	66%	45%	45%	67%	66%
Ambient Wet Bulb Temperature	G1	84°F	49°F	74°F	74°F	76°F	49°F
Site Elevation (ft AMSL)		625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
FUEL GAS PERFORMANCE HEATER CHARACTERISTICS (Per CT)							
Natural Gas Flow Rate (lb/hr)	G2	116,990.	116,950.	104,910.	104,910.	109,340.	115,370.
Natural Gas Inlet Temperature (°F)		60.0	60.0	60.0	60.0	60.0	60.0
Natural Gas Outlet Temperature (°F)	G2	391.7	392.0	392.1	392.0	391.8	392.2
Heating Water Inlet Flow Rate (lb/hr)		75,832.	75,983.	69,375.	62,201.	71,469.	68,573.
Heating Water Inlet Temperature (°F)		457.4	457.3	453.0	477.3	455.1	477.7
Heating Water Outlet Temperature (°F)		161.3	161.6	162.1	154.8	161.2	155.8
TURBINE COOLING AIR COOLER CHARACTERISTICS (Per CT)							
Cooling Water Inlet Flow Rate (lb/hr)	W11	142,889	142,889	164,320	164,320	156,296	145,232
Cooling Water Inlet Temperature (°F)	W11	336.0	335.9	331.8	341.5	333.5	343.6
Cooling Water Outlet Temperature (°F)		540.6	540.5	522.7	531.1	527.7	549.7
Turbine Cooling Air Cooler Heat Rejection (MMBtu/hr)		32.0	32.0	34.0	34.0	33.0	33.0
CYCLE MAKEUP CONDITIONS							
Makeup Flow Rate to Steam Cycle (gpm)	W7	36.5.	36.5.	34.3.	41.9.	35.2.	43.3.
Makeup Temperature (°F)	W7	60.0	60.0	60.0	60.0	60.0	60.0
TOTAL PLANT PERFORMANCE							
Total Gross CT Electrical Output (kW)		535,000.	535,000.	465,800.	465,800.	490,001.	526,400.
Total Gross Steam Turbine Electrical Output (kW)	E2	227,940.	236,361.	220,553.	277,115.	225,782.	285,527.
Total Gross Plant Electrical Output (kW)	D3	762,940.	771,361.	686,353.	742,915.	715,782.	811,927.
Auxiliary Power							
BOP Percent Aux Power, Approx. (%)		2.20	2.20	2.20	2.20	2.20	2.20
BOP Auxiliary Power (kW)		16,780.	16,970.	15,100.	16,340.	15,750.	17,860.
Chiller 0.7327 kW per ton chilling capacity (kW)		16,953.	654.	0.	0.	0.	0.
Total Auxiliary Power (kW)		33,733.	17,624.	15,100.	16,340.	15,750.	17,860.
Percentage of Gross Electrical Output (%)		4.42	2.28	2.20	2.20	2.20	2.20
Net Plant Electrical Output (kW)	D4	729,207.	753,737.	671,253.	726,575.	700,032.	794,067.
Net Plant Electrical Heat Rate, LHV (Btu/kWh)	D5	6,403.	6,192.	6,237.	6,435.	6,233.	6,342.
Net Plant Electrical Heat Rate, HHV (Btu/kWh)		7,107.	6,873.	6,923.	7,143.	6,919.	7,040.

* = Cooling Tower parameter can not be calculated at minimum cooling water temperature conditi

PRELIMINARY

Estimated Performance Summary
2x2x1 MHI M501GAC

CASE DESCRIPTION	Stream No.	Case 29	Case 30	Case 31	Case 32	Case 33	Case 34	Case 35	Case 36
Equipment Design									
Ambient Dry Bulb Temperature	G1	55°F	5°F	105°F	105°F	105°F	85°F	85°F	85°F
Relative Humidity	G1	66%	68%	43%	43%	43%	67%	67%	67%
Ambient Wet Bulb Temperature	G1	49°F	3.5°F	84°F	84°F	84°F	76°F	76°F	76°F
Site Elevation (ft AMSL)		625	625	625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2	2	2
Fuel Type		Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil
COMBUSTION TURBINE CHARACTERISTICS (per CT)									
CT Frame		M501GAC	M501GAC	M501GAC	M501GAC	M501GAC	M501GAC	M501GAC	M501GAC
Load Condition		100%	100%	100%	85%	70%	100%	85%	70%
Inlet Air Cooling		NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
Chiller Cooling Capacity (ton)		0.	0.	0.	0.	0.	0.	0.	0.
Chiller Air Outlet Temperature (°F)		-	-	-	-	-	-	-	-
Evaporative Cooler Water Flow Rate (Evaporation only) (lb//hr)		0.	0.	0.	0.	0.	0.	0.	0.
Evaporative Cooler Air Outlet Temperature (°F)		-	-	-	-	-	-	-	-
Fuel Lower Heating Value (Btu/lb)	G2, G4, O1	18,360.	18,360.	18,360.	18,360.	18,360.	18,360.	18,360.	18,360.
Fuel Flow Rate (lb/hr)	G2, O1	111,680.	111,680.	98,610.	87,850.	77,920.	104,350.	92,470.	81,700.
Fuel Inlet Temperature (°F)	G2, O1	60.	60.	60.	60.	60.	60.	60.	60.
Heat Input to CT, LHV (MMBtu/hr)	D1	2,050.4	2,050.4	1,810.5	1,612.9	1,430.6	1,915.9	1,697.7	1,500.0
Combustor NOx Water Injection Flow Rate (lb/hr)	W1	78,176	78,176	69,027	61,495	54,544	73,045	64,729	57,190
Exhaust Gas Flow Rate (lb/hr)	G3	4,710,404.	4,691,400.	4,196,103.	3,857,701.	3,371,500.	4,391,900.	4,011,002.	3,483,400.
Exhaust Gas Temperature (°F)	G3	975.	943.	1,020.	1,013.	1,063.	1,005.	997.	1,049.
Exhaust Analysis, % Vol.									
Argon	G3	0.92	0.93	0.90	0.90	0.90	0.91	0.91	0.91
Nitrogen	G3	73.53	74.16	71.89	72.01	71.98	72.21	72.33	72.28
Oxygen	G3	12.79	12.90	12.46	12.74	12.63	12.47	12.74	12.60
Carbon Dioxide	G3	4.71	4.74	4.63	4.46	4.53	4.68	4.53	4.61
Water	G3	8.04	7.26	10.12	9.88	9.96	9.72	9.49	9.60
CT Gross Output (kW)	E1	213,300.	215,600.	178,900.	152,000.	125,200.	193,700.	164,700.	135,600.
CT Gross Heat Rate, LHV (Btu/kWh)		9,613.	9,510.	10,120.	10,611.	11,427.	9,891.	10,308.	11,062.
CT Gross Heat Rate, HHV (Btu/kWh)		10,190.	10,081.	10,727.	11,248.	12,112.	10,484.	10,927.	11,726.
HRSG CHARACTERISTICS (per HRSG)									
Heat Input to Duct Burner, LHV (MMBtu/hr)	D2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heat Input to Duct Burner, HHV (MMBtu/hr)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Duct Burner Fuel Flow Rate (lb/hr)	G4	0	0	0	0	0	0	0	0
Duct Burner Gas Exit Temperature (°F)		939.3	912.0	977.9	971.6	1,014.1	965.0	958.0	1,002.4
Main Steam Flow Rate (lb/hr)	S1	463,549.	431,752.	455,131.	420,452.	403,270.	462,252.	422,902.	405,848.
Main Steam Pressure (psia)	S1	1,116.6	1,035.2	1,110.2	1,027.2	999.0	1,122.2	1,028.8	1,001.8
Main Steam Temperature (°F)	S1	899.7	883.3	927.6	926.7	959.1	917.5	916.8	950.7
Main Steam Enthalpy (Btu/lb)	S1	1,443.9	1,437.4	1,460.6	1,463.1	1,482.8	1,454.3	1,457.2	1,477.9
Hot Reheat Flow Rate (lb/hr)	S5	561,187.	527,143.	542,319.	495,211.	461,940.	553,778.	501,178.	466,942.
Hot Reheat Pressure (psia)	S5	362.2	337.6	354.5	323.5	306.1	360.4	326.0	308.3
Hot Reheat Temperature (°F)	S5	908.8	887.6	940.4	936.8	973.2	929.6	925.6	963.6
Hot Reheat Enthalpy (Btu/lb)	S5	1,476.3	1,465.9	1,493.3	1,492.5	1,512.3	1,487.4	1,486.5	1,507.2
IP Superheater Flow Rate (lb/hr)	S4	108,537.	105,542.	97,889.	84,645.	68,152.	102,395.	88,219.	70,636.
IP Superheater Pressure (psia)	S4	377.7	352.1	369.5	337.3	319.1	375.7	339.9	321.4
IP Superheater Temperature (°F)	S4	551.7	543.8	552.2	546.1	546.8	552.9	545.7	546.7
IP Superheater Enthalpy (Btu/lb)	S4	1,280.5	1,278.3	1,281.6	1,281.2	1,283.3	1,281.5	1,280.7	1,283.0
LP Superheater Flow Rate (lb/hr)	S7	80,834.	78,114.	66,633.	52,458.	34,890.	72,629.	56,801.	37,778.
LP Superheater Pressure (psia)	S7	90.1	85.1	83.4	73.0	64.0	86.6	75.0	65.3
LP Superheater Temperature (°F)	S7	482.4	477.8	489.2	493.3	509.7	486.6	490.0	506.6
LP Superheater Enthalpy (Btu/lb)	S7	1,271.4	1,269.6	1,275.6	1,278.6	1,287.6	1,273.9	1,276.8	1,285.9
Condensate Preheater Inlet Flow Rate (lb/hr)	W2	545,878.	483,401.	437,501.	309,786.	196,744.	488,622.	338,091.	214,075.
Condensate Preheater Inlet Pressure (psia)	W2	237.4	246.6	245.1	259.2	269.7	241.0	257.1	268.2
Condensate Preheater Inlet Temperature (°F)	W2	205.7	202.7	205.1	200.5	196.9	205.8	200.8	197.1
Condensate Preheater Inlet Enthalpy (Btu/lb)	W2	174.4	171.4	173.8	169.1	165.5	174.5	169.4	165.7
HRSG Exhaust Stack Gas Characteristics									
HRSG Exhaust Gas Temperature (°F)	G5	285.2	285.1	285.0	284.8	285.0	285.0	284.8	284.9
HRSG Exhaust Gas Flow Rate (lb/hr)	G5	4,710,404.	4,691,400.	4,196,103.	3,857,701.	3,371,500.	4,391,900.	4,011,002.	3,483,400.
HRSG BLOWDOWN CHARACTERISTICS (Per HRSG)									
HP Evaporator Blowdown Flow Rate (lb/hr)		4,682.	4,361.	4,597.	4,247.	4,073.	4,669.	4,272.	4,099.
IP Evaporator Blowdown Flow Rate (lb/hr)		1,096.	1,066.	989.	855.	688.	1,034.	891.	713.
DEAERATOR CHARACTERISTICS (Per HRSG)									
DA Operating Pressure (psia)		93.4	88.3	85.8	74.7	64.9	89.4	76.9	66.3
Main Boiler Feedwater Inlet Flow Rate (lb/hr)		660,350.	622,392.	626,804.	564,071.	512,356.	644,591.	574,519.	520,376.
Main Boiler Feedwater Inlet Temperature (°F)		300.1	294.0	284.8	264.2	240.3	291.9	269.4	244.0
Main Boiler Feedwater Outlet Flow Rate (lb/hr)		577,865.	542,722.	558,606.	510,199.	476,184.	570,350.	516,285.	481,297.
Main Boiler Feedwater Outlet Temperature (°F)		322.9	318.9	316.9	307.3	297.8	319.8	309.3	299.3
BFW Temperature Rise (°F)		22.8	24.9	32.1	43.1	57.5	27.9	39.9	55.3
Primary Pegging Steam Flow Rate (lb/hr)		18,905.	19,220.	24,412.	28,728.	34,010.	22,090.	27,258.	33,300.
Auxiliary Pegging Steam Flow Rate (lb/hr)		0.	0.	0.	0.	0.	0.	0.	0.
Vent Steam Flow Rate (lb/hr)		1,651.	1,556.	1,567.	1,410.	1,281.	1,611.	1,436.	1,301.

PRELIMINARY

Estimated Performance Summary
2x2x1 MHI M501GAC

CASE DESCRIPTION	Stream No.	Case 29	Case 30	Case 31	Case 32	Case 33	Case 34	Case 35	Case 36
Equipment Design									
Ambient Dry Bulb Temperature	G1	55°F	5°F	105°F	105°F	105°F	85°F	85°F	85°F
Relative Humidity	G1	66%	68%	43%	43%	43%	67%	67%	67%
Ambient Wet Bulb Temperature	G1	49°F	3.5°F	84°F	84°F	84°F	76°F	76°F	76°F
Site Elevation (ft AMSL)		625	625	625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2	2	2
Fuel Type		Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil
PUMP CHARACTERISTICS									
HP Feedpump Control Valve Discharge									
Total Flow Rate per HRSG (lb/hr)		468,232.	436,113.	459,728.	424,699.	407,343.	466,921.	427,174.	409,948.
Pressure (psia)		2,525.7	2,524.2	2,522.5	2,523.3	2,525.4	2,524.0	2,524.0	2,526.1
Temperature (°F)		328.9	324.9	322.8	313.1	303.5	325.8	315.1	305.0
Enthalpy (Btu/lb)		303.9	299.7	297.6	287.7	277.9	300.6	289.8	279.4
IP Feedpump Control Valve Discharge									
Total Flow Rate per HRSG (lb/hr)		109,633.	106,609.	98,878.	85,500.	68,841.	103,429.	89,111.	71,349.
Pressure (psia)		387.3.	361.7.	377.5.	343.8.	323.5.	384.3.	346.9.	326.1.
Temperature (°F)		323.6.	319.6.	317.6.	307.9.	298.4.	320.5.	310.0.	299.9.
Enthalpy (Btu/lb)		294.7.	290.5.	288.5.	278.4.	268.6.	291.5.	280.5.	270.1.
HRSG Preheater Recirculation Pump CV Discharge									
Total Flow Rate per HRSG (lb/hr)		0.	0.	0.	0.	0.	0.	0.	0.
Pressure (psia)		-	-	-	-	-	-	-	-
Temperature (°F)		-	-	-	-	-	-	-	-
Enthalpy (Btu/lb)		-	-	-	-	-	-	-	-
Condensate Pump Discharge									
Total Flow Rate from Condenser (lb/hr)		1,186,822.	1,115,759.	1,154,213.	1,041,264.	948,292.	1,177,517.	1,052,066.	955,388.
Pressure (psia)		350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
Temperature (°F)		98.1	92.5	122.2	119.8	117.9	114.8	111.9	109.8
Enthalpy (Btu/lb)		67.0	61.5	91.1	88.7	86.8	83.7	80.8	78.7
STEAM TURBINE CHARACTERISTICS		TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB
Main Steam Throttle Flow Rate (lb/hr)	S2	927,099.	863,504.	910,262.	840,905.	806,540.	924,503.	845,805.	811,697.
Main Steam Throttle Pressure (psia)	S2	1,053.7	976.8	1,047.5	969.0	942.2	1,059.0	970.6	945.0
Main Steam Throttle Temperature (°F)	S2	889.7	873.3	917.6	916.7	949.1	907.5	906.8	940.7
Main Steam Throttle Enthalpy (Btu/lb)	S2	1,440.4	1,433.8	1,457.0	1,459.4	1,478.9	1,450.7	1,453.6	1,474.0
Cold Reheat Steam Flow Rate (lb/hr)	S3	905,301.	843,201.	888,860.	821,133.	787,576.	902,766.	825,918.	792,612.
Cold Reheat Steam Pressure (psia)	S3	399.3.	372.1.	391.3.	357.7.	339.4.	397.6.	360.2.	341.7.
Cold Reheat Steam Temperature (°F)	S3	645.2.	632.9.	666.2.	663.5.	686.2.	658.5.	656.1.	679.8.
Cold Reheat Steam Enthalpy (Btu/lb)	S3	1,332.6.	1,327.7.	1,344.8.	1,345.5.	1,358.9.	1,340.2.	1,341.3.	1,355.3.
Hot Reheat Steam Flow Rate (lb/hr)	S6	1,122,375.	1,054,286.	1,084,639.	990,422.	923,881.	1,107,556.	1,002,357.	933,883.
Hot Reheat Steam Pressure (psia)	S6	340.3.	317.2.	333.0.	303.9.	287.5.	338.6.	306.2.	289.6.
Hot Reheat Steam Temperature (°F)	S6	898.8.	877.6.	930.4.	926.8.	963.2.	919.6.	915.6.	953.6.
Hot Reheat Steam Enthalpy (Btu/lb)	S6	1,471.8.	1,461.4.	1,488.7.	1,487.8.	1,507.5.	1,482.8.	1,481.8.	1,502.4.
SFLP Turbine Inlet Steam Flow (lb/hr)	S8	387,390	365,256	367,309	330,233	299,472	377,883	336,509	304,245
SFLP Turbine Inlet Steam Pressure (psia)	S8	75.7	70.9	72.6	65.3	60.0	74.4	66.2	60.8
SFLP Turbine Inlet Steam Temperature (°F)	S8	522.2	508.1	541.9	538.0	561.0	535.2	530.8	554.7
SFLP Turbine Inlet Steam Enthalpy (Btu/lb)	S8	1,292.7	1,286.1	1,302.7	1,301.3	1,313.1	1,299.2	1,297.8	1,309.9
SFLP Turbine Exhaust Steam Flow Rate (lb/hr)	S10	398,454.	375,606.	378,085.	340,129.	308,831.	388,857.	346,494.	313,685.
SFLP Turbine Exhaust UEEP (Btu/lb)	S10	1,024.6	1,020.2	1,055.0	1,056.7	1,065.3	1,042.5	1,043.6	1,051.7
SFLP Turbine Exhaust Loss (Btu/lb)		16.9	20.4	6.2	6.3	6.4	7.1	6.9	6.7
SFLP Turbine Exhaust Annulus Velocity (ft/sec)		910.1	1,003.8	458.4	441.0	424.9	567.4	549.2	532.3
SFLP Turbine Exhaust Sonic Velocity (ft/sec)		1,457.6	1,453.7	1,450.0	1,447.2	1,427.5	1,424.1	1,421.7	1,418.0
DFLP Turbine Inlet Steam Flow (lb/hr)	S9	904,405	852,424	858,312	772,305	701,254	882,733	786,653	712,279
DFLP Turbine Inlet Steam Pressure (psia)	S9	74.3	69.5	71.2	64.0	58.9	73.0	65.0	59.6
DFLP Turbine Inlet Steam Temperature (°F)	S9	521.9	507.8	541.7	537.7	560.9	534.9	530.6	554.5
DFLP Turbine Inlet Steam Enthalpy (Btu/lb)	S9	1,292.7	1,286.1	1,302.7	1,301.3	1,313.1	1,299.2	1,297.8	1,309.9
DFLP Turbine Second Extraction Steam Flow (lb/hr)	S12	48,073	45,304	40,898	35,862	31,767	43,685	37,875	33,513
DFLP Turbine Second Extraction Steam Pressure (psia)	S12	15.1	14.1	14.6	13.1	12.1	14.9	13.3	12.2
DFLP Turbine Second Extraction Steam Temperature (°F)	S12	250.1	240.3	262.5	259.8	276.9	258.2	255.3	272.9
DFLP Turbine Second Extraction Steam Enthalpy (Btu/lb)	S12	1,168.8	1,164.3	1,174.9	1,174.0	1,182.4	1,172.7	1,171.8	1,180.5
DFLP Turbine Third Extraction Steam Flow (lb/hr)	S13	84,549	82,543	57,275	49,883	43,589	66,731	57,962	50,777
DFLP Turbine Third Extraction Steam Pressure (psia)	S13	7.41	6.93	7.37	6.64	6.10	7.45	6.65	6.07
DFLP Turbine Third Extraction Steam Temperature (°F)	S13	179.3	176.3	179.1	174.5	179.3	179.6	174.5	174.4
DFLP Turbine Third Extraction Steam Enthalpy (Btu/lb)	S13	1,125.0	1,121.1	1,131.7	1,131.1	1,138.3	1,129.3	1,128.6	1,135.9
DFLP Turbine Exhaust Steam Flow Rate (lb/hr)	S11	772,036.	724,812.	760,385.	686,785.	626,111.	772,566.	691,042.	628,204.
DFLP Turbine Exhaust UEEP (Btu/lb)	S11	1,025.5	1,020.7	1,056.9	1,058.5	1,067.0	1,044.4	1,045.4	1,053.4
DFLP Turbine Exhaust Loss (Btu/lb)		15.9	19.1	6.3	6.3	6.4	7.1	6.9	6.8
DFLP Turbine Exhaust Annulus Velocity (ft/sec)		883.4	970.3	461.9	446.0	431.5	564.8	548.7	533.9
DFLP Turbine Exhaust Sonic Velocity (ft/sec)		1,457.6	1,453.7	1,450.0	1,447.2	1,427.5	1,424.1	1,421.7	1,418.0
Turbine Backpressure (In. HgA)	S10, S11	1.82	1.53	3.68	3.44	3.26	2.99	2.75	2.58
Gross Steam Turbine Output (kW)	E2	182,782.	169,599.	172,686.	156,822.	149,869.	178,351.	160,589.	153,505.

PRELIMINARY

Estimated Performance Summary
2x2x1 MHI M501GAC

CASE DESCRIPTION	Stream No.	Case 29	Case 30	Case 31	Case 32	Case 33	Case 34	Case 35	Case 36
Equipment Design									
Ambient Dry Bulb Temperature	G1	55°F	5°F	105°F	105°F	105°F	85°F	85°F	85°F
Relative Humidity	G1	66%	68%	43%	43%	43%	67%	67%	67%
Ambient Wet Bulb Temperature	G1	49°F	3.5°F	84°F	84°F	84°F	76°F	76°F	76°F
Site Elevation (ft AMSL)		625	625	625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2	2	2
Fuel Type		Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil
FEEDWATER HEATER CHARACTERISTICS									
Feedwater Heater #2									
Extraction Steam Flow Rate (lb/hr)		48,073	45,304	40,898	35,862	31,767	43,685	37,875	33,513
Extraction Line Pressure Drop (%)		4.6	4.6	3.6	3.4	3.3	3.9	3.7	3.6
Extraction Enthalpy (Btu/lb)		1,168.8	1,164.3	1,174.9	1,174.0	1,182.4	1,172.7	1,171.8	1,180.5
Feedwater Inlet Temperature (°F)		172.1	169.1	174.9	170.9	167.7	174.5	170.2	166.8
Feedwater Outlet Temperature (°F)		207.7	204.7	207.0	202.4	198.8	207.7	202.7	199.0
Drain Pressure (psia)		14.4	13.5	14.1	12.7	11.7	14.3	12.8	11.8
Drain Temperature (°F)		211.0	207.7	209.8	204.6	200.7	210.7	205.1	201.0
Feedwater Heater #1									
Extraction Steam Flow Rate, includes SSR Flow (lb/hr)		85,807	83,721	58,501	51,009	44,655	67,980	59,098	51,851
Extraction Line Pressure Drop (%)		7.8	8.4	3.6	3.4	3.1	4.8	4.6	4.2
Extraction Enthalpy (Btu/lb)		1,128.1	1,124.0	1,136.2	1,135.8	1,143.5	1,133.2	1,132.7	1,140.5
Feedwater Inlet Temperature (°F)		99.6	94.0	123.7	121.3	119.5	116.3	113.4	111.4
Feedwater Outlet Temperature (°F)		171.6	168.7	174.7	170.7	167.6	174.1	169.9	166.6
Drain Pressure (psia)		6.83	6.35	7.10	6.42	5.91	7.10	6.35	5.81
Drain Temperature (°F)		175.7	172.5	177.4	172.9	169.3	177.4	172.5	168.6
TURBINE BYPASS SYSTEM CHARACTERISTICS (per HRSG)									
MS Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-	-	-	-	-
MS Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W8	-	-	-	-	-	-	-	-
MS Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S14	-	-	-	-	-	-	-	-
MS Bypass Attemporator Outlet Steam Pressure (psia)	S14	-	-	-	-	-	-	-	-
MS Bypass Attemporator Outlet Steam Temperature (°F)	S14	-	-	-	-	-	-	-	-
MS Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S14	-	-	-	-	-	-	-	-
HRH Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-	-	-	-	-
HRH Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W9	-	-	-	-	-	-	-	-
HRH Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S15	-	-	-	-	-	-	-	-
HRH Bypass Attemporator Outlet Steam Pressure (psia)	S15	-	-	-	-	-	-	-	-
HRH Bypass Attemporator Outlet Steam Temperature (°F)	S15	-	-	-	-	-	-	-	-
HRH Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S15	-	-	-	-	-	-	-	-
LP Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-	-	-	-	-
LP Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W10	-	-	-	-	-	-	-	-
LP Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S16	-	-	-	-	-	-	-	-
LP Bypass Attemporator Outlet Steam Pressure (psia)	S16	-	-	-	-	-	-	-	-
LP Bypass Attemporator Outlet Steam Temperature (°F)	S16	-	-	-	-	-	-	-	-
LP Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S16	-	-	-	-	-	-	-	-
CONDENSER CHARACTERISTICS									
Operating Pressure (psia)		0.894	0.752	1.810	1.691	1.603	1.470	1.350	1.269
Operating Pressure (in Hg Abs.)		1.82	1.53	3.68	3.44	3.26	2.99	2.75	2.58
Temperature of Condensing Steam (°F)		98.0	92.3	122.4	119.9	118.0	114.9	112.0	109.8
CW Flow Rate Through Condenser (gpm)	W3	98,750	98,750	98,750	98,750	98,750	98,750	98,750	98,750
CW Temperature Into Condenser (°F)	W3	69.3	65.0	95.2	95.3	95.4	87.2	87.0	86.9
CW Temperature Out Of Condenser (°F)	W4	92.1	86.5	117.6	115.6	114.0	109.8	107.4	105.6
Circulating Water Temperature Rise (°F)		22.8	21.4	22.3	20.2	18.6	22.7	20.3	18.7
Terminal Temperature Difference, TTD (°F)		5.9	5.9	4.8	4.3	4.0	5.1	4.6	4.2
Total Condenser Heat Rejection (MMBtu/hr)		1,122.8	1,056.7	1,099.7	996.2	916.7	1,116.0	1,001.2	918.5
AUXILIARY COOLING SYSTEM									
Auxiliary Cooling Water Flow Rate Through Heat Exchangers (gpm)	W5	17,250	17,250	17,250	17,250	17,250	17,250	17,250	17,250
Auxiliary Cooling Water Temperature Rise (°F)		20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Auxiliary Cooling Heat Rejection (MMBtu/hr)		172.2	172.3	172.1	172.1	172.1	172.1	172.1	172.1
COOLING TOWER CHARACTERISTICS									
CW Flow Rate Into Cooling Tower (gpm)	W6	116,000	116,000	116,000	116,000	116,000	116,000	116,000	116,000
CW Temperature Into Cooling Tower (°F)	W6	91.6	86.2	117.2	115.5	114.2	109.4	107.3	105.8
Air Inlet Wet Bulb Temperature (°F)		49.0	3.7	84.0	84.0	84.0	76.0	76.0	76.0
Current Approach Temperature (°F)		20.4	*	12.1	12.2	12.2	11.8	11.6	11.4
Current Range Temperature (°F)		22.3	21.4	21.2	19.5	18.2	21.8	19.8	18.4
Drift Rate (%)		0.005	*	0.005	0.005	0.005	0.005	0.005	0.005
Cycles of Concentration		4	4	4	4	4	4	4	4
Evaporation Loss (gpm)		1,811	*	2,326	2,148	2,011	2,126	1,944	1,813
Drift Loss (gpm)		5.8	*	5.8	5.8	5.8	5.8	5.8	5.8
Blowdown (gpm)		598	*	770	710	664	703	642	599
Blowdown Temperature (°F)		69.2	*	95.2	95.3	95.3	87.1	87.0	86.9
Makeup (gpm)		2,414	*	3,101	2,864	2,681	2,835	2,592	2,417
Makeup Temperature (°F)		60.0	*	60.0	60.0	60.0	60.0	60.0	60.0
Total Cooling Tower Heat Rejection (MMBtu/hr)		1,305.4	1,230.7	1,282.3	1,178.8	1,099.2	1,298.5	1,183.7	1,101.0

PRELIMINARY
Estimated Performance Summary
2x2x1 MHI M501GAC

CASE DESCRIPTION	Stream No.	Case 29	Case 30	Case 31	Case 32	Case 33	Case 34	Case 35	Case 36
Equipment Design									
Ambient Dry Bulb Temperature	G1	55°F	5°F	105°F	105°F	105°F	85°F	85°F	85°F
Relative Humidity	G1	66%	68%	43%	43%	43%	67%	67%	67%
Ambient Wet Bulb Temperature	G1	49°F	3.5°F	84°F	84°F	84°F	76°F	76°F	76°F
Site Elevation (ft AMSL)		625	625	625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2	2	2
Fuel Type		Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil
FUEL GAS PERFORMANCE HEATER CHARACTERISTICS (Per CT)									
Natural Gas Flow Rate (lb/hr)	G2	-	-	-	-	-	-	-	-
Natural Gas Inlet Temperature (°F)		-	-	-	-	-	-	-	-
Natural Gas Outlet Temperature (°F)	G2	-	-	-	-	-	-	-	-
Heating Water Inlet Flow Rate (lb/hr)		-	-	-	-	-	-	-	-
Heating Water Inlet Temperature (°F)		-	-	-	-	-	-	-	-
Heating Water Outlet Temperature (°F)		-	-	-	-	-	-	-	-
TURBINE COOLING AIR COOLER CHARACTERISTICS (Per CT)									
Cooling Water Inlet Flow Rate (lb/hr)	W11	145,114	122,646	157,290	116,722	86,119	154,767	114,533	83,836
Cooling Water Inlet Temperature (°F)	W11	328.9	324.9	322.8	313.1	303.5	325.8	315.1	305.0
Cooling Water Outlet Temperature (°F)		520.0	492.7	511.8	527.1	539.1	517.2	525.2	536.2
Turbine Cooling Air Cooler Heat Rejection (MMBtu/hr)		30.0	22.0	32.0	27.0	22.0	32.0	26.0	21.0
CYCLE MAKEUP CONDITIONS									
Makeup Flow Rate to Steam Cycle (gpm)	W7	29.7.	27.9.	28.6.	26.0.	24.2.	29.3.	26.4.	24.5.
Makeup Temperature (°F)	W7	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
TOTAL PLANT PERFORMANCE									
Total Gross CT Electrical Output (kW)		426,600.	431,200.	357,800.	304,000.	250,400.	387,400.	329,400.	271,200.
Total Gross Steam Turbine Electrical Output (kW)	E2	182,782.	169,599.	172,686.	156,822.	149,869.	178,351.	160,589.	153,505.
Total Gross Plant Electrical Output (kW)	D3	609,382.	600,799.	530,486.	460,822.	400,269.	565,751.	489,989.	424,705.
Auxiliary Power									
BOP Percent Aux Power, Approx. (%)		2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
BOP Auxiliary Power (kW)		13,410.	13,220.	11,670.	10,140.	8,810.	12,450.	10,780.	9,340.
Chiller 0.7327 kW per ton chilling capacity (kW)		0.	0.	0.	0.	0.	0.	0.	0.
Total Auxiliary Power (kW)		13,410.	13,220.	11,670.	10,140.	8,810.	12,450.	10,780.	9,340.
Percentage of Gross Electrical Output (%)		2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
Net Plant Electrical Output (kW)	D4	595,972.	587,579.	518,816.	450,682.	391,459.	553,301.	479,209.	415,365.
Net Plant Electrical Heat Rate, LHV (Btu/kWh)	D5	6,881.	6,979.	6,979.	7,158.	7,309.	6,925.	7,086.	7,223.
Net Plant Electrical Heat Rate, HHV (Btu/kWh)		7,294.	7,398.	7,398.	7,587.	7,748.	7,341.	7,511.	7,656.

* = Cooling Tower parameter can not be calculated at minimum cooling water temperature conditi

PRELIMINARY

Estimated Performance Summary
2x2x1 MHI M501GAC

CASE DESCRIPTION	Stream No.	Case 37	Case 38	Case 39	Case 40
Equipment Design					
Ambient Dry Bulb Temperature	G1	55°F	55°F	5°F	5°F
Relative Humidity	G1	66%	66%	68%	68%
Ambient Wet Bulb Temperature	G1	49°F	49°F	3.5°F	3.5°F
Site Elevation (ft AMSL)		625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2
Fuel Type		Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil
COMBUSTION TURBINE CHARACTERISTICS (per CT)					
CT Frame		M501GAC	M501GAC	M501GAC	M501GAC
Load Condition		85%	70%	85%	70%
Inlet Air Cooling		NONE	NONE	NONE	NONE
Chiller Cooling Capacity (ton)		0.	0.	0.	0.
Chiller Air Outlet Temperature (°F)		-	-	-	-
Evaporative Cooler Water Flow Rate (Evaporation only) (lb//hr)		0.	0.	0.	0.
Evaporative Cooler Air Outlet Temperature (°F)		-	-	-	-
Fuel Lower Heating Value (Btu/lb)	G2, G4, O1	18,360.	18,360.	18,360.	18,360.
Fuel Flow Rate (lb/hr)	G2, O1	98,440.	86,510.	99,240.	86,720.
Fuel Inlet Temperature (°F)	G2, O1	60.	60.	60.	60.
Heat Input to CT, LHV (MMBtu/hr)	D1	1,807.4	1,588.3	1,822.0	1,592.2
Combustor NOx Water Injection Flow Rate (lb/hr)	W1	68,908	60,557	69,468	60,704
Exhaust Gas Flow Rate (lb/hr)	G3	4,221,500.	3,651,702.	4,075,800.	3,913,100.
Exhaust Gas Temperature (°F)	G3	977.	1,027.	984.	927.
Exhaust Analysis, % Vol.					
Argon	G3	0.92	0.92	0.93	0.94
Nitrogen	G3	73.61	73.55	74.10	74.45
Oxygen	G3	12.95	12.84	12.77	13.53
Carbon Dioxide	G3	4.61	4.68	4.82	4.37
Water	G3	7.90	8.01	7.38	6.71
CT Gross Output (kW)	E1	181,300.	149,100.	183,300.	150,900.
CT Gross Heat Rate, LHV (Btu/kWh)		9,969.	10,653.	9,940.	10,551.
CT Gross Heat Rate, HHV (Btu/kWh)		10,567.	11,292.	10,537.	11,184.
HRSG CHARACTERISTICS (per HRSG)					
Heat Input to Duct Burner, LHV (MMBtu/hr)	D2	0.0	0.0	0.0	0.0
Heat Input to Duct Burner, HHV (MMBtu/hr)		0.0	0.0	0.0	0.0
Duct Burner Fuel Flow Rate (lb/hr)	G4	0	0	0	0
Duct Burner Gas Exit Temperature (°F)		940.9	983.7	947.5	897.7
Main Steam Flow Rate (lb/hr)	S1	424,052.	405,486.	411,476.	356,845.
Main Steam Pressure (psia)	S1	1,026.3	996.0	999.9	911.6
Main Steam Temperature (°F)	S1	904.9	938.6	912.4	877.3
Main Steam Enthalpy (Btu/lb)	S1	1,450.4	1,471.0	1,455.8	1,438.7
Hot Reheat Flow Rate (lb/hr)	S5	506,099.	469,824.	488,498.	433,096.
Hot Reheat Pressure (psia)	S5	327.4	308.5	317.0	276.8
Hot Reheat Temperature (°F)	S5	912.0	949.1	918.9	877.9
Hot Reheat Enthalpy (Btu/lb)	S5	1,479.2	1,499.4	1,483.2	1,463.0
IP Superheater Flow Rate (lb/hr)	S4	92,018.	73,872.	86,697.	84,642.
IP Superheater Pressure (psia)	S4	341.4	321.7	330.5	288.8
IP Superheater Temperature (°F)	S4	545.0	545.4	543.3	531.1
IP Superheater Enthalpy (Btu/lb)	S4	1,280.2	1,282.3	1,280.2	1,277.3
LP Superheater Flow Rate (lb/hr)	S7	61,570.	41,140.	55,026.	48,992.
LP Superheater Pressure (psia)	S7	77.0	66.5	72.8	63.9
LP Superheater Temperature (°F)	S7	486.9	502.8	490.1	485.2
LP Superheater Enthalpy (Btu/lb)	S7	1,275.1	1,283.9	1,277.0	1,275.5
Condensate Preheater Inlet Flow Rate (lb/hr)	W2	367,224.	229,997.	311,396.	225,649.
Condensate Preheater Inlet Pressure (psia)	W2	255.1	267.2	260.5	273.1
Condensate Preheater Inlet Temperature (°F)	W2	200.6	196.7	198.7	193.0
Condensate Preheater Inlet Enthalpy (Btu/lb)	W2	169.2	165.3	167.3	161.6
HRSG Exhaust Stack Gas Characteristics					
HRSG Exhaust Gas Temperature (°F)	G5	284.8	284.9	285.1	284.8
HRSG Exhaust Gas Flow Rate (lb/hr)	G5	4,221,500.	3,651,702.	4,075,800.	3,913,100.
HRSG BLOWDOWN CHARACTERISTICS (Per HRSG)					
HP Evaporator Blowdown Flow Rate (lb/hr)		4,283.	4,096.	4,156.	3,604.
IP Evaporator Blowdown Flow Rate (lb/hr)		929.	746.	876.	855.
DEAERATOR CHARACTERISTICS (Per HRSG)					
DA Operating Pressure (psia)		79.2	67.6	74.7	65.6
Main Boiler Feedwater Inlet Flow Rate (lb/hr)		584,312.	526,657.	559,633.	496,178.
Main Boiler Feedwater Inlet Temperature (°F)		274.5	247.1	264.4	246.6
Main Boiler Feedwater Outlet Flow Rate (lb/hr)		521,283.	484,200.	503,205.	445,946.
Main Boiler Feedwater Outlet Temperature (°F)		311.3	300.6	307.3	298.5
BFW Temperature Rise (°F)		36.8	53.5	42.9	52.0
Primary Pegging Steam Flow Rate (lb/hr)		25,732.	32,702.	28,360.	29,879.
Auxiliary Pegging Steam Flow Rate (lb/hr)		0.	0.	0.	0.
Vent Steam Flow Rate (lb/hr)		1,461.	1,317.	1,399.	1,240.

PRELIMINARY

Estimated Performance Summary
2x2x1 MHI M501GAC

CASE DESCRIPTION	Stream No.	Case 37	Case 38	Case 39	Case 40
Equipment Design					
Ambient Dry Bulb Temperature	G1	55°F	55°F	5°F	5°F
Relative Humidity	G1	66%	66%	68%	68%
Ambient Wet Bulb Temperature	G1	49°F	49°F	3.5°F	3.5°F
Site Elevation (ft AMSL)		625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2
Fuel Type		Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil
PUMP CHARACTERISTICS					
HP Feedpump Control Valve Discharge					
Total Flow Rate per HRSG (lb/hr)		428,335.	409,582.	415,632.	360,449.
Pressure (psia)		2,525.2	2,526.9	2,525.5	2,520.6
Temperature (°F)		317.2	306.3	313.1	304.2
Enthalpy (Btu/lb)		291.9	280.8	287.7	278.6
IP Feedpump Control Valve Discharge					
Total Flow Rate per HRSG (lb/hr)		92,948.	74,618.	87,573.	85,497.
Pressure (psia)		349.0.	326.8.	337.4.	296.1.
Temperature (°F)		312.0.	301.2.	307.9.	299.1.
Enthalpy (Btu/lb)		282.6.	271.5.	278.4.	269.2.
HRSG Preheater Recirculation Pump CV Discharge					
Total Flow Rate per HRSG (lb/hr)		0.	0.	0.	0.
Pressure (psia)		-	-	-	-
Temperature (°F)		-	-	-	-
Enthalpy (Btu/lb)		-	-	-	-
Condensate Pump Discharge					
Total Flow Rate from Condenser (lb/hr)		1,052,449.	950,937.	1,005,951.	894,048.
Pressure (psia)		350.0	350.0	350.0	350.0
Temperature (°F)		94.5	91.9	90.1	87.3
Enthalpy (Btu/lb)		63.5	60.9	59.1	56.3
STEAM TURBINE CHARACTERISTICS		TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB
Main Steam Throttle Flow Rate (lb/hr)	S2	848,104.	810,972.	822,951.	713,690.
Main Steam Throttle Pressure (psia)	S2	968.3	939.5	943.4	866.0
Main Steam Throttle Temperature (°F)	S2	894.9	928.6	902.4	867.3
Main Steam Throttle Enthalpy (Btu/lb)	S2	1,446.7	1,467.2	1,452.1	1,434.8
Cold Reheat Steam Flow Rate (lb/hr)	S3	828,163.	791,904.	803,602.	696,909.
Cold Reheat Steam Pressure (psia)	S3	361.6.	341.7.	350.3.	305.5.
Cold Reheat Steam Temperature (°F)	S3	647.2.	670.6.	652.7.	624.2.
Cold Reheat Steam Enthalpy (Btu/lb)	S3	1,336.3.	1,350.4.	1,340.1.	1,327.6.
Hot Reheat Steam Flow Rate (lb/hr)	S6	1,012,199.	939,648.	976,996.	866,193.
Hot Reheat Steam Pressure (psia)	S6	307.6.	289.8.	297.8.	260.0.
Hot Reheat Steam Temperature (°F)	S6	902.0.	939.1.	908.9.	867.9.
Hot Reheat Steam Enthalpy (Btu/lb)	S6	1,474.6.	1,494.7.	1,478.6.	1,458.4.
SFLP Turbine Inlet Steam Flow (lb/hr)	S8	342,434	308,071	327,829	290,764
SFLP Turbine Inlet Steam Pressure (psia)	S8	67.1	61.2	64.4	56.3
SFLP Turbine Inlet Steam Temperature (°F)	S8	522.2	545.0	526.2	497.7
SFLP Turbine Inlet Steam Enthalpy (Btu/lb)	S8	1,293.4	1,305.1	1,295.6	1,282.4
SFLP Turbine Exhaust Steam Flow Rate (lb/hr)	S10	352,482.	317,536.	337,552.	299,292.
SFLP Turbine Exhaust UEEP (Btu/lb)	S10	1,025.8	1,032.4	1,025.9	1,020.1
SFLP Turbine Exhaust Loss (Btu/lb)		16.4	16.0	19.6	18.1
SFLP Turbine Exhaust Annulus Velocity (ft/sec)		896.7	880.7	978.6	941.1
SFLP Turbine Exhaust Sonic Velocity (ft/sec)		1,459.2	1,467.2	1,459.9	1,447.2
DFLP Turbine Inlet Steam Flow (lb/hr)	S9	800,084	720,896	766,218	679,368
DFLP Turbine Inlet Steam Pressure (psia)	S9	65.8	60.0	63.1	55.2
DFLP Turbine Inlet Steam Temperature (°F)	S9	522.0	544.8	525.9	497.5
DFLP Turbine Inlet Steam Enthalpy (Btu/lb)	S9	1,293.4	1,305.1	1,295.6	1,282.4
DFLP Turbine Second Extraction Steam Flow (lb/hr)	S12	41,357	36,419	39,701	34,083
DFLP Turbine Second Extraction Steam Pressure (psia)	S12	13.4	12.2	12.8	11.3
DFLP Turbine Second Extraction Steam Temperature (°F)	S12	250.4	267.3	253.7	233.1
DFLP Turbine Second Extraction Steam Enthalpy (Btu/lb)	S12	1,169.4	1,177.8	1,171.1	1,161.8
DFLP Turbine Third Extraction Steam Flow (lb/hr)	S13	73,676	64,881	72,501	63,257
DFLP Turbine Third Extraction Steam Pressure (psia)	S13	6.56	5.94	6.26	5.53
DFLP Turbine Third Extraction Steam Temperature (°F)	S13	173.9	169.6	171.8	166.5
DFLP Turbine Third Extraction Steam Enthalpy (Btu/lb)	S13	1,125.6	1,132.5	1,126.9	1,119.1
DFLP Turbine Exhaust Steam Flow Rate (lb/hr)	S11	685,279.	619,812.	654,235.	582,222.
DFLP Turbine Exhaust UEEP (Btu/lb)	S11	1,026.7	1,033.3	1,026.4	1,020.8
DFLP Turbine Exhaust Loss (Btu/lb)		15.6	15.3	18.5	17.2
DFLP Turbine Exhaust Annulus Velocity (ft/sec)		873.3	861.0	950.0	916.8
DFLP Turbine Exhaust Sonic Velocity (ft/sec)		1,459.2	1,467.2	1,459.9	1,447.2
Turbine Backpressure (In. HgA)	S10, S11	1.63	1.50	1.42	1.30
Gross Steam Turbine Output (kW)	E2	165,009.	157,105.	160,319.	137,224.

PRELIMINARY

Estimated Performance Summary
2x2x1 MHI M501GAC

CASE DESCRIPTION	Stream No.	Case 37	Case 38	Case 39	Case 40
Equipment Design					
Ambient Dry Bulb Temperature	G1	55°F	55°F	5°F	5°F
Relative Humidity	G1	66%	66%	68%	68%
Ambient Wet Bulb Temperature	G1	49°F	49°F	3.5°F	3.5°F
Site Elevation (ft AMSL)		625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2
Fuel Type		Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil
FEEDWATER HEATER CHARACTERISTICS					
Feedwater Heater #2					
Extraction Steam Flow Rate (lb/hr)		41,357	36,419	39,701	34,083
Extraction Line Pressure Drop (%)		4.3	4.1	4.4	4.1
Extraction Enthalpy (Btu/lb)		1,169.4	1,177.8	1,171.1	1,161.8
Feedwater Inlet Temperature (°F)		167.6	164.1	165.5	161.0
Feedwater Outlet Temperature (°F)		202.5	198.6	200.6	194.9
Drain Pressure (psia)		12.8	11.7	12.3	10.8
Drain Temperature (°F)		205.1	200.8	203.1	196.8
Feedwater Heater #1					
Extraction Steam Flow Rate, includes SSR Flow (lb/hr)		74,819	65,958	73,608	64,227
Extraction Line Pressure Drop (%)		7.5	7.1	8.0	7.7
Extraction Enthalpy (Btu/lb)		1,128.8	1,136.1	1,130.0	1,122.2
Feedwater Inlet Temperature (°F)		96.0	93.5	91.6	88.8
Feedwater Outlet Temperature (°F)		167.3	163.8	165.2	160.8
Drain Pressure (psia)		6.07	5.52	5.76	5.11
Drain Temperature (°F)		170.5	166.4	168.2	163.1
TURBINE BYPASS SYSTEM CHARACTERISTICS (per HRSG)					
MS Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-
MS Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W8	-	-	-	-
MS Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S14	-	-	-	-
MS Bypass Attemporator Outlet Steam Pressure (psia)	S14	-	-	-	-
MS Bypass Attemporator Outlet Steam Temperature (°F)	S14	-	-	-	-
MS Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S14	-	-	-	-
HRH Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-
HRH Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W9	-	-	-	-
HRH Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S15	-	-	-	-
HRH Bypass Attemporator Outlet Steam Pressure (psia)	S15	-	-	-	-
HRH Bypass Attemporator Outlet Steam Temperature (°F)	S15	-	-	-	-
HRH Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S15	-	-	-	-
LP Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-
LP Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W10	-	-	-	-
LP Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S16	-	-	-	-
LP Bypass Attemporator Outlet Steam Pressure (psia)	S16	-	-	-	-
LP Bypass Attemporator Outlet Steam Temperature (°F)	S16	-	-	-	-
LP Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S16	-	-	-	-
CONDENSER CHARACTERISTICS					
Operating Pressure (psia)		0.800	0.737	0.696	0.636
Operating Pressure (in Hg Abs.)		1.63	1.50	1.42	1.30
Temperature of Condensing Steam (°F)		94.3	91.7	89.9	87.0
CW Flow Rate Through Condenser (gpm)	W3	98,750	98,750	98,750	98,750
CW Temperature Into Condenser (°F)	W3	68.7	68.3	65.0	65.0
CW Temperature Out Of Condenser (°F)	W4	89.1	86.8	84.5	82.3
Circulating Water Temperature Rise (°F)		20.3	18.5	19.5	17.3
Terminal Temperature Difference, TTD (°F)		5.3	4.9	5.4	4.7
Total Condenser Heat Rejection (MMBtu/hr)		1,000.5	912.4	960.5	851.2
AUXILIARY COOLING SYSTEM					
Auxiliary Cooling Water Flow Rate Through Heat Exchangers (gpm)	W5	17,250	17,250	17,250	17,250
Auxiliary Cooling Water Temperature Rise (°F)		20.0	20.0	20.0	20.0
Total Auxiliary Cooling Heat Rejection (MMBtu/hr)		172.3	172.3	172.3	172.3
COOLING TOWER CHARACTERISTICS					
CW Flow Rate Into Cooling Tower (gpm)	W6	116,000	116,000	116,000	116,000
CW Temperature Into Cooling Tower (°F)	W6	89.0	87.1	84.6	82.7
Air Inlet Wet Bulb Temperature (°F)		49.0	49.0	3.7	3.7
Current Approach Temperature (°F)		19.9	19.4	*	*
Current Range Temperature (°F)		20.3	18.8	19.7	17.9
Drift Rate (%)		0.005	0.005	*	*
Cycles of Concentration		4	4	4	4
Evaporation Loss (gpm)		1,640	1,518	*	*
Drift Loss (gpm)		5.8	5.8	*	*
Blowdown (gpm)		541	500	*	*
Blowdown Temperature (°F)		68.7	68.3	*	*
Makeup (gpm)		2,187	2,024	*	*
Makeup Temperature (°F)		60.0	60.0	*	*
Total Cooling Tower Heat Rejection (MMBtu/hr)		1,183.1	1,095.0	1,134.5	1,025.2

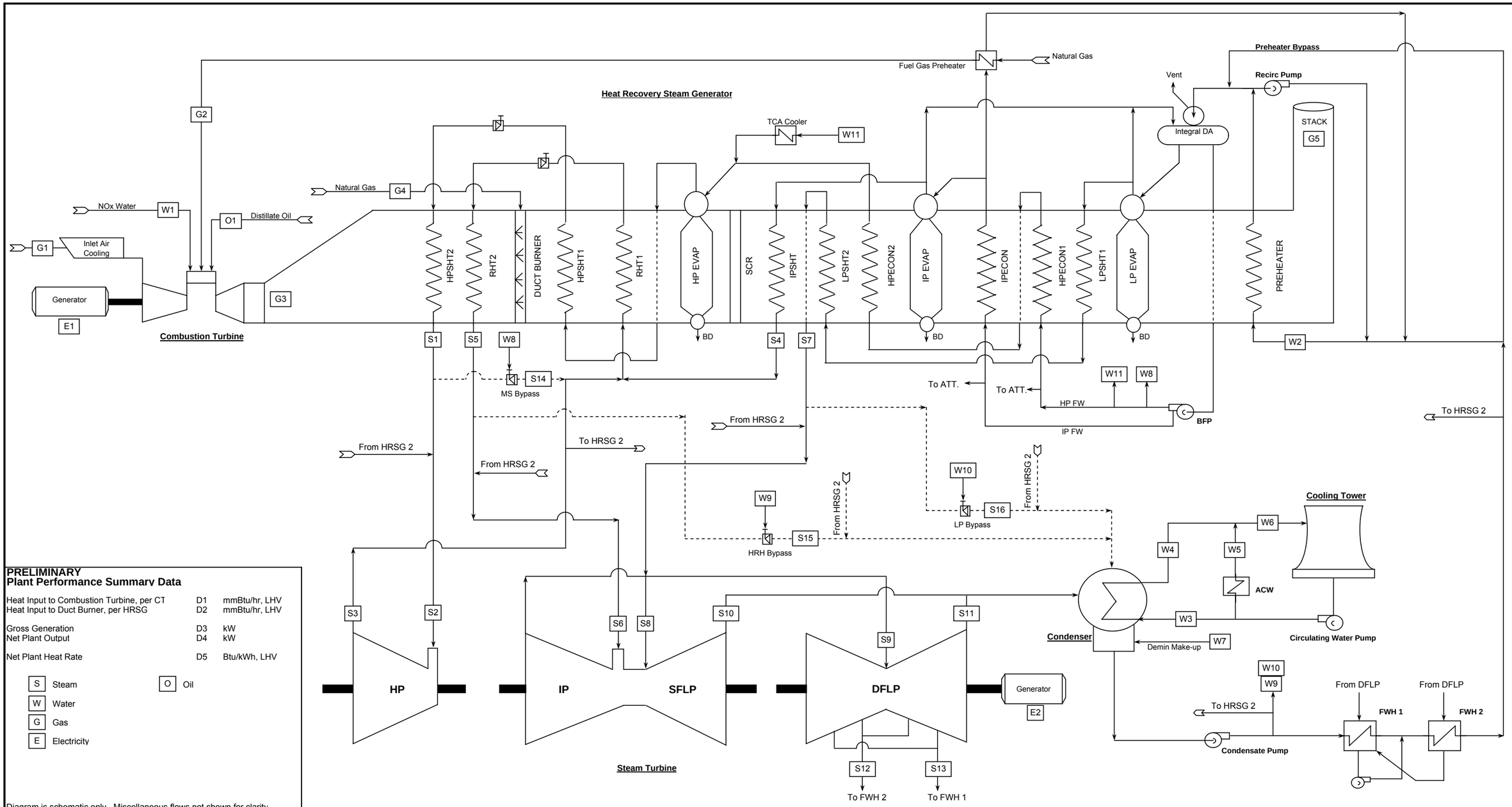
PRELIMINARY

Estimated Performance Summary
2x2x1 MHI M501GAC

CASE DESCRIPTION	Stream No.	Case 37	Case 38	Case 39	Case 40
Equipment Design					
Ambient Dry Bulb Temperature	G1	55°F	55°F	5°F	5°F
Relative Humidity	G1	66%	66%	68%	68%
Ambient Wet Bulb Temperature	G1	49°F	49°F	3.5°F	3.5°F
Site Elevation (ft AMSL)		625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2
Fuel Type		Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil
FUEL GAS PERFORMANCE HEATER CHARACTERISTICS (Per CT)					
Natural Gas Flow Rate (lb/hr)	G2	-	-	-	-
Natural Gas Inlet Temperature (°F)		-	-	-	-
Natural Gas Outlet Temperature (°F)	G2	-	-	-	-
Heating Water Inlet Flow Rate (lb/hr)		-	-	-	-
Heating Water Inlet Temperature (°F)		-	-	-	-
Heating Water Outlet Temperature (°F)		-	-	-	-
TURBINE COOLING AIR COOLER CHARACTERISTICS (Per CT)					
Cooling Water Inlet Flow Rate (lb/hr)	W11	107,982	78,880	93,703	71,115
Cooling Water Inlet Temperature (°F)	W11	317.2	306.3	313.1	304.2
Cooling Water Outlet Temperature (°F)		523.0	529.3	483.9	501.8
Turbine Cooling Air Cooler Heat Rejection (MMBtu/hr)		24.0	19.0	17.0	15.0
CYCLE MAKEUP CONDITIONS					
Makeup Flow Rate to Steam Cycle (gpm)	W7	26.7.	24.6.	25.7.	22.8.
Makeup Temperature (°F)	W7	60.0	60.0	60.0	60.0
TOTAL PLANT PERFORMANCE					
Total Gross CT Electrical Output (kW)		362,600.	298,200.	366,600.	301,800.
Total Gross Steam Turbine Electrical Output (kW)	E2	165,009.	157,105.	160,319.	137,224.
Total Gross Plant Electrical Output (kW)	D3	527,609.	455,305.	526,919.	439,024.
Auxiliary Power					
BOP Percent Aux Power, Approx. (%)		2.20	2.20	2.20	2.20
BOP Auxiliary Power (kW)		11,610.	10,020.	11,590.	9,660.
Chiller 0.7327 kW per ton chilling capacity (kW)		0.	0.	0.	0.
Total Auxiliary Power (kW)		11,610.	10,020.	11,590.	9,660.
Percentage of Gross Electrical Output (%)		2.20	2.20	2.20	2.20
Net Plant Electrical Output (kW)	D4	515,999.	445,285.	515,329.	429,364.
Net Plant Electrical Heat Rate, LHV (Btu/kWh)	D5	7,005.	7,134.	7,071.	7,416.
Net Plant Electrical Heat Rate, HHV (Btu/kWh)		7,426.	7,562.	7,496.	7,861.

* = Cooling Tower parameter can not be calculated at minimum cooling water temperature conditi

Heat Recovery Steam Generator



PRELIMINARY
Plant Performance Summary Data

Heat Input to Combustion Turbine, per CT	D1	mmBtu/hr, LHV
Heat Input to Duct Burner, per HRSG	D2	mmBtu/hr, LHV
Gross Generation	D3	kW
Net Plant Output	D4	kW
Net Plant Heat Rate	D5	Btu/kWh, LHV

S Steam
W Water
G Gas
E Electricity
O Oil

Diagram is schematic only. Miscellaneous flows not shown for clarity
Turbine casing configuration may differ

Legend

W = lb/hr
P = psia
T = °F
H = Btu/lb
= Attemperator (ATT.)
BD = Blowdown (BD)

Drawing Release Record

Rev.	Date	Prepared By	Reviewed By	Approved By	Project No.:
0	27-Jul-2011	M. Thomas	D. Azukas		12756-002

American Electric Power
Big Sandy Plant
Unit 1 Repowering Cost Estimate Study
MHI 501GAC 2x2x1 Combined Cycle Configuration
Cycle Diagram Schematic

Sargent & Lundy LLC

PRELIMINARY
Estimated Performance Summary
2x2x1 GE 7FA.05

Notes and Assumptions:

1. Ambient conditions per S&L Report and ASHRAE data.
   - Winter Extreme: -23°F db / -23°F wb
   - 99% Winter: 5°F db / 3.5°F wb
   - Annual Average: 55°F db / 49°F wb
   - 1% Summer Wet Bulb: 85°F db / 76°F wb
   - 1% Summer Dry Bulb: 89°F db / 74°F wb
   - PJM Design: 91°F db / 45% RH (74°F wb)
   - Summer Extreme: 105°F db / 84°F wb
   - Site elevation: 625 ft AMSL
2. Combustion Turbine performance based on data provided by GE dated 06-Jun-11.
3. HRSG design is based on Annual Average ambient conditions without duct firing.
   - Main Steam and Hot Reheat Steam design temperatures are 960°F and 1010°F respectively to avoid exceeding the stress limits of the turbine blades. (see Note 4)
   - Exhaust gas temperature loss is 2°F in the transtion from CT to HRSG.
   - Miscellaneous casing heat losses are 1.0%.
   - Evaporators use a 15°F pinch temperature.
   - Reheat superheater waterside pressure loss is 2% on design case. Waterside pressure loss is 1% on design case for all other superheaters.
   - Economizer waterside pressure loss is 1% on design case.
   - Stack temperature is maintained at 185°F minimum for natural gas cases / 285°F minimum for distillate oil cases using condensate preheater bypass when necessary for off-design cases.
4. Steam Turbine design is based on MHI heat balance diagram after HP and IP/SFLP turbine replacement.
   - Dwg. # KA3-0071-4 dated 2006/12/15 - Maximum Mechanical Design Point
   - Steam Turbine has a 3-flow LP section with a 25" last stage blade per Client email dated 23-Jun-11.
   - Exhaust losses based on curve CT-11679 dated 10-Oct-60. (filename: BS1 DFLP EL CT11679 001.pdf)
   - Performance based on new and clean conditions (i.e., no degradation).
   - Performance matched based on the ASME 1967 Steam Tables.
     - Main Steam and Hot Reheat Steam temperatures are limited to 950°F and 1000°F respectively in combined cycle operation to avoid exceeding the stress limits of the turbine blades.
     - This is based on a conference call with MHI on 18-Jul-11 (filename: BS1 Repowering CE Study Project_Mitsubishi TC_07-18-11.doc)
     - Floor pressure for part load cases is assumed to be half of the maximum ST inlet pressure (1944 psia / 2 = 972 psia).
5. Steam Turbine generator efficiency is 98.8%.
6. Condenser design is based on Worthington Corporation datasheet for serial number 1 589 669. (filename: BS1 Main Condenser Data, Dwgs.pdf)
   - HEI cleanliness factor = 0.85
   - Performance based on new and clean conditions aside from above HEI cleanliness factor (i.e., no degradation)
   - Performance matched based on the ASME 1967 Steam Tables.
   - Minimum condenser pressure = 1.0 in HgA based on the typical limit of air removal equipment.
7. Cooling Tower design is based on SPX proposal for BS U1 repairs and upgrade. (filename: 110512 SPX Proposal B03297 to American Electric Power for Big Sandy Unit 1 Upgrade.pdf)
   - Performace based on Option 3 per Client email dated 07-Jun-11.
   - Drift loss = 0.005%, which is typical for a natural draft cooling tower.
   - Performance based on new and clean conditions (i.e., no degradation).
   - Performance matched based on the ASME 1967 Steam Tables.
   - Cooling water outlet minimum temperature in winter cases is 65°F based on Client email dated 5-Jul-11.
8. Feedwater Heaters #1&2 design are based on American Exchanger Services datasheets AM-EX Nos. 2733-01 and 2733-02 respectively. (filenames: 2733-01-004-R2.pdf & 2733-02-004-R2.pdf)
   - Performance based on new and clean conditions (i.e., no degradation).
   - Performance matched based on the ASME 1967 Steam Tables.
9. Fuel Gas Performance Heater fuel outlet temperature = 365°F per GE performance data.
   - Design fuel outlet temperature may not be achievable for part load cases.
10. Duct burner fuel flow rate adjusted to achieve 1.6 MMlb/hr Steam Turbine exhaust flow rate for fired cases per Client direction.
    - The exhaust flow rate limit is due to the limitations of the existing condenser.
11. Natural Gas lower heating value (LHV) = 21,515 Btu/lb with ratio HHV/LHV = 1.11 based on GE standard natural gas fuel.
12. Piping Line Losses:
    - Main Steam - 100 psi pressure loss and 10°F temperature drop
    - Cold Reheat - 6% pressure loss and 4°F temperature drop
    - Hot Reheat - 6% pressure loss and 10°F temperature drop
    - LP Admission Line - 10% pressure loss and 4°F temperature drop
    - Condensate Line - 140 psi pressure loss per project team and 2°F temperature drop
13. Combustion Turbine inlet pressure drop including chiller coils is 4.0 inches H2O at ISO conditions.
14. HRSG gas side pressure drop is 16.0 inches H2O at ISO conditions.
15. HRSG blowdown is 1% for HP and IP.
16. Deaerator is integral with LP evaporator of HRSG.
17. To approximate flows in gpm, flows calculated in lb/hr are divided by the conversion factor of 500.
18. Condensate Pump will be replaced to account for additional piping and equipment for the repowered combined cycle plant that is not in the existing plant.
    - New Condensate Pump discharge pressure per input from project team.
19. Feedpump discharge characteristics do not account for piping and valving losses between control valve and HRSG economizer inlet.
20. BOP Auxiliary Power percentage is approximately 2.20% which accounts for auxiliaries in combined cycle.
21. Temperature change across the SCR is assumed to be zero.
22. Chiller outlet air temperature is 50°F, which is the industry standard value.
23. Evaporative cooler water flow rate does not include blowdown flow, only evaporation.
24. Makeup water flow rate to the steam cycle does not include the water flow to the evaporative coolers or to the CT for water injection.
25. Steam property method is IAPWS-IF97 (ASME 1999 steam tables) for the overall combined cycle model.
26. Heat balance results determined using GateCycle program, Version 5.52.

PRELIMINARY

Estimated Performance Summary
2x2x1 GE 7FA.05

CASE DESCRIPTION	Stream No.	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8
Equipment Design		HRSG							
Ambient Dry Bulb Temperature	G1	55°F	85°F	5°F	85°F	85°F	105°F	91°F	55°F
Relative Humidity	G1	66%	67%	68%	67%	67%	43%	45%	66%
Ambient Wet Bulb Temperature	G1	49°F	76°F	3.5°F	76°F	76°F	84°F	74°F	49°F
Site Elevation (ft AMSL)		625	625	625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2	2	2
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
COMBUSTION TURBINE CHARACTERISTICS (per CT)									
CT Frame		GE 7FA.05	GE 7FA.05	GE 7FA.05	GE 7FA.05	GE 7FA.05	GE 7FA.05	GE 7FA.05	GE 7FA.05
Load Condition		100%	100%	100%	100%	100%	100%	100%	100%
Inlet Air Cooling		NONE	CHILLER ON	NONE	CHILLER ON	NONE	CHILLER ON	CHILLER ON	CHILLER ON
Chiller Cooling Capacity (ton)		0.	7,011.	0.	7,011.	0.	10,055.	6,022.	388.
Chiller Air Outlet Temperature (°F)		-	50.	-	50.	-	50.	50.	50.
Evaporative Cooler Water Flow Rate (Evaporation only) (lb//hr)		0.	0.	0.	0.	0.	0.	0.	0.
Evaporative Cooler Air Outlet Temperature (°F)		-	-	-	-	-	-	-	-
Fuel Lower Heating Value (Btu/lb)	G2, G4, O1	21,515.	21,515.	21,515.	21,515.	21,515.	21,515.	21,515.	21,515.
Fuel Flow Rate (lb/hr)	G2, O1	86,047.	87,255.	94,195.	87,255.	81,664.	87,255.	87,255.	87,162.
Fuel Inlet Temperature (°F)	G2, O1	365.	365.	365.	365.	365.	365.	365.	365.
Heat Input to CT, LHV (MMBtu/hr)	D1	1,851.3	1,877.3	2,026.6	1,877.3	1,757.0	1,877.3	1,877.3	1,875.3
Combustor NOx Water Injection Flow Rate (lb/hr)	W1	0	0	0	0	0	0	0	0
Exhaust Gas Flow Rate (lb/hr)	G3	4,019,000.	4,053,000.	4,335,000.	4,053,000.	3,878,000.	4,053,000.	4,053,000.	4,057,002.
Exhaust Gas Temperature (°F)	G3	1,114.	1,112.	1,084.	1,112.	1,129.	1,112.	1,112.	1,112.
Exhaust Analysis, % Vol.									
Argon	G3	0.89	0.88	0.89	0.88	0.87	0.88	0.88	0.89
Nitrogen	G3	74.40	74.21	75.01	74.21	73.13	74.21	74.21	74.40
Oxygen	G3	12.40	12.31	12.43	12.31	12.23	12.31	12.31	12.37
Carbon Dioxide	G3	3.81	3.82	3.88	3.82	3.72	3.82	3.82	3.82
Water	G3	8.50	8.78	7.79	8.78	10.05	8.78	8.78	8.52
CT Gross Output (kW)	E1	209,779.	213,132.	232,251.	213,132.	194,303.	213,132.	213,132.	212,986.
CT Gross Heat Rate, LHV (Btu/kWh)		8,825.	8,808.	8,726.	8,808.	9,043.	8,808.	8,808.	8,805.
CT Gross Heat Rate, HHV (Btu/kWh)		9,796.	9,777.	9,686.	9,777.	10,037.	9,777.	9,777.	9,773.
HRSG CHARACTERISTICS (per HRSG)									
Heat Input to Duct Burner, LHV (MMBtu/hr)	D2	0.0	418.2	0.0	0.0	0.0	408.5	418.1	439.4
Heat Input to Duct Burner, HHV (MMBtu/hr)		0.0	464.2	0.0	0.0	0.0	453.4	464.0	487.7
Duct Burner Fuel Flow Rate (lb/hr)	G4	0	19,436	0	0	0	18,986	19,431	20,421
Duct Burner Gas Exit Temperature (°F)		1,049.9	1,389.2	1,025.2	1,048.2	1,057.2	1,381.7	1,389.1	1,405.7
Main Steam Flow Rate (lb/hr)	S1	510,461.	843,301.	522,767.	514,105.	505,989.	835,311.	843,111.	860,178.
Main Steam Pressure (psia)	S1	1,244.7	2,006.6	1,264.4	1,252.0	1,234.2	1,988.8	2,006.2	2,044.2
Main Steam Temperature (°F)	S1	960.0	960.0	943.1	957.8	960.0	960.0	960.0	960.0
Main Steam Enthalpy (Btu/lb)	S1	1,475.1	1,448.6	1,464.4	1,473.6	1,475.5	1,449.3	1,448.7	1,447.3
Hot Reheat Flow Rate (lb/hr)	S5	556,249.	847,742.	575,439.	560,550.	554,437.	841,017.	847,603.	862,449.
Hot Reheat Pressure (psia)	S5	373.1	566.1	382.9	375.7	371.9	561.6	565.9	575.8
Hot Reheat Temperature (°F)	S5	1,010.0	1,010.0	989.1	1,008.2	1,010.0	1,010.0	1,010.0	1,010.0
Hot Reheat Enthalpy (Btu/lb)	S5	1,529.9	1,524.5	1,518.5	1,528.9	1,530.0	1,524.6	1,524.5	1,524.2
IP Superheater Flow Rate (lb/hr)	S4	57,790.	23,919.	64,964.	58,533.	55,231.	24,992.	23,971.	22,097.
IP Superheater Pressure (psia)	S4	388.5	589.5	398.7	391.2	387.0	584.9	589.4	599.6
IP Superheater Temperature (°F)	S4	569.5	657.1	568.1	569.6	569.2	655.5	657.0	660.4
IP Superheater Enthalpy (Btu/lb)	S4	1,290.1	1,326.3	1,288.4	1,289.9	1,290.1	1,325.6	1,326.3	1,327.6
LP Superheater Flow Rate (lb/hr)	S7	43,618.	14,720.	49,492.	44,322.	41,607.	15,656.	14,730.	12,594.
LP Superheater Pressure (psia)	S7	80.3	105.7	83.8	81.0	79.3	105.2	105.7	107.1
LP Superheater Temperature (°F)	S7	520.0	649.1	515.9	519.6	520.7	646.1	649.0	655.0
LP Superheater Enthalpy (Btu/lb)	S7	1,291.2	1,353.6	1,288.8	1,290.9	1,291.6	1,352.2	1,353.6	1,356.5
Condensate Preheater Inlet Flow Rate (lb/hr)	W2	679,307.	943,957.	710,692.	685,323.	671,878.	937,947.	943,806.	956,894.
Condensate Preheater Inlet Pressure (psia)	W2	247.2	169.5	241.3	245.8	248.0	171.3	169.5	165.5
Condensate Preheater Inlet Temperature (°F)	W2	203.1	218.9	203.9	204.1	203.4	219.0	218.9	218.7
Condensate Preheater Inlet Enthalpy (Btu/lb)	W2	171.7	187.5	172.5	172.7	172.1	187.6	187.5	187.2
HRSG Exhaust Stack Gas Characteristics									
HRSG Exhaust Gas Temperature (°F)	G5	271.1	281.9	274.4	272.0	270.3	281.8	281.9	281.8
HRSG Exhaust Gas Flow Rate (lb/hr)	G5	4,019,000.	4,072,436.	4,335,000.	4,053,000.	3,878,000.	4,071,986.	4,072,431.	4,077,423.
HRSG BLOWDOWN CHARACTERISTICS (Per HRSG)									
HP Evaporator Blowdown Flow Rate (lb/hr)		5,156.	8,314.	5,280.	5,193.	5,087.	8,231.	8,311.	8,484.
IP Evaporator Blowdown Flow Rate (lb/hr)		584.	242.	656.	591.	558.	252.	242.	223.
DEAERATOR CHARACTERISTICS (Per HRSG)									
DA Operating Pressure (psia)		81.9	105.9	85.8	82.6	80.8	105.3	105.9	107.2
Main Boiler Feedwater Inlet Flow Rate (lb/hr)		679,307.	943,957.	710,692.	685,323.	671,878.	937,947.	943,806.	956,894.
Main Boiler Feedwater Inlet Temperature (°F)		288.0	289.1	291.7	288.6	286.5	289.3	289.1	288.8
Main Boiler Feedwater Outlet Flow Rate (lb/hr)		633,991.	926,879.	659,423.	639,290.	628,590.	919,939.	926,717.	941,907.
Main Boiler Feedwater Outlet Temperature (°F)		313.7	332.0	316.9	314.3	312.7	331.6	332.0	332.9
BFW Temperature Rise (°F)		25.7	42.8	25.2	25.7	26.2	42.3	42.8	44.0
Primary Pegging Steam Flow Rate (lb/hr)		21,397.	49,394.	22,118.	21,601.	21,563.	48,450.	49,379.	51,439.
Auxiliary Pegging Steam Flow Rate (lb/hr)		0.	0.	0.	0.	0.	0.	0.	0.
Vent Steam Flow Rate (lb/hr)		1,698.	2,360.	1,777.	1,713.	1,680.	2,345.	2,360.	2,392.

PRELIMINARY

Estimated Performance Summary
2x2x1 GE 7FA.05

CASE DESCRIPTION	Stream No.	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8
Equipment Design		HRSG							
Ambient Dry Bulb Temperature	G1	55°F	85°F	5°F	85°F	85°F	105°F	91°F	55°F
Relative Humidity	G1	66%	67%	68%	67%	67%	43%	45%	66%
Ambient Wet Bulb Temperature	G1	49°F	76°F	3.5°F	76°F	76°F	84°F	74°F	49°F
Site Elevation (ft AMSL)		625	625	625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2	2	2
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
PUMP CHARACTERISTICS									
HP Feedpump Control Valve Discharge									
Total Flow Rate per HRSG (lb/hr)		515,617.	851,615.	528,048.	519,298.	511,076.	843,543.	851,422.	868,662.
Pressure (psia)		1,295.7	2,111.4	1,317.3	1,303.6	1,284.2	2,092.0	2,111.0	2,152.4
Temperature (°F)		316.6	337.1	319.9	317.3	315.6	336.6	337.1	338.1
Enthalpy (Btu/lb)		289.1	311.6	292.5	289.7	288.0	311.1	311.6	312.7
IP Feedpump Control Valve Discharge									
Total Flow Rate per HRSG (lb/hr)		118,374.	75,264.	131,375.	119,992.	117,513.	76,396.	75,294.	73,246.
Pressure (psia)		396.4.	591.6.	408.4.	399.3.	394.2.	587.0.	591.4.	601.5.
Temperature (°F)		314.4.	333.2.	317.7.	315.1.	313.4.	332.8.	333.2.	334.1.
Enthalpy (Btu/lb)		285.2.	305.0.	288.6.	285.9.	284.2.	304.6.	305.0.	306.0.
HRSG Preheater Recirculation Pump CV Discharge									
Total Flow Rate per HRSG (lb/hr)		0.	0.	0.	0.	0.	0.	0.	0.
Pressure (psia)		-	-	-	-	-	-	-	-
Temperature (°F)		-	-	-	-	-	-	-	-
Enthalpy (Btu/lb)		-	-	-	-	-	-	-	-
Condensate Pump Discharge									
Total Flow Rate from Condenser (lb/hr)		1,115,609.	1,624,672.	1,156,800.	1,142,267.	1,125,804.	1,624,407.	1,624,565.	1,625,091.
Pressure (psia)		350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
Temperature (°F)		96.6	125.2	93.5	114.3	114.0	132.3	125.3	109.6
Enthalpy (Btu/lb)		65.6	94.1	62.5	83.2	82.9	101.2	94.2	78.5
STEAM TURBINE CHARACTERISTICS		TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB
Main Steam Throttle Flow Rate (lb/hr)	S2	1,020,922.	1,686,602.	1,045,534.	1,028,209.	1,011,979.	1,670,623.	1,686,222.	1,720,357.
Main Steam Throttle Pressure (psia)	S2	1,182.8	1,907.5	1,201.6	1,189.8	1,172.9	1,890.6	1,907.2	1,943.3
Main Steam Throttle Temperature (°F)	S2	950.0	950.0	933.1	947.8	950.0	950.0	950.0	950.0
Main Steam Throttle Enthalpy (Btu/lb)	S2	1,471.3	1,445.7	1,460.6	1,469.8	1,471.6	1,446.3	1,445.7	1,444.4
Cold Reheat Steam Flow Rate (lb/hr)	S3	996,918.	1,646,946.	1,020,952.	1,004,034.	988,185.	1,631,343.	1,646,575.	1,679,907.
Cold Reheat Steam Pressure (psia)	S3	411.0.	627.2.	421.4.	413.8.	409.2.	622.2.	627.0.	638.0.
Cold Reheat Steam Temperature (°F)	S3	676.0.	656.5.	663.4.	674.3.	677.1.	656.8.	656.4.	655.8.
Cold Reheat Steam Enthalpy (Btu/lb)	S3	1,349.0.	1,323.2.	1,341.3.	1,347.9.	1,349.7.	1,323.8.	1,323.2.	1,322.0.
Hot Reheat Steam Flow Rate (lb/hr)	S6	1,112,498.	1,695,485.	1,150,879.	1,121,100.	1,108,874.	1,682,034.	1,695,207.	1,724,899.
Hot Reheat Steam Pressure (psia)	S6	350.6.	532.1.	359.8.	353.0.	349.4.	527.9.	532.0.	541.2.
Hot Reheat Steam Temperature (°F)	S6	1,000.0.	1,000.0.	979.1.	998.2.	1,000.0.	1,000.0.	1,000.0.	1,000.0.
Hot Reheat Steam Enthalpy (Btu/lb)	S6	1,525.2.	1,520.0.	1,513.8.	1,524.2.	1,525.3.	1,520.1.	1,520.0.	1,519.7.
SFLP Turbine Inlet Steam Flow (lb/hr)	S8	361,750	519,682	374,797	364,765	359,388	516,215	519,608	527,273
SFLP Turbine Inlet Steam Pressure (psia)	S8	73.4	105.1	75.4	74.0	72.9	104.4	105.0	106.5
SFLP Turbine Inlet Steam Temperature (°F)	S8	587.7	578.7	571.3	586.5	587.4	579.1	578.7	577.9
SFLP Turbine Inlet Steam Enthalpy (Btu/lb)	S8	1,325.2	1,318.4	1,317.0	1,324.6	1,325.1	1,318.7	1,318.5	1,317.9
SFLP Turbine Exhaust Steam Flow Rate (lb/hr)	S10	373,310.	538,059.	386,693.	376,410.	370,878.	534,431.	537,981.	545,995.
SFLP Turbine Exhaust UEEP (Btu/lb)	S10	1,041.0	1,049.0	1,035.3	1,055.6	1,056.1	1,057.7	1,049.1	1,036.0
SFLP Turbine Exhaust Loss (Btu/lb)		17.0	7.6	21.0	7.2	7.1	6.4	7.6	16.8
SFLP Turbine Exhaust Annulus Velocity (ft/sec)		904.3	596.8	1,012.0	564.2	562.0	498.0	595.5	904.9
SFLP Turbine Exhaust Sonic Velocity (ft/sec)		1,430.3	1,467.0	1,426.5	1,453.1	1,452.6	1,476.0	1,467.1	1,447.1
DFLP Turbine Inlet Steam Flow (lb/hr)	S9	847,273	1,221,461	877,668	854,331	841,870	1,213,178	1,221,273	1,239,384
DFLP Turbine Inlet Steam Pressure (psia)	S9	72.0	103.0	74.0	72.6	71.5	102.4	103.0	104.5
DFLP Turbine Inlet Steam Temperature (°F)	S9	587.5	578.4	571.1	586.3	587.1	578.8	578.4	577.6
DFLP Turbine Inlet Steam Enthalpy (Btu/lb)	S9	1,325.2	1,318.4	1,317.0	1,324.6	1,325.1	1,318.7	1,318.5	1,317.9
DFLP Turbine Second Extraction Steam Flow (lb/hr)	S12	44,217	65,000	47,346	41,868	41,090	62,582	64,965	70,435
DFLP Turbine Second Extraction Steam Pressure (psia)	S12	14.6	21.0	15.0	14.8	14.6	20.9	21.0	21.1
DFLP Turbine Second Extraction Steam Temperature (°F)	S12	298.5	289.0	286.5	295.9	296.6	288.6	289.0	289.7
DFLP Turbine Second Extraction Steam Enthalpy (Btu/lb)	S12	1,192.0	1,186.0	1,186.2	1,190.8	1,191.1	1,185.8	1,186.0	1,186.3
DFLP Turbine Third Extraction Steam Flow (lb/hr)	S13	77,472	94,642	84,373	63,450	62,328	85,230	94,516	115,072
DFLP Turbine Third Extraction Steam Pressure (psia)	S13	7.09	10.38	7.22	7.35	7.25	10.44	10.38	10.27
DFLP Turbine Third Extraction Steam Temperature (°F)	S13	193.6	194.9	182.6	193.8	194.4	195.2	194.9	194.4
DFLP Turbine Third Extraction Steam Enthalpy (Btu/lb)	S13	1,144.6	1,140.3	1,139.3	1,144.6	1,144.9	1,140.7	1,140.3	1,139.7
DFLP Turbine Exhaust Steam Flow Rate (lb/hr)	S11	725,848.	1,062,237.	746,220.	749,278.	738,713.	1,065,781.	1,062,210.	1,054,302.
DFLP Turbine Exhaust UEEP (Btu/lb)	S11	1,042.1	1,051.1	1,035.9	1,057.6	1,058.1	1,059.9	1,051.2	1,037.0
DFLP Turbine Exhaust Loss (Btu/lb)		16.1	7.5	19.7	7.2	7.1	6.4	7.5	15.7
DFLP Turbine Exhaust Annulus Velocity (ft/sec)		880.9	590.5	978.4	562.7	560.8	497.7	589.2	875.7
DFLP Turbine Exhaust Sonic Velocity (ft/sec)		1,430.3	1,467.0	1,426.5	1,453.1	1,452.6	1,476.0	1,467.1	1,447.1
Turbine Backpressure (In. HgA)	S10, S11	1.74	4.01	1.59	2.95	2.92	4.86	4.02	2.57
Gross Steam Turbine Output (kW)	E2	195,758.	290,581.	199,227.	192,428.	190,081.	284,641.	290,490.	300,878.

PRELIMINARY

Estimated Performance Summary
2x2x1 GE 7FA.05

CASE DESCRIPTION	Stream No.	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8
Equipment Design		HRSG							
Ambient Dry Bulb Temperature	G1	55°F	85°F	5°F	85°F	85°F	105°F	91°F	55°F
Relative Humidity	G1	66%	67%	68%	67%	67%	43%	45%	66%
Ambient Wet Bulb Temperature	G1	49°F	76°F	3.5°F	76°F	76°F	84°F	74°F	49°F
Site Elevation (ft AMSL)		625	625	625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2	2	2
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
FEEDWATER HEATER CHARACTERISTICS									
Feedwater Heater #2									
Extraction Steam Flow Rate (lb/hr)		44,217	65,000	47,346	41,868	41,090	62,582	64,965	70,435
Extraction Line Pressure Drop (%)		4.4	4.5	4.7	3.9	3.8	4.2	4.5	5.2
Extraction Enthalpy (Btu/lb)		1,192.0	1,186.0	1,186.2	1,190.8	1,191.1	1,185.8	1,186.0	1,186.3
Feedwater Inlet Temperature (°F)		170.7	187.2	170.8	174.1	173.6	188.4	187.2	184.4
Feedwater Outlet Temperature (°F)		206.5	222.7	207.3	207.6	207.0	222.9	222.7	222.3
Drain Pressure (psia)		14.0	20.0	14.3	14.3	14.1	20.0	20.0	20.0
Drain Temperature (°F)		209.5	227.9	210.5	210.4	209.7	227.9	227.9	228.0
Feedwater Heater #1									
Extraction Steam Flow Rate, includes SSR Flow (lb/hr)		78,788	96,737	85,727	64,776	63,636	87,306	96,610	117,206
Extraction Line Pressure Drop (%)		7.4	5.1	8.3	4.6	4.6	4.1	5.1	7.7
Extraction Enthalpy (Btu/lb)		1,148.2	1,144.7	1,142.7	1,149.0	1,149.4	1,145.5	1,144.8	1,143.4
Feedwater Inlet Temperature (°F)		98.4	127.1	95.2	116.0	115.7	134.2	127.2	111.5
Feedwater Outlet Temperature (°F)		170.3	186.6	170.3	173.8	173.3	187.9	186.6	183.6
Drain Pressure (psia)		6.57	9.85	6.63	7.01	6.91	10.01	9.85	9.48
Drain Temperature (°F)		174.0	192.5	174.4	176.8	176.2	193.2	192.5	190.7
TURBINE BYPASS SYSTEM CHARACTERISTICS (per HRSG)									
MS Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-	-	-	-	-
MS Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W8	-	-	-	-	-	-	-	-
MS Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S14	-	-	-	-	-	-	-	-
MS Bypass Attemporator Outlet Steam Pressure (psia)	S14	-	-	-	-	-	-	-	-
MS Bypass Attemporator Outlet Steam Temperature (°F)	S14	-	-	-	-	-	-	-	-
MS Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S14	-	-	-	-	-	-	-	-
HRH Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-	-	-	-	-
HRH Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W9	-	-	-	-	-	-	-	-
HRH Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S15	-	-	-	-	-	-	-	-
HRH Bypass Attemporator Outlet Steam Pressure (psia)	S15	-	-	-	-	-	-	-	-
HRH Bypass Attemporator Outlet Steam Temperature (°F)	S15	-	-	-	-	-	-	-	-
HRH Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S15	-	-	-	-	-	-	-	-
LP Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-	-	-	-	-
LP Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W10	-	-	-	-	-	-	-	-
LP Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S16	-	-	-	-	-	-	-	-
LP Bypass Attemporator Outlet Steam Pressure (psia)	S16	-	-	-	-	-	-	-	-
LP Bypass Attemporator Outlet Steam Temperature (°F)	S16	-	-	-	-	-	-	-	-
LP Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S16	-	-	-	-	-	-	-	-
CONDENSER CHARACTERISTICS									
Operating Pressure (psia)		0.855	1.970	0.781	1.450	1.434	2.389	1.975	1.264
Operating Pressure (in Hg Abs.)		1.74	4.01	1.59	2.95	2.92	4.86	4.02	2.57
Temperature of Condensing Steam (°F)		96.5	125.5	93.6	114.4	114.1	132.7	125.6	109.7
CW Flow Rate Through Condenser (gpm)	W3	98,750	98,750	98,750	98,750	98,750	98,750	98,750	98,750
CW Temperature Into Condenser (°F)	W3	69.1	87.4	65.0	87.1	87.1	94.8	87.5	70.6
CW Temperature Out Of Condenser (°F)	W4	90.9	118.5	87.4	109.4	109.1	125.9	118.6	101.7
Circulating Water Temperature Rise (°F)		21.8	31.1	22.4	22.3	22.0	31.2	31.1	31.2
Terminal Temperature Difference, TTD (°F)		5.7	7.0	6.1	5.0	4.9	6.7	7.0	7.9
Total Condenser Heat Rejection (MMBtu/hr)		1,074.1	1,531.5	1,103.7	1,097.1	1,082.4	1,534.0	1,531.5	1,534.9
AUXILIARY COOLING SYSTEM									
Auxiliary Cooling Water Flow Rate Through Heat Exchangers (gpm)	W5	17,250	17,250	17,250	17,250	17,250	17,250	17,250	17,250
Auxiliary Cooling Water Temperature Rise (°F)		20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Auxiliary Cooling Heat Rejection (MMBtu/hr)		172.2	172.1	172.3	172.1	172.1	172.1	172.1	172.2
COOLING TOWER CHARACTERISTICS									
CW Flow Rate Into Cooling Tower (gpm)	W6	116,000	116,000	116,000	116,000	116,000	116,000	116,000	116,000
CW Temperature Into Cooling Tower (°F)	W6	90.6	116.8	87.1	109.1	108.8	124.3	116.9	100.1
Air Inlet Wet Bulb Temperature (°F)		49.0	76.0	3.5	76.0	76.0	84.0	73.7	49.0
Current Approach Temperature (°F)		20.2	12.2	*	11.8	11.7	12.0	14.7	21.8
Current Range Temperature (°F)		21.5	28.7	22.3	21.4	21.2	28.4	28.7	29.4
Drift Rate (%)		0.005	0.005	*	0.005	0.005	0.005	0.005	0.005
Cycles of Concentration		4	4	4	4	4	4	4	4
Evaporation Loss (gpm)		1,743	2,788	*	2,096	2,073	3,067	2,941	2,394
Drift Loss (gpm)		5.8	5.8	*	5.8	5.8	5.8	5.8	5.8
Blowdown (gpm)		575	923	*	693	685	1,017	974	792
Blowdown Temperature (°F)		69.0	87.3	*	87.1	87.1	94.7	87.4	70.5
Makeup (gpm)		2,323	3,717	*	2,795	2,764	4,090	3,921	3,193
Makeup Temperature (°F)		60.0	60.0	*	60.0	60.0	60.0	60.0	60.0
Total Cooling Tower Heat Rejection (MMBtu/hr)		1,256.7	1,714.0	1,277.7	1,279.6	1,264.9	1,716.6	1,714.0	1,717.5

PRELIMINARY

Estimated Performance Summary
2x2x1 GE 7FA.05

CASE DESCRIPTION	Stream No.	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8
Equipment Design		HRSG							
Ambient Dry Bulb Temperature	G1	55°F	85°F	5°F	85°F	85°F	105°F	91°F	55°F
Relative Humidity	G1	66%	67%	68%	67%	67%	43%	45%	66%
Ambient Wet Bulb Temperature	G1	49°F	76°F	3.5°F	76°F	76°F	84°F	74°F	49°F
Site Elevation (ft AMSL)		625	625	625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2	2	2
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
FUEL GAS PERFORMANCE HEATER CHARACTERISTICS (Per CT)									
Natural Gas Flow Rate (lb/hr)	G2	86,047.	87,255.	94,195.	87,255.	81,664.	87,255.	87,255.	87,162.
Natural Gas Inlet Temperature (°F)		60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Natural Gas Outlet Temperature (°F)	G2	365.0	365.1	365.2	365.1	365.0	364.9	365.0	365.1
Heating Water Inlet Flow Rate (lb/hr)		60,000.	50,752.	65,755.	60,868.	56,612.	50,799.	50,736.	50,527.
Heating Water Inlet Temperature (°F)		437.8	482.5	439.5	438.1	437.7	481.6	482.4	484.3
Heating Water Outlet Temperature (°F)		187.1	185.4	189.0	187.4	185.6	185.0	185.5	186.5
CYCLE MAKEUP CONDITIONS									
Makeup Flow Rate to Steam Cycle (gpm)	W7	29.8.	43.7.	44.5.	30.0.	29.3.	43.3.	43.7.	44.4.
Makeup Temperature (°F)	W7	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
TOTAL PLANT PERFORMANCE									
Total Gross CT Electrical Output (kW)		419,558.	426,264.	464,502.	426,264.	388,606.	426,264.	426,264.	425,972.
Total Gross Steam Turbine Electrical Output (kW)	E2	195,758.	290,581.	199,227.	192,428.	190,081.	284,641.	290,490.	300,878.
Total Gross Plant Electrical Output (kW)	D3	615,316.	716,845.	663,729.	618,692.	578,687.	710,905.	716,754.	726,850.
Auxiliary Power									
BOP Percent Aux Power, Approx. (%)		2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
BOP Auxiliary Power (kW)		13,540.	15,770.	14,600.	13,610.	12,730.	15,640.	15,770.	15,990.
Chiller 0.7327 kW per ton chilling capacity (kW)		0.	10,274.	0.	10,274.	0.	14,734.	8,825.	569.
Total Auxiliary Power (kW)		13,540.	26,044.	14,600.	23,884.	12,730.	30,374.	24,595.	16,559.
Percentage of Gross Electrical Output (%)		2.20	3.63	2.20	3.86	2.20	4.27	3.43	2.28
Net Plant Electrical Output (kW)	D4	601,776.	690,801.	649,129.	594,808.	565,957.	680,531.	692,159.	710,291.
Net Plant Electrical Heat Rate, LHV (Btu/kWh)	D5	6,153.	6,646.	6,244.	6,312.	6,209.	6,718.	6,632.	6,518.
Net Plant Electrical Heat Rate, HHV (Btu/kWh)		6,830.	7,377.	6,931.	7,007.	6,892.	7,457.	7,362.	7,234.

* = Cooling Tower parameter can not be calculated at minimum cooling water temperature condition. (See Note 6)

PRELIMINARY

Estimated Performance Summary
2x2x1 GE 7FA.05

CASE DESCRIPTION	Stream No.	Case 9	Case 10	Case 11	Case 12	Case 13	Case 14	Case 15	Case 16
Equipment Design									
Ambient Dry Bulb Temperature	G1	5°F	91°F	91°F	91°F	85°F	105°F	105°F	105°F
Relative Humidity	G1	68%	45%	45%	45%	67%	43%	43%	43%
Ambient Wet Bulb Temperature	G1	3.5°F	74°F	74°F	74°F	76°F	84°F	84°F	84°F
Site Elevation (ft AMSL)		625	625	625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2	2	2
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
COMBUSTION TURBINE CHARACTERISTICS (per CT)									
CT Frame		GE 7FA.05	GE 7FA.05	GE 7FA.05	GE 7FA.05	GE 7FA.05	GE 7FA.05	GE 7FA.05	GE 7FA.05
Load Condition		100%	100%	100%	100%	100%	100%	75%	49%
Inlet Air Cooling		NONE	CHILLER ON	EVAP ON	EVAP ON	CHILLER ON	NONE	NONE	NONE
Chiller Cooling Capacity (ton)		0.	6,022.	0.	0.	7,011.	0.	0.	0.
Chiller Air Outlet Temperature (°F)		-	50.	-	-	50.	-	-	-
Evaporative Cooler Water Flow Rate (Evaporation only) (lb//hr)		0.	0.	11,658.	11,658.	0.	0.	0.	0.
Evaporative Cooler Air Outlet Temperature (°F)		-	-	75.	75.	-	-	-	-
Fuel Lower Heating Value (Btu/lb)	G2, G4, O1	21,515.	21,515.	21,515.	21,515.	21,515.	21,515.	21,515.	21,515.
Fuel Flow Rate (lb/hr)	G2, O1	94,195.	87,255.	84,086.	84,086.	87,255.	76,988.	63,165.	51,229.
Fuel Inlet Temperature (°F)	G2, O1	365.	365.	365.	365.	365.	365.	365.	365.
Heat Input to CT, LHV (MMBtu/hr)	D1	2,026.6	1,877.3	1,809.1	1,809.1	1,877.3	1,656.4	1,359.0	1,102.2
Combustor NOx Water Injection Flow Rate (lb/hr)	W1	0	0	0	0	0	0	0	0
Exhaust Gas Flow Rate (lb/hr)	G3	4,335,000.	4,053,000.	3,966,000.	3,966,000.	4,053,000.	3,694,000.	2,971,000.	2,663,000.
Exhaust Gas Temperature (°F)	G3	1,084.	1,112.	1,123.	1,123.	1,112.	1,145.	1,215.	1,215.
Exhaust Analysis, % Vol.									
Argon	G3	0.89	0.88	0.87	0.87	0.88	0.87	0.87	0.87
Nitrogen	G3	75.01	74.21	73.09	73.09	74.21	72.77	72.72	72.99
Oxygen	G3	12.43	12.31	12.17	12.17	12.31	12.22	12.07	12.83
Carbon Dioxide	G3	3.88	3.82	3.75	3.75	3.82	3.68	3.75	3.40
Water	G3	7.79	8.78	10.12	10.12	8.78	10.46	10.60	9.91
CT Gross Output (kW)	E1	232,251.	213,132.	201,547.	201,547.	213,132.	179,521.	134,641.	87,965.
CT Gross Heat Rate, LHV (Btu/kWh)		8,726.	8,808.	8,976.	8,976.	8,808.	9,227.	10,094.	12,530.
CT Gross Heat Rate, HHV (Btu/kWh)		9,686.	9,777.	9,963.	9,963.	9,777.	10,242.	11,204.	13,908.
HRSG CHARACTERISTICS (per HRSG)									
Heat Input to Duct Burner, LHV (MMBtu/hr)	D2	415.6	0.0	0.0	417.5	0.0	0.0	0.0	0.0
Heat Input to Duct Burner, HHV (MMBtu/hr)		461.3	0.0	0.0	463.4	0.0	0.0	0.0	0.0
Duct Burner Fuel Flow Rate (lb/hr)	G4	19,315	0	0	19,404	0	0	0	0
Duct Burner Gas Exit Temperature (°F)		1,349.4	1,048.1	1,054.7	1,399.0	1,048.0	1,064.3	1,093.5	1,089.4
Main Steam Flow Rate (lb/hr)	S1	851,882.	513,960.	513,829.	842,534.	532,909.	492,468.	428,450.	380,973.
Main Steam Pressure (psia)	S1	2,025.5	1,251.8	1,252.7	2,004.9	1,244.6	1,202.6	1,051.4	1,015.1
Main Steam Temperature (°F)	S1	959.7	957.9	960.0	960.0	949.1	960.0	960.0	960.0
Main Steam Enthalpy (Btu/lb)	S1	1,447.8	1,473.6	1,474.9	1,448.7	1,468.7	1,476.5	1,481.6	1,482.7
Hot Reheat Flow Rate (lb/hr)	S5	860,065.	560,441.	561,650.	849,142.	629,171.	542,967.	484,353.	434,348.
Hot Reheat Pressure (psia)	S5	571.6	375.7	376.7	566.9	315.6	364.2	325.2	291.8
Hot Reheat Temperature (°F)	S5	998.2	1,008.2	1,010.0	1,010.0	1,003.4	1,010.0	1,010.0	1,010.0
Hot Reheat Enthalpy (Btu/lb)	S5	1,517.8	1,528.9	1,529.8	1,524.4	1,528.0	1,530.2	1,531.3	1,532.2
IP Superheater Flow Rate (lb/hr)	S4	28,213.	58,565.	57,004.	23,002.	62,244.	51,567.	37,255.	35,423.
IP Superheater Pressure (psia)	S4	595.5	391.1	392.1	590.3	339.4	378.8	337.3	302.7
IP Superheater Temperature (°F)	S4	657.3	569.6	570.5	657.7	567.0	567.4	556.1	549.6
IP Superheater Enthalpy (Btu/lb)	S4	1,326.0	1,289.9	1,290.4	1,326.6	1,293.1	1,289.8	1,287.0	1,286.5
LP Superheater Flow Rate (lb/hr)	S7	19,283.	44,331.	43,026.	13,266.	23,182.	38,643.	26,740.	24,103.
LP Superheater Pressure (psia)	S7	107.8	81.0	80.6	105.6	70.0	76.8	65.7	59.0
LP Superheater Temperature (°F)	S7	643.3	519.6	521.0	651.3	563.5	520.8	520.7	515.8
LP Superheater Enthalpy (Btu/lb)	S7	1,350.6	1,290.9	1,291.7	1,354.7	1,313.5	1,291.9	1,292.8	1,291.0
Condensate Preheater Inlet Flow Rate (lb/hr)	W2	965,529.	685,193.	682,345.	941,879.	727,351.	653,934.	573,540.	512,060.
Condensate Preheater Inlet Pressure (psia)	W2	164.2	245.9	245.9	169.5	248.3	251.3	266.8	274.6
Condensate Preheater Inlet Temperature (°F)	W2	218.3	204.1	204.0	219.0	137.3	202.8	197.7	193.6
Condensate Preheater Inlet Enthalpy (Btu/lb)	W2	186.8	172.7	172.7	187.5	105.9	171.4	166.4	162.2
HRSG Exhaust Stack Gas Characteristics									
HRSG Exhaust Gas Temperature (°F)	G5	283.4	272.0	271.6	281.7	233.4	268.0	256.1	249.4
HRSG Exhaust Gas Flow Rate (lb/hr)	G5	4,354,315.	4,053,000.	3,966,000.	3,985,404.	4,053,000.	3,694,000.	2,971,000.	2,663,000.
HRSG BLOWDOWN CHARACTERISTICS (Per HRSG)									
HP Evaporator Blowdown Flow Rate (lb/hr)		8,605.	5,192.	5,184.	8,271.	5,383.	4,913.	4,132.	3,651.
IP Evaporator Blowdown Flow Rate (lb/hr)		285.	592.	576.	232.	629.	521.	376.	358.
DEAERATOR CHARACTERISTICS (Per HRSG)									
DA Operating Pressure (psia)		108.1	82.6	82.2	105.7	70.6	78.1	66.5	59.7
Main Boiler Feedwater Inlet Flow Rate (lb/hr)		965,529.	685,193.	682,345.	941,879.	727,351.	653,934.	573,540.	512,060.
Main Boiler Feedwater Inlet Temperature (°F)		291.5	288.6	287.8	288.5	255.7	283.8	271.1	265.3
Main Boiler Feedwater Outlet Flow Rate (lb/hr)		943,832.	639,149.	637,612.	926,260.	702,348.	613,654.	545,366.	486,676.
Main Boiler Feedwater Outlet Temperature (°F)		333.5	314.3	313.9	331.9	303.4	310.4	299.4	292.3
BFW Temperature Rise (°F)		41.9	25.7	26.1	43.4	47.7	26.6	28.3	27.0
Primary Pegging Steam Flow Rate (lb/hr)		49,618.	21,610.	21,856.	49,893.	40,654.	21,188.	19,435.	16,456.
Auxiliary Pegging Steam Flow Rate (lb/hr)		0.	0.	0.	0.	0.	0.	0.	0.
Vent Steam Flow Rate (lb/hr)		2,414.	1,713.	1,706.	2,355.	1,818.	1,635.	1,434.	1,280.

PRELIMINARY

Estimated Performance Summary
2x2x1 GE 7FA.05

CASE DESCRIPTION	Stream No.	Case 9	Case 10	Case 11	Case 12	Case 13	Case 14	Case 15	Case 16
Equipment Design									
Ambient Dry Bulb Temperature	G1	5°F	91°F	91°F	91°F	85°F	105°F	105°F	105°F
Relative Humidity	G1	68%	45%	45%	45%	67%	43%	43%	43%
Ambient Wet Bulb Temperature	G1	3.5°F	74°F	74°F	74°F	76°F	84°F	84°F	84°F
Site Elevation (ft AMSL)		625	625	625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2	2	2
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
PUMP CHARACTERISTICS									
HP Feedpump Control Valve Discharge									
Total Flow Rate per HRSG (lb/hr)		860,487.	519,152.	519,013.	850,805.	572,310.	497,382.	432,582.	384,624.
Pressure (psia)		2,136.3	1,303.4	1,304.1	2,108.9	1,300.0	1,250.0	1,088.2	1,044.6
Temperature (°F)		338.7	317.2	316.9	337.0	306.3	313.2	301.8	294.6
Enthalpy (Btu/lb)		313.2	289.7	289.4	311.4	278.5	285.5	273.5	266.0
IP Feedpump Control Valve Discharge									
Total Flow Rate per HRSG (lb/hr)		83,345.	119,997.	118,598.	75,454.	130,038.	116,271.	112,784.	102,052.
Pressure (psia)		598.1.	399.2.	399.7.	592.2.	349.3.	385.2.	341.2.	306.2.
Temperature (°F)		334.7.	315.1.	314.7.	333.1.	304.1.	311.2.	300.1.	292.9.
Enthalpy (Btu/lb)		306.6.	285.9.	285.5.	304.9.	274.5.	281.8.	270.3.	262.9.
HRSG Preheater Recirculation Pump CV Discharge									
Total Flow Rate per HRSG (lb/hr)		0.	0.	0.	0.	0.	0.	0.	0.
Pressure (psia)		-	-	-	-	-	-	-	-
Temperature (°F)		-	-	-	-	-	-	-	-
Enthalpy (Btu/lb)		-	-	-	-	-	-	-	-
Condensate Pump Discharge									
Total Flow Rate from Condenser (lb/hr)		1,625,500.	1,142,353.	1,142,141.	1,624,572.	1,663,589.	1,106,942.	975,039.	876,807.
Pressure (psia)		350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
Temperature (°F)		104.8	114.6	114.6	125.3	133.2	121.4	118.6	116.5
Enthalpy (Btu/lb)		73.7	83.5	83.5	94.2	102.1	90.3	87.5	85.4
STEAM TURBINE CHARACTERISTICS		TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB
Main Steam Throttle Flow Rate (lb/hr)	S2	1,703,763.	1,027,920.	1,027,658.	1,685,068.	0	984,936.	856,901.	761,946.
Main Steam Throttle Pressure (psia)	S2	1,925.5	1,189.6	1,190.5	1,905.9	-	1,142.8	999.1	972.0
Main Steam Throttle Temperature (°F)	S2	949.7	947.9	950.0	950.0	-	950.0	950.0	950.0
Main Steam Throttle Enthalpy (Btu/lb)	S2	1,444.8	1,469.8	1,471.0	1,445.7	-	1,472.7	1,477.5	1,478.4
Cold Reheat Steam Flow Rate (lb/hr)	S3	1,663,704.	1,003,751.	1,003,496.	1,645,448.	0	961,779.	836,753.	744,031.
Cold Reheat Steam Pressure (psia)	S3	633.5.	413.7.	414.7.	627.9.	-	400.4.	355.9.	319.2.
Cold Reheat Steam Temperature (°F)	S3	656.2.	674.4.	676.6.	656.9.	-	678.4.	683.7.	682.3.
Cold Reheat Steam Enthalpy (Btu/lb)	S3	1,322.6.	1,347.9.	1,349.1.	1,323.4.	-	1,351.0.	1,356.6.	1,358.0.
Hot Reheat Steam Flow Rate (lb/hr)	S6	1,720,129.	1,120,882.	1,123,300.	1,698,284.	0	1,085,934.	968,706.	868,696.
Hot Reheat Steam Pressure (psia)	S6	537.3.	352.9.	353.9.	532.9.	-	342.2.	305.4.	274.1.
Hot Reheat Steam Temperature (°F)	S6	988.2.	998.2.	1,000.0.	1,000.0.	-	1,000.0.	1,000.0.	1,000.0.
Hot Reheat Steam Enthalpy (Btu/lb)	S6	1,513.4.	1,524.2.	1,525.1.	1,520.0.	-	1,525.5.	1,526.5.	1,527.4.
SFLP Turbine Inlet Steam Flow (lb/hr)	S8	529,934	364,664	364,613	519,639	0	350,645	308,020	276,300
SFLP Turbine Inlet Steam Pressure (psia)	S8	106.7	74.0	74.0	105.0	-	71.2	62.5	56.1
SFLP Turbine Inlet Steam Temperature (°F)	S8	571.3	586.4	587.5	578.2	-	586.9	585.1	585.1
SFLP Turbine Inlet Steam Enthalpy (Btu/lb)	S8	1,314.6	1,324.6	1,325.1	1,318.2	-	1,325.0	1,324.7	1,325.2
SFLP Turbine Exhaust Steam Flow Rate (lb/hr)	S10	548,536.	376,307.	376,267.	538,021.	0	361,861.	317,899.	285,121.
SFLP Turbine Exhaust UEEP (Btu/lb)	S10	1,032.5	1,056.0	1,056.2	1,048.9	-	1,067.1	1,070.2	1,073.4
SFLP Turbine Exhaust Loss (Btu/lb)		21.7	7.1	7.1	7.6	-	6.3	6.4	6.5
SFLP Turbine Exhaust Annulus Velocity (ft/sec)		1,034.0	560.2	560.2	595.5	-	453.1	431.1	411.1
SFLP Turbine Exhaust Sonic Velocity (ft/sec)		1,440.8	1,453.5	1,453.5	1,467.1	-	1,432.0	1,425.4	1,462.2
DFLP Turbine Inlet Steam Flow (lb/hr)	S9	1,245,098	854,228	854,069	1,221,353	0	821,461	721,750	647,301
DFLP Turbine Inlet Steam Pressure (psia)	S9	104.6	72.5	72.6	103.0	-	69.8	61.3	55.0
DFLP Turbine Inlet Steam Temperature (°F)	S9	570.9	586.2	587.3	577.9	-	586.7	584.9	585.0
DFLP Turbine Inlet Steam Enthalpy (Btu/lb)	S9	1,314.6	1,324.6	1,325.1	1,318.2	-	1,325.0	1,324.7	1,325.2
DFLP Turbine Second Extraction Steam Flow (lb/hr)	S12	72,188	41,820	41,797	64,961	0	38,610	32,775	28,552
DFLP Turbine Second Extraction Steam Pressure (psia)	S12	21.1	14.8	14.8	21.0	-	14.3	12.6	11.3
DFLP Turbine Second Extraction Steam Temperature (°F)	S12	285.3	295.9	296.7	288.6	-	295.6	294.6	294.9
DFLP Turbine Second Extraction Steam Enthalpy (Btu/lb)	S12	1,184.2	1,190.7	1,191.1	1,185.8	-	1,190.7	1,190.6	1,191.1
DFLP Turbine Third Extraction Steam Flow (lb/hr)	S13	121,555	63,206	63,182	94,521	0	53,687	45,278	39,033
DFLP Turbine Third Extraction Steam Pressure (psia)	S13	10.23	7.35	7.35	10.38	-	7.18	6.35	5.73
DFLP Turbine Third Extraction Steam Temperature (°F)	S13	194.2	193.8	194.5	194.9	-	195.0	194.6	195.3
DFLP Turbine Third Extraction Steam Enthalpy (Btu/lb)	S13	1,137.7	1,144.6	1,144.9	1,140.2	-	1,145.2	1,145.4	1,146.0
DFLP Turbine Exhaust Steam Flow Rate (lb/hr)	S11	1,051,779.	749,467.	749,355.	1,062,289.	0	729,418.	643,921.	579,916.
DFLP Turbine Exhaust UEEP (Btu/lb)	S11	1,033.0	1,058.0	1,058.2	1,051.0	-	1,069.1	1,072.0	1,075.1
DFLP Turbine Exhaust Loss (Btu/lb)		20.1	7.1	7.1	7.5	-	6.3	6.4	6.5
DFLP Turbine Exhaust Annulus Velocity (ft/sec)		993.4	559.0	559.0	589.2	-	457.6	437.4	418.8
DFLP Turbine Exhaust Sonic Velocity (ft/sec)		1,440.8	1,453.5	1,453.5	1,467.1	-	1,432.0	1,425.4	1,462.2
Turbine Backpressure (In. HgA)	S10, S11	2.23	2.97	2.97	4.02	-	3.61	3.33	3.14
Gross Steam Turbine Output (kW)	E2	299,208.	192,291.	192,689.	290,585.	0.	182,420.	160,382.	142,959.

PRELIMINARY

Estimated Performance Summary
2x2x1 GE 7FA.05

CASE DESCRIPTION	Stream No.	Case 9	Case 10	Case 11	Case 12	Case 13	Case 14	Case 15	Case 16
Equipment Design									
Ambient Dry Bulb Temperature	G1	5°F	91°F	91°F	91°F	85°F	105°F	105°F	105°F
Relative Humidity	G1	68%	45%	45%	45%	67%	43%	43%	43%
Ambient Wet Bulb Temperature	G1	3.5°F	74°F	74°F	74°F	76°F	84°F	84°F	84°F
Site Elevation (ft AMSL)		625	625	625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2	2	2
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
FEEDWATER HEATER CHARACTERISTICS									
Feedwater Heater #2									
Extraction Steam Flow Rate (lb/hr)		72,188	41,820	41,797	64,961	0	38,610	32,775	28,552
Extraction Line Pressure Drop (%)		5.5	3.8	3.8	4.5	-	3.5	3.3	3.1
Extraction Enthalpy (Btu/lb)		1,184.2	1,190.7	1,191.1	1,185.8	-	1,190.7	1,190.6	1,191.1
Feedwater Inlet Temperature (°F)		183.4	174.1	174.1	187.2	133.2	174.0	169.3	165.4
Feedwater Outlet Temperature (°F)		222.0	207.6	207.6	222.7	133.2	206.3	200.7	196.0
Drain Pressure (psia)		20.0	14.3	14.3	20.0	-	13.8	12.2	11.0
Drain Temperature (°F)		227.9	210.4	210.4	227.9	-	208.8	202.6	197.6
Feedwater Heater #1									
Extraction Steam Flow Rate, includes SSR Flow (lb/hr)		123,674	64,532	64,509	96,616	0	54,964	46,402	40,038
Extraction Line Pressure Drop (%)		8.6	4.6	4.6	5.1	-	3.5	3.2	2.9
Extraction Enthalpy (Btu/lb)		1,141.2	1,149.0	1,149.3	1,144.6	-	1,150.2	1,150.7	1,151.5
Feedwater Inlet Temperature (°F)		106.7	116.3	116.3	127.2	133.2	123.1	120.3	118.2
Feedwater Outlet Temperature (°F)		182.6	173.8	173.8	186.6	133.2	173.8	169.1	165.2
Drain Pressure (psia)		9.35	7.01	7.01	9.85	-	6.93	6.14	5.56
Drain Temperature (°F)		190.0	176.9	176.9	192.5	-	176.3	171.0	166.7
TURBINE BYPASS SYSTEM CHARACTERISTICS (per HRSG)									
MS Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-	532,909	-	-	-
MS Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W8	-	-	-	-	34,018	-	-	-
MS Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S14	-	-	-	-	566,928	-	-	-
MS Bypass Attemporator Outlet Steam Pressure (psia)	S14	-	-	-	-	339.4	-	-	-
MS Bypass Attemporator Outlet Steam Temperature (°F)	S14	-	-	-	-	758.0	-	-	-
MS Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S14	-	-	-	-	1,397.3	-	-	-
HRH Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-	629,171	-	-	-
HRH Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W9	-	-	-	-	169,782	-	-	-
HRH Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S15	-	-	-	-	798,953	-	-	-
HRH Bypass Attemporator Outlet Steam Pressure (psia)	S15	-	-	-	-	60.0	-	-	-
HRH Bypass Attemporator Outlet Steam Temperature (°F)	S15	-	-	-	-	382.7	-	-	-
HRH Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S15	-	-	-	-	1,225.0	-	-	-
LP Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-	23,182	-	-	-
LP Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W10	-	-	-	-	1,828	-	-	-
LP Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S16	-	-	-	-	25,009	-	-	-
LP Bypass Attemporator Outlet Steam Pressure (psia)	S16	-	-	-	-	60.0	-	-	-
LP Bypass Attemporator Outlet Steam Temperature (°F)	S16	-	-	-	-	382.7	-	-	-
LP Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S16	-	-	-	-	1,225.0	-	-	-
CONDENSER CHARACTERISTICS									
Operating Pressure (psia)		1.095	1.461	1.461	1.974	2.438	1.773	1.636	1.540
Operating Pressure (in Hg Abs.)		2.23	2.97	2.97	4.02	4.96	3.61	3.33	3.14
Temperature of Condensing Steam (°F)		104.8	114.7	114.7	125.6	382.7	121.6	118.7	116.6
CW Flow Rate Through Condenser (gpm)	W3	98,750	98,750	98,750	98,750	98,750	98,750	98,750	98,750
CW Temperature Into Condenser (°F)	W3	65.0	87.4	87.4	87.5	87.4	95.3	95.4	95.4
CW Temperature Out Of Condenser (°F)	W4	96.2	109.7	109.7	118.6	125.0	117.0	114.6	112.8
Circulating Water Temperature Rise (°F)		31.2	22.3	22.3	31.1	37.6	21.7	19.2	17.4
Terminal Temperature Difference, TTD (°F)		8.6	5.0	5.0	7.0	-64.9	4.7	4.1	3.7
Total Condenser Heat Rejection (MMBtu/hr)		1,536.5	1,097.3	1,097.4	1,531.4	1,851.6	1,068.3	947.1	856.4
AUXILIARY COOLING SYSTEM									
Auxiliary Cooling Water Flow Rate Through Heat Exchangers (gpm)	W5	17,250	17,250	17,250	17,250	17,250	17,250	17,250	17,250
Auxiliary Cooling Water Temperature Rise (°F)		20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Auxiliary Cooling Heat Rejection (MMBtu/hr)		172.3	172.1	172.1	172.1	172.1	172.1	172.1	172.1
COOLING TOWER CHARACTERISTICS									
CW Flow Rate Into Cooling Tower (gpm)	W6	116,000	116,000	116,000	116,000	116,000	116,000	116,000	116,000
CW Temperature Into Cooling Tower (°F)	W6	94.5	109.4	109.4	116.9	122.4	116.7	114.7	113.2
Air Inlet Wet Bulb Temperature (°F)		3.5	73.7	73.7	73.7	76.0	84.0	84.0	84.0
Current Approach Temperature (°F)		*	14.4	14.4	14.7	12.4	12.1	12.2	12.2
Current Range Temperature (°F)		30.1	21.4	21.4	28.7	34.1	20.7	18.7	17.2
Drift Rate (%)		*	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Cycles of Concentration		4	4	4	4	4	4	4	4
Evaporation Loss (gpm)		*	2,229	2,229	2,941	3,299	2,272	2,063	1,906
Drift Loss (gpm)		*	5.8	5.8	5.8	5.8	5.8	5.8	5.8
Blowdown (gpm)		*	737	737	974	1,094	752	682	630
Blowdown Temperature (°F)		*	87.4	87.4	87.4	87.3	95.2	95.3	95.4
Makeup (gpm)		*	2,972	2,972	3,921	4,399	3,029	2,751	2,542
Makeup Temperature (°F)		*	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Total Cooling Tower Heat Rejection (MMBtu/hr)		1,710.5	1,279.8	1,279.9	1,713.9	2,034.1	1,250.8	1,129.7	1,039.0

PRELIMINARY

Estimated Performance Summary
2x2x1 GE 7FA.05

CASE DESCRIPTION	Stream No.	Case 9	Case 10	Case 11	Case 12	Case 13	Case 14	Case 15	Case 16
Equipment Design									
Ambient Dry Bulb Temperature	G1	5°F	91°F	91°F	91°F	85°F	105°F	105°F	105°F
Relative Humidity	G1	68%	45%	45%	45%	67%	43%	43%	43%
Ambient Wet Bulb Temperature	G1	3.5°F	74°F	74°F	74°F	76°F	84°F	84°F	84°F
Site Elevation (ft AMSL)		625	625	625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2	2	2
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
FUEL GAS PERFORMANCE HEATER CHARACTERISTICS (Per CT)									
Natural Gas Flow Rate (lb/hr)	G2	94,195.	87,255.	84,086.	84,086.	87,255.	76,988.	63,165.	51,229.
Natural Gas Inlet Temperature (°F)		60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Natural Gas Outlet Temperature (°F)	G2	364.9	365.1	365.0	365.2	364.9	365.0	364.9	365.3
Heating Water Inlet Flow Rate (lb/hr)		54,847.	60,840.	58,121.	48,804.	67,165.	53,674.	46,431.	39,361.
Heating Water Inlet Temperature (°F)		483.1	438.1	438.8	482.9	423.4	436.0	424.8	416.2
Heating Water Outlet Temperature (°F)		186.8	187.3	185.9	185.3	195.8	185.0	186.3	187.3
CYCLE MAKEUP CONDITIONS									
Makeup Flow Rate to Steam Cycle (gpm)	W7	45.2.	30.0.	29.9.	43.4.	31.3.	28.3.	23.8.	21.2.
Makeup Temperature (°F)	W7	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
TOTAL PLANT PERFORMANCE									
Total Gross CT Electrical Output (kW)		464,502.	426,264.	403,094.	403,094.	426,264.	359,042.	269,282.	175,930.
Total Gross Steam Turbine Electrical Output (kW)	E2	299,208.	192,291.	192,689.	290,585.	0.	182,420.	160,382.	142,959.
Total Gross Plant Electrical Output (kW)	D3	763,710.	618,555.	595,783.	693,680.	426,264.	541,462.	429,664.	318,889.
Auxiliary Power									
BOP Percent Aux Power, Approx. (%)		2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
BOP Auxiliary Power (kW)		16,800.	13,610.	13,110.	15,260.	9,380.	11,910.	9,450.	7,020.
Chiller 0.7327 kW per ton chilling capacity (kW)		0.	8,825.	0.	0.	10,274.	0.	0.	0.
Total Auxiliary Power (kW)		16,800.	22,435.	13,110.	15,260.	19,654.	11,910.	9,450.	7,020.
Percentage of Gross Electrical Output (%)		2.20	3.63	2.20	2.20	4.61	2.20	2.20	2.20
Net Plant Electrical Output (kW)	D4	746,910.	596,120.	582,673.	678,420.	406,610.	529,552.	420,214.	311,869.
Net Plant Electrical Heat Rate, LHV (Btu/kWh)	D5	6,539.	6,298.	6,210.	6,564.	9,234.	6,256.	6,468.	7,068.
Net Plant Electrical Heat Rate, HHV (Btu/kWh)		7,259.	6,991.	6,893.	7,286.	10,250.	6,944.	7,180.	7,846.

* = Cooling Tower parameter can not be calculated at minimum cooling water temperature condition.

PRELIMINARY

Estimated Performance Summary
2x2x1 GE 7FA.05

CASE DESCRIPTION	Stream No.	Case 17	Case 18	Case 19	Case 20	Case 21	Case 22
Equipment Design							
Ambient Dry Bulb Temperature	G1	85°F	85°F	55°F	55°F	5°F	5°F
Relative Humidity	G1	67%	67%	66%	66%	68%	68%
Ambient Wet Bulb Temperature	G1	76°F	76°F	49°F	49°F	3.5°F	3.5°F
Site Elevation (ft AMSL)		625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
COMBUSTION TURBINE CHARACTERISTICS (per CT)							
CT Frame		GE 7FA.05	GE 7FA.05	GE 7FA.05	GE 7FA.05	GE 7FA.05	GE 7FA.05
Load Condition		75%	47%	75%	46%	75%	48%
Inlet Air Cooling		NONE	NONE	NONE	NONE	NONE	NONE
Chiller Cooling Capacity (ton)		0.	0.	0.	0.	0.	0.
Chiller Air Outlet Temperature (°F)		-	-	-	-	-	-
Evaporative Cooler Water Flow Rate (Evaporation only) (lb//hr)		0.	0.	0.	0.	0.	0.
Evaporative Cooler Air Outlet Temperature (°F)		-	-	-	-	-	-
Fuel Lower Heating Value (Btu/lb)	G2, G4, O1	21,515.	21,515.	21,515.	21,515.	21,515.	21,515.
Fuel Flow Rate (lb/hr)	G2, O1	66,428.	52,043.	69,296.	53,279.	74,162.	58,025.
Fuel Inlet Temperature (°F)	G2, O1	365.	365.	365.	365.	365.	365.
Heat Input to CT, LHV (MMBtu/hr)	D1	1,429.2	1,119.7	1,490.9	1,146.3	1,595.6	1,248.4
Combustor NOx Water Injection Flow Rate (lb/hr)	W1	0	0	0	0	0	0
Exhaust Gas Flow Rate (lb/hr)	G3	3,040,000.	2,646,000.	3,183,000.	2,636,000.	3,487,003.	2,742,001.
Exhaust Gas Temperature (°F)	G3	1,213.	1,215.	1,174.	1,215.	1,094.	1,200.
Exhaust Analysis, % Vol.							
Argon	G3	0.87	0.87	0.89	0.89	0.89	0.89
Nitrogen	G3	73.02	73.31	74.36	74.57	75.07	75.09
Oxygen	G3	11.93	12.76	12.27	12.86	12.61	12.65
Carbon Dioxide	G3	3.86	3.48	3.87	3.60	3.80	3.78
Water	G3	10.32	9.58	8.62	8.08	7.63	7.59
CT Gross Output (kW)	E1	145,727.	91,322.	157,334.	96,498.	174,188.	111,480.
CT Gross Heat Rate, LHV (Btu/kWh)		9,807.	12,261.	9,476.	11,879.	9,160.	11,198.
CT Gross Heat Rate, HHV (Btu/kWh)		10,886.	13,610.	10,518.	13,186.	10,168.	12,430.
HRSG CHARACTERISTICS (per HRSG)							
Heat Input to Duct Burner, LHV (MMBtu/hr)	D2	0.0	0.0	0.0	0.0	0.0	0.0
Heat Input to Duct Burner, HHV (MMBtu/hr)		0.0	0.0	0.0	0.0	0.0	0.0
Duct Burner Fuel Flow Rate (lb/hr)	G4	0	0	0	0	0	0
Duct Burner Gas Exit Temperature (°F)		1,093.1	1,088.9	1,073.7	1,087.5	1,033.1	1,081.2
Main Steam Flow Rate (lb/hr)	S1	436,719.	377,617.	434,758.	372,435.	431,865.	381,013.
Main Steam Pressure (psia)	S1	1,071.2	1,014.4	1,066.0	1,013.2	1,058.3	1,015.1
Main Steam Temperature (°F)	S1	960.0	960.0	960.0	960.0	960.0	960.0
Main Steam Enthalpy (Btu/lb)	S1	1,480.9	1,482.8	1,481.1	1,482.8	1,481.3	1,482.7
Hot Reheat Flow Rate (lb/hr)	S5	493,312.	430,864.	484,928.	425,782.	471,308.	432,508.
Hot Reheat Pressure (psia)	S5	331.1	289.5	325.6	286.1	315.5	290.6
Hot Reheat Temperature (°F)	S5	1,010.0	1,010.0	1,010.0	1,010.0	1,000.4	1,010.0
Hot Reheat Enthalpy (Btu/lb)	S5	1,531.1	1,532.3	1,531.3	1,532.4	1,526.4	1,532.2
IP Superheater Flow Rate (lb/hr)	S4	38,189.	35,256.	41,421.	35,046.	49,597.	36,279.
IP Superheater Pressure (psia)	S4	343.5	300.3	338.2	296.7	328.6	301.5
IP Superheater Temperature (°F)	S4	558.2	549.4	555.9	548.8	551.2	549.1
IP Superheater Enthalpy (Btu/lb)	S4	1,287.6	1,286.6	1,286.8	1,286.6	1,284.9	1,286.3
LP Superheater Flow Rate (lb/hr)	S7	27,309.	23,741.	30,337.	23,245.	37,546.	24,591.
LP Superheater Pressure (psia)	S7	67.0	58.5	67.0	57.7	68.0	58.9
LP Superheater Temperature (°F)	S7	522.6	516.1	516.6	516.7	504.7	515.5
LP Superheater Enthalpy (Btu/lb)	S7	1,293.6	1,291.2	1,290.7	1,291.5	1,284.7	1,290.9
Condensate Preheater Inlet Flow Rate (lb/hr)	W2	585,689.	509,123.	583,297.	505,020.	582,120.	517,359.
Condensate Preheater Inlet Pressure (psia)	W2	264.9	272.2	266.2	268.6	267.5	273.6
Condensate Preheater Inlet Temperature (°F)	W2	198.2	193.0	197.3	192.1	196.9	192.9
Condensate Preheater Inlet Enthalpy (Btu/lb)	W2	166.9	161.7	166.0	160.8	165.6	161.5
HRSG Exhaust Stack Gas Characteristics							
HRSG Exhaust Gas Temperature (°F)	G5	257.1	248.7	257.7	247.4	260.8	248.9
HRSG Exhaust Gas Flow Rate (lb/hr)	G5	3,040,000.	2,646,000.	3,183,000.	2,636,000.	3,487,003.	2,742,001.
HRSG BLOWDOWN CHARACTERISTICS (Per HRSG)							
HP Evaporator Blowdown Flow Rate (lb/hr)		4,219.	3,616.	4,247.	3,561.	4,338.	3,663.
IP Evaporator Blowdown Flow Rate (lb/hr)		386.	356.	418.	354.	501.	366.
DEAERATOR CHARACTERISTICS (Per HRSG)							
DA Operating Pressure (psia)		67.7	59.1	68.0	58.3	69.4	59.7
Main Boiler Feedwater Inlet Flow Rate (lb/hr)		585,689.	509,123.	583,297.	505,020.	582,120.	517,359.
Main Boiler Feedwater Inlet Temperature (°F)		272.1	264.7	273.9	263.7	278.8	265.5
Main Boiler Feedwater Outlet Flow Rate (lb/hr)		556,914.	484,108.	551,502.	480,511.	543,118.	491,475.
Main Boiler Feedwater Outlet Temperature (°F)		300.7	291.7	301.0	290.9	302.4	292.3
BFW Temperature Rise (°F)		28.6	27.0	27.0	27.1	23.6	26.9
Primary Pegging Steam Flow Rate (lb/hr)		20,062.	16,382.	18,971.	16,295.	16,725.	16,562.
Auxiliary Pegging Steam Flow Rate (lb/hr)		0.	0.	0.	0.	0.	0.
Vent Steam Flow Rate (lb/hr)		1,464.	1,273.	1,458.	1,263.	1,455.	1,293.

PRELIMINARY

Estimated Performance Summary
2x2x1 GE 7FA.05

CASE DESCRIPTION	Stream No.	Case 17	Case 18	Case 19	Case 20	Case 21	Case 22
Equipment Design							
Ambient Dry Bulb Temperature	G1	85°F	85°F	55°F	55°F	5°F	5°F
Relative Humidity	G1	67%	67%	66%	66%	68%	68%
Ambient Wet Bulb Temperature	G1	76°F	76°F	49°F	49°F	3.5°F	3.5°F
Site Elevation (ft AMSL)		625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
PUMP CHARACTERISTICS							
HP Feedpump Control Valve Discharge							
Total Flow Rate per HRSG (lb/hr)		440,939.	381,233.	439,004.	375,996.	436,203.	384,676.
Pressure (psia)		1,109.1	1,043.3	1,104.4	1,041.3	1,098.3	1,044.8
Temperature (°F)		303.1	294.0	303.4	293.1	304.8	294.6
Enthalpy (Btu/lb)		274.9	265.4	275.1	264.5	276.6	266.0
IP Feedpump Control Valve Discharge							
Total Flow Rate per HRSG (lb/hr)		115,975.	102,875.	112,497.	104,515.	106,915.	106,800.
Pressure (psia)		347.6.	303.8.	343.0.	300.4.	335.3.	305.5.
Temperature (°F)		301.4.	292.3.	301.6.	291.4.	303.0.	292.9.
Enthalpy (Btu/lb)		271.7.	262.3.	271.9.	261.4.	273.3.	262.9.
HRSG Preheater Recirculation Pump CV Discharge							
Total Flow Rate per HRSG (lb/hr)		0.	0.	0.	0.	0.	0.
Pressure (psia)		-	-	-	-	-	-
Temperature (°F)		-	-	-	-	-	-
Enthalpy (Btu/lb)		-	-	-	-	-	-
Condensate Pump Discharge							
Total Flow Rate from Condenser (lb/hr)		985,385.	862,908.	960,239.	838,574.	946,427.	851,497.
Pressure (psia)		350.0	350.0	350.0	350.0	350.0	350.0
Temperature (°F)		110.7	107.7	92.4	89.0	88.9	86.7
Enthalpy (Btu/lb)		79.6	76.7	61.4	58.0	57.9	55.7
STEAM TURBINE CHARACTERISTICS		TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB
Main Steam Throttle Flow Rate (lb/hr)	S2	873,439.	755,233.	869,516.	744,870.	863,730.	762,026.
Main Steam Throttle Pressure (psia)	S2	1,017.9	972.0	1,013.0	972.0	1,005.5	972.0
Main Steam Throttle Temperature (°F)	S2	950.0	950.0	950.0	950.0	950.0	950.0
Main Steam Throttle Enthalpy (Btu/lb)	S2	1,476.9	1,478.4	1,477.1	1,478.4	1,477.3	1,478.4
Cold Reheat Steam Flow Rate (lb/hr)	S3	852,903.	737,476.	849,071.	727,357.	843,422.	744,109.
Cold Reheat Steam Pressure (psia)	S3	362.5.	316.6.	357.2.	312.9.	347.9.	318.1.
Cold Reheat Steam Temperature (°F)	S3	683.4.	682.2.	681.2.	682.1.	676.8.	681.5.
Cold Reheat Steam Enthalpy (Btu/lb)	S3	1,356.0.	1,358.1.	1,355.2.	1,358.3.	1,353.3.	1,357.7.
Hot Reheat Steam Flow Rate (lb/hr)	S6	986,626.	861,727.	969,855.	851,565.	942,615.	865,015.
Hot Reheat Steam Pressure (psia)	S6	311.0.	271.9.	305.8.	268.7.	296.4.	272.9.
Hot Reheat Steam Temperature (°F)	S6	1,000.0.	1,000.0.	1,000.0.	1,000.0.	990.4.	1,000.0.
Hot Reheat Steam Enthalpy (Btu/lb)	S6	1,526.4.	1,527.5.	1,526.5.	1,527.6.	1,521.7.	1,527.4.
SFLP Turbine Inlet Steam Flow (lb/hr)	S8	313,776	273,986	310,644	270,647	306,870	275,536
SFLP Turbine Inlet Steam Pressure (psia)	S8	63.7	55.6	63.1	55.0	62.1	55.9
SFLP Turbine Inlet Steam Temperature (°F)	S8	585.2	585.1	585.9	585.1	580.4	585.4
SFLP Turbine Inlet Steam Enthalpy (Btu/lb)	S8	1,324.7	1,325.2	1,325.0	1,325.3	1,322.5	1,325.3
SFLP Turbine Exhaust Steam Flow Rate (lb/hr)	S10	323,842.	282,734.	320,602.	279,282.	316,657.	284,340.
SFLP Turbine Exhaust UEEP (Btu/lb)	S10	1,058.3	1,061.3	1,041.9	1,043.0	1,039.3	1,041.5
SFLP Turbine Exhaust Loss (Btu/lb)		6.9	6.6	16.2	15.3	19.3	18.0
SFLP Turbine Exhaust Annulus Velocity (ft/sec)		539.4	513.3	883.6	856.6	963.6	930.1
SFLP Turbine Exhaust Sonic Velocity (ft/sec)		1,458.6	1,455.8	1,448.4	1,444.6	1,424.7	1,420.2
DFLP Turbine Inlet Steam Flow (lb/hr)	S9	735,203	641,858	727,660	633,943	718,688	645,383
DFLP Turbine Inlet Steam Pressure (psia)	S9	62.4	54.5	61.8	53.9	60.9	54.9
DFLP Turbine Inlet Steam Temperature (°F)	S9	585.0	585.0	585.7	585.0	580.3	585.2
DFLP Turbine Inlet Steam Enthalpy (Btu/lb)	S9	1,324.7	1,325.2	1,325.0	1,325.3	1,322.5	1,325.3
DFLP Turbine Second Extraction Steam Flow (lb/hr)	S12	34,647	29,191	36,557	30,738	36,464	31,743
DFLP Turbine Second Extraction Steam Pressure (psia)	S12	12.8	11.2	12.6	11.0	12.4	11.2
DFLP Turbine Second Extraction Steam Temperature (°F)	S12	295.4	295.7	297.7	297.5	293.9	297.9
DFLP Turbine Second Extraction Steam Enthalpy (Btu/lb)	S12	1,191.0	1,191.5	1,192.1	1,192.3	1,190.4	1,192.5
DFLP Turbine Third Extraction Steam Flow (lb/hr)	S13	52,746	44,364	65,290	55,629	66,600	58,516
DFLP Turbine Third Extraction Steam Pressure (psia)	S13	6.36	5.59	6.12	5.36	6.00	5.43
DFLP Turbine Third Extraction Steam Temperature (°F)	S13	193.7	194.4	193.0	193.2	189.4	193.1
DFLP Turbine Third Extraction Steam Enthalpy (Btu/lb)	S13	1,145.0	1,145.6	1,144.7	1,145.1	1,143.1	1,145.1
DFLP Turbine Exhaust Steam Flow Rate (lb/hr)	S11	648,039.	568,502.	626,040.	547,773.	615,847.	555,325.
DFLP Turbine Exhaust UEEP (Btu/lb)	S11	1,060.1	1,063.0	1,042.9	1,044.1	1,040.1	1,042.4
DFLP Turbine Exhaust Loss (Btu/lb)		6.9	6.6	15.6	14.8	18.3	17.3
DFLP Turbine Exhaust Annulus Velocity (ft/sec)		540.7	517.0	864.2	841.4	938.7	909.8
DFLP Turbine Exhaust Sonic Velocity (ft/sec)		1,458.6	1,455.8	1,448.4	1,444.6	1,424.7	1,420.2
Turbine Backpressure (In. HgA)	S10, S11	2.65	2.43	1.53	1.37	1.37	1.27
Gross Steam Turbine Output (kW)	E2	166,491.	144,607.	168,980.	146,927.	165,803.	149,993.

PRELIMINARY

Estimated Performance Summary
2x2x1 GE 7FA.05

CASE DESCRIPTION	Stream No.	Case 17	Case 18	Case 19	Case 20	Case 21	Case 22
Equipment Design							
Ambient Dry Bulb Temperature	G1	85°F	85°F	55°F	55°F	5°F	5°F
Relative Humidity	G1	67%	67%	66%	66%	68%	68%
Ambient Wet Bulb Temperature	G1	76°F	76°F	49°F	49°F	3.5°F	3.5°F
Site Elevation (ft AMSL)		625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
FEEDWATER HEATER CHARACTERISTICS							
Feedwater Heater #2							
Extraction Steam Flow Rate (lb/hr)		34,647	29,191	36,557	30,738	36,464	31,743
Extraction Line Pressure Drop (%)		3.6	3.3	4.1	3.8	4.2	3.9
Extraction Enthalpy (Btu/lb)		1,191.0	1,191.5	1,192.1	1,192.3	1,190.4	1,192.5
Feedwater Inlet Temperature (°F)		168.6	163.7	165.3	160.4	164.2	160.6
Feedwater Outlet Temperature (°F)		201.1	195.3	200.0	194.2	199.3	194.9
Drain Pressure (psia)		12.3	10.8	12.1	10.6	11.9	10.8
Drain Temperature (°F)		203.3	196.9	202.3	195.9	201.5	196.6
Feedwater Heater #1							
Extraction Steam Flow Rate, includes SSR Flow (lb/hr)		53,892	45,359	66,424	56,612	67,714	59,518
Extraction Line Pressure Drop (%)		4.3	4.0	7.1	6.7	7.6	7.2
Extraction Enthalpy (Btu/lb)		1,149.6	1,150.4	1,148.5	1,148.9	1,146.7	1,148.8
Feedwater Inlet Temperature (°F)		112.4	109.4	94.2	90.7	90.7	88.5
Feedwater Outlet Temperature (°F)		168.4	163.6	165.0	160.2	163.9	160.4
Drain Pressure (psia)		6.09	5.37	5.69	5.00	5.54	5.04
Drain Temperature (°F)		170.6	165.2	167.7	162.2	166.6	162.5
TURBINE BYPASS SYSTEM CHARACTERISTICS (per HRSG)							
MS Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-	-	-
MS Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W8	-	-	-	-	-	-
MS Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S14	-	-	-	-	-	-
MS Bypass Attemporator Outlet Steam Pressure (psia)	S14	-	-	-	-	-	-
MS Bypass Attemporator Outlet Steam Temperature (°F)	S14	-	-	-	-	-	-
MS Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S14	-	-	-	-	-	-
HRH Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-	-	-
HRH Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W9	-	-	-	-	-	-
HRH Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S15	-	-	-	-	-	-
HRH Bypass Attemporator Outlet Steam Pressure (psia)	S15	-	-	-	-	-	-
HRH Bypass Attemporator Outlet Steam Temperature (°F)	S15	-	-	-	-	-	-
HRH Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S15	-	-	-	-	-	-
LP Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-	-	-
LP Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W10	-	-	-	-	-	-
LP Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S16	-	-	-	-	-	-
LP Bypass Attemporator Outlet Steam Pressure (psia)	S16	-	-	-	-	-	-
LP Bypass Attemporator Outlet Steam Temperature (°F)	S16	-	-	-	-	-	-
LP Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S16	-	-	-	-	-	-
CONDENSER CHARACTERISTICS							
Operating Pressure (psia)		1.303	1.195	0.749	0.672	0.672	0.625
Operating Pressure (in Hg Abs.)		2.65	2.43	1.53	1.37	1.37	1.27
Temperature of Condensing Steam (°F)		110.7	107.7	92.2	88.7	88.7	86.5
CW Flow Rate Through Condenser (gpm)	W3	98,750	98,750	98,750	98,750	98,750	98,750
CW Temperature Into Condenser (°F)	W3	87.0	86.8	68.4	67.8	65.0	65.0
CW Temperature Out Of Condenser (°F)	W4	106.3	103.9	87.3	84.4	83.6	81.8
Circulating Water Temperature Rise (°F)		19.4	17.1	18.9	16.6	18.6	16.8
Terminal Temperature Difference, TTD (°F)		4.4	3.8	4.9	4.4	5.1	4.6
Total Condenser Heat Rejection (MMBtu/hr)		953.3	840.0	930.0	816.4	916.8	829.3
AUXILIARY COOLING SYSTEM							
Auxiliary Cooling Water Flow Rate Through Heat Exchangers (gpm)	W5	17,250	17,250	17,250	17,250	17,250	17,250
Auxiliary Cooling Water Temperature Rise (°F)		20.0	20.0	20.0	20.0	20.0	20.0
Total Auxiliary Cooling Heat Rejection (MMBtu/hr)		172.1	172.1	172.3	172.3	172.3	172.3
COOLING TOWER CHARACTERISTICS							
CW Flow Rate Into Cooling Tower (gpm)	W6	116,000	116,000	116,000	116,000	116,000	116,000
CW Temperature Into Cooling Tower (°F)	W6	106.4	104.3	87.4	84.9	83.8	82.3
Air Inlet Wet Bulb Temperature (°F)		76.0	76.0	49.0	49.0	3.5	3.5
Current Approach Temperature (°F)		11.5	11.3	19.5	18.9	*	*
Current Range Temperature (°F)		19.0	17.1	19.1	17.1	18.9	17.5
Drift Rate (%)		0.005	0.005	0.005	0.005	*	*
Cycles of Concentration		4	4	4	4	4	4
Evaporation Loss (gpm)		1,868	1,688	1,542	1,385	*	*
Drift Loss (gpm)		5.8	5.8	5.8	5.8	*	*
Blowdown (gpm)		617	557	508	456	*	*
Blowdown Temperature (°F)		86.9	86.8	68.3	67.7	*	*
Makeup (gpm)		2,491	2,251	2,056	1,847	*	*
Makeup Temperature (°F)		60.0	60.0	60.0	60.0	*	*
Total Cooling Tower Heat Rejection (MMBtu/hr)		1,135.8	1,022.5	1,112.6	999.0	1,090.8	1,003.3

PRELIMINARY

Estimated Performance Summary
2x2x1 GE 7FA.05

CASE DESCRIPTION	Stream No.	Case 17	Case 18	Case 19	Case 20	Case 21	Case 22
Equipment Design							
Ambient Dry Bulb Temperature	G1	85°F	85°F	55°F	55°F	5°F	5°F
Relative Humidity	G1	67%	67%	66%	66%	68%	68%
Ambient Wet Bulb Temperature	G1	76°F	76°F	49°F	49°F	3.5°F	3.5°F
Site Elevation (ft AMSL)		625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
FUEL GAS PERFORMANCE HEATER CHARACTERISTICS (Per CT)							
Natural Gas Flow Rate (lb/hr)	G2	66,428.	52,043.	69,296.	53,279.	74,162.	58,025.
Natural Gas Inlet Temperature (°F)		60.0	60.0	60.0	60.0	60.0	60.0
Natural Gas Outlet Temperature (°F)	G2	364.9	365.1	364.8	365.0	364.8	364.8
Heating Water Inlet Flow Rate (lb/hr)		48,728.	40,393.	51,687.	42,057.	56,817.	45,980.
Heating Water Inlet Temperature (°F)		425.9	414.9	424.1	413.0	421.4	413.5
Heating Water Outlet Temperature (°F)		187.0	188.4	189.1	190.4	192.7	191.9
CYCLE MAKEUP CONDITIONS							
Makeup Flow Rate to Steam Cycle (gpm)	W7	24.3.	21.0.	24.5.	20.7.	25.2.	21.3.
Makeup Temperature (°F)	W7	60.0	60.0	60.0	60.0	60.0	60.0
TOTAL PLANT PERFORMANCE							
Total Gross CT Electrical Output (kW)		291,454.	182,644.	314,669.	192,996.	348,376.	222,960.
Total Gross Steam Turbine Electrical Output (kW)	E2	166,491.	144,607.	168,980.	146,927.	165,803.	149,993.
Total Gross Plant Electrical Output (kW)	D3	457,945.	327,251.	483,649.	339,923.	514,179.	372,953.
Auxiliary Power							
BOP Percent Aux Power, Approx. (%)		2.20	2.20	2.20	2.20	2.20	2.20
BOP Auxiliary Power (kW)		10,070.	7,200.	10,640.	7,480.	11,310.	8,200.
Chiller 0.7327 kW per ton chilling capacity (kW)		0.	0.	0.	0.	0.	0.
Total Auxiliary Power (kW)		10,070.	7,200.	10,640.	7,480.	11,310.	8,200.
Percentage of Gross Electrical Output (%)		2.20	2.20	2.20	2.20	2.20	2.20
Net Plant Electrical Output (kW)	D4	447,875.	320,051.	473,009.	332,443.	502,869.	364,753.
Net Plant Electrical Heat Rate, LHV (Btu/kWh)	D5	6,382.	6,997.	6,304.	6,896.	6,346.	6,845.
Net Plant Electrical Heat Rate, HHV (Btu/kWh)		7,084.	7,767.	6,997.	7,655.	7,044.	7,598.

* = Cooling Tower parameter can not be calculated at minimum cooling water temperature condition.

PRELIMINARY

Estimated Performance Summary
2x2x1 GE 7FA.05

CASE DESCRIPTION	Stream No.	Case 23	Case 24	Case 25	Case 26	Case 27	Case 28
Equipment Design							
Ambient Dry Bulb Temperature	G1	105°F	55°F	91°F	91°F	85°F	55°F
Relative Humidity	G1	43%	66%	45%	45%	67%	66%
Ambient Wet Bulb Temperature	G1	84°F	49°F	74°F	74°F	76°F	49°F
Site Elevation (ft AMSL)		625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
COMBUSTION TURBINE CHARACTERISTICS (per CT)							
CT Frame		GE 7FA.05	GE 7FA.05	GE 7FA.05	GE 7FA.05	GE 7FA.05	GE 7FA.05
Load Condition		100%	75%	100%	100%	100%	100%
Inlet Air Cooling		CHILLER ON	CHILLER ON	NONE	NONE	EVAP ON	NONE
Chiller Cooling Capacity (ton)		10,055.	388.	0.	0.	0.	0.
Chiller Air Outlet Temperature (°F)		50.	50.	-	-	-	-
Evaporative Cooler Water Flow Rate (Evaporation only) (lb//hr)		0.	0.	0.	0.	6,041.	0.
Evaporative Cooler Air Outlet Temperature (°F)		-	-	-	-	76.	-
Fuel Lower Heating Value (Btu/lb)	G2, G4, O1	21,515.	21,515.	21,515.	21,515.	21,515.	21,515.
Fuel Flow Rate (lb/hr)	G2, O1	87,255.	87,162.	80,056.	80,056.	83,797.	86,047.
Fuel Inlet Temperature (°F)	G2, O1	365.	365.	365.	365.	365.	365.
Heat Input to CT, LHV (MMBtu/hr)	D1	1,877.3	1,875.3	1,722.4	1,722.4	1,802.9	1,851.3
Combustor NOx Water Injection Flow Rate (lb/hr)	W1	0	0	0	0	0	0
Exhaust Gas Flow Rate (lb/hr)	G3	4,053,000.	4,057,002.	3,833,000.	3,833,000.	3,948,000.	4,019,000.
Exhaust Gas Temperature (°F)	G3	1,112.	1,112.	1,132.	1,132.	1,125.	1,114.
Exhaust Analysis, % Vol.							
Argon	G3	0.88	0.89	0.88	0.88	0.87	0.89
Nitrogen	G3	74.21	74.40	73.53	73.53	72.89	74.40
Oxygen	G3	12.31	12.37	12.38	12.38	12.12	12.40
Carbon Dioxide	G3	3.82	3.82	3.70	3.70	3.75	3.81
Water	G3	8.78	8.52	9.51	9.51	10.37	8.50
CT Gross Output (kW)	E1	213,132.	212,986.	189,653.	189,653.	200,561.	209,779.
CT Gross Heat Rate, LHV (Btu/kWh)		8,808.	8,805.	9,082.	9,082.	8,989.	8,825.
CT Gross Heat Rate, HHV (Btu/kWh)		9,777.	9,773.	10,081.	10,081.	9,978.	9,796.
HRSG CHARACTERISTICS (per HRSG)							
Heat Input to Duct Burner, LHV (MMBtu/hr)	D2	0.0	0.0	0.0	441.1	0.0	445.4
Heat Input to Duct Burner, HHV (MMBtu/hr)		0.0	0.0	0.0	489.6	0.0	494.4
Duct Burner Fuel Flow Rate (lb/hr)	G4	0	0	0	20,500	0	20,702
Duct Burner Gas Exit Temperature (°F)		1,048.1	1,048.2	1,058.2	1,434.9	1,055.7	1,414.6
Main Steam Flow Rate (lb/hr)	S1	513,960.	513,630.	500,416.	845,540.	513,484.	860,404.
Main Steam Pressure (psia)	S1	1,251.8	1,251.1	1,221.2	2,011.7	1,251.9	2,044.8
Main Steam Temperature (°F)	S1	957.9	958.2	960.0	960.0	960.0	960.0
Main Steam Enthalpy (Btu/lb)	S1	1,473.6	1,473.9	1,475.9	1,448.5	1,474.9	1,447.3
Hot Reheat Flow Rate (lb/hr)	S5	560,442.	560,011.	549,109.	852,951.	561,635.	863,300.
Hot Reheat Pressure (psia)	S5	375.7	375.4	368.4	569.5	376.7	576.3
Hot Reheat Temperature (°F)	S5	1,008.2	1,008.4	1,010.0	1,010.0	1,010.0	1,010.0
Hot Reheat Enthalpy (Btu/lb)	S5	1,528.9	1,529.0	1,530.1	1,524.4	1,529.8	1,524.2
IP Superheater Flow Rate (lb/hr)	S4	58,566.	58,457.	54,124.	21,142.	56,657.	22,092.
IP Superheater Pressure (psia)	S4	391.2	390.9	383.3	592.8	392.0	600.1
IP Superheater Temperature (°F)	S4	569.6	569.6	568.3	658.4	570.5	660.5
IP Superheater Enthalpy (Btu/lb)	S4	1,289.9	1,289.9	1,289.9	1,326.8	1,290.4	1,327.6
LP Superheater Flow Rate (lb/hr)	S7	44,394.	44,189.	40,797.	9,404.	42,746.	11,624.
LP Superheater Pressure (psia)	S7	81.0	80.9	78.3	105.2	80.5	106.9
LP Superheater Temperature (°F)	S7	519.5	519.8	520.3	655.3	521.2	656.0
LP Superheater Enthalpy (Btu/lb)	S7	1,290.8	1,291.0	1,291.5	1,356.7	1,291.8	1,357.0
Condensate Preheater Inlet Flow Rate (lb/hr)	W2	685,249.	684,651.	664,606.	939,238.	681,798.	956,076.
Condensate Preheater Inlet Pressure (psia)	W2	245.7	246.2	249.4	169.6	246.0	165.5
Condensate Preheater Inlet Temperature (°F)	W2	204.4	203.3	203.0	219.0	204.0	218.7
Condensate Preheater Inlet Enthalpy (Btu/lb)	W2	173.0	172.0	171.7	187.6	172.6	187.2
HRSG Exhaust Stack Gas Characteristics							
HRSG Exhaust Gas Temperature (°F)	G5	272.1	271.6	269.4	280.6	271.5	281.6
HRSG Exhaust Gas Flow Rate (lb/hr)	G5	4,053,000.	4,057,002.	3,833,000.	3,853,500.	3,948,000.	4,039,702.
HRSG BLOWDOWN CHARACTERISTICS (Per HRSG)							
HP Evaporator Blowdown Flow Rate (lb/hr)		5,192.	5,188.	5,018.	8,161.	5,178.	8,448.
IP Evaporator Blowdown Flow Rate (lb/hr)		592.	590.	547.	214.	572.	223.
DEAERATOR CHARACTERISTICS (Per HRSG)							
DA Operating Pressure (psia)		82.7	82.5	79.8	105.3	82.1	107.0
Main Boiler Feedwater Inlet Flow Rate (lb/hr)		685,249.	684,651.	664,606.	939,238.	681,798.	956,076.
Main Boiler Feedwater Inlet Temperature (°F)		288.7	288.4	285.7	286.8	287.6	288.4
Main Boiler Feedwater Outlet Flow Rate (lb/hr)		639,142.	638,748.	622,146.	927,496.	637,349.	942,063.
Main Boiler Feedwater Outlet Temperature (°F)		314.3	314.2	311.9	331.6	313.8	332.8
BFW Temperature Rise (°F)		25.6	25.8	26.2	44.8	26.2	44.4
Primary Pegging Steam Flow Rate (lb/hr)		21,532.	21,709.	21,293.	51,200.	21,913.	51,773.
Auxiliary Pegging Steam Flow Rate (lb/hr)		0.	0.	0.	0.	0.	0.
Vent Steam Flow Rate (lb/hr)		1,713.	1,712.	1,662.	2,348.	1,704.	2,390.

PRELIMINARY

Estimated Performance Summary
2x2x1 GE 7FA.05

CASE DESCRIPTION	Stream No.	Case 23	Case 24	Case 25	Case 26	Case 27	Case 28
Equipment Design							
Ambient Dry Bulb Temperature	G1	105°F	55°F	91°F	91°F	85°F	55°F
Relative Humidity	G1	43%	66%	45%	45%	67%	66%
Ambient Wet Bulb Temperature	G1	84°F	49°F	74°F	74°F	76°F	49°F
Site Elevation (ft AMSL)		625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
PUMP CHARACTERISTICS							
HP Feedpump Control Valve Discharge							
Total Flow Rate per HRSG (lb/hr)		519,152.	518,819.	505,434.	853,701.	518,662.	868,852.
Pressure (psia)		1,303.4	1,302.7	1,270.2	2,113.5	1,303.2	2,152.3
Temperature (°F)		317.3	317.2	314.7	336.7	316.8	338.0
Enthalpy (Btu/lb)		289.8	289.6	287.1	311.1	289.2	312.6
IP Feedpump Control Valve Discharge							
Total Flow Rate per HRSG (lb/hr)		119,990.	119,930.	116,711.	73,794.	118,687.	73,211.
Pressure (psia)		399.2.	398.9.	390.2.	594.4.	399.5.	602.0.
Temperature (°F)		315.1.	315.0.	312.6.	332.8.	314.6.	334.0.
Enthalpy (Btu/lb)		285.9.	285.8.	283.3.	304.6.	285.4.	305.9.
HRSG Preheater Recirculation Pump CV Discharge							
Total Flow Rate per HRSG (lb/hr)		0.	0.	0.	0.	0.	0.
Pressure (psia)		-	-	-	-	-	-
Temperature (°F)		-	-	-	-	-	-
Enthalpy (Btu/lb)		-	-	-	-	-	-
Condensate Pump Discharge							
Total Flow Rate from Condenser (lb/hr)		1,150,468.	1,123,493.	1,114,675.	1,624,337.	1,141,298.	1,624,816.
Pressure (psia)		350.0	350.0	350.0	350.0	350.0	350.0
Temperature (°F)		122.4	96.9	114.0	125.3	114.3	109.6
Enthalpy (Btu/lb)		91.2	65.8	82.9	94.2	83.2	78.5
STEAM TURBINE CHARACTERISTICS		TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB
Main Steam Throttle Flow Rate (lb/hr)	S2	1,027,920.	1,027,261.	1,000,832.	1,691,080.	1,026,968.	1,720,808.
Main Steam Throttle Pressure (psia)	S2	1,189.6	1,189.0	1,160.5	1,912.4	1,189.7	1,943.9
Main Steam Throttle Temperature (°F)	S2	947.9	948.2	950.0	950.0	950.0	950.0
Main Steam Throttle Enthalpy (Btu/lb)	S2	1,469.8	1,470.0	1,472.1	1,445.5	1,471.1	1,444.4
Cold Reheat Steam Flow Rate (lb/hr)	S3	1,003,751.	1,003,108.	977,301.	1,651,319.	1,002,822.	1,680,348.
Cold Reheat Steam Pressure (psia)	S3	413.7.	413.4.	405.2.	630.5.	414.6.	638.6.
Cold Reheat Steam Temperature (°F)	S3	674.4.	674.6.	677.4.	657.0.	676.7.	655.9.
Cold Reheat Steam Enthalpy (Btu/lb)	S3	1,347.9.	1,348.1.	1,350.1.	1,323.3.	1,349.2.	1,322.1.
Hot Reheat Steam Flow Rate (lb/hr)	S6	1,120,883.	1,120,021.	1,098,218.	1,705,902.	1,123,270.	1,726,601.
Hot Reheat Steam Pressure (psia)	S6	353.0.	352.7.	346.1.	535.3.	353.9.	541.7.
Hot Reheat Steam Temperature (°F)	S6	998.2.	998.4.	1,000.0.	1,000.0.	1,000.0.	1,000.0.
Hot Reheat Steam Enthalpy (Btu/lb)	S6	1,524.2.	1,524.3.	1,525.4.	1,519.9.	1,525.1.	1,519.7.
SFLP Turbine Inlet Steam Flow (lb/hr)	S8	364,719	364,372	355,712	519,584	364,415	527,228
SFLP Turbine Inlet Steam Pressure (psia)	S8	74.0	73.9	72.2	105.0	74.0	106.5
SFLP Turbine Inlet Steam Temperature (°F)	S8	586.4	586.6	587.3	576.8	587.5	577.5
SFLP Turbine Inlet Steam Enthalpy (Btu/lb)	S8	1,324.5	1,324.6	1,325.1	1,317.5	1,325.1	1,317.7
SFLP Turbine Exhaust Steam Flow Rate (lb/hr)	S10	376,362.	376,007.	367,083.	538,040.	376,064.	545,961.
SFLP Turbine Exhaust UEEP (Btu/lb)	S10	1,066.0	1,040.7	1,056.6	1,048.6	1,055.9	1,035.9
SFLP Turbine Exhaust Loss (Btu/lb)		6.3	17.0	7.1	7.6	7.2	16.8
SFLP Turbine Exhaust Annulus Velocity (ft/sec)		459.2	905.1	556.4	595.5	564.0	905.1
SFLP Turbine Exhaust Sonic Velocity (ft/sec)		1,420.2	1,417.3	1,463.4	1,430.6	1,462.9	1,458.7
DFLP Turbine Inlet Steam Flow (lb/hr)	S9	854,301	853,371	833,160	1,221,352	853,667	1,239,187
DFLP Turbine Inlet Steam Pressure (psia)	S9	72.5	72.5	70.8	102.9	72.5	104.5
DFLP Turbine Inlet Steam Temperature (°F)	S9	586.2	586.4	587.1	576.5	587.3	577.2
DFLP Turbine Inlet Steam Enthalpy (Btu/lb)	S9	1,324.5	1,324.6	1,325.1	1,317.5	1,325.1	1,317.7
DFLP Turbine Second Extraction Steam Flow (lb/hr)	S12	40,577	44,631	40,517	64,945	41,813	70,422
DFLP Turbine Second Extraction Steam Pressure (psia)	S12	14.9	14.7	14.5	20.9	14.8	21.1
DFLP Turbine Second Extraction Steam Temperature (°F)	S12	295.2	297.7	296.6	287.6	296.7	289.5
DFLP Turbine Second Extraction Steam Enthalpy (Btu/lb)	S12	1,190.4	1,191.6	1,191.1	1,185.3	1,191.1	1,186.2
DFLP Turbine Third Extraction Steam Flow (lb/hr)	S13	56,461	78,088	61,315	94,519	63,377	115,055
DFLP Turbine Third Extraction Steam Pressure (psia)	S13	7.45	7.14	7.18	10.38	7.34	10.27
DFLP Turbine Third Extraction Steam Temperature (°F)	S13	194.5	192.8	194.4	194.9	194.5	194.4
DFLP Turbine Third Extraction Steam Enthalpy (Btu/lb)	S13	1,144.8	1,144.2	1,144.9	1,139.8	1,144.9	1,139.6
DFLP Turbine Exhaust Steam Flow Rate (lb/hr)	S11	757,527.	730,915.	731,586.	1,062,309.	748,743.	1,054,136.
DFLP Turbine Exhaust UEEP (Btu/lb)	S11	1,068.1	1,041.7	1,058.6	1,050.7	1,057.9	1,037.0
DFLP Turbine Exhaust Loss (Btu/lb)		6.3	16.1	7.1	7.5	7.2	15.7
DFLP Turbine Exhaust Annulus Velocity (ft/sec)		463.1	881.4	555.5	589.2	562.7	875.7
DFLP Turbine Exhaust Sonic Velocity (ft/sec)		1,420.2	1,417.3	1,463.4	1,430.6	1,462.9	1,458.7
Turbine Backpressure (In. HgA)	S10, S11	3.70	1.75	2.92	4.02	2.95	2.57
Gross Steam Turbine Output (kW)	E2	189,191.	196,805.	188,038.	291,268.	192,713.	300,967.

PRELIMINARY

Estimated Performance Summary
2x2x1 GE 7FA.05

CASE DESCRIPTION	Stream No.	Case 23	Case 24	Case 25	Case 26	Case 27	Case 28
Equipment Design							
Ambient Dry Bulb Temperature	G1	105°F	55°F	91°F	91°F	85°F	55°F
Relative Humidity	G1	43%	66%	45%	45%	67%	66%
Ambient Wet Bulb Temperature	G1	84°F	49°F	74°F	74°F	76°F	49°F
Site Elevation (ft AMSL)		625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
FEEDWATER HEATER CHARACTERISTICS							
Feedwater Heater #2							
Extraction Steam Flow Rate (lb/hr)		40,577	44,631	40,517	64,945	41,813	70,422
Extraction Line Pressure Drop (%)		3.6	4.4	3.8	4.5	3.9	5.2
Extraction Enthalpy (Btu/lb)		1,190.4	1,191.6	1,191.1	1,185.3	1,191.1	1,186.2
Feedwater Inlet Temperature (°F)		175.5	171.0	173.2	187.2	174.1	184.4
Feedwater Outlet Temperature (°F)		207.9	206.8	206.5	222.7	207.6	222.3
Drain Pressure (psia)		14.3	14.1	13.9	20.0	14.3	20.0
Drain Temperature (°F)		210.7	209.8	209.2	227.9	210.4	228.0
Feedwater Heater #1							
Extraction Steam Flow Rate, includes SSR Flow (lb/hr)		57,786	79,413	62,610	96,622	64,703	117,190
Extraction Line Pressure Drop (%)		3.6	7.4	4.5	5.1	4.6	7.7
Extraction Enthalpy (Btu/lb)		1,149.8	1,147.8	1,149.4	1,144.2	1,149.3	1,143.3
Feedwater Inlet Temperature (°F)		124.1	98.6	115.7	127.2	116.0	111.5
Feedwater Outlet Temperature (°F)		175.2	170.5	172.9	186.6	173.7	183.6
Drain Pressure (psia)		7.19	6.61	6.85	9.85	7.00	9.48
Drain Temperature (°F)		178.0	174.2	175.8	192.5	176.8	190.6
TURBINE BYPASS SYSTEM CHARACTERISTICS (per HRSG)							
MS Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-	-	-
MS Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W8	-	-	-	-	-	-
MS Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S14	-	-	-	-	-	-
MS Bypass Attemporator Outlet Steam Pressure (psia)	S14	-	-	-	-	-	-
MS Bypass Attemporator Outlet Steam Temperature (°F)	S14	-	-	-	-	-	-
MS Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S14	-	-	-	-	-	-
HRH Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-	-	-
HRH Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W9	-	-	-	-	-	-
HRH Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S15	-	-	-	-	-	-
HRH Bypass Attemporator Outlet Steam Pressure (psia)	S15	-	-	-	-	-	-
HRH Bypass Attemporator Outlet Steam Temperature (°F)	S15	-	-	-	-	-	-
HRH Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S15	-	-	-	-	-	-
LP Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-	-	-
LP Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W10	-	-	-	-	-	-
LP Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S16	-	-	-	-	-	-
LP Bypass Attemporator Outlet Steam Pressure (psia)	S16	-	-	-	-	-	-
LP Bypass Attemporator Outlet Steam Temperature (°F)	S16	-	-	-	-	-	-
LP Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S16	-	-	-	-	-	-
CONDENSER CHARACTERISTICS							
Operating Pressure (psia)		1.819	0.861	1.435	1.974	1.449	1.264
Operating Pressure (in Hg Abs.)		3.70	1.75	2.92	4.02	2.95	2.57
Temperature of Condensing Steam (°F)		122.6	96.7	114.1	125.5	114.4	109.7
CW Flow Rate Through Condenser (gpm)	W3	98,750	98,750	98,750	98,750	98,750	98,750
CW Temperature Into Condenser (°F)	W3	95.2	69.1	87.4	87.5	87.1	70.6
CW Temperature Out Of Condenser (°F)	W4	117.7	91.0	109.2	118.6	109.4	101.7
Circulating Water Temperature Rise (°F)		22.5	21.9	21.8	31.1	22.3	31.2
Terminal Temperature Difference, TTD (°F)		4.8	5.7	4.9	7.0	5.0	7.9
Total Condenser Heat Rejection (MMBtu/hr)		1,107.8	1,081.1	1,072.3	1,530.8	1,096.6	1,534.6
AUXILIARY COOLING SYSTEM							
Auxiliary Cooling Water Flow Rate Through Heat Exchangers (gpm)	W5	17,250	17,250	17,250	17,250	17,250	17,250
Auxiliary Cooling Water Temperature Rise (°F)		20.0	20.0	20.0	20.0	20.0	20.0
Total Auxiliary Cooling Heat Rejection (MMBtu/hr)		172.1	172.2	172.1	172.1	172.1	172.2
COOLING TOWER CHARACTERISTICS							
CW Flow Rate Into Cooling Tower (gpm)	W6	116,000	116,000	116,000	116,000	116,000	116,000
CW Temperature Into Cooling Tower (°F)	W6	117.4	90.8	108.9	116.9	109.1	100.0
Air Inlet Wet Bulb Temperature (°F)		84.0	49.0	73.7	73.7	76.0	49.0
Current Approach Temperature (°F)		12.1	20.2	14.4	14.7	11.8	21.8
Current Range Temperature (°F)		21.3	21.6	21.0	28.6	21.4	29.4
Drift Rate (%)		0.005	0.005	0.005	0.005	0.005	0.005
Cycles of Concentration		4	4	4	4	4	4
Evaporation Loss (gpm)		2,340	1,752	2,188	2,940	2,095	2,394
Drift Loss (gpm)		5.8	5.8	5.8	5.8	5.8	5.8
Blowdown (gpm)		774	578	723	974	693	792
Blowdown Temperature (°F)		95.2	69.0	87.3	87.4	87.1	70.5
Makeup (gpm)		3,120	2,336	2,917	3,920	2,794	3,192
Makeup Temperature (°F)		60.0	60.0	60.0	60.0	60.0	60.0
Total Cooling Tower Heat Rejection (MMBtu/hr)		1,290.3	1,263.7	1,254.8	1,713.3	1,279.1	1,717.2

PRELIMINARY

Estimated Performance Summary
2x2x1 GE 7FA.05

CASE DESCRIPTION	Stream No.	Case 23	Case 24	Case 25	Case 26	Case 27	Case 28
Equipment Design							
Ambient Dry Bulb Temperature	G1	105°F	55°F	91°F	91°F	85°F	55°F
Relative Humidity	G1	43%	66%	45%	45%	67%	66%
Ambient Wet Bulb Temperature	G1	84°F	49°F	74°F	74°F	76°F	49°F
Site Elevation (ft AMSL)		625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
FUEL GAS PERFORMANCE HEATER CHARACTERISTICS (Per CT)							
Natural Gas Flow Rate (lb/hr)	G2	87,255.	87,162.	80,056.	80,056.	83,797.	86,047.
Natural Gas Inlet Temperature (°F)		60.0	60.0	60.0	60.0	60.0	60.0
Natural Gas Outlet Temperature (°F)	G2	365.0	365.2	365.1	364.9	365.0	365.3
Heating Water Inlet Flow Rate (lb/hr)		60,833.	60,882.	55,707.	46,289.	57,891.	49,861.
Heating Water Inlet Temperature (°F)		438.1	438.0	437.0	483.7	438.9	484.5
Heating Water Outlet Temperature (°F)		187.3	187.6	185.6	185.3	185.8	186.4
CYCLE MAKEUP CONDITIONS							
Makeup Flow Rate to Steam Cycle (gpm)	W7	30.0.	30.0.	28.9.	42.9.	29.8.	44.2.
Makeup Temperature (°F)	W7	60.0	60.0	60.0	60.0	60.0	60.0
TOTAL PLANT PERFORMANCE							
Total Gross CT Electrical Output (kW)		426,264.	425,972.	379,306.	379,307.	401,122.	419,558.
Total Gross Steam Turbine Electrical Output (kW)	E2	189,191.	196,805.	188,038.	291,268.	192,713.	300,967.
Total Gross Plant Electrical Output (kW)	D3	615,455.	622,777.	567,344.	670,575.	593,835.	720,525.
Auxiliary Power							
BOP Percent Aux Power, Approx. (%)		2.20	2.20	2.20	2.20	2.20	2.20
BOP Auxiliary Power (kW)		13,540.	13,700.	12,480.	14,750.	13,060.	15,850.
Chiller 0.7327 kW per ton chilling capacity (kW)		14,734.	569.	0.	0.	0.	0.
Total Auxiliary Power (kW)		28,274.	14,269.	12,480.	14,750.	13,060.	15,850.
Percentage of Gross Electrical Output (%)		4.59	2.29	2.20	2.20	2.20	2.20
Net Plant Electrical Output (kW)	D4	587,181.	608,508.	554,864.	655,825.	580,775.	704,675.
Net Plant Electrical Heat Rate, LHV (Btu/kWh)	D5	6,394.	6,164.	6,208.	6,598.	6,209.	6,518.
Net Plant Electrical Heat Rate, HHV (Btu/kWh)		7,098.	6,842.	6,891.	7,323.	6,892.	7,235.

* = Cooling Tower parameter can not be calculated at minimum cooling water temperature condition.

PRELIMINARY

Estimated Performance Summary
2x2x1 GE 7FA.05

CASE DESCRIPTION	Stream No.	Case 29	Case 30	Case 31	Case 32	Case 33	Case 34	Case 35	Case 36
Equipment Design									
Ambient Dry Bulb Temperature	G1	55°F	5°F	105°F	105°F	105°F	85°F	85°F	85°F
Relative Humidity	G1	66%	68%	43%	43%	43%	67%	67%	67%
Ambient Wet Bulb Temperature	G1	49°F	3.5°F	84°F	84°F	84°F	76°F	76°F	76°F
Site Elevation (ft AMSL)		625	625	625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2	2	2
Fuel Type		Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil
COMBUSTION TURBINE CHARACTERISTICS (per CT)									
CT Frame		GE 7FA.05	GE 7FA.05	GE 7FA.05	GE 7FA.05	GE 7FA.05	GE 7FA.05	GE 7FA.05	GE 7FA.05
Load Condition		100%	100%	100%	75%	50%	100%	75%	50%
Inlet Air Cooling		NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
Chiller Cooling Capacity (ton)		0.	0.	0.	0.	0.	0.	0.	0.
Chiller Air Outlet Temperature (°F)		-	-	-	-	-	-	-	-
Evaporative Cooler Water Flow Rate (Evaporation only) (lb//hr)		0.	0.	0.	0.	0.	0.	0.	0.
Evaporative Cooler Air Outlet Temperature (°F)		-	-	-	-	-	-	-	-
Fuel Lower Heating Value (Btu/lb)	G2, G4, O1	18,300.	18,300.	18,300.	18,300.	18,300.	18,300.	18,300.	18,300.
Fuel Flow Rate (lb/hr)	G2, O1	116,142.	116,142.	102,934.	83,410.	63,710.	109,519.	87,503.	67,022.
Fuel Inlet Temperature (°F)	G2, O1	80.	80.	80.	80.	80.	80.	80.	80.
Heat Input to CT, LHV (MMBtu/hr)	D1	2,125.4	2,125.4	1,883.7	1,526.4	1,165.9	2,004.2	1,601.3	1,226.5
Combustor NOx Water Injection Flow Rate (lb/hr)	W1	158,221	150,871	128,883	93,364	59,736	139,171	99,104	64,517
Exhaust Gas Flow Rate (lb/hr)	G3	4,141,000.	4,091,000.	3,806,000.	3,030,000.	2,514,000.	4,000,000.	3,138,000.	2,570,000.
Exhaust Gas Temperature (°F)	G3	1,101.	1,080.	1,129.	1,207.	1,215.	1,115.	1,188.	1,215.
Exhaust Analysis, % Vol.									
Argon	G3	0.84	0.85	0.83	0.83	0.85	0.83	0.84	0.85
Nitrogen	G3	70.70	71.44	69.68	70.00	70.96	69.90	70.23	71.11
Oxygen	G3	10.67	10.74	10.74	10.67	11.54	10.69	10.62	11.36
Carbon Dioxide	G3	5.75	5.84	5.51	5.62	5.20	5.59	5.70	5.35
Water	G3	12.03	11.13	13.24	12.88	11.46	12.99	12.61	11.33
CT Gross Output (kW)	E1	222,606.	224,849.	190,788.	143,091.	95,394.	206,368.	154,776.	103,184.
CT Gross Heat Rate, LHV (Btu/kWh)		9,548.	9,453.	9,873.	10,667.	12,222.	9,712.	10,346.	11,887.
CT Gross Heat Rate, HHV (Btu/kWh)		10,121.	10,020.	10,466.	11,307.	12,955.	10,294.	10,967.	12,600.
HRSG CHARACTERISTICS (per HRSG)									
Heat Input to Duct Burner, LHV (MMBtu/hr)	D2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heat Input to Duct Burner, HHV (MMBtu/hr)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Duct Burner Fuel Flow Rate (lb/hr)	G4	0	0	0	0	0	0	0	0
Duct Burner Gas Exit Temperature (°F)		1,039.0	1,022.0	1,058.6	1,092.5	1,089.5	1,050.5	1,083.6	1,090.0
Main Steam Flow Rate (lb/hr)	S1	526,355.	501,385.	507,128.	440,692.	363,531.	522,673.	446,500.	371,790.
Main Steam Pressure (psia)	S1	1,274.9	1,214.4	1,237.0	1,080.7	1,011.4	1,269.8	1,094.3	1,013.1
Main Steam Temperature (°F)	S1	946.5	942.4	960.0	960.0	960.0	953.1	960.0	960.0
Main Steam Enthalpy (Btu/lb)	S1	1,466.1	1,465.7	1,475.4	1,480.6	1,482.9	1,470.2	1,480.1	1,482.8
Hot Reheat Flow Rate (lb/hr)	S5	579,913.	555,643.	557,505.	498,047.	417,185.	573,133.	501,551.	425,876.
Hot Reheat Pressure (psia)	S5	387.0	369.4	373.9	334.2	280.3	383.9	336.6	286.1
Hot Reheat Temperature (°F)	S5	997.5	985.3	1,010.0	1,010.0	1,010.0	1,006.6	1,010.0	1,010.0
Hot Reheat Enthalpy (Btu/lb)	S5	1,522.8	1,516.8	1,529.9	1,531.0	1,532.5	1,527.8	1,531.0	1,532.4
IP Superheater Flow Rate (lb/hr)	S4	65,934.	66,047.	58,443.	41,744.	37,048.	62,750.	44,153.	37,314.
IP Superheater Pressure (psia)	S4	403.0	384.7	389.1	346.9	290.8	399.6	349.5	296.8
IP Superheater Temperature (°F)	S4	567.7	561.2	567.2	557.0	546.1	568.6	557.5	546.9
IP Superheater Enthalpy (Btu/lb)	S4	1,287.7	1,285.5	1,288.7	1,286.6	1,285.7	1,288.6	1,286.7	1,285.5
LP Superheater Flow Rate (lb/hr)	S7	47,849.	46,086.	38,261.	16,131.	5,248.	44,228.	18,861.	6,085.
LP Superheater Pressure (psia)	S7	84.3	80.5	78.4	64.1	51.8	82.3	65.3	53.0
LP Superheater Temperature (°F)	S7	518.1	515.3	528.3	552.9	554.1	522.2	549.3	554.5
LP Superheater Enthalpy (Btu/lb)	S7	1,289.9	1,288.8	1,295.4	1,308.8	1,310.3	1,292.1	1,306.9	1,310.4
Condensate Preheater Inlet Flow Rate (lb/hr)	W2	498,890.	438,350.	393,786.	190,693.	70,187.	463,997.	207,452.	81,143.
Condensate Preheater Inlet Pressure (psia)	W2	240.5	247.0	247.9	266.2	283.5	242.8	264.9	281.9
Condensate Preheater Inlet Temperature (°F)	W2	206.3	204.1	205.4	198.9	190.5	206.5	199.2	191.1
Condensate Preheater Inlet Enthalpy (Btu/lb)	W2	174.9	172.7	174.0	167.6	159.2	175.1	167.8	159.8
HRSG Exhaust Stack Gas Characteristics									
HRSG Exhaust Gas Temperature (°F)	G5	285.0	285.1	285.1	284.9	284.8	285.0	284.9	284.8
HRSG Exhaust Gas Flow Rate (lb/hr)	G5	4,141,000.	4,091,000.	3,806,000.	3,030,000.	2,514,000.	4,000,000.	3,138,000.	2,570,000.
HRSG BLOWDOWN CHARACTERISTICS (Per HRSG)									
HP Evaporator Blowdown Flow Rate (lb/hr)		5,317.	5,064.	5,113.	4,279.	3,483.	5,280.	4,365.	3,565.
IP Evaporator Blowdown Flow Rate (lb/hr)		666.	667.	590.	422.	374.	634.	446.	377.
DEAERATOR CHARACTERISTICS (Per HRSG)									
DA Operating Pressure (psia)		86.1	82.4	79.7	64.4	51.8	84.0	65.7	53.0
Main Boiler Feedwater Inlet Flow Rate (lb/hr)		647,737.	620,801.	614,931.	530,568.	435,926.	637,155.	537,064.	445,760.
Main Boiler Feedwater Inlet Temperature (°F)		285.5	279.7	273.0	238.5	207.5	281.6	241.8	210.6
Main Boiler Feedwater Outlet Flow Rate (lb/hr)		598,272.	573,163.	575,133.	513,110.	429,589.	591,336.	516,861.	438,560.
Main Boiler Feedwater Outlet Temperature (°F)		317.2	314.0	311.7	297.3	283.2	315.4	298.6	284.7
BFW Temperature Rise (°F)		31.7	34.3	38.7	58.9	75.7	33.8	56.8	74.2
Primary Pegging Steam Flow Rate (lb/hr)		24,942.	25,694.	28,397.	35,978.	37,136.	26,030.	35,242.	37,269.
Auxiliary Pegging Steam Flow Rate (lb/hr)		0.	0.	0.	0.	0.	0.	0.	0.
Vent Steam Flow Rate (lb/hr)		1,619.	1,552.	1,537.	1,326.	1,090.	1,593.	1,343.	1,114.

PRELIMINARY

Estimated Performance Summary
2x2x1 GE 7FA.05

CASE DESCRIPTION	Stream No.	Case 29	Case 30	Case 31	Case 32	Case 33	Case 34	Case 35	Case 36
Equipment Design									
Ambient Dry Bulb Temperature	G1	55°F	5°F	105°F	105°F	105°F	85°F	85°F	85°F
Relative Humidity	G1	66%	68%	43%	43%	43%	67%	67%	67%
Ambient Wet Bulb Temperature	G1	49°F	3.5°F	84°F	84°F	84°F	76°F	76°F	76°F
Site Elevation (ft AMSL)		625	625	625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2	2	2
Fuel Type		Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil
PUMP CHARACTERISTICS									
HP Feedpump Control Valve Discharge									
Total Flow Rate per HRSG (lb/hr)		531,672.	506,450.	512,241.	444,971.	367,014.	527,952.	450,865.	375,355.
Pressure (psia)		1,328.2	1,264.2	1,287.4	1,119.4	1,038.4	1,322.6	1,134.2	1,041.3
Temperature (°F)		320.2	316.9	314.6	299.8	285.4	318.4	301.1	286.9
Enthalpy (Btu/lb)		292.8	289.3	287.0	271.5	256.7	291.0	272.9	258.2
IP Feedpump Control Valve Discharge									
Total Flow Rate per HRSG (lb/hr)		66,600.	66,714.	62,891.	68,139.	62,576.	63,384.	65,996.	63,205.
Pressure (psia)		409.1.	391.1.	394.1.	349.7.	293.3.	405.3.	352.7.	299.4.
Temperature (°F)		318.0.	314.8.	312.5.	298.0.	283.8.	316.2.	299.3.	285.3.
Enthalpy (Btu/lb)		288.9.	285.6.	283.2.	268.2.	253.5.	287.0.	269.6.	255.1.
HRSG Preheater Recirculation Pump CV Discharge									
Total Flow Rate per HRSG (lb/hr)		0.	0.	0.	0.	0.	0.	0.	0.
Pressure (psia)		-	-	-	-	-	-	-	-
Temperature (°F)		-	-	-	-	-	-	-	-
Enthalpy (Btu/lb)		-	-	-	-	-	-	-	-
Condensate Pump Discharge									
Total Flow Rate from Condenser (lb/hr)		1,165,821.	1,114,323.	1,133,396.	981,310.	810,392.	1,165,023.	985,591.	821,679.
Pressure (psia)		350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
Temperature (°F)		97.9	92.9	122.0	118.7	115.0	114.9	110.7	106.7
Enthalpy (Btu/lb)		66.9	61.9	90.9	87.6	83.9	83.8	79.6	75.6
STEAM TURBINE CHARACTERISTICS		TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB
Main Steam Throttle Flow Rate (lb/hr)	S2	1,052,711.	1,002,770.	1,014,256.	881,383.	727,062.	1,045,346.	893,000.	743,580.
Main Steam Throttle Pressure (psia)	S2	1,211.6	1,154.1	1,175.5	1,027.0	972.0	1,206.7	1,039.9	972.0
Main Steam Throttle Temperature (°F)	S2	936.5	932.4	950.0	950.0	950.0	943.1	950.0	950.0
Main Steam Throttle Enthalpy (Btu/lb)	S2	1,462.3	1,461.9	1,471.6	1,476.6	1,478.4	1,466.4	1,476.1	1,478.4
Cold Reheat Steam Flow Rate (lb/hr)	S3	1,027,959.	979,193.	990,409.	860,660.	709,967.	1,020,767.	872,003.	726,097.
Cold Reheat Steam Pressure (psia)	S3	425.7.	406.3.	411.3.	366.0.	306.4.	422.4.	369.0.	312.9.
Cold Reheat Steam Temperature (°F)	S3	666.8.	664.2.	677.8.	683.5.	682.0.	671.6.	682.4.	682.4.
Cold Reheat Steam Enthalpy (Btu/lb)	S3	1,342.9.	1,342.8.	1,350.0.	1,355.9.	1,358.6.	1,345.8.	1,355.1.	1,358.4.
Hot Reheat Steam Flow Rate (lb/hr)	S6	1,159,826.	1,111,286.	1,115,011.	996,095.	834,370.	1,146,267.	1,003,103.	851,753.
Hot Reheat Steam Pressure (psia)	S6	363.6.	347.0.	351.3.	313.9.	263.2.	360.6.	316.2.	268.7.
Hot Reheat Steam Temperature (°F)	S6	987.5.	975.3.	1,000.0.	1,000.0.	1,000.0.	996.6.	1,000.0.	1,000.0.
Hot Reheat Steam Enthalpy (Btu/lb)	S6	1,518.1.	1,512.2.	1,525.2.	1,526.3.	1,527.7.	1,523.1.	1,526.2.	1,527.6.
SFLP Turbine Inlet Steam Flow (lb/hr)	S8	378,581	362,878	359,147	309,758	254,380	372,249	313,570	260,136
SFLP Turbine Inlet Steam Pressure (psia)	S8	76.5	73.0	72.9	62.8	51.6	75.4	63.6	52.8
SFLP Turbine Inlet Steam Temperature (°F)	S8	578.9	570.3	587.0	582.6	579.3	585.1	583.4	579.6
SFLP Turbine Inlet Steam Enthalpy (Btu/lb)	S8	1,320.7	1,316.7	1,324.9	1,323.5	1,322.7	1,323.8	1,323.8	1,322.7
SFLP Turbine Exhaust Steam Flow Rate (lb/hr)	S10	390,565.	374,326.	370,680.	319,918.	262,826.	384,122.	323,833.	268,766.
SFLP Turbine Exhaust UEEP (Btu/lb)	S10	1,038.5	1,035.4	1,066.6	1,069.4	1,074.7	1,055.0	1,057.9	1,061.3
SFLP Turbine Exhaust Loss (Btu/lb)		17.1	20.7	6.3	6.4	6.7	7.2	6.8	6.5
SFLP Turbine Exhaust Annulus Velocity (ft/sec)		908.4	1,005.0	456.8	432.1	395.1	567.0	539.3	502.6
SFLP Turbine Exhaust Sonic Velocity (ft/sec)		1,453.9	1,453.8	1,448.4	1,443.3	1,424.9	1,419.4	1,419.4	1,415.6
DFLP Turbine Inlet Steam Flow (lb/hr)	S9	886,444	849,591	841,556	726,402	596,844	871,942	735,198	610,299
DFLP Turbine Inlet Steam Pressure (psia)	S9	75.0	71.6	71.5	61.6	50.6	74.0	62.4	51.7
DFLP Turbine Inlet Steam Temperature (°F)	S9	578.7	570.1	586.8	582.5	579.2	584.9	583.3	579.5
DFLP Turbine Inlet Steam Enthalpy (Btu/lb)	S9	1,320.7	1,316.7	1,324.9	1,323.5	1,322.7	1,323.8	1,323.8	1,322.7
DFLP Turbine Second Extraction Steam Flow (lb/hr)	S12	46,848	45,140	39,796	33,059	25,778	42,947	34,661	27,412
DFLP Turbine Second Extraction Steam Pressure (psia)	S12	15.2	14.5	14.6	12.7	10.4	15.1	12.8	10.6
DFLP Turbine Second Extraction Steam Temperature (°F)	S12	291.8	285.9	295.6	292.8	290.8	294.9	294.1	291.7
DFLP Turbine Second Extraction Steam Enthalpy (Btu/lb)	S12	1,188.7	1,186.1	1,190.6	1,189.8	1,189.3	1,190.2	1,190.4	1,189.7
DFLP Turbine Third Extraction Steam Flow (lb/hr)	S13	81,444	80,836	55,358	45,610	34,722	64,991	52,708	41,447
DFLP Turbine Third Extraction Steam Pressure (psia)	S13	7.37	7.01	7.35	6.38	5.29	7.49	6.35	5.31
DFLP Turbine Third Extraction Steam Temperature (°F)	S13	187.8	182.2	194.9	193.0	192.1	192.8	192.6	191.1
DFLP Turbine Third Extraction Steam Enthalpy (Btu/lb)	S13	1,141.7	1,139.2	1,145.1	1,144.6	1,144.6	1,144.0	1,144.4	1,144.2
DFLP Turbine Exhaust Steam Flow Rate (lb/hr)	S11	758,424.	723,875.	746,666.	647,964.	536,536.	764,273.	648,062.	541,636.
DFLP Turbine Exhaust UEEP (Btu/lb)	S11	1,039.6	1,036.0	1,068.6	1,071.2	1,076.2	1,057.0	1,059.7	1,062.9
DFLP Turbine Exhaust Loss (Btu/lb)		16.2	19.5	6.3	6.4	6.6	7.2	6.9	6.6
DFLP Turbine Exhaust Annulus Velocity (ft/sec)		883.8	973.6	461.1	438.4	404.0	565.2	540.6	507.3
DFLP Turbine Exhaust Sonic Velocity (ft/sec)		1,453.9	1,453.8	1,448.4	1,443.3	1,424.9	1,419.4	1,419.4	1,415.6
Turbine Backpressure (In. HgA)	S10, S11	1.81	1.55	3.67	3.34	3.00	3.00	2.65	2.36
Gross Steam Turbine Output (kW)	E2	201,548.	191,998.	187,358.	163,768.	134,789.	195,868.	168,580.	140,719.

PRELIMINARY

Estimated Performance Summary
2x2x1 GE 7FA.05

CASE DESCRIPTION	Stream No.	Case 29	Case 30	Case 31	Case 32	Case 33	Case 34	Case 35	Case 36
Equipment Design									
Ambient Dry Bulb Temperature	G1	55°F	5°F	105°F	105°F	105°F	85°F	85°F	85°F
Relative Humidity	G1	66%	68%	43%	43%	43%	67%	67%	67%
Ambient Wet Bulb Temperature	G1	49°F	3.5°F	84°F	84°F	84°F	76°F	76°F	76°F
Site Elevation (ft AMSL)		625	625	625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2	2	2
Fuel Type		Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil
FEEDWATER HEATER CHARACTERISTICS									
Feedwater Heater #2									
Extraction Steam Flow Rate (lb/hr)		46,848	45,140	39,796	33,059	25,778	42,947	34,661	27,412
Extraction Line Pressure Drop (%)		4.5	4.6	3.6	3.3	3.0	3.9	3.6	3.2
Extraction Enthalpy (Btu/lb)		1,188.7	1,186.1	1,190.6	1,189.8	1,189.3	1,190.2	1,190.4	1,189.7
Feedwater Inlet Temperature (°F)		172.1	169.8	174.9	169.5	162.3	174.8	168.6	161.8
Feedwater Outlet Temperature (°F)		208.2	206.0	207.3	200.9	192.4	208.4	201.1	193.1
Drain Pressure (psia)		14.5	13.9	14.1	12.2	10.1	14.5	12.3	10.3
Drain Temperature (°F)		211.4	209.0	210.0	202.9	193.7	211.4	203.2	194.5
Feedwater Heater #1									
Extraction Steam Flow Rate, includes SSR Flow (lb/hr)		82,808	82,140	56,671	46,766	35,683	66,343	53,876	42,429
Extraction Line Pressure Drop (%)		7.5	8.1	3.5	3.2	2.7	4.7	4.3	3.8
Extraction Enthalpy (Btu/lb)		1,145.2	1,142.6	1,150.1	1,150.0	1,150.5	1,148.4	1,149.2	1,149.2
Feedwater Inlet Temperature (°F)		99.7	94.6	123.7	120.5	116.7	116.6	112.4	108.4
Feedwater Outlet Temperature (°F)		171.7	169.3	174.7	169.3	162.2	174.5	168.4	161.7
Drain Pressure (psia)		6.82	6.44	7.09	6.17	5.15	7.14	6.08	5.11
Drain Temperature (°F)		175.7	173.1	177.4	171.2	163.4	177.7	170.6	163.1
TURBINE BYPASS SYSTEM CHARACTERISTICS (per HRSG)									
MS Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-	-	-	-	-
MS Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W8	-	-	-	-	-	-	-	-
MS Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S14	-	-	-	-	-	-	-	-
MS Bypass Attemporator Outlet Steam Pressure (psia)	S14	-	-	-	-	-	-	-	-
MS Bypass Attemporator Outlet Steam Temperature (°F)	S14	-	-	-	-	-	-	-	-
MS Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S14	-	-	-	-	-	-	-	-
HRH Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-	-	-	-	-
HRH Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W9	-	-	-	-	-	-	-	-
HRH Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S15	-	-	-	-	-	-	-	-
HRH Bypass Attemporator Outlet Steam Pressure (psia)	S15	-	-	-	-	-	-	-	-
HRH Bypass Attemporator Outlet Steam Temperature (°F)	S15	-	-	-	-	-	-	-	-
HRH Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S15	-	-	-	-	-	-	-	-
LP Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-	-	-	-	-
LP Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W10	-	-	-	-	-	-	-	-
LP Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S16	-	-	-	-	-	-	-	-
LP Bypass Attemporator Outlet Steam Pressure (psia)	S16	-	-	-	-	-	-	-	-
LP Bypass Attemporator Outlet Steam Temperature (°F)	S16	-	-	-	-	-	-	-	-
LP Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S16	-	-	-	-	-	-	-	-
CONDENSER CHARACTERISTICS									
Operating Pressure (psia)		0.890	0.761	1.801	1.642	1.476	1.472	1.302	1.158
Operating Pressure (in Hg Abs.)		1.81	1.55	3.67	3.34	3.00	3.00	2.65	2.36
Temperature of Condensing Steam (°F)		97.8	92.7	122.2	118.9	115.1	115.0	110.7	106.7
CW Flow Rate Through Condenser (gpm)	W3	98,750	98,750	98,750	98,750	98,750	98,750	98,750	98,750
CW Temperature Into Condenser (°F)	W3	69.2	65.0	95.2	95.4	95.5	87.2	87.0	86.7
CW Temperature Out Of Condenser (°F)	W4	92.0	86.7	117.4	114.7	111.6	109.9	106.3	103.0
Circulating Water Temperature Rise (°F)		22.7	21.7	22.2	19.3	16.1	22.7	19.4	16.3
Terminal Temperature Difference, TTD (°F)		5.9	6.0	4.8	4.2	3.5	5.1	4.4	3.7
Total Condenser Heat Rejection (MMBtu/hr)		1,118.5	1,070.9	1,092.6	952.3	793.6	1,117.9	952.9	800.5
AUXILIARY COOLING SYSTEM									
Auxiliary Cooling Water Flow Rate Through Heat Exchangers (gpm)	W5	17,250	17,250	17,250	17,250	17,250	17,250	17,250	17,250
Auxiliary Cooling Water Temperature Rise (°F)		20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Auxiliary Cooling Heat Rejection (MMBtu/hr)		172.2	172.3	172.1	172.1	172.1	172.1	172.1	172.1
COOLING TOWER CHARACTERISTICS									
CW Flow Rate Into Cooling Tower (gpm)	W6	116,000	116,000	116,000	116,000	116,000	116,000	116,000	116,000
CW Temperature Into Cooling Tower (°F)	W6	91.6	86.5	117.1	114.8	112.2	109.5	106.4	103.6
Air Inlet Wet Bulb Temperature (°F)		49.0	3.5	84.0	84.0	84.0	76.0	76.0	76.0
Current Approach Temperature (°F)		20.4	*	12.1	12.2	12.2	11.8	11.5	11.2
Current Range Temperature (°F)		22.3	21.8	21.1	18.7	16.1	21.8	19.0	16.5
Drift Rate (%)		0.005	*	0.005	0.005	0.005	0.005	0.005	0.005
Cycles of Concentration		4	4	4	4	4	4	4	4
Evaporation Loss (gpm)		1,805	*	2,314	2,072	1,797	2,129	1,868	1,626
Drift Loss (gpm)		5.8	*	5.8	5.8	5.8	5.8	5.8	5.8
Blowdown (gpm)		596	*	765	685	593	704	617	536
Blowdown Temperature (°F)		69.2	*	95.2	95.3	95.4	87.1	86.9	86.7
Makeup (gpm)		2,406	*	3,085	2,763	2,396	2,839	2,490	2,168
Makeup Temperature (°F)		60.0	*	60.0	60.0	60.0	60.0	60.0	60.0
Total Cooling Tower Heat Rejection (MMBtu/hr)		1,301.1	1,244.9	1,275.1	1,134.8	976.1	1,300.4	1,135.4	983.0

PRELIMINARY

Estimated Performance Summary
2x2x1 GE 7FA.05

CASE DESCRIPTION	Stream No.	Case 29	Case 30	Case 31	Case 32	Case 33	Case 34	Case 35	Case 36
Equipment Design									
Ambient Dry Bulb Temperature	G1	55°F	5°F	105°F	105°F	105°F	85°F	85°F	85°F
Relative Humidity	G1	66%	68%	43%	43%	43%	67%	67%	67%
Ambient Wet Bulb Temperature	G1	49°F	3.5°F	84°F	84°F	84°F	76°F	76°F	76°F
Site Elevation (ft AMSL)		625	625	625	625	625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2	2	2	2	2
Fuel Type		Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil
FUEL GAS PERFORMANCE HEATER CHARACTERISTICS (Per CT)									
Natural Gas Flow Rate (lb/hr)	G2	-	-	-	-	-	-	-	-
Natural Gas Inlet Temperature (°F)		-	-	-	-	-	-	-	-
Natural Gas Outlet Temperature (°F)	G2	-	-	-	-	-	-	-	-
Heating Water Inlet Flow Rate (lb/hr)		-	-	-	-	-	-	-	-
Heating Water Inlet Temperature (°F)		-	-	-	-	-	-	-	-
Heating Water Outlet Temperature (°F)		-	-	-	-	-	-	-	-
CYCLE MAKEUP CONDITIONS									
Makeup Flow Rate to Steam Cycle (gpm)	W7	30.4.	29.1.	29.0.	24.1.	19.8.	30.0.	24.6.	20.2.
Makeup Temperature (°F)	W7	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
TOTAL PLANT PERFORMANCE									
Total Gross CT Electrical Output (kW)		445,212.	449,698.	381,576.	286,182.	190,788.	412,736.	309,552.	206,368.
Total Gross Steam Turbine Electrical Output (kW)	E2	201,548.	191,998.	187,358.	163,768.	134,789.	195,868.	168,580.	140,719.
Total Gross Plant Electrical Output (kW)	D3	646,760.	641,696.	568,934.	449,950.	325,577.	608,604.	478,132.	347,087.
Auxiliary Power									
BOP Percent Aux Power, Approx. (%)		2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
BOP Auxiliary Power (kW)		14,230.	14,120.	12,520.	9,900.	7,160.	13,390.	10,520.	7,640.
Chiller 0.7327 kW per ton chilling capacity (kW)		0.	0.	0.	0.	0.	0.	0.	0.
Total Auxiliary Power (kW)		14,230.	14,120.	12,520.	9,900.	7,160.	13,390.	10,520.	7,640.
Percentage of Gross Electrical Output (%)		2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
Net Plant Electrical Output (kW)	D4	632,530.	627,576.	556,414.	440,050.	318,417.	595,214.	467,612.	339,447.
Net Plant Electrical Heat Rate, LHV (Btu/kWh)	D5	6,720.	6,773.	6,771.	6,937.	7,323.	6,734.	6,849.	7,226.
Net Plant Electrical Heat Rate, HHV (Btu/kWh)		7,124.	7,180.	7,177.	7,354.	7,762.	7,138.	7,260.	7,660.

* = Cooling Tower parameter can not be calculated at minimum cooling water temperature condition.

PRELIMINARY

Estimated Performance Summary
2x2x1 GE 7FA.05

CASE DESCRIPTION	Stream No.	Case 37	Case 38	Case 39	Case 40
Equipment Design					
Ambient Dry Bulb Temperature	G1	55°F	55°F	5°F	5°F
Relative Humidity	G1	66%	66%	68%	68%
Ambient Wet Bulb Temperature	G1	49°F	49°F	3.5°F	3.5°F
Site Elevation (ft AMSL)		625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2
Fuel Type		Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil
COMBUSTION TURBINE CHARACTERISTICS (per CT)					
CT Frame		GE 7FA.05	GE 7FA.05	GE 7FA.05	GE 7FA.05
Load Condition		75%	50%	75%	50%
Inlet Air Cooling		NONE	NONE	NONE	NONE
Chiller Cooling Capacity (ton)		0.	0.	0.	0.
Chiller Air Outlet Temperature (°F)		-	-	-	-
Evaporative Cooler Water Flow Rate (Evaporation only) (lb//hr)		0.	0.	0.	0.
Evaporative Cooler Air Outlet Temperature (°F)		-	-	-	-
Fuel Lower Heating Value (Btu/lb)	G2, G4, O1	18,300.	18,300.	18,300.	18,300.
Fuel Flow Rate (lb/hr)	G2, O1	91,858.	70,803.	92,339.	71,891.
Fuel Inlet Temperature (°F)	G2, O1	80.	80.	80.	80.
Heat Input to CT, LHV (MMBtu/hr)	D1	1,681.0	1,295.7	1,689.8	1,315.6
Combustor NOx Water Injection Flow Rate (lb/hr)	W1	112,633	76,557	107,796	76,091
Exhaust Gas Flow Rate (lb/hr)	G3	3,244,002.	2,616,000.	3,341,000.	2,659,000.
Exhaust Gas Temperature (°F)	G3	1,161.	1,215.	1,108.	1,186.
Exhaust Analysis, % Vol.					
Argon	G3	0.85	0.86	0.86	0.86
Nitrogen	G3	71.09	71.83	72.05	72.53
Oxygen	G3	10.68	11.22	11.10	11.39
Carbon Dioxide	G3	5.82	5.58	5.70	5.59
Water	G3	11.56	10.51	10.29	9.63
CT Gross Output (kW)	E1	166,954.	111,303.	168,636.	112,424.
CT Gross Heat Rate, LHV (Btu/kWh)		10,069.	11,641.	10,020.	11,702.
CT Gross Heat Rate, HHV (Btu/kWh)		10,673.	12,340.	10,622.	12,404.
HRSG CHARACTERISTICS (per HRSG)					
Heat Input to Duct Burner, LHV (MMBtu/hr)	D2	0.0	0.0	0.0	0.0
Heat Input to Duct Burner, HHV (MMBtu/hr)		0.0	0.0	0.0	0.0
Duct Burner Fuel Flow Rate (lb/hr)	G4	0	0	0	0
Duct Burner Gas Exit Temperature (°F)		1,070.3	1,089.9	1,043.6	1,075.8
Main Steam Flow Rate (lb/hr)	S1	445,906.	376,704.	430,163.	369,787.
Main Steam Pressure (psia)	S1	1,092.5	1,014.2	1,054.4	1,012.7
Main Steam Temperature (°F)	S1	960.0	960.0	960.0	960.0
Main Steam Enthalpy (Btu/lb)	S1	1,480.2	1,482.8	1,481.5	1,482.8
Hot Reheat Flow Rate (lb/hr)	S5	496,397.	431,239.	470,402.	419,974.
Hot Reheat Pressure (psia)	S5	333.2	289.7	315.6	282.2
Hot Reheat Temperature (°F)	S5	1,010.0	1,010.0	1,007.0	1,010.0
Hot Reheat Enthalpy (Btu/lb)	S5	1,531.0	1,532.3	1,529.9	1,532.5
IP Superheater Flow Rate (lb/hr)	S4	46,780.	37,456.	50,352.	39,480.
IP Superheater Pressure (psia)	S4	346.3	300.5	328.7	293.0
IP Superheater Temperature (°F)	S4	555.9	547.4	549.4	545.5
IP Superheater Enthalpy (Btu/lb)	S4	1,286.0	1,285.4	1,284.0	1,285.1
LP Superheater Flow Rate (lb/hr)	S7	21,172.	6,409.	24,000.	7,517.
LP Superheater Pressure (psia)	S7	65.4	53.7	63.2	52.6
LP Superheater Temperature (°F)	S7	544.6	554.5	534.5	553.3
LP Superheater Enthalpy (Btu/lb)	S7	1,304.6	1,310.4	1,299.8	1,309.9
Condensate Preheater Inlet Flow Rate (lb/hr)	W2	212,772.	86,901.	199,600.	79,399.
Condensate Preheater Inlet Pressure (psia)	W2	265.7	281.0	270.3	282.8
Condensate Preheater Inlet Temperature (°F)	W2	198.3	191.1	196.2	190.0
Condensate Preheater Inlet Enthalpy (Btu/lb)	W2	166.9	159.8	164.9	158.7
HRSG Exhaust Stack Gas Characteristics					
HRSG Exhaust Gas Temperature (°F)	G5	284.9	284.8	284.9	284.9
HRSG Exhaust Gas Flow Rate (lb/hr)	G5	3,244,002.	2,616,000.	3,341,000.	2,659,000.
HRSG BLOWDOWN CHARACTERISTICS (Per HRSG)					
HP Evaporator Blowdown Flow Rate (lb/hr)		4,394.	3,612.	4,303.	3,574.
IP Evaporator Blowdown Flow Rate (lb/hr)		473.	378.	509.	399.
DEAERATOR CHARACTERISTICS (Per HRSG)					
DA Operating Pressure (psia)		65.9	53.8	63.8	52.7
Main Boiler Feedwater Inlet Flow Rate (lb/hr)		534,257.	451,624.	510,616.	441,263.
Main Boiler Feedwater Inlet Temperature (°F)		242.7	211.8	240.3	209.4
Main Boiler Feedwater Outlet Flow Rate (lb/hr)		511,748.	444,086.	485,328.	432,642.
Main Boiler Feedwater Outlet Temperature (°F)		298.8	285.6	296.8	284.3
BFW Temperature Rise (°F)		56.1	73.8	56.5	74.9
Primary Pegging Steam Flow Rate (lb/hr)		34,658.	37,611.	33,259.	37,231.
Auxiliary Pegging Steam Flow Rate (lb/hr)		0.	0.	0.	0.
Vent Steam Flow Rate (lb/hr)		1,336.	1,129.	1,277.	1,103.

PRELIMINARY

Estimated Performance Summary
2x2x1 GE 7FA.05

CASE DESCRIPTION	Stream No.	Case 37	Case 38	Case 39	Case 40
Equipment Design					
Ambient Dry Bulb Temperature	G1	55°F	55°F	5°F	5°F
Relative Humidity	G1	66%	66%	68%	68%
Ambient Wet Bulb Temperature	G1	49°F	49°F	3.5°F	3.5°F
Site Elevation (ft AMSL)		625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2
Fuel Type		Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil
PUMP CHARACTERISTICS					
HP Feedpump Control Valve Discharge					
Total Flow Rate per HRSG (lb/hr)		450,299.	380,316.	434,467.	373,361.
Pressure (psia)		1,132.9	1,043.1	1,093.9	1,041.0
Temperature (°F)		301.3	287.8	299.1	286.5
Enthalpy (Btu/lb)		273.1	259.1	270.8	257.7
IP Feedpump Control Valve Discharge					
Total Flow Rate per HRSG (lb/hr)		61,449.	63,770.	50,861.	59,281.
Pressure (psia)		349.9.	303.1.	333.0.	295.9.
Temperature (°F)		299.5.	286.2.	297.4.	284.8.
Enthalpy (Btu/lb)		269.8.	256.0.	267.5.	254.6.
HRSG Preheater Recirculation Pump CV Discharge					
Total Flow Rate per HRSG (lb/hr)		0.	0.	0.	0.
Pressure (psia)		-	-	-	-
Temperature (°F)		-	-	-	-
Enthalpy (Btu/lb)		-	-	-	-
Condensate Pump Discharge					
Total Flow Rate from Condenser (lb/hr)		964,950.	818,488.	920,634.	798,434.
Pressure (psia)		350.0	350.0	350.0	350.0
Temperature (°F)		92.5	88.4	88.4	85.4
Enthalpy (Btu/lb)		61.5	57.4	57.3	54.4
STEAM TURBINE CHARACTERISTICS		TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB	TC3F 25 in. LSB
Main Steam Throttle Flow Rate (lb/hr)	S2	891,811.	753,409.	860,327.	739,573.
Main Steam Throttle Pressure (psia)	S2	1,038.1	972.0	1,001.8	972.0
Main Steam Throttle Temperature (°F)	S2	950.0	950.0	950.0	950.0
Main Steam Throttle Enthalpy (Btu/lb)	S2	1,476.2	1,478.4	1,477.4	1,478.4
Cold Reheat Steam Flow Rate (lb/hr)	S3	870,843.	735,694.	840,100.	722,184.
Cold Reheat Steam Pressure (psia)	S3	365.8.	316.8.	347.8.	309.1.
Cold Reheat Steam Temperature (°F)	S3	680.8.	682.7.	677.6.	680.7.
Cold Reheat Steam Enthalpy (Btu/lb)	S3	1,354.4.	1,358.4.	1,353.8.	1,357.7.
Hot Reheat Steam Flow Rate (lb/hr)	S6	992,795.	862,478.	940,805.	839,948.
Hot Reheat Steam Pressure (psia)	S6	313.0.	272.0.	296.4.	265.0.
Hot Reheat Steam Temperature (°F)	S6	1,000.0.	1,000.0.	997.0.	1,000.0.
Hot Reheat Steam Enthalpy (Btu/lb)	S6	1,526.3.	1,527.5.	1,525.2.	1,527.7.
SFLP Turbine Inlet Steam Flow (lb/hr)	S8	311,916	263,585	298,016	257,496
SFLP Turbine Inlet Steam Pressure (psia)	S8	63.3	53.5	60.5	52.2
SFLP Turbine Inlet Steam Temperature (°F)	S8	584.2	579.7	583.1	580.4
SFLP Turbine Inlet Steam Enthalpy (Btu/lb)	S8	1,324.2	1,322.7	1,323.9	1,323.1
SFLP Turbine Exhaust Steam Flow Rate (lb/hr)	S10	322,120.	272,325.	307,774.	266,042.
SFLP Turbine Exhaust UEEP (Btu/lb)	S10	1,041.5	1,042.1	1,040.2	1,041.2
SFLP Turbine Exhaust Loss (Btu/lb)		16.3	15.1	19.0	17.2
SFLP Turbine Exhaust Annulus Velocity (ft/sec)		884.2	850.5	955.2	906.7
SFLP Turbine Exhaust Sonic Velocity (ft/sec)		1,452.7	1,467.1	1,453.1	1,447.1
DFLP Turbine Inlet Steam Flow (lb/hr)	S9	731,210	618,313	698,599	604,008
DFLP Turbine Inlet Steam Pressure (psia)	S9	62.1	52.4	59.3	51.2
DFLP Turbine Inlet Steam Temperature (°F)	S9	584.1	579.6	582.9	580.2
DFLP Turbine Inlet Steam Enthalpy (Btu/lb)	S9	1,324.2	1,322.7	1,323.9	1,323.1
DFLP Turbine Second Extraction Steam Flow (lb/hr)	S12	36,787	29,819	35,144	29,204
DFLP Turbine Second Extraction Steam Pressure (psia)	S12	12.7	10.7	12.1	10.5
DFLP Turbine Second Extraction Steam Temperature (°F)	S12	296.4	293.5	296.0	294.3
DFLP Turbine Second Extraction Steam Enthalpy (Btu/lb)	S12	1,191.5	1,190.5	1,191.4	1,191.0
DFLP Turbine Third Extraction Steam Flow (lb/hr)	S13	65,613	53,947	64,333	53,914
DFLP Turbine Third Extraction Steam Pressure (psia)	S13	6.14	5.22	5.85	5.08
DFLP Turbine Third Extraction Steam Temperature (°F)	S13	191.9	189.8	191.3	190.2
DFLP Turbine Third Extraction Steam Enthalpy (Btu/lb)	S13	1,144.2	1,143.6	1,144.0	1,143.9
DFLP Turbine Exhaust Steam Flow Rate (lb/hr)	S11	629,041.	534,747.	599,343.	521,084.
DFLP Turbine Exhaust UEEP (Btu/lb)	S11	1,042.5	1,043.1	1,041.0	1,042.1
DFLP Turbine Exhaust Loss (Btu/lb)		15.6	14.6	18.1	16.5
DFLP Turbine Exhaust Annulus Velocity (ft/sec)		864.9	836.4	931.6	889.3
DFLP Turbine Exhaust Sonic Velocity (ft/sec)		1,452.7	1,467.1	1,453.1	1,447.1
Turbine Backpressure (In. HgA)	S10, S11	1.53	1.34	1.34	1.22
Gross Steam Turbine Output (kW)	E2	171,907.	146,747.	164,443.	143,680.

PRELIMINARY

Estimated Performance Summary
2x2x1 GE 7FA.05

CASE DESCRIPTION	Stream No.	Case 37	Case 38	Case 39	Case 40
Equipment Design					
Ambient Dry Bulb Temperature	G1	55°F	55°F	5°F	5°F
Relative Humidity	G1	66%	66%	68%	68%
Ambient Wet Bulb Temperature	G1	49°F	49°F	3.5°F	3.5°F
Site Elevation (ft AMSL)		625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2
Fuel Type		Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil
FEEDWATER HEATER CHARACTERISTICS					
Feedwater Heater #2					
Extraction Steam Flow Rate (lb/hr)		36,787	29,819	35,144	29,204
Extraction Line Pressure Drop (%)		4.1	3.8	4.1	3.8
Extraction Enthalpy (Btu/lb)		1,191.5	1,190.5	1,191.4	1,191.0
Feedwater Inlet Temperature (°F)		165.5	159.5	163.3	158.3
Feedwater Outlet Temperature (°F)		200.2	193.0	198.1	192.0
Drain Pressure (psia)		12.1	10.3	11.6	10.1
Drain Temperature (°F)		202.4	194.6	200.2	193.5
Feedwater Heater #1					
Extraction Steam Flow Rate, includes SSR Flow (lb/hr)		66,775	54,942	65,444	54,886
Extraction Line Pressure Drop (%)		7.1	6.6	7.5	7.0
Extraction Enthalpy (Btu/lb)		1,148.0	1,147.6	1,147.8	1,147.7
Feedwater Inlet Temperature (°F)		94.3	90.1	90.1	87.2
Feedwater Outlet Temperature (°F)		165.1	159.2	163.0	158.0
Drain Pressure (psia)		5.71	4.87	5.41	4.73
Drain Temperature (°F)		167.8	161.1	165.5	159.8
TURBINE BYPASS SYSTEM CHARACTERISTICS (per HRSG)					
MS Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-
MS Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W8	-	-	-	-
MS Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S14	-	-	-	-
MS Bypass Attemporator Outlet Steam Pressure (psia)	S14	-	-	-	-
MS Bypass Attemporator Outlet Steam Temperature (°F)	S14	-	-	-	-
MS Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S14	-	-	-	-
HRH Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-
HRH Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W9	-	-	-	-
HRH Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S15	-	-	-	-
HRH Bypass Attemporator Outlet Steam Pressure (psia)	S15	-	-	-	-
HRH Bypass Attemporator Outlet Steam Temperature (°F)	S15	-	-	-	-
HRH Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S15	-	-	-	-
LP Bypass Attemporator Inlet Steam Flow Rate (lb/hr)		-	-	-	-
LP Bypass Attemporator Inlet Water Flow Rate (lb/hr)	W10	-	-	-	-
LP Bypass Attemporator Outlet Steam Flow Rate (lb/hr)	S16	-	-	-	-
LP Bypass Attemporator Outlet Steam Pressure (psia)	S16	-	-	-	-
LP Bypass Attemporator Outlet Steam Temperature (°F)	S16	-	-	-	-
LP Bypass Attemporator Outlet Steam Enthalpy (Btu/lb)	S16	-	-	-	-
CONDENSER CHARACTERISTICS					
Operating Pressure (psia)		0.752	0.658	0.659	0.599
Operating Pressure (in Hg Abs.)		1.53	1.34	1.34	1.22
Temperature of Condensing Steam (°F)		92.3	88.1	88.1	85.1
CW Flow Rate Through Condenser (gpm)	W3	98,750	98,750	98,750	98,750
CW Temperature Into Condenser (°F)	W3	68.4	67.7	65.0	65.0
CW Temperature Out Of Condenser (°F)	W4	87.4	83.8	83.1	80.8
Circulating Water Temperature Rise (°F)		19.0	16.2	18.1	15.8
Terminal Temperature Difference, TTD (°F)		5.0	4.3	5.0	4.3
Total Condenser Heat Rejection (MMBtu/hr)		933.9	796.4	893.2	778.2
AUXILIARY COOLING SYSTEM					
Auxiliary Cooling Water Flow Rate Through Heat Exchangers (gpm)	W5	17,250	17,250	17,250	17,250
Auxiliary Cooling Water Temperature Rise (°F)		20.0	20.0	20.0	20.0
Total Auxiliary Cooling Heat Rejection (MMBtu/hr)		172.3	172.3	172.3	172.3
COOLING TOWER CHARACTERISTICS					
CW Flow Rate Into Cooling Tower (gpm)	W6	116,000	116,000	116,000	116,000
CW Temperature Into Cooling Tower (°F)	W6	87.5	84.4	83.4	81.4
Air Inlet Wet Bulb Temperature (°F)		49.0	49.0	3.5	3.5
Current Approach Temperature (°F)		19.5	18.7	*	*
Current Range Temperature (°F)		19.1	16.8	18.5	16.6
Drift Rate (%)		0.005	0.005	*	*
Cycles of Concentration		4	4	4	4
Evaporation Loss (gpm)		1,547	1,358	*	*
Drift Loss (gpm)		5.8	5.8	*	*
Blowdown (gpm)		510	447	*	*
Blowdown Temperature (°F)		68.4	67.6	*	*
Makeup (gpm)		2,063	1,810	*	*
Makeup Temperature (°F)		60.0	60.0	*	*
Total Cooling Tower Heat Rejection (MMBtu/hr)		1,116.5	979.0	1,067.2	952.2

PRELIMINARY

Estimated Performance Summary
2x2x1 GE 7FA.05

CASE DESCRIPTION	Stream No.	Case 37	Case 38	Case 39	Case 40
Equipment Design					
Ambient Dry Bulb Temperature	G1	55°F	55°F	5°F	5°F
Relative Humidity	G1	66%	66%	68%	68%
Ambient Wet Bulb Temperature	G1	49°F	49°F	3.5°F	3.5°F
Site Elevation (ft AMSL)		625	625	625	625
Cycle Configuration (# CT x # HRSG x # ST)		2 x 2 x 1	2 x 2 x 1	2 x 2 x 1	2 x 2 x 1
Number of CT's Operating		2	2	2	2
Fuel Type		Distillate Oil	Distillate Oil	Distillate Oil	Distillate Oil
FUEL GAS PERFORMANCE HEATER CHARACTERISTICS (Per CT)					
Natural Gas Flow Rate (lb/hr)	G2	-	-	-	-
Natural Gas Inlet Temperature (°F)		-	-	-	-
Natural Gas Outlet Temperature (°F)	G2	-	-	-	-
Heating Water Inlet Flow Rate (lb/hr)		-	-	-	-
Heating Water Inlet Temperature (°F)		-	-	-	-
Heating Water Outlet Temperature (°F)		-	-	-	-
CYCLE MAKEUP CONDITIONS					
Makeup Flow Rate to Steam Cycle (gpm)	W7	24.8.	20.5.	24.4.	20.3.
Makeup Temperature (°F)	W7	60.0	60.0	60.0	60.0
TOTAL PLANT PERFORMANCE					
Total Gross CT Electrical Output (kW)		333,908.	222,606.	337,272.	224,848.
Total Gross Steam Turbine Electrical Output (kW)	E2	171,907.	146,747.	164,443.	143,680.
Total Gross Plant Electrical Output (kW)	D3	505,815.	369,354.	501,715.	368,528.
Auxiliary Power					
BOP Percent Aux Power, Approx. (%)		2.20	2.20	2.20	2.20
BOP Auxiliary Power (kW)		11,130.	8,130.	11,040.	8,110.
Chiller 0.7327 kW per ton chilling capacity (kW)		0.	0.	0.	0.
Total Auxiliary Power (kW)		11,130.	8,130.	11,040.	8,110.
Percentage of Gross Electrical Output (%)		2.20	2.20	2.20	2.20
Net Plant Electrical Output (kW)	D4	494,685.	361,224.	490,675.	360,418.
Net Plant Electrical Heat Rate, LHV (Btu/kWh)	D5	6,796.	7,174.	6,888.	7,300.
Net Plant Electrical Heat Rate, HHV (Btu/kWh)		7,204.	7,604.	7,301.	7,738.

* = Cooling Tower parameter can not be calculated at minimum cooling water temperature condition.

Heat Recovery Steam Generator

Fuel Gas Preheater
Natural Gas
Preheater Bypass
Recirc Pump
Vent
Integral DA
STACK
G5
G2
Natural Gas
G4
NOx Water
W1
O1
Distillate Oil
G1
Inlet Air Cooling
Generator
E1
G3
Combustion Turbine
HPSHT2
RHT2
DUCT BURNER
HPSHT1
RHT1
HP EVAP
SCR
IPSHT
LPSHT2
HPECON2
IP EVAP
IPECON
HPECON1
LPSHT1
LP EVAP
PREHEATER
BD
S1
S5
W8
S14
MS Bypass
S4
S7
W2
To ATT.
To ATT.
W8
HP FW
IP FW
BFP
From HRSG 2
To HRSG 2
From HRSG 2
From HRSG 2
To HRSG 2
From HRSG 2
W10
S16
LP Bypass
From HRSG 2
W9
S15
HRH Bypass
S3
S2
S6
S8
S10
S9
S11
HP
IP
SFLP
DFLP
Generator
E2
Steam Turbine
S12
S13
To FWH 2
To FWH 1
Cooling Tower
W6
W4
W5
ACW
W3
W7
Demin Make-up
Condenser
Circulating Water Pump
W10
W9
To HRSG 2
From DFLP
From DFLP
FWH 1
FWH 2
Condensate Pump

PRELIMINARY
Plant Performance Summary Data

Heat Input to Combustion Turbine, per CT	D1	mmBtu/hr, LHV
Heat Input to Duct Burner, per HRSG	D2	mmBtu/hr, LHV
Gross Generation	D3	kW
Net Plant Output	D4	kW
Net Plant Heat Rate	D5	Btu/kWh, LHV

S Steam
W Water
G Gas
E Electricity
O Oil

Diagram is schematic only. Miscellaneous flows not shown for clarity
Turbine casing configuration may differ

Legend

W = lb/hr
P = psia
T = °F
H = Btu/lb
= Attemperator (ATT.)
BD = Blowdown (BD)

Drawing Release Record

Rev.	Date	Prepared By	Reviewed By	Approved By	Project No.:
0	27-Jul-2011	M. Thomas	D. Azukas		12756-002

American Electric Power
Big Sandy Plant
Unit 1 Repowering Cost Estimate Study
GE 7FA.05 2x2x1 Combined Cycle Configuration
Cycle Diagram Schematic

Sargent & Lundy LLC

ATTACHMENT 1-5
Emissions Calculations

Design Basis for S&L Emissions Calculations

Emissions Estimates

S&L will provide emissions estimates for NO_x, CO, VOC, SO_2, $PM/PM_{10}/PM_{2.5}$, H_2SO_4, NH_3, and CO_2. The following operating cases will be evaluated:

- Natural Gas fuel
  - Annual Average – 100% load
  - Annual Average – 100% load with inlet chillers
  - Annual Average – 100% load with inlet chillers and duct firing
  - 99% Winter – 100% load
  - 99% Winter – 100% load with duct firing
  - 1% Summer – 100% load
  - 1% Summer – 100% load with inlet chillers
  - 1% Summer – 100% load with inlet chillers and duct firing

- Distillate Oil fuel
  - Annual Average – 100% load
  - 99% Winter – 100% load
  - 1% Sumer – 100% load

Emissions estimates will be based on CT performance data provided by MHI (Option 1) and GE (Option 2) and heat balances developed by S&L for both Options 1 and 2. The stack emissions estimates will assume that SCR will be installed for NO_x reduction and CO oxidation catalyst will be installed for CO reduction. SO_2 and H_2SO_4 emissions will be based on fuel sulfur content of 0.5 gr/100ft^3 for natural gas and 0.0015 wt% for fuel oil. CT $PM/PM_{10}/PM_{2.5}$ emissions will be set equal to 0.005 lb/mmBtu for MHI (Option 1) and 18 lb/hr (~0.008-0.009 lb/mmBtu) for GE (Option 2) (front and back half).

For gas fired operation (without duct firing), the following target NO_x, CO, VOC, and NH_3 emission rates are assumed:

NO_x: 2.0 ppmvd@15%O_2

CO: 1.4 – 2.0 ppmvd@15%O_2

VOC: 1.0 – 1.4 ppmvd@15%O_2

NH_3 Slip: 5 ppm

American Electric Power
Big Sandy Plant Unit 1
Repowering Cost Estimate Study

		Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
Ambient Temp - % Load		55 F - 100% Load	55 F - 100% Load	55 F - 100% Load	5 F - 100% Load	5 F - 100% Load	85 F - 100% Load
Fuel		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
Inlet Chiller		Off	On	On	Off	Off	Off
Duct Firing (Fired / Unfired)		Unfired	Unfired	Fired	Unfired	Fired	Unfired
Controlled Emissions (Per CT/HRSG)		ppmvd@15%O_2	ppmvd@15%O_2	ppmvd@15%O_2	ppmvd@15%O_2	ppmvd@15%O_2	ppmvd@15%O_2
	NO_X	2.0	2.0	2.0	2.0	2.0	2.0
	CO	2.0	2.0	2.6	2.0	2.5	2.0
	VOC	1.4	1.4	1.6	1.4	1.5	1.4
	NH_3	5.0	5.0	5.0	5.0	5.0	5.0
		lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
	NO_X	19.5	19.7	21.7	21.9	23.5	18.1
	CO	11.9	12.0	17.4	13.3	17.8	11.0
	SO_2	3.78	3.83	4.23	4.24	4.57	3.50
	PM_{10} / $PM_{2.5}$	14.69	14.82	18.57	16.51	19.83	13.56
	VOC	4.75	4.82	6.01	5.35	6.05	4.41
	H_2SO_4	1.33	1.35	2.14	1.49	2.31	1.23
	NH_3	18.0	18.3	20.1	20.3	21.8	16.7
	CO_2	321,834	325,777	356,805	360,905	386,447	298,299

American Electric Power
Big Sandy Plant Unit 1
Repowering Cost Estimate Study

		Case 7	Case 8	Case 9	Case 10	Case 11
Ambient Temp - % Load		85 F - 100% Load	85 F - 100% Load	55 F - 100% Load	5 F - 100% Load	89 F - 100% Load
Fuel		Natural Gas	Natural Gas	Distillate Oil	Distillate Oil	Distillate Oil
Inlet Chiller		On	On	Off	Off	Off
Duct Firing (Fired / Unfired)		Unfired	Fired	Unfired	Unfired	Unfired
Controlled Emissions (Per CT/HRSG)		ppmvd@15%O_2	ppmvd@15%O_2	ppmvd@15%O_2	ppmvd@15%O_2	ppmvd@15%O_2
	NO_X	2.0	2.0	5.0	5.0	5.0
	CO	2.0	2.6	10.0	10.0	10.0
	VOC	1.4	1.5	8.0	8.0	8.0
	NH_3	5.0	5.0	5.0	5.0	5.0
		lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
	NO_X	19.8	21.6	44.6	44.6	41.6
	CO	12.0	16.9	54.3	54.3	50.7
	SO_2	3.83	4.19	3.35	3.35	3.13
	PM_{10} / $PM_{2.5}$	14.82	18.31	24.59	24.59	22.69
	VOC	4.83	5.83	24.86	24.89	23.22
	H_2SO_4	1.35	2.12	1.18	1.18	1.10
	NH_3	18.3	20.0	16.5	16.5	15.4
	CO_2	325,861	354,139	369,047	368,760	344,151

Option 1
Mitsubishi M501GAC Combined Cycle
Emissions Summary
Preliminary

Emissions Case No.		**Case 1**	**Case 2**	**Case 3**	**Case 4**	**Case 5**	**Case 6**	**Case 7**	**Case 8**
Reference Heat Balance Case No.		Case 1	Case 24	Case 8	Case 3	Case 9	Case 5	Case 4	Case 2
		55 F - 100% Load	**55 F - 100% Load**	**55 F - 100% Load Annual Average Chiller Duct Firing**	**5 F - 100% Load**	**5 F - 100% Load 99% Winter Duct Firing**	**85 F - 100% Load 1% Summer Chiller**	**85 F - 100% Load 1% Summer Chiller Duct Firing**	**85 F - 100% Load**
American Electric Power			**Annual Average**						
Big Sandy Plant Unit 1		**Annual Average**	**Chiller**		**99% Winter**		**1% Summer**		
Repowering Cost Estimate Study									
Gas Fired Emission Estimates (per CT/HRSG)									
SITE CONDITIONS									
Ambient Temperature	°F	55	55	55	5	5	85	85	85
Relative Humidity	%	65.7	65.7	65.7	61	61	66.8	66.8	66.8
Site Elevation	feet	625	625	625	625	625	625	625	625
Atmospheric Pressure	psia	14.37	14.37	14.37	14.37	14.37	14.37	14.37	14.37
FACILITY CONDITIONS (Note 1)									
CT Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CT Model		M501GAC	M501GAC	M501GAC	M501GAC	M501GAC	M501GAC	M501GAC	M501GAC
CT Load	%	100	100	100	100	100	100	100	100
CT Chiller	ON/OFF	Off	On	On	Off	Off	Off	On	On
CT Gross Power Output	kW	263,200	267,500	267,500	300,500	300,500	238,600	267,500	267,500
CT Heat Consumption (LHV)	MBtu/hr	2,302.0	2,334.0	2,334.0	2,587.0	2,587.0	2,136.0	2,334.0	2,334.0
CT Heat Consumption (HHV)	MBtu/hr	2,555.2	2,590.7	2,590.7	2,871.6	2,871.6	2,371.0	2,590.7	2,590.7
CT Fuel Flow Rate	lb/hr	115,309	116,912	116,912	129,585	129,585	106,994	116,912	116,912
CT Fuel Flow Rate	MSCF/hr	2.64	2.68	2.68	2.97	2.97	2.45	2.68	2.68
CT Exhaust Gas Flow Rate	lb/hr	5,002,211	5,048,040	5,048,040	5,505,678	5,505,678	4,663,080	5,046,530	5,046,530
CT Exhaust Gas Temperature	°F	1,134	1,132	1,132	1,113	1,113	1,156	1,132	1,132
DB Heat Consumption (HHV) **(Note 1)**	MBtu/hr	0.0	0.0	269.6	0.0	221.9	0.0	0.0	245.7
DB Heat Consumption (LHV)	MBtu/hr	0.0	0.0	242.9	0.0	199.9	0.0	0.0	221.4
DB Fuel Flow Rate	lb/hr	0	0	12,166	0	10,014	0	0	11,088
DB Fuel Flow Rate	MSCF/hr	0.00	0.00	0.28	0.00	0.23	0.00	0.00	0.25
NATURAL GAS ANALYSIS (Note 2)									
Fuel LHV	Btu/lb	19,964	19,964	19,964	19,964	19,964	19,964	19,964	19,964
Fuel HHV	Btu/lb	22,172	22,172	22,172	22,172	22,172	22,172	22,172	22,172
Fuel LHV	Btu/ft^3	870.8	870.8	870.8	870.8	870.8	870.8	870.8	870.8
Fuel HHV	Btu/ft^3	967.1	967.1	967.1	967.1	967.1	967.1	967.1	967.1
HHV/LHV Ratio		1.110	1.110	1.110	1.110	1.110	1.110	1.110	1.110
Total Sulfur, S **(Note 3)**	grains/100 ft^3	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
COMBUSTION TURBINE EXHAUST ANALYSIS (Note 4)									
Argon, Ar	% vol	0.930	0.930	0.930	0.940	0.940	0.920	0.930	0.930
Nitrogen, N_2	% vol	74.20	74.07	74.07	74.79	74.79	72.89	73.99	73.99
Oxygen, O_2	% vol	11.99	11.92	11.92	11.95	11.95	11.73	11.89	11.89
Carbon Dioxide, CO_2	% vol	4.15	4.16	4.16	4.24	4.24	4.10	4.16	4.16
Water, H_2O	% vol	8.73	8.93	8.93	8.08	8.08	10.37	9.02	9.02
Total		*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*
Molecular weight	lb/lbmol	28.39	28.37	28.37	28.47	28.47	28.21	28.36	28.36
COMBUSTION TURBINE EMISSIONS (per CT) (Note 5)									
NO_X	ppmvd @ 15% O_2	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
NO_X	ppmvd	19.7	19.9	19.9	20.1	20.1	19.9	19.9	19.9
NO_X as NO_2	lb/hr	146.0	148.1	148.1	164.2	164.2	135.4	148.2	148.2
CO	ppmvd @ 15% O_2	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
CO	ppmvd	13.2	13.2	13.2	13.4	13.4	13.2	13.3	13.3
CO	lb/hr	59.3	60.1	60.1	66.7	66.7	55.0	60.2	60.2
VOC	ppmvd @ 15% O_2	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
VOC	ppmvd	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9
VOC	ppmvw	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
VOC	lb/hr	4.8	4.8	4.8	5.3	5.3	4.4	4.8	4.8
SO_2	ppmvd @ 15% O_2	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
SO_2	ppmvd	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
SO_2	lb/hr	3.78	3.83	3.83	4.24	4.24	3.50	3.83	3.83
SO_3 Oxidation **(Note 6)**	%	8	8	8	8	8	8	8	8
SO_3	ppmvd @ 15% O_2	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022
SO_3	ppmvd	0.029	0.030	0.030	0.030	0.030	0.030	0.030	0.030
SO_3	lb/hr	0.378	0.383	0.383	0.424	0.424	0.350	0.383	0.383

Option 1
Mitsubishi M501GAC Combined Cycle
Emissions Summary
Preliminary

Emissions Case No.		**Case 1**	**Case 2**	**Case 3**	**Case 4**	**Case 5**	**Case 6**	**Case 7**	**Case 8**
Reference Heat Balance Case No.		Case 1	Case 24	Case 8	Case 3	Case 9	Case 5	Case 4	Case 2
		55 F - 100% Load	**55 F - 100% Load**	**55 F - 100% Load Annual Average Chiller**	**5 F - 100% Load**	**5 F - 100% Load**	**85 F - 100% Load**	**85 F - 100% Load**	**85 F - 100% Load 1% Summer Chiller**
American Electric Power			**Annual Average**			**99% Winter**		**1% Summer**	
Big Sandy Plant Unit 1		**Annual Average**	**Chiller**	**Duct Firing**	**99% Winter**	**Duct Firing**	**1% Summer**	**Chiller**	**Duct Firing**
Repowering Cost Estimate Study									
Gas Fired Emission Estimates (per CT/HRSG)									
PM10									
Total (Front & Back Half)	lb/hr	12.90	13.00	13.00	14.50	14.50	11.90	13.00	13.00
Total (Front & Back Half)	lb/mmBtu	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050
CO_2	ppmvd @ 15% O_2	34,557	34,493	34,493	34,451	34,451	34,534	34,459	34,459
CO_2	ppmvd	45,469	45,674	45,674	46,127	46,127	45,739	45,729	45,729
CO_2	lb/hr	321,760	325,701	325,701	360,821	360,821	298,230	325,785	325,785
DUCT BURNER EMISSIONS (per CT/HRSG) (See Note 7)									
DB Heat Consumption (HHV)	MBtu/hr	0.0	0.0	269.6	0.0	221.9	0.0	0.0	245.7
NO_X	lb/MBtu, HHV	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NO_X	lb/hr	0.0	0.0	27.0	0.0	22.2	0.0	0.0	24.6
CO	lb/MBtu, HHV	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
CO	lb/hr	0.0	0.0	27.0	0.0	22.2	0.0	0.0	24.6
VOC	lb/MBtu, HHV	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
VOC	lb/hr	0.0	0.0	2.7	0.0	2.2	0.0	0.0	2.5
SO_2	lb/hr	0.00	0.00	0.40	0.00	0.33	0.00	0.00	0.36
SO_3 Oxidation	%	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
SO_3	lb/hr	0.00	0.00	0.04	0.00	0.03	0.00	0.00	0.04
PM10									
Front and Back Half	lb/MBtu, HHV	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
Front and Back Half	lb/hr	0.0	0.0	2.7	0.0	2.2	0.0	0.0	2.5
CO_2	lb/hr	0	0	30,974	0	25,494	0	0	28,228
POST DUCT BURNER EXHAUST COMPOSTION (per CT/HRSG)									
Argon, Ar	vol %	0.93	0.93	0.93	0.94	0.94	0.92	0.93	0.93
Nitrogen, N_2	vol %	74.20	74.06	73.78	74.79	74.57	72.88	74.00	73.74
Oxygen, O_2	vol %	11.99	11.92	11.08	11.95	11.32	11.73	11.89	11.13
Carbon Dioxide, CO_2	vol %	4.15	4.16	4.54	4.24	4.53	4.10	4.16	4.50
Water, H_2O	vol %	8.73	8.93	9.68	8.08	8.65	10.37	9.02	9.71
Total		*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*
Molecular weight	lb/lbmol	28.39	28.37	28.32	28.47	28.44	28.21	28.36	28.32
POST DUCT BURNER EMISSIONS (per CT/HRSG)									
NO_X	ppmvd @ 15% O_2	15.0	15.0	16.1	15.0	15.8	15.0	15.0	16.0
NO_X	ppmvd	19.7	19.9	23.6	20.1	22.9	19.9	19.9	23.3
NO_X as NO_2	lb/hr	146.0	148.1	175.0	164.2	186.4	135.4	148.2	172.8
CO	ppmvd @ 15% O_2	10.0	10.0	13.2	10.0	12.4	10.0	10.0	12.9
CO	ppmvd	13.2	13.2	19.3	13.4	17.9	13.2	13.3	18.8
CO	lb/hr	59.3	60.1	87.1	66.7	88.8	55.0	60.2	84.7
VOC	ppmvd @ 15% O_2	1.4	1.4	2.0	1.4	1.8	1.4	1.4	1.9
VOC	ppmvd	1.8	1.9	2.9	1.9	2.7	1.9	1.9	2.8
VOC	ppmvw	1.7	1.7	2.6	1.7	2.4	1.7	1.7	2.5
VOC	lb/hr	4.8	4.8	7.5	5.3	7.6	4.4	4.8	7.3
SO_2	ppmvd @ 15% O_2	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
SO_2	ppmvd	0.37	0.37	0.41	0.37	0.40	0.37	0.37	0.41
SO_2	lb/hr	3.78	3.83	4.23	4.24	4.57	3.50	3.83	4.19
SO_3	ppmvd @ 15% O_2	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
SO_3	ppmvd	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
SO_3	lb/hr	0.38	0.38	0.42	0.42	0.46	0.35	0.38	0.42
PM10									
Front & Back Half	lb/hr	12.90	13.00	15.70	14.50	16.72	11.90	13.00	15.46
CO_2	ppmvd @ 15% O_2	34,557	34,493	34,336	34,451	34,335	34,534	34,459	34,318
CO_2	ppmvd	45,469	45,674	50,226	46,127	49,540	45,739	45,729	49,880
CO_2	lb/hr	321,760	325,701	356,675	360,821	386,315	298,230	325,785	354,013

Option 1
Mitsubishi M501GAC Combined Cycle
Emissions Summary
Preliminary

Emissions Case No.		**Case 1**	**Case 2**	**Case 3**	**Case 4**	**Case 5**	**Case 6**	**Case 7**	**Case 8**
Reference Heat Balance Case No.		Case 1	Case 24	Case 8	Case 3	Case 9	Case 5	Case 4	Case 2
		55 F - 100% Load	**55 F - 100% Load**	**55 F - 100% Load Annual Average Chiller**	**5 F - 100% Load**	**5 F - 100% Load**	**85 F - 100% Load**	**85 F - 100% Load**	**85 F - 100% Load 1% Summer Chiller**
American Electric Power			**Annual Average**			**99% Winter**		**1% Summer**	
Big Sandy Plant Unit 1		**Annual Average**	**Chiller**	**Duct Firing**	**99% Winter**	**Duct Firing**	**1% Summer**	**Chiller**	**Duct Firing**
Repowering Cost Estimate Study									
Gas Fired Emission Estimates (per CT/HRSG)									
POST OXIDATION CATALYST EMISSIONS (per CT/HRSG)									
CO Reduction **(Note 8)**	% decrease	80	80	80	80	80	80	80	80
CO	ppmvd @ 15% O_2	2.0	2.0	2.6	2.0	2.5	2.0	2.0	2.6
CO	ppmvd	2.6	2.6	3.9	2.7	3.6	2.6	2.7	3.8
CO	lb/hr	11.9	12.0	17.4	13.3	17.8	11.0	12.0	16.9
VOC Reduction **(Note 8)**	% decrease	0	0	20	0	20	0	0	20
VOC (non-methane, non-ethane)	ppmvd @ 15% O_2	1.4	1.4	1.6	1.4	1.5	1.4	1.4	1.5
VOC (non-methane, non-ethane)	ppmvd	1.8	1.9	2.3	1.9	2.1	1.9	1.9	2.3
VOC as CH_4	lb/hr	4.8	4.8	6.0	5.3	6.1	4.4	4.8	5.8
SO_3 Oxidation **(Note 9)**	% increase	10	10	20	10	20	10	10	20
D SO_3	ppmvd @ 15% O_2	0.028	0.028	0.056	0.028	0.056	0.028	0.028	0.056
D SO_3	ppmvd	0.037	0.037	0.082	0.037	0.081	0.037	0.037	0.081
D SO_3	lb/hr	0.47	0.48	1.06	0.53	1.14	0.44	0.48	1.05
CO_2	ppmvd @ 15% O_2	34,565	34,501	34,349	34,459	34,347	34,542	34,467	34,330
CO_2	ppmvd	45,480	45,685	50,244	46,138	49,557	45,749	45,740	49,898
CO_2	lb/hr	321,834	325,777	356,805	360,905	386,447	298,299	325,861	354,139
POST SCR EMISSIONS (per CT/HRSG)									
Hours of Operation **(Note 10)**	hours/year	8,760	8,760	8,760	8,760	8,760	8,760	8,760	8,760
NO_X **(Note 11)**	ppmvd @ 15% O_2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
NO_X Removal Efficiency **(Note 8)**	% decrease	86.7	86.7	87.6	86.7	87.4	86.7	86.7	87.5
NO_X	ppmvd	2.6	2.6	2.9	2.7	2.9	2.6	2.7	2.9
NO_X	lb/hr	19.5	19.7	21.7	21.9	23.5	18.1	19.8	21.6
NO_X	lb/MBtu (HHV)	0.0076	0.0076	0.0076	0.0076	0.0076	0.0076	0.0076	0.0076
NO_X **(Note 10)**	ton/yr	85.3	86.5	95.1	95.9	103.0	79.1	86.6	94.5
NH_3	ppmvd @ 15% O_2	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
NH_3	ppmvd	6.58	6.62	7.31	6.69	7.21	6.62	6.64	7.27
NH_3	lb/hr	18.0	18.3	20.1	20.3	21.8	16.7	18.3	20.0
NH_3	lbmol/hr	1.1	1.1	1.2	1.2	1.3	1.0	1.1	1.2
NH_3 **(Note 10)**	ton/yr	78.9	80.0	88.0	88.8	95.4	73.2	80.1	87.4
CO	ppmvd @ 15% O_2	2.0	2.0	2.6	2.0	2.5	2.0	2.0	2.6
CO	ppmvd	2.6	2.6	3.9	2.7	3.6	2.6	2.7	3.8
CO	lb/hr	11.9	12.0	17.4	13.3	17.8	11.0	12.0	16.9
CO	lb/MBtu (HHV)	0.0046	0.0046	0.0061	0.0046	0.0057	0.0046	0.0046	0.0060
CO **(Note 10)**	ton/yr	51.9	52.6	76.3	58.4	77.8	48.1	52.7	74.2
VOC	ppmvd @ 15% O_2	1.4	1.4	1.6	1.4	1.5	1.4	1.4	1.5
VOC	ppmvd	1.8	1.9	2.3	1.9	2.1	1.9	1.9	2.3
VOC	lb/hr	4.8	4.8	6.0	5.3	6.1	4.4	4.8	5.8
VOC	lb/MBtu (HHV)	0.0019	0.0019	0.0021	0.0019	0.0020	0.0019	0.0019	0.0021
VOC **(Note 10)**	ton/yr	20.8	21.1	26.3	23.4	26.5	19.3	21.1	25.5
SO_2	ppmvd @ 15% O_2	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
SO_2	ppmvd	0.37	0.37	0.41	0.37	0.40	0.37	0.37	0.41
SO_2	lb/hr	3.78	3.83	4.23	4.24	4.57	3.50	3.83	4.19
SO_2	lb/MBtu (HHV)	0.00148	0.00148	0.00148	0.00148	0.00148	0.00148	0.00148	0.00148
SO_2 **(Note 10)**	ton/yr	16.5	16.8	18.5	18.6	20.0	15.3	16.8	18.4
SO_3 Oxidation across SCR **(Note 12)**	% increase	5	5	5	5	5	5	5	5
SO_3 Oxidation across SCR	lb/hr	0.24	0.24	0.26	0.27	0.29	0.22	0.24	0.26
SO_3	ppmvd @ 15% O_2	0.06	0.06	0.09	0.06	0.09	0.06	0.06	0.09
SO_3	ppmvd	0.08	0.08	0.13	0.09	0.13	0.08	0.08	0.13
SO_3	lb/hr	1.09	1.10	1.74	1.22	1.89	1.01	1.10	1.73
SO_3	lbmol/hr	1.36E-02	1.37E-02	2.18E-02	1.52E-02	2.36E-02	1.26E-02	1.37E-02	2.16E-02
H_2SO_4	lb/hr	1.33	1.35	2.14	1.49	2.31	1.23	1.35	2.12
H_2SO_4	lb/mmBtu	0.000425	0.000425	0.000610	0.000425	0.000610	0.000425	0.000425	0.000610
H_2SO_4 **(Note 10)**	ton/yr	5.8	5.9	9.4	6.5	10.1	5.4	5.9	9.3
$(NH_4)_2SO_4$, Ammonium Sulfate **(Note 13)**	lb/hr	1.79	1.82	2.88	2.01	3.11	1.66	1.82	2.85
$(NH_4)_2SO_4$, Ammonium Sulfate	ton/yr	7.8	8.0	12.6	8.8	13.6	7.3	8.0	12.5

Option 1
Mitsubishi M501GAC Combined Cycle
Emissions Summary
Preliminary

Emissions Case No.		**Case 1**	**Case 2**	**Case 3**	**Case 4**	**Case 5**	**Case 6**	**Case 7**	**Case 8**
Reference Heat Balance Case No.		Case 1	Case 24	Case 8	Case 3	Case 9	Case 5	Case 4	Case 2
		55 F - 100% Load	**55 F - 100% Load**	**55 F - 100% Load**	**5 F - 100% Load**	**5 F - 100% Load**	**85 F - 100% Load**	**85 F - 100% Load**	**85 F - 100% Load**
American Electric Power				**Annual Average**					**1% Summer**
Big Sandy Plant Unit 1		**Annual Average**	**Annual Average**	**Chiller**		**99% Winter**		**1% Summer**	**Chiller**
Repowering Cost Estimate Study			**Chiller**	**Duct Firing**	**99% Winter**	**Duct Firing**	**1% Summer**	**Chiller**	**Duct Firing**
Gas Fired Emission Estimates (per CT/HRSG)									
PM10									
Total PM10	lb/hr	14.69	14.82	18.57	16.51	19.83	13.56	14.82	18.31
Total PM10	lb/MBtu (HHV)	0.0057	0.0057	0.0065	0.0058	0.0064	0.0057	0.0057	0.0065
Total PM10	grains/scf	0.0015	0.0015	0.0019	0.0016	0.0019	0.0015	0.0015	0.0019
Total PM10	grains/dscf	0.0017	0.0017	0.0021	0.0017	0.0020	0.0017	0.0017	0.0021
Total PM10 **(Note 10)**	ton/yr	64.3	64.9	81.4	72.3	86.9	59.4	64.9	80.2
CO_2	ppmvd @ 15% O_2	34,565	34,501	34,349	34,459	34,347	34,542	34,467	34,330
CO_2	ppmvd	45,480	45,685	50,244	46,138	49,557	45,749	45,740	49,898
CO_2	lb/hr	321,834	325,777	356,805	360,905	386,447	298,299	325,861	354,139
CO_2	lb/mmBtu (HHV)	126.0	125.7	124.7	125.7	124.9	125.8	125.8	124.9
CO_2 **(Note 10)**	ton/yr	1,409,635	1,426,902	1,562,805	1,580,764	1,692,638	1,306,551	1,427,270	1,551,131
Aqueous Ammonia (per CT/HRSG)									
Purity **(Note 14)**	%	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0
Consumption	lb/hr	464.6	471.2	553.8	522.6	590.7	430.9	471.8	547.1
Stack Conditions (per CT/HRSG)									
Internal Diameter **(Note 15)**	ft	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
Flow	lb/hr	5,002,676	5,048,511	5,060,760	5,506,201	5,516,282	4,663,511	5,047,002	5,058,165
Flow	scfm	1,131,655	1,142,878	1,147,618	1,242,102	1,246,003	1,061,797	1,142,944	1,147,264
Flow	dscfm	1,032,861	1,040,829	1,036,525	1,141,740	1,138,198	951,699	1,039,840	1,035,918
Temperature **(Note 1)**	°F	276.9	277.4	282.0	280.7	284.6	274.5	277.8	281.9
Flow	acfm	1,615,657	1,632,787	1,649,786	1,782,486	1,797,500	1,510,984	1,633,767	1,649,055
Exit Velocity	ft/s	64.8	65.5	66.2	71.5	72.1	60.6	65.5	66.2

Notes:

MBtu = 10^6 Btu

1. Performance information, including CT Output, Heat Input, and Exhaust Gas Flow Rates were obtained from MHI document: "Big Sandy MHI M501GAC 2x2x1_06-27-11.pdf" dated 4/14/2011. MHI exhaust flow rates were increased by a factor of 1.08 so that S&L-calculated CT lb/hr emissions generally match MHI-calculated values. Duct burner firing rates and stack temperatures were obtained from S&L heat balance "Big Sandy MHI M501GAC 2x2x1_06-27-11.pdf."
2. Natural gas heating value provided in the performance data identified in Note 1.
3. Fuel S content assumed to be 0.5 gr/100scf.
4. Exhaust Gas compositions were based on information provided in the performance data identified in Note 1.
5. Combustion turbine emission rates were based on MHI performance data identified in Note 1, target emission rates identified by AEP, potential guarantees, and potential permit limits. Emission rates should be further evaluated prior to establishing permit limits
6. Assumed 8% SO_2 to SO_3 oxidation during the combustion of natural gas.
7. Duct burner emission rates based on potential vendor guarantees. Emissions rates should be further evaluated prior to establishing permit limits.
8. CO, VOC, and NOx removal efficiencies are estimated based on reduction that is expected throughout life of catalyst.
9. SO_2 to SO_3 oxidation across oxidiation catalyst assumed to be 10% (without duct firing) and 20% (with duct firing).
10. Emission Calculations included in this spreadsheet are based on 8,760 hour/year operation for each case (per CT/HRSG). Excess emissions during periods of startup and shutdown are not included.
11. Assumed a post-SCR NOx emission rate of 2.0 ppmvd @ 15% O2.
12. SO_2 to SO_3 oxidation across the SCR is assumed to be 5%.
13. Assumed 100% conversion of SO_3 to (NH4)2SO4, and all $(NH_4)_2SO_4$ is captured as front half particulate matter.
14. Assumed aqueous ammonia purity of 19.0%
15. Assumed an Internal Stack Diameter of 23 feet for HRSG stack.

Option 1
Mitsubishi M501GAC Combined Cycle
Emissions Summary
Preliminary

Emissions Case No.		**Case 9**	**Case 10**	**Case 11**
Reference Heat Balance Case No.		Case 28	Case 29	Case 34
		55 F - 100% Load	**5 F - 100% Load**	**89 F - 100% Load**
American Electric Power				
Big Sandy Plant Unit 1		**Annual Average**	**99% Winter**	**1% Summer**
Repowering Cost Estimate Study				
Distillate Oil Fired Emission Estimates (per CT/HRSG)				
SITE CONDITIONS				
Ambient Temperature	°F	55	5	89
Relative Humidity	%	65.7	61	50
Site Elevation	feet	625	625	625
Atmospheric Pressure	psia	14.37	14.37	14.37
FACILITY CONDITIONS (Note 1)				
CT Fuel Type		Distillate Oil	Distillate Oil	Distillate Oil
CT Model		M501GAC	M501GAC	M501GAC
CT Load	%	100	100	100
CT Chiller	ON/OFF	Off	Off	Off
CT Gross Power Output	kW	213,300	215,600	193,700
CT Heat Consumption (LHV)	MBtu/hr	2,050.0	2,050.0	1,916.0
CT Heat Consumption (HHV)	MBtu/hr	2,276.8	2,276.8	2,128.0
CT Fuel Flow Rate	lb/hr	111,656	111,656	104,357
CT Exhaust Gas Flow Rate	lb/hr	5,082,522	5,062,021	4,738,860
CT Exhaust Gas Temperature	°F	975	943	1,005
CT Power Augmentation Steam Flow	lb/hr	0	0	0
DB Heat Consumption (HHV) **(Note 2)**	MBtu/hr	0.0	0.0	0.0
DB Heat Consumption (LHV)	MBtu/hr	0.0	0.0	0.0
DB Fuel Flow Rate	lb/hr	0	0	0
DB Fuel Flow Rate	MSCF/hr	0.00	0.00	0.00
DISTILLATE FUEL OIL ANALYSIS (Note 2)				
Sulfur Content	wt%	0.0015	0.0015	0.0015
Fuel LHV	Btu/lb	18,360	18,360	18,360
Fuel HHV	Btu/lb	19,462	19,462	19,462
HHV/LHV Ratio		1.06	1.06	1.06
COMBUSTION TURBINE EXHAUST ANALYSIS (Note 3)				
Argon, Ar	% vol	0.920	0.930	0.910
Nitrogen, N_2	% vol	73.53	74.16	72.21
Oxygen, O_2	% vol	12.79	12.90	12.47
Carbon Dioxide, CO_2	% vol	4.71	4.74	4.68
Water, H_2O	% vol	8.04	7.26	9.72
Total		*100.0*	*100.0*	*100.0*
Molecular weight	lb/lbmol	28.58	28.67	28.40
COMBUSTION TURBINE EMISSIONS (per CT) (Note 4)				
NO_X	ppmvd @ 15% O_2	42.0	42.0	42.0
NO_X	ppmvd	49.8	49.7	50.4
NO_X as NO_2	lb/hr	374.3	374.7	349.6
CO	ppmvd @ 15% O_2	50.0	50.0	50.0
CO	ppmvd	59.2	59.2	60.0
CO	lb/hr	271.3	271.6	253.4
VOC	ppmvd @ 15% O_2	10.0	10.0	10.0
VOC	ppmvd	11.8	11.8	12.0
VOC	ppmvw	10.9	11.0	10.8
VOC	lb/hr	31.1	31.1	29.0
SO_2	ppmvd @ 15% O_2	0.27	0.27	0.27
SO_2	ppmvd	0.32	0.32	0.32
SO_2	lb/hr	3.35	3.35	3.13
SO_3 Oxidation **(Note 5)**	%	8	8	8
SO_3	ppmvd @ 15% O_2	0.022	0.022	0.022
SO_3	ppmvd	0.026	0.026	0.026
SO_3	lb/hr	0.335	0.335	0.313
PM10				
Total (Front & Back Half)	lb/hr	23.00	23.00	21.20
Total (Front & Back Half)	lb/mmBtu	0.0101	0.0101	0.0100

Option 1
Mitsubishi M501GAC Combined Cycle
Emissions Summary
Preliminary

Emissions Case No.		**Case 9**	**Case 10**	**Case 11**
Reference Heat Balance Case No.		Case 28	Case 29	Case 34
		55 F - 100% Load	**5 F - 100% Load**	**89 F - 100% Load**
American Electric Power				
Big Sandy Plant Unit 1		**Annual Average**	**99% Winter**	**1% Summer**
Repowering Cost Estimate Study				
Distillate Oil Fired Emission Estimates (per CT/HRSG)				
CO_2	ppmvd @ 15% O_2	43,234	43,154	43,168
CO_2	ppmvd	51,223	51,116	51,844
CO_2	lb/hr	368,621	368,333	343,753
POST OXIDATION CATALYST EMISSIONS (per CT/HRSG)				
CO Reduction **(Note 6)**	% decrease	80	80	80
CO	ppmvd @ 15% O_2	10.0	10.0	10.0
CO	ppmvd	11.8	11.8	12.0
CO	lb/hr	54.3	54.3	50.7
VOC Reduction **(Note 6)**	% decrease	20	20	20
VOC (non-methane, non-ethane)	ppmvd @ 15% O_2	8.0	8.0	8.0
VOC (non-methane, non-ethane)	ppmvd	9.5	9.5	9.6
VOC as CH_4	lb/hr	24.9	24.9	23.2
SO_3 Oxidation **(Note 7)**	% increase	10	10	10
D SO_3	ppmvd @ 15% O_2	0.027	0.027	0.027
D SO_3	ppmvd	0.032	0.032	0.032
D SO_3	lb/hr	0.42	0.42	0.39
CO_2	ppmvd @ 15% O_2	43,284	43,204	43,218
CO_2	ppmvd	51,283	51,175	51,905
CO_2	lb/hr	369,047	368,760	344,151
POST SCR EMISSIONS (per CT/HRSG)				
Hours of Operation **(Note 8)**	hours/year	8,760	8,760	8,760
NO_X **(Note 9)**	ppmvd @ 15% O_2	5.0	5.0	5.0
NO_X Removal Efficiency **(Note 6)**	% decrease	88.1	88.1	88.1
NO_X	ppmvd	5.9	5.9	6.0
NO_X	lb/hr	44.6	44.6	41.6
NO_X	lb/MBtu (HHV)	0.0196	0.0196	0.0196
NO_X **(Note 8)**	ton/yr	195.2	195.4	182.3
NH_3	ppmvd @ 15% O_2	5.0	5.0	5.0
NH_3	ppmvd	5.92	5.92	6.00
NH_3	lb/hr	16.5	16.5	15.4
NH_3	lbmol/hr	1.0	1.0	0.9
NH_3 **(Note 8)**	ton/yr	72.3	72.3	67.5
CO	ppmvd @ 15% O_2	10.0	10.0	10.0
CO	ppmvd	11.8	11.8	12.0
CO	lb/hr	54.3	54.3	50.7
CO	lb/MBtu (HHV)	0.0238	0.0239	0.0238
CO **(Note 8)**	ton/yr	237.7	237.9	222.0

Option 1
Mitsubishi M501GAC Combined Cycle
Emissions Summary
Preliminary

Emissions Case No.		**Case 9**	**Case 10**	**Case 11**
Reference Heat Balance Case No.		Case 28	Case 29	Case 34
		55 F - 100% Load	**5 F - 100% Load**	**89 F - 100% Load**
American Electric Power				
Big Sandy Plant Unit 1		**Annual Average**	**99% Winter**	**1% Summer**
Repowering Cost Estimate Study				
Distillate Oil Fired Emission Estimates (per CT/HRSG)				
VOC	ppmvd @ 15% O_2	8.0	8.0	8.0
VOC	ppmvd	9.5	9.5	9.6
VOC	lb/hr	24.9	24.9	23.2
VOC	lb/MBtu (HHV)	0.0109	0.0109	0.0109
VOC **(Note 8)**	ton/yr	108.9	109.0	101.7
SO_2	ppmvd @ 15% O_2	0.27	0.27	0.27
SO_2	ppmvd	0.32	0.32	0.32
SO_2	lb/hr	3.35	3.35	3.13
SO_2	lb/MBtu (HHV)	0.00147	0.00147	0.00147
SO_2 **(Note 8)**	ton/yr	14.7	14.7	13.7
SO_3 Oxidation across SCR **(Note 10)**	% increase	5	5	5
SO_3 Oxidation across SCR	lb/hr	0.21	0.21	0.20
SO_3	ppmvd @ 15% O_2	0.06	0.06	0.06
SO_3	ppmvd	0.07	0.07	0.07
SO_3	lb/hr	0.96	0.96	0.90
SO_3	lbmol/hr	1.20E-02	1.20E-02	1.12E-02
H_2SO_4	lb/hr	1.18	1.18	1.10
H_2SO_4	lb/mmBtu	0.000423	0.000423	0.000423
H_2SO_4 **(Note 8)**	ton/yr	5.2	5.2	4.8
$(NH_4)_2SO_4$, Ammonium Sulfate **(Note 11)**	lb/hr	1.59	1.59	1.49
$(NH_4)_2SO_4$, Ammonium Sulfate	ton/yr	7.0	7.0	6.5
PM10				
Total PM10	lb/hr	24.59	24.59	22.69
Total PM10	lb/MBtu (HHV)	0.0108	0.0108	0.0107
Total PM10	grains/scf	0.0025	0.0025	0.0025
Total PM10	grains/dscf	0.0027	0.0027	0.0027
Total PM10 **(Note 8)**	ton/yr	107.7	107.7	99.4
CO_2	ppmvd @ 15% O_2	43,284	43,204	43,218
CO_2	ppmvd	51,283	51,175	51,905
CO_2	lb/hr	369,047	368,760	344,151
CO_2	lb/mmBtu (HHV)	162.1	162.0	161.7
CO_2 **(Note 8)**	ton/yr	1,616,425	1,615,169	1,507,380
Aqueous Ammonia (per CT/HRSG)				
Purity **(Note 12)**	%	19.0	19.0	19.0
Consumption	lb/hr	1050.6	1051.8	981.3
Stack Conditions (per CT/HRSG)				
Internal Diameter **(Note 13)**	ft	23.0	23.0	23.0
Flow	lb/hr	5,083,572	5,063,072	4,739,841
Flow	scfm	1,142,339	1,134,225	1,072,103
Flow	dscfm	1,050,485	1,051,872	967,884
Temperature **(Note 1)**	°F	285.0	285.0	285.0
Flow	acfm	1,648,837	1,637,126	1,547,459
Exit Velocity	ft/s	66.1	65.7	62.1

Option 1
Mitsubishi M501GAC Combined Cycle
Emissions Summary
Preliminary

Emissions Case No.	**Case 9**	**Case 10**	**Case 11**
Reference Heat Balance Case No.	Case 28	Case 29	Case 34
	55 F - 100% Load	**5 F - 100% Load**	**89 F - 100% Load**
American Electric Power			
Big Sandy Plant Unit 1	**Annual Average**	**99% Winter**	**1% Summer**
Repowering Cost Estimate Study			
Distillate Oil Fired Emission Estimates (per CT/HRSG)			

Notes:

MBtu = 10^6 Btu

1. Performance information, including CT Output, Heat Input, and Exhaust Gas Flow Rates were obtained from MHI documents: "212-GTperf-GAC_oilR1_20110407.pdf" dated 4/7/2011 and "212-Gtperf-GAC_oil2_20110414.pdf" dated 4/14/2011. MHI exhaust flow rates were increased by a factor of 1.08 so that S&L-calculated CT lb/hr emissions generally match MHI-calculated values. Duct burner firing rates and stack temperatures were obtained from S&L heat balance "Big Sandy MHI M501GAC 2x2x1_06-27-11.pdf."
2. Natural gas heating value provided in the performance data identified in Note 1.
3. Exhaust Gas compositions were based on information provided in the performance data referenced in Note 1.
4. Combustion turbine emission rates were based on MHI performance data identified in Note 1. Emission rates should be further evaluated prior to establishing permit limits
5. Assumed 8% SO_2 to SO_3 oxidation during the combustion of fuel oil
6. CO, VOC, and NOx removal efficiencies are estimated based on reduction that is expected throughout life of catalyst.
7. SO_2 to SO_3 oxidation across oxidiation catalyst assumed to be 10%.
8. Annual emissions are based on 8,760 hour/year operation for each case (per CT/HRSG). Excess emissions during startup and shutdown are not included.
9. Assumed a post-SCR NOx emission rate of 5 ppmvd @ 15% O2.
10. SO_2 to SO_3 oxidation across the SCR is assumed to be 5%.
11. Assumed 100% conversion of SO_3 to (NH4)2SO4, and all $(NH_4)_2SO_4$ is captured as front half particulate matter.
12. Assumed aqueous ammonia purity of 19.0%
13. Assumed an Internal Stack Diameter of 23 feet.

Option 1
MHI 501 GAC Combined Cycle
Emissions Summary
Preliminary - Not for Permit

American Electric Power
Big Sandy Plant Unit 1
Repowering Cost Estimate Study
Startup and Shutdown Emissions Estimates (Lead CT/HRSG Only)

Cold Start-up Emissions (Lead CT/HRSG)[1,2]

Pollutant	Flame to FSNL (lbs)	FSNL to "Emissions Compliant" Load[3] (lbs)	**Total Emissions per Cold Start-up[4] (lbs)**	Estimated Overall Cold Start-up Time[6] (minutes)	Average Emission Rate (lb/hr)	Maximum 1-hr Rolling Average Rate During Startup (lb/hr)
NOx	5.9	110.1	**116.0**	92	75.7	93.5
CO	94.6	2288.0	**2382.6**	92	1553.9	2088.5
VOC	29.6	649.0	**678.6**	92	442.6	584.9
Average Stack Exhaust Flow Rate During Startup[4]			acfm	1,057,870		
Average Stack Exhaust Velocity During Startup[4]			ft/sec	42.4		

Warm Start-up Emissions (Lead CT/HRSG)[1,2]

Pollutant	Flame to FSNL (lbs)	FSNL to "Emissions Compliant" Load[3] (lbs)	**Total Emissions per Warm Start-up[4] (lbs)**	Estimated Overall Warm Start-up Time[2] (minutes)	Average Emission Rate (lb/hr)	Maximum 1-hr Rolling Average Rate During Startup (lb/hr)
NOx	5.9	72.6	**78.5**	62	76.0	77.9
CO	94.6	1480.2	**1574.8**	62	1524.0	1572.2
VOC	29.6	357.3	**386.9**	62	374.4	386.6
Average Stack Exhaust Flow Rate During Startup[4]			acfm	1,056,878		
Average Stack Exhaust Velocity During Startup[4]			ft/sec	42.4		

Hot Start-up Emissions (Lead CT/HRSG)[1,2]

Pollutant	Flame to FSNL (lbs)	FSNL to "Emissions Compliant" Load[3] (lbs)	**Total Emissions per Hot Start-up[4] (lbs)**	Estimated Overall Hot Start-up Time[2] (minutes)	Average Emission Rate (lb/hr)	Maximum 1-hr Rolling Average Rate During Startup (lb/hr)
NOx	5.9	53.2	**59.1**	53	66.9	NA
CO	94.6	462.4	**557.0**	53	630.6	NA
VOC	29.6	127.9	**157.5**	53	178.3	NA
Average Stack Exhaust Flow Rate During Startup[4]			acfm	1,064,926		
Average Stack Exhaust Velocity During Startup[4]			ft/sec	42.7		

Shutdown Emissions (Lead CT/HRSG)[1,2]

Pollutant	Lowest "Emissions Compliant" Load to FSNL[3] (lbs)	FSNL to Flameout (lbs)	**Total Emissions per Shutdown[5] (lbs)**	Estimated Overall Shutdown Time[3] (minutes)	Average Emission Rate (lb/hr)	Maximum 1-hr Rolling Average Rate During Startup (lb/hr)
NOx	17.4	1.0	**18.4**	20	55.3	NA
CO	126.1	20.9	**147.0**	20	441.0	NA
VOC	116.7	6.6	**123.3**	20	370.0	NA
Average Stack Exhaust Flow Rate During Shutdown[5]			acfm	1,058,440		
Average Stack Exhaust Velocity During Shutdown[5]			ft/sec	42.5		

(1) Emissions estimates based on the following documents provided by MHI: M501GAC2on1BS1StartupCurves08-24-2011-BS1(R0).pdf, and 233_S&L_M501GAC_Emission_Curve_Gas_20110826x.pdf.
(2) Total emissions include emissions reductions with SCR and oxidation catalyst. Assumed control technology performance is based on preliminary judgement and does not represent vendor guaranatees or NH3 slip restrictions.
(3) Each CT/HRSG is assumed to be "emissions compliant" at loads equal to and greater than 50% when controlled emission rates meet target values.
(4) Startup is assumed to be period from CT ignition to load at which Unit is "emissions compliant."
(5) Shutdown is assumed to be period between CT operating at lowest "emission compliant" load to flameout.

Emission Estimates - Cold Start

MHI M501GAC Combined Cycle
(startup after 72 hour shutdown or longer)

				NOx Emissions					CO Emissions					VOC Emissions				
	Combustion Turbine Load	GT Exhaust Flow Rate	Stack Gas Temperature	Reduction w/SCR	*Uncontrolled*	*Controlled*			Reduction w/CO catalyst	*Uncontrolled*	*Controlled*			Reduction w/CO catalyst	*Uncontrolled*	*Controlled*		
	MPS-APE-065C	MHI M501GAC Typical Starting Curve on Gas Firing	Assumed to be ~260 F	Assumed	*MPS-APE-068 (5 deg F)*		*Rolling 1-hour average*		Assumed	*MPS-APE-068 (5 deg F)*		*Rolling 1-hour average*		Assumed	*MPS-APE-068 (5 deg F)*		*Rolling 1-hour average*	
Minutes	%	acfm			*lb*	*lb*	*lb/hr*	*lb*	%	*lb*	*lb*	*lb/hr*	*lb*	%	*lb*	*lb*	*lb/hr*	*lb*
1-15	Lightoff to FSNL					*5.9*		*5.9*			*94.6*		*94.6*			*29.6*		*29.6*
16	0	1,049,952	260	0.0%	1.25	*1.25*		*7.2*	0.0%	60.8	*60.8*		*155.4*	0.0%	21.2	*21.2*		*50.8*
17	20	1,055,597	260	0.0%	1.68	*1.68*		*8.8*	0.0%	47.1	*47.1*		*202.5*	0.0%	6.2	*6.2*		*57.0*
18	20	1,055,597	260	0.0%	1.68	*1.68*		*10.5*	0.0%	47.1	*47.1*		*249.7*	0.0%	6.2	*6.2*		*63.2*
19	20	1,055,597	260	0.0%	1.68	*1.68*		*12.2*	0.0%	47.1	*47.1*		*296.8*	0.0%	6.2	*6.2*		*69.4*
20	20	1,055,597	260	0.0%	1.68	*1.68*		*13.9*	0.0%	47.1	*47.1*		*343.9*	0.0%	6.2	*6.2*		*75.6*
21	20	1,055,597	260	0.0%	1.68	*1.68*		*15.6*	1.0%	47.1	*46.7*		*390.6*	0.0%	6.2	*6.2*		*81.8*
22	20	1,055,597	260	0.0%	1.68	*1.68*		*17.3*	2.5%	47.1	*46.0*		*436.5*	0.0%	6.2	*6.2*		*88.0*
23	20	1,055,597	260	0.0%	1.68	*1.68*		*18.9*	4.0%	47.1	*45.2*		*481.8*	0.0%	6.2	*6.2*		*94.2*
24	20	1,055,597	260	0.0%	1.68	*1.68*		*20.6*	5.5%	47.1	*44.5*		*526.3*	0.0%	6.2	*6.2*		*100.4*
25	20	1,055,597	260	0.0%	1.68	*1.68*		*22.3*	7.0%	47.1	*43.8*		*570.1*	0.0%	6.2	*6.2*		*106.5*
26	20	1,055,597	260	0.0%	1.68	*1.68*		*24.0*	8.5%	47.1	*43.1*		*613.3*	0.0%	6.2	*6.2*		*112.7*
27	20	1,055,597	260	0.0%	1.68	*1.68*		*25.7*	10.0%	47.1	*42.4*		*655.7*	0.0%	6.2	*6.2*		*118.9*
28	20	1,055,597	260	0.0%	1.68	*1.68*		*27.4*	11.5%	47.1	*41.7*		*697.4*	0.0%	6.2	*6.2*		*125.1*
29	20	1,055,597	260	0.0%	1.68	*1.68*		*29.0*	13.0%	47.1	*41.0*		*738.4*	0.0%	6.2	*6.2*		*131.3*
30	20	1,055,597	260	0.0%	1.68	*1.68*		*30.7*	14.5%	47.1	*40.3*		*778.7*	0.0%	6.2	*6.2*		*137.5*
31	20	1,055,597	260	0.0%	1.68	*1.68*		*32.4*	16.0%	47.1	*39.6*		*818.3*	0.0%	6.2	*6.2*		*143.7*
32	20	1,055,597	260	0.0%	1.68	*1.68*		*34.1*	17.5%	47.1	*38.9*		*857.2*	0.0%	6.2	*6.2*		*149.9*
33	20	1,055,597	260	0.0%	1.68	*1.68*		*35.8*	19.0%	47.1	*38.2*		*895.4*	0.0%	6.2	*6.2*		*156.1*
34	20	1,055,597	260	0.0%	1.68	*1.68*		*37.5*	20.5%	47.1	*37.5*		*932.8*	0.0%	6.2	*6.2*		*162.3*
35	20	1,055,597	260	0.0%	1.68	*1.68*		*39.1*	22.0%	47.1	*36.8*		*969.6*	0.0%	6.2	*6.2*		*168.5*
36	20	1,055,597	260	0.0%	1.68	*1.68*		*40.8*	23.5%	47.1	*36.1*		*1005.6*	0.0%	6.2	*6.2*		*174.7*
37	20	1,055,597	260	0.0%	1.68	*1.68*		*42.5*	25.0%	47.1	*35.3*		*1041.0*	0.0%	6.2	*6.2*		*180.9*
38	20	1,055,597	260	0.0%	1.68	*1.68*		*44.2*	26.5%	47.1	*34.6*		*1075.6*	0.0%	6.2	*6.2*		*187.1*
39	20	1,055,597	260	0.0%	1.68	*1.68*		*45.9*	28.0%	47.1	*33.9*		*1109.6*	0.0%	6.2	*6.2*		*193.3*
40	20	1,055,597	260	0.0%	1.68	*1.68*		*47.6*	29.5%	47.1	*33.2*		*1142.8*	0.0%	6.2	*6.2*		*199.5*
41	20	1,055,597	260	0.0%	1.68	*1.68*		*49.2*	31.0%	47.1	*32.5*		*1175.3*	0.0%	6.2	*6.2*		*205.7*
42	20	1,055,597	260	0.0%	1.68	*1.68*		*50.9*	32.5%	47.1	*31.8*		*1207.1*	0.0%	6.2	*6.2*		*211.9*
43	20	1,055,597	260	0.0%	1.68	*1.68*		*52.6*	34.0%	47.1	*31.1*		*1238.2*	0.0%	6.2	*6.2*		*218.1*
44	20	1,055,597	260	0.0%	1.68	*1.68*		*54.3*	35.5%	47.1	*30.4*		*1268.6*	0.0%	6.2	*6.2*		*224.3*
45	20	1,055,597	260	0.0%	1.68	*1.68*		*56.0*	37.0%	47.1	*29.7*		*1298.3*	0.0%	6.2	*6.2*		*230.5*
46	20	1,055,597	260	0.0%	1.68	*1.68*		*57.7*	38.5%	47.1	*29.0*		*1327.3*	0.0%	6.2	*6.2*		*236.7*
47	20	1,055,597	260	0.0%	1.68	*1.68*		*59.3*	40.0%	47.1	*28.3*		*1355.6*	0.3%	6.2	*6.2*		*242.9*
48	20	1,055,597	260	0.0%	1.68	*1.68*		*61.0*	41.5%	47.1	*27.6*		*1383.2*	0.6%	6.2	*6.2*		*249.0*
49	20	1,055,597	260	0.0%	1.68	*1.68*		*62.7*	43.0%	47.1	*26.9*		*1410.0*	0.9%	6.2	*6.1*		*255.2*
50	20	1,055,597	260	0.0%	1.68	*1.68*		*64.4*	44.5%	47.1	*26.2*		*1436.2*	1.2%	6.2	*6.1*		*261.3*
51	20	1,055,597	260	3.0%	1.68	*1.63*		*66.0*	46.0%	47.1	*25.5*		*1461.6*	1.5%	6.2	*6.1*		*267.4*
52	20	1,055,597	260	6.0%	1.68	*1.58*		*67.6*	47.5%	47.1	*24.7*		*1486.4*	1.8%	6.2	*6.1*		*273.5*
53	20	1,055,597	260	9.0%	1.68	*1.53*		*69.1*	49.0%	47.1	*24.0*		*1510.4*	2.1%	6.2	*6.1*		*279.5*
54	20	1,055,597	260	12.0%	1.68	*1.48*		*70.6*	50.5%	47.1	*23.3*		*1533.8*	2.4%	6.2	*6.0*		*285.6*
55	20	1,055,597	260	14.0%	1.68	*1.45*		*72.1*	52.0%	47.1	*22.6*		*1556.4*	2.7%	6.2	*6.0*		*291.6*
56	20	1,055,597	260	16.0%	1.68	*1.41*		*73.5*	53.5%	47.1	*21.9*		*1578.3*	3.0%	6.2	*6.0*		*297.6*
57	20	1,055,597	260	18.0%	1.68	*1.38*		*74.9*	55.0%	47.1	*21.2*		*1599.5*	3.3%	6.2	*6.0*		*303.6*
58	20	1,055,597	260	20.0%	1.68	*1.35*		*76.2*	56.5%	47.1	*20.5*		*1620.0*	3.6%	6.2	*6.0*		*309.6*
59	20	1,055,597	260	22.0%	1.68	*1.31*		*77.5*	58.0%	47.1	*19.8*		*1639.8*	3.9%	6.2	*6.0*		*315.5*
60	20	1,055,597	260	24.0%	1.68	*1.28*	*78.8*	*78.8*	59.5%	47.1	*19.1*	*1658.9*	*1658.9*	4.2%	6.2	*5.9*	*321.5*	*321.5*
61	21	1,055,597	260	26.0%	1.68	*1.25*	*79.6*	*80.0*	61.0%	47.1	*18.4*	*1671.0*	*1677.3*	4.5%	6.2	*5.9*	*325.4*	*327.4*
62	22	1,055,973	260	28.0%	2.19	*1.58*	*80.8*	*81.6*	62.5%	121.6	*45.6*	*1710.2*	*1722.9*	4.8%	30.0	*28.6*	*352.0*	*356.0*
63	23	1,056,350	260	30.0%	2.22	*1.55*	*82.0*	*83.2*	64.0%	120.0	*43.2*	*1747.1*	*1766.1*	5.1%	28.8	*27.4*	*377.4*	*383.4*
64	24	1,056,726	260	32.0%	2.25	*1.53*	*83.1*	*84.7*	65.5%	118.4	*40.9*	*1781.7*	*1806.9*	5.4%	27.6	*26.1*	*401.6*	*409.5*
65	25	1,057,102	260	34.0%	2.27	*1.50*	*84.2*	*86.2*	66.0%	116.8	*39.7*	*1815.1*	*1846.6*	5.7%	26.4	*24.9*	*424.6*	*434.4*
66	26	1,057,479	260	36.0%	2.30	*1.47*	*85.3*	*87.7*	66.5%	115.2	*38.6*	*1847.4*	*1885.2*	6.0%	25.2	*23.7*	*446.3*	*458.2*
67	27	1,057,855	260	38.0%	2.32	*1.44*	*86.4*	*89.1*	67.0%	113.7	*37.5*	*1878.6*	*1922.7*	6.3%	24.0	*22.5*	*466.9*	*480.7*
68	28	1,058,231	260	40.0%	2.35	*1.41*	*87.4*	*90.5*	67.5%	112.1	*36.4*	*1908.7*	*1959.2*	6.6%	22.8	*21.3*	*486.2*	*502.0*
69	28	1,058,608	260	42.0%	2.37	*1.38*	*88.4*	*91.9*	68.0%	110.5	*35.4*	*1937.8*	*1994.5*	6.9%	21.6	*20.2*	*504.4*	*522.2*
70	29	1,058,984	260	44.0%	2.40	*1.34*	*89.3*	*93.2*	68.5%	108.9	*34.3*	*1965.8*	*2028.8*	7.2%	20.4	*19.0*	*521.4*	*541.2*
71	30	1,059,360	260	46.0%	2.43	*1.31*	*90.2*	*94.6*	69.0%	107.3	*33.3*	*1992.7*	*2062.1*	7.5%	19.2	*17.8*	*537.2*	*559.0*
72	31	1,059,737	260	48.0%	2.44	*1.27*	*91.1*	*95.8*	69.5%	105.0	*32.0*	*2018.5*	*2094.2*	7.8%	17.6	*16.2*	*551.5*	*575.2*
73	32	1,060,113	260	50.0%	2.46	*1.23*	*91.9*	*97.0*	70.0%	102.7	*30.8*	*2043.0*	*2125.0*	8.1%	16.0	*14.7*	*564.2*	*589.8*
74	33	1,060,489	260	52.0%	2.47	*1.19*	*92.7*	*98.2*	70.5%	100.4	*29.6*	*2066.3*	*2154.6*	8.4%	14.3	*13.1*	*575.3*	*603.0*
75	34	1,060,866	260	54.0%	2.49	*1.15*	*93.5*	*99.4*	71.0%	98.1	*28.5*	*2088.5*	*2183.1*	8.7%	12.7	*11.6*	*584.9*	*614.5*
76	35	1,061,242	260	56.0%	2.51	*1.10*	*93.3*	*100.5*	71.5%	95.8	*27.3*	*2055.0*	*2210.4*	9.0%	11.0	*10.0*	*573.8*	*624.5*

Emission Estimates - Cold Start

MHI M501GAC Combined Cycle
(startup after 72 hour shutdown or longer)

				NOx Emissions					CO Emissions					VOC Emissions				
	Combustion Turbine Load	GT Exhaust Flow Rate	Stack Gas Temperature	Reduction w/SCR	*Uncontrolled*	*Controlled*			Reduction w/CO catalyst	*Uncontrolled*	*Controlled*			Reduction w/CO catalyst	*Uncontrolled*	*Controlled*		
	MPS-APE-065C	MHI M501GAC Typical Starting Curve on Gas Firing	Assumed to be ~260 F	Assumed	*MPS-APE-068 (5 deg F)*		*Rolling 1-hour average*	*Accumulated*	Assumed	*MPS-APE-068 (5 deg F)*		*Rolling 1-hour average*	*Accumulated*	Assumed	*MPS-APE-068 (5 deg F)*		*Rolling 1-hour average*	*Accumulated*
Minutes	%	acfm			*lb*	*lb*	*lb/hr*	*lb*	%	*lb*	*lb*	*lb/hr*	*lb*	%	*lb*	*lb*	*lb/hr*	*lb*
77	36	1,061,242	260	56.0%	2.51	*1.10*	*92.8*	*101.6*	72.0%	95.8	*26.8*	*2034.7*	*2237.2*	9.3%	11.0	*10.0*	*577.6*	*634.5*
78	37	1,061,618	260	56.0%	2.52	*1.11*	*92.2*	*102.7*	72.5%	88.0	*24.2*	*2011.8*	*2261.4*	9.6%	9.8	*8.9*	*580.2*	*643.4*
79	38	1,061,995	260	55.0%	2.52	*1.14*	*91.6*	*103.8*	73.0%	80.2	*21.6*	*1986.3*	*2283.1*	9.9%	8.6	*7.7*	*581.8*	*651.1*
80	39	1,062,371	260	55.0%	2.53	*1.14*	*91.1*	*105.0*	73.5%	72.3	*19.2*	*1958.3*	*2302.2*	10.2%	7.4	*6.6*	*582.2*	*657.7*
81	40	1,062,747	260	55.0%	2.54	*1.14*	*90.5*	*106.1*	74.0%	64.5	*16.8*	*1928.4*	*2319.0*	10.5%	6.1	*5.5*	*581.4*	*663.2*
82	41	1,063,124	260	55.0%	2.55	*1.15*	*90.0*	*107.3*	74.5%	56.7	*14.5*	*1896.9*	*2333.4*	10.8%	4.9	*4.4*	*579.6*	*667.6*
83	42	1,063,500	260	55.0%	2.56	*1.15*	*89.5*	*108.4*	75.0%	49.0	*12.2*	*1863.9*	*2345.7*	11.1%	4.0	*3.6*	*577.0*	*671.2*
84	43	1,063,876	260	55.0%	2.56	*1.15*	*88.9*	*109.6*	75.5%	41.3	*10.1*	*1829.5*	*2355.8*	11.4%	3.1	*2.8*	*573.6*	*673.9*
85	43	1,064,253	260	54.0%	2.57	*1.18*	*88.4*	*110.7*	76.0%	33.6	*8.1*	*1793.7*	*2363.9*	11.9%	2.3	*2.0*	*569.4*	*675.9*
86	44	1,064,629	260	54.0%	2.57	*1.18*	*87.9*	*111.9*	76.5%	25.9	*6.1*	*1756.7*	*2370.0*	12.4%	1.4	*1.2*	*564.4*	*677.2*
87	45	1,065,005	260	54.0%	2.58	*1.19*	*87.4*	*113.1*	77.0%	18.2	*4.2*	*1718.5*	*2374.2*	12.9%	0.5	*0.4*	*558.6*	*677.6*
88	46	1,065,382	260	60.0%	2.39	*0.95*	*86.7*	*114.1*	77.5%	14.7	*3.3*	*1680.1*	*2377.5*	13.4%	0.4	*0.4*	*552.8*	*677.9*
89	47	1,065,758	260	65.0%	2.19	*0.77*	*85.8*	*114.8*	78.0%	11.2	*2.5*	*1641.5*	*2379.9*	13.9%	0.3	*0.3*	*546.9*	*678.2*
90	48	1,066,134	260	70.0%	2.00	*0.60*	*84.7*	*115.4*	78.5%	7.7	*1.7*	*1602.9*	*2381.6*	14.4%	0.2	*0.2*	*540.9*	*678.4*
91	49	1,066,511	260	80.0%	1.81	*0.36*	*83.4*	*115.8*	79.0%	4.2	*0.9*	*1564.2*	*2382.5*	14.9%	0.1	*0.1*	*534.8*	*678.5*
92	50	1,066,887	260	86.7%	1.61	*0.21*	*81.9*	*116.0*	80.0%	0.7	*0.1*	*1525.4*	*2382.6*	15.0%	0.05	*0.04*	*528.7*	*678.6*
93	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.1*			15.0%	0.05	*0.04*		
94	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.1*			15.0%	0.05	*0.04*		
95	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.1*			15.0%	0.05	*0.04*		
96	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.1*			15.0%	0.05	*0.04*		
97	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.1*			15.0%	0.05	*0.04*		
98	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.1*			15.0%	0.05	*0.04*		
99	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.1*			15.0%	0.05	*0.04*		
100	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.1*			15.0%	0.05	*0.04*		
101	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.1*			15.0%	0.05	*0.04*		
102	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.1*			15.0%	0.05	*0.04*		
103	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.1*			15.0%	0.05	*0.04*		
104	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.1*			15.0%	0.05	*0.04*		
105	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.1*			15.0%	0.05	*0.04*		
106	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.1*			15.0%	0.05	*0.04*		
107	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.1*			15.0%	0.05	*0.04*		
108	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.1*			15.0%	0.05	*0.04*		
109	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.1*			15.0%	0.05	*0.04*		
110	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.1*			15.0%	0.05	*0.04*		
111	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.1*			15.0%	0.05	*0.04*		
112	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.1*			15.0%	0.05	*0.04*		
113	50	1,066,887	260	86.7%	1.61	*0.21*			80.5%	0.7	*0.1*			15.0%	0.05	*0.04*		
114	50	1,066,887	260	86.7%	1.61	*0.21*			81.0%	0.7	*0.1*			15.0%	0.05	*0.04*		
115	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.1*			15.0%	0.05	*0.04*		
116	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.1*			15.0%	0.05	*0.04*		
117	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.1*			15.0%	0.05	*0.04*		
118	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.1*			15.0%	0.05	*0.04*		
119	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.1*			15.0%	0.05	*0.04*		
120	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.1*			15.0%	0.05	*0.04*		
Average Flue Gas Flow (initial load to >50% load):		**1,057,870 acfm**					**SU EMISSIONS:**					**SU EMISSIONS:**					**SU EMISSIONS:**	
							Flame to FSNL:	**5.9**				**Flame to FSNL:**	**94.6**				**Flame to FSNL:**	**29.6**
							FSNL to >50% Load:	**110.1**				**FSNL to >50% Load:**	**2288.0**				**FSNL to >50% Load:**	**649.0**
							Total SU Emissions:	**116.0**				**Total SU Emissions:**	**2382.6**				**Total SU Emissions:**	**678.6**
							Avg SU Emissions (lb/hr):	**75.7**				**Avg SU Emissions (lb/hr):**	**1553.9**				**Avg SU Emissions (lb/hr):**	**442.6**

= Time/load at which unit is "emissions compliant

Emission Estimates - Warm Start

MHI M501GAC Combined Cycle

(startup after 8 hour shutdown but less than 72 hours)

				NOx Emissions					CO Emissions					VOC Emissions				
	Combustion Turbine Load	GT Exhaust Flow Rate	Stack Gas Temperature	Reduction w/SCR	*Uncontrolled*	*Controlled*			Reduction w/CO catalyst	*Uncontrolled*	*Controlled*			Reduction w/CO catalyst	*Uncontrolled*	*Controlled*		
	MPS-APE-065B	MHI M501GAC Typical Starting Curve on Gas Firing	Assumed to be ~260 F	Assumed	*MPS-APE-068 (5 deg F)*		*Rolling 1-hour average*	*Accumulated*	Assumed	*MPS-APE-068 (5 deg F)*		*Rolling 1-hour average*	*Accumulated*	Assumed	*MPS-APE-068 (5 deg F)*		*Rolling 1-hour average*	*Accumulated*
Minutes	%	acfm			*lb*	*lb*	*lb/hr*	*lb*	%	*lb*	*lb*	*lb/hr*	*lb*	%	*lb*	*lb*	*lb/hr*	*lb*
1-15	Lightoff to FSNL					*5.9*		*5.9*			*94.6*		*94.6*			*29.6*		*29.6*
16	0	1,049,952	260	0.0%	1.25	*1.25*		*7.2*	0.0%	60.8	*60.8*		*155.4*	0.0%	21.2	*21.2*		*50.8*
17	20	1,055,597	260	0.0%	1.68	*1.68*		*8.8*	0.0%	47.1	*47.1*		*202.5*	0.0%	6.2	*6.2*		*57.0*
18	20	1,055,597	260	0.0%	1.68	*1.68*		*10.5*	0.0%	47.1	*47.1*		*249.7*	0.0%	6.2	*6.2*		*63.2*
19	20	1,055,597	260	0.0%	1.68	*1.68*		*12.2*	0.0%	47.1	*47.1*		*296.8*	0.0%	6.2	*6.2*		*69.4*
20	20	1,055,597	260	0.0%	1.68	*1.68*		*13.9*	0.0%	47.1	*47.1*		*343.9*	0.0%	6.2	*6.2*		*75.6*
21	20	1,055,597	260	0.0%	1.68	*1.68*		*15.6*	2.0%	47.1	*46.2*		*390.1*	0.0%	6.2	*6.2*		*81.8*
22	20	1,055,597	260	0.0%	1.68	*1.68*		*17.3*	4.0%	47.1	*45.2*		*435.4*	0.0%	6.2	*6.2*		*88.0*
23	20	1,055,597	260	0.0%	1.68	*1.68*		*18.9*	6.0%	47.1	*44.3*		*479.7*	0.0%	6.2	*6.2*		*94.2*
24	20	1,055,597	260	0.0%	1.68	*1.68*		*20.6*	8.0%	47.1	*43.4*		*523.0*	0.0%	6.2	*6.2*		*100.4*
25	20	1,055,597	260	0.0%	1.68	*1.68*		*22.3*	10.0%	47.1	*42.4*		*565.4*	0.0%	6.2	*6.2*		*106.5*
26	20	1,055,597	260	0.0%	1.68	*1.68*		*24.0*	12.0%	47.1	*41.5*		*606.9*	0.0%	6.2	*6.2*		*112.7*
27	20	1,055,597	260	0.0%	1.68	*1.68*		*25.7*	14.0%	47.1	*40.5*		*647.4*	0.0%	6.2	*6.2*		*118.9*
28	20	1,055,597	260	0.0%	1.68	*1.68*		*27.4*	16.0%	47.1	*39.6*		*687.0*	0.0%	6.2	*6.2*		*125.1*
29	20	1,055,597	260	0.0%	1.68	*1.68*		*29.0*	18.0%	47.1	*38.6*		*725.7*	0.0%	6.2	*6.2*		*131.3*
30	20	1,055,597	260	0.0%	1.68	*1.68*		*30.7*	20.0%	47.1	*37.7*		*763.4*	0.0%	6.2	*6.2*		*137.5*
31	20	1,055,597	260	0.0%	1.68	*1.68*		*32.4*	22.0%	47.1	*36.8*		*800.1*	0.0%	6.2	*6.2*		*143.7*
32	20	1,055,597	260	0.0%	1.68	*1.68*		*34.1*	24.0%	47.1	*35.8*		*836.0*	0.0%	6.2	*6.2*		*149.9*
33	20	1,055,597	260	0.0%	1.68	*1.68*		*35.8*	26.0%	47.1	*34.9*		*870.8*	0.0%	6.2	*6.2*		*156.1*
34	20	1,055,597	260	0.0%	1.68	*1.68*		*37.5*	28.0%	47.1	*33.93*		*904.8*	0.0%	6.2	*6.2*		*162.3*
35	20	1,055,597	260	0.0%	1.68	*1.68*		*39.1*	30.0%	47.1	*32.99*		*937.8*	0.0%	6.2	*6.2*		*168.5*
36	20	1,055,597	260	0.0%	1.68	*1.68*		*40.8*	32.0%	47.1	*32.05*		*969.8*	0.0%	6.2	*6.2*		*174.7*
37	20	1,055,597	260	0.0%	1.68	*1.68*		*42.5*	34.0%	47.1	*31.11*		*1000.9*	0.0%	6.2	*6.2*		*180.9*
38	20	1,055,597	260	0.0%	1.68	*1.68*		*44.2*	36.0%	47.1	*30.16*		*1031.1*	0.0%	6.2	*6.2*		*187.1*
39	20	1,055,597	260	0.0%	1.68	*1.68*		*45.9*	38.0%	47.1	*29.22*		*1060.3*	0.0%	6.2	*6.2*		*193.3*
40	20	1,055,597	260	0.0%	1.68	*1.68*		*47.6*	40.0%	47.1	*28.28*		*1088.6*	0.0%	6.2	*6.2*		*199.5*
41	20	1,055,597	260	0.0%	1.68	*1.68*		*49.2*	42.0%	47.1	*27.34*		*1115.9*	0.0%	6.2	*6.2*		*205.7*
42	20	1,055,597	260	0.0%	1.68	*1.68*		*50.9*	44.0%	47.1	*26.39*		*1142.3*	0.0%	6.2	*6.2*		*211.9*
43	20	1,055,597	260	0.0%	1.68	*1.68*		*52.6*	46.0%	47.1	*25.45*		*1167.8*	0.5%	6.2	*6.2*		*218.1*
44	20	1,055,597	260	0.0%	1.68	*1.68*		*54.3*	48.0%	47.1	*24.51*		*1192.3*	1.0%	6.2	*6.1*		*224.2*
45	20	1,055,597	260	0.0%	1.68	*1.68*		*56.0*	50.0%	47.1	*23.57*		*1215.9*	1.5%	6.2	*6.1*		*230.3*
46	20	1,055,597	260	0.0%	1.68	*1.68*		*57.7*	52.0%	47.1	*22.62*		*1238.5*	2.0%	6.2	*6.1*		*236.4*
47	20	1,055,597	260	3.0%	1.68	*1.63*		*59.3*	54.0%	47.1	*21.68*		*1260.2*	2.5%	6.2	*6.0*		*242.4*
48	20	1,055,597	260	6.0%	1.68	*1.58*		*60.9*	56.0%	47.1	*20.74*		*1280.9*	3.0%	6.2	*6.0*		*248.4*
49	20	1,055,597	260	9.0%	1.68	*1.53*		*62.4*	58.0%	47.1	*19.80*		*1300.7*	3.5%	6.2	*6.0*		*254.4*
50	20	1,055,597	260	14.0%	1.68	*1.45*		*63.8*	60.0%	47.1	*18.85*		*1319.5*	4.0%	6.2	*5.9*		*260.3*
51	20	1,055,597	260	19.0%	1.68	*1.36*		*65.2*	62.0%	47.1	*17.91*		*1337.5*	4.5%	6.2	*5.9*		*266.3*
52	23	1,056,350	260	24.0%	2.22	*1.69*		*66.9*	64.0%	120.0	*43.20*		*1380.6*	5.5%	28.8	*27.3*		*293.5*
53	25	1,057,479	260	29.0%	2.30	*1.63*		*68.5*	66.0%	115.2	*39.18*		*1419.8*	6.5%	25.2	*23.6*		*317.1*
54	28	1,058,608	260	34.0%	2.37	*1.57*		*70.1*	68.0%	110.5	*35.36*		*1455.2*	7.5%	21.6	*20.0*		*337.1*
55	31	1,059,360	260	40.0%	2.43	*1.46*		*71.6*	70.0%	107.3	*32.20*		*1487.4*	8.5%	19.2	*17.6*		*354.8*
56	34	1,060,489	260	46.0%	2.47	*1.34*		*72.9*	72.0%	100.4	*28.12*		*1515.5*	9.5%	14.3	*13.0*		*367.7*
57	36	1,061,618	260	52.0%	2.52	*1.21*		*74.1*	74.0%	88.0	*22.88*		*1538.4*	10.5%	9.8	*8.8*		*376.5*
58	39	1,062,747	260	55.0%	2.54	*1.14*		*75.2*	75.0%	64.5	*16.13*		*1554.5*	11.5%	6.1	*5.4*		*381.9*
59	42	1,063,500	260	55.0%	2.56	*1.15*		*76.4*	76.0%	49.0	*11.76*		*1566.3*	12.5%	4.0	*3.5*		*385.4*
60	45	1,064,629	260	55.0%	2.57	*1.16*	*77.5*	*77.5*	77.0%	25.9	*5.96*	*1572.2*	*1572.2*	13.5%	1.4	*1.2*	*386.6*	*386.6*
61	47	1,065,758	260	64.0%	2.19	*0.79*	*77.9*	*78.3*	78.0%	11.2	*2.47*	*1568.4*	*1574.7*	14.5%	0.3	*0.3*	*384.9*	*386.9*
62	50	1,066,887	260	86.7%	1.61	*0.21*	*77.8*	*78.5*	80.0%	0.7	*0.14*	*1562.2*	*1574.8*	15.0%	0.05	*0.04*	*383.0*	*386.9*
63	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
64	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
65	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
66	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
67	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
68	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
69	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
70	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
71	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
72	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
73	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
74	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
75	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
76	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		

Emission Estimates - Warm Start

MHI M501GAC Combined Cycle

(startup after 8 hour shutdown but less than 72 hours)

				NOx Emissions					CO Emissions					VOC Emissions				
	Combustion Turbine Load	GT Exhaust Flow Rate	Stack Gas Temperature	Reduction w/SCR	*Uncontrolled*	*Controlled*			Reduction w/CO catalyst	*Uncontrolled*	*Controlled*			Reduction w/CO catalyst	*Uncontrolled*	*Controlled*		
	MPS-APE-065B	MHI M501GAC Typical Starting Curve on Gas Firing	Assumed to be ~260 F	Assumed	*MPS-APE-068 (5 deg F)*		*Rolling 1-hour average*	*Accumulated*	Assumed	*MPS-APE-068 (5 deg F)*		*Rolling 1-hour average*	*Accumulated*	Assumed	*MPS-APE-068 (5 deg F)*		*Rolling 1-hour average*	*Accumulated*
Minutes	%	acfm			*lb*	*lb*	*lb/hr*	*lb*	%	*lb*	*lb*	*lb/hr*	*lb*	%	*lb*	*lb*	*lb/hr*	*lb*
77	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
78	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
79	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
80	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
81	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
82	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
83	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
84	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
85	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
86	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
87	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
88	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
89	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
90	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
91	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
92	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
93	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
94	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
95	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
96	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
97	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
98	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
99	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
100	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
101	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
102	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
103	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
104	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
105	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
106	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
107	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
108	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
109	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
110	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
111	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
112	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
113	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
114	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
115	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
116	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
117	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
118	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
119	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
120	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
Average Flue Gas Flow (initial load to >50% load):		**1,056,878 acfm**				**SU EMISSIONS:**					**SU EMISSIONS:**					**SU EMISSIONS:**		
						Flame to FSNL:		**5.9**			**Flame to FSNL:**		**94.6**			**Flame to FSNL:**		**29.6**
						FSNL to >50% Load:		**72.6**			**FSNL to >50% Load:**		**1480.2**			**FSNL to >50% Load:**		**357.3**
						Total SU Emissions:		**78.5**			**Total SU Emissions:**		**1574.8**			**Total SU Emissions:**		**386.9**
						Avg SU Emissions (lb/hr):		**76.0**			**Avg SU Emissions (lb/hr):**		**1524.0**			**Avg SU Emissions (lb/hr):**		**374.4**

= Time/load at which unit is "emissions compliant

Emission Estimates - Hot Start

MHI M501GAC Combined Cycle
(startup less than 8 hours after shutdown)

				NOx Emissions					CO Emissions					VOC Emissions				
	Combustion Turbine Load	GT Exhaust Flow Rate	Stack Gas Temperature	Reduction w/SCR	*Uncontrolled*	*Controlled*			Reduction w/CO catalyst	*Uncontrolled*	*Controlled*			Reduction w/CO catalyst	*Uncontrolled*	*Controlled*		
	MPS-APE-065A	MHI M501GAC Typical Starting Curve on Gas Firing	Assumed to be ~260 F	Assumed	*MPS-APE-068 (5 deg F)*		*Rolling 1-hour average*	*Accumulated*	Assumed	*MPS-APE-068 (5 deg F)*		*Rolling 1-hour average*	*Accumulated*	Assumed	*MPS-APE-068 (5 deg F)*		*Rolling 1-hour average*	*Accumulated*
Minutes	%	acfm			*lb*	*lb*	*lb/hr*	*lb*	%	*lb*	*lb*	*lb/hr*	*lb*	%	*lb*	*lb*	*lb/hr*	*lb*
1-15	Lightoff to FSNL					*5.9*		*5.9*			*94.6*		*94.6*			*29.6*		*29.6*
16	0	1,049,952	260	0.0%	1.25	*1.25*		*7.2*	5.0%	60.8	*57.7*		*152.3*	0.0%	21.2	*21.2*		*50.8*
17	7	1,050,705	260	0.0%	1.64	*1.64*		*8.8*	10.0%	77.1	*69.4*		*221.7*	0.0%	24.1	*24.1*		*74.9*
18	14	1,053,339	260	0.0%	1.72	*1.72*		*10.5*	15.0%	63.3	*53.8*		*275.5*	0.0%	15.3	*15.3*		*90.2*
19	21	1,055,973	260	0.0%	2.19	*2.19*		*12.7*	20.0%	121.6	*97.3*		*372.8*	0.0%	30.0	*30.0*		*120.2*
20	29	1,058,608	260	0.0%	2.37	*2.37*		*15.1*	25.0%	110.5	*82.9*		*455.7*	0.0%	21.6	*21.6*		*141.9*
21	36	1,061,242	260	0.0%	2.51	*2.51*		*17.6*	30.0%	95.8	*67.1*		*522.7*	0.0%	11.0	*11.0*		*152.9*
22	43	1,063,876	260	0.0%	2.56	*2.56*		*20.2*	35.0%	41.3	*26.8*		*549.6*	0.0%	3.1	*3.1*		*156.0*
23	50	1,066,887	260	0.0%	1.61	*1.61*		*21.8*	40.0%	0.7	*0.4*		*550.0*	0.0%	0.05	*0.05*		*156.1*
24	50	1,066,887	260	0.0%	1.61	*1.61*		*23.4*	45.0%	0.7	*0.4*		*550.4*	0.0%	0.05	*0.05*		*156.1*
25	50	1,066,887	260	0.0%	1.61	*1.61*		*25.0*	50.0%	0.7	*0.4*		*550.8*	0.0%	0.05	*0.05*		*156.2*
26	50	1,066,887	260	0.0%	1.61	*1.61*		*26.6*	51.5%	0.7	*0.3*		*551.1*	0.0%	0.05	*0.05*		*156.2*
27	50	1,066,887	260	0.0%	1.61	*1.61*		*28.2*	53.0%	0.7	*0.3*		*551.5*	0.0%	0.05	*0.05*		*156.3*
28	50	1,066,887	260	0.0%	1.61	*1.61*		*29.8*	54.5%	0.7	*0.33*		*551.8*	0.0%	0.05	*0.05*		*156.3*
29	50	1,066,887	260	0.0%	1.61	*1.61*		*31.4*	56.0%	0.7	*0.31*		*552.1*	0.0%	0.05	*0.05*		*156.4*
30	50	1,066,887	260	0.0%	1.61	*1.61*		*33.0*	57.5%	0.7	*0.30*		*552.4*	0.0%	0.05	*0.05*		*156.4*
31	50	1,066,887	260	0.0%	1.61	*1.61*		*34.7*	59.0%	0.7	*0.29*		*552.7*	0.5%	0.05	*0.05*		*156.5*
32	50	1,066,887	260	0.0%	1.61	*1.61*		*36.3*	60.5%	0.7	*0.28*		*553.0*	1.0%	0.05	*0.05*		*156.5*
33	50	1,066,887	260	0.0%	1.61	*1.61*		*37.9*	62.0%	0.7	*0.27*		*553.2*	1.5%	0.05	*0.05*		*156.6*
34	50	1,066,887	260	0.0%	1.61	*1.61*		*39.5*	63.5%	0.7	*0.26*		*553.5*	2.0%	0.05	*0.05*		*156.6*
35	50	1,066,887	260	0.0%	1.61	*1.61*		*41.1*	65.0%	0.7	*0.25*		*553.8*	2.5%	0.05	*0.05*		*156.7*
36	50	1,066,887	260	0.0%	1.61	*1.61*		*42.7*	66.5%	0.7	*0.24*		*554.0*	3.0%	0.05	*0.05*		*156.7*
37	50	1,066,887	260	0.0%	1.61	*1.61*		*44.3*	67.5%	0.7	*0.23*		*554.2*	3.5%	0.05	*0.05*		*156.8*
38	50	1,066,887	260	3.0%	1.61	*1.56*		*45.9*	68.5%	0.7	*0.23*		*554.5*	4.0%	0.05	*0.05*		*156.8*
39	50	1,066,887	260	8.0%	1.61	*1.48*		*47.4*	69.5%	0.7	*0.22*		*554.7*	4.5%	0.05	*0.05*		*156.9*
40	50	1,066,887	260	13.0%	1.61	*1.40*		*48.8*	70.5%	0.7	*0.21*		*554.9*	5.0%	0.05	*0.05*		*156.9*
41	50	1,066,887	260	18.0%	1.61	*1.32*		*50.1*	71.5%	0.7	*0.20*		*555.1*	6.0%	0.05	*0.05*		*157.0*
42	50	1,066,887	260	23.0%	1.61	*1.24*		*51.3*	72.5%	0.7	*0.20*		*555.3*	7.0%	0.05	*0.05*		*157.0*
43	50	1,066,887	260	28.0%	1.61	*1.16*		*52.5*	73.5%	0.7	*0.19*		*555.5*	8.0%	0.05	*0.05*		*157.1*
44	50	1,066,887	260	33.0%	1.61	*1.08*		*53.6*	74.5%	0.7	*0.18*		*555.7*	9.0%	0.05	*0.05*		*157.1*
45	50	1,066,887	260	38.0%	1.61	*1.00*		*54.6*	75.5%	0.7	*0.18*		*555.8*	10.0%	0.05	*0.05*		*157.2*
46	50	1,066,887	260	43.0%	1.61	*0.92*		*55.5*	76.5%	0.7	*0.17*		*556.0*	11.0%	0.05	*0.05*		*157.2*
47	50	1,066,887	260	48.0%	1.61	*0.84*		*56.3*	77.5%	0.7	*0.16*		*556.2*	12.0%	0.05	*0.05*		*157.3*
48	50	1,066,887	260	55.0%	1.61	*0.73*		*57.1*	78.5%	0.7	*0.15*		*556.3*	13.0%	0.05	*0.04*		*157.3*
49	50	1,066,887	260	62.0%	1.61	*0.61*		*57.7*	79.5%	0.7	*0.15*		*556.5*	14.0%	0.05	*0.04*		*157.4*
50	50	1,066,887	260	69.0%	1.61	*0.50*		*58.2*	80.0%	0.7	*0.14*		*556.6*	15.0%	0.05	*0.04*		*157.4*
51	50	1,066,887	260	76.0%	1.61	*0.39*		*58.6*	80.0%	0.7	*0.14*		*556.7*	15.0%	0.05	*0.04*		*157.4*
52	50	1,066,887	260	82.0%	1.61	*0.29*		*58.8*	80.0%	0.7	*0.14*		*556.9*	15.0%	0.05	*0.04*		*157.5*
53	50	1,066,887	260	86.7%	1.61	*0.21*		*59.1*	80.0%	0.7	*0.14*		*557.0*	15.0%	0.05	*0.04*		*157.5*
54	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
55	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
56	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
57	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
58	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
59	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
60	50	1,066,887	260	86.7%	1.61	*0.21*			80.0%	0.7	*0.14*			15.0%	0.05	*0.04*		
Average Flue Gas Flow (initial load to >50% load):		**1,064,926 acfm**				**START-UP EMISSIONS:**					**START-UP EMISSIONS:**					**START-UP EMISSIONS:**		
						Flame to FSNL:		**5.90**			**Flame to FSNL:**		**94.60**			**Flame to FSNL:**		**29.60**
						FSNL to >50% Load:		**53.2**			**FSNL to >50% Load:**		**462.4**			**FSNL to >50% Load:**		**127.9**
						Total SU Emissions:		**59.1**			**Total SU Emissions:**		**557.0**			**Total SU Emissions:**		**157.5**
						Avg SU Emissions (lb/hr):		**66.9**			**Avg SU Emissions (lb/hr):**		**630.6**			**Avg SU Emissions (lb/hr):**		**178.3**

= Time/load at which unit is "emissions compliant

Emission Estimates - Shutdown
MHI M501GAC Combined Cycle

				NOx Emissions					CO Emissions					VOC Emissions				
	Combustion Turbine Load	GT Exhaust Flow Rate	Stack Gas Temperature	Reduction w/SCR	*Uncontrolled*	*Controlled*			Reduction w/CO catalyst	*Uncontrolled*	*Controlled*			Reduction w/CO catalyst	*Uncontrolled*	*Controlled*		
	MHI "Normal Stop Mode (M501G/2on1)"	MHI M501GAC Typical Starting Curve on Gas Firing	Assumed to be ~260 F	Assumed	*MPS-APE-068 (5 deg F)*		*Rolling 1-hour average*	*Accumulated*	Assumed	*MPS-APE-068 (5 deg F)*		*Rolling 1-hour average*	*Accumulated*	Assumed	*MPS-APE-068 (5 deg F)*		*Rolling 1-hour average*	*Accumulated*
Minutes	%	acfm			*lb*	*lb*	*lb/hr*	*lb*	%	*lb*	*lb*	*lb/hr*	*lb*	%	*lb*	*lb*	*lb/hr*	*lb*
59	100	1,693,471	260	87%	2.43	*0.32*			80%	0.99	*0.20*			0%	0.080	*0.080*		
58	100	1,693,471	260	87%	2.43	*0.32*			80%	0.99	*0.20*			0%	0.080	*0.080*		
57	100	1,693,471	260	87%	2.43	*0.32*			80%	0.99	*0.20*			0%	0.080	*0.080*		
56	100	1,693,471	260	87%	2.43	*0.32*			80%	0.99	*0.20*			0%	0.080	*0.080*		
55	100	1,693,471	260	87%	2.43	*0.32*			80%	0.99	*0.20*			0%	0.080	*0.080*		
54	97	1,650,288	260	87%	2.39	*0.32*			80%	0.97	*0.19*			0%	0.079	*0.079*		
53	94	1,607,104	260	87%	2.35	*0.31*			80%	0.95	*0.19*			0%	0.078	*0.078*		
52	91	1,563,921	260	87%	2.31	*0.31*			80%	0.93	*0.19*			0%	0.076	*0.076*		
51	88	1,520,737	260	87%	2.27	*0.30*			80%	0.90	*0.18*			0%	0.075	*0.075*		
50	85	1,477,554	260	87%	2.22	*0.30*			80%	0.88	*0.18*			0%	0.074	*0.074*		
49	82	1,434,370	260	87%	2.18	*0.29*			80%	0.86	*0.17*			0%	0.073	*0.073*		
48	79	1,391,187	260	87%	2.14	*0.29*			80%	0.84	*0.17*			0%	0.072	*0.072*		
47	77	1,348,003	260	87%	2.10	*0.28*			80%	0.82	*0.16*			0%	0.070	*0.070*		
46	74	1,304,820	260	87%	2.04	*0.27*			80%	0.80	*0.16*			0%	0.069	*0.069*		
45	71	1,261,636	260	87%	1.98	*0.26*			80%	0.78	*0.16*			0%	0.068	*0.068*		
44	68	1,218,453	260	87%	1.92	*0.26*			80%	0.76	*0.15*			0%	0.067	*0.067*		
43	65	1,175,269	260	87%	1.86	*0.25*			80%	0.74	*0.15*			0%	0.066	*0.066*		
42	62	1,132,086	260	87%	1.80	*0.24*			80%	0.72	*0.14*			0%	0.064	*0.064*		
41	59	1,107,530	260	87%	1.75	*0.23*			80%	0.71	*0.14*			0%	0.061	*0.061*		
40	56	1,097,369	260	87%	1.71	*0.23*			80%	0.71	*0.14*			0%	0.059	*0.059*		
39	56	1,097,369	260	87%	1.71	*0.23*			80%	0.71	*0.14*			0%	0.059	*0.059*		
38	56	1,097,369	260	87%	1.71	*0.23*			80%	0.71	*0.14*			0%	0.059	*0.059*		
37	56	1,097,369	260	87%	1.71	*0.23*			80%	0.71	*0.14*			0%	0.059	*0.059*		
36	56	1,097,369	260	87%	1.71	*0.23*			80%	0.71	*0.14*			0%	0.059	*0.059*		
35	56	1,097,369	260	87%	1.71	*0.23*			80%	0.71	*0.14*			0%	0.059	*0.059*		
34	56	1,097,369	260	87%	1.71	*0.23*			80%	0.71	*0.14*			0%	0.059	*0.059*		
33	56	1,097,369	260	87%	1.71	*0.23*			80%	0.71	*0.14*			0%	0.059	*0.059*		
32	56	1,097,369	260	87%	1.71	*0.23*			80%	0.71	*0.14*			0%	0.059	*0.059*		
31	56	1,097,369	260	87%	1.71	*0.23*			80%	0.71	*0.14*			0%	0.059	*0.059*		
30	56	1,097,369	260	87%	1.71	*0.23*			80%	0.71	*0.14*			0%	0.059	*0.059*		
29	56	1,097,369	260	87%	1.71	*0.23*			80%	0.71	*0.14*			0%	0.059	*0.059*		
28	56	1,097,369	260	87%	1.71	*0.23*			80%	0.71	*0.14*			0%	0.059	*0.059*		
27	56	1,097,369	260	87%	1.71	*0.23*			80%	0.71	*0.14*			0%	0.059	*0.059*		
26	56	1,097,369	260	87%	1.71	*0.23*			80%	0.71	*0.14*			0%	0.059	*0.059*		
25	56	1,097,369	260	87%	1.71	*0.23*			80%	0.71	*0.14*			0%	0.059	*0.059*		
24	56	1,097,369	260	87%	1.71	*0.23*			80%	0.71	*0.14*			0%	0.06	*0.06*		
23	56	1,097,369	260	87%	1.71	*0.23*			80%	0.71	*0.14*			0%	0.06	*0.06*		
22	56	1,097,369	260	87%	1.71	*0.23*			80%	0.71	*0.14*			0%	0.06	*0.06*		
21	56	1,097,369	260	87%	1.71	*0.23*			80%	0.71	*0.14*			0%	0.06	*0.06*		
20	50	1,066,887	260	87%	1.61	*0.21*		*0.2*	80%	0.72	*0.14*		*0.1*	0%	0.05	*0.05*		*0.1*
19	45	1,064,629	260	0%	2.57	*2.57*		*2.8*	80%	25.91	*5.18*		*5.3*	15.0%	1.38	*1.17*		*1.2*
18	39	1,062,747	260	0%	2.54	*2.54*		*5.3*	80%	64.51	*12.90*		*18.2*	14.0%	6.13	*5.27*		*6.5*
17	34	1,060,489	260	0%	2.47	*2.47*		*7.8*	80%	100.43	*20.09*		*38.3*	13.0%	14.31	*12.45*		*18.9*
16	28	1,058,608	260	0%	2.37	*2.37*		*10.2*	80%	110.5	*22.1*		*60.4*	12.0%	21.6	*19.0*		*38.0*
15	22	1,056,350	260	0%	2.22	*2.22*		*12.4*	80%	120.0	*24.0*		*84.4*	11.0%	28.8	*25.7*		*63.7*
14	17	1,054,092	260	0%	1.72	*1.72*		*14.1*	80%	58.1	*11.6*		*96.0*	10.0%	12.5	*11.2*		*74.9*
13	11	1,052,210	260	0%	1.70	*1.70*		*15.8*	80%	70.7	*14.1*		*110.2*	9.0%	19.1	*17.3*		*92.2*
12	6	1,049,952	260	0%	1.61	*1.61*		*17.4*	80%	79.7	*15.9*		*126.1*	8.0%	26.6	*24.5*		*116.7*
11-0	FSNL to Flameout					*1.00*		*18.4*			*20.9*		*147.0*			*6.6*		*123.3*
	Average Flue Gas Flow (<50% load):	**1,058,440 acfm**				**SD EMISSIONS:**					**SD EMISSIONS:**					**SD EMISSIONS:**		
						<50% Load to FSNL:		**17.4**			**<50% Load to FSNL:**		**126.1**			**<50% Load to FSNL:**		**116.7**
						FSNL to Flameout:		**1.0**			**FSNL to Flameout:**		**20.9**			**FSNL to Flameout:**		**6.6**
						Total SD Emissions:		**18.4**			**Total SD Emissions:**		**147.0**			**Total SD Emissions:**		**123.3**
						Avg SD Emissions (lb/hr):		**55.3**			**Avg SD Emissions (lb/hr):**		**441.0**			**Avg SD Emissions (lb/hr):**		**370.0**

= Time/load at which unit is "emissions compliant

= Time at which unit reaches full load operatio

American Electric Power
Big Sandy Plant Unit 1
Repowering Cost Estimate Study

		Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
Ambient Temp - % Load		55 F - 100% Load	55 F - 100% Load	55 F - 100% Load	5 F - 100% Load	5 F - 100% Load	85 F - 100% Load
Fuel		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
Inlet Chiller		Off	On	On	Off	Off	Off
Duct Firing (Fired / Unfired)		Unfired	Unfired	Fired	Unfired	Fired	Unfired
Controlled Emissions (Per CT/HRSG)		ppmvd@15%O_2	ppmvd@15%O_2	ppmvd@15%O_2	ppmvd@15%O_2	ppmvd@15%O_2	ppmvd@15%O_2
	NO_X	2.0	2.0	2.0	2.0	2.0	2.0
	CO	1.4	1.4	3.0	1.4	2.9	1.5
	VOC	1.0	1.0	2.1	1.0	2.0	1.0
	NH_3	5.0	5.0	5.0	5.0	5.0	5.0
		lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
	NO_X	14.9	15.1	18.9	16.3	20.1	14.1
	CO	6.5	6.6	17.2	7.1	17.7	6.2
	SO_2	3.04	3.08	3.86	3.32	4.11	2.88
	PM_{10} / $PM_{2.5}$	19.44	19.46	25.92	19.58	26.09	19.37
	VOC	2.55	2.57	6.80	2.74	6.97	2.47
	H_2SO_4	1.07	1.08	1.95	1.17	2.07	1.01
	NH_3	13.7	13.9	17.5	15.0	18.6	13.0
	CO_2	237,552	240,441	301,309	260,173	321,041	225,221

American Electric Power
Big Sandy Plant Unit 1
Repowering Cost Estimate Study

		Case 7	Case 8	Case 9	Case 10	Case 11
Ambient Temp - % Load		85 F - 100% Load	85 F - 100% Load	55 F - 100% Load	5 F - 100% Load	89 F - 100% Load
Fuel		Natural Gas	Natural Gas	Distillate Oil	Distillate Oil	Distillate Oil
Inlet Chiller		On	On	Off	Off	Off
Duct Firing (Fired / Unfired)		Unfired	Fired	Unfired	Unfired	Unfired
Controlled Emissions (Per CT/HRSG)		ppmvd@15%O_2	ppmvd@15%O_2	ppmvd@15%O_2	ppmvd@15%O_2	ppmvd@15%O_2
	NO_X	2.0	2.0	5.0	5.0	5.0
	CO	1.4	2.9	2.7	2.7	2.7
	VOC	1.0	2.0	2.1	2.1	2.2
	NH_3	5.0	5.0	5.0	5.0	5.0
		lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
	NO_X	15.1	18.8	44.1	44.1	41.5
	CO	6.6	16.7	14.4	14.4	13.9
	SO_2	3.08	3.83	3.47	3.47	3.27
	PM_{10} / $PM_{2.5}$	19.46	25.65	35.65	35.65	35.55
	VOC	2.57	6.60	6.58	6.48	6.39
	H_2SO_4	1.08	1.93	1.22	1.22	1.15
	NH_3	13.9	17.4	16.3	16.3	15.4
	CO_2	240,455	298,481	371,003	370,800	349,876

Option 2
General Electric GE 7FA.05 Combined Cycle
Emissions Summary
Preliminary

Emissions Case No.		**Case 1**	**Case 2**	**Case 3**	**Case 4**	**Case 5**	**Case 6**	**Case 7**	**Case 8**
Reference Heat Balance Case No.		Case 1	Case 24	Case 8	Case 3	Case 9	Case 5	Case 4	Case 2
		55 F - 100% Load	**55 F - 100% Load**	**55 F - 100% Load Annual Average Chiller Duct Firing**	**5 F - 100% Load**	**5 F - 100% Load 99% Winter Duct Firing**	**85 F - 100% Load 1% Summer Duct Firing**	**85 F - 100% Load 1% Summer Chiller**	**85 F - 100% Load 1% Summer Chiller Duct Firing**
American Electric Power			**Annual Average Chiller**						
Big Sandy Plant Unit 1		**Annual Average**			**99% Winter**		**1% Summer**		
Repowering Cost Estimate Study									
Gas Fired Emission Estimates (per CT/HRSG)									
SITE CONDITIONS									
Ambient Temperature	°F	55	55	55	5	5	85	85	85
Relative Humidity	%	66	66	66	68	68	67	67	67
Site Elevation	feet	625	625	625	625	625	625	625	625
Atmospheric Pressure	psia	14.37	14.37	14.37	14.37	14.37	14.37	14.37	14.37
FACILITY CONDITIONS (Note 1)									
CT Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CT Model		GE 7FA.05	GE 7FA.06	GE 7FA.07	GE 7FA.08	GE 7FA.09	GE 7FA.10	GE 7FA.11	GE 7FA.12
CT Load	%	100	100	100	100	100	100	100	100
CT Chiller	ON/OFF	Off	On	On	Off	Off	Off	On	On
CT Gross Power Output	kW	209,779	212,986	212,986	232,251	232,251	194,303	213,132	213,132
CT Heat Consumption (LHV)	MBtu/hr	1,851.3	1,875.3	1,875.3	2,026.6	2,026.6	1,757.0	1,877.3	1,877.3
CT Heat Consumption (HHV)	MBtu/hr	2,054.9	2,081.6	2,081.6	2,249.5	2,249.5	1,950.3	2,083.8	2,083.8
CT Fuel Flow Rate	lb/hr	92,733	93,936	93,936	101,514	101,514	88,010	94,036	94,036
CT Fuel Flow Rate	MSCF/hr	2.13	2.15	2.15	2.33	2.33	2.02	2.16	2.16
CT Exhaust Gas Flow Rate	lb/hr	4,019,000	4,057,001	4,057,002	4,335,000	4,335,000	3,878,000	4,053,000	4,053,000
CT Exhaust Gas Temperature	°F	1,114	1,112	1,112	1,084	1,084	1,129	1,112	1,112
DB Heat Consumption (HHV) **(Note 1)**	MBtu/hr	0.0	0.0	529.1	0.0	529.1	0.0	0.0	504.4
DB Heat Consumption (LHV)	MBtu/hr	0.0	0.0	476.7	0.0	476.7	0.0	0.0	454.4
DB Fuel Flow Rate	lb/hr	0	0	23,877	0	23,877	0	0	22,762
DB Fuel Flow Rate	MSCF/hr	0.00	0.00	0.55	0.00	0.55	0.00	0.00	0.52
NATURAL GAS ANALYSIS (Note 2)									
Fuel LHV	Btu/lb	19,964	19,964	19,964	19,964	19,964	19,964	19,964	19,964
Fuel HHV	Btu/lb	22,172	22,172	22,172	22,172	22,172	22,172	22,172	22,172
Fuel LHV	Btu/ft^3	870.8	870.8	870.8	870.8	870.8	870.8	870.8	870.8
Fuel HHV	Btu/ft^3	967.1	967.1	967.1	967.1	967.1	967.1	967.1	967.1
HHV/LHV Ratio		1.110	1.110	1.110	1.110	1.110	1.110	1.110	1.110
Total Sulfur, S **(Note 3)**	grains/100 ft^3	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
COMBUSTION TURBINE EXHAUST ANALYSIS (Note 4)									
Argon, Ar	% vol	0.890	0.890	0.890	0.890	0.890	0.870	0.880	0.880
Nitrogen, N_2	% vol	74.40	74.40	74.40	75.01	75.01	73.13	74.21	74.21
Oxygen, O_2	% vol	12.40	12.37	12.37	12.43	12.43	12.23	12.31	12.31
Carbon Dioxide, CO_2	% vol	3.81	3.82	3.82	3.88	3.88	3.72	3.82	3.82
Water, H_2O	% vol	8.50	8.52	8.52	7.79	7.79	10.05	8.78	8.78
Total		*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*
Molecular weight	lb/lbmol	28.37	28.37	28.37	28.46	28.46	28.20	28.34	28.34
COMBUSTION TURBINE EMISSIONS (per CT) (Note 5)									
NO_X	ppmvd @ 15% O_2	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
NO_X	ppmvd	11.2	11.3	11.3	11.3	11.3	11.1	11.3	11.3
NO_X as NO_2	lb/hr	66.8	67.7	67.7	73.1	73.1	63.4	67.8	67.8
CO	ppmvd @ 15% O_2	7.2	7.2	7.2	7.2	7.2	7.3	7.2	7.2
CO	ppmvd	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
CO	lb/hr	32.7	33.0	33.0	35.4	35.4	31.2	32.9	32.9
VOC	ppmvd @ 15% O_2	1.2	1.2	1.2	1.2	1.2	1.3	1.2	1.2
VOC	ppmvd	1.5	1.5	1.5	1.5	1.5	1.6	1.5	1.5
VOC	ppmvw	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
VOC	lb/hr	3.2	3.2	3.2	3.4	3.4	3.1	3.2	3.2
SO_2	ppmvd @ 15% O_2	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
SO_2	ppmvd	0.37	0.37	0.37	0.37	0.37	0.36	0.37	0.37
SO_2	lb/hr	3.04	3.08	3.08	3.32	3.32	2.88	3.08	3.08
SO_3 Oxidation **(Note 6)**	%	8	8	8	8	8	8	8	8
SO_3	ppmvd @ 15% O_2	0.023	0.023	0.023	0.024	0.024	0.024	0.023	0.023
SO_3	ppmvd	0.029	0.029	0.029	0.030	0.030	0.029	0.029	0.029
SO_3	lb/hr	0.304	0.308	0.308	0.332	0.332	0.288	0.308	0.308

Option 2
General Electric GE 7FA.05 Combined Cycle
Emissions Summary
Preliminary

Emissions Case No.		**Case 1**	**Case 2**	**Case 3**	**Case 4**	**Case 5**	**Case 6**	**Case 7**	**Case 8**
Reference Heat Balance Case No.		Case 1	Case 24	Case 8	Case 3	Case 9	Case 5	Case 4	Case 2
		55 F - 100% Load	**55 F - 100% Load**	**55 F - 100% Load Annual Average Chiller**	**5 F - 100% Load**	**5 F - 100% Load**	**85 F - 100% Load**	**85 F - 100% Load**	**85 F - 100% Load 1% Summer Chiller**
American Electric Power			**Annual Average**			**99% Winter**		**1% Summer**	
Big Sandy Plant Unit 1		**Annual Average**	**Chiller**	**Duct Firing**	**99% Winter**	**Duct Firing**	**1% Summer**	**Chiller**	**Duct Firing**
Repowering Cost Estimate Study									
Gas Fired Emission Estimates (per CT/HRSG)									
PM10									
Total (Front & Back Half)	lb/hr	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00
Total (Front & Back Half)	lb/mmBtu	0.0088	0.0086	0.0086	0.0080	0.0080	0.0092	0.0086	0.0086
CO_2	ppmvd @ 15% O_2	33,433	33,393	33,393	33,459	33,459	33,409	33,365	33,365
CO_2	ppmvd	41,639	41,758	41,758	42,078	42,078	41,356	41,877	41,877
CO_2	lb/hr	237,502	240,391	240,391	260,119	260,119	225,174	240,405	240,405
DUCT BURNER EMISSIONS (per CT/HRSG) (See Note 7)									
DB Heat Consumption (HHV)	MBtu/hr	0.0	0.0	529.1	0.0	529.1	0.0	0.0	504.4
NO_X	lb/MBtu, HHV	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NO_X	lb/hr	0.0	0.0	52.9	0.0	52.9	0.0	0.0	50.4
CO	lb/MBtu, HHV	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
CO	lb/hr	0.0	0.0	52.9	0.0	52.9	0.0	0.0	50.4
VOC	lb/MBtu, HHV	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
VOC	lb/hr	0.0	0.0	5.3	0.0	5.3	0.0	0.0	5.0
SO_2	lb/hr	0.00	0.00	0.78	0.00	0.78	0.00	0.00	0.75
SO_3 Oxidation	%	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
SO_3	lb/hr	0.00	0.00	0.08	0.00	0.08	0.00	0.00	0.07
PM10									
Front and Back Half	lb/MBtu, HHV	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
Front and Back Half	lb/hr	0.0	0.0	5.3	0.0	5.3	0.0	0.0	5.0
CO_2	lb/hr	0	0	60,787	0	60,787	0	0	57,949
POST DUCT BURNER EXHAUST COMPOSTION (per CT/HRSG)									
Argon, Ar	vol %	0.89	0.89	0.88	0.89	0.88	0.87	0.88	0.87
Nitrogen, N_2	vol %	74.40	74.40	73.70	75.01	74.35	73.13	74.21	73.54
Oxygen, O_2	vol %	12.40	12.37	10.33	12.43	10.52	12.23	12.31	10.37
Carbon Dioxide, CO_2	vol %	3.81	3.82	4.74	3.88	4.74	3.72	3.82	4.70
Water, H_2O	vol %	8.50	8.52	10.35	7.79	9.51	10.05	8.78	10.52
Total		*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*
Molecular weight	lb/lbmol	28.37	28.37	28.25	28.46	28.35	28.20	28.34	28.23
POST DUCT BURNER EMISSIONS (per CT/HRSG)									
NO_X	ppmvd @ 15% O_2	9.0	9.0	12.7	9.0	12.5	9.0	9.0	12.6
NO_X	ppmvd	11.2	11.3	20.3	11.3	19.7	11.1	11.3	19.9
NO_X as NO_2	lb/hr	66.8	67.7	120.6	73.1	126.1	63.4	67.8	118.2
CO	ppmvd @ 15% O_2	7.2	7.2	14.9	7.2	14.4	7.3	7.2	14.6
CO	ppmvd	9.0	9.0	23.7	9.0	22.7	9.0	9.0	23.0
CO	lb/hr	32.7	33.0	85.9	35.4	88.3	31.2	32.9	83.3
VOC	ppmvd @ 15% O_2	1.2	1.2	2.6	1.2	2.5	1.3	1.2	2.5
VOC	ppmvd	1.5	1.5	4.1	1.5	3.9	1.6	1.5	4.0
VOC	ppmvw	1.4	1.4	3.7	1.4	3.5	1.4	1.4	3.6
VOC	lb/hr	3.2	3.2	8.5	3.4	8.7	3.1	3.2	8.3
SO_2	ppmvd @ 15% O_2	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
SO_2	ppmvd	0.37	0.37	0.47	0.37	0.46	0.36	0.37	0.46
SO_2	lb/hr	3.04	3.08	3.86	3.32	4.11	2.88	3.08	3.83
SO_3	ppmvd @ 15% O_2	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
SO_3	ppmvd	0.03	0.03	0.04	0.03	0.04	0.03	0.03	0.04
SO_3	lb/hr	0.30	0.31	0.39	0.33	0.41	0.29	0.31	0.38
PM10									
Front & Back Half	lb/hr	18.00	18.00	23.29	18.00	23.29	18.00	18.00	23.04
CO_2	ppmvd @ 15% O_2	33,433	33,393	33,266	33,459	33,326	33,409	33,365	33,248
CO_2	ppmvd	41,639	41,758	52,850	42,078	52,403	41,356	41,877	52,477
CO_2	lb/hr	237,502	240,391	301,178	260,119	320,906	225,174	240,405	298,354

Option 2
General Electric GE 7FA.05 Combined Cycle
Emissions Summary
Preliminary

Emissions Case No.		**Case 1**	**Case 2**	**Case 3**	**Case 4**	**Case 5**	**Case 6**	**Case 7**	**Case 8**
Reference Heat Balance Case No.		Case 1	Case 24	Case 8	Case 3	Case 9	Case 5	Case 4	Case 2
		55 F - 100% Load	**55 F - 100% Load**	**55 F - 100% Load Annual Average Chiller Duct Firing**	**5 F - 100% Load**	**5 F - 100% Load 99% Winter Duct Firing**	**85 F - 100% Load 1% Summer Chiller**	**85 F - 100% Load 1% Summer Chiller Duct Firing**	**85 F - 100% Load 1% Summer Chiller Duct Firing**
American Electric Power			**Annual Average**						
Big Sandy Plant Unit 1		**Annual Average**			**99% Winter**		**1% Summer**		
Repowering Cost Estimate Study									
Gas Fired Emission Estimates (per CT/HRSG)									
POST OXIDATION CATALYST EMISSIONS (per CT/HRSG)									
CO Reduction **(Note 8)**	% decrease	80	80	80	80	80	80	80	80
CO	ppmvd @ 15% O_2	1.4	1.4	3.0	1.4	2.9	1.5	1.4	2.9
CO	ppmvd	1.8	1.8	4.7	1.8	4.5	1.8	1.8	4.6
CO	lb/hr	6.5	6.6	17.2	7.1	17.7	6.2	6.6	16.7
VOC Reduction **(Note 8)**	% decrease	20	20	20	20	20	20	20	20
VOC (non-methane, non-ethane)	ppmvd @ 15% O_2	1.0	1.0	2.1	1.0	2.0	1.0	1.0	2.0
VOC (non-methane, non-ethane)	ppmvd	1.2	1.2	3.3	1.2	3.1	1.2	1.2	3.2
VOC as CH_4	lb/hr	2.5	2.6	6.8	2.7	7.0	2.5	2.6	6.6
SO_3 Oxidation **(Note 9)**	% increase	10	10	20	10	20	10	10	20
D SO_3	ppmvd @ 15% O_2	0.029	0.029	0.059	0.029	0.059	0.029	0.029	0.059
D SO_3	ppmvd	0.037	0.037	0.093	0.037	0.092	0.036	0.037	0.092
D SO_3	lb/hr	0.38	0.38	0.96	0.42	1.03	0.36	0.38	0.96
CO_2	ppmvd @ 15% O_2	33,440	33,400	33,280	33,466	33,340	33,416	33,372	33,263
CO_2	ppmvd	41,648	41,766	52,873	42,087	52,425	41,365	41,886	52,500
CO_2	lb/hr	237,552	240,441	301,309	260,173	321,041	225,221	240,455	298,481
POST SCR EMISSIONS (per CT/HRSG)									
Hours of Operation **(Note 10)**	hours/year	8,760	8,760	8,760	8,760	8,760	8,760	8,760	8,760
NO_X **(Note 11)**	ppmvd @ 15% O_2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
NO_X Removal Efficiency **(Note 8)**	% decrease	77.8	77.8	84.3	77.8	84.0	77.8	77.8	84.1
NO_X	ppmvd	2.5	2.5	3.2	2.5	3.1	2.5	2.5	3.2
NO_X	lb/hr	14.9	15.1	18.9	16.3	20.1	14.1	15.1	18.8
NO_X	lb/MBtu (HHV)	0.0072	0.0072	0.0073	0.0072	0.0072	0.0072	0.0072	0.0072
NO_X **(Note 10)**	ton/yr	65.1	65.9	82.9	71.2	88.2	61.7	66.0	82.2
NH_3	ppmvd @ 15% O_2	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
NH_3	ppmvd	6.23	6.25	7.94	6.29	7.86	6.19	6.28	7.89
NH_3	lb/hr	13.7	13.9	17.5	15.0	18.6	13.0	13.9	17.4
NH_3	lbmol/hr	0.8	0.8	1.0	0.9	1.1	0.8	0.8	1.0
NH_3 **(Note 10)**	ton/yr	60.2	61.0	76.7	65.9	81.6	57.1	61.1	76.1
CO	ppmvd @ 15% O_2	1.4	1.4	3.0	1.4	2.9	1.5	1.4	2.9
CO	ppmvd	1.8	1.8	4.7	1.8	4.5	1.8	1.8	4.6
CO	lb/hr	6.5	6.6	17.2	7.1	17.7	6.2	6.6	16.7
CO	lb/MBtu (HHV)	0.0032	0.0032	0.0066	0.0031	0.0064	0.0032	0.0032	0.0064
CO **(Note 10)**	ton/yr	28.6	28.9	75.2	31.0	77.4	27.3	28.8	73.0
VOC	ppmvd @ 15% O_2	1.0	1.0	2.1	1.0	2.0	1.0	1.0	2.0
VOC	ppmvd	1.2	1.2	3.3	1.2	3.1	1.2	1.2	3.2
VOC	lb/hr	2.5	2.6	6.8	2.7	7.0	2.5	2.6	6.6
VOC	lb/MBtu (HHV)	0.0012	0.0012	0.0026	0.0012	0.0025	0.0013	0.0012	0.0026
VOC **(Note 10)**	ton/yr	11.1	11.3	29.8	12.0	30.5	10.8	11.3	28.9
SO_2	ppmvd @ 15% O_2	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
SO_2	ppmvd	0.37	0.37	0.47	0.37	0.46	0.36	0.37	0.46
SO_2	lb/hr	3.04	3.08	3.86	3.32	4.11	2.88	3.08	3.83
SO_2	lb/MBtu (HHV)	0.00148	0.00148	0.00148	0.00148	0.00148	0.00148	0.00148	0.00148
SO_2 **(Note 10)**	ton/yr	13.3	13.5	16.9	14.6	18.0	12.6	13.5	16.8
SO_3 Oxidation across SCR **(Note 12)**	% increase	5	5	5	5	5	5	5	5
SO_3 Oxidation across SCR	lb/hr	0.19	0.19	0.24	0.21	0.26	0.18	0.19	0.24
SO_3	ppmvd @ 15% O_2	0.07	0.07	0.10	0.07	0.10	0.07	0.07	0.10
SO_3	ppmvd	0.08	0.08	0.15	0.08	0.15	0.08	0.08	0.15
SO_3	lb/hr	0.87	0.88	1.59	0.96	1.69	0.83	0.89	1.58
SO_3	lbmol/hr	1.09E-02	1.10E-02	1.99E-02	1.19E-02	2.12E-02	1.03E-02	1.11E-02	1.97E-02
H_2SO_4	lb/hr	1.07	1.08	1.95	1.17	2.07	1.01	1.08	1.93
H_2SO_4	lb/mmBtu	0.000425	0.000425	0.000610	0.000425	0.000610	0.000425	0.000425	0.000610
H_2SO_4 **(Note 10)**	ton/yr	4.7	4.7	8.5	5.1	9.1	4.4	4.8	8.5
$(NH_4)_2SO_4$, Ammonium Sulfate **(Note 13)**	lb/hr	1.44	1.46	2.63	1.58	2.80	1.37	1.46	2.60
$(NH_4)_2SO_4$, Ammonium Sulfate	ton/yr	6.3	6.4	11.5	6.9	12.2	6.0	6.4	11.4

Option 2
General Electric GE 7FA.05 Combined Cycle
Emissions Summary
Preliminary

Emissions Case No.		**Case 1**	**Case 2**	**Case 3**	**Case 4**	**Case 5**	**Case 6**	**Case 7**	**Case 8**
Reference Heat Balance Case No.		Case 1	Case 24	Case 8	Case 3	Case 9	Case 5	Case 4	Case 2
		55 F - 100% Load	**55 F - 100% Load**	**55 F - 100% Load Annual Average Chiller Duct Firing**	**5 F - 100% Load**	**5 F - 100% Load 99% Winter Duct Firing**	**85 F - 100% Load 1% Summer Duct Firing**	**85 F - 100% Load 1% Summer Chiller**	**85 F - 100% Load 1% Summer Chiller Duct Firing**
American Electric Power			**Annual Average**						
Big Sandy Plant Unit 1		**Annual Average**	**Chiller**		**99% Winter**		**1% Summer**		
Repowering Cost Estimate Study									
Gas Fired Emission Estimates (per CT/HRSG)									
PM10									
Total PM10	lb/hr	19.44	19.46	25.92	19.58	26.09	19.37	19.46	25.65
Total PM10	lb/MBtu (HHV)	0.0095	0.0093	0.0099	0.0087	0.0094	0.0099	0.0093	0.0099
Total PM10	grains/scf	0.0025	0.0025	0.0033	0.0023	0.0031	0.0026	0.0025	0.0032
Total PM10	grains/dscf	0.0027	0.0027	0.0036	0.0025	0.0034	0.0028	0.0027	0.0036
Total PM10 **(Note 10)**	ton/yr	85.2	85.2	113.5	85.7	114.3	84.8	85.2	112.3
CO_2	ppmvd @ 15% O_2	33,440	33,400	33,280	33,466	33,340	33,416	33,372	33,263
CO_2	ppmvd	41,648	41,766	52,873	42,087	52,425	41,365	41,886	52,500
CO_2	lb/hr	237,552	240,441	301,309	260,173	321,041	225,221	240,455	298,481
CO_2	lb/mmBtu (HHV)	115.6	115.5	115.4	115.7	115.5	115.5	115.4	115.3
CO_2 **(Note 10)**	ton/yr	1,040,479	1,053,132	1,319,734	1,139,556	1,406,157	986,469	1,053,191	1,307,347
Aqueous Ammonia (per CT/HRSG)									
Purity **(Note 14)**	%	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0
Consumption	lb/hr	224.3	227.3	389.5	245.4	407.6	212.8	227.5	382.1
Stack Conditions (per CT/HRSG)									
Internal Diameter **(Note 15)**	ft	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Flow	lb/hr	4,019,224	4,057,228	4,081,268	4,335,245	4,359,284	3,878,213	4,053,227	4,076,144
Flow	scfm	909,824	918,478	927,781	978,485	987,788	883,462	918,530	927,398
Flow	dscfm	832,489	840,224	831,779	902,261	893,816	794,674	837,883	829,832
Temperature **(Note 1)**	°F	272.0	272.4	284.1	274.9	285.7	271.3	272.8	283.9
Flow	acfm	1,290,313	1,303,298	1,337,529	1,393,186	1,427,100	1,251,729	1,304,084	1,336,619
Exit Velocity	ft/s	56.6	57.1	58.6	61.1	62.6	54.9	57.2	58.6

Notes:

MBtu = 10^6 Btu

1. Performance information, including CT Output, Heat Input, and Exhaust Gas Flow Rates were obtained from GE document: "Big Sandy GE 7FA 2x2x1 July01.pdf" dated 7/1/2011.
   Duct burner firing rates and stack temperatures were obtained from S&L heat balance "BigSandy7FA05.xls"
2. Natural gas heating value provided in the performance data identified in Note 1.
3. Fuel S content assumed to be 0.5 gr/100scf.
4. Exhaust Gas compositions were based on information provided in the performance data identified in Note 1.
5. Combustion turbine emission rates were based on GE performance data identified in Note 1, target emission rates identified by AEP, potential guarantees, and potential permit limits. Emission rates should be further evaluated prior to establishing permit limits
6. Assumed 8% SO_2 to SO_3 oxidation during the combustion of natural gas.
7. Duct burner emission rates based on potential vendor guarantees. Emissions rates should be further evaluated prior to establishing permit limits.
8. CO, VOC, and NOx removal efficiencies are estimated based on reduction that is expected throughout life of catalyst.
9. SO_2 to SO_3 oxidation across oxidiation catalyst assumed to be 10% (without duct firing) and 20% (with duct firing).
10. Emission Calculations included in this spreadsheet are based on 8,760 hour/year operation for each case (per CT/HRSG). Excess emissions during periods of startup and shutdown are not included.
11. Assumed a post-SCR NOx emission rate of 2.0 ppmvd @ 15% O2.
12. SO_2 to SO_3 oxidation across the SCR is assumed to be 5%.
13. Assumed 100% conversion of SO_3 to (NH4)2SO4, and all $(NH_4)_2SO_4$ is captured as front half particulate matter.
14. Assumed aqueous ammonia purity of 19.0%
15. Assumed an Internal Stack Diameter of 22 feet for HRSG stack.

Option 2
General Electric GE 7FA.05 Combined Cycle
Emissions Summary
Preliminary

Emissions Case No.		**Case 9**	**Case 10**	**Case 11**
Reference Heat Balance Case No.		Case 29	Case 30	Case 34
		55 F - 100% Load	**5 F - 100% Load**	**89 F - 100% Load**
American Electric Power				
Big Sandy Plant Unit 1		**Annual Average**	**99% Winter**	**1% Summer**
Repowering Cost Estimate Study				
Distillate Oil Fired Emission Estimates (per CT/HRSG)				
SITE CONDITIONS				
Ambient Temperature	°F	55	5	85
Relative Humidity	%	66	68	67
Site Elevation	feet	625	625	625
Atmospheric Pressure	psia	14.37	14.37	14.37
FACILITY CONDITIONS (Note 1)				
CT Fuel Type		Distillate Oil	Distillate Oil	Distillate Oil
CT Model		GE 7FA.05	GE 7FA.05	GE 7FA.05
CT Load	%	100	100	100
CT Chiller	ON/OFF	Off	Off	Off
CT Gross Power Output	kW	222,606	224,849	206,368
CT Heat Consumption (LHV)	MBtu/hr	2,125.4	2,125.4	2,004.2
CT Heat Consumption (HHV)	MBtu/hr	2,360.6	2,360.6	2,225.9
CT Fuel Flow Rate	lb/hr	115,763	115,763	109,161
CT Exhaust Gas Flow Rate	lb/hr	4,141,000	4,091,000	4,000,000
CT Exhaust Gas Temperature	°F	1,101	1,080	1,115
CT Power Augmentation Steam Flow	lb/hr	0	0	0
DB Heat Consumption (HHV) **(Note 2)**	MBtu/hr	0.0	0.0	0.0
DB Heat Consumption (LHV)	MBtu/hr	0.0	0.0	0.0
DB Fuel Flow Rate	lb/hr	0	0	0
DB Fuel Flow Rate	MSCF/hr	0.00	0.00	0.00
DISTILLATE FUEL OIL ANALYSIS (Note 2)				
Sulfur Content	wt%	0.0015	0.0015	0.0015
Fuel LHV	Btu/lb	18,360	18,360	18,360
Fuel HHV	Btu/lb	19,462	19,462	19,462
HHV/LHV Ratio		1.06	1.06	1.06
COMBUSTION TURBINE EXHAUST ANALYSIS (Note 3)				
Argon, Ar	% vol	0.840	0.850	0.830
Nitrogen, N_2	% vol	70.70	71.44	69.90
Oxygen, O_2	% vol	10.67	10.74	10.69
Carbon Dioxide, CO_2	% vol	5.75	5.84	5.59
Water, H_2O	% vol	12.03	11.13	12.99
Total		*100.0*	*100.0*	*100.0*
Molecular weight	lb/lbmol	28.26	28.36	28.13
COMBUSTION TURBINE EMISSIONS (per CT) (Note 4)				
NO_X	ppmvd @ 15% O_2	42.0	42.0	42.0
NO_X	ppmvd	62.4	62.8	61.3
NO_X as NO_2	lb/hr	370.3	370.0	349.0
CO	ppmvd @ 15% O_2	13.5	13.4	13.7
CO	ppmvd	20.0	20.0	20.0
CO	lb/hr	72.2	71.8	69.3
VOC	ppmvd @ 15% O_2	2.7	2.6	2.8
VOC	ppmvd	4.0	3.9	4.0
VOC	ppmvw	3.5	3.5	3.5
VOC	lb/hr	8.2	8.1	8.0
SO_2	ppmvd @ 15% O_2	0.28	0.28	0.28
SO_2	ppmvd	0.42	0.42	0.41
SO_2	lb/hr	3.47	3.47	3.27
SO_3 Oxidation **(Note 5)**	%	8	8	8
SO_3	ppmvd @ 15% O_2	0.023	0.023	0.023
SO_3	ppmvd	0.034	0.034	0.033
SO_3	lb/hr	0.347	0.347	0.327
PM10				
Total (Front & Back Half)	lb/hr	34.00	34.00	34.00
Total (Front & Back Half)	lb/mmBtu	0.0144	0.0144	0.0153

Option 2
General Electric GE 7FA.05 Combined Cycle
Emissions Summary
Preliminary

Emissions Case No.		**Case 9**	**Case 10**	**Case 11**
Reference Heat Balance Case No.		Case 29	Case 30	Case 34
		55 F - 100% Load	**5 F - 100% Load**	**89 F - 100% Load**
American Electric Power				
Big Sandy Plant Unit 1		**Annual Average**	**99% Winter**	**1% Summer**
Repowering Cost Estimate Study				
Distillate Oil Fired Emission Estimates (per CT/HRSG)				
CO_2	ppmvd @ 15% O_2	43,981	43,984	44,003
CO_2	ppmvd	65,371	65,714	64,245
CO_2	lb/hr	370,889	370,688	349,767
POST OXIDATION CATALYST EMISSIONS (per CT/HRSG)				
CO Reduction **(Note 6)**	% decrease	80	80	80
CO	ppmvd @ 15% O_2	2.7	2.7	2.7
CO	ppmvd	4.0	4.0	4.0
CO	lb/hr	14.4	14.4	13.9
VOC Reduction **(Note 6)**	% decrease	20	20	20
VOC (non-methane, non-ethane)	ppmvd @ 15% O_2	2.1	2.1	2.2
VOC (non-methane, non-ethane)	ppmvd	3.2	3.2	3.2
VOC as CH_4	lb/hr	6.6	6.5	6.4
SO_3 Oxidation **(Note 7)**	% increase	10	10	10
D SO_3	ppmvd @ 15% O_2	0.028	0.028	0.028
D SO_3	ppmvd	0.042	0.042	0.041
D SO_3	lb/hr	0.43	0.43	0.41
CO_2	ppmvd @ 15% O_2	43,994	43,997	44,017
CO_2	ppmvd	65,391	65,734	64,266
CO_2	lb/hr	371,003	370,800	349,876
POST SCR EMISSIONS (per CT/HRSG)				
Hours of Operation **(Note 8)**	hours/year	8,760	8,760	8,760
NO_X **(Note 9)**	ppmvd @ 15% O_2	5.0	5.0	5.0
NO_X Removal Efficiency **(Note 6)**	% decrease	88.1	88.1	88.1
NO_X	ppmvd	7.4	7.5	7.3
NO_X	lb/hr	44.1	44.1	41.5
NO_X	lb/MBtu (HHV)	0.0187	0.0187	0.0187
NO_X **(Note 8)**	ton/yr	193.1	192.9	182.0
NH_3	ppmvd @ 15% O_2	5.0	5.0	5.0
NH_3	ppmvd	7.43	7.47	7.30
NH_3	lb/hr	16.3	16.3	15.4
NH_3	lbmol/hr	1.0	1.0	0.9
NH_3 **(Note 8)**	ton/yr	71.5	71.4	67.4
CO	ppmvd @ 15% O_2	2.7	2.7	2.7
CO	ppmvd	4.0	4.0	4.0
CO	lb/hr	14.4	14.4	13.9
CO	lb/MBtu (HHV)	0.0061	0.0061	0.0062
CO **(Note 8)**	ton/yr	63.3	62.9	60.7

Option 2
General Electric GE 7FA.05 Combined Cycle
Emissions Summary
Preliminary

Emissions Case No.		**Case 9**	**Case 10**	**Case 11**
Reference Heat Balance Case No.		Case 29	Case 30	Case 34
		55 F - 100% Load	**5 F - 100% Load**	**89 F - 100% Load**
American Electric Power				
Big Sandy Plant Unit 1		**Annual Average**	**99% Winter**	**1% Summer**
Repowering Cost Estimate Study				
Distillate Oil Fired Emission Estimates (per CT/HRSG)				
VOC	ppmvd @ 15% O_2	2.1	2.1	2.2
VOC	ppmvd	3.2	3.2	3.2
VOC	lb/hr	6.6	6.5	6.4
VOC	lb/MBtu (HHV)	0.0028	0.0027	0.0029
VOC **(Note 8)**	ton/yr	28.8	28.4	28.0
SO_2	ppmvd @ 15% O_2	0.28	0.28	0.28
SO_2	ppmvd	0.42	0.42	0.41
SO_2	lb/hr	3.47	3.47	3.27
SO_2	lb/MBtu (HHV)	0.00147	0.00147	0.00147
SO_2 **(Note 8)**	ton/yr	15.2	15.2	14.3
SO_3 Oxidation across SCR **(Note 10)**	% increase	5	5	5
SO_3 Oxidation across SCR	lb/hr	0.22	0.22	0.20
SO_3	ppmvd @ 15% O_2	0.07	0.07	0.07
SO_3	ppmvd	0.10	0.10	0.10
SO_3	lb/hr	1.00	1.00	0.94
SO_3	lbmol/hr	1.25E-02	1.25E-02	1.18E-02
H_2SO_4	lb/hr	1.22	1.22	1.15
H_2SO_4	lb/mmBtu	0.000423	0.000423	0.000423
H_2SO_4 **(Note 8)**	ton/yr	5.4	5.4	5.1
$(NH_4)_2SO_4$, Ammonium Sulfate **(Note 11)**	lb/hr	1.65	1.65	1.55
$(NH_4)_2SO_4$, Ammonium Sulfate	ton/yr	7.2	7.2	6.8
PM10				
Total PM10	lb/hr	35.65	35.65	35.55
Total PM10	lb/MBtu (HHV)	0.0151	0.0151	0.0160
Total PM10	grains/scf	0.0044	0.0045	0.0045
Total PM10	grains/dscf	0.0050	0.0051	0.0052
Total PM10 **(Note 8)**	ton/yr	156.1	156.1	155.7
CO_2	ppmvd @ 15% O_2	43,994	43,997	44,017
CO_2	ppmvd	65,391	65,734	64,266
CO_2	lb/hr	371,003	370,800	349,876
CO_2	lb/mmBtu (HHV)	157.2	157.1	157.2
CO_2 **(Note 8)**	ton/yr	1,624,992	1,624,104	1,532,457
Aqueous Ammonia (per CT/HRSG)				
Purity **(Note 12)**	%	19.0	19.0	19.0
Consumption	lb/hr	1039.2	1038.5	979.5
Stack Conditions (per CT/HRSG)				
Internal Diameter **(Note 13)**	ft	22.0	22.0	22.0
Flow	lb/hr	4,142,039	4,092,039	4,000,979
Flow	scfm	941,525	926,606	913,405
Flow	dscfm	828,248	823,475	794,753
Temperature **(Note 1)**	°F	284.9	285.1	284.8
Flow	acfm	1,358,803	1,337,632	1,318,043
Exit Velocity	ft/s	59.6	58.6	57.8

Option 2
General Electric GE 7FA.05 Combined Cycle
Emissions Summary
Preliminary

Emissions Case No.	**Case 9**	**Case 10**	**Case 11**
Reference Heat Balance Case No.	Case 29	Case 30	Case 34
	55 F - 100% Load	**5 F - 100% Load**	**89 F - 100% Load**
American Electric Power			
Big Sandy Plant Unit 1	**Annual Average**	**99% Winter**	**1% Summer**
Repowering Cost Estimate Study			
Distillate Oil Fired Emission Estimates (per CT/HRSG)			

Notes:

MBtu = 10^6 Btu

1. Performance information, including CT Output, Heat Input, and Exhaust Gas Flow Rates were obtained from GE document: "Big Sandy GE 7FA 2x2x1 July01.pdf" dated 7/1/2011. Duct burner firing rates and stack temperatures were obtained from S&L heat balance "BigSandy7FA05.xls"
2. Distillate Oil heating value provided in the performance data identified in Note 1.
3. Exhaust Gas compositions were based on information provided in the performance data referenced in Note 1.
4. Combustion turbine emission rates were based on GE performance data identified in Note 1. Emission rates should be further evaluated prior to establishing permit limits
5. Assumed 8% SO_2 to SO_3 oxidation during the combustion of fuel oil
6. CO, VOC, and NOx removal efficiencies are estimated based on reduction that is expected throughout life of catalyst.
7. SO_2 to SO_3 oxidation across oxidiation catalyst assumed to be 10%.
8. Annual emissions are based on 8,760 hour/year operation for each case (per CT/HRSG). Excess emissions during startup and shutdown are not included.
9. Assumed a post-SCR NOx emission rate of 5 ppmvd @ 15% O2.
10. SO_2 to SO_3 oxidation across the SCR is assumed to be 5%.
11. Assumed 100% conversion of SO_3 to (NH4)2SO4, and all $(NH_4)_2SO_4$ is captured as front half particulate matter.
12. Assumed aqueous ammonia purity of 19.0%
13. Assumed an Internal Stack Diameter of 22 feet.

Option 2
GE 7FA.05 Combined Cycle
Emissions Summary
Preliminary

American Electric Power
Big Sandy Plant Unit 1
Repowering Cost Estimate Study
Startup and Shutdown Emissions Estimates

Cold Start-up Emissions ("Lead" CT/HRSG)

Pollutant	Start Signal to FSNL	FSNL to "Emissions Compliant" Load[1]	**Total Emissions per Cold Start-up[2]**	Estimated Overall Cold Start-up Time[2]	Average Emission Rate	Maximum 1-hr Rolling Average Rate During Startup
	(lbs)	(lbs)	**(lbs)**	(minutes)	(lb/hr)	(lb/hr)
NOx	6.0	432.4	**438.4**	201	130.9	168.2
CO	29.0	409.2	**438.2**	201	130.8	225.8
VOC	1.0	69.0	**70.0**	201	20.9	54.4
Average Flue Gas Flow During Startup[2]			acfm	756,874		
Average Exhaust Velocity During Startup[2]			ft/sec	33.2		

Warm Start-up Emissions ("Lead" CT/HRSG)

Pollutant	Start Signal to FSNL	FSNL to "Emissions Compliant" Load[1]	**Total Emissions per Warm Start-up[2]**	Estimated Overall Warm Start-up Time[2]	Average Emission Rate	Maximum 1-hr Rolling Average Rate During Startup
	(lbs)	(lbs)	**(lbs)**	(minutes)	(lb/hr)	(lb/hr)
NOx	6.0	160.3	**166.3**	91	109.6	156.8
CO	29.0	256.5	**285.5**	91	188.2	227.9
VOC	1.0	36.2	**37.2**	91	24.5	34.4
Average Flue Gas Flow During Startup[2]			acfm	610,401		
Average Exhaust Velocity During Startup[2]			ft/sec	26.8		

Hot Start-up Emissions ("Lead" CT/HRSG)

Pollutant	Start Signal to FSNL	FSNL to "Emissions Compliant" Load[1]	**Total Emissions per Hot Start-up[2]**	Estimated Overall Hot Start-up Time[2]	Average Emission Rate	Maximum 1-hr Rolling Average Rate During Startup
	(lbs)	(lbs)	**(lbs)**	(minutes)	(lb/hr)	(lb/hr)
NOx	6.0	38.5	**44.5**	50	53.4	NA
CO	29.0	478.6	**507.6**	50	609.1	NA
VOC	1.0	26.5	**27.5**	50	33.0	NA
Average Flue Gas Flow During Startup[2]			acfm	625,666		
Average Exhaust Velocity During Startup[2]			ft/sec	27.4		

Shutdown Emissions (per CT/HRSG)

Pollutant	Lowest "Emissions Compliant" Load to FSNL	FSNL to Flameout	**Total Emissions per Shutdown[3]**	Estimated Overall Shutdown Time[3]	Average Emission Rate	Maximum 1-hr Rolling Average Rate During Startup
	(lbs)	(lbs)	**(lbs)**	(minutes)	(lb/hr)	(lb/hr)
NOx	14.3	3.0	**17.3**	24	43.3	NA
CO	101.9	25.0	**126.9**	24	317.2	NA
VOC	9.9	1.0	**10.9**	24	27.3	NA
Average Flue Gas Flow During Shutdown[3]			acfm	671,857		
Average Exhaust Velocity During Shutdown[3]			ft/sec	29.5		

(1) Each CT/HRSG is assumed to be "emissions compliant" at loads equal to and greater than 50%.

(2) Startup is assumed to be period from start signal to load at which Unit is "emissions compliant"

(3) Shutdown is assumed to be period between CT operating at lowest "emission compliant" load to flameout.

Emission Estimates - Cold Start (ISO Conditions)

GE 7FA.05 Combined Cycle

(startup after 72 hour shutdown or longer)

				NOx Emissions					CO Emissions (With CO Catalyst)					VOC Emissions (With CO Catalyst)				
	Combustion Turbine Load	GT Exhaust Flow Rate	Stack Gas Temperature	Reduction w/SCR	*Uncontrolled*	*Controlled*			Reduction w/CO catalyst	*Uncontrolled*	*Controlled*			Reduction w/CO catalyst	*Uncontrolled*	*Controlled*		
	GE Graph 102HA8306 Sheet 8 of 25	GE Graph 102HA8306 Sheet 8 of 25	Assumed to be ~260 F	Assumed	*GE Dwg No. 329A5374, Rev C*		*Rolling 1-hour average*	*Accumulated*	Assumed	*GE Dwg No. 329A5374, Rev C*		*Rolling 1-hour average*	*Accumulated*	Assumed	*GE Dwg No. 329A5374, Rev C*		*Rolling 1-hour average*	*Accumulated*
Minutes	%	acfm			*lb*	*lb*	*lb/hr*	*lb*	%	*lb*	*lb*	*lb/hr*	*lb*	%	*lb*	*lb*	*lb/hr*	*lb*
1-23	Start Signal to FSNL					*6.0*		*6.0*			*29.0*		*29.0*			*1.0*		*1.0*
24	0.0	667,479	260	0.0%	1.33	*1.33*		*7.3*	0.0%	10.74	*10.74*		*39.7*	0.0%	0.920	*0.92*		*1.9*
25	5.0	673,659	260	0.0%	2.34	*2.34*		*9.7*	1.0%	7.03	*6.96*		*46.7*	0.0%	0.424	*0.42*		*2.3*
26	10.0	679,840	260	0.0%	3.19	*3.19*		*12.9*	2.5%	3.33	*3.25*		*49.9*	0.0%	0.120	*0.12*		*2.5*
27	10.0	766,365	260	0.0%	3.19	*3.19*		*16.0*	4.0%	3.33	*3.20*		*53.1*	0.0%	0.120	*0.12*		*2.6*
28	10.0	852,890	260	0.0%	3.19	*3.19*		*19.2*	5.5%	3.33	*3.15*		*56.3*	0.0%	0.120	*0.12*		*2.7*
29	10.0	852,890	260	0.0%	3.19	*3.19*		*22.4*	7.0%	3.33	*3.10*		*59.4*	0.0%	0.120	*0.12*		*2.8*
30	10.0	852,890	260	0.0%	3.19	*3.19*		*25.6*	8.5%	3.33	*3.05*		*62.4*	0.0%	0.120	*0.12*		*2.9*
31	10.0	852,890	260	0.0%	3.19	*3.19*		*28.8*	10.0%	3.33	*3.00*		*65.4*	0.0%	0.120	*0.12*		*3.1*
32	10.0	852,890	260	0.0%	3.19	*3.19*		*32.0*	11.5%	3.33	*2.95*		*68.4*	0.0%	0.120	*0.12*		*3.2*
33	10.0	852,890	260	0.0%	3.19	*3.19*		*35.2*	13.0%	3.33	*2.90*		*71.3*	0.0%	0.120	*0.12*		*3.3*
34	10.0	852,890	260	0.0%	3.19	*3.19*		*38.4*	14.5%	3.33	*2.85*		*74.1*	0.0%	0.120	*0.12*		*3.4*
35	10.0	852,890	260	0.0%	3.19	*3.19*		*41.6*	16.0%	3.33	*2.80*		*76.9*	0.0%	0.120	*0.12*		*3.5*
36	10.0	852,890	260	0.0%	3.19	*3.19*		*44.8*	17.5%	3.33	*2.75*		*79.7*	0.0%	0.120	*0.12*		*3.7*
37	10.0	852,890	260	0.0%	3.19	*3.19*		*47.9*	19.0%	3.33	*2.70*		*82.4*	0.0%	0.120	*0.12*		*3.8*
38	10.0	852,890	260	0.0%	3.19	*3.19*		*51.1*	20.5%	3.33	*2.65*		*85.0*	0.0%	0.120	*0.12*		*3.9*
39	10.0	852,890	260	0.0%	3.19	*3.19*		*54.3*	22.0%	3.33	*2.60*		*87.6*	0.0%	0.120	*0.12*		*4.0*
40	10.0	852,890	260	0.0%	3.19	*3.19*		*57.5*	23.5%	3.33	*2.55*		*90.2*	0.0%	0.120	*0.12*		*4.1*
41	10.0	852,890	260	0.0%	3.19	*3.19*		*60.7*	25.0%	3.33	*2.50*		*92.7*	0.0%	0.120	*0.12*		*4.3*
42	10.0	852,890	260	0.0%	3.19	*3.19*		*63.9*	26.5%	3.33	*2.45*		*95.1*	0.0%	0.120	*0.12*		*4.4*
43	10.0	852,890	260	0.0%	3.19	*3.19*		*67.1*	28.0%	3.33	*2.40*		*97.5*	0.0%	0.120	*0.12*		*4.5*
44	10.0	852,890	260	0.0%	3.19	*3.19*		*70.3*	29.5%	3.33	*2.35*		*99.9*	0.0%	0.120	*0.12*		*4.6*
45	10.0	852,890	260	0.0%	3.19	*3.19*		*73.5*	31.0%	3.33	*2.30*		*102.2*	0.0%	0.120	*0.12*		*4.7*
46	10.0	852,890	260	0.0%	3.19	*3.19*		*76.7*	32.5%	3.33	*2.25*		*104.4*	0.0%	0.120	*0.12*		*4.9*
47	10.0	852,890	260	0.0%	3.19	*3.19*		*79.8*	34.0%	3.33	*2.20*		*106.6*	0.0%	0.120	*0.12*		*5.0*
48	10.0	852,890	260	0.0%	3.19	*3.19*		*83.0*	35.5%	3.33	*2.15*		*108.8*	0.0%	0.120	*0.12*		*5.1*
49	10.0	852,890	260	0.0%	3.19	*3.19*		*86.2*	37.0%	3.33	*2.10*		*110.9*	0.0%	0.120	*0.12*		*5.2*
50	10.0	852,890	260	0.0%	3.19	*3.19*		*89.4*	38.5%	3.33	*2.05*		*112.9*	0.0%	0.120	*0.12*		*5.3*
51	10.0	852,890	260	3.0%	3.19	*3.09*		*92.5*	40.0%	3.33	*2.00*		*114.9*	0.1%	0.120	*0.12*		*5.5*
52	10.0	852,890	260	6.0%	3.19	*3.00*		*95.5*	41.5%	3.33	*1.95*		*116.9*	0.2%	0.120	*0.12*		*5.6*
53	10.0	852,890	260	9.0%	3.19	*2.90*		*98.4*	43.0%	3.33	*1.90*		*118.8*	0.3%	0.120	*0.12*		*5.7*
54	10.0	852,890	260	12.0%	3.19	*2.81*		*101.2*	44.5%	3.33	*1.85*		*120.6*	0.4%	0.120	*0.12*		*5.8*
55	10.0	852,890	260	15.0%	3.19	*2.71*		*103.9*	46.0%	3.33	*1.80*		*122.4*	0.5%	0.120	*0.12*		*5.9*
56	10.0	852,890	260	18.0%	3.19	*2.62*		*106.5*	47.5%	3.33	*1.75*		*124.2*	0.6%	0.120	*0.12*		*6.1*
57	10.0	852,890	260	21.0%	3.19	*2.52*		*109.1*	49.0%	3.33	*1.70*		*125.9*	0.7%	0.120	*0.12*		*6.2*
58	10.0	852,890	260	23.0%	3.19	*2.46*		*111.5*	49.5%	3.33	*1.68*		*127.6*	0.8%	0.120	*0.12*		*6.3*
59	10.0	852,890	260	23.0%	3.19	*2.46*		*114.0*	50.0%	3.33	*1.67*		*129.2*	0.9%	0.120	*0.12*		*6.4*
60	10.0	852,890	260	23.0%	3.19	*2.46*	*116.4*	*116.4*	50.5%	3.33	*1.65*	*130.9*	*130.9*	1.0%	0.120	*0.12*	*6.5*	*6.5*
61	10.0	852,890	260	23.0%	3.19	*2.46*	*118.6*	*118.9*	51.0%	3.33	*1.63*	*131.3*	*132.5*	1.1%	0.120	*0.12*	*6.6*	*6.7*
62	10.0	852,890	260	23.0%	3.19	*2.46*	*120.8*	*121.3*	51.5%	3.33	*1.62*	*131.6*	*134.1*	1.2%	0.120	*0.12*	*6.7*	*6.8*
63	10.0	852,890	260	23.0%	3.19	*2.46*	*123.0*	*123.8*	52.0%	3.33	*1.60*	*132.0*	*135.7*	1.3%	0.120	*0.12*	*6.8*	*6.9*
64	10.0	852,890	260	23.0%	3.19	*2.46*	*125.2*	*126.3*	52.5%	3.33	*1.58*	*132.3*	*137.3*	1.4%	0.120	*0.12*	*6.8*	*7.0*
65	10.0	852,890	260	23.0%	3.19	*2.46*	*127.4*	*128.7*	53.0%	3.33	*1.57*	*132.6*	*138.9*	1.5%	0.120	*0.12*	*6.9*	*7.1*
66	10.0	852,890	260	23.0%	3.19	*2.46*	*129.6*	*131.2*	53.5%	3.33	*1.55*	*132.9*	*140.4*	1.6%	0.120	*0.12*	*7.0*	*7.3*
67	10.0	852,890	260	23.0%	3.19	*2.46*	*131.8*	*133.6*	54.0%	3.33	*1.53*	*133.2*	*142.0*	1.7%	0.120	*0.12*	*7.1*	*7.4*
68	10.0	852,890	260	23.0%	3.19	*2.46*	*134.0*	*136.1*	54.5%	3.33	*1.52*	*133.4*	*143.5*	1.8%	0.120	*0.12*	*7.1*	*7.5*
69	10.0	852,890	260	23.0%	3.19	*2.46*	*136.2*	*138.5*	55.0%	3.33	*1.50*	*133.7*	*145.0*	1.9%	0.120	*0.12*	*7.2*	*7.6*
70	10.0	852,890	260	23.0%	3.19	*2.46*	*138.4*	*141.0*	55.5%	3.33	*1.48*	*133.9*	*146.5*	2.0%	0.120	*0.12*	*7.3*	*7.7*
71	10.0	852,890	260	23.0%	3.19	*2.46*	*140.6*	*143.4*	56.0%	3.33	*1.47*	*134.1*	*147.9*	2.1%	0.120	*0.12*	*7.4*	*7.8*
72	10.0	852,890	260	23.0%	3.19	*2.46*	*142.8*	*145.9*	56.5%	3.33	*1.45*	*134.3*	*149.4*	2.2%	0.120	*0.12*	*7.4*	*8.0*
73	10.0	852,890	260	23.0%	3.19	*2.46*	*145.0*	*148.4*	57.0%	3.33	*1.43*	*134.4*	*150.8*	2.3%	0.120	*0.12*	*7.5*	*8.1*
74	10.0	852,890	260	23.0%	3.19	*2.46*	*147.2*	*150.8*	57.5%	3.33	*1.42*	*134.6*	*152.2*	2.4%	0.120	*0.12*	*7.6*	*8.2*
75	10.0	852,890	260	23.0%	3.19	*2.46*	*149.4*	*153.3*	58.0%	3.33	*1.40*	*134.7*	*153.6*	2.5%	0.120	*0.12*	*7.7*	*8.3*
76	10.0	852,890	260	23.0%	3.19	*2.46*	*151.6*	*155.7*	58.5%	3.33	*1.38*	*134.9*	*155.0*	2.6%	0.120	*0.12*	*7.7*	*8.4*
77	10.0	852,890	260	23.0%	3.19	*2.46*	*153.7*	*158.2*	59.0%	3.33	*1.37*	*135.0*	*156.4*	2.7%	0.120	*0.12*	*7.8*	*8.6*
78	10.0	852,890	260	23.0%	3.19	*2.46*	*155.9*	*160.6*	59.5%	3.33	*1.35*	*135.1*	*157.7*	2.8%	0.120	*0.12*	*7.9*	*8.7*
79	10.0	852,890	260	23.0%	3.19	*2.46*	*158.1*	*163.1*	60.0%	3.33	*1.33*	*135.1*	*159.1*	2.9%	0.120	*0.12*	*8.0*	*8.8*
80	10.0	852,890	260	23.0%	3.19	*2.46*	*160.3*	*165.6*	60.5%	3.33	*1.32*	*135.2*	*160.4*	3.0%	0.120	*0.12*	*8.0*	*8.9*
81	10.0	852,890	260	23.0%	3.19	*2.46*	*162.5*	*168.0*	61.0%	3.33	*1.30*	*135.2*	*161.7*	3.1%	0.120	*0.12*	*8.1*	*9.0*
82	10.0	852,890	260	23.0%	3.19	*2.46*	*164.7*	*170.5*	61.5%	3.33	*1.28*	*135.2*	*163.0*	3.2%	0.120	*0.12*	*8.2*	*9.1*
83	10.0	852,890	260	23.0%	3.19	*2.46*	*166.9*	*172.9*	62.0%	3.33	*1.27*	*135.2*	*164.2*	3.3%	0.120	*0.12*	*8.3*	*9.3*

Emission Estimates - Cold Start (ISO Conditions)

GE 7FA.05 Combined Cycle

(startup after 72 hour shutdown or longer)

				NOx Emissions					CO Emissions (With CO Catalyst)					VOC Emissions (With CO Catalyst)				
	Combustion Turbine Load	GT Exhaust Flow Rate	Stack Gas Temperature	Reduction w/SCR	*Uncontrolled*	*Controlled*			Reduction w/CO catalyst	*Uncontrolled*	*Controlled*			Reduction w/CO catalyst	*Uncontrolled*	*Controlled*		
	GE Graph 102HA8306 Sheet 8 of 25	GE Graph 102HA8306 Sheet 8 of 25	Assumed to be ~260 F	Assumed	*GE Dwg No. 329A5374, Rev C*		*Rolling 1-hour average*	*Accumulated*	Assumed	*GE Dwg No. 329A5374, Rev C*		*Rolling 1-hour average*	*Accumulated*	Assumed	*GE Dwg No. 329A5374, Rev C*		*Rolling 1-hour average*	*Accumulated*
Minutes	%	acfm			*lb*	*lb*	*lb/hr*	*lb*	%	*lb*	*lb*	*lb/hr*	*lb*	%	*lb*	*lb*	*lb/hr*	*lb*
84	10.0	852,890	260	23.0%	3.19	*2.46*	*168.0*	*175.4*	62.5%	3.33	*1.25*	*125.8*	*165.5*	3.4%	0.120	*0.12*	*7.4*	*9.4*
85	10.0	852,890	260	23.0%	3.19	*2.46*	*168.2*	*177.8*	63.0%	3.33	*1.23*	*120.0*	*166.7*	3.5%	0.120	*0.12*	*7.1*	*9.5*
86	10.0	852,890	260	23.0%	3.19	*2.46*	*167.4*	*180.3*	63.5%	3.33	*1.22*	*118.0*	*167.9*	3.6%	0.120	*0.12*	*7.1*	*9.6*
87	10.0	852,890	260	23.0%	3.19	*2.46*	*166.7*	*182.7*	64.0%	3.33	*1.20*	*116.0*	*169.1*	3.7%	0.120	*0.12*	*7.1*	*9.7*
88	10.0	852,890	260	23.0%	3.19	*2.46*	*166.0*	*185.2*	64.5%	3.33	*1.18*	*114.0*	*170.3*	3.8%	0.120	*0.12*	*7.1*	*9.8*
89	10.0	852,890	260	23.0%	3.19	*2.46*	*165.2*	*187.7*	65.0%	3.33	*1.17*	*112.1*	*171.5*	3.9%	0.120	*0.12*	*7.1*	*9.9*
90	10.0	852,890	260	23.0%	3.19	*2.46*	*164.5*	*190.1*	65.5%	3.33	*1.15*	*110.2*	*172.6*	4.0%	0.120	*0.12*	*7.1*	*10.1*
91	10.0	852,890	260	23.0%	3.19	*2.46*	*163.8*	*192.6*	66.0%	3.33	*1.13*	*108.3*	*173.8*	4.1%	0.120	*0.12*	*7.1*	*10.2*
92	10.0	852,890	260	23.0%	3.19	*2.46*	*163.0*	*195.0*	66.5%	3.33	*1.12*	*106.5*	*174.9*	4.2%	0.120	*0.12*	*7.1*	*10.3*
93	10.0	852,890	260	23.0%	3.19	*2.46*	*162.3*	*197.5*	67.0%	3.33	*1.10*	*104.7*	*176.0*	4.3%	0.120	*0.12*	*7.1*	*10.4*
94	10.0	852,890	260	23.0%	3.19	*2.46*	*161.6*	*199.9*	67.5%	3.33	*1.08*	*102.9*	*177.1*	4.4%	0.120	*0.11*	*7.1*	*10.5*
95	10.0	852,890	260	23.0%	3.19	*2.46*	*160.8*	*202.4*	68.0%	3.33	*1.07*	*101.2*	*178.1*	4.5%	0.120	*0.11*	*7.1*	*10.6*
96	10.0	852,890	260	23.0%	3.19	*2.46*	*160.1*	*204.9*	68.5%	3.33	*1.05*	*99.5*	*179.2*	4.6%	0.120	*0.11*	*7.1*	*10.8*
97	10.0	852,890	260	23.0%	3.19	*2.46*	*159.4*	*207.3*	69.0%	3.33	*1.03*	*97.8*	*180.2*	4.7%	0.120	*0.11*	*7.1*	*10.9*
98	10.0	852,890	260	23.0%	3.19	*2.46*	*158.6*	*209.8*	69.5%	3.33	*1.02*	*96.2*	*181.2*	4.8%	0.120	*0.11*	*7.1*	*11.0*
99	10.0	852,890	260	23.0%	3.19	*2.46*	*157.9*	*212.2*	70.0%	3.33	*1.00*	*94.6*	*182.2*	4.9%	0.120	*0.11*	*7.1*	*11.1*
100	10.0	852,890	260	23.0%	3.19	*2.46*	*157.2*	*214.7*	70.5%	3.33	*0.98*	*93.0*	*183.2*	5.0%	0.120	*0.11*	*7.1*	*11.2*
101	10.0	852,890	260	23.0%	3.19	*2.46*	*156.4*	*217.1*	71.0%	3.33	*0.97*	*91.5*	*184.2*	5.1%	0.120	*0.11*	*7.1*	*11.3*
102	10.0	852,890	260	23.0%	3.19	*2.46*	*155.7*	*219.6*	71.5%	3.33	*0.95*	*90.0*	*185.1*	5.2%	0.120	*0.11*	*7.0*	*11.4*
103	10.0	852,890	260	23.0%	3.19	*2.46*	*155.0*	*222.0*	72.0%	3.33	*0.93*	*88.5*	*186.1*	5.3%	0.120	*0.11*	*7.0*	*11.6*
104	10.0	852,890	260	23.0%	3.19	*2.46*	*154.2*	*224.5*	72.5%	3.33	*0.92*	*87.1*	*187.0*	5.4%	0.120	*0.11*	*7.0*	*11.7*
105	10.0	852,890	260	23.0%	3.19	*2.46*	*153.5*	*227.0*	73.0%	3.33	*0.90*	*85.7*	*187.9*	5.5%	0.120	*0.11*	*7.0*	*11.8*
106	10.0	852,890	260	23.0%	3.19	*2.46*	*152.8*	*229.4*	73.5%	3.33	*0.88*	*84.3*	*188.8*	5.6%	0.120	*0.11*	*7.0*	*11.9*
107	10.0	852,890	260	23.0%	3.19	*2.46*	*152.0*	*231.9*	74.0%	3.33	*0.87*	*83.0*	*189.6*	5.7%	0.120	*0.11*	*7.0*	*12.0*
108	10.0	852,890	260	23.0%	3.19	*2.46*	*151.3*	*234.3*	74.5%	3.33	*0.85*	*81.7*	*190.5*	5.8%	0.120	*0.11*	*7.0*	*12.1*
109	10.0	852,890	260	23.0%	3.19	*2.46*	*150.6*	*236.8*	75.0%	3.33	*0.83*	*80.4*	*191.3*	5.9%	0.120	*0.11*	*7.0*	*12.2*
110	10.0	852,890	260	23.0%	3.19	*2.46*	*149.8*	*239.2*	75.5%	3.33	*0.82*	*79.2*	*192.1*	6.0%	0.120	*0.11*	*7.0*	*12.3*
111	10.0	852,890	260	23.0%	3.19	*2.46*	*149.2*	*241.7*	76.0%	3.33	*0.80*	*78.0*	*192.9*	6.1%	0.120	*0.11*	*7.0*	*12.5*
112	10.0	852,890	260	23.0%	3.19	*2.46*	*148.6*	*244.1*	76.5%	3.33	*0.78*	*76.8*	*193.7*	6.2%	0.120	*0.11*	*7.0*	*12.6*
113	10.0	847,482	260	23.0%	3.19	*2.46*	*148.2*	*246.6*	77.0%	3.33	*0.77*	*75.7*	*194.5*	6.3%	0.120	*0.11*	*7.0*	*12.7*
114	10.0	842,074	260	23.0%	3.19	*2.46*	*147.8*	*249.1*	77.5%	3.33	*0.75*	*74.6*	*195.2*	6.4%	0.120	*0.11*	*7.0*	*12.8*
115	10.0	836,666	260	23.0%	3.19	*2.46*	*147.6*	*251.5*	78.0%	3.33	*0.73*	*73.5*	*196.0*	6.5%	0.120	*0.11*	*7.0*	*12.9*
116	10.0	831,258	260	23.0%	3.19	*2.46*	*147.4*	*254.0*	78.5%	3.33	*0.72*	*72.5*	*196.7*	6.6%	0.120	*0.11*	*7.0*	*13.0*
117	10.0	825,851	260	23.0%	3.19	*2.46*	*147.4*	*256.4*	79.0%	3.33	*0.70*	*71.5*	*197.4*	6.7%	0.120	*0.11*	*6.9*	*13.1*
118	10.0	820,443	260	23.0%	3.19	*2.46*	*147.4*	*258.9*	79.5%	3.33	*0.68*	*70.5*	*198.1*	6.8%	0.120	*0.11*	*6.9*	*13.2*
119	10.0	815,035	260	24.0%	3.19	*2.42*	*147.3*	*261.3*	80.0%	3.33	*0.67*	*69.5*	*198.7*	6.9%	0.120	*0.11*	*6.9*	*13.4*
120	10.0	809,627	260	24.0%	3.19	*2.42*	*147.3*	*263.7*	80.0%	3.33	*0.67*	*68.5*	*199.4*	7.0%	0.120	*0.11*	*6.9*	*13.5*
121	10.0	804,219	260	24.0%	3.19	*2.42*	*147.3*	*266.2*	80.0%	3.33	*0.67*	*67.5*	*200.1*	7.1%	0.120	*0.11*	*6.9*	*13.6*
122	10.0	798,812	260	24.0%	3.19	*2.42*	*147.2*	*268.6*	80.0%	3.33	*0.67*	*66.6*	*200.7*	7.2%	0.120	*0.11*	*6.9*	*13.7*
123	10.0	793,404	260	24.0%	3.19	*2.42*	*147.2*	*271.0*	80.0%	3.33	*0.67*	*65.7*	*201.4*	7.3%	0.120	*0.11*	*6.9*	*13.8*
124	10.0	787,996	260	24.0%	3.19	*2.42*	*147.2*	*273.4*	80.0%	3.33	*0.67*	*64.7*	*202.1*	7.4%	0.120	*0.11*	*6.9*	*13.9*
125	10.0	782,588	260	24.0%	3.19	*2.42*	*147.1*	*275.9*	80.0%	3.33	*0.67*	*63.8*	*202.7*	7.5%	0.120	*0.11*	*6.9*	*14.0*
126	10.0	777,180	260	24.0%	3.19	*2.42*	*147.1*	*278.3*	80.0%	3.33	*0.67*	*63.0*	*203.4*	7.6%	0.120	*0.11*	*6.9*	*14.1*
127	10.0	771,772	260	24.0%	3.19	*2.42*	*147.1*	*280.7*	80.0%	3.33	*0.67*	*62.1*	*204.1*	7.7%	0.120	*0.11*	*6.9*	*14.2*
128	10.0	766,365	260	24.0%	3.19	*2.42*	*147.0*	*283.1*	80.0%	3.33	*0.67*	*61.2*	*204.7*	7.8%	0.120	*0.11*	*6.9*	*14.4*
129	10.0	760,957	260	24.0%	3.19	*2.42*	*147.0*	*285.6*	80.0%	3.33	*0.67*	*60.4*	*205.4*	7.9%	0.120	*0.11*	*6.9*	*14.5*
130	10.0	755,549	260	24.0%	3.19	*2.42*	*147.0*	*288.0*	80.0%	3.33	*0.67*	*59.6*	*206.1*	8.0%	0.120	*0.11*	*6.9*	*14.6*
131	10.0	750,141	260	24.0%	3.19	*2.42*	*147.0*	*290.4*	80.0%	3.33	*0.67*	*58.8*	*206.7*	8.1%	0.120	*0.11*	*6.8*	*14.7*
132	10.0	744,733	260	24.0%	3.19	*2.42*	*146.9*	*292.8*	80.0%	3.33	*0.67*	*58.0*	*207.4*	8.2%	0.120	*0.11*	*6.8*	*14.8*
133	10.0	739,326	260	24.0%	3.19	*2.42*	*146.9*	*295.2*	80.0%	3.33	*0.67*	*57.2*	*208.1*	8.3%	0.120	*0.11*	*6.8*	*14.9*
134	10.0	733,918	260	24.0%	3.19	*2.42*	*146.9*	*297.7*	80.0%	3.33	*0.67*	*56.5*	*208.7*	8.4%	0.120	*0.11*	*6.8*	*15.0*
135	10.0	728,510	260	24.0%	3.19	*2.42*	*146.8*	*300.1*	80.0%	3.33	*0.67*	*55.8*	*209.4*	8.6%	0.120	*0.11*	*6.8*	*15.1*
136	10.0	723,102	260	25.0%	3.19	*2.39*	*146.8*	*302.5*	80.0%	3.33	*0.67*	*55.0*	*210.1*	8.8%	0.120	*0.11*	*6.8*	*15.2*
137	10.0	717,694	260	25.0%	3.19	*2.39*	*146.7*	*304.9*	80.0%	3.33	*0.67*	*54.3*	*210.7*	9.0%	0.120	*0.11*	*6.8*	*15.4*
138	10.0	712,287	260	25.0%	3.19	*2.39*	*146.6*	*307.3*	80.0%	3.33	*0.67*	*53.7*	*211.4*	9.2%	0.120	*0.11*	*6.8*	*15.5*
139	10.0	706,879	260	25.0%	3.19	*2.39*	*146.6*	*309.7*	80.0%	3.33	*0.67*	*53.0*	*212.1*	9.4%	0.120	*0.11*	*6.8*	*15.6*
140	10.0	701,471	260	25.0%	3.19	*2.39*	*146.5*	*312.1*	80.0%	3.33	*0.67*	*52.3*	*212.7*	9.6%	0.120	*0.11*	*6.8*	*15.7*
141	10.0	696,063	260	25.0%	3.19	*2.39*	*146.4*	*314.5*	80.0%	3.33	*0.67*	*51.7*	*213.4*	9.8%	0.120	*0.11*	*6.8*	*15.8*
142	10.0	690,655	260	25.0%	3.19	*2.39*	*146.4*	*316.8*	80.0%	3.33	*0.67*	*51.1*	*214.1*	10.0%	0.120	*0.11*	*6.8*	*15.9*
143	10.0	685,247	260	25.0%	3.19	*2.39*	*146.3*	*319.2*	80.0%	3.33	*0.67*	*50.5*	*214.7*	10.2%	0.120	*0.11*	*6.8*	*16.0*
144	10.0	679,840	260	25.0%	3.19	*2.39*	*146.3*	*321.6*	80.0%	3.33	*0.67*	*49.9*	*215.4*	10.4%	0.120	*0.11*	*6.7*	*16.1*
145	10.0	674,432	260	25.0%	3.19	*2.39*	*146.2*	*324.0*	80.0%	3.33	*0.67*	*49.3*	*216.1*	10.6%	0.120	*0.11*	*6.7*	*16.2*
146	10.0	669,024	260	25.0%	3.19	*2.39*	*146.1*	*326.4*	80.0%	3.33	*0.67*	*48.8*	*216.7*	10.8%	0.120	*0.11*	*6.7*	*16.3*
147	10.0	663,616	260	25.0%	3.19	*2.39*	*146.1*	*328.8*	80.0%	3.33	*0.67*	*48.3*	*217.4*	11.0%	0.120	*0.11*	*6.7*	*16.4*

Emission Estimates - Cold Start (ISO Conditions)

GE 7FA.05 Combined Cycle

(startup after 72 hour shutdown or longer)

				NOx Emissions					CO Emissions (With CO Catalyst)					VOC Emissions (With CO Catalyst)				
	Combustion Turbine Load	GT Exhaust Flow Rate	Stack Gas Temperature	Reduction w/SCR	*Uncontrolled*	*Controlled*			Reduction w/CO catalyst	*Uncontrolled*	*Controlled*			Reduction w/CO catalyst	*Uncontrolled*	*Controlled*		
	GE Graph 102HA8306 Sheet 8 of 25	GE Graph 102HA8306 Sheet 8 of 25	Assumed to be ~260 F	Assumed	*GE Dwg No. 329A5374, Rev C*		*Rolling 1-hour average*	*Accumulated*	Assumed	*GE Dwg No. 329A5374, Rev C*		*Rolling 1-hour average*	*Accumulated*	Assumed	*GE Dwg No. 329A5374, Rev C*		*Rolling 1-hour average*	*Accumulated*
Minutes	%	acfm			*lb*	*lb*	*lb/hr*	*lb*	%	*lb*	*lb*	*lb/hr*	*lb*	%	*lb*	*lb*	*lb/hr*	*lb*
148	10.0	658,208	260	26.0%	3.19	*2.36*	*146.0*	*331.2*	80.0%	3.33	*0.67*	*47.7*	*218.1*	11.2%	0.120	*0.11*	*6.7*	*16.5*
149	10.0	652,801	260	26.0%	3.19	*2.36*	*145.9*	*333.5*	80.0%	3.33	*0.67*	*47.2*	*218.7*	11.4%	0.120	*0.11*	*6.7*	*16.6*
150	10.0	647,393	260	26.0%	3.19	*2.36*	*145.8*	*335.9*	80.0%	3.33	*0.67*	*46.8*	*219.4*	11.6%	0.120	*0.11*	*6.7*	*16.8*
151	10.0	641,985	260	26.0%	3.19	*2.36*	*145.7*	*338.2*	80.0%	3.33	*0.67*	*46.3*	*220.1*	11.8%	0.120	*0.11*	*6.7*	*16.9*
152	10.0	636,577	260	26.0%	3.19	*2.36*	*145.6*	*340.6*	80.0%	3.33	*0.67*	*45.8*	*220.7*	12.0%	0.120	*0.11*	*6.7*	*17.0*
153	10.0	631,169	260	26.0%	3.19	*2.36*	*145.5*	*343.0*	80.0%	3.33	*0.67*	*45.4*	*221.4*	12.2%	0.120	*0.11*	*6.7*	*17.1*
154	10.0	625,761	260	26.0%	3.19	*2.36*	*145.4*	*345.3*	80.0%	3.33	*0.67*	*45.0*	*222.1*	12.4%	0.120	*0.11*	*6.7*	*17.2*
155	10.0	620,354	260	26.0%	3.19	*2.36*	*145.3*	*347.7*	80.0%	3.33	*0.67*	*44.6*	*222.7*	12.6%	0.120	*0.11*	*6.6*	*17.3*
156	10.0	614,946	260	26.0%	3.19	*2.36*	*145.2*	*350.0*	80.0%	3.33	*0.67*	*44.2*	*223.4*	12.8%	0.120	*0.10*	*6.6*	*17.4*
157	10.0	609,538	260	26.0%	3.19	*2.36*	*145.1*	*352.4*	80.0%	3.33	*0.67*	*43.8*	*224.1*	13.0%	0.120	*0.10*	*6.6*	*17.5*
158	10.0	604,130	260	26.0%	3.19	*2.36*	*145.0*	*354.8*	80.0%	3.33	*0.67*	*43.5*	*224.7*	13.2%	0.120	*0.10*	*6.6*	*17.6*
159	10.0	598,722	260	26.0%	3.19	*2.36*	*144.9*	*357.1*	80.0%	3.33	*0.67*	*43.2*	*225.4*	13.4%	0.120	*0.10*	*6.6*	*17.7*
160	10.0	593,315	260	26.0%	3.19	*2.36*	*144.8*	*359.5*	80.0%	3.33	*0.67*	*42.9*	*226.1*	13.6%	0.120	*0.10*	*6.6*	*17.8*
161	10.0	593,315	260	26.0%	3.19	*2.36*	*144.7*	*361.9*	80.0%	3.33	*0.67*	*42.6*	*226.7*	13.8%	0.120	*0.10*	*6.6*	*17.9*
162	10.2	593,315	260	26.0%	3.19	*2.36*	*144.6*	*364.2*	80.0%	3.33	*0.67*	*42.3*	*227.4*	14.0%	0.120	*0.10*	*6.6*	*18.0*
163	10.4	593,315	260	26.0%	3.19	*2.36*	*144.5*	*366.6*	80.0%	3.33	*0.67*	*42.0*	*228.1*	14.2%	0.120	*0.10*	*6.6*	*18.1*
164	10.6	593,315	260	26.0%	3.19	*2.36*	*144.4*	*368.9*	80.0%	3.33	*0.67*	*41.8*	*228.7*	14.4%	0.120	*0.10*	*6.5*	*18.2*
165	10.8	593,315	260	26.0%	3.19	*2.36*	*144.3*	*371.3*	80.0%	3.33	*0.67*	*41.5*	*229.4*	14.6%	0.120	*0.10*	*6.5*	*18.3*
166	11.0	593,315	260	26.0%	3.19	*2.36*	*144.2*	*373.7*	80.0%	3.33	*0.67*	*41.3*	*230.1*	14.8%	0.120	*0.10*	*6.5*	*18.4*
167	11.2	593,315	260	36.0%	2.32	*1.49*	*143.3*	*375.1*	80.0%	38.18	*7.64*	*48.1*	*237.7*	15.0%	3.174	*2.70*	*9.1*	*21.1*
168	11.4	593,315	260	36.0%	2.32	*1.49*	*142.3*	*376.6*	80.0%	38.18	*7.64*	*54.9*	*245.4*	15.2%	3.174	*2.69*	*11.7*	*23.8*
169	11.6	593,315	260	36.0%	2.32	*1.49*	*141.3*	*378.1*	80.0%	38.18	*7.64*	*61.7*	*253.0*	15.4%	3.174	*2.68*	*14.3*	*26.5*
170	11.8	593,315	260	36.0%	2.32	*1.49*	*140.4*	*379.6*	80.0%	38.18	*7.64*	*68.5*	*260.6*	15.6%	3.174	*2.68*	*16.8*	*29.2*
171	11.9	593,315	260	36.0%	2.32	*1.49*	*139.4*	*381.1*	80.0%	38.18	*7.64*	*75.3*	*268.3*	15.8%	3.174	*2.67*	*19.4*	*31.8*
172	12.1	593,315	260	32.0%	2.57	*1.75*	*138.7*	*382.8*	80.0%	35.00	*7.00*	*81.5*	*275.3*	16.0%	2.705	*2.27*	*21.5*	*34.1*
173	12.3	593,315	260	32.0%	2.57	*1.75*	*138.0*	*384.6*	80.0%	35.00	*7.00*	*87.8*	*282.3*	16.2%	2.705	*2.27*	*23.7*	*36.4*
174	12.5	593,315	260	32.0%	2.57	*1.75*	*137.3*	*386.3*	80.0%	35.00	*7.00*	*94.0*	*289.3*	16.4%	2.705	*2.26*	*25.8*	*38.6*
175	12.7	593,315	260	32.0%	2.57	*1.75*	*136.6*	*388.1*	80.0%	35.00	*7.00*	*100.3*	*296.3*	16.6%	2.705	*2.26*	*28.0*	*40.9*
176	12.9	593,315	260	32.0%	2.57	*1.75*	*135.8*	*389.8*	80.0%	35.00	*7.00*	*106.6*	*303.3*	16.8%	2.705	*2.25*	*30.1*	*43.1*
177	13.1	593,315	260	29.0%	2.81	*2.00*	*135.4*	*391.8*	80.0%	31.81	*6.36*	*112.2*	*309.6*	17.0%	2.236	*1.86*	*31.9*	*45.0*
178	13.3	593,315	260	29.0%	2.81	*2.00*	*134.9*	*393.8*	80.0%	31.81	*6.36*	*117.9*	*316.0*	17.2%	2.236	*1.85*	*33.6*	*46.9*
179	13.5	593,315	260	29.0%	2.81	*2.00*	*134.5*	*395.8*	80.0%	31.81	*6.36*	*123.6*	*322.3*	17.4%	2.236	*1.85*	*35.3*	*48.7*
180	13.7	593,315	260	29.0%	2.81	*2.00*	*134.1*	*397.8*	80.0%	31.81	*6.36*	*129.3*	*328.7*	17.6%	2.236	*1.84*	*37.1*	*50.5*
181	13.9	593,315	260	29.0%	2.81	*2.00*	*133.7*	*399.8*	80.0%	31.81	*6.36*	*135.0*	*335.1*	17.8%	2.236	*1.84*	*38.8*	*52.4*
182	14.1	593,315	260	27.0%	3.06	*2.23*	*133.5*	*402.0*	80.0%	28.63	*5.73*	*140.1*	*340.8*	18.0%	1.768	*1.45*	*40.1*	*53.8*
183	14.3	593,315	260	27.0%	3.06	*2.23*	*133.3*	*404.3*	80.0%	28.63	*5.73*	*145.1*	*346.5*	18.2%	1.768	*1.45*	*41.5*	*55.3*
184	14.5	593,315	260	27.0%	3.06	*2.23*	*133.1*	*406.5*	80.0%	28.63	*5.73*	*150.2*	*352.2*	18.4%	1.768	*1.44*	*42.8*	*56.7*
185	14.7	593,315	260	27.0%	3.06	*2.23*	*132.9*	*408.7*	80.0%	28.63	*5.73*	*155.2*	*358.0*	18.6%	1.768	*1.44*	*44.1*	*58.2*
186	14.9	593,315	260	27.0%	3.06	*2.23*	*132.7*	*411.0*	80.0%	28.63	*5.73*	*160.3*	*363.7*	18.8%	1.768	*1.44*	*45.5*	*59.6*
187	15.1	593,315	260	25.0%	3.30	*2.48*	*132.7*	*413.4*	80.0%	25.44	*5.09*	*164.7*	*368.8*	19.0%	1.299	*1.05*	*46.4*	*60.6*
188	15.3	593,315	260	25.0%	3.30	*2.48*	*132.8*	*415.9*	80.0%	25.44	*5.09*	*169.1*	*373.9*	19.2%	1.299	*1.05*	*47.3*	*61.7*
189	15.4	593,315	260	25.0%	3.30	*2.48*	*132.8*	*418.4*	80.0%	25.44	*5.09*	*173.5*	*379.0*	19.4%	1.299	*1.05*	*48.3*	*62.7*
190	15.6	593,315	260	25.0%	3.30	*2.48*	*132.9*	*420.9*	80.0%	25.44	*5.09*	*178.0*	*384.0*	19.6%	1.299	*1.04*	*49.2*	*63.8*
191	15.8	593,315	260	25.0%	3.30	*2.48*	*133.0*	*423.4*	80.0%	25.44	*5.09*	*182.4*	*389.1*	19.8%	1.299	*1.04*	*50.1*	*64.8*
192	16.0	593,315	260	23.0%	3.55	*2.73*	*133.3*	*426.1*	80.0%	19.07	*3.81*	*185.5*	*393.0*	20.0%	0.830	*0.66*	*50.7*	*65.5*
193	16.2	593,315	260	23.0%	3.55	*2.73*	*133.6*	*428.8*	80.0%	19.07	*3.81*	*188.7*	*396.8*	20.0%	0.830	*0.66*	*51.2*	*66.2*
194	16.4	593,315	260	23.0%	3.55	*2.73*	*133.9*	*431.5*	80.0%	19.07	*3.81*	*191.8*	*400.6*	20.0%	0.830	*0.66*	*51.8*	*66.8*
195	16.6	593,315	260	23.0%	3.55	*2.73*	*134.2*	*434.3*	80.0%	19.07	*3.81*	*195.0*	*404.4*	20.0%	0.830	*0.66*	*52.4*	*67.5*
196	16.8	593,315	260	23.0%	3.55	*2.73*	*134.5*	*437.0*	80.0%	19.07	*3.81*	*198.1*	*408.2*	20.0%	0.830	*0.66*	*52.9*	*68.2*
197	17.0	593,315	260	68.0%	1.19	*0.38*	*132.5*	*437.4*	80.0%	68.75	*13.75*	*211.2*	*422.0*	20.0%	1.609	*1.29*	*54.1*	*69.4*
198	25.3	646,878	260	57.0%	1.42	*0.61*	*130.7*	*438.0*	80.0%	70.32	*14.06*	*224.6*	*436.0*	20.0%	0.556	*0.44*	*54.4*	*69.9*
199	33.6	700,441	260	77.8%	0.57	*0.13*	*128.5*	*438.1*	80.0%	9.33	*1.87*	*225.8*	*437.9*	20.0%	0.031	*0.03*	*54.3*	*69.9*
200	41.9	754,004	260	77.8%	0.65	*0.14*	*126.2*	*438.3*	80.0%	1.31	*0.26*	*225.4*	*438.1*	20.0%	0.034	*0.03*	*54.3*	*69.9*
201	50.2	807,567	260	77.8%	0.71	*0.16*	*124.0*	*438.4*	80.0%	0.44	*0.09*	*224.8*	*438.2*	20.0%	0.037	*0.03*	*54.2*	*70.0*
202	58.5	861,130	260	77.8%	0.76	*0.17*	*121.8*	*438.6*	80.0%	0.47	*0.09*	*224.2*	*438.3*	20.0%	0.038	*0.03*	*54.1*	*70.0*
203	66.8	914,693	260	77.8%	0.83	*0.18*	*119.5*	*438.8*	80.0%	0.50	*0.10*	*223.7*	*438.4*	20.0%	0.039	*0.03*	*54.0*	*70.0*
204	75.1	968,256	260	77.8%	0.91	*0.20*	*117.4*	*439.0*	80.0%	0.54	*0.11*	*223.1*	*438.5*	20.0%	0.040	*0.03*	*53.9*	*70.1*
205	83.4	1,021,820	260	77.8%	0.98	*0.22*	*115.2*	*439.2*	80.0%	0.57	*0.11*	*222.6*	*438.7*	20.0%	0.044	*0.04*	*53.9*	*70.1*
206	91.7	1,075,383	260	77.8%	1.05	*0.23*	*113.0*	*439.4*	80.0%	0.60	*0.12*	*222.0*	*438.8*	20.0%	0.049	*0.04*	*53.8*	*70.1*
207	100.0	1,236,072	260	77.8%	1.13	*0.25*	*110.9*	*439.7*	80.0%	0.63	*0.13*	*221.5*	*438.9*	20.0%	0.054	*0.04*	*53.7*	*70.2*
208	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
209	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		

Emission Estimates - Cold Start (ISO Conditions)

GE 7FA.05 Combined Cycle
(startup after 72 hour shutdown or longer)

				NOx Emissions					CO Emissions (With CO Catalyst)					VOC Emissions (With CO Catalyst)				
	Combustion Turbine Load	GT Exhaust Flow Rate	Stack Gas Temperature	Reduction w/SCR	*Uncontrolled*	*Controlled*			Reduction w/CO catalyst	*Uncontrolled*	*Controlled*			Reduction w/CO catalyst	*Uncontrolled*	*Controlled*		
	GE Graph 102HA8306 Sheet 8 of 25	GE Graph 102HA8306 Sheet 8 of 25	Assumed to be ~260 F	Assumed	*GE Dwg No. 329A5374, Rev C*		*Rolling 1-hour average*	*Accumulated*	Assumed	*GE Dwg No. 329A5374, Rev C*		*Rolling 1-hour average*	*Accumulated*	Assumed	*GE Dwg No. 329A5374, Rev C*		*Rolling 1-hour average*	*Accumulated*
Minutes	%	acfm			*lb*	*lb*	*lb/hr*	*lb*	%	*lb*	*lb*	*lb/hr*	*lb*	%	*lb*	*lb*	*lb/hr*	*lb*
210	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
211	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
212	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
213	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
214	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
215	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
216	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
217	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
218	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
219	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
220	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
221	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
222	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
223	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
224	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
225	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
226	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
227	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
228	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
229	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
230	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
231	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
232	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
233	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
234	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
235	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
236	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
237	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
238	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
239	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
240	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
Average Flue Gas Flow (initial load to >50% load):		**756,874 acfm**		**SU EMISSIONS:**					**SU EMISSIONS:**					**SU EMISSIONS:**				
				Flame to FSNL:				**6.0**	**Flame to FSNL:**				**29.0**	**Flame to FSNL:**				**1.0**
				FSNL to >50% Load:				**432.4**	**FSNL to >50% Load:**				**409.2**	**FSNL to >50% Load:**				**69.0**
				Total SU Emissions:				**438.4**	**Total SU Emissions:**				**438.2**	**Total SU Emissions:**				**70.0**
				Avg SU Emissions (lb/hr):				**130.9**	**Avg SU Emissions (lb/hr):**				**130.8**	**Avg SU Emissions (lb/hr):**				**20.9**

= Time/load at which unit is "emissions compliant"

= Time at which unit reaches full load operation

Emission Estimates - Warm Start (ISO Conditions)

GE 7FA.05 Combined Cycle

(startup after 8 hour shutdown but less than 72 hours)

				NOx Emissions					CO Emissions (With CO Catalyst)					VOC Emissions (With CO Catalyst)				
	Combustion Turbine Load	GT Exhaust Flow Rate	Stack Gas Temperature	Reduction w/SCR	Uncontrolled	Controlled			Reduction w/CO catalyst	Uncontrolled	Controlled			Reduction w/CO catalyst	Uncontrolled	Controlled		
	GE Graph 102HA8306 Sheet 13 of 25	GE Graph 102HA8306 Sheet 13 of 25	Assumed to be ~260 F	Assumed	GE Dwg No. 329A5374, Rev C		Rolling 1-hour average	Accumulated	Assumed	GE Dwg No. 329A5374, Rev C		Rolling 1-hour average	Accumulated	Assumed	GE Dwg No. 329A5374, Rev C		Rolling 1-hour average	Accumulated
Minutes	%	acfm			lb	lb	lb/hr	lb	%	lb	lb	lb/hr	lb	%	lb	lb	lb/hr	lb
1-23	Start Signal to FSNL					6.0		6.0			29.0		29.0			1.0		1.0
24	0.0	667,479	260	0.0%	1.33	1.33		7.3	0.0%	10.7	10.74		39.7	0.0%	0.92	0.92		1.9
25	5.0	630,397	260	0.0%	2.34	2.34		9.7	2.0%	7.0	6.89		46.6	0.0%	0.42	0.42		2.3
26	10.0	630,397	260	0.0%	3.19	3.19		12.9	4.0%	3.3	3.20		49.8	0.0%	0.12	0.12		2.5
27	10.0	741,643	260	0.0%	3.19	3.19		16.0	6.0%	3.3	3.13		53.0	0.0%	0.12	0.12		2.6
28	10.0	704,561	260	0.0%	3.19	3.19		19.2	8.0%	3.3	3.07		56.0	0.0%	0.12	0.12		2.7
29	10.0	667,479	260	0.0%	3.19	3.19		22.4	10.0%	3.3	3.00		59.0	0.0%	0.12	0.12		2.8
30	10.0	630,397	260	0.0%	3.19	3.19		25.6	12.0%	3.3	2.93		62.0	0.0%	0.12	0.12		2.9
31	10.0	593,315	260	0.0%	3.19	3.19		28.8	14.0%	3.3	2.87		64.8	0.0%	0.12	0.12		3.1
32	10.0	593,315	260	0.0%	3.19	3.19		32.0	16.0%	3.3	2.80		67.6	0.0%	0.12	0.12		3.2
33	10.0	593,315	260	0.0%	3.19	3.19		35.2	18.0%	3.3	2.73		70.4	0.0%	0.12	0.12		3.3
34	10.0	593,315	260	0.0%	3.19	3.19		38.4	20.0%	3.3	2.67		73.0	0.0%	0.12	0.12		3.4
35	10.0	593,315	260	0.0%	3.19	3.19		41.6	22.0%	3.3	2.60		75.6	0.0%	0.12	0.12		3.5
36	10.0	593,315	260	0.0%	3.19	3.19		44.8	24.0%	3.3	2.53		78.2	0.0%	0.12	0.12		3.7
37	10.0	593,315	260	0.0%	3.19	3.19		47.9	26.0%	3.3	2.47		80.6	0.0%	0.12	0.12		3.8
38	10.0	593,315	260	0.0%	3.19	3.19		51.1	28.0%	3.3	2.40		83.0	0.0%	0.12	0.12		3.9
39	10.0	593,315	260	0.0%	3.19	3.19		54.3	30.0%	3.3	2.33		85.4	0.0%	0.12	0.12		4.0
40	10.0	593,315	260	0.0%	3.19	3.19		57.5	32.0%	3.3	2.27		87.6	0.0%	0.12	0.12		4.1
41	10.0	593,315	260	0.0%	3.19	3.19		60.7	34.0%	3.3	2.20		89.8	0.0%	0.12	0.12		4.3
42	10.0	593,315	260	0.0%	3.19	3.19		63.9	36.0%	3.3	2.13		92.0	0.0%	0.12	0.12		4.4
43	10.0	593,315	260	0.0%	3.19	3.19		67.1	38.0%	3.3	2.07		94.0	0.0%	0.12	0.12		4.5
44	10.0	593,315	260	0.0%	3.19	3.19		70.3	40.0%	3.3	2.00		96.0	0.0%	0.12	0.12		4.6
45	10.0	593,315	260	0.0%	3.19	3.19		73.5	42.0%	3.3	1.93		98.0	0.0%	0.12	0.12		4.7
46	10.0	593,315	260	3.0%	3.19	3.09		76.6	44.0%	3.3	1.87		99.8	0.0%	0.12	0.12		4.9
47	10.0	593,315	260	6.0%	3.19	3.00		79.6	46.0%	3.3	1.80		101.6	0.3%	0.12	0.12		5.0
48	10.0	593,315	260	9.0%	3.19	2.90		82.5	48.0%	3.3	1.73		103.4	0.5%	0.12	0.12		5.1
49	10.0	593,315	260	12.0%	3.19	2.81		85.3	50.0%	3.3	1.67		105.0	0.8%	0.12	0.12		5.2
50	10.0	593,315	260	15.0%	3.19	2.71		88.0	51.0%	3.3	1.63		106.7	1.0%	0.12	0.12		5.3
51	10.0	593,315	260	18.0%	3.19	2.62		90.6	52.0%	3.3	1.60		108.3	1.3%	0.12	0.12		5.5
52	10.0	593,315	260	21.0%	3.19	2.52		93.1	53.0%	3.3	1.57		109.8	1.5%	0.12	0.12		5.6
53	10.0	593,315	260	24.0%	3.19	2.42		95.5	54.0%	3.3	1.53		111.4	1.8%	0.12	0.12		5.7
54	10.0	593,315	260	27.0%	3.19	2.33		97.9	55.0%	3.3	1.50		112.9	2.0%	0.12	0.12		5.8
55	10.0	593,315	260	27.0%	3.19	2.33		100.2	56.0%	3.3	1.47		114.3	2.3%	0.12	0.12		5.9
56	10.0	593,315	260	27.0%	3.19	2.33		102.5	57.0%	3.3	1.43		115.8	2.5%	0.12	0.12		6.1
57	10.0	593,315	260	27.0%	3.19	2.33		104.9	58.0%	3.3	1.40		117.2	2.8%	0.12	0.12		6.2
58	10.0	593,315	260	27.0%	3.19	2.33		107.2	59.0%	3.3	1.37		118.5	3.0%	0.12	0.12		6.3
59	10.0	593,315	260	27.0%	3.19	2.33		109.5	60.0%	3.3	1.33		119.9	3.3%	0.12	0.12		6.4
60	10.0	593,315	260	27.0%	3.19	2.33	111.8	111.8	61.0%	3.3	1.30	121.2	121.2	3.5%	0.12	0.12	6.5	6.5
61	10.0	593,315	260	27.0%	3.19	2.33	113.9	114.2	62.0%	3.3	1.27	121.2	122.4	3.8%	0.12	0.12	6.6	6.6
62	10.0	593,315	260	27.0%	3.19	2.33	116.0	116.5	63.0%	3.3	1.23	121.1	123.7	4.0%	0.12	0.12	6.7	6.8
63	10.0	593,315	260	27.0%	3.19	2.33	118.0	118.8	64.0%	3.3	1.20	121.1	124.9	4.3%	0.12	0.12	6.7	6.9
64	10.0	593,315	260	27.0%	3.19	2.33	120.1	121.2	65.0%	3.3	1.17	121.0	126.0	4.5%	0.12	0.11	6.8	7.0
65	10.0	593,315	260	27.0%	3.19	2.33	122.2	123.5	66.0%	3.3	1.13	120.9	127.2	4.8%	0.12	0.11	6.9	7.1
66	10.0	593,315	260	27.0%	3.19	2.33	124.2	125.8	67.0%	3.3	1.10	120.7	128.3	5.0%	0.12	0.11	6.9	7.2
67	10.0	593,315	260	27.0%	3.19	2.33	126.3	128.1	68.0%	3.3	1.07	120.5	129.3	5.3%	0.12	0.11	7.0	7.3
68	10.0	593,315	260	27.0%	3.19	2.33	128.4	130.5	69.0%	3.3	1.03	120.3	130.4	5.5%	0.12	0.11	7.1	7.4
69	10.4	593,315	260	27.0%	3.19	2.33	130.4	132.8	70.0%	3.3	1.00	120.0	131.4	5.8%	0.12	0.11	7.2	7.6
70	10.8	593,315	260	27.0%	3.19	2.33	132.5	135.1	71.0%	3.3	0.97	119.7	132.3	6.0%	0.12	0.11	7.2	7.7
71	11.3	593,315	260	37.0%	2.32	1.46	133.7	136.6	72.0%	38.2	10.69	129.2	143.0	6.7%	3.17	2.96	10.1	10.6
72	11.7	593,315	260	37.0%	2.32	1.46	134.9	138.1	73.0%	38.2	10.31	138.2	153.3	7.4%	3.17	2.94	13.0	13.6
73	12.1	593,315	260	34.0%	2.57	1.70	136.4	139.7	74.0%	35.0	9.10	146.0	162.4	8.1%	2.70	2.49	15.5	16.1
74	12.5	593,315	260	34.0%	2.57	1.70	137.8	141.4	75.0%	35.0	8.75	153.5	171.2	8.8%	2.70	2.47	17.9	18.5
75	12.9	593,315	260	34.0%	2.57	1.70	139.2	143.1	76.0%	35.0	8.40	160.7	179.6	9.5%	2.70	2.45	20.3	21.0
76	13.4	593,315	260	31.0%	2.81	1.94	140.9	145.1	77.0%	31.8	7.32	166.7	186.9	10.2%	2.24	2.01	22.3	23.0
77	13.8	593,315	260	31.0%	2.81	1.94	142.6	147.0	78.0%	31.8	7.00	172.5	193.9	10.9%	2.24	1.99	24.2	25.0
78	14.2	593,315	260	28.0%	3.06	2.20	144.5	149.2	79.0%	28.6	6.01	177.2	199.9	11.6%	1.77	1.56	25.7	26.5
79	14.6	593,315	260	29.0%	3.06	2.17	146.4	151.4	80.0%	28.6	5.73	181.7	205.6	12.3%	1.768	1.55	27.3	28.1
80	15.1	593,315	260	26.0%	3.30	2.44	148.6	153.8	80.0%	25.4	5.09	185.5	210.7	13.0%	1.299	1.13	28.3	29.2
81	15.5	593,315	260	26.0%	3.30	2.44	150.8	156.3	80.0%	25.44	5.09	189.3	215.8	13.7%	1.299	1.12	29.4	30.3
82	15.9	593,315	260	26.0%	3.30	2.44	153.0	158.7	80.0%	25.4	5.09	193.2	220.9	14.4%	1.299	1.11	30.5	31.4
83	16.3	593,315	260	24.0%	3.55	2.70	155.4	161.4	80.0%	19.1	3.81	195.7	224.7	15.1%	0.830	0.70	31.1	32.1

Emission Estimates - Warm Start (ISO Conditions)

GE 7FA.05 Combined Cycle

(startup after 8 hour shutdown but less than 72 hours)

				NOx Emissions					CO Emissions (With CO Catalyst)					VOC Emissions (With CO Catalyst)				
	Combustion Turbine Load	GT Exhaust Flow Rate	Stack Gas Temperature	Reduction w/SCR	*Uncontrolled*	*Controlled*			Reduction w/CO catalyst	*Uncontrolled*	*Controlled*			Reduction w/CO catalyst	*Uncontrolled*	*Controlled*		
	GE Graph 102HA8306 Sheet 13 of 25	GE Graph 102HA8306 Sheet 13 of 25	Assumed to be ~260 F	Assumed	*GE Dwg No. 329A5374, Rev C*		*Rolling 1-hour average*	*Accumulated*	Assumed	*GE Dwg No. 329A5374, Rev C*		*Rolling 1-hour average*	*Accumulated*	Assumed	*GE Dwg No. 329A5374, Rev C*		*Rolling 1-hour average*	*Accumulated*
Minutes	%	acfm			*lb*	*lb*	*lb/hr*	*lb*	%	*lb*	*lb*	*lb/hr*	*lb*	%	*lb*	*lb*	*lb/hr*	*lb*
84	16.7	593,315	260	24.0%	3.55	*2.70*	*156.8*	*164.1*	80.0%	19.07	*3.81*	*188.8*	*228.5*	15.8%	0.830	*0.70*	*30.9*	*32.8*
85	17.2	593,315	260	70.0%	1.19	*0.36*	*154.8*	*164.5*	80.0%	68.75	*13.75*	*195.6*	*242.3*	16.5%	1.609	*1.34*	*31.8*	*34.2*
86	17.6	593,315	260	70.0%	1.19	*0.36*	*152.0*	*164.8*	80.0%	68.75	*13.75*	*206.2*	*256.0*	17.2%	1.609	*1.33*	*33.1*	*35.5*
87	18.0	593,315	260	70.0%	1.22	*0.37*	*149.1*	*165.2*	80.0%	68.75	*13.75*	*216.8*	*269.8*	17.9%	1.417	*1.16*	*34.1*	*36.7*
88	26.2	657,590	260	54.0%	1.45	*0.67*	*146.6*	*165.9*	80.0%	70.64	*14.13*	*227.9*	*283.9*	18.6%	0.525	*0.43*	*34.4*	*37.1*
89	34.4	721,866	260	77.8%	0.58	*0.13*	*143.6*	*166.0*	80.0%	6.75	*1.35*	*226.2*	*285.2*	19.3%	0.032	*0.03*	*34.3*	*37.1*
90	42.6	786,142	260	77.8%	0.66	*0.15*	*140.5*	*166.1*	80.0%	0.83	*0.17*	*223.5*	*285.4*	20.0%	0.034	*0.03*	*34.2*	*37.2*
91	50.8	850,418	260	77.8%	0.71	*0.16*	*137.5*	*166.3*	80.0%	0.44	*0.09*	*220.7*	*285.5*	20.0%	0.037	*0.03*	*34.1*	*37.2*
92	59.0	914,693	260	77.8%	0.77	*0.17*	*134.5*	*166.5*	80.0%	0.48	*0.10*	*218.0*	*285.6*	20.0%	0.038	*0.03*	*34.0*	*37.2*
93	67.2	978,969	260	77.8%	0.84	*0.19*	*131.5*	*166.7*	80.0%	0.51	*0.10*	*215.3*	*285.7*	20.0%	0.039	*0.03*	*33.9*	*37.3*
94	75.4	1,043,245	260	77.8%	0.91	*0.20*	*128.5*	*166.9*	80.0%	0.54	*0.11*	*212.8*	*285.8*	20.0%	0.040	*0.03*	*33.9*	*37.3*
95	83.6	1,107,521	260	77.8%	0.98	*0.22*	*125.5*	*167.1*	80.0%	0.57	*0.11*	*210.3*	*285.9*	20.0%	0.044	*0.04*	*33.8*	*37.3*
96	91.8	1,171,796	260	77.8%	1.05	*0.23*	*122.5*	*167.3*	80.0%	0.60	*0.12*	*207.9*	*286.0*	20.0%	0.049	*0.04*	*33.7*	*37.4*
97	100.0	1,236,072	260	77.8%	1.13	*0.25*	*119.6*	*167.6*	80.0%	0.63	*0.13*	*205.5*	*286.2*	20.0%	0.054	*0.04*	*33.6*	*37.4*
98	100.0	1,171,796	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
99	100.0	1,193,222	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
100	100.0	1,214,647	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
101	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
102	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
103	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
104	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
105	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
106	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
107	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
108	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
109	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
110	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
111	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
112	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
113	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
114	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
115	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
116	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
117	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
118	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
119	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
120	100.0	1,236,072	260	77.8%	1.13	*0.25*			80.0%	0.63	*0.13*			20.0%	0.054	*0.04*		
Average Flue Gas Flow (initial load to >50% load):		**610,401 acfm**		**SU EMISSIONS:**					**SU EMISSIONS:**					**SU EMISSIONS:**				
				Flame to FSNL:				**6.0**	**Flame to FSNL:**				**29.0**	**Flame to FSNL:**				**1.0**
				FSNL to >55% Load:				**160.3**	**FSNL to >50% Load:**				**256.5**	**FSNL to >50% Load:**				**36.2**
				Total SU Emissions:				**166.3**	**Total SU Emissions:**				**285.5**	**Total SU Emissions:**				**37.2**
				Avg SU Emissions (lb/hr):				**109.6**	**Avg SU Emissions (lb/hr):**				**188.2**	**Avg SU Emissions (lb/hr):**				**24.5**

= Time/load at which unit is "emissions compliant"

= Time at which unit reaches full load operation

Emission Estimates - Hot Start (ISO Conditions)

GE 7FA.05 Combined Cycle

(startup less than 8 hours after shutdown)

				NOx Emissions					CO Emissions (With CO Catalyst)					VOC Emissions (With CO Catalyst)				
	Combustion Turbine Load	GT Exhaust Flow Rate	Stack Gas Temperature	Reduction w/SCR	*Uncontrolled*	*Controlled*			Reduction w/CO catalyst	*Uncontrolled*	*Controlled*			Reduction w/CO catalyst	*Uncontrolled*	*Controlled*		
	GE Graph 102HA8306 Sheet 23 of 25	GE Graph 102HA8306 Sheet 23 of 25	Assumed to be ~260 F	Assumed	*GE Dwg No. 329A5374, Rev C*		*Rolling 1-hour average*	*Accumulated*	Assumed	*GE Dwg No. 329A5374, Rev C*		*Rolling 1-hour average*	*Accumulated*	Assumed	*GE Dwg No. 329A5374, Rev C*		*Rolling 1-hour average*	*Accumulated*
Minutes	%	acfm			*lb*	*lb*	*lb/hr*	*lb*	%	*lb*	*lb*	*lb/hr*	*lb*	%	*lb*	*lb*	*lb/hr*	*lb*
1-23	Start Signal to FSNL					*6.0*		*6.0*			*29.0*		*29.0*			*1.0*		*1.0*
24	0.0	630,397	260	0.0%	1.33	*1.33*		*7.3*	5.0%	10.7	*10.20*		*39.2*	0.0%	0.9	*0.9*		*1.9*
25	10.0	630,397	260	0.0%	3.19	*3.19*		*10.5*	10.0%	3.3	*3.00*		*42.2*	0.0%	0.1	*0.1*		*2.0*
26	10.0	741,643	260	0.0%	3.19	*3.19*		*13.7*	15.0%	3.3	*2.83*		*45.0*	0.0%	0.1	*0.1*		*2.2*
27	10.0	704,561	260	0.0%	3.19	*3.19*		*16.9*	20.0%	3.3	*2.67*		*47.7*	0.0%	0.1	*0.1*		*2.3*
28	10.0	667,479	260	0.0%	3.19	*3.19*		*20.1*	25.0%	3.3	*2.50*		*50.2*	0.0%	0.1	*0.1*		*2.4*
29	10.0	630,397	260	0.0%	3.19	*3.19*		*23.3*	30.0%	3.3	*2.33*		*52.5*	0.0%	0.1	*0.1*		*2.5*
30	10.0	593,315	260	0.0%	3.19	*3.19*		*26.5*	35.0%	3.3	*2.17*		*54.7*	0.0%	0.1	*0.1*		*2.6*
31	17.0	593,315	260	0.0%	1.19	*1.19*		*27.7*	40.0%	68.8	*41.25*		*95.9*	0.5%	1.6	*1.6*		*4.2*
32	17.0	593,315	260	0.0%	1.19	*1.19*		*28.9*	45.0%	68.8	*37.81*		*133.8*	1.0%	1.6	*1.6*		*5.8*
33	17.0	593,315	260	0.0%	1.19	*1.19*		*30.0*	50.0%	68.8	*34.38*		*168.1*	1.5%	1.6	*1.6*		*7.4*
34	17.0	593,315	260	0.0%	1.19	*1.19*		*31.2*	52.0%	68.8	*33.00*		*201.1*	2.0%	1.6	*1.6*		*9.0*
35	17.0	593,315	260	0.0%	1.19	*1.19*		*32.4*	54.0%	68.8	*31.63*		*232.8*	2.5%	1.6	*1.6*		*10.6*
36	17.0	593,315	260	3.0%	1.19	*1.16*		*33.6*	56.0%	68.8	*30.25*		*263.0*	3.0%	1.6	*1.6*		*12.1*
37	17.0	593,315	260	6.0%	1.19	*1.12*		*34.7*	58.0%	68.8	*28.88*		*291.9*	3.5%	1.6	*1.6*		*13.7*
38	17.0	593,315	260	9.0%	1.19	*1.08*		*35.8*	60.0%	68.8	*27.50*		*319.4*	4.0%	1.6	*1.5*		*15.2*
39	17.0	593,315	260	12.0%	1.19	*1.05*		*36.8*	62.0%	68.8	*26.13*		*345.5*	4.5%	1.6	*1.5*		*16.8*
40	17.0	593,315	260	15.0%	1.19	*1.01*		*37.8*	64.0%	68.8	*24.75*		*370.3*	5.0%	1.6	*1.5*		*18.3*
41	17.0	593,315	260	18.0%	1.19	*0.98*		*38.8*	66.0%	68.8	*23.38*		*393.6*	6.5%	1.61	*1.5*		*19.8*
42	17.0	593,315	260	21.0%	1.19	*0.94*		*39.8*	68.0%	68.8	*22.00*		*415.6*	8.0%	1.61	*1.5*		*21.3*
43	17.0	593,315	260	24.0%	1.19	*0.91*		*40.7*	70.0%	68.75	*20.63*		*436.3*	9.5%	1.609	*1.5*		*22.7*
44	17.0	593,315	260	27.0%	1.19	*0.87*		*41.5*	72.0%	68.75	*19.25*		*455.5*	11.0%	1.609	*1.4*		*24.2*
45	17.0	593,315	260	30.0%	1.19	*0.83*		*42.4*	74.0%	68.75	*17.88*		*473.4*	12.5%	1.609	*1.4*		*25.6*
46	17.0	593,315	260	33.0%	1.19	*0.80*		*43.2*	76.0%	68.75	*16.50*		*489.9*	14.0%	1.609	*1.4*		*27.0*
47	25.3	593,315	260	36.0%	1.42	*0.91*		*44.1*	78.0%	70.32	*15.47*		*505.4*	15.5%	0.556	*0.5*		*27.4*
48	33.6	664,732	260	77.8%	0.57	*0.13*		*44.2*	80.0%	9.33	*1.87*		*507.2*	17.0%	0.031	*0.0*		*27.4*
49	41.9	736,150	260	77.8%	0.65	*0.14*		*44.4*	80.0%	1.31	*0.26*		*507.5*	18.5%	0.034	*0.0*		*27.5*
50	50.2	807,567	260	77.8%	0.71	*0.16*		*44.5*	80.0%	0.44	*0.09*		*507.6*	20.0%	0.037	*0.0*		*27.5*
51	58.5	878,985	260	77.8%	0.76	*0.17*		*44.7*	80.0%	0.47	*0.09*		*507.7*	20.0%	0.038	*0.0*		*27.5*
52	66.8	950,402	260	77.8%	0.83	*0.18*		*44.9*	80.0%	0.50	*0.10*		*507.8*	20.0%	0.039	*0.0*		*27.6*
53	75.1	1,021,820	260	77.8%	0.91	*0.20*		*45.1*	80.0%	0.54	*0.11*		*507.9*	20.0%	0.040	*0.0*		*27.6*
54	83.4	1,093,237	260	77.8%	0.98	*0.22*		*45.3*	80.0%	0.57	*0.11*		*508.0*	20.0%	0.044	*0.0*		*27.6*
55	91.7	1,164,655	260	77.8%	1.05	*0.23*		*45.5*	80.0%	0.60	*0.12*		*508.1*	20.0%	0.049	*0.0*		*27.7*
56	100.0	1,236,072	260	77.8%	1.13	*0.25*		*45.8*	80.0%	0.63	*0.13*		*508.2*	20.0%	0.054	*0.0*		*27.7*
57	100.0	1,236,072	260	77.8%	1.13	*0.25*		*46.0*	80.0%	0.63	*0.13*		*508.4*	20.0%	0.054	*0.0*		*27.8*
58	100.0	1,236,072	260	77.8%	1.13	*0.25*		*46.3*	80.0%	0.63	*0.13*		*508.5*	20.0%	0.054	*0.0*		*27.8*
59	100.0	1,236,072	260	77.8%	1.13	*0.25*		*46.5*	80.0%	0.63	*0.13*		*508.6*	20.0%	0.054	*0.0*		*27.8*
60	100.0	1,236,072	260	77.8%	1.13	*0.25*	*46.8*	*46.8*	80.0%	0.63	*0.13*	*508.7*	*508.7*	20.0%	0.054	*0.0*	*27.9*	*27.9*
Average Flue Gas Flow (initial load to >50% load):		**625,666 acfm**		**START-UP EMISSIONS:**					**SU EMISSIONS:**					**SU EMISSIONS:**				
				Flame to FSNL:				**6.0**	**Flame to FSNL:**				**29.0**	**Flame to FSNL:**			**1.0**
				FSNL to >50% Load:				**38.5**	**FSNL to >50% Load:**				**478.6**	**FSNL to >50% Load:**			**26.5**
				Total SU Emissions:				**44.5**	**Total SU Emissions:**				**507.6**	**Total SU Emissions:**			**27.5**
				Avg SU Emissions (lb/hr):				**53.4**	**Avg SU Emissions (lb/hr):**				**609.1**	**Avg SU Emissions (lb/hr):**			**33.0**

= Time/load at which unit is "emissions compliant"

= Time at which unit reaches full load operation

Emission Estimates - Shutdown (ISO Conditions)
GE 7FA.05 Combined Cycle

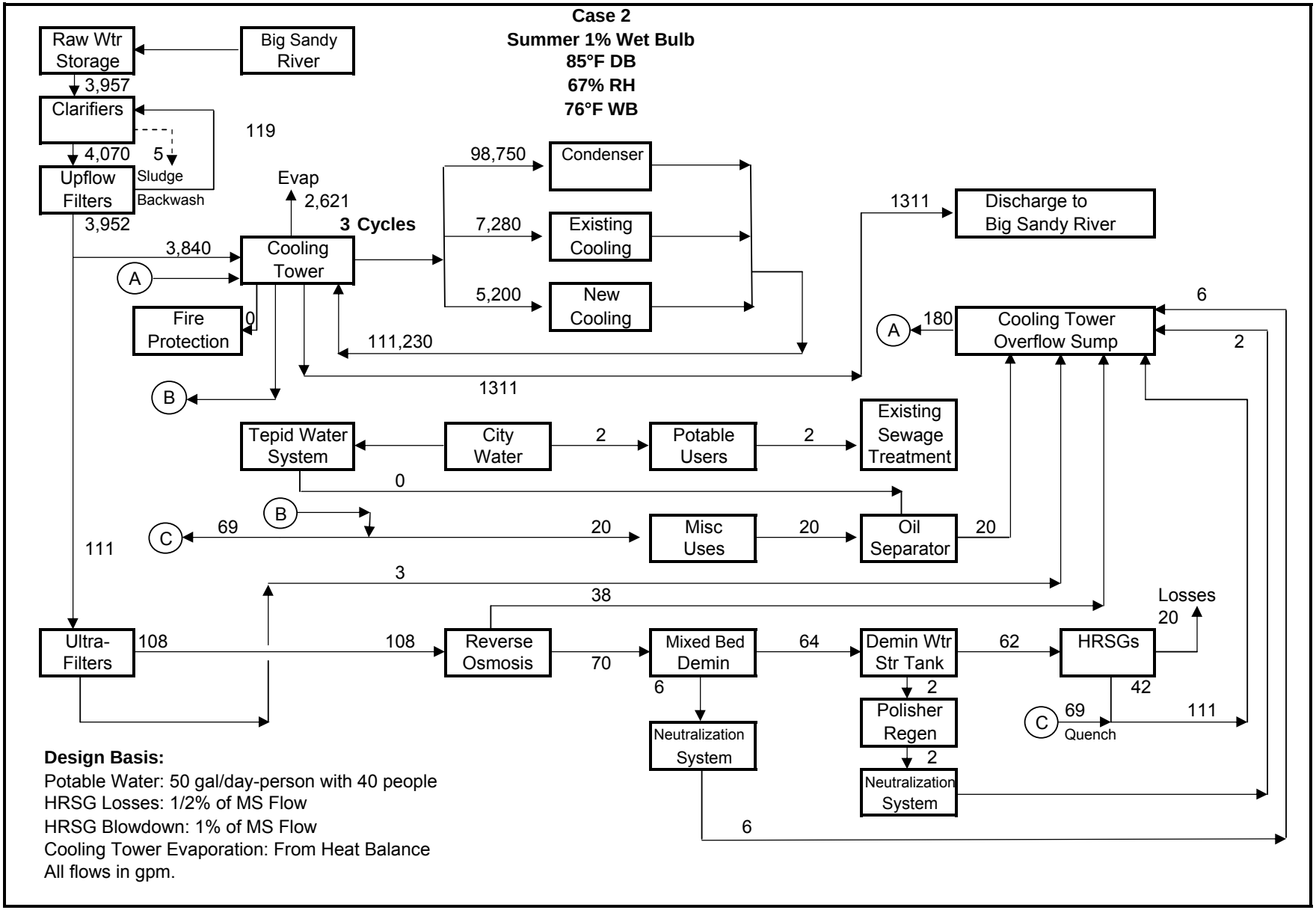
				NOx Emissions					CO Emissions (With CO Catalyst)					VOC Emissions (With CO Catalyst)				
	Combustion Turbine Load	GT Exhaust Flow Rate	Stack Gas Temperature	Reduction w/SCR	*Uncontrolled*	*Controlled*			Reduction w/CO catalyst	*Uncontrolled*	*Controlled*			Reduction w/CO catalyst	*Uncontrolled*	*Controlled*		
	GE Graph 102H4986--Normal Shutdown	GE Graph 102H4986--Normal Shutdown	Assumed to be ~260 F	Assumed	*GE Dwg No. 329A5374, Rev C*		*Rolling 1-hour average*	*Accumulated*	Assumed	*GE Dwg No. 329A5374, Rev C*		*Rolling 1-hour average*	*Accumulated*	Assumed	*GE Dwg No. 329A5374, Rev C*		*Rolling 1-hour average*	*Accumulated*
Minutes	%	acfm			*lb*	*lb*	*lb/hr*	*lb*	%	*lb*	*lb*	*lb/hr*	*lb*	%	*lb*	*lb*	*lb/hr*	*lb*
59	100.0	1,236,072	260	50.0%	1.13	*0.56*			80.0%	0.63	*0.13*			20.0%	0.054	*0.043*		
58	100.0	1,236,072	260	50.0%	1.13	*0.56*			80.0%	0.63	*0.13*			20.0%	0.054	*0.043*		
57	100.0	1,236,072	260	50.0%	1.13	*0.56*			80.0%	0.63	*0.13*			20.0%	0.054	*0.043*		
56	100.0	1,236,072	260	50.0%	1.13	*0.56*			80.0%	0.63	*0.13*			20.0%	0.054	*0.043*		
55	100.0	1,236,072	260	50.0%	1.13	*0.56*			80.0%	0.63	*0.13*			20.0%	0.054	*0.043*		
54	100.0	1,236,072	260	50.0%	1.13	*0.56*			80.0%	0.63	*0.13*			20.0%	0.054	*0.043*		
53	100.0	1,236,072	260	50.0%	1.13	*0.56*			80.0%	0.63	*0.13*			20.0%	0.054	*0.043*		
52	100.0	1,236,072	260	50.0%	1.13	*0.56*			80.0%	0.63	*0.13*			20.0%	0.054	*0.043*		
51	100.0	1,236,072	260	50.0%	1.13	*0.56*			80.0%	0.63	*0.13*			20.0%	0.054	*0.043*		
50	100.0	1,236,072	260	50.0%	1.13	*0.56*			80.0%	0.63	*0.13*			20.0%	0.054	*0.043*		
49	100.0	1,236,072	260	50.0%	1.13	*0.56*			80.0%	0.63	*0.13*			20.0%	0.054	*0.043*		
48	100.0	1,236,072	260	50.0%	1.13	*0.56*			80.0%	0.63	*0.13*			20.0%	0.054	*0.043*		
47	100.0	1,236,072	260	50.0%	1.13	*0.56*			80.0%	0.63	*0.13*			20.0%	0.054	*0.043*		
46	100.0	1,236,072	260	50.0%	1.13	*0.56*			80.0%	0.63	*0.13*			20.0%	0.054	*0.043*		
45	100.0	1,236,072	260	50.0%	1.13	*0.56*			80.0%	0.63	*0.13*			20.0%	0.054	*0.043*		
44	100.0	1,236,072	260	50.0%	1.13	*0.56*			80.0%	0.63	*0.13*			20.0%	0.054	*0.043*		
43	100.0	1,236,072	260	50.0%	1.13	*0.56*			80.0%	0.63	*0.13*			20.0%	0.054	*0.043*		
42	100.0	1,236,072	260	50.0%	1.13	*0.56*			80.0%	0.63	*0.13*			20.0%	0.054	*0.043*		
41	100.0	1,236,072	260	50.0%	1.13	*0.56*			80.0%	0.63	*0.13*			20.0%	0.054	*0.043*		
40	100.0	1,236,072	260	50.0%	1.13	*0.56*			80.0%	0.63	*0.13*			20.0%	0.054	*0.043*		
39	100.0	1,236,072	260	50.0%	1.13	*0.56*			80.0%	0.63	*0.13*			20.0%	0.054	*0.043*		
38	100.0	1,236,072	260	50.0%	1.13	*0.56*			80.0%	0.63	*0.13*			20.0%	0.054	*0.043*		
37	100.0	1,236,072	260	50.0%	1.13	*0.56*			80.0%	0.63	*0.13*			20.0%	0.054	*0.043*		
36	100.0	1,236,072	260	50.0%	1.13	*0.56*			80.0%	0.63	*0.13*			20.0%	0.054	*0.043*		
35	100.0	1,236,072	260	50.0%	1.13	*0.56*			80.0%	0.63	*0.13*			20.0%	0.054	*0.043*		
34	100.0	1,236,072	260	50.0%	1.13	*0.56*			80.0%	0.63	*0.13*			20.0%	0.054	*0.043*		
33	100.0	1,236,072	260	50.0%	1.13	*0.56*			80.0%	0.63	*0.13*			20.0%	0.054	*0.043*		
32	100.0	1,236,072	260	50.0%	1.13	*0.56*			80.0%	0.63	*0.13*			20.0%	0.054	*0.043*		
31	100.0	1,236,072	260	50.0%	1.13	*0.56*			80.0%	0.63	*0.13*			20.0%	0.054	*0.043*		
30	100.0	1,236,072	260	50.0%	1.13	*0.56*			80.0%	0.63	*0.13*			20.0%	0.054	*0.043*		
29	91.7	1,143,367	260	50.0%	1.05	*0.52*			80.0%	0.60	*0.12*			20.0%	0.049	*0.039*		
28	83.4	1,050,661	260	50.0%	0.98	*0.49*			80.0%	0.57	*0.11*			20.0%	0.044	*0.036*		
27	75.1	984,737	260	50.0%	0.91	*0.45*			80.0%	0.54	*0.11*			20.0%	0.040	*0.032*		
26	66.8	918,814	260	50.0%	0.83	*0.41*			80.0%	0.50	*0.10*			20.0%	0.039	*0.031*		
25	58.5	852,890	260	50.0%	0.76	*0.38*			80.0%	0.47	*0.09*			20.0%	0.038	*0.030*		
24	50.2	840,529	260	50.0%	0.71	*0.36*		*0.4*	80.0%	0.44	*0.09*		*0.1*	20.0%	0.037	*0.029*		*0.0*
23	41.9	787,996	260	0.0%	0.65	*0.65*		*1.0*	80.0%	1.31	*0.26*		*0.3*	19.0%	0.034	*0.028*		*0.1*
22	33.6	735,463	260	0.0%	0.57	*0.57*		*1.6*	80.0%	9.33	*1.87*		*2.2*	18.0%	0.031	*0.026*		*0.1*
21	25.3	655,118	260	0.0%	1.42	*1.42*		*3.0*	80.0%	70.32	*14.06*		*16.3*	17.0%	0.556	*0.461*		*0.5*
20	17.0	630,397	260	0.0%	1.19	*1.19*		*4.2*	80.0%	68.75	*13.75*		*30.0*	16.0%	1.609	*1.351*		*1.9*
19	17.0	630,397	260	0.0%	1.19	*1.19*		*5.4*	80.0%	68.75	*13.75*		*43.8*	15.0%	1.609	*1.368*		*3.3*
18	17.0	630,397	260	0.0%	1.19	*1.19*		*6.6*	80.0%	68.75	*13.75*		*57.5*	14.0%	1.609	*1.384*		*4.6*
17	17.0	630,397	260	0.0%	1.19	*1.19*		*7.8*	80.0%	68.75	*13.75*		*71.3*	13.0%	1.609	*1.400*		*6.0*
16	17.0	630,397	260	0.0%	1.19	*1.19*		*9.0*	80.0%	68.75	*13.75*		*85.0*	12.0%	1.609	*1.416*		*7.5*
15	17.0	630,397	260	0.0%	1.19	*1.19*		*10.1*	80.0%	68.75	*13.75*		*98.8*	11.0%	1.609	*1.432*		*8.9*
14	8.5	630,397	260	0.0%	2.85	*2.85*		*13.0*	80.0%	4.81	*0.96*		*99.7*	10.0%	0.190	*0.171*		*9.1*
13	0.0	630,397	260	0.0%	1.33	*1.33*		*14.3*	80.0%	10.7	*2.15*		*101.9*	9.0%	0.92	*0.837*		*9.9*
12-0	FSNL to Flameout					*3.0*		*17.3*			*25.0*		*126.9*			*1.0*		*10.9*

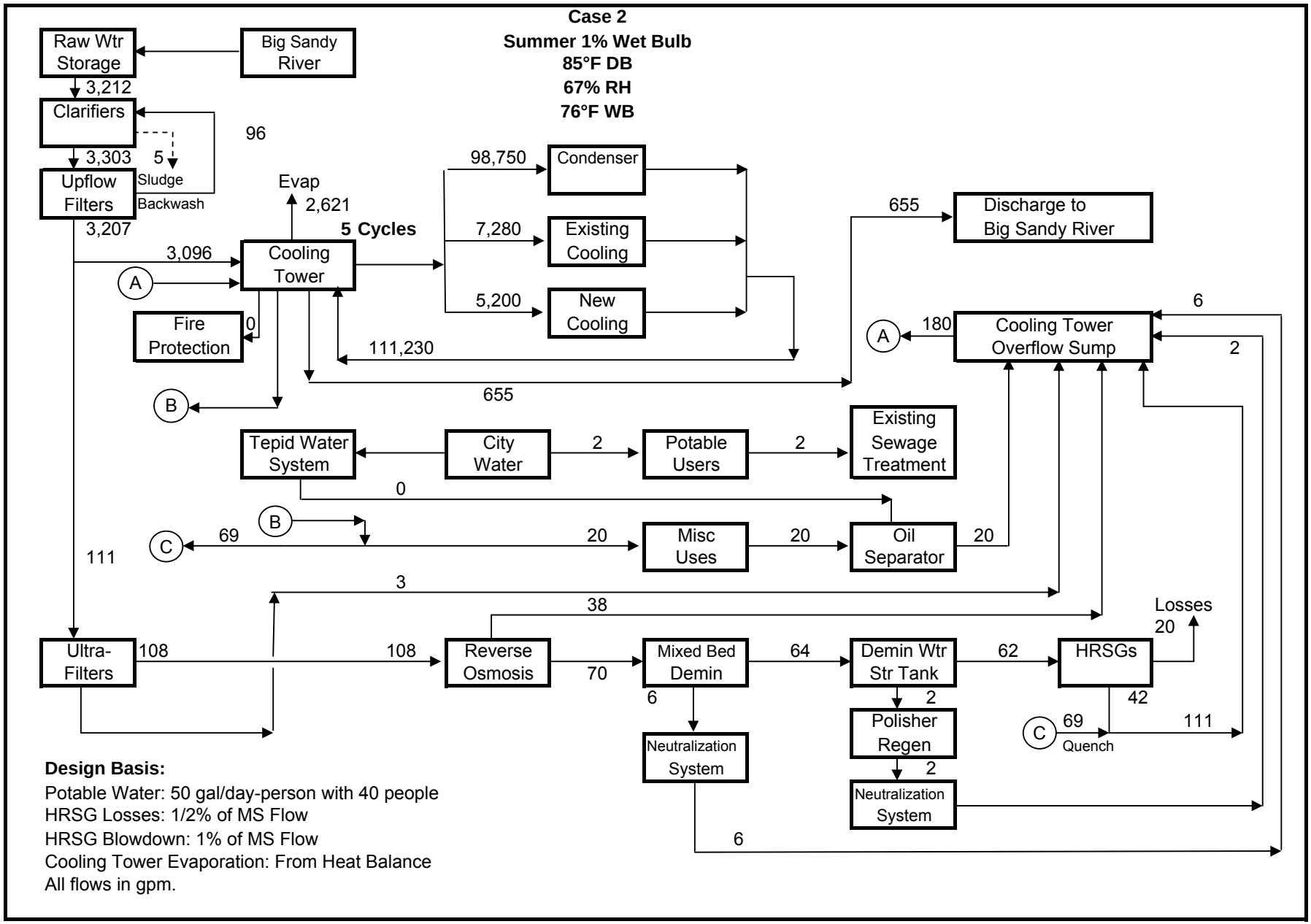
Average Flue Gas Flow (<50% load):	671,857 acfm	SD EMISSIONS:		SD EMISSIONS:		SD EMISSIONS:	
		<50% Load to FSNL:	14.3	<50% Load to FSNL:	101.9	<50% Load to FSNL:	9.9
		FSNL to Flameout:	3.0	FSNL to Flameout:	25.0	FSNL to Flameout:	1.0
		Total SD Emissions:	17.3	Total SD Emissions:	126.9	Total SD Emissions:	10.9
		Avg SD Emissions (lb/hr):	43.3	Avg SD Emissions (lb/hr):	317.2	Avg SD Emissions (lb/hr):	27.3

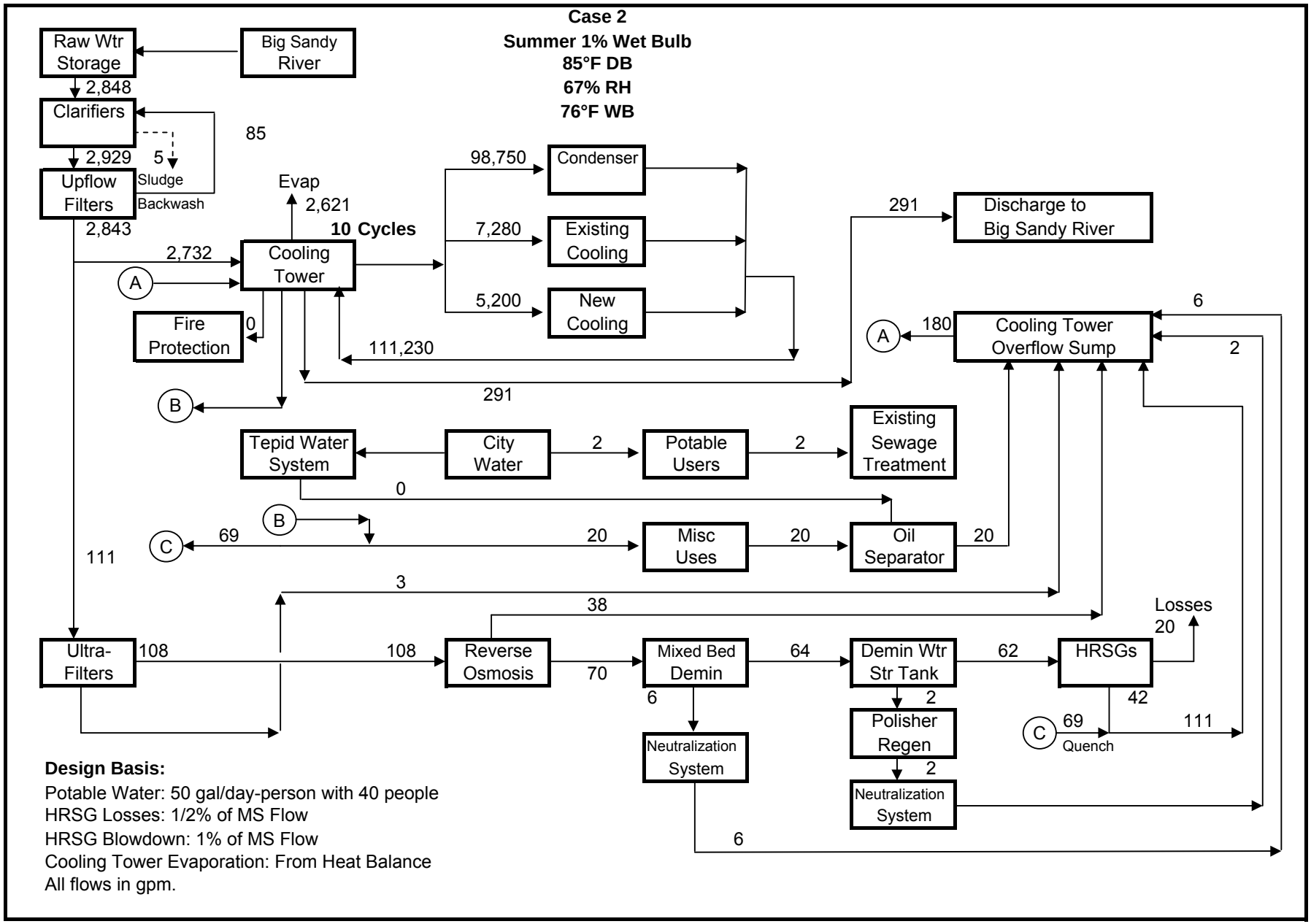
= Time/load at which unit is "emissions compliant"

= Time at which unit reaches full load operation

ATTACHMENT 1-6
Water Balances


Case 2
Summer 1% Wet Bulb
85°F DB
67% RH
76°F WB
Raw Wtr Storage
Big Sandy River
3,957
Clarifiers
119
4,070
5
Sludge
Upflow Filters
Backwash
3,952
Evap
2,621
3 Cycles
3,840
Cooling Tower
A
Fire Protection
0
111,230
B
1311
98,750
Condenser
7,280
Existing Cooling
5,200
New Cooling
1311
Discharge to Big Sandy River
6
A
180
Cooling Tower Overflow Sump
2
Tepid Water System
City Water
2
Potable Users
2
Existing Sewage Treatment
0
B
C
69
20
Misc Uses
20
Oil Separator
20
111
3
38
Losses
20
Ultra-Filters
108
108
Reverse Osmosis
70
Mixed Bed Demin
64
Demin Wtr Str Tank
62
HRSGs
6
2
42
Polisher Regen
C
69
Quench
111
Neutralization System
2
Neutralization System
6
Design Basis:
Potable Water: 50 gal/day-person with 40 people
HRSG Losses: 1/2% of MS Flow
HRSG Blowdown: 1% of MS Flow
Cooling Tower Evaporation: From Heat Balance
All flows in gpm.


Case 2
Summer 1% Wet Bulb
85°F DB
67% RH
76°F WB
Raw Wtr Storage
Big Sandy River
3,212
Clarifiers
96
3,303
5
Sludge
Upflow Filters
Backwash
3,207
Evap
2,621
5 Cycles
3,096
Cooling Tower
A
Fire Protection
0
111,230
B
98,750
Condenser
7,280
Existing Cooling
5,200
New Cooling
655
Discharge to Big Sandy River
180
Cooling Tower Overflow Sump
6
2
655
Tepid Water System
City Water
2
Potable Users
2
Existing Sewage Treatment
0
B
69
C
20
Misc Uses
20
Oil Separator
20
111
3
38
Losses
20
Ultra-Filters
108
108
Reverse Osmosis
70
Mixed Bed Demin
64
Demin Wtr Str Tank
62
HRSGs
6
2
42
Polisher Regen
C
69
Quench
111
Neutralization System
2
Neutralization System
6
Design Basis:
Potable Water: 50 gal/day-person with 40 people
HRSG Losses: 1/2% of MS Flow
HRSG Blowdown: 1% of MS Flow
Cooling Tower Evaporation: From Heat Balance
All flows in gpm.


Case 2
Summer 1% Wet Bulb
85°F DB
67% RH
76°F WB
Raw Wtr Storage
Big Sandy River
2,848
Clarifiers
85
2,929
5
Sludge
Upflow Filters
Backwash
2,843
Evap
2,621
10 Cycles
2,732
Cooling Tower
A
Fire Protection
0
111,230
291
B
98,750
Condenser
7,280
Existing Cooling
5,200
New Cooling
291
Discharge to Big Sandy River
6
180
Cooling Tower Overflow Sump
2
Tepid Water System
City Water
2
Potable Users
2
Existing Sewage Treatment
0
B
69
20
Misc Uses
20
Oil Separator
20
C
111
3
38
Losses
20
Ultra-Filters
108
108
Reverse Osmosis
70
Mixed Bed Demin
64
Demin Wtr Str Tank
62
HRSGs
6
2
42
Polisher Regen
C
69
Quench
111
Neutralization System
2
Neutralization System
6
Design Basis:
Potable Water: 50 gal/day-person with 40 people
HRSG Losses: 1/2% of MS Flow
HRSG Blowdown: 1% of MS Flow
Cooling Tower Evaporation: From Heat Balance
All flows in gpm.

ATTACHMENT 1-7
Electrical One-Lines

DWG. NO. ESK-001

TO 138KV SWITCHYARD ESK-002

AEP SCOPE

GSU-1A
18-141.5KV
210/280/355MVA
ONAN/ONAF/ONAF
Z = 9% @ 210MVA
NLTC

GSU-1B
18-141.5KV
210/280/355MVA
ONAN/ONAF/ONAF
Z = 9% @ 210MVA
NLTC

ISOLATED PHASE BUS DUCT

GCB-1A

GCB-1B

UAT-1A
18-4.26KV
27/36 MVA - H
13.5/18 MVA - X
13.5/18 MVA - Y
ONAN/ONAF
ZHX = 5% @ 13.5MVA
ZHY = 5% @ 13.5MVA
NLTC

UAT-1B
18-4.26KV
27/36 MVA - H
13.5/18 MVA - X
13.5/18 MVA - Y
ONAN/ONAF
ZHX = 5% @ 13.5MVA
ZHY = 5% @ 13.5MVA
NLTC

CTG-1A
18 KV/353.5 MVA @ 0.85 PF
MITSUBISHI. G FRAME

CTG-1B
18 KV/353.5 MVA @ 0.85 PF
MITSUBISHI. G FRAME

CABLE BUS DUCT

12A-1 3000A NC

12B-1 3000A NC

12AB 3000A NO

134-1 3000A NC

13B-1 3000A NC

13AB 3000A NO

4.16KV SWGR/MCC-12A. 3000A. 50KA

4.16KV SWGR/MCC-12B. 3000A. 50KA

4.16KV SWGR-13A. 3000A. 50KA

4.16KV MCC-13B. 3000A. 50KA

1200A

SPARE

SPACE

X00A

A1
ESK-003
SWITCHGEAR 14A
(CHILLERS)

A2
ESK-003
SWITCHGEAR 14B
(CHILLERS)

CTG 1A EXCITATION XFMR
CTG 1A ISLOATION XFMR

CTG 1B EXCITATION XFMR
CTG 1B ISLOATION XFMR

BOILER FEED PUMP 1A 1

BOILER FEED PUMP 1A 2
SPARE STARTER

BOILER FEED PUMP 1B 1

BOILER FEED PUMP 1B 2
SPARE STARTER

UST-21A
4160-480V
2/2.6MVA
AA/FA
Z = 5.75% @ 2MVA

UST-21B
4160-480V
2/2.6MVA
AA/FA
Z = 5.75% @ 2MVA

31A-1 4000A NC

31B-1 4000A NC

31AB 4000A NO

480V SWGR-31A. 4000A. 65KA

480V SWGR-31B. 4000A. 65KA

800A

MCC CTG PDC

MCC CTG 1A FUEL OIL PACKAGE

MCC @ CTG-1A EL PACKAGE

MCC @ HRSG-1A PDC

MCC @ HRSG-1A PDC

GAS SKID

MCC @ CTG-1A EL PACKAGE

MCC CTG PDC

MCC ESSENTIAL SERVICE

EMERGENCY DG 480V/1000KW

D

HRSG 1A PDC

UST-22A
4160-480V
2/2.6 MVA
AA/FA
Z = 5.75% @ 2MVA

UST-22B
4160-480V
2/2.6 MVA
AA/FA
Z = 5.75% @ 2MVA

32A-1 4000A NC

32B-1 4000A NO

32AB 4000A NO

480V SWGR-32A. 4000A. 65KA

480V SWGR-32B. 4000A. 65KA

MCC @ CTG-1B EL PACKAGE

GAS SKID

MCC @ HRSG-1B PDC

MCC @ TRANSFORMER PDC

MCC @ TRANSFORMER PDC

MCC @ HRSG-1B PDC

MCC @ CTG-1B EL PACKAGE

MCC CTG 1B FUEL OIL PACKAGE

HRSG 1B PDC

UST-23A
4160-480V
2/2.6 MVA
AA/FA
Z = 5.75% @ 2MVA

UST-23B
4160-480V
2/2.6 MVA
AA/FA
Z = 5.75% @ 2MVA

33A-1 4000A NC

33B-1 4000A NC

33AB 4000A NO

480V SWGR-33A. 4000A. 65KA

480V SWGR-33B. 4000A. 65KA

MCC @ WATER TREATMENT

WATER TREATMENT

UST-24A
4160-480V
2/2.6 MVA
AA/FA
Z = 5.75% @ 2MVA

UST-24B
4160-480V
2/2.6 MVA
AA/FA
Z = 5.75% @ 2MVA

34A-1 4000A NC

34B-1 4000A NO

34AB 4000A NO

480V SWGR-34A. 4000A. 65KA

480V SWGR-34B. 4000A. 65KA

MCC @ WATER PRETREATMENT

WATER PRETREATMENT

NOTES

DATE	NO.	DESCRIPTION	APPD.
		REVISIONS	

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

COMBINED CYCLE U1 REPOWERING COST ESTIMATE STUDY OPTION 1 ONE LINE DIAGRAM

DWG. NO. ESK-001

SCALE: 1"=00'-0"

DR:

CH:

APPROVED BY

DATE:

FILE NAME: ESK-001.DGN

REV	DATE RELEASED	PURPOSE	
D	08/23/2011	ISSUED FOR USE	M. SRONCE, K. NOMANBHOY
C	07/25/2011	ISSUED FOR USE	M. SRONCE, K. NOMANBHOY
B	07/12/2011	FOR CLIENT COMMENTS	M. SRONCE, K. NOMANBHOY
A	06/14/2011	FOR CLIENT COMMENTS	M. SRONCE, K. NOMANBHOY
		PREPARED	
		REVIEWED	
		APPROVED	

DRAWING RELEASE RECORD

PROFESSIONAL ENGINEER'S STAMP

Sargent & Lundy

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL, FOR THAT OF ITS SUBCONTRACTORS PERFORMING THE WORK.

AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOURMINUTE

I050694

DWG. NO. ESK-002

FROM CTG A & CTG B ESK-001

TO 138KV SWITCHYARD

AEP SCOPE

TRANSF 1W 22-138KV 150MVA NLTC

TRANSF 1E 22-138KV 150MVA NLTC

ISOLATED PHASE BUS DUCT

TRANSF 1Q1 22-4.16KV 12/16 MVA ONAN/ONAF Z = 6.02% NLTC

ISOLATED PHASE BUS DUCT

EXCITATION TRANSFORMER

STG 22 KV/330MVA @ 0.85 PF

TO 138KV SWITCHYARD

TRANSF 1Q1 138-4.16KV 12/16 MVA ONAN/ONAF Z = 6.12% NLTC

STG PDC

EXISTING PLANT EE ROOM

1A 1600A NC

1600A NO

1600A NC

4.16KV SWGR/MCC-1A. 1600A. 40KA

4.16KV MCC-1B. 1600A. 40KA

NEW 4.16KV SWITCHGEAR

SPLICE BOX (WHERE REQUIRED)

EXISTING CABLE

1200A

400A

SPARE

ESK-003 UST 27A (FUEL OIL)

ESK-003 UST 27B (FUEL OIL)

C1

C2

C

UNIT PLANT LIGHTING

PLANT AIR COMPRESSOR

CONDENSATE BOOSTER PUMP

CIRCULATING WATER PUMP

HOT WELL PUMP

FUEL OIL PUMP 1

FUEL OIL PUMP 2

CLOSED COOLING WATER PUMP

AUX TRANS 11A 4160-600V 1000 KVA

1600A NC

1600A NO

600V SWGR-11A. 1600A. 65KA

600V SWGR-11B. 1600A. 65KA

NEW 600V SWITCHGEAR

SPLICE BOX (WHERE REQUIRED)

EXISTING CABLE

MCC 1 TB A

MCC 1 BKMF A

MCC 1HF A

MCC 1SBF A

MCC 1 TC A

TURBINE ROOM CRANE

MCC 1 MS B

MCC 1 BKM B

MCC 1 TB B

MCC 1 TC B

MCC 1 BB B

MCC 1FF B

MCC 1 BUF B

HEATER DRAIN PUMP

AUX OIL PUMP

N.C.

N.O.

TO UNIT 2

AUX TRANS 21PH 4160-600V 1500 KVA

AUX TRANS 11SBRP 4160-600V 750 KVA

AUX TRANS 11SH 4160-600V 1500 KVA

600V BUS 11SBRP

600V BUS 11SH

RIVER WATER MAKE UP PUMP 400HP

RIVER WATER MAKE UP PUMP 200HP

STBY RIVER WATER MAKE UP PUMP 200HP

MCC 2PH 1

MCC 2PH 2

MCC MCW

MCC 1SBRP

MCC 1SH

EXISTING RIVER WATER DISTRIBUTION

AUX TRANS 11FP 4160-600V 300 KVA

FIRE PUMP

EXISTING FIRE PUMPS

NOTES

NEW

EXISTING

DATE	NO.	DESCRIPTION	APPD.
		REVISIONS	

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

COMBINED CYCLE U1 REPOWERING COST ESTIMATE STUDY OPTION 1 ONE LINE DIAGRAM

DWG. NO. ESK-002

SCALE: 1"=100'-0"

DR: M. SRONCE

CK: K. NOMANBHOY

APPROVED BY:

DATE:

FILE NAME: ESK-002.DGN

REV	DATE RELEASED	PURPOSE	
C	07/25/2011	ISSUED FOR USE	M. SRONCE / K. NOMANBHOY
B	07/12/2011	FOR CLIENT COMMENTS	M. SRONCE / K. NOMANBHOY
A	06/14/2011	FOR CLIENT COMMENTS	M. SRONCE / K. NOMANBHOY

DRAWING RELEASE RECORD

PREPARED

REVIEWED

APPROVED

PROFESSIONAL ENGINEER'S STAMP

Bergmann Lundy

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL FOR THAT OF ITS SUBCONTRACTORS PERFORMING THE WORK

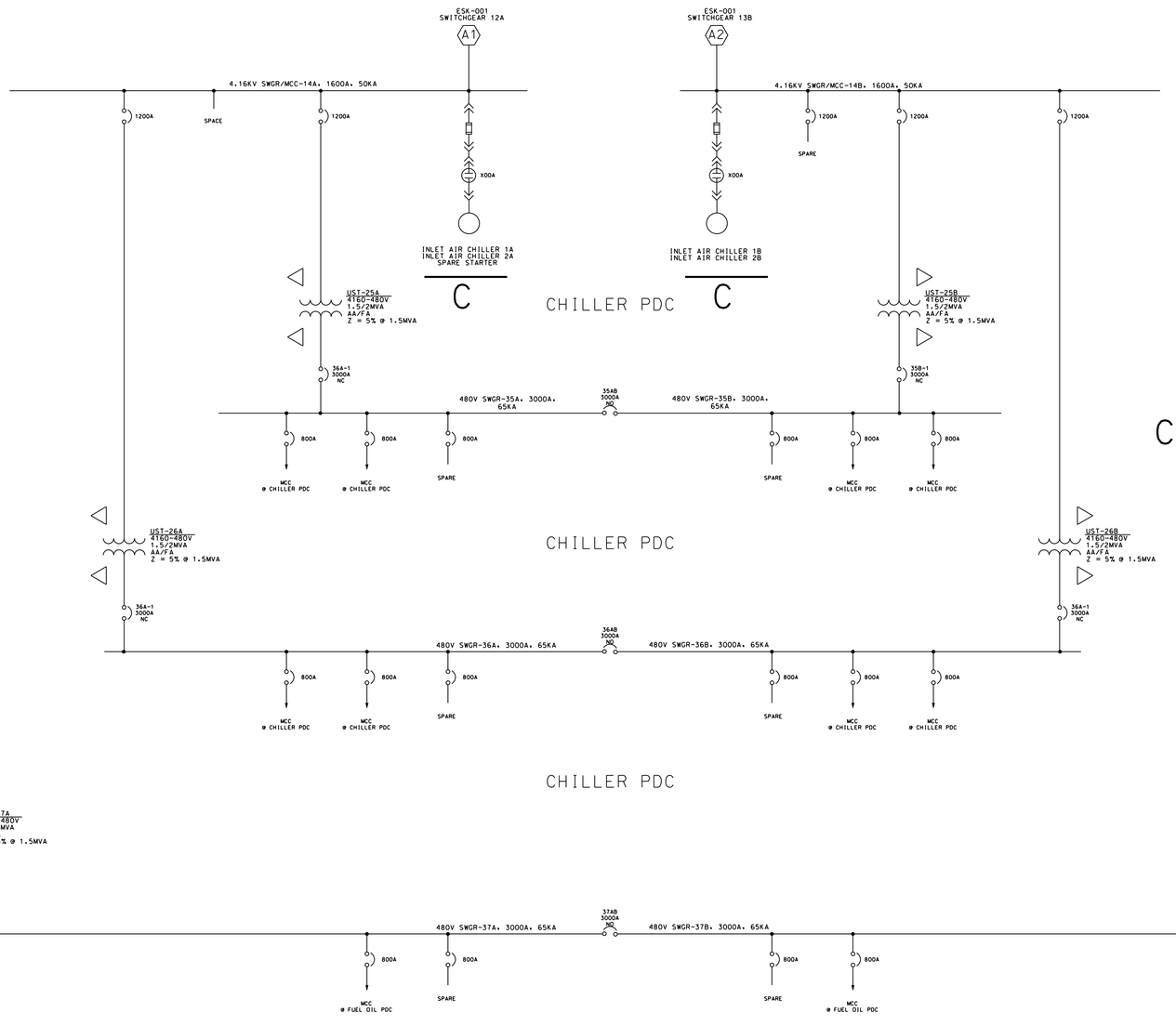
AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

IGS0694

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOUR:MINUTE

DWG. NO. ESK-003



NOTES

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

COMBINED CYCLE U1 REPOWERING COST ESTIMATE STUDY OPTION 1 ONE LINE DIAGRAM

DWG. NO. ESK-003

SCALE: 1"=00'-0"

DRN

CHK

APPROVED BY

DATE

FILE NAME: ESK-003.DGN

REV	DATE RELEASED	PURPOSE	PREPARED	REVIEWED	APPROVED
C	07/25/2011	ISSUED FOR USE	M. SRONCE	K. NOWAKHOY	
B	07/12/2011	FOR CLIENT COMMENTS	M. SRONCE	K. NOWAKHOY	
A	06/14/2011	FOR CLIENT COMMENTS	M. SRONCE	K. NOWAKHOY	

DRAWING RELEASE RECORD

PROFESSIONAL ENGINEER'S STAMP

Sargent & Lundy

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE WORKING ON THE SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL, FOR THAT OF ITS SUBCONTRACTORS PERFORMING THE WORK.

AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

IGS0694

SYSTEM DATE: DD-MMM-YY
SYSTEM TIME: HOUR:MINUTE

DWG. NO. ESK-004

TO 138KV SWITCHYARD ESK-005

AEP SCOPE

GSU-1A
18-141.5KV
165/220/275MVA
ONAN/ONAF/ONAF
Z = 9% @ 165MVA
NLTC

GSU-1B
18-141.5KV
165/220/275MVA
ONAN/ONAF/ONAF
Z = 9% @ 165MVA
NLTC

ISOLATED PHASE BUS DUCT

GCB-1A

GCB-1B

CTG-1A
18 KV/273 MVA @ 0.85 PF
GE, F FRAME

CTG-1B
18 KV/273 MVA @ 0.85 PF
GE, F FRAME

UAT-1A
18-4.26KV
24/32 MVA - H
12/16 MVA - X
12/16 MVA - Y
ONAN/ONAF
ZHX = 5% @ 12MVA
ZHY = 5% @ 12MVA
NLTC

UAT-1B
18-4.26KV
24/32 MVA - H
12/16 MVA - X
12/16 MVA - Y
ONAN/ONAF
ZHX = 5% @ 12MVA
ZHY = 5% @ 12MVA
NLTC

CABLE BUS DUCT

12A-1 3000A NC

12AB 3000A ND

12B-1 3000A NC

13A-1 3000A NC

13AB 3000A ND

13B-1 3000A NC

4.16KV SWGR/MCC-12A, 3000A, 50KA

4.16KV SWGR/MCC-12B, 3000A, 50KA

4.16KV SWGR-13A, 3000A, 50KA

4.16KV MCC-13B, 3000A, 50KA

1200A

SPARE

SPACE

X00A

A1
ESK-003
SWITCHGEAR 14A
(CHILLERS)

A2
ESK-003
SWITCHGEAR 14B
(CHILLERS)

CTG 1A EXCITATION XFMR
CTG 1A ISLOATION XFMR

BOILER FEED PUMP 1A 1

BOILER FEED PUMP 1A 2
SPARE STARTER

BOILER FEED PUMP 1B 1

BOILER FEED PUMP 1B 2
SPARE STARTER

CTG 1B EXCITATION XFMR
CTG 1B ISLOATION XFMR

UST-21A
4160-480V
2/2.6MVA
AA/FA
Z = 5.75% @ 2MVA

UST-21B
4160-480V
2/2.6MVA
AA/FA
Z = 5.75% @ 2MVA

31A-1 4000A NC

31B-1 4000A NC

31AB 4000A NO

480V SWGR-31A, 4000A, 65KA

480V SWGR-31B, 4000A, 65KA

800A

MCC CTG PDC

MCC CTG 1A FUEL OIL PACKAGE

MCC @ CTG-1A EL PACKAGE

MCC @ HRSG-1A PDC

GAS SKID

MCC ESSENTIAL SERVICE

EMERGENCY DG 480V/1000KW

HRSG 1A PDC

UST-22A
4160-480V
2/2.6 MVA
AA/FA
Z = 5.75% @ 2MVA

UST-22B
4160-480V
2/2.6 MVA
AA/FA
Z = 5.75% @ 2MVA

32A-1 4000A NC

32B-1 4000A NC

32AB 4000A NO

480V SWGR-32A, 4000A, 65KA

480V SWGR-32B, 4000A, 65KA

MCC @ CTG-1B EL PACKAGE

MCC @ HRSG-1B PDC

MCC @ TRANSFORMER PDC

MCC CTG 1B FUEL OIL PACKAGE

HRSG 1B PDC

UST-23A
4160-480V
2/2.6 MVA
AA/FA
Z = 5.75% @ 2MVA

UST-23B
4160-480V
2/2.6 MVA
AA/FA
Z = 5.75% @ 2MVA

33A-1 4000A NC

33B-1 4000A NC

33AB 4000A NO

480V SWGR-33A, 4000A, 65KA

480V SWGR-33B, 4000A, 65KA

MCC @ WATER TREATMENT

WATER TREATMENT

UST-24A
4160-480V
2/2.6 MVA
AA/FA
Z = 5.75% @ 2MVA

UST-24B
4160-480V
2/2.6 MVA
AA/FA
Z = 5.75% @ 2MVA

34A-1 4000A NC

34B-1 4000A NC

34AB 4000A NO

480V SWGR-34A, 4000A, 65KA

480V SWGR-34B, 4000A, 65KA

MCC @ WATER PRETREATMENT

WATER PRETREATMENT

NOTES

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

COMBINED CYCLE U1 REPOWERING COST ESTIMATE STUDY OPTION 2 ONE LINE DIAGRAM

DWG. NO. ESK-004

SCALE: 1"=00'-0"

DR:

CH:

APPROVED BY

DATE:

FILE NAME: ESK-004.DGN

REV	DATE RELEASED	PURPOSE	
D	08/23/2011	ISSUED FOR USE	M. SRONCE / K. NOMANBHOY
C	07/25/2011	ISSUED FOR USE	M. SRONCE / K. NOMANBHOY
B	07/12/2011	FOR CLIENT COMMENTS	M. SRONCE / K. NOMANBHOY
A	06/14/2011	FOR CLIENT COMMENTS	M. SRONCE / K. NOMANBHOY
		PREPARED	
		REVIEWED	
		APPROVED	

DRAWING RELEASE RECORD

PROFESSIONAL ENGINEER'S STAMP

Sargent & Lundy

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE PERFORMING THE WORK. THIS INCLUDES THE CONTRACTOR'S/INSTALLER'S PERSONNEL FOR THAT OF ITS SUBCONTRACTOR'S

AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOURMINUTE

IGS0694

DWG. NO. ESK-005

TO 138KV SWITCHYARD

FROM CTG A & CTG B ESK-004

AEP SCOPE

TRANSF 1W 22-138KV 150MVA NLTC

TRANSF 1E 22-138KV 150MVA NLTC

ISOLATED PHASE BUS DUCT

TRANSF 101 22-4.16KV 12/16 MVA ONAN/ONAF Z = 6.02% NLTC

ISOLATED PHASE BUS DUCT

STG 22 KV/330MVA @ 0.85 PF

EXCITATION TRANSFORMER

TO 138KV SWITCHYARD

TRANSF 101 138-4.16KV 12/16 MVA ONAN/ONAF Z = 6.12% NLTC

STG PDC

EXISTING PLANT EE ROOM

1A 1600A NC

4.16KV SWGR/MCC-1A. 1600A. 40KA

1600A NO

1600A NC

4.16KV MCC-1B. 1600A. 40KA

1600A NO

NEW 4.16KV SWITCHGEAR

SPLICE BOX (WHERE REQUIRED)

EXISTING CABLE

1200A

UNIT PLANT LIGHTING

PLANT AIR COMPRESSOR

CONDENSATE BOOSTER PUMP

CIRCULATING WATER PUMP

HOT WELL PUMP

FUEL OIL PUMP 1

C1

ESK-006 UST 27A (FUEL OIL)

AUX TRANS 11A 4160-600V 1000 KVA

CLOSED COOLING WATER PUMP

SPARE

C2

ESK-006 UST 27B (FUEL OIL)

FUEL OIL PUMP 2

UNIT PLANT LIGHTING

C

1600A NC

600V SWGR-11A. 1600A. 65KA

1600A NO

600V SWGR-11B. 1600A. 65KA

1600A NC

NEW 600V SWITCHGEAR

SPLICE BOX (WHERE REQUIRED)

EXISTING CABLE

HEATER DRAIN PUMP

MCC 1 TB A

SPARE

MCC 1 BKMF A

MCC 1 BMF A

MCC 1HF A

MCC 1SBF A

MCC 1 TC A

TURBINE ROOM CRANE

SPARE

MCC 1 MS B

AUX OIL PUMP

MCC 1 BKM B

MCC 1 TB B

MCC 1 TC B

MCC 1 BB B

MCC 1FF B

MCC 1 BUF B

SPARE

HEATER DRAIN PUMP

C

TO UNIT 2

N.C.

N.O.

AUX TRANS 21PH 4160-600V 1500 KVA

AUX TRANS 11SBRP 4160-600V 750 KVA

AUX TRANS 11SH 4160-600V 1500 KVA

AUX TRANS 11FP 4160-600V 300 KVA

600V BUS 11SBRP

600V BUS 11SH

RIVER WATER MAKE UP PUMP 400HP

MCC 2PH 1

MCC 2PH 2

STBY RIVER WATER MAKE UP PUMP 200HP

MCC MCW

MCC 1SBRP

MCC 1SH

FIRE PUMP

EXISTING RIVER WATER DISTRIBUTION

EXISTING FIRE PUMPS

NOTES

NEW

EXISTING

DATE	NO.	DESCRIPTION	APPD.
		REVISIONS	

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

FILE NAME: ESK-005.DGN

COMBINED CYCLE U1 REPOWERING COST ESTIMATE STUDY OPTION 2 ONE LINE DIAGRAM

DWG. NO. ESK-005

SCALE: 1"=100'-0"

DR:

CH:

APPROVED BY:

DATE:

REV	DATE RELEASED	PURPOSE	
C	07/25/2011	ISSUED FOR USE	M. SRONCE, K. NOMANBHOY
B	07/12/2011	FOR CLIENT COMMENTS	M. SRONCE, K. NOMANBHOY
A	06/14/2011	FOR CLIENT COMMENTS	M. SRONCE, K. NOMANBHOY
			PREPARED
			REVIEWED
			APPROVED

DRAWING RELEASE RECORD

PROFESSIONAL ENGINEER'S STAMP

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S EMPLOYEES, AND SHALL BE RESPONSIBLE FOR THAT OF ITS SUBCONTRACTORS PERFORMING THE WORK.

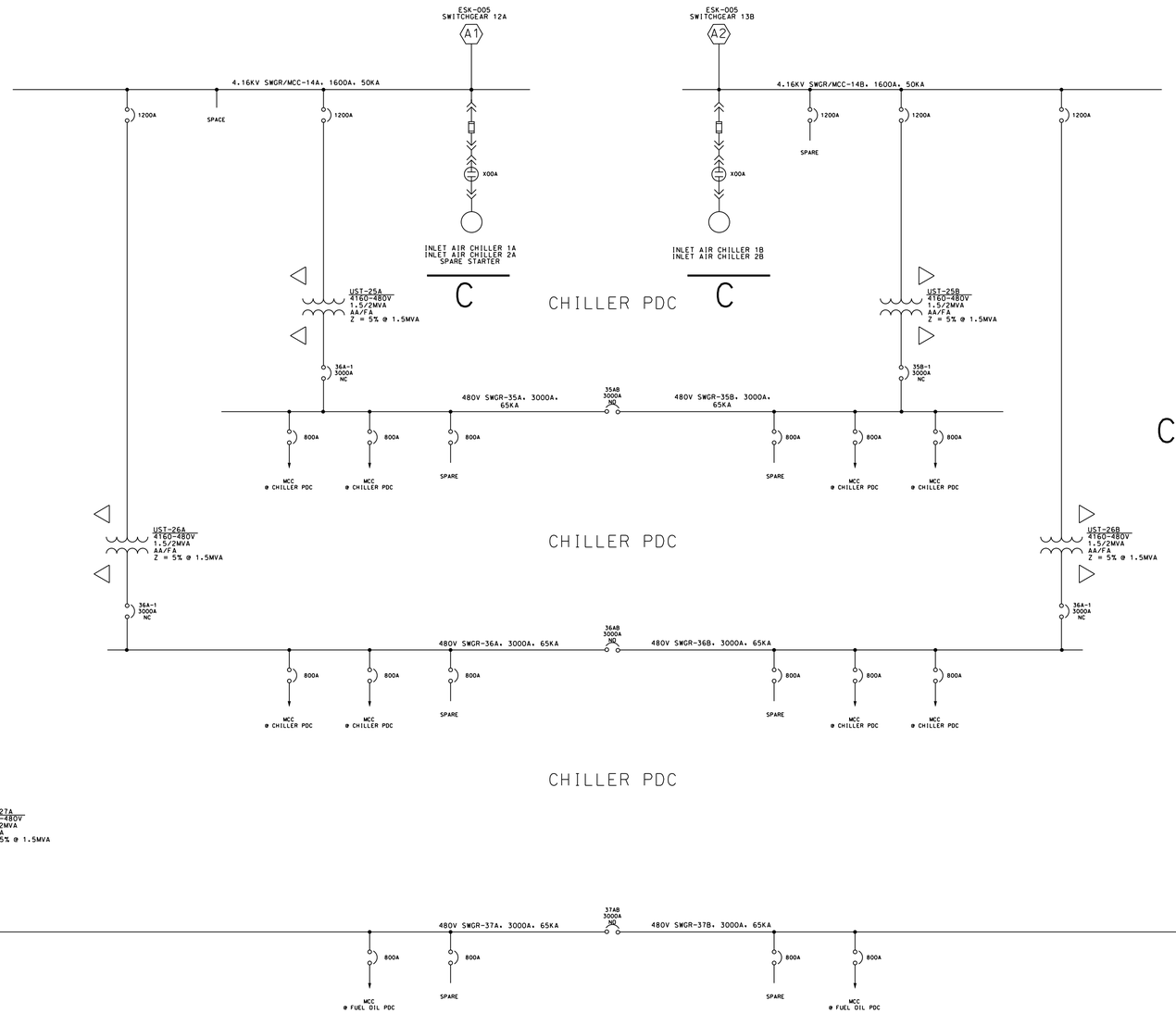
AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOUR:MINUTE

1050694

DWG. NO. ESK-006



NOTES

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

COMBINED CYCLE U1 REPOWERING COST ESTIMATE STUDY OPTION 2 ONE LINE DIAGRAM

DWG. NO. ESK-006

SCALE: 1"=00'-0"

DRN

CHK

APPROVED BY

DATE:

FILE NAME: ESK-006.DGN

REV	DATE RELEASED	PURPOSE	PREPARED / REVIEWED / APPROVED
C	07/25/2011	ISSUED FOR USE	M. SRONCE / K. NOMANBHOY
B	07/12/2011	FOR CLIENT COMMENTS	M. SRONCE / K. NOMANBHOY
A	06/14/2011	FOR CLIENT COMMENTS	M. SRONCE / K. NOMANBHOY

DRAWING RELEASE RECORD

PROFESSIONAL ENGINEER'S STAMP

Sargent & Lundy

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PERSONS RESULTING FROM THE CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUBCONTRACTORS) PERFORMING THE WORK

AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

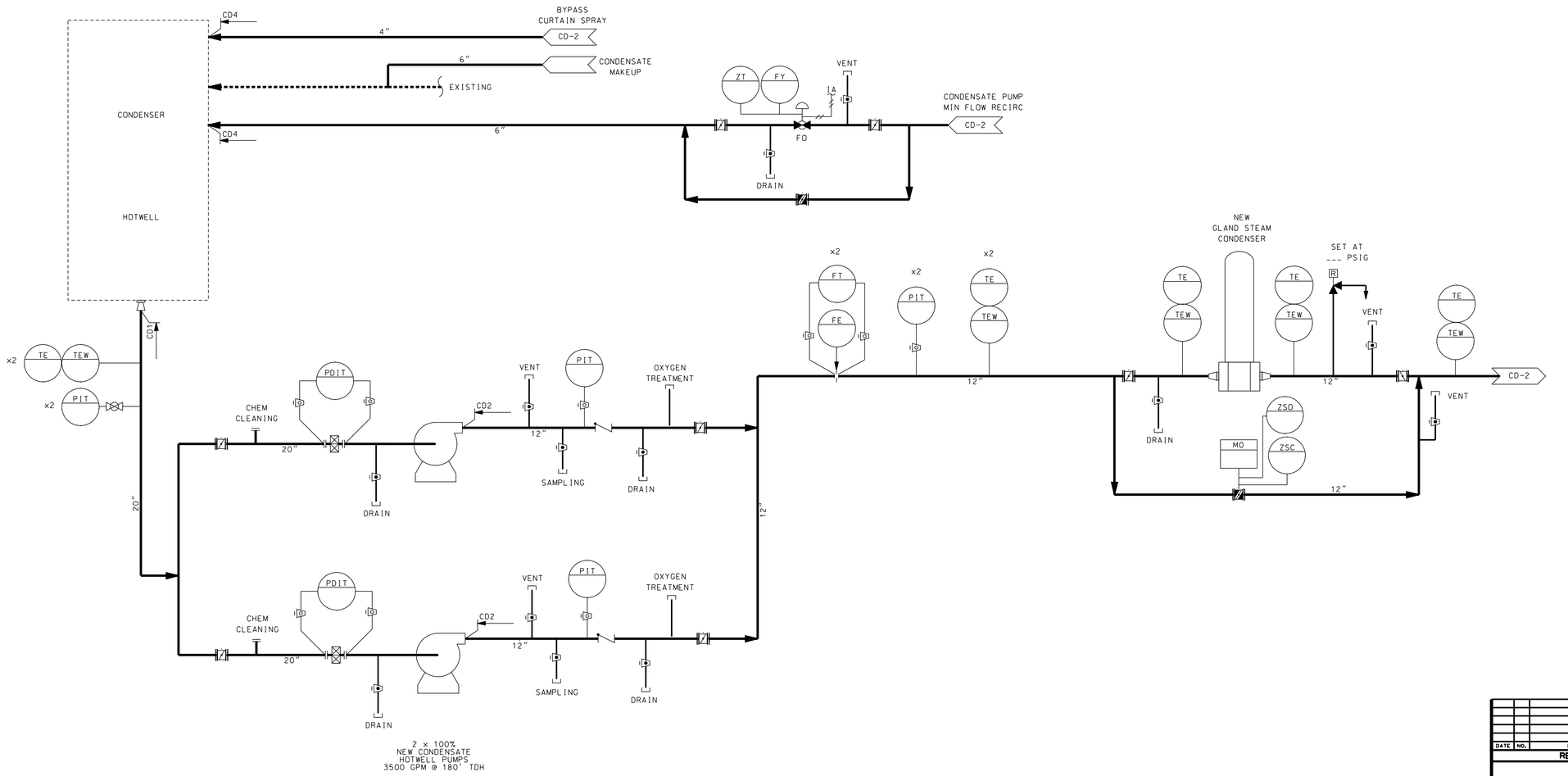
SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOUR:MINUTE

IGS0694

ATTACHMENT 1-8
Major System P&ID's

DWG. NO.

NOTES:
1. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
2. ALL PROCESS DRAINS WILL BE ROUTED TO AN OWS DRAIN POINT.
3. HIGH-POINT VENTS AND LOW-POINT DRAINS WILL BE LOCATED AS REQUIRED BASED ON PIPE ROUTING.
4. DASHED PIPELINES, EQUIPMENT AND COMPONENTS ARE EXISTING. SEE DWG. NO. 1-5007-17 FOR DETAILS OF EXISTING SYSTEMS.



2 x 100%
NEW CONDENSATE
HOTWELL PUMPS
3500 GPM @ 180' TDH

NOTE 1

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	MAX OPER. PRESSURE (PSIG)	MAX OPER. TEMP. (DEG. F)	PIPE CLASS	PDT	INSTR. PIPE CLASS	INSTR. PDT	INSUL-ATION TYPE	FIELD TEST PRESSURE (PSIG)	REMARKS
CD1	25	150			D	S&L 0105					CS
CD2	100	150			D	S&L 0105					CS
CD3	300	150			D	S&L 0305					CS
CD4	300	250			D	S&L 0305					CS

REV	DATE RELEASED	PURPOSE	
C	07/22/2011	ISSUED FOR USE	M. WEILER C. WOODS
B	07/08/2011	FOR ESTIMATING	M. WEILER C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	M. WEILER C. WOODS
			PREPARED REVIEWED APPROVED

DRAWING RELEASE RECORD

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL FOR THAT OF ITS SUBCONTRACTOR'S PERFORMING THE WORK.

PROFESSIONAL ENGINEER'S STAMP

Elegant & Lundy

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

U1 REPOWERING OPTION 1 COST ESTIMATE STUDY CONDENSATE SYSTEM

DWG. NO. RPMSK-OPT1-CD-001

SCALE: 1"=100'-0"

DR:

CK:

APPROVED BY

DATE:

AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

IGS0694

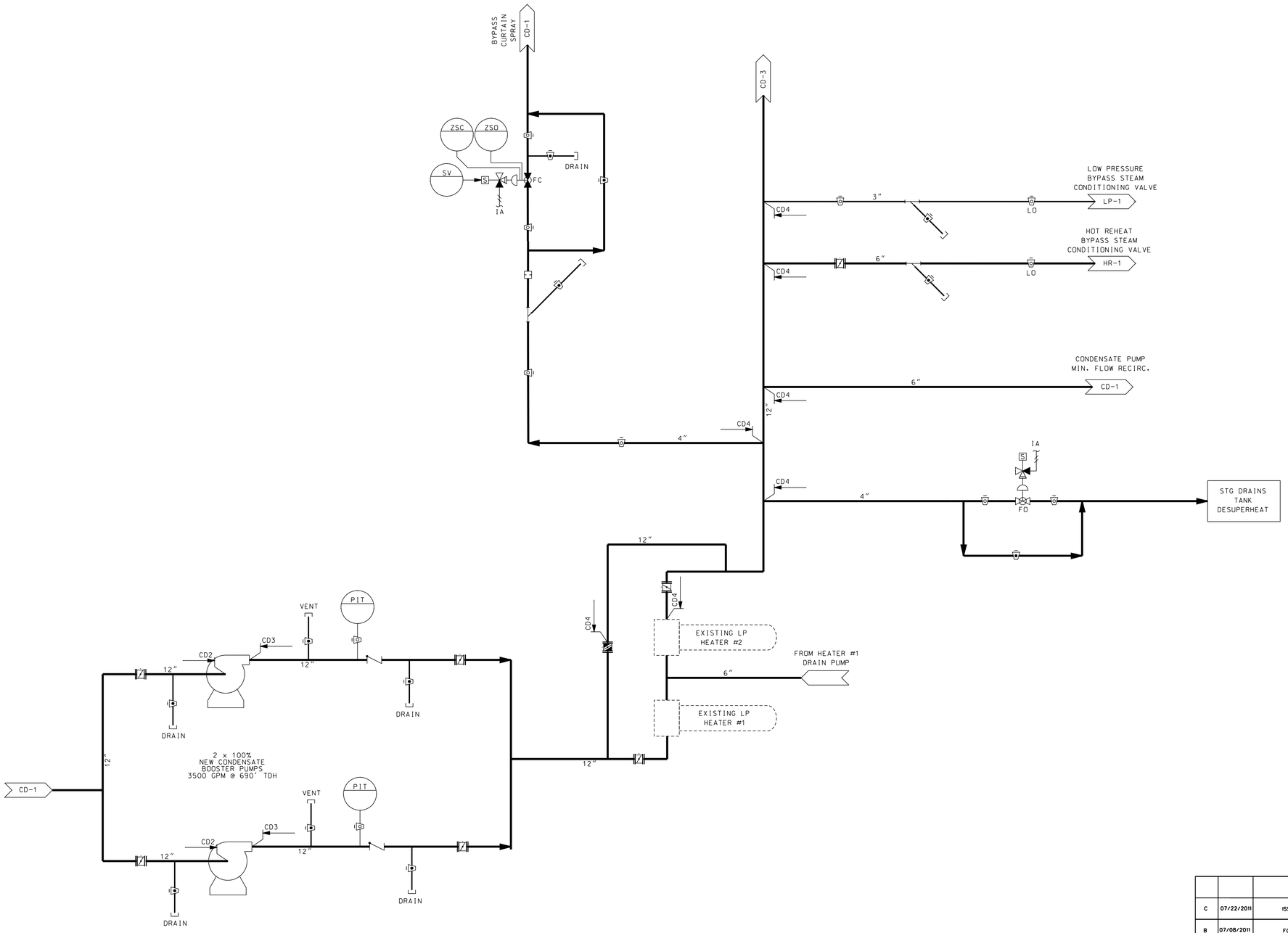
SYSTEM DATE- DD-MMM-YYYY
SYSTEM TIME- HOURMINUTE

DRG. NO.

NOTE1

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	MAX OPER. PRESSURE (PSIG)	MAX OPER. TEMP. (DEG. F)	PIPE CLASS	PDT	INSTR. PIPE CLASS	INSTR. PDT	INSUL-ATION TYPE	FIELD TEST PRESSURE (PSIG)	REMARKS
CD1	25	150			D	S&L 0105					CS
CD2	100	150			D	S&L 0105					CS
CD3	300	150			D	S&L 0305					CS
CD4	300	250			D	S&L 0305					CS

NOTES:
1. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
2. ALL PROCESS DRAINS WILL BE ROUTED TO AN OWS DRAIN POINT.
3. HIGH-POINT VENTS AND LOW-POINT DRAINS WILL BE LOCATED AS REQUIRED BASED ON PIPE ROUTING.



REV	DATE RELEASED	PURPOSE		
C	07/22/2011	ISSUED FOR USE	M. WEILER C. WOODS	
B	07/08/2011	FOR ESTIMATING	M. WEILER C. WOODS	
A	6/14/2011	FOR CLIENT COMMENTS	M. WEILER C. WOODS	
			PREPARED REVIEWED APPROVED	

DRAWING RELEASE RECORD

PROFESSIONAL ENGINEER'S STAMP

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL FACTOR'S EMPLOYEES AND SHALL REQUIRE THAT EACH SUBCONTRACTOR'S INSTALLER'S PERSONNEL (OR THAT OF ITS SUBCONTRACTORS) PERFORMING THE WORK

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

U1 REPOWERING OPTION 1 COST ESTIMATE STUDY CONDENSATE SYSTEM

DWG. NO. RPMSK-OPT1-CD-002

SCALE: 1"=100'-0"

DR:

CH:

APPROVED BY:

DATE:

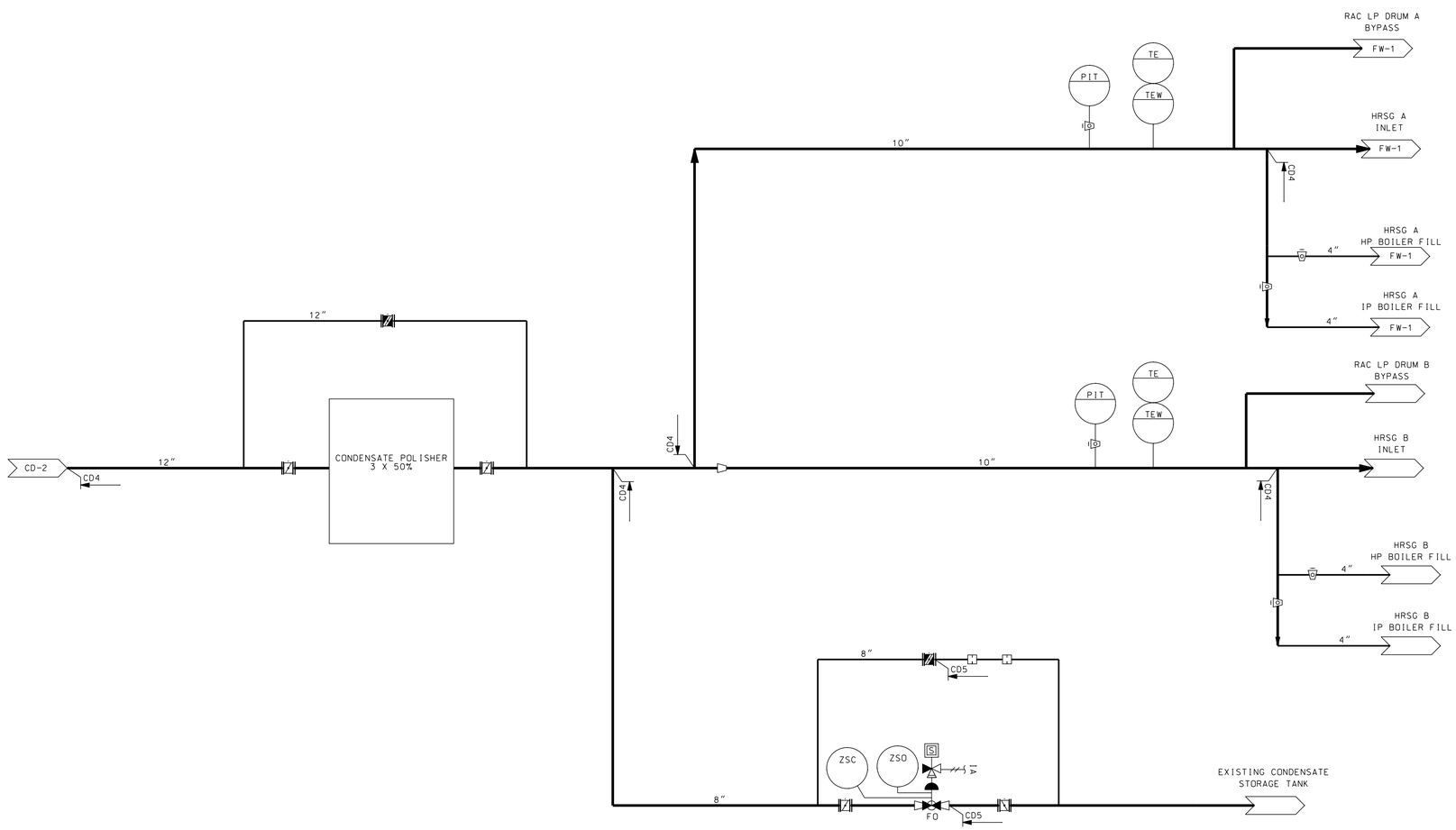
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE- DD-MMM-YYYY
SYSTEM TIME- HOURMINUTE

IGS0694

DWG. NO.

NOTES:
1. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
2. ALL PROCESS DRAINS WILL BE ROUTED TO AN OWS DRAIN POINT.
3. HIGH-POINT VENTS AND LOW-POINT DRAINS WILL BE LOCATED AS REQUIRED BASED ON PIPE ROUTING.



NOTE 1

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	MAX OPER. PRESSURE (PSIG)	MAX OPER. TEMP. (DEG. F)	PIPE CLASS	PDT	INSTR. PIPE CLASS	INSTR. PDT	INSUL-ATION TYPE	FIELD TEST PRESSURE (PSIG)	REMARKS
CD1	25	150			D	S&L 0105					CS
CD2	100	150			D	S&L 0105					CS
CD3	300	150			D	S&L 0305					CS
CD4	300	250			D	S&L 0305					CS
CD5	50	250			D	S&L 0105					CS

REV	DATE RELEASED	PURPOSE	
C	07/22/2011	ISSUED FOR USE	M. WEILER / C. WOODS
B	07/08/2011	FOR ESTIMATING	M. WEILER / C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	M. WEILER / C. WOODS

DRAWING RELEASE RECORD — PREPARED / REVIEWED / APPROVED

PROFESSIONAL ENGINEER'S STAMP

Stephanie M. Lumley

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/ INSTALLER'S PERSONNEL (OR THAT OF ITS SUBCONTRACTORS) PERFORMING THE WORK.

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY — KENTUCKY

U1 REPOWERING OPTION 1 COST ESTIMATE STUDY CONDENSATE SYSTEM

DWG. NO. RPMSK-OPT1-CD-003

SCALE: 1"=100'-0"

DR:

CH:

APPROVED BY:

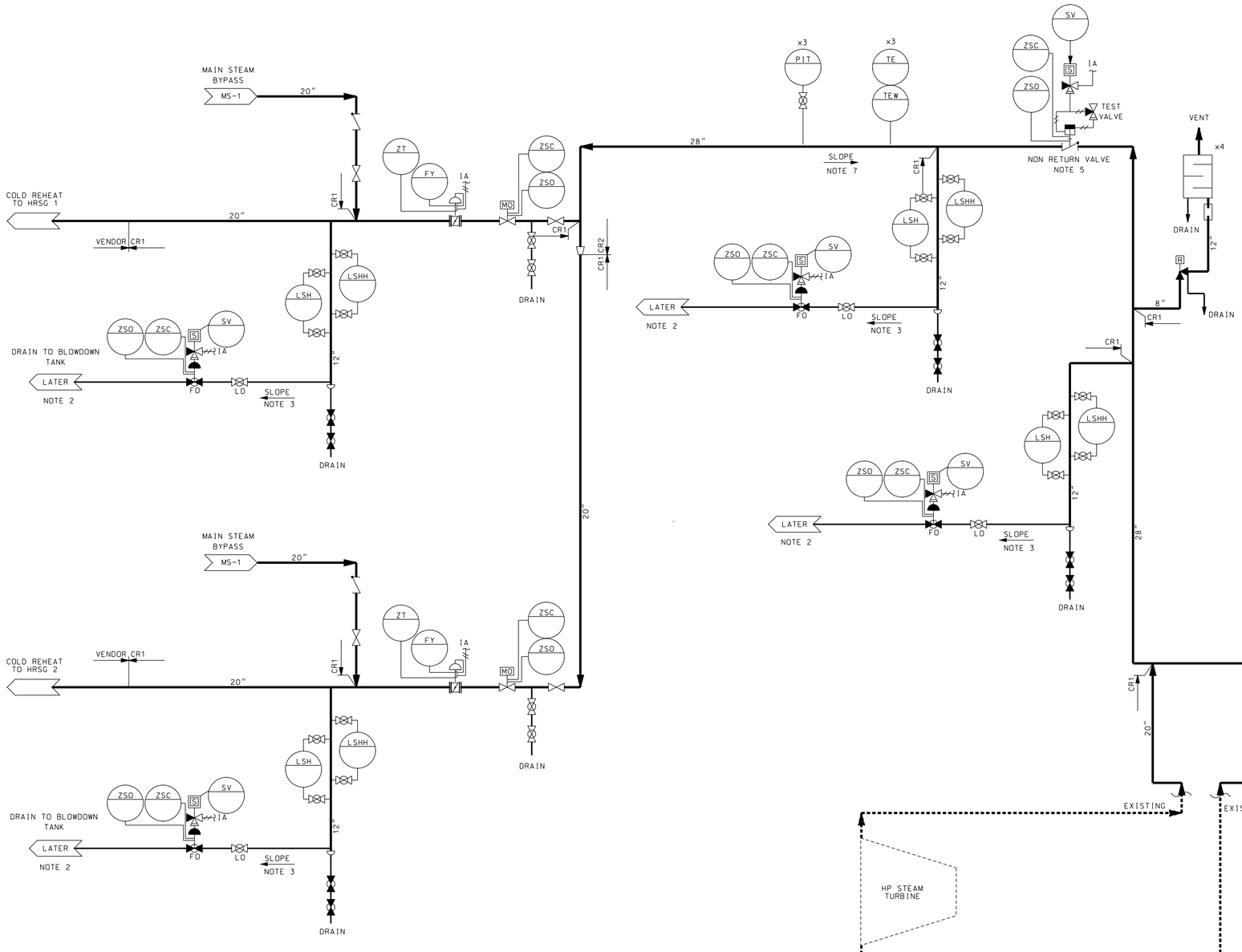
DATE:

AEP AMERICAN ELECTRIC POWER
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE- DD-MMM-YYYY
SYSTEM TIME- HOUR:MINUTE

IGS0694

DWG. NO.



NOTES:
1. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
2. VENTS AND DRAINS TO BE LOCATED AT ALL SYSTEM HIGH AND LOW POINTS PER THE PIPE ROUTING. TYPICAL VENT AND DRAIN CONFIGURATION IS SHOWN FOR REFERENCE.
3. PIPING SHALL BE SLOPED AT A MINIMUM OF $\frac{1}{4}$ INCH PER FOOT.
4. ALL STEAM PIPING INCLUDING VENTS AND DRAINS SHALL BE INSULATED.
5. CONFIGURATION OF NON RETURN VALVE TO BE CONFIRMED BASED ON STEAM TURBINE SUPPLIER.
6. ROUTE TO A SAFE PLACE AWAY FROM SITE PERSONEL.
7. STEAM PIPE IN THE PIPE RACK WILL BE ROUTED WITH A MINIMUM SLOPE TO ENSURE DRAINAGE.
8. DASHED PIPELINES, EQUIPMENT AND COMPONENTS ARE EXISTING. SEE DWG. NO. 1-5005-24 FOR DETAILS OF EXISTING SYSTEMS.

NOTE 1

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	PIPE MATERIAL	REMARKS
CR1	650	785	ASTM A335 GR. P11	SCH. 40
CR2	650	785	ASTM A335 GR. P11	0.75" WALL

REV	DATE RELEASED	PURPOSE	
C	07/22/2011	ISSUED FOR USE	M. WEILER / C. WOODS
B	07/08/2011	FOR ESTIMATING	M. WEILER / C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	M. WEILER / C. WOODS
			PREPARED
			REVIEWED
			APPROVED

DRAWING RELEASE RECORD

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/ INSTALLER'S PERSONNEL (OR THAT OF ITS SUBCONTRACTORS) PERFORMING THE WORK

PROFESSIONAL ENGINEER'S STAMP

DATE	NO.	DESCRIPTION	APPD.
		REVISIONS	

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

U1 REPOWERING OPTION 1 COST ESTIMATE STUDY COLD REHEAT

DWG. NO. RPMSK-OPT1-CR-001

SCALE: 1"=100'-0"

DR:

CK:

APPROVED BY

DATE:

AEP AMERICAN ELECTRIC POWER
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE- DD-MMM-YYYY
SYSTEM TIME- HOURMINUTE

IGS0694

DRG. NO.

NOTE 1

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	MAX OPER. PRESSURE (PSIG)	MAX OPER. TEMP. (DEG. F)	PIPE CLASS	PDT	INSTR. PIPE CLASS	INSTR. PDT	INSUL-ATION TYPE	FIELD TEST PRESSURE (PSIG)	REMARKS
CW1	45	115			D	S&L 0105					CS

NOTES:
1. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
2. SAMPLE PROBES AND ANALYZERS SHALL BE PROVIDED FOR SPECIFIC CONDUCTIVITY, ORP, CORROSION, DEPOSITION, ALKALINITY AND pH.
3. DASHED PIPELINES, EQUIPMENT AND COMPONENTS ARE EXISTING. SEE DWG. NO. TBD FOR DETAILS OF EXISTING SYSTEMS.

EXISTING NATURAL DRAFT COOLING TOWER

COOLING TOWER PUMP BASIN

FROM EXISTING CONDENSER

AUX. CONDENSER CIRCULATING WATER

CW1

20"

FROM CLOSED COOLING WATER HEAT EXCHANGERS

CW-2

IA

BLOWDOWN LATER

8"

CW1

TO EXISTING CONDENSER

AUX. CONDENSER CIRCULATING WATER

CW1

20"

FROM CLOSED COOLING WATER HEAT EXCHANGERS

CW-2

CHEMICAL FEED EXISTING

MAKEUP WATER FROM PRETREATMENT

EXISTING CIRCULATING WATER PUMPS
2 PUMPS

COOLING TOWER PUMP BASIN

REV	DATE RELEASED	PURPOSE	PREPARED	REVIEWED	APPROVED
C	07/22/2011	ISSUED FOR USE	M. WEILER	C. WOODS	
B	07/08/2011	FOR ESTIMATING	M. WEILER	C. WOODS	
A	06/14/2011	FOR CLIENT COMMENTS	M. WEILER	C. WOODS	

DRAWING RELEASE RECORD

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL OR THAT OF ITS SUBCONTRACTORS IS PERFORMING THE WORK.

PROFESSIONAL ENGINEER'S STAMP

Burns & Lundy

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

U1 REPOWERING OPTION 1
COST ESTIMATE STUDY
CIRCULATING WATER SYSTEM

DWG. NO. RPMSK-OPT1-CW-001

SCALE: 1"=100'-0"

DR:

CH:

APPROVED BY:

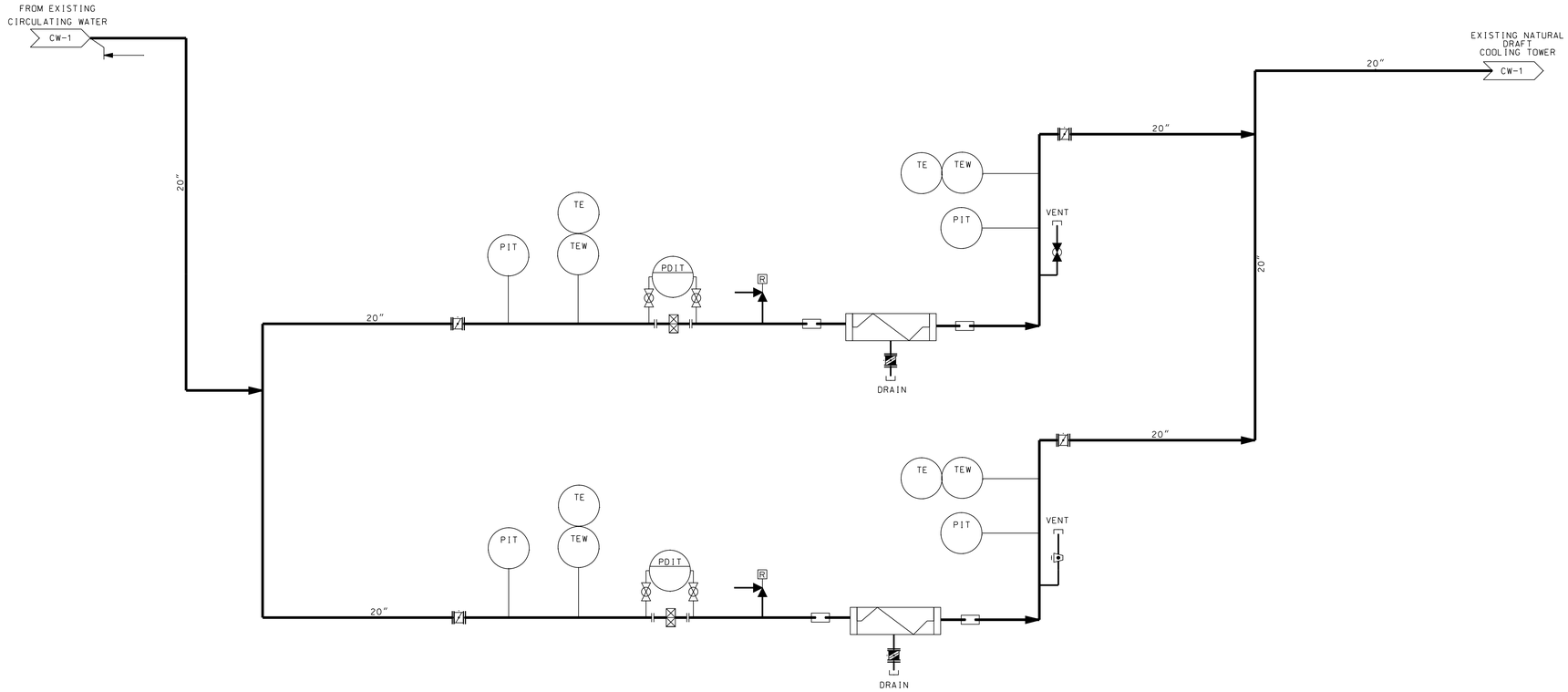
DATE:

AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOUR:MINUTE

IGS0694



CLOSED COOLING WATER
HEAT EXCHANGERS
SHELL & TUBE (SHELL SIDE)
2 @ 100% CAPACITY EACH

NOTE 1

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	MAX OPER. PRESSURE (PSIG)	MAX OPER. TEMP. (DEG. F)	PIPE CLASS	PDT	INSTR. PIPE CLASS	INSTR. PDT	INSUL-ATION TYPE	FIELD TEST PRESSURE (PSIG)	REMARKS
CW1	45	115			D	S&L 0105					CS

NOTES:
1. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
2. ALL PROCESS DRAINS WILL BE ROUTED TO AN OWS DRAIN POINT.
3. HIGH-POINT VENTS AND LOW-POINT DRAINS WILL BE LOCATED AS REQUIRED BASED ON PIPE ROUTING.

REV	DATE RELEASED	PURPOSE	
C	07/22/2011	ISSUED FOR USE	M. WEILER / C. WOODS
B	07/08/2011	FOR ESTIMATING	M. WEILER / C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	M. WEILER / C. WOODS
			PREPARED
			REVIEWED
			APPROVED

DRAWING RELEASE RECORD

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR's/ INSTALLER's PERSONNEL FOR THAT OF ITS SUBCONTRACTORS PERFORMING THE WORK.

PROFESSIONAL ENGINEER'S STAMP

Sargent & Lundy

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

U1 REPOWERING OPTION 1
COST ESTIMATE STUDY
CIRCULATING WATER SYSTEM

DWG. NO. RPMSK-OPT1-CW-002

SCALE: 1"=100'-0"

DR:

CH:

APPROVED BY

DATE:

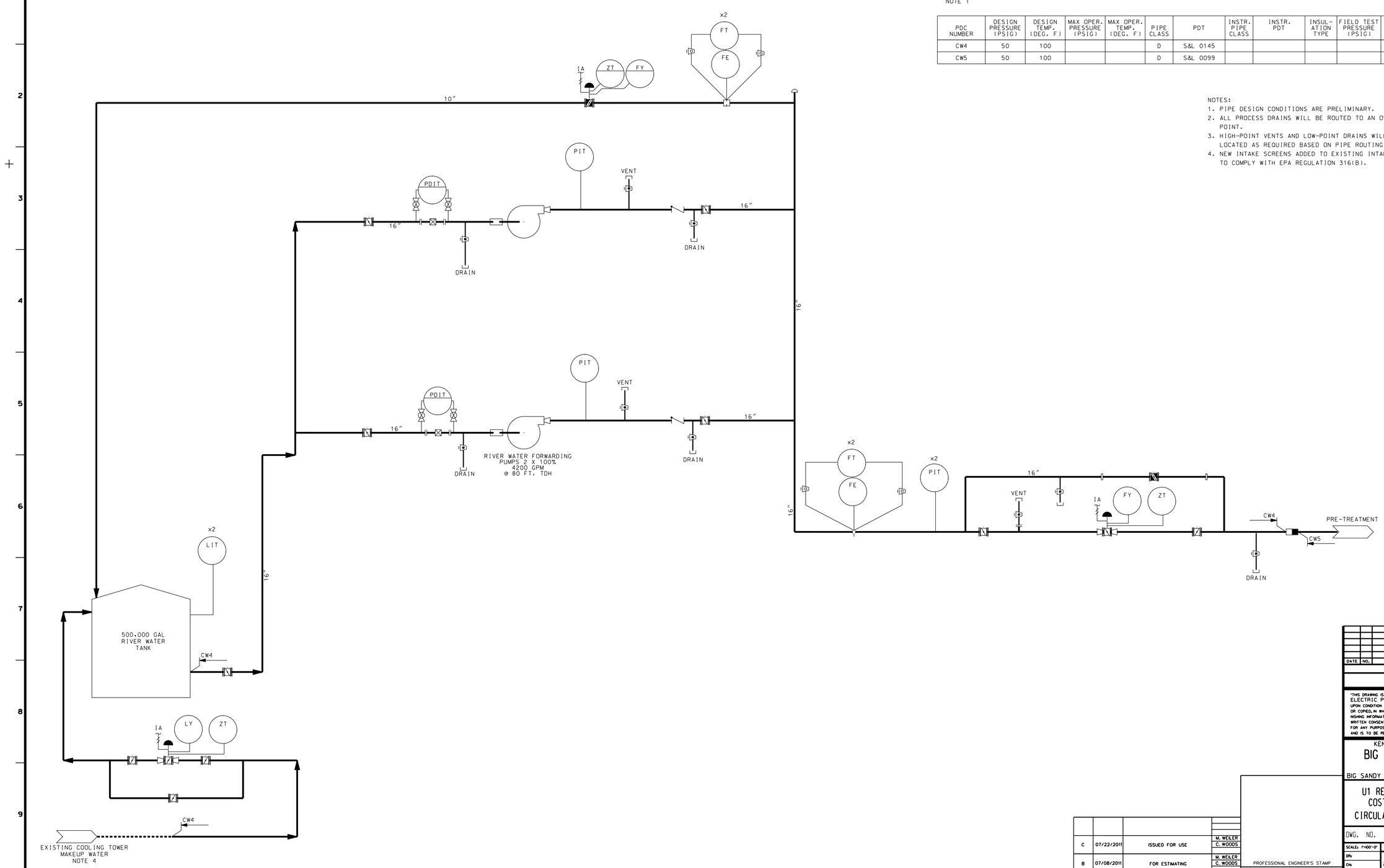
AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOUR:MINUTE

IGS0694

DRG. NO.



NOTE 1

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	MAX OPER. PRESSURE (PSIG)	MAX OPER. TEMP. (DEG. F)	PIPE CLASS	PDT	INSTR. PIPE CLASS	INSTR. PDT	INSUL-ATION TYPE	FIELD TEST PRESSURE (PSIG)	REMARKS
CW4	50	100			D	S&L 0145					SS
CW5	50	100			D	S&L 0099					HDPE

NOTES:
1. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
2. ALL PROCESS DRAINS WILL BE ROUTED TO AN OWS DRAIN POINT.
3. HIGH-POINT VENTS AND LOW-POINT DRAINS WILL BE LOCATED AS REQUIRED BASED ON PIPE ROUTING.
4. NEW INTAKE SCREENS ADDED TO EXISTING INTAKE STRUCTURE TO COMPLY WITH EPA REGULATION 316(B).

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

U1 REPOWERING OPTION 1
COST ESTIMATE STUDY
CIRCULATING WATER SYSTEM

DWG. NO. RPMSK-OPT1-CW-003

SCALE: 1"=100'-0"

DR:

CH:

APPROVED BY:

DATE:

REV	DATE RELEASED	PURPOSE	
C	07/22/2011	ISSUED FOR USE	M. WEILER / C. WOODS
B	07/08/2011	FOR ESTIMATING	M. WEILER / C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	M. WEILER / C. WOODS
			PREPARED
			REVIEWED
			APPROVED

DRAWING RELEASE RECORD

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL OR THAT OF ITS SUBCONTRACTORS PERFORMING THE WORK.

PROFESSIONAL ENGINEER'S STAMP

Burns & Lundy

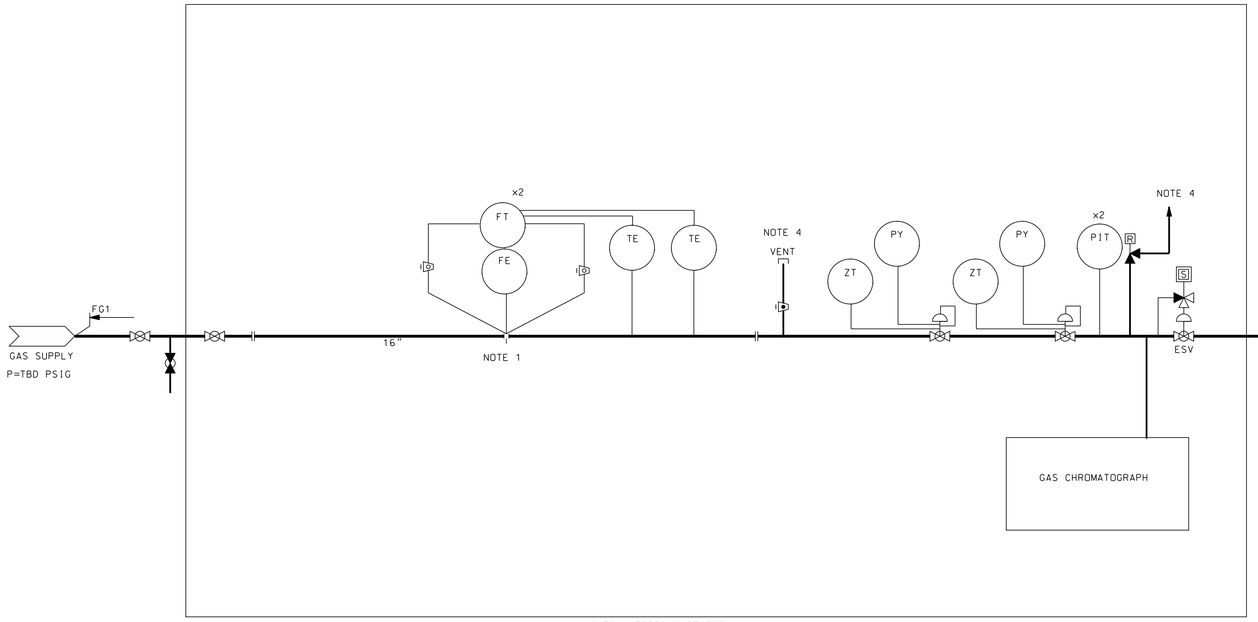
AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

IGS0694

SYSTEM DATE- DD-MMM-YYYY
SYSTEM TIME- HOUR:MINUTE

DWG. NO.



CHECK METERING STATION
WITH SUN SHADE

16"

FG-2 — 8" — TO CT A

FG-2 — 4" — TO DUCT BURNER A

6" — AUX. BOILER SUPPLY

FG-2 — 8" — TO CT B

FG-2 — 4" — TO DUCT BURNER B

NOTES:

1. GAS METERING REQUIRES 30 DIAMETER OF STRAIGHT PIPE UPSTREAM AND 5 DIAMETER OF STRAIGHT PIPE DOWNSTREAM.
2. INTERFACE WITH NATURAL GAS LINE AT TBD PSIG.
3. PIPING DESIGN CONDITIONS ARE PRELIMINARY.
4. VENT LINES ROUTED TO SAFE ELEVATION.

NOTE 3

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	MAX OPER. PRESSURE (PSIG)	MAX OPER. TEMP. (DEG. F)	PIPE CLASS	PDT	INSTR. PIPE CLASS	INSTR. PDT	INSUL-ATION TYPE	FIELD TEST PRESSURE (PSIG)	REMARKS
FG1	650	150			D	S&L 0305					CS

REV	DATE RELEASED	PURPOSE	
C	07/22/2011	ISSUED FOR USE	M. WEILER / C. WOODS
B	07/08/2011	FOR ESTIMATING	M. WEILER / C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	M. WEILER / C. WOODS

DRAWING RELEASE RECORD

PREPARED
REVIEWED
APPROVED

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PERSONNEL LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/ INSTALLER'S PERSONNEL FOR THAT OF ITS SUBCONTRACTORS IS PERFORMING THE WORK.

PROFESSIONAL ENGINEER'S STAMP

Sargent & Lundy

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

U1 REPOWERING OPTION 1 COST ESTIMATE STUDY

FUEL GAS SYSTEM

DWG. NO. RPMSK-OPT1-FG-001

SCALE: 1"=100'-0"

DRN

CHK

APPROVED BY

DATE:

AEP AMERICAN ELECTRIC POWER
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE- DD-MMM-YYYY
SYSTEM TIME- HOUR:MINUTE

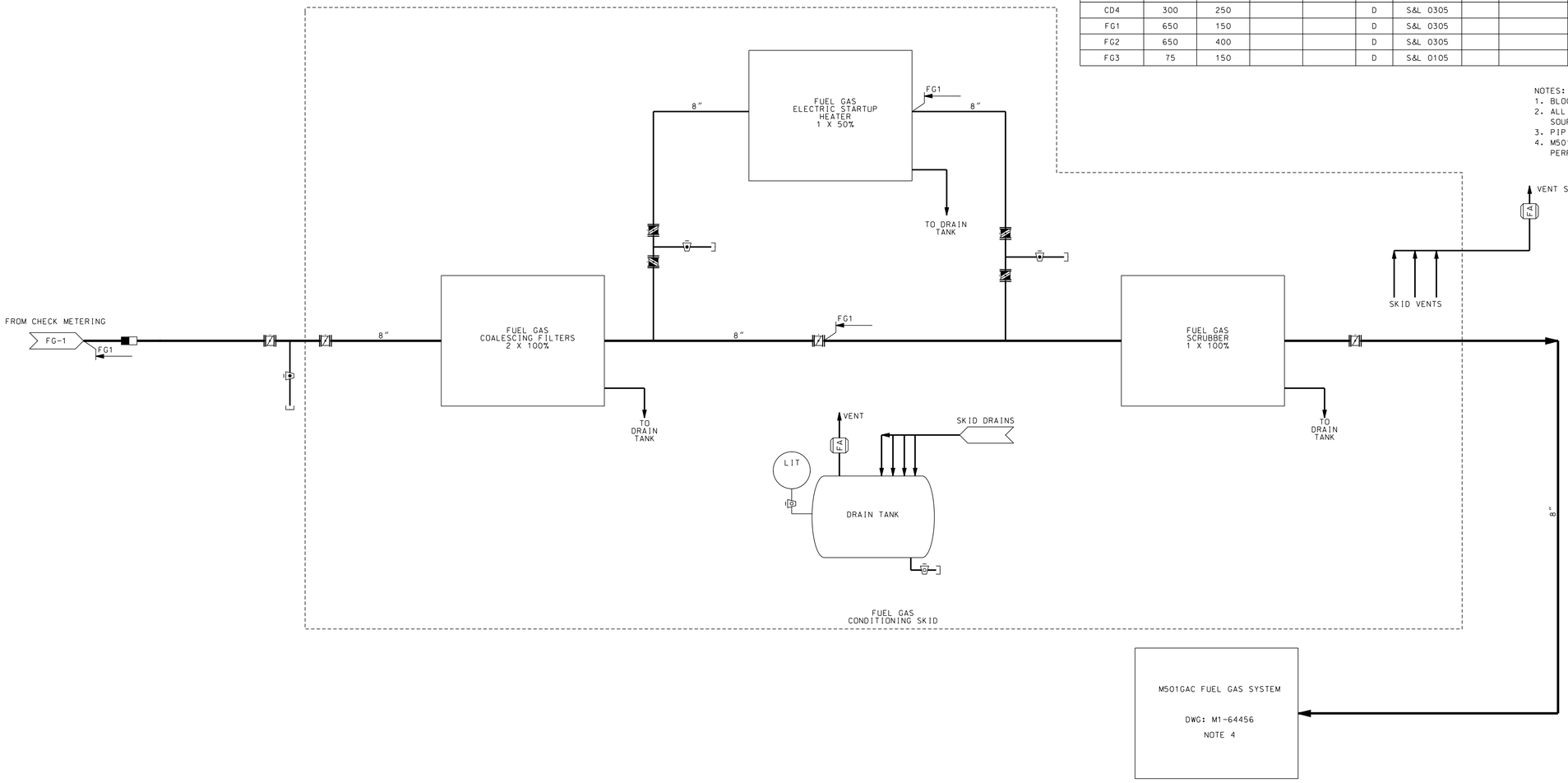
IGS0694

DRG. NO.

NOTE 3

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	MAX OPER. PRESSURE (PSIG)	MAX OPER. TEMP. (DEG. F)	PIPE CLASS	PDT	INSTR. PIPE CLASS	INSTR. PDT	INSUL-ATION TYPE	FIELD TEST PRESSURE (PSIG)	REMARKS
CD4	300	250			D	S&L 0305					CS
FG1	650	150			D	S&L 0305					CS
FG2	650	400			D	S&L 0305					CS
FG3	75	150			D	S&L 0105					CS

NOTES:
1. BLOCK 2 IS IDENTICAL TO BLOCK 1.
2. ALL VENTS ROUTED TO SAFE ELEVATIONS CLEAR OF ALL IGNITION SOURCES.
3. PIPING DESIGN CONDITIONS ARE PRELIMINARY.
4. M501GAC SCOPE OF SUPPLY INCLUDES FLOW METER, ESV, PERFORMANCE HEATER, AND INLET FILTER SKID.



REV	DATE RELEASED	PURPOSE		
C	07/22/2011	ISSUED FOR USE	M. WEILER	C. WOODS
B	07/08/2011	FOR ESTIMATING	M. WEILER	C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	M. WEILER	C. WOODS

DRAWING RELEASE RECORD — PREPARED / REVIEWED / APPROVED

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL OR THAT OF ITS SUBCONTRACTORS IS PERFORMING THE WORK.

PROFESSIONAL ENGINEER'S STAMP

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY — KENTUCKY

U1 REPOWERING OPTION 1 COST ESTIMATE STUDY FUEL GAS SYSTEM

DWG. NO. RPMSK-OPT1-FG-002

SCALE: 1"=100'-0"

DR:

CK:

APPROVED BY:

DATE:

AEP AMERICAN ELECTRIC POWER
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

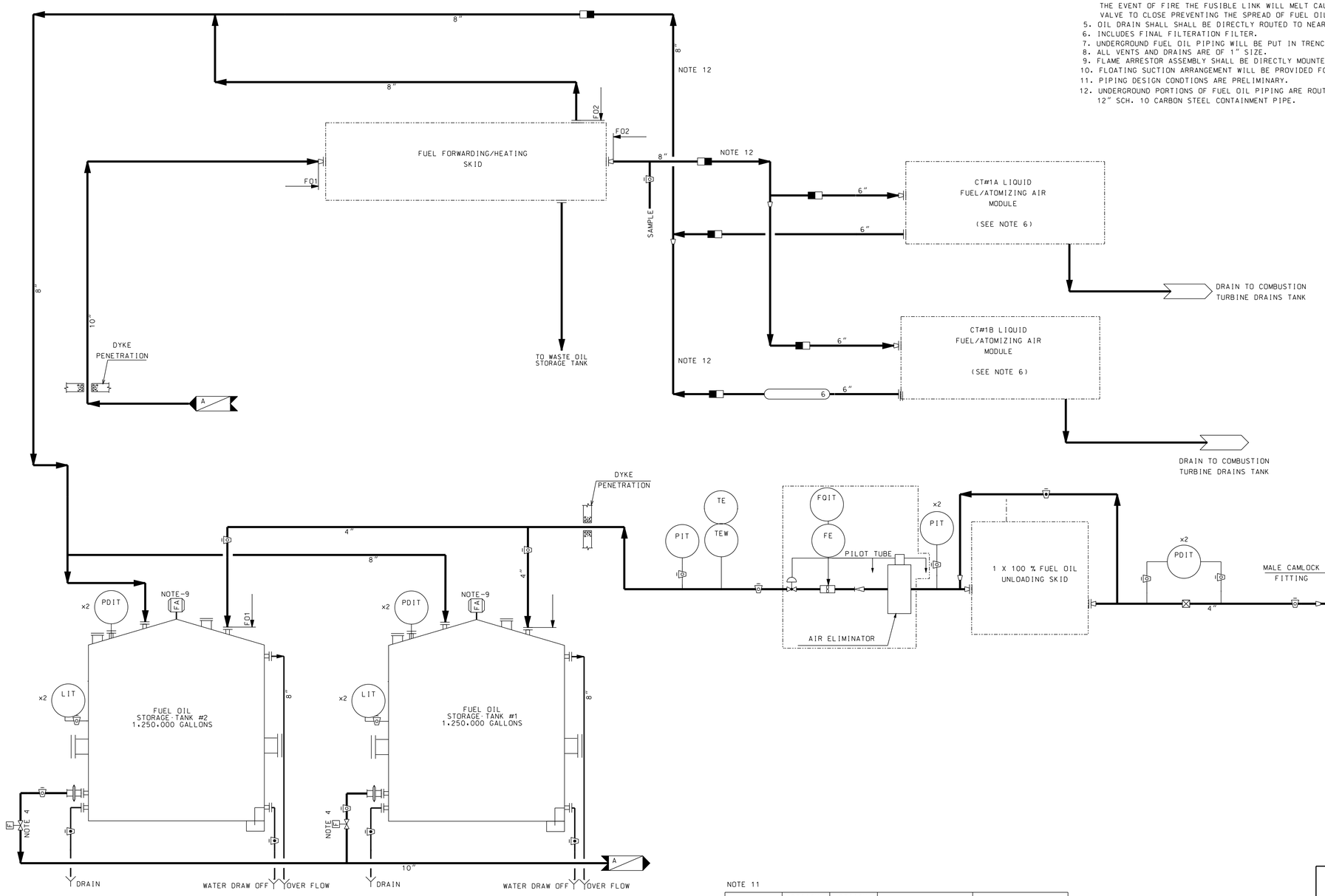
IGS0694

SYSTEM DATE- DD-MMM-YYYY
SYSTEM TIME- HOURMINUTE

DRG. NO.

NOTES :

1. HIGH POINTS SHALL BE PROVIDED WITH AIR VENTS WITH CAP.
2. LOW POINTS SHALL BE PROVIDED WITH DRAINS WITH CAP.
3. PIPELINES DOWNSTREAM AND ABOVEGROUND OF FUEL OIL MANAGEMENT SPOOL PIECE SHALL BE HEAT TRACED AND INSULATED.
4. THE SUPPLY LINE FROM FUEL OIL STORAGE TANKS IS EQUIPPED WITH A FIRE SAFETY SHUT-OFF VALVE WITH A FUSIBLE LINK. IN THE EVENT OF FIRE THE FUSIBLE LINK WILL MELT CAUSING THE VALVE TO CLOSE PREVENTING THE SPREAD OF FUEL OIL.
5. OIL DRAIN SHALL SHALL BE DIRECTLY ROUTED TO NEARBY OWS DRAIN.
6. INCLUDES FINAL FILTERATION FILTER.
7. UNDERGROUND FUEL OIL PIPING WILL BE PUT IN TRENCHES WITHIN A CARRIER PIPE.
8. ALL VENTS AND DRAINS ARE OF 1" SIZE.
9. FLAME ARRESTOR ASSEMBLY SHALL BE DIRECTLY MOUNTED ON THE TANK NOZZLE.
10. FLOATING SUCTION ARRANGEMENT WILL BE PROVIDED FOR FUEL OIL TANK.
11. PIPING DESIGN CONDTIONS ARE PRELIMINARY.
12. UNDERGROUND PORTIONS OF FUEL OIL PIPING ARE ROUTED IN A 12" SCH. 10 CARBON STEEL CONTAINMENT PIPE.



NOTE 11

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	PIPE MATERIAL	REMARKS
FO1	50	100	A106 GR. B	SCH. 40
FO2	960	120	A106 GR. B	SCH. 40

DATE	NO.	DESCRIPTION	APPD.
		REVISIONS	

REV	DATE RELEASED	PURPOSE	
C	07/22/2011	ISSUED FOR USE	M. WEILER / C. WOODS
B	07/08/2011	FOR ESTIMATING	M. WEILER / C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	M. WEILER / C. WOODS
			PREPARED
			REVIEWED
			APPROVED

DRAWING RELEASE RECORD

PROFESSIONAL ENGINEER'S STAMP

Sargent & Lundy

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/ INSTALLER'S PERSONNEL FOR THAT OF ITS SUBCONTRACTORS IS PERFORMING THE WORK.

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

U1 REPOWERING OPTION 1 COST ESTIMATE STUDY FUEL OIL SYSTEM

DWG. NO. RPMSK-OPT1-FO-001

SCALE: NOT TO SCALE

DR: M. WEILER

CH: C. WOODS

APPROVED BY:

DATE:

AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE- DD-MMM-YYYY
SYSTEM TIME- HOURMINUTE

IGS0694

DRG. NO.

NOTES:
1. THE SYSTEM FOR POWER BLOCK 1 IS SHOWN. POWER BLOCK 2 WILL HAVE IDENTICAL EQUIPMENT AND LAYOUTS.
2. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
3. PUMPS CONTROL AND INSTRUMENTATION TO INCLUDE:
   - PUMP VIBRATION MONITORING AND ALARM
   - THRUST BEARING TEMPERATURE AND ALARM
   - MOTOR BEARING AND WINDING TEMPERATURE AND ALARM
   - LUBE OIL PRESSURE AND TEMPERATURE
4. DRAIN TO CONDENSER SHALL BE LOCATED AS CLOSE TO THE BOILER FEED PUMP BRANCH AS POSSIBLE.

PEGGING STEAM FROM HRSG

INTEGRAL LP DRUM / DEAERATOR

VENT

LT ×3

FW3

FW1

CD1

ZSC

ZSO

IA

ZT

FY

10"

TEW

TE

SET @ --- PSIG

R

PIT ×2

LO

DRAIN

PDIT

FW2

FW3

FW1

(PUMP)

(MOTOR)

HP/IP BOILER FEED PUMP

NOTE 3

OILY WASTE DRAIN

2 x 100% BOILER FEEDWATER PUMPS WITH VFDS 1770 GPM 6705 FT. TDH

MO

MC

CD-3

CD2

IP BOILER FILL

1F

FW2 CD2

4"

FT

FE

PIT

TE

TEW

×2

TO IP ECONOMIZER MS BYPASS ATTEMPERATOR AND RH DESUPERHEATER

FW-2

HP BOILER FILL

FW3 CD2

TO HP ECONOMIZER AND HP DESUPERHEATER

12"

DRAIN TO CONDENSER NOTE 4

RCA MIN FLOW TO CONDENSER

FO

NOTE 2

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	PIPE MATERIAL	REMARKS
FW1	100	350	ASTM A106 GR. C CARBON STEEL	SCH. 40
FW2	650	350	ASTM A106 GR. C CARBON STEEL	SCH. 40
FW3	2750	350	ASTM A106 GR. C CARBON STEEL	SCH. 120
CD4	300	250	ASTM A106 GR. B CARBON STEEL	S&L 0305

REV	DATE RELEASED	PURPOSE	
D	07/25/2011	ISSUED FOR USE	M. WEILER / C. WOODS
C	07/22/2011	ISSUED FOR USE	M. WEILER / C. WOODS
B	07/08/2011	FOR ESTIMATING	M. WEILER / C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	M. WEILER / C. WOODS

DRAWING RELEASE RECORD — PREPARED / REVIEWED / APPROVED

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PERSONNEL LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/ INSTALLER'S PERSONNEL OR THAT OF ITS SUBCONTRACTORS PERFORMING THE WORK.

PROFESSIONAL ENGINEER'S STAMP

Sargent & Lundy

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

U1 REPOWERING OPTION 1 COST ESTIMATE STUDY FEED WATER SYSTEM

DWG. NO. RPMSK-OPT1-FW-001

SCALE: 1"=100'-0"

DRN

CHK

APPROVED BY

DATE:

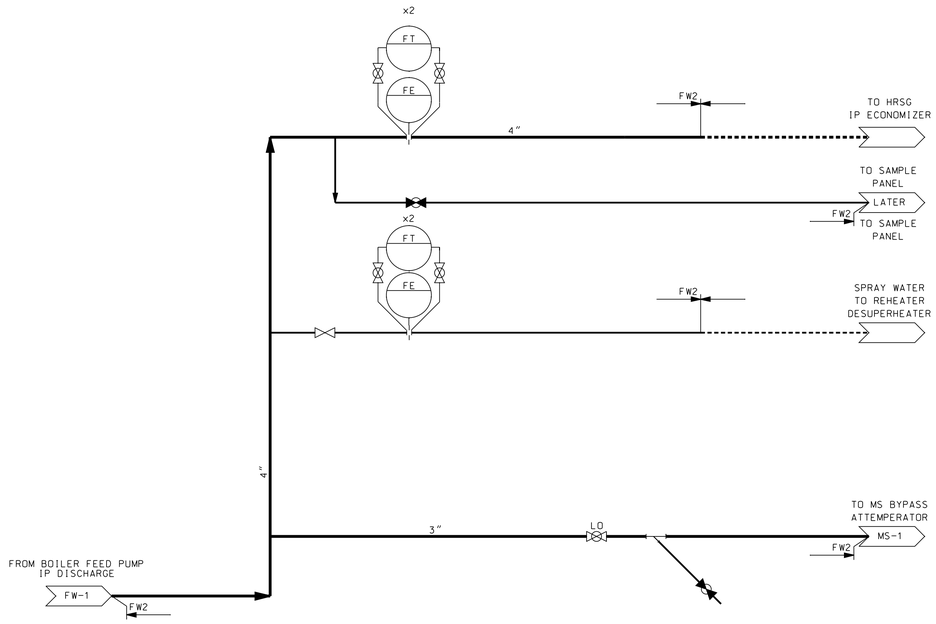
AEP AMERICAN ELECTRIC POWER
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

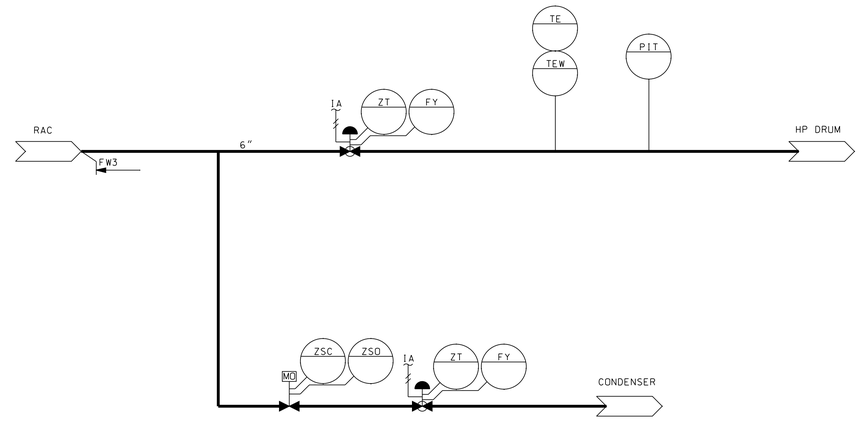
SYSTEM DATE- DD-MMM-YYYY
SYSTEM TIME- HOUR:MINUTE

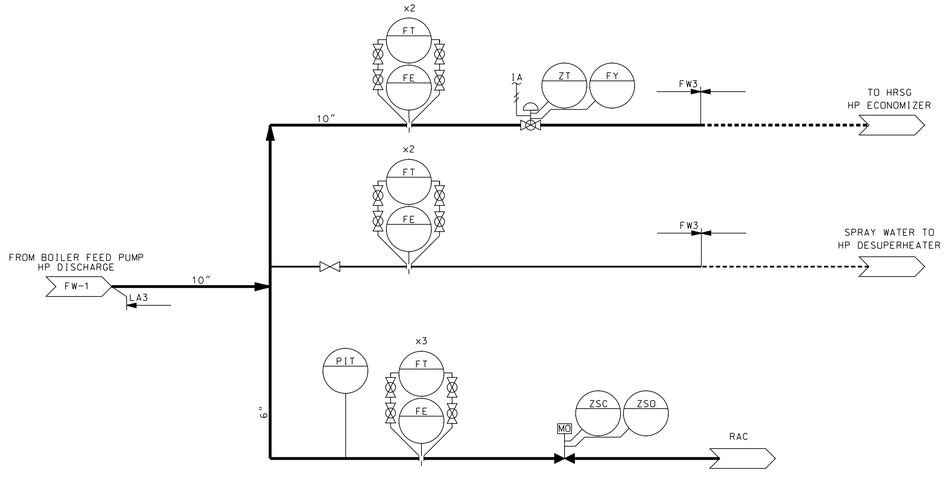
IGS0694

DWG. NO.

NOTES:
1. THE SYSTEM FOR POWER BLOCK 1 IS SHOWN. POWER BLOCK 2 WILL HAVE IDENTICAL EQUIPMENT AND LAYOUTS.
2. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
3. FEED WATER INLET VALVES TO ECONOMIZER ARE BY HRSG SUPPLIER.







NOTE 2

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	PIPE MATERIAL	REMARKS
FW2	650	350	ASTM A106 GR. C CARBON STEEL	SCH. 40
FW3	2750	350	ASTM A106 GR. C CARBON STEEL	SCH. 120

REV	DATE RELEASED	PURPOSE	
C	07/22/2011	ISSUED FOR USE	PREPARED: M. WEILER; REVIEWED: C. WOODS
B	07/08/2011	FOR ESTIMATING	PREPARED: M. WEILER; REVIEWED: C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	PREPARED: M. WEILER; REVIEWED: C. WOODS
			APPROVED

DRAWING RELEASE RECORD

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE INVOLVED IN THE WORK. THIS SHALL BE THE CONTRACTOR'S/ INSTALLER'S, PERSONNEL, AS WELL AS THAT OF ITS SUBCONTRACTOR'S PERFORMING THE WORK.

PROFESSIONAL ENGINEER'S STAMP

Stamp not Legible

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

U1 REPOWERING OPTION 1
COST ESTIMATE STUDY
FEED WATER SYSTEM

DWG. NO. RPMSK-OPT1-FW-002

SCALE: 1"=100'-0"

DR:

CH:

APPROVED BY:

DATE:

AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

IGS0694

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOUR:MINUTE

DWG. NO.

NOTE 1

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	PIPE MATERIAL	REMARKS
HR1	600	1070	9 CR - 1 MO-V ALLOY STEEL	
HR2	600	1070	9 CR - 1 MO-V ALLOY STEEL	
HR3	600	400	ASTM A335 P22	
HR4	600	400	ASTM A106 GR. B CARBON STEEL	
HR5	600	1070	9 CR - 1 MO-V ALLOY STEEL	
CD4	300	250	ASTM A106 GR. B CARBON STEEL	

NOTES:
1. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
2. VENTS AND DRAINS TO BE LOCATED AT ALL SYSTEM HIGH AND LOW POINTS PER THE PIPE ROUTING. TYPICAL VENT AND DRAIN CONFIGURATION IS SHOWN FOR REFERENCE.
3. PIPING SHALL BE SLOPED AT A MINIMUM OF 1/4 INCH PER FOOT.
4. ALL STEAM PIPING INCLUDING VENTS AND DRAINS SHALL BE INSULATED.
5. REQUIRED DISTANCE FROM DESUPERHEATER SPECIFIED BY MANUFACTURER.
6. STEAM PIPE IN THE PIPE RACK WILL BE ROUTED WITH A MINIMUM SLOPE TO ENSURE DRAINAGE.

REV	DATE RELEASED	PURPOSE	
C	07/22/2011	ISSUED FOR USE	M. WEILER / C. WOODS
B	07/08/2011	FOR ESTIMATING	M. WEILER / C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	M. WEILER / C. WOODS
			PREPARED
			REVIEWED
			APPROVED

DRAWING RELEASE RECORD

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/ INSTALLER'S PERSONNEL FOR THAT OF ITS SUBCONTRACTORS IS PERFORMING THE WORK.

Sargent & Lundy

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

U1 REPOWERING OPTION 1 COST ESTIMATE STUDY HOT REHEAT

DWG. NO. RPMSK-OPT1-HR-001

SCALE: 1"=00'-0"

DR:

CH:

APPROVED BY

DATE:

AEP AMERICAN ELECTRIC POWER

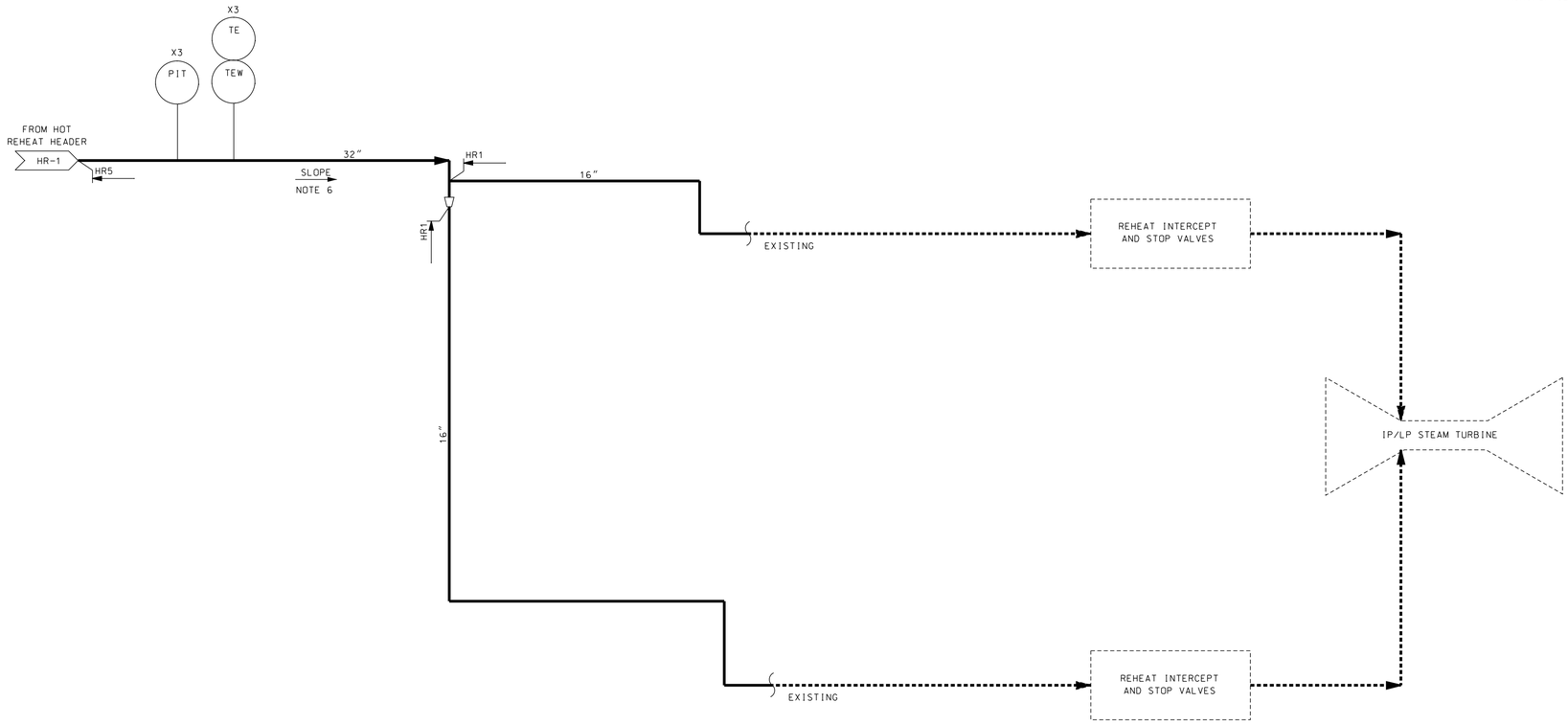
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE- DD-MMM-YYYY
SYSTEM TIME- HOURMINUTE

IGS0694

DWG. NO.

NOTES:
1. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
2. VENTS AND DRAINS TO BE LOCATED AT ALL SYSTEM HIGH AND LOW POINTS PER THE PIPE ROUTING. TYPICAL VENT AND DRAIN CONFIGURATION IS SHOWN FOR REFERENCE.
3. PIPING SHALL BE SLOPED AT A MINIMUM OF 1/4 INCH PER FOOT.
4. ALL STEAM PIPE INCLUDING VENTS AND DRAINS SHALL BE INSULATED.
5. DASHED PIPELINES, EQUIPMENT AND COMPONENTS ARE EXISTING. SEE DWG. NO. 1-5005-24 FOR DETAILS OF EXISTING SYSTEMS.
6. STEAM PIPE IN THE PIPE RACK WILL BE ROUTED WITH A MINIMUM SLOPE TO ENSURE DRAINAGE.



NOTE 1

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	PIPE MATERIAL	REMARKS
HR1	600	1070	9 CR - 1 MO-V ALLOY STEEL	
HR5	600	1070	9 CR - 1 MO-V ALLOY STEEL	

REV	DATE RELEASED	PURPOSE	
C	07/22/2011	ISSUED FOR USE	PREPARED: M. WEILER; REVIEWED: C. WOODS
B	07/08/2011	FOR ESTIMATING	PREPARED: M. WEILER; REVIEWED: C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	PREPARED: M. WEILER; REVIEWED: C. WOODS
			APPROVED

DRAWING RELEASE RECORD

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PERSONS LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/ INSTALLER'S PERSONNEL FOR THAT OF ITS SUBCONTRACTORS IS PERFORMING THE WORK

PROFESSIONAL ENGINEER'S STAMP

Stargent & Lundy...

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

U1 REPOWERING OPTION 1 COST ESTIMATE STUDY HOT REHEAT

DWG. NO. RPMSK-OPT1-HR-002

SCALE: 1"=00'-0"
DR:
CH:
APPROVED BY
DATE:

AEP AMERICAN ELECTRIC POWER
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

IGS0694

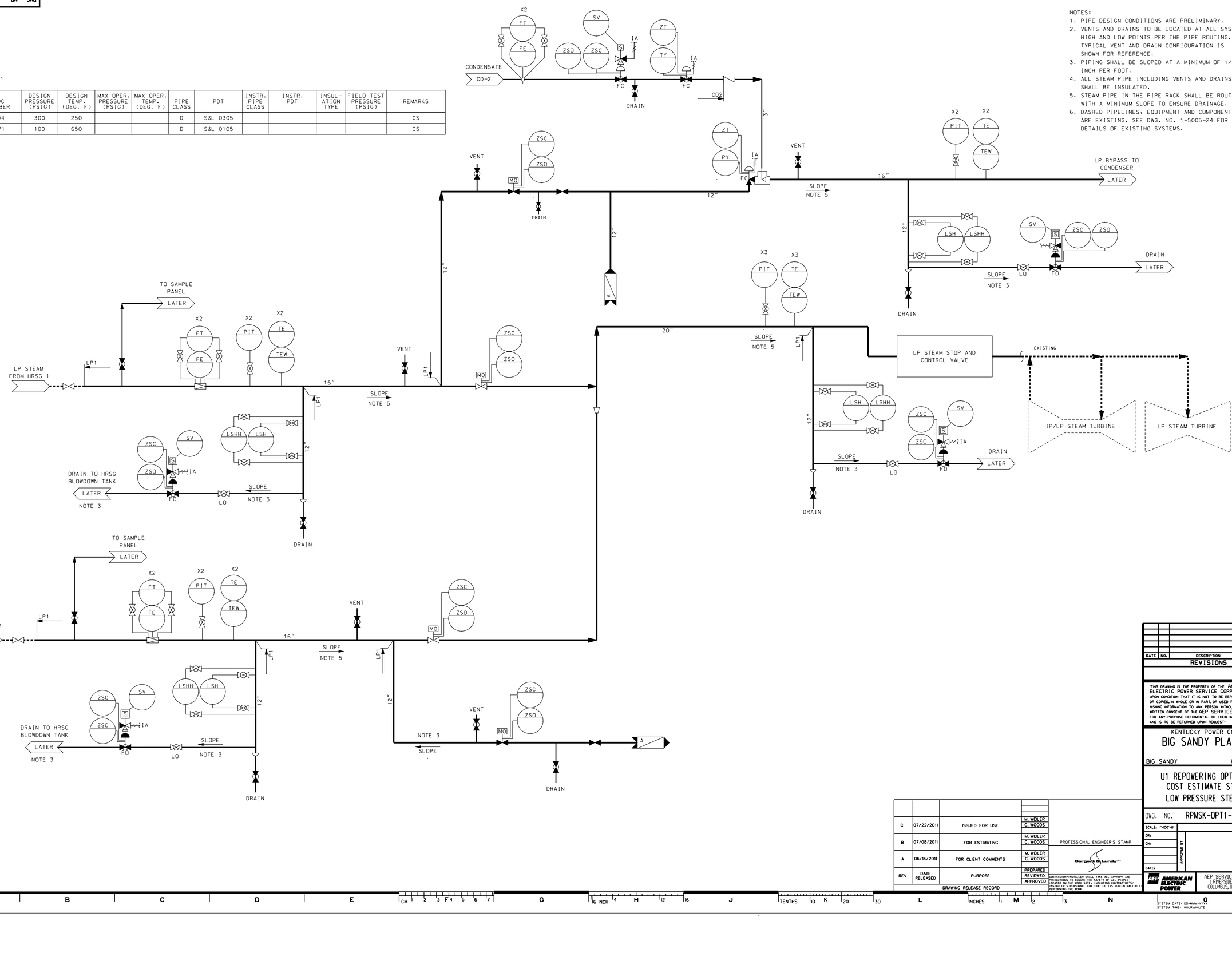
SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOUR:MINUTE

DWG. NO.

NOTE 1

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	MAX OPER. PRESSURE (PSIG)	MAX OPER. TEMP. (DEG. F)	PIPE CLASS	PDT	INSTR. PIPE CLASS	INSTR. PDT	INSUL-ATION TYPE	FIELD TEST PRESSURE (PSIG)	REMARKS
CD4	300	250			D	S&L 0305					CS
LP1	100	650			D	S&L 0105					CS

NOTES:
1. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
2. VENTS AND DRAINS TO BE LOCATED AT ALL SYSTEM HIGH AND LOW POINTS PER THE PIPE ROUTING. TYPICAL VENT AND DRAIN CONFIGURATION IS SHOWN FOR REFERENCE.
3. PIPING SHALL BE SLOPED AT A MINIMUM OF 1/4 INCH PER FOOT.
4. ALL STEAM PIPE INCLUDING VENTS AND DRAINS SHALL BE INSULATED.
5. STEAM PIPE IN THE PIPE RACK SHALL BE ROUTED WITH A MINIMUM SLOPE TO ENSURE DRAINAGE.
6. DASHED PIPELINES, EQUIPMENT AND COMPONENTS ARE EXISTING. SEE DWG. NO. 1-5005-24 FOR DETAILS OF EXISTING SYSTEMS.



REV	DATE RELEASED	PURPOSE	
			PREPARED
			REVIEWED
			APPROVED
C	07/22/2011	ISSUED FOR USE	M. WEILER / C. WOODS
B	07/08/2011	FOR ESTIMATING	M. WEILER / C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	M. WEILER / C. WOODS

DRAWING RELEASE RECORD

PROFESSIONAL ENGINEER'S STAMP

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/ INSTALLER'S EMPLOYEES, FOR THAT OF ITS SUBCONTRACTORS IS PERFORMING THE WORK.

DATE	NO.	DESCRIPTION	APPD.
		REVISIONS	

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY — KENTUCKY

U1 REPOWERING OPTION 1 COST ESTIMATE STUDY LOW PRESSURE STEAM

DWG. NO. RPMSK-OPT1-LP-001

SCALE: 1"=00'-0"

DR:

CH:

APPROVED BY

DATE:

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE- DD-MMM-YYYY
SYSTEM TIME- HH:MM:NN:TT

IGS0694

NOTE 1

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	PIPE MATERIAL	REMARKS
MS1	2000	1070	9 CR - 1 MO-V ALLOY STEEL	SCH. 160
MS2	650	1070	9 CR - 1 MO-V ALLOY STEEL	SCH. 60
CR1	650	785	ASTM A335 GR. P11	SCH. 40
FW2	650	340	ASTM A106 GR. C CARBON STEEL	SCH. 40

NOTES:
1. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
2. VENTS AND DRAINS TO BE LOCATED AT ALL SYSTEM HIGH AND LOW POINTS PER THE PIPE ROUTING. TYPICAL VENT AND DRAIN CONFIGURATION IS SHOWN FOR REFERENCE.
3. PIPING SHALL BE SLOPED AT A MINIMUM OF 1/4 INCH PER FOOT.
4. ALL STEAM PIPE INCLUDING VENTS AND DRAINS SHALL BE INSULATED.
5. STEAM PIPE IN THE PIPE RACK SHALL BE ROUTED WITH A MINIMUM SLOPE TO ENSURE DRAINAGE.

IP FEEDWATER FW-2
HP STEAM FROM HRSG 1
HP STEAM FROM HRSG 2
TO SAMPLE PANEL
DRAIN TO HRSG BLOWDOWN TANK LATER
MS BYPASS TO HRSG 1 COLD REHEAT CR-1
MS BYPASS TO HRSG 2 COLD REHEAT CR-1
MS TO STEAM TURBINE MS-2
DRAIN LATER
DRAIN

REV	DATE RELEASED	PURPOSE	
C	07/22/2011	ISSUED FOR USE	M. WEILER / C. WOODS
B	07/08/2011	FOR ESTIMATING	M. WEILER / C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	M. WEILER / C. WOODS

DRAWING RELEASE RECORD

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/ INSTALLER'S PERSONNEL FOR THAT OF ITS SUBCONTRACTORS PERFORMING THE WORK.

Sargent & Lundy

DATE	NO.	DESCRIPTION	APPD.
		REVISIONS	

"THIS DRAWING IS THE PROPERTY OF THE AMERICAN ELECTRIC POWER SERVICE CORP., AND IS LOANED UPON CONDITION THAT IT IS NOT TO BE REPRODUCED OR COPIED, IN WHOLE OR IN PART, OR USED FOR FURNISHING INFORMATION TO ANY PERSON WITHOUT THE WRITTEN CONSENT OF THE AEP SERVICE CORP., OR FOR ANY PURPOSE DETRIMENTAL TO THEIR INTEREST, AND IS TO BE RETURNED UPON REQUEST"

KENTUCKY POWER CO.
BIG SANDY PLANT
BIG SANDY KENTUCKY

U1 REPOWERING OPTION 1 COST ESTIMATE STUDY MAIN STEAM

DWG. NO. RPMSK-OPT1-MS-001

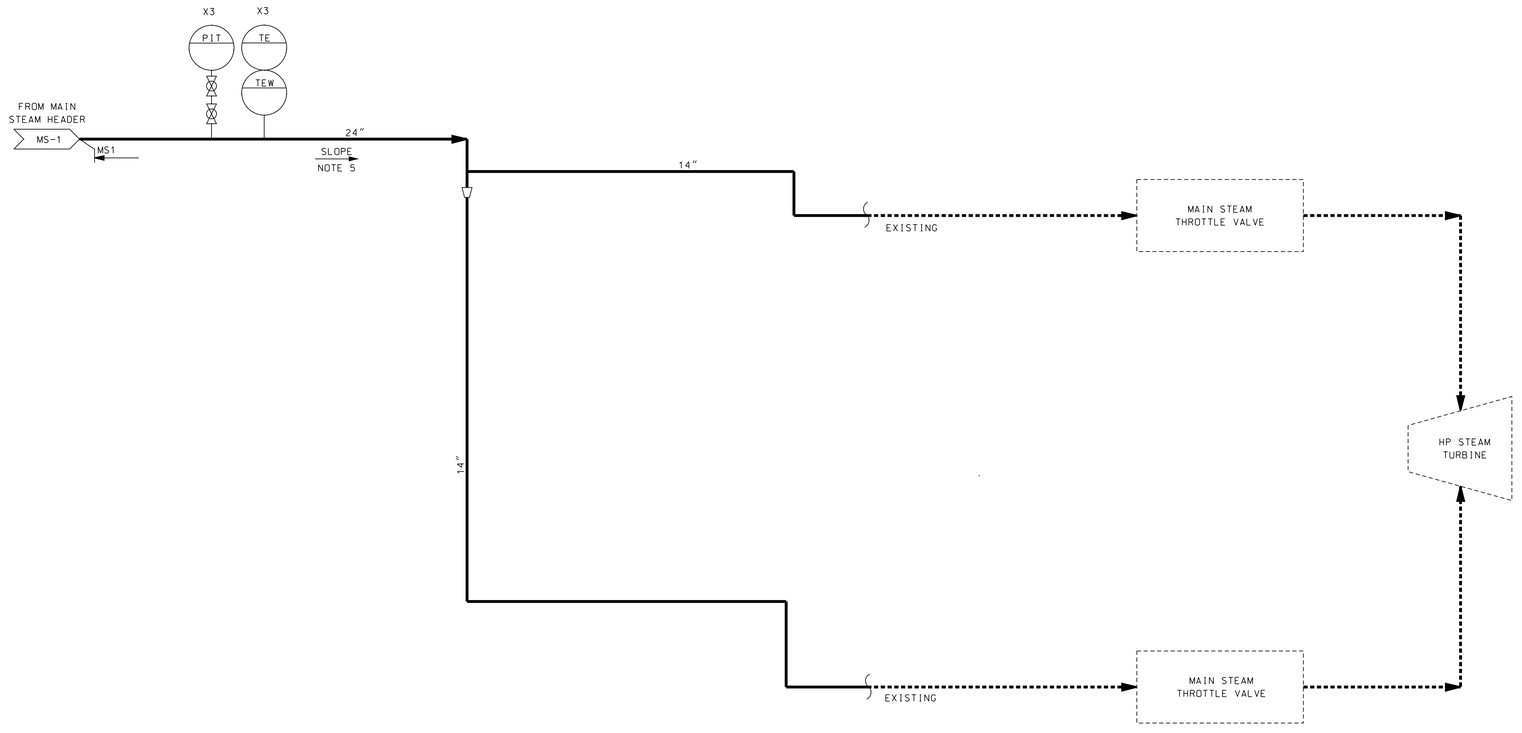
SCALE: 1"=100'-0"
DR:
CH:
APPROVED BY:
DATE:

AEP AMERICAN ELECTRIC POWER
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOUR:MINUTE

IGS0694

DWG. NO.



NOTES:
1. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
2. VENTS AND DRAINS TO BE LOCATED AT ALL SYSTEM HIGH AND LOW POINTS PER THE PIPE ROUTING. TYPICAL VENT AND DRAIN CONFIGURATION IS SHOWN FOR REFERENCE.
3. PIPING SHALL BE SLOPED AT A MINIMUM OF 1/4 INCH PER FOOT.
4. ALL STEAM PIPE INCLUDING VENTS AND DRAINS SHALL BE INSULATED.
5. STEAM PIPE IN THE PIPE RACK SHALL BE ROUTED WITH A MINIMUM SLOPE TO ENSURE DRAINAGE.
6. DASHED PIPELINES, EQUIPMENT AND COMPONENTS ARE EXISTING. SEE DWG. NO. 1-5005-24 FOR DETAILS OF EXISTING SYSTEMS.

NOTE 1

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	PIPE MATERIAL	REMARKS
MS1	2000	1070	9 CR - 1 MO-V ALLOY STEEL	SCH. 160
MS2	650	1070	9 CR - 1 MO-V ALLOY STEEL	SCH. 60

REV	DATE RELEASED	PURPOSE	
C	07/22/2011	ISSUED FOR USE	M. WEILER / C. WOODS
B	07/08/2011	FOR ESTIMATING	M. WEILER / C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	M. WEILER / C. WOODS
			PREPARED
		DRAWING RELEASE RECORD	REVIEWED
			APPROVED

PROFESSIONAL ENGINEER'S STAMP

Sargent & Lundy

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PERSONS LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/ INSTALLER'S PERSONNEL FOR THAT OF ITS SUBCONTRACTORS IS PERFORMING THE WORK

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

U1 REPOWERING OPTION 1 COST ESTIMATE STUDY MAIN STEAM

DWG. NO. RPMSK-OPT1-MS-002

SCALE: 1"=100'-0"

DR:

CH:

APPROVED BY

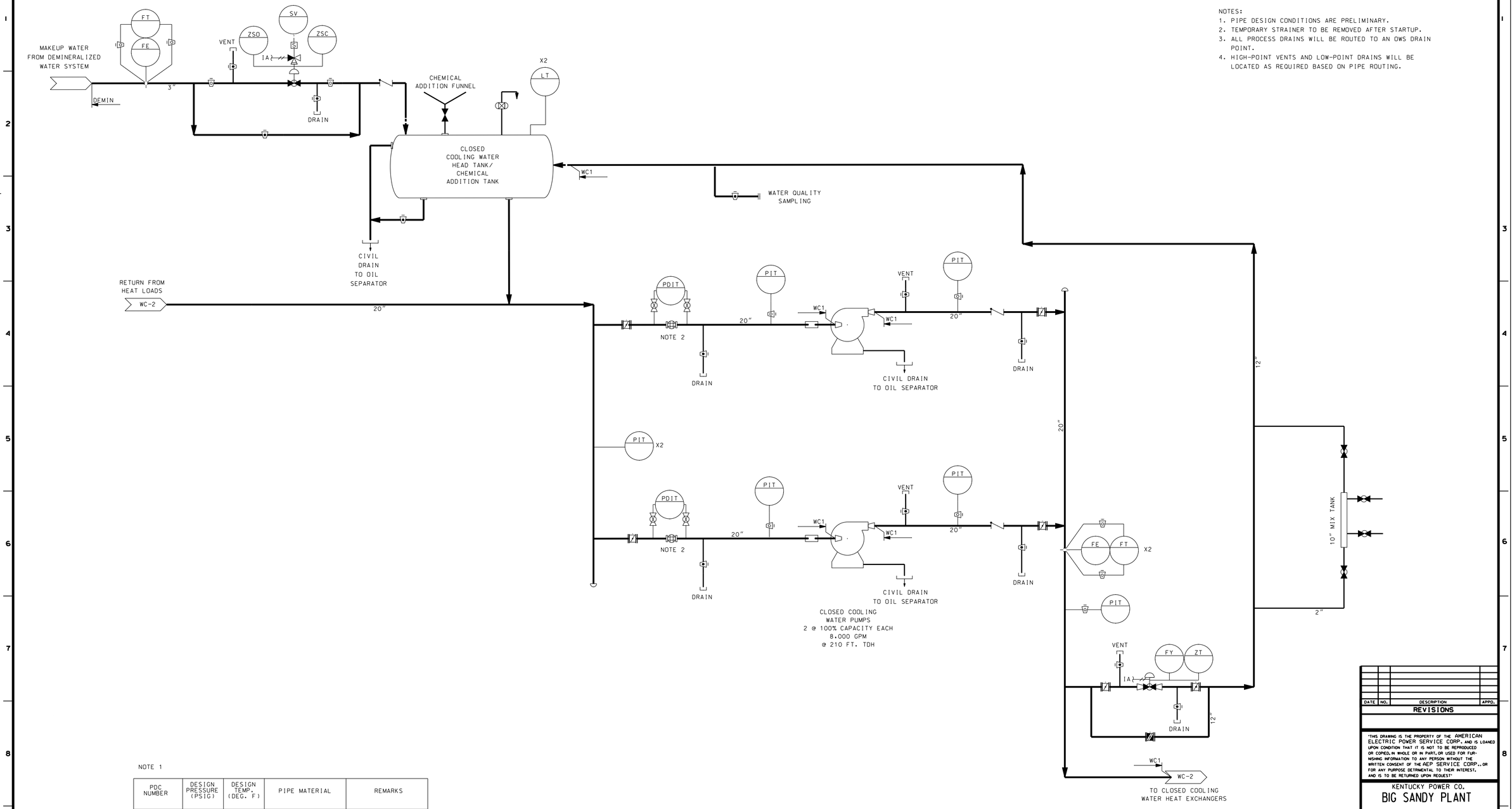
DATE:

AEP AMERICAN ELECTRIC POWER
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE- DD-MMM-YYYY
SYSTEM TIME- HOURMINUTE

IGS0694

DWG. NO.



NOTES:
1. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
2. TEMPORARY STRAINER TO BE REMOVED AFTER STARTUP.
3. ALL PROCESS DRAINS WILL BE ROUTED TO AN OWS DRAIN POINT.
4. HIGH-POINT VENTS AND LOW-POINT DRAINS WILL BE LOCATED AS REQUIRED BASED ON PIPE ROUTING.

NOTE 1

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	PIPE MATERIAL	REMARKS
DEMIN	80	100	ASTM A312 304 STAINLESS STEEL	PDT S&L-0145
WC1	130	135	ASTM A106 GR. B CARBON STEEL	PDT S&L-0105

REV	DATE RELEASED	PURPOSE	
C	07/22/2011	ISSUED FOR USE	PREPARED: M. WEILER; REVIEWED: C. WOODS
B	07/08/2011	FOR ESTIMATING	PREPARED: M. WEILER; REVIEWED: C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	PREPARED: M. WEILER; REVIEWED: C. WOODS
			APPROVED

DRAWING RELEASE RECORD

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE ASSOCIATED WITH THE WORK. THIS INCLUDES CONTRACTOR'S/ INSTALLER'S PERSONNEL, AS WELL AS THAT OF ITS SUBCONTRACTORS PERFORMING THE WORK.

PROFESSIONAL ENGINEER'S STAMP

Stamp not to Scale

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

U1 REPOWERING OPTION 1 COST ESTIMATE STUDY CLOSED COOLING WATER

DWG. NO. RPMSK-OPT1-WC-001

SCALE: 1"=100'-0"

DR:

CH:

APPROVED BY:

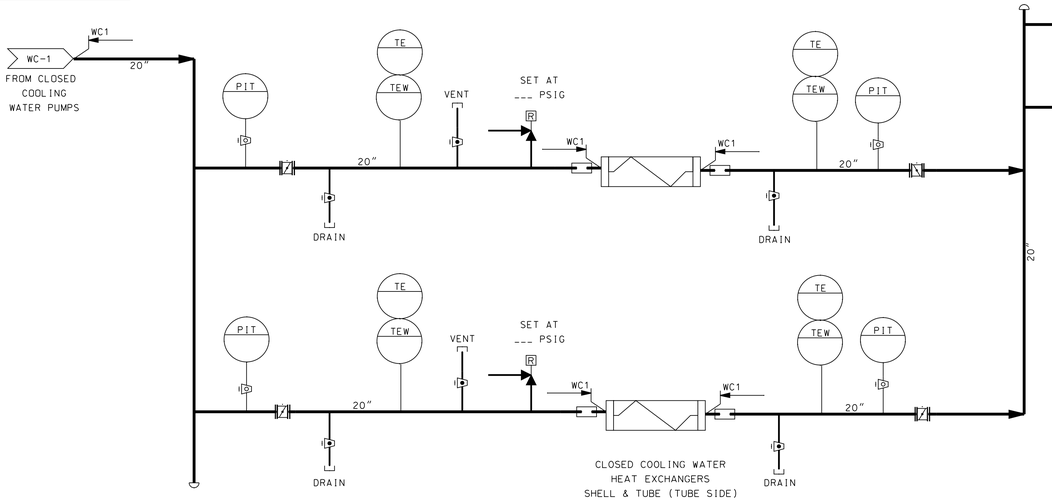
DATE:

AEP AMERICAN ELECTRIC POWER
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

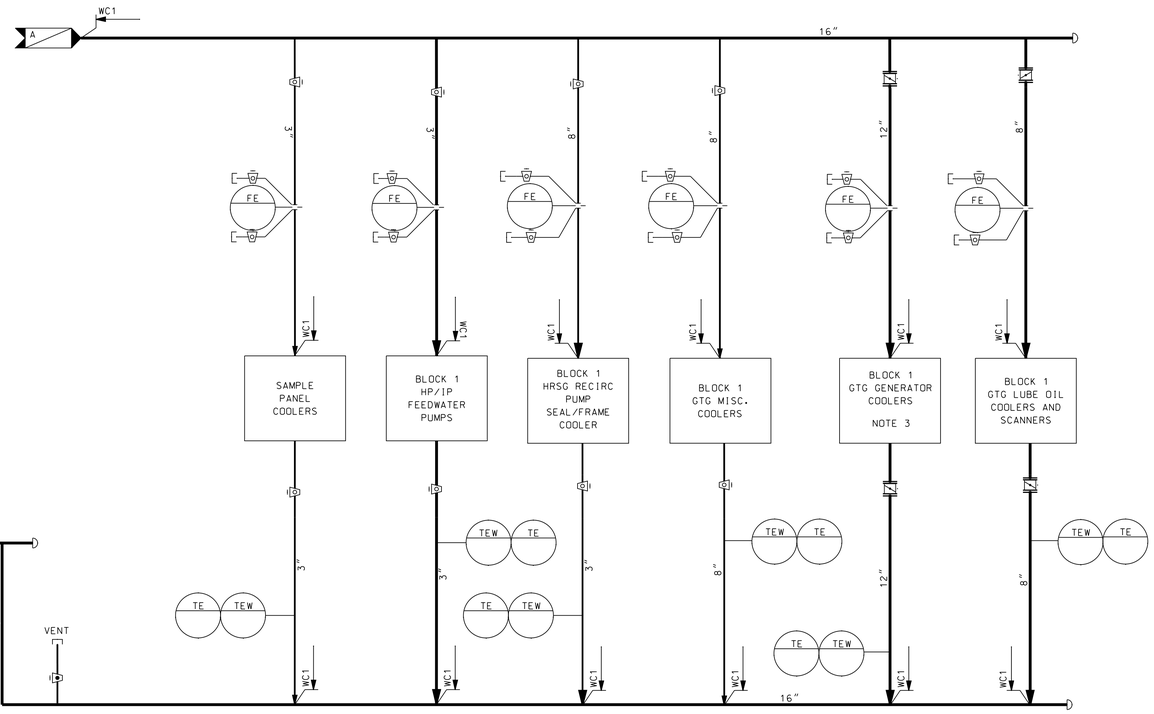
SYSTEM DATE- DD-MMM-YYYY
SYSTEM TIME- HOURMINUTE

IGS0694

DWG. NO.



NOTES:
1. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
2. ALL PROCESS DRAINS WILL BE ROUTED TO AN OWS DRAIN POINT.
3. HIGH-POINT VENTS AND LOW-POINT DRAINS WILL BE LOCATED AS REQUIRED BASED ON PIPE ROUTING.



NOTE 1

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	PIPE MATERIAL	REMARKS
WC1	130	135	ASTM A106 GR. B CARBON STEEL	PDT S&L-0105

REV	DATE RELEASED	PURPOSE	
C	07/22/2011	ISSUED FOR USE	M. WEILER / C. WOODS
B	07/08/2011	FOR ESTIMATING	M. WEILER / C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	M. WEILER / C. WOODS
			PREPARED
			REVIEWED
			APPROVED

DRAWING RELEASE RECORD

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/ INSTALLER'S PERSONNEL OR THAT OF ITS SUBCONTRACTORS PERFORMING THE WORK.

PROFESSIONAL ENGINEER'S STAMP

Sargent & Lundy

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

U1 REPOWERING OPTION 1 COST ESTIMATE STUDY CLOSED COOLING WATER

DWG. NO. RPMSK-OPT1-WC-002

SCALE: 1"=00'-0"

DR:

CH:

APPROVED BY

DATE:

AEP AMERICAN ELECTRIC POWER

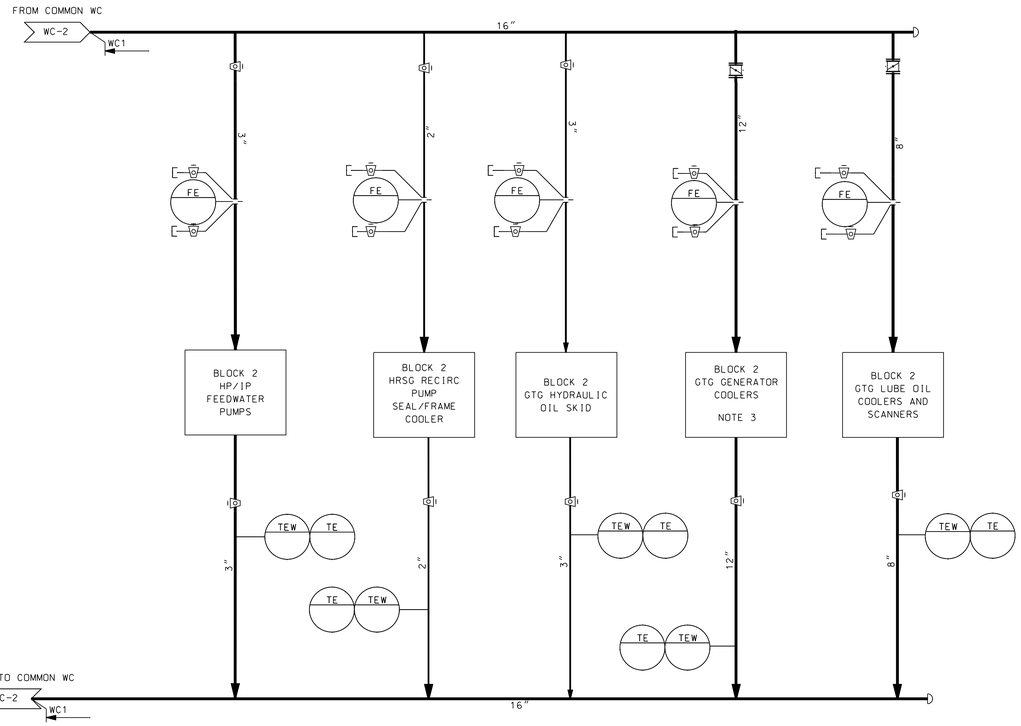
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

IGS0694

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOUR:MINUTE

DWG. NO.

NOTES:
1. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
2. ALL PROCESS DRAINS WILL BE ROUTED TO AN OWS DRAIN POINT.
3. HIGH-POINT VENTS AND LOW-POINT DRAINS WILL BE LOCATED AS REQUIRED BASED ON PIPE ROUTING.



NOTE 1

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	PIPE MATERIAL	REMARKS
WC1	130	135	ASTM A106 GR. B CARBON STEEL	PDT S&L-0105

REV	DATE RELEASED	PURPOSE	
C	07/22/2011	ISSUED FOR USE	M. WEILER / C. WOODS
B	07/08/2011	FOR ESTIMATING	M. WEILER / C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	M. WEILER / C. WOODS

DRAWING RELEASE RECORD

PREPARED
REVIEWED
APPROVED

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/ SUBCONTRACTOR'S PERSONNEL FOR THAT OF ITS SUBCONTRACTOR'S PERFORMING THE WORK.

PROFESSIONAL ENGINEER'S STAMP

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

U1 REPOWERING OPTION 1 COST ESTIMATE STUDY CLOSED COOLING WATER

DWG. NO. RPMSK-OPT1-WC-003

SCALE: 1"=100'-0"
DR:
CH:
APPROVED BY
DATE:

AEP AMERICAN ELECTRIC POWER

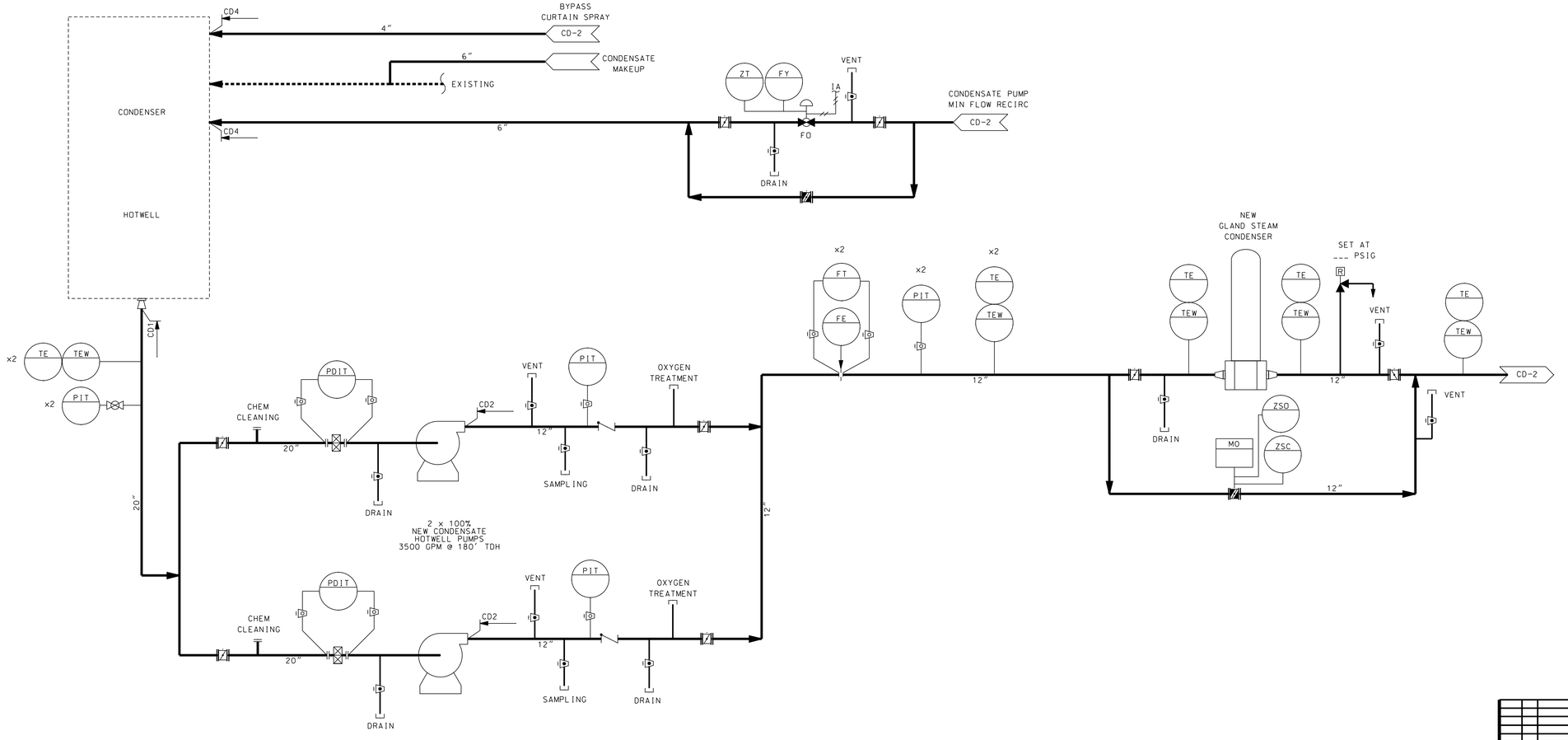
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOUR:MINUTE

IGS0694

DWG. NO.

NOTES:
1. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
2. ALL PROCESS DRAINS WILL BE ROUTED TO AN OWS DRAIN POINT.
3. HIGH-POINT VENTS AND LOW-POINT DRAINS WILL BE LOCATED AS REQUIRED BASED ON PIPE ROUTING.
4. DASHED PIPELINES, EQUIPMENT AND COMPONENTS ARE EXISTING. SEE DWG. NO. 1-5007-17 FOR DETAILS OF EXISTING SYSTEMS.



NOTE 1

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	MAX OPER. PRESSURE (PSIG)	MAX OPER. TEMP. (DEG. F)	PIPE CLASS	PDT	INSTR. PIPE CLASS	INSTR. PDT	INSUL-ATION TYPE	FIELD TEST PRESSURE (PSIG)	REMARKS
CD1	25	150			D	S&L 0105					CS
CD2	100	150			D	S&L 0105					CS
CD3	300	150			D	S&L 0305					CS
CD4	300	250			D	S&L 0305					CS

REV	DATE RELEASED	PURPOSE	
C	07/22/2011	ISSUED FOR USE	M. WEILER / C. WOODS
B	07/12/2011	FOR ESTIMATING	M. WEILER / C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	M. WEILER / C. WOODS

DRAWING RELEASE RECORD

PREPARED / REVIEWED / APPROVED

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/ INSTALLER'S PERSONNEL (OR THAT OF ITS SUBCONTRACTORS) PERFORMING THE WORK.

PROFESSIONAL ENGINEER'S STAMP

Stamp is illegible

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

U1 REPOWERING OPTION 2 COST ESTIMATE STUDY CONDENSATE SYSTEM

DWG. NO. RPMSK-OPT2-CD-001

SCALE: 1"=100'-0"

DR:

CH:

APPROVED BY

DATE:

AEP AMERICAN ELECTRIC POWER
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE- DD-MMM-YYYY
SYSTEM TIME- HOUR:MINUTE

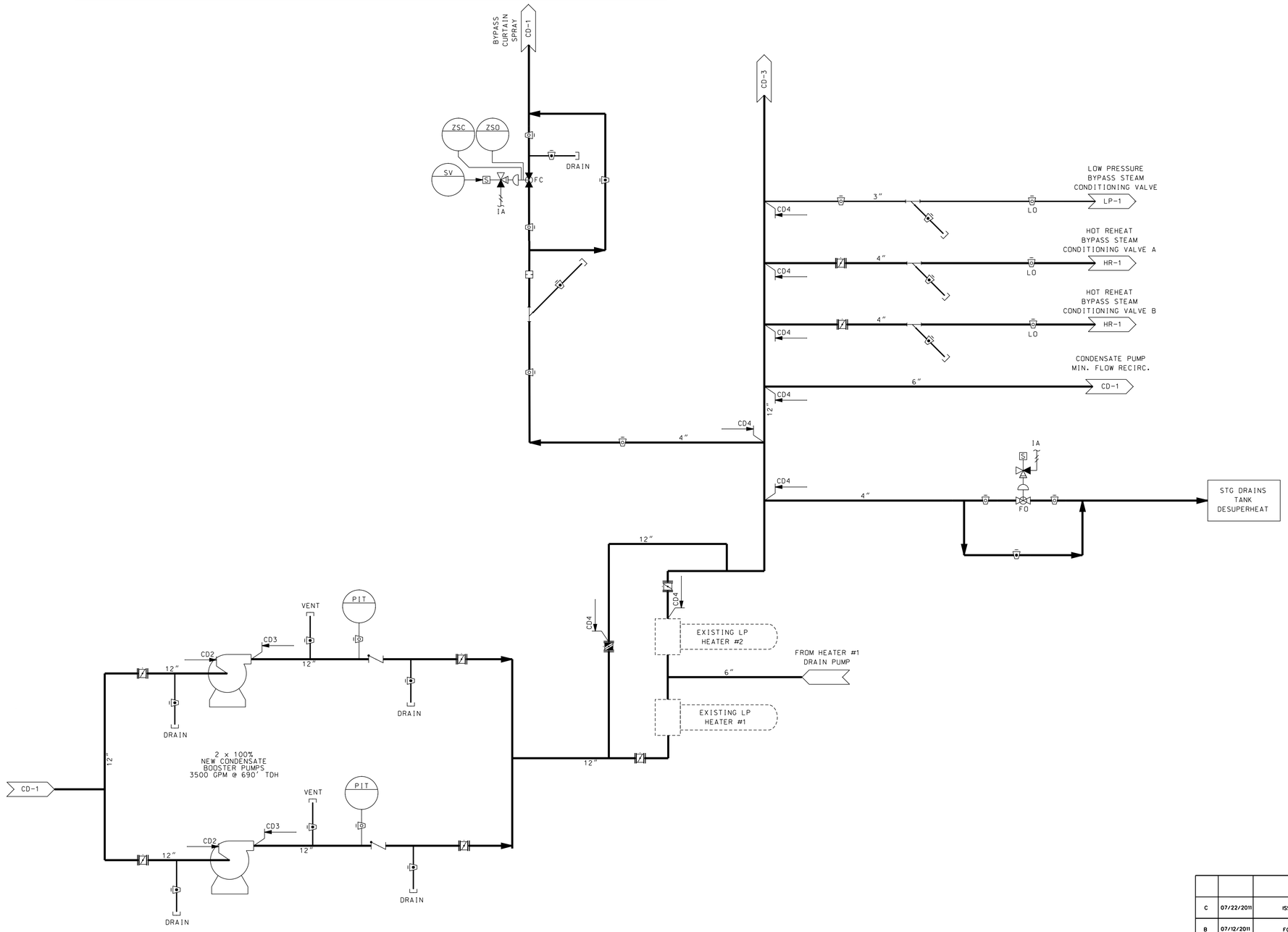
IGS0694

DWG. NO.

NOTE1

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	MAX OPER. PRESSURE (PSIG)	MAX OPER. TEMP. (DEG. F)	PIPE CLASS	PDT	INSTR. PIPE CLASS	INSTR. PDT	INSUL-ATION TYPE	FIELD TEST PRESSURE (PSIG)	REMARKS
CD1	25	150			D	S&L 0105					CS
CD2	100	150			D	S&L 0105					CS
CD3	300	150			D	S&L 0305					CS
CD4	300	250			D	S&L 0305					CS

NOTES:
1. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
2. ALL PROCESS DRAINS WILL BE ROUTED TO AN OWS DRAIN POINT.
3. HIGH-POINT VENTS AND LOW-POINT DRAINS WILL BE LOCATED AS REQUIRED BASED ON PIPE ROUTING.



REV	DATE RELEASED	PURPOSE	
C	07/22/2011	ISSUED FOR USE	M. WEILER / C. WOODS
B	07/12/2011	FOR ESTIMATING	M. WEILER / C. WOODS
A	6/14/2011	FOR CLIENT COMMENTS	M. WEILER / C. WOODS
			PREPARED
		DRAWING RELEASE RECORD	REVIEWED
			APPROVED

PROFESSIONAL ENGINEER'S STAMP

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL FACTORY & INSTALLER'S PERSONNEL FOR THAT OF ITS SUBCONTRACTORS IS PERFORMING THE WORK

DATE	NO.	DESCRIPTION	APPD.
		REVISIONS	

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

U1 REPOWERING OPTION 2 COST ESTIMATE STUDY CONDENSATE SYSTEM

DWG. NO. RPMSK-OPT2-CD-002

SCALE: 1"=100'-0"

DR:

CH:

APPROVED BY:

DATE:

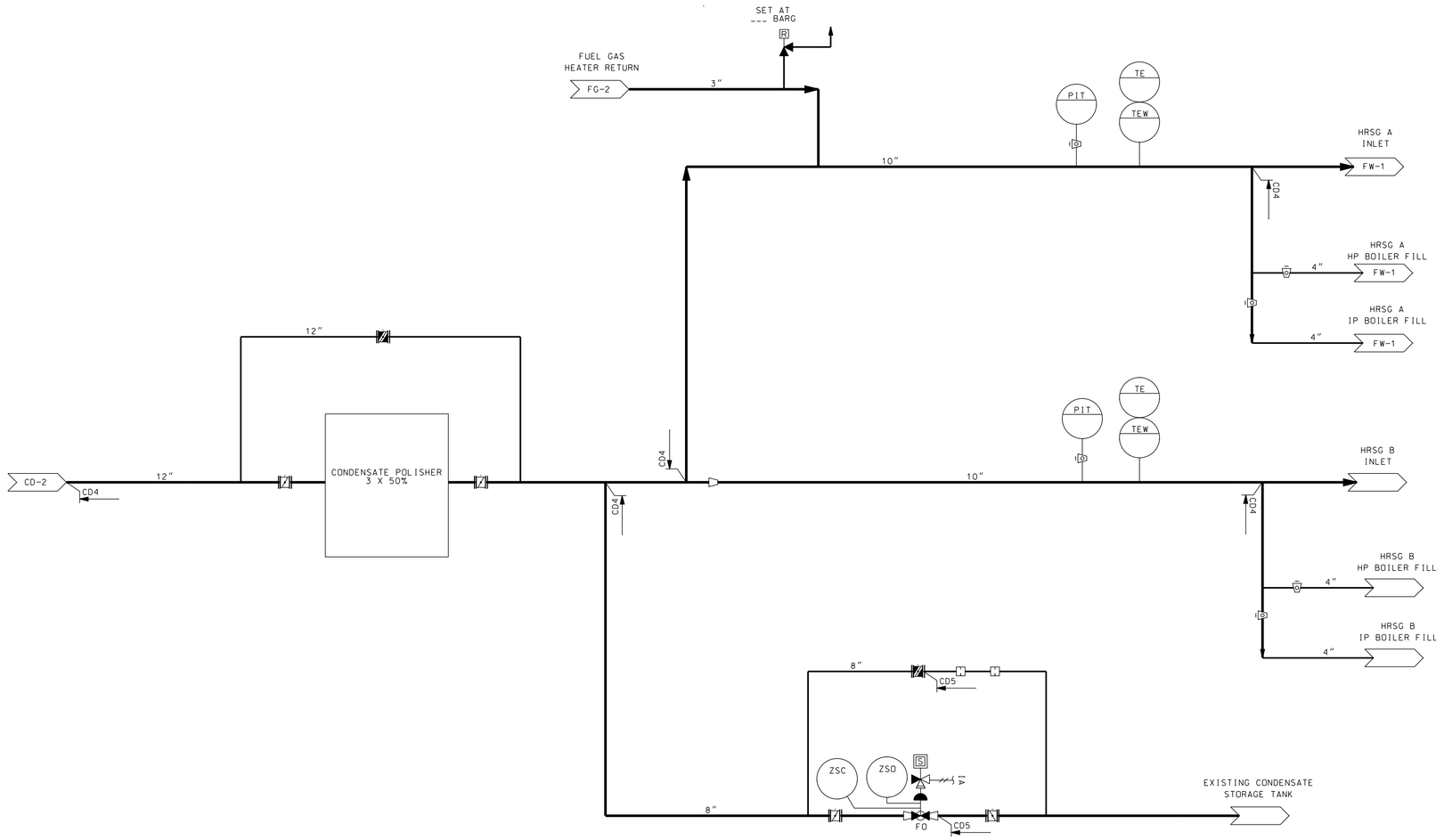
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE- DD-MMM-YYYY
SYSTEM TIME- HOURMINUTE

IGS0694

DRG. NO.

NOTES:
1. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
2. ALL PROCESS DRAINS WILL BE ROUTED TO AN OWS DRAIN POINT.
3. HIGH-POINT VENTS AND LOW-POINT DRAINS WILL BE LOCATED AS REQUIRED BASED ON PIPE ROUTING.



NOTE 1

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	MAX OPER. PRESSURE (PSIG)	MAX OPER. TEMP. (DEG. F)	PIPE CLASS	PDT	INSTR. PIPE CLASS	INSTR. PDT	INSUL-ATION TYPE	FIELD TEST PRESSURE (PSIG)	REMARKS
CD1	25	150			D	S&L 0105					CS
CD2	100	150			D	S&L 0105					CS
CD3	300	150			D	S&L 0305					CS
CD4	300	250			D	S&L 0305					CS
CD5	50	250			D	S&L 0105					CS

REV	DATE RELEASED	PURPOSE	
C	07/22/2011	ISSUED FOR USE	M. WEILER / C. WOODS
B	07/12/2011	FOR ESTIMATING	M. WEILER / C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	M. WEILER / C. WOODS

DRAWING RELEASE RECORD — PREPARED / REVIEWED / APPROVED

PROFESSIONAL ENGINEER'S STAMP

Stephen M. Landy

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUBCONTRACTORS) PERFORMING THE WORK.

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY — KENTUCKY

U1 REPOWERING OPTION 2
COST ESTIMATE STUDY
CONDENSATE SYSTEM

DWG. NO. RPMSK-OPT2-CD-003

SCALE: 1"=100'-0"

DR:

CH:

APPROVED BY:

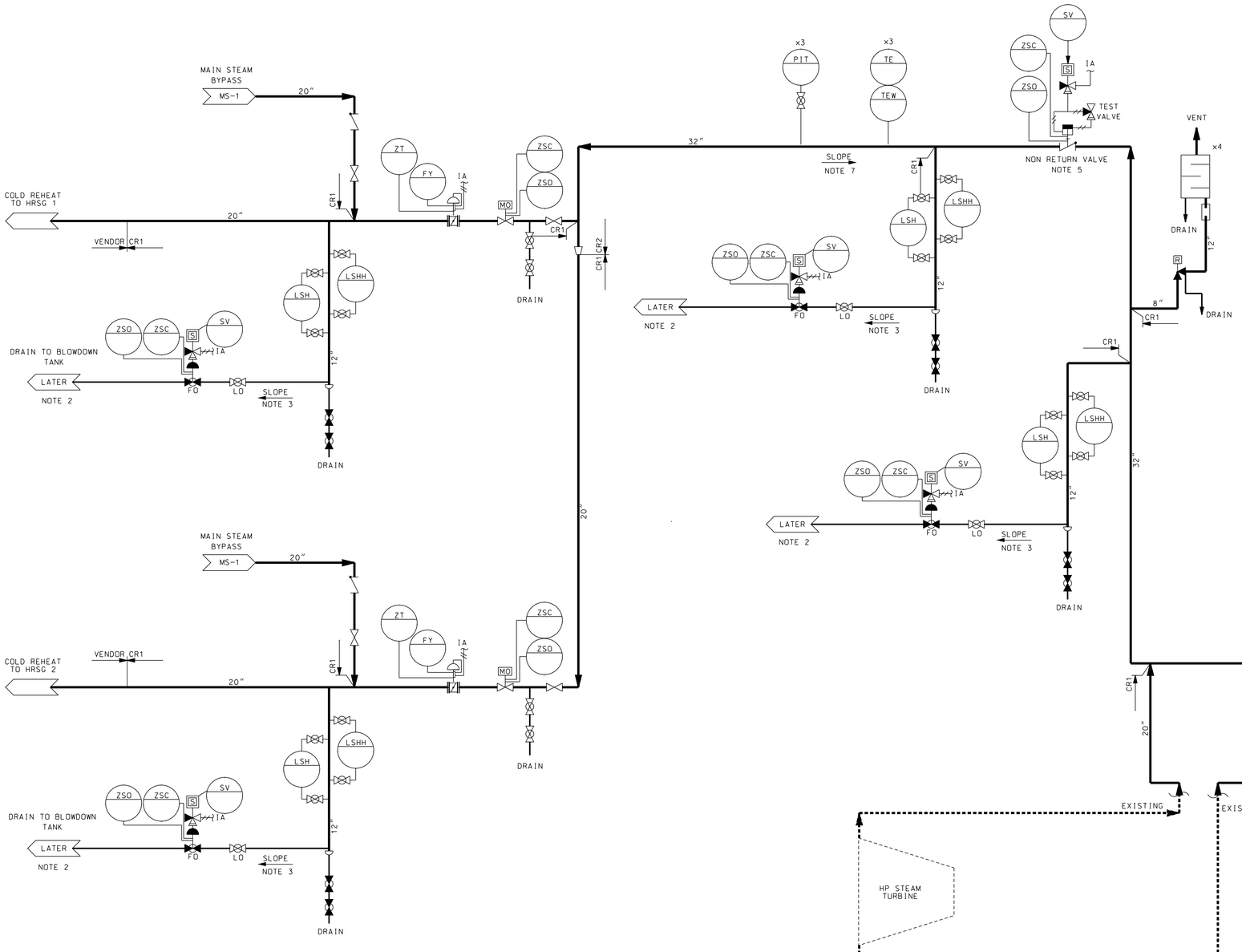
DATE:

AEP AMERICAN ELECTRIC POWER
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE- DD-MMM-YYYY
SYSTEM TIME- HOUR:MINUTE

IGS0694

DRG. NO.



NOTES:
1. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
2. VENTS AND DRAINS TO BE LOCATED AT ALL SYSTEM HIGH AND LOW POINTS PER THE PIPE ROUTING. TYPICAL VENT AND DRAIN CONFIGURATION IS SHOWN FOR REFERENCE.
3. PIPING SHALL BE SLOPED AT A MINIMUM OF $\frac{1}{4}$ INCH PER FOOT.
4. ALL STEAM PIPING INCLUDING VENTS AND DRAINS SHALL BE INSULATED.
5. CONFIGURATION OF NON RETURN VALVE TO BE CONFIRMED BASED ON STEAM TURBINE SUPPLIER.
6. ROUTE TO A SAFE PLACE AWAY FROM SITE PERSONEL.
7. STEAM PIPE IN THE PIPE RACK WILL BE ROUTED WITH A MINIMUM SLOPE TO ENSURE DRAINAGE.
8. DASHED PIPELINES, EQUIPMENT AND COMPONENTS ARE EXISTING. SEE DWG. NO. 1-5005-24 FOR DETAILS OF EXISTING SYSTEMS.

NOTE 1

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	PIPE MATERIAL	REMARKS
CR1	675	750	ASTM A335 GR. P11	SCH. 40
CR2	675	750	ASTM A335 GR. P11	0.90" WALL

REV	DATE RELEASED	PURPOSE	
C	07/22/2011	ISSUED FOR USE	M. WEILER / C. WOODS
B	07/12/2011	FOR ESTIMATING	M. WEILER / C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	M. WEILER / C. WOODS
			PREPARED
			REVIEWED
			APPROVED

DRAWING RELEASE RECORD

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/ INSTALLER'S PERSONNEL, FOR THAT OF ITS SUBCONTRACTORS PERFORMING THE WORK

PROFESSIONAL ENGINEER'S STAMP

DATE	NO.	DESCRIPTION	APPD.
		REVISIONS	

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

U1 REPOWERING OPTION 2 COST ESTIMATE STUDY COLD REHEAT

DWG. NO. RPMSK-OPT2-CR-001

SCALE: 1"=100'-0"

DR:

CK:

APPROVED BY

DATE:

AEP AMERICAN ELECTRIC POWER
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE- DD-MMM-YYYY
SYSTEM TIME- HOURMINUTE

IGS0694

DWG. NO.

NOTE 2

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	MAX OPER. PRESSURE (PSIG)	MAX OPER. TEMP. (DEG. F)	PIPE CLASS	PDT	INSTR. PIPE CLASS	INSTR. PDT	INSUL-ATION TYPE	FIELD TEST PRESSURE (PSIG)	REMARKS
CW1	45	115			D	S&L 0105					CS

NOTES:
1. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
2. SAMPLE PROBES AND ANALYZERS SHALL BE PROVIDED FOR SPECIFIC CONDUCTIVITY, ORP, CORROSION, DEPOSITION, ALKALINITY AND pH.
3. DASHED PIPELINES, EQUIPMENT AND COMPONENTS ARE EXISTING. SEE DWG. NO. TBD FOR DETAILS OF EXISTING SYSTEMS.

EXISTING NATURAL DRAFT COOLING TOWER

COOLING TOWER PUMP BASIN

FROM EXISTING CONDENSER

AUX. CONDENSER CIRCULATING WATER

CW1

16"

FROM CLOSED COOLING WATER HEAT EXCHANGERS

CW-2

1A

BLOWDOWN LATER

8"

CW1

TO EXISTING CONDENSER

AUX. CONDENSER CIRCULATING WATER

CW1

16"

FROM CLOSED COOLING WATER HEAT EXCHANGERS

CW-2

CHEMICAL FEED EXISTING

MAKEUP WATER FROM PRETREATMENT

EXISTING CIRCULATING WATER PUMPS
2 PUMPS

COOLING TOWER PUMP BASIN

REV	DATE RELEASED	PURPOSE	PREPARED	REVIEWED	APPROVED
C	07/22/2011	ISSUED FOR USE	M. WEILER	C. WOODS	
B	07/12/2011	FOR ESTIMATING	M. WEILER	C. WOODS	
A	06/14/2011	FOR CLIENT COMMENTS	M. WEILER	C. WOODS	

DRAWING RELEASE RECORD

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL OR THAT OF ITS SUBCONTRACTOR(S) PERFORMING THE WORK.

PROFESSIONAL ENGINEER'S STAMP

Burgess & Lundy

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

U1 REPOWERING OPTION 2
COST ESTIMATE STUDY
CIRCULATING WATER SYSTEM

DWG. NO. RPMSK-OPT2-CW-001

SCALE: 1"=100'-0"

DR:

CH:

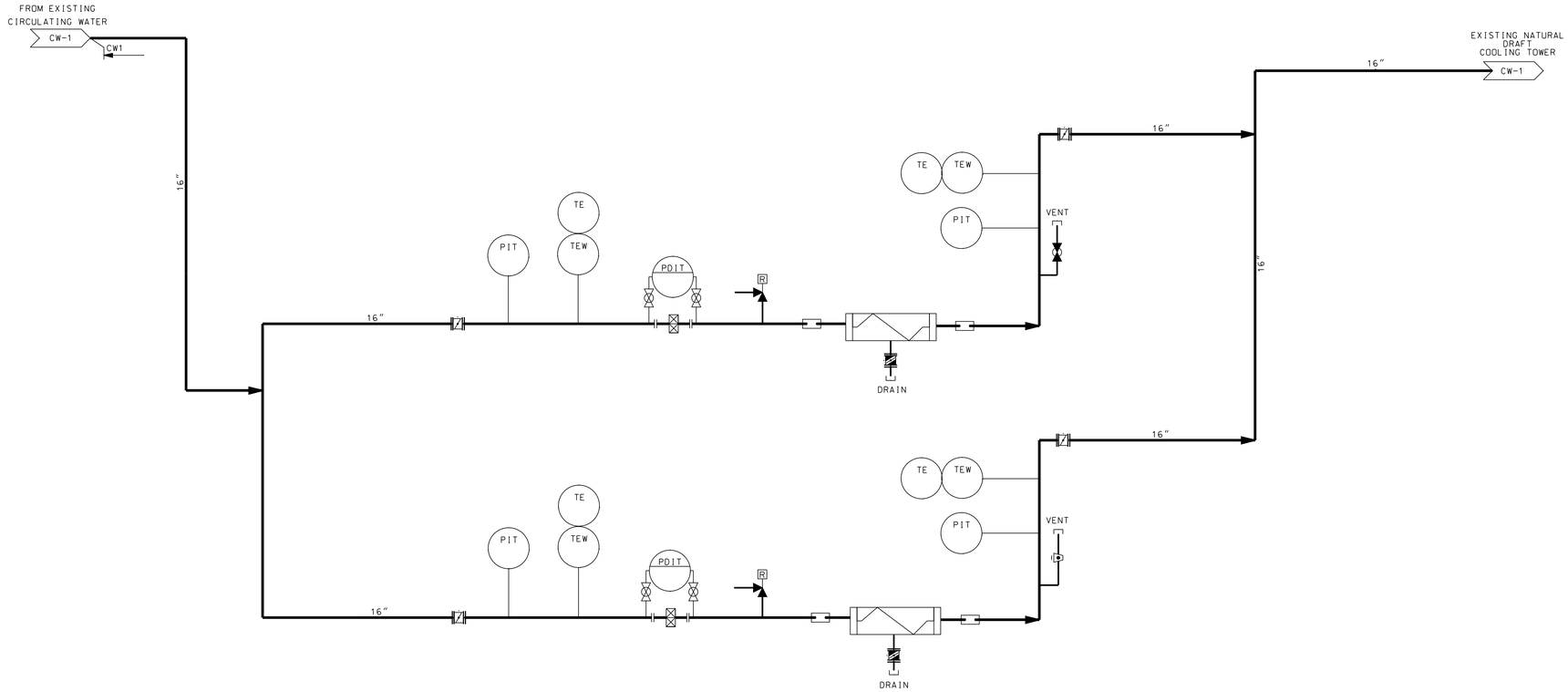
APPROVED BY

DATE:

AEP AMERICAN ELECTRIC POWER
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOUR:MINUTE

IGS0694



CLOSED COOLING WATER
HEAT EXCHANGERS
SHELL & TUBE (SHELL SIDE)
2 @ 100% CAPACITY EACH

NOTE 1

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	MAX OPER. PRESSURE (PSIG)	MAX OPER. TEMP. (DEG. F)	PIPE CLASS	PDT	INSTR. PIPE CLASS	INSTR. PDT	INSUL-ATION TYPE	FIELD TEST PRESSURE (PSIG)	REMARKS
CW1	45	115			D	S&L 0105					CS

NOTES:
1. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
2. ALL PROCESS DRAINS WILL BE ROUTED TO AN OWS DRAIN POINT.
3. HIGH-POINT VENTS AND LOW-POINT DRAINS WILL BE LOCATED AS REQUIRED BASED ON PIPE ROUTING.

REV	DATE RELEASED	PURPOSE	
C	07/22/2011	ISSUED FOR USE	M. WEILER / C. WOODS
B	07/12/2011	FOR ESTIMATING	M. WEILER / C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	M. WEILER / C. WOODS
		DRAWING RELEASE RECORD	PREPARED / REVIEWED / APPROVED

PROFESSIONAL ENGINEER'S STAMP

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/ INSTALLER'S PERSONNEL FOR THAT OF ITS SUBCONTRACTORS PERFORMING THE WORK.

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

U1 REPOWERING OPTION 2 COST ESTIMATE STUDY CIRCULATING WATER SYSTEM

DWG. NO. RPMSK-OPT2-CW-002

SCALE: 1"=100'-0"

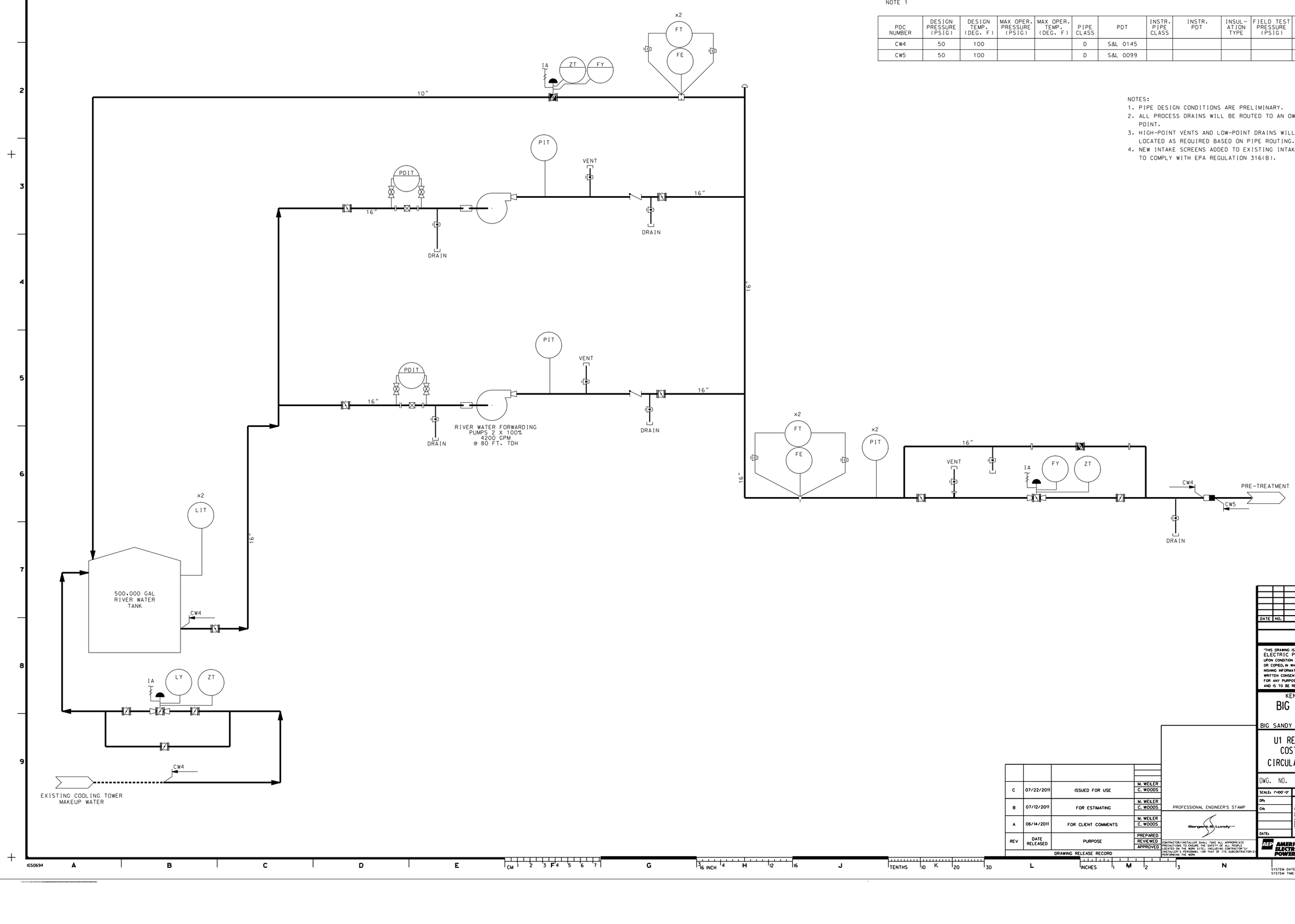
DR: C/K: APPROVED BY: DATE:

AEP AMERICAN ELECTRIC POWER
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE- DD-MMM-YYYY
SYSTEM TIME- HOUR:MINUTE

IGS0694

DRG. NO.



NOTE 1

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	MAX OPER. PRESSURE (PSIG)	MAX OPER. TEMP. (DEG. F)	PIPE CLASS	PDT	INSTR. PIPE CLASS	INSTR. PDT	INSUL-ATION TYPE	FIELD TEST PRESSURE (PSIG)	REMARKS
CW4	50	100			D	S&L 0145					SS
CW5	50	100			D	S&L 0099					HDPE

NOTES:
1. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
2. ALL PROCESS DRAINS WILL BE ROUTED TO AN OWS DRAIN POINT.
3. HIGH-POINT VENTS AND LOW-POINT DRAINS WILL BE LOCATED AS REQUIRED BASED ON PIPE ROUTING.
4. NEW INTAKE SCREENS ADDED TO EXISTING INTAKE STRUCTURE TO COMPLY WITH EPA REGULATION 316(B).

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

U1 REPOWERING OPTION 2 COST ESTIMATE STUDY CIRCULATING WATER SYSTEM

DWG. NO. RPMSK-OPT2-CW-003

SCALE: 1"=100'-0"

DR:

CH:

APPROVED BY:

DATE:

REV	DATE RELEASED	PURPOSE	
C	07/22/2011	ISSUED FOR USE	M. WEILER / C. WOODS
B	07/12/2011	FOR ESTIMATING	M. WEILER / C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	M. WEILER / C. WOODS
			PREPARED
			REVIEWED
			APPROVED

DRAWING RELEASE RECORD

PROFESSIONAL ENGINEER'S STAMP

Burgess & Lundy

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/ INSTALLER'S PERSONNEL OR THAT OF ITS SUBCONTRACTORS PERFORMING THE WORK.

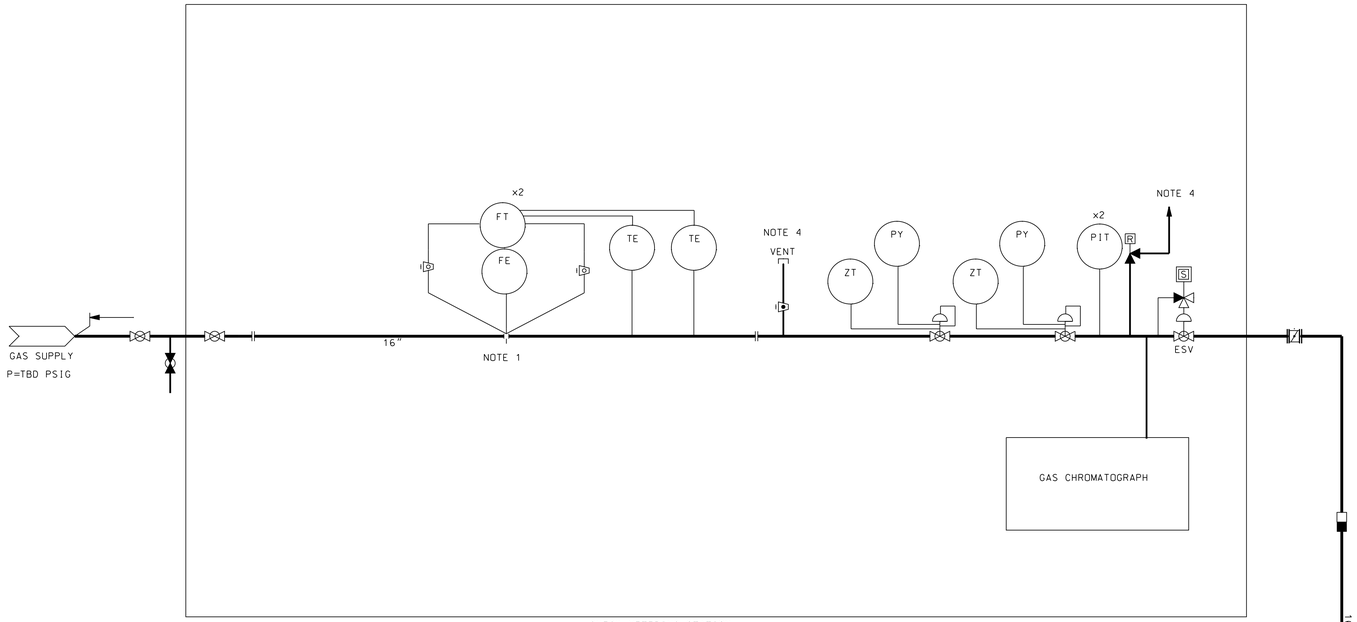
AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE= DD-MMM-YYYY
SYSTEM TIME= HOUR:MINUTE

IGS0694

DRG. NO.



CHECK METERING STATION
WITH SUN SHADE

16"

FG-2 — 8" — TO CT A

FG-2 — 4" — TO DUCT BURNER A

6" — AUX. BOILER SUPPLY

FG-2 — 8" — TO CT B

FG-2 — 4" — TO DUCT BURNER B

NOTES:

1. GAS METERING REQUIRES 30 DIAMETER OF STRAIGHT PIPE UPSTREAM AND 5 DIAMETER OF STRAIGHT PIPE DOWNSTREAM.
2. INTERFACE WITH NATURAL GAS LINE AT TBD PSIG.
3. PIPING DESIGN CONDITIONS ARE PRELIMINARY.
4. VENT LINES ROUTED TO SAFE ELEVATION.

NOTE 3

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	MAX OPER. PRESSURE (PSIG)	MAX OPER. TEMP. (DEG. F)	PIPE CLASS	PDT	INSTR. PIPE CLASS	INSTR. PDT	INSUL-ATION TYPE	FIELD TEST PRESSURE (PSIG)	REMARKS
FG1	650	150			D	S&L 0305					CS

REV	DATE RELEASED	PURPOSE		
C	07/22/2011	ISSUED FOR USE	M. WEILER C. WOODS	
B	07/12/2011	FOR ESTIMATING	M. WEILER C. WOODS	
A	06/14/2011	FOR CLIENT COMMENTS	M. WEILER C. WOODS	
			PREPARED	
			REVIEWED	
			APPROVED	

DRAWING RELEASE RECORD

PROFESSIONAL ENGINEER'S STAMP

Sargent & Lundy

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THAT ALL PERSONNEL LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/ INSTALLER'S PERSONNEL (OR THAT OF ITS SUBCONTRACTORS) PERFORMING THE WORK

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

U1 REPOWERING OPTION 2 COST ESTIMATE STUDY

FUEL GAS SYSTEM

DWG. NO. RPMSK-OPT2-FG-001

SCALE: 1"=100'-0"

DRN

CHK

APPROVED BY

DATE:

AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE- DD-MMM-YYYY
SYSTEM TIME- HOUR:MINUTE

IGS0694

NOTE 3

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	MAX OPER. PRESSURE (PSIG)	MAX OPER. TEMP. (DEG. F)	PIPE CLASS	PDT	INSTR. PIPE CLASS	INSTR. PDT	INSUL-ATION TYPE	FIELD TEST PRESSURE (PSIG)	REMARKS
CD4	300	250			D	S&L 0305					CS
FG1	650	150			D	S&L 0305					CS
FG2	650	400			D	S&L 0305					CS
FG3	75	150			D	S&L 0105					CS

NOTES:
1. BLOCK 2 IS IDENTICAL TO BLOCK 1.
2. ALL VENTS ROUTED TO SAFE ELEVATIONS CLEAR OF ALL IGNITION SOURCES.
3. PIPING DESIGN CONDITIONS ARE PRELIMINARY.

FUEL GAS ELECTRIC STARTUP HEATER 1 X 50%
FG2
8"
8"
FW2
FEEDWATER
3"
TO DRAIN TANK
VENT STACK
F.A.
SKID VENTS
FROM CHECK METERING
FG-1
FG1
8"
FUEL GAS COALESCING FILTERS 2 X 100%
8"
FUEL GAS PERFORMANCE HEATER
FG2
8"
FUEL GAS SCRUBBER 1 X 100%
TO DRAIN TANK
TO DRAIN TANK
8"
VENT
F.A.
SKID DRAINS
LIT
DRAIN TANK
FG2
3"
CD-3
TO CONDENSATE
FUEL GAS CONDITIONING SKID
8"
GE7FA.05 FUEL GAS TERMINATION POINT

Note 2
R
FT
FE
PIT
TE
TEW
TE
TEW
PURGE
SET @ 60 PSIG
FG3
SET @ 60 PSIG
FG3
FROM CHECK METERING TO DUCT BURNER SKID
FG-1
FG1
4"
8"
HRSG DUCT BURNER SKID

REV	DATE RELEASED	PURPOSE		
C	07/22/2011	ISSUED FOR USE	M. WEILER	C. WOODS
B	07/12/2011	FOR ESTIMATING	M. WEILER	C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	M. WEILER	C. WOODS

DRAWING RELEASE RECORD

PREPARED / REVIEWED / APPROVED

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/ INSTALLER'S PERSONNEL OR THAT OF ITS SUBCONTRACTORS IS PERFORMING THE WORK.

PROFESSIONAL ENGINEER'S STAMP

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.
BIG SANDY PLANT
BIG SANDY KENTUCKY

U1 REPOWERING OPTION 2 COST ESTIMATE STUDY FUEL GAS SYSTEM

DWG. NO. RPMSK-OPT2-FG-002

SCALE: 1"=100'-0" | DR: | CH: | APPROVED BY | DATE:

AEP AMERICAN ELECTRIC POWER
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

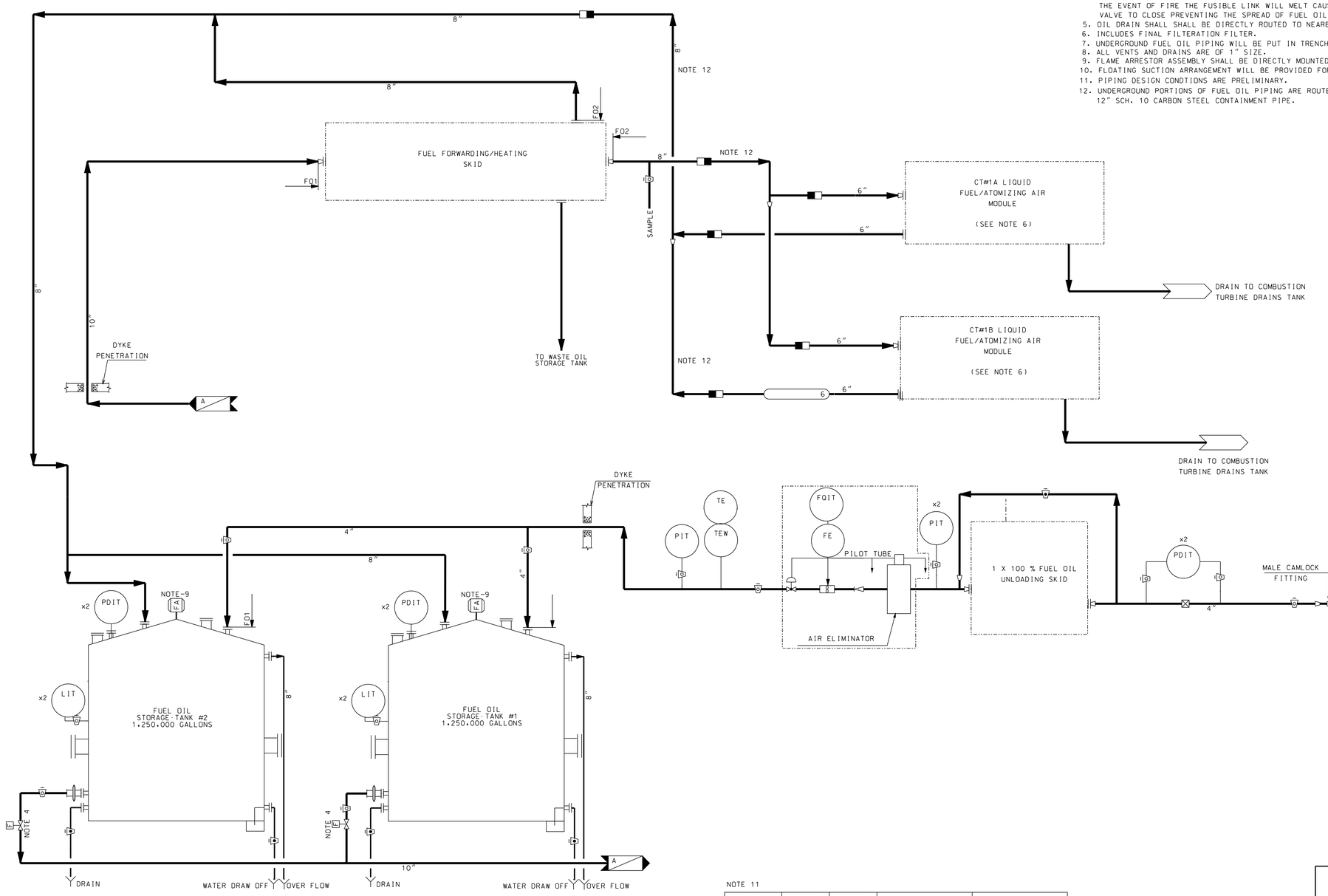
IGS0694

SYSTEM DATE- DD-MMM-YYYY
SYSTEM TIME- HOURMINUTE

DWG. NO.

NOTES :

1. HIGH POINTS SHALL BE PROVIDED WITH AIR VENTS WITH CAP.
2. LOW POINTS SHALL BE PROVIDED WITH DRAINS WITH CAP.
3. PIPELINES DOWNSTREAM AND ABOVEGROUND OF FUEL OIL MANAGEMENT SPOOL PIECE SHALL BE HEAT TRACED AND INSULATED.
4. THE SUPPLY LINE FROM FUEL OIL STORAGE TANKS IS EQUIPPED WITH A FIRE SAFETY SHUT-OFF VALVE WITH A FUSIBLE LINK. IN THE EVENT OF FIRE THE FUSIBLE LINK WILL MELT CAUSING THE VALVE TO CLOSE PREVENTING THE SPREAD OF FUEL OIL.
5. OIL DRAIN SHALL SHALL BE DIRECTLY ROUTED TO NEARBY OWS DRAIN.
6. INCLUDES FINAL FILTERATION FILTER.
7. UNDERGROUND FUEL OIL PIPING WILL BE PUT IN TRENCHES WITHIN A CARRIER PIPE.
8. ALL VENTS AND DRAINS ARE OF 1" SIZE.
9. FLAME ARRESTOR ASSEMBLY SHALL BE DIRECTLY MOUNTED ON THE TANK NOZZLE.
10. FLOATING SUCTION ARRANGEMENT WILL BE PROVIDED FOR FUEL OIL TANK.
11. PIPING DESIGN CONDTIONS ARE PRELIMINARY.
12. UNDERGROUND PORTIONS OF FUEL OIL PIPING ARE ROUTED IN A 12" SCH. 10 CARBON STEEL CONTAINMENT PIPE.



NOTE 11

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	PIPE MATERIAL	REMARKS
FO1	50	100	A106 GR. B	SCH. 40
FO2	960	120	A106 GR. B	SCH. 40

REV	DATE RELEASED	PURPOSE	
C	07/22/2011	ISSUED FOR USE	M. WEILER / C. WOODS
B	07/12/2011	FOR ESTIMATING	M. WEILER / C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	M. WEILER / C. WOODS
			PREPARED
			REVIEWED
			APPROVED

DRAWING RELEASE RECORD

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/ INSTALLER'S PERSONNEL FOR THAT OF ITS SUBCONTRACTORS IS PERFORMING THE WORK.

PROFESSIONAL ENGINEER'S STAMP

Sargent & Lundy

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

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KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

U1 REPOWERING OPTION 2 COST ESTIMATE STUDY FUEL OIL SYSTEM

DWG. NO. RPMSK-OPT2-FO-001

SCALE: NOT TO SCALE

DR:

CH:

APPROVED BY:

DATE:

AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE- DD-MMM-YYYY
SYSTEM TIME- HOURMINUTE

IGS0694

DRG. NO.

NOTES:
1. THE SYSTEM FOR POWER BLOCK 1 IS SHOWN. POWER BLOCK 2 WILL HAVE IDENTICAL EQUIPMENT AND LAYOUTS.
2. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
3. PUMPS CONTROL AND INSTRUMENTATION TO INCLUDE:
   - PUMP VIBRATION MONITORING AND ALARM
   - THRUST BEARING TEMPERATURE AND ALARM
   - MOTOR BEARING AND WINDING TEMPERATURE AND ALARM
   - LUBE OIL PRESSURE AND TEMPERATURE
4. DRAIN TO CONDENSER SHALL BE LOCATED AS CLOSE TO THE BOILER FEED PUMP BRANCH AS POSSIBLE.

PEGGING STEAM FROM HRSG

INTEGRAL LP DRUM / DEAERATOR

VENT

LT ×3

FW3

FW1

CV

ZSC

ZSO

TEW

TE

SET @ --- PSIG

R

PIT ×2

LO

DRAIN

10"

ZSO

ZSC

MO

12"

10"

DRAIN TO CONDENSER NOTE 4

PDIT

FW2

FW3

FW1

(PUMP)

(MOTOR)

HP/IP BOILER FEED PUMP

NOTE 3

DRAIN

OILY WASTE DRAIN

2 x 100% BOILER FEEDWATER PUMPS WITH VFDS 2025 GPM 5810 FT. TDH

IP BOILER FILL

CD-3

1F

FW2 CD2

4"

FT

FE

PIT

TE

TEW

×2

TO IP ECONOMIZER MS BYPASS ATTEMPERATOR AND RH DESUPERHEATER

FW2

FW-2

10"

VENT

1A

ZT

FY

FO

HP BOILER FILL

CD-3

1F

FW3 CD2

4"

TO HP ECONOMIZER AND HP DESUPERHEATER

FW3

FW-2

NOTE 2

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	PIPE MATERIAL	REMARKS
FW1	100	350	ASTM A106 GR. C CARBON STEEL	SCH. 40
FW2	650	350	ASTM A106 GR. C CARBON STEEL	SCH. 40
FW3	2350	350	ASTM A106 GR. C CARBON STEEL	SCH. 120
CD4	300	250	ASTM A106 GR. B CARBON STEEL	S&L 0305

REV	DATE RELEASED	PURPOSE	
D	07/25/2011	ISSUED FOR USE	M. WEILER / C. WOODS
C	07/22/2011	ISSUED FOR USE	M. WEILER / C. WOODS
B	07/12/2011	FOR ESTIMATING	M. WEILER / C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	M. WEILER / C. WOODS

DRAWING RELEASE RECORD

PREPARED / REVIEWED / APPROVED

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PERSONNEL LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/ INSTALLER'S PERSONNEL FOR THAT OF ITS SUBCONTRACTOR(S) PERFORMING THE WORK.

PROFESSIONAL ENGINEER'S STAMP

Sargent & Lundy

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

U1 REPOWERING OPTION 2 COST ESTIMATE STUDY FEED WATER SYSTEM

DWG. NO. RPMSK-OPT2-FW-001

SCALE: 1"=100'-0"

DRN

CHK

APPROVED BY

DATE:

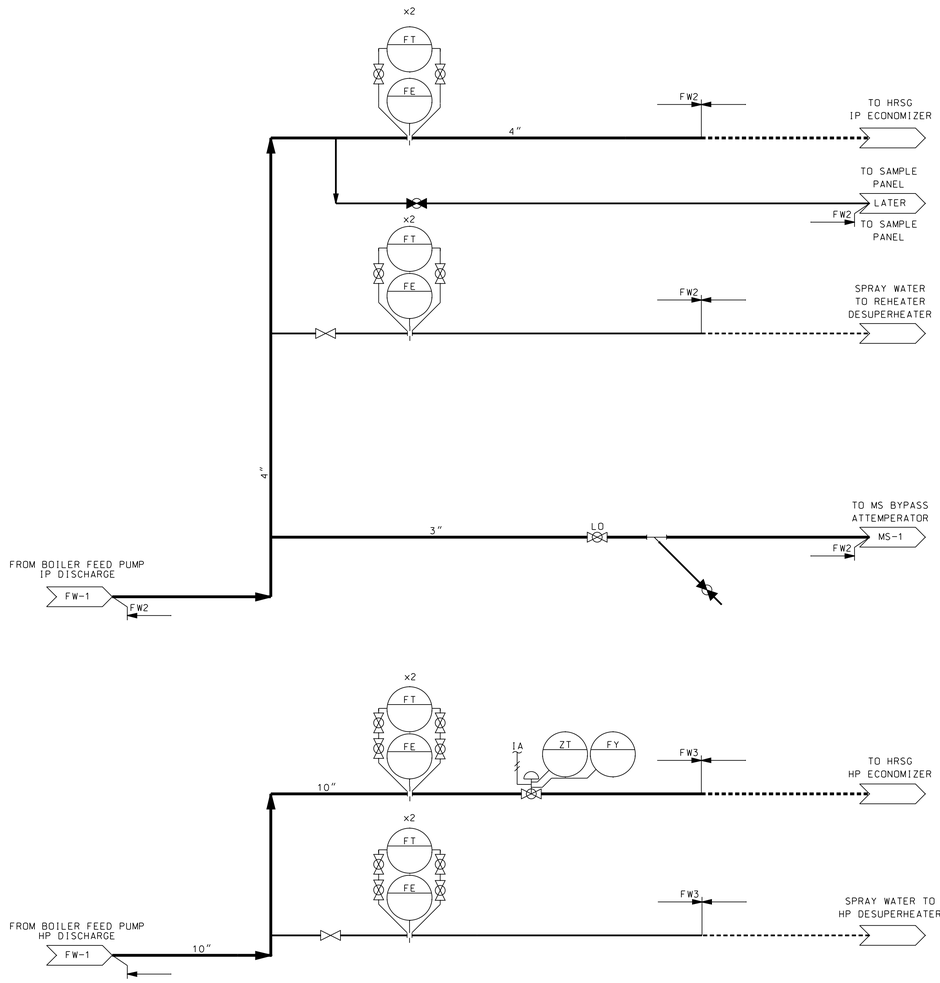
AEP AMERICAN ELECTRIC POWER
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE- DD-MMM-YYYY
SYSTEM TIME- HOUR:MINUTE

IGS0694

DWG. NO.

NOTES:
1. THE SYSTEM FOR POWER BLOCK 1 IS SHOWN. POWER BLOCK 2 WILL HAVE IDENTICAL EQUIPMENT AND LAYOUTS.
2. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
3. FEED WATER INLET VALVES TO ECONOMIZER ARE BY HRSG SUPPLIER.



NOTE 2

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	PIPE MATERIAL	REMARKS
FW2	650	350	ASTM A106 GR. C CARBON STEEL	SCH. 40
FW3	2350	350	ASTM A106 GR. C CARBON STEEL	SCH. 120

REV	DATE RELEASED	PURPOSE	
			M. WEILER
C	07/22/2011	ISSUED FOR USE	C. WOODS
			M. WEILER
B	07/12/2011	FOR ESTIMATING	C. WOODS
			M. WEILER
A	06/14/2011	FOR CLIENT COMMENTS	C. WOODS
			PREPARED
			REVIEWED
			APPROVED

DRAWING RELEASE RECORD

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/ SUBCONTRACTOR'S PERSONNEL FOR THAT OF ITS SUBCONTRACTOR'S PERFORMING THE WORK.

PROFESSIONAL ENGINEER'S STAMP

Bechtel Corporation

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

U1 REPOWERING OPTION 2 COST ESTIMATE STUDY FEED WATER SYSTEM

DWG. NO. RPMSK-OPT2-FW-002

SCALE: 1"=100'-0"

DR:

CH:

APPROVED BY

DATE:

AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

IGS0694

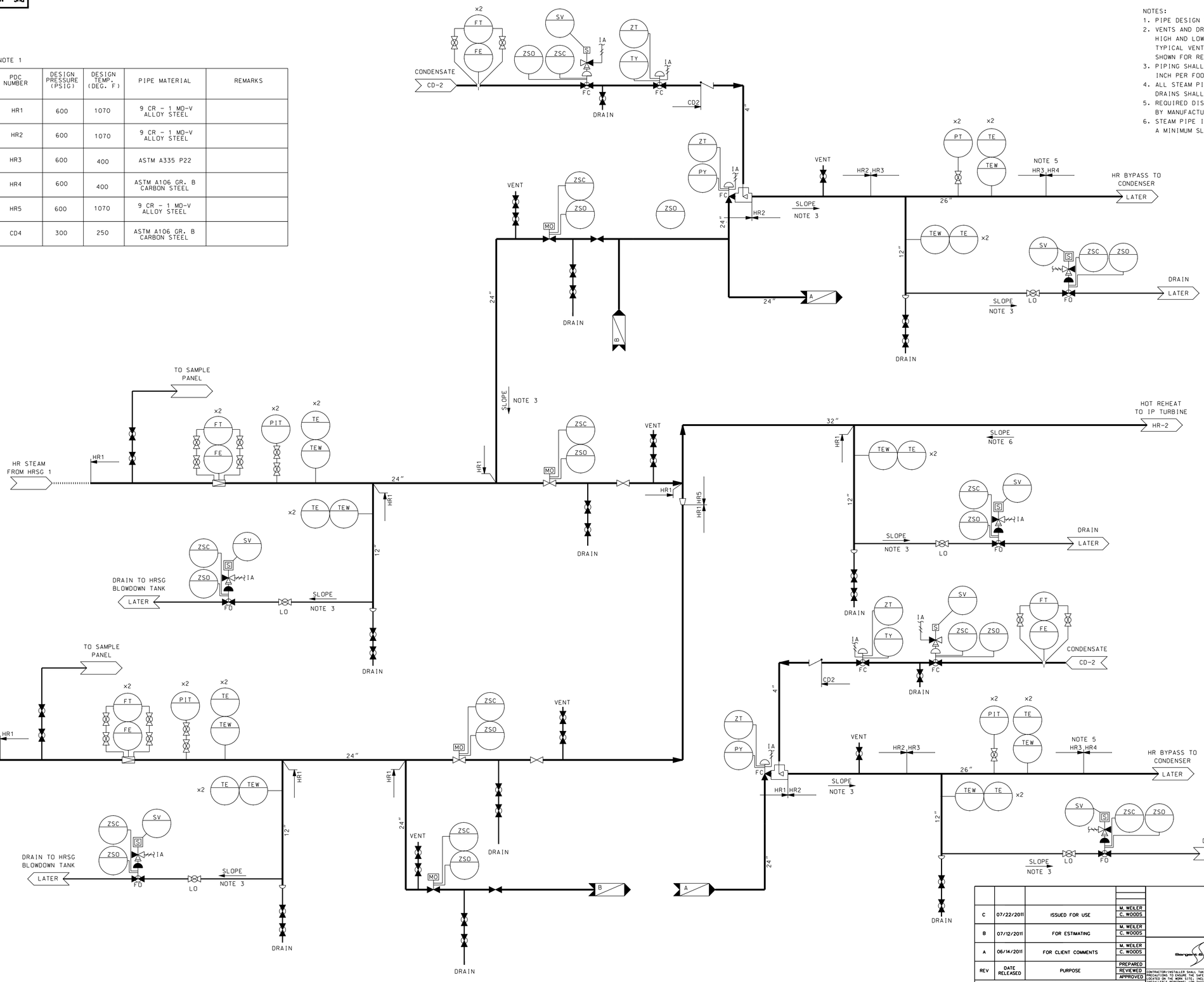
SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOUR:MINUTE

DWG. NO.

NOTE 1

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	PIPE MATERIAL	REMARKS
HR1	600	1070	9 CR - 1 MO-V ALLOY STEEL	
HR2	600	1070	9 CR - 1 MO-V ALLOY STEEL	
HR3	600	400	ASTM A335 P22	
HR4	600	400	ASTM A106 GR. B CARBON STEEL	
HR5	600	1070	9 CR - 1 MO-V ALLOY STEEL	
CD4	300	250	ASTM A106 GR. B CARBON STEEL	

NOTES:
1. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
2. VENTS AND DRAINS TO BE LOCATED AT ALL SYSTEM HIGH AND LOW POINTS PER THE PIPE ROUTING. TYPICAL VENT AND DRAIN CONFIGURATION IS SHOWN FOR REFERENCE.
3. PIPING SHALL BE SLOPED AT A MINIMUM OF 1/4 INCH PER FOOT.
4. ALL STEAM PIPING INCLUDING VENTS AND DRAINS SHALL BE INSULATED.
5. REQUIRED DISTANCE FROM DESUPERHEATER SPECIFIED BY MANUFACTURER.
6. STEAM PIPE IN THE PIPE RACK WILL BE ROUTED WITH A MINIMUM SLOPE TO ENSURE DRAINAGE.



DATE	NO.	DESCRIPTION	APPD.
		REVISIONS	

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY — KENTUCKY

U1 REPOWERING OPTION 2 COST ESTIMATE STUDY HOT REHEAT

DWG. NO. RPMSK-OPT2-HR-001

SCALE: 1"=100'-0"

REV	DATE RELEASED	PURPOSE	
C	07/22/2011	ISSUED FOR USE	M. WEILER / C. WOODS
B	07/12/2011	FOR ESTIMATING	M. WEILER / C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	M. WEILER / C. WOODS
			PREPARED
			REVIEWED
			APPROVED

DRAWING RELEASE RECORD

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL FOR THAT OF ITS SUBCONTRACTORS IS PERFORMING THE WORK.

Sargent & Lundy

DRN: CHK: APPROVED BY DATE:

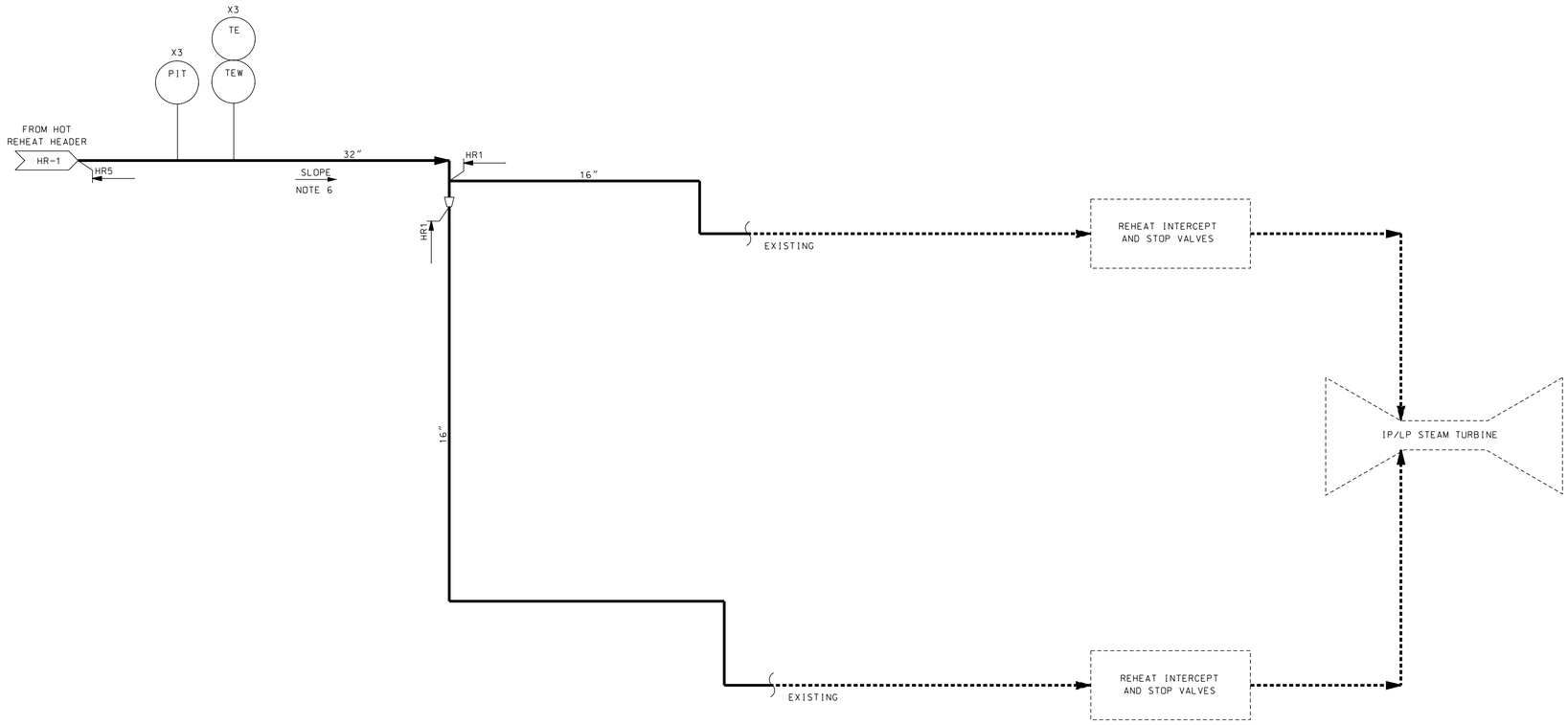
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE- DD-MMM-YYYY
SYSTEM TIME- HOURMINUTE

IGS0694

DWG. NO.

NOTES:
1. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
2. VENTS AND DRAINS TO BE LOCATED AT ALL SYSTEM HIGH AND LOW POINTS PER THE PIPE ROUTING. TYPICAL VENT AND DRAIN CONFIGURATION IS SHOWN FOR REFERENCE.
3. PIPING SHALL BE SLOPED AT A MINIMUM OF 1/4 INCH PER FOOT.
4. ALL STEAM PIPE INCLUDING VENTS AND DRAINS SHALL BE INSULATED.
5. DASHED PIPELINES, EQUIPMENT AND COMPONENTS ARE EXISTING. SEE DWG. NO. 1-5005-24 FOR DETAILS OF EXISTING SYSTEMS.
6. STEAM PIPE IN THE PIPE RACK WILL BE ROUTED WITH A MINIMUM SLOPE TO ENSURE DRAINAGE.



NOTE 1

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	PIPE MATERIAL	REMARKS
HR1	600	1070	9 CR - 1 MO-V ALLOY STEEL	
HR5	600	1070	9 CR - 1 MO-V ALLOY STEEL	

REV	DATE RELEASED	PURPOSE	
C	07/22/2011	ISSUED FOR USE	PREPARED: M. WEILER; REVIEWED: C. WOODS
B	07/12/2011	FOR ESTIMATING	PREPARED: M. WEILER; REVIEWED: C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	PREPARED: M. WEILER; REVIEWED: C. WOODS
			APPROVED

DRAWING RELEASE RECORD

PROFESSIONAL ENGINEER'S STAMP

Sargent & Lundy

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PERSONS LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/ INSTALLER'S PERSONNEL, FOR THAT OF ITS SUBCONTRACTORS PERFORMING THE WORK

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

U1 REPOWERING OPTION 2 COST ESTIMATE STUDY HOT REHEAT

DWG. NO. RPMSK-OPT2-HR-002

SCALE: 1"=00'-0"

DR:

CH:

APPROVED BY

DATE:

AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

IGS0694

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOUR:MINUTE

DWG. NO.

NOTE 1

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	MAX OPER. PRESSURE (PSIG)	MAX OPER. TEMP. (DEG. F)	PIPE CLASS	PDT	INSTR. PIPE CLASS	INSTR. PDT	INSUL-ATION TYPE	FIELD TEST PRESSURE (PSIG)	REMARKS
CD4	300	250			D	S&L 0305					CS
LP1	100	650			D	S&L 0105					CS

NOTES:
1. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
2. VENTS AND DRAINS TO BE LOCATED AT ALL SYSTEM HIGH AND LOW POINTS PER THE PIPE ROUTING. TYPICAL VENT AND DRAIN CONFIGURATION IS SHOWN FOR REFERENCE.
3. PIPING SHALL BE SLOPED AT A MINIMUM OF 1/4 INCH PER FOOT.
4. ALL STEAM PIPE INCLUDING VENTS AND DRAINS SHALL BE INSULATED.
5. STEAM PIPE IN THE PIPE RACK SHALL BE ROUTED WITH A MINIMUM SLOPE TO ENSURE DRAINAGE.
6. DASHED PIPELINES, EQUIPMENT AND COMPONENTS ARE EXISTING. SEE DWG. NO. 1-5005-24 FOR DETAILS OF EXISTING SYSTEMS.

CONDENSATE
CD-2
FT
FE
ZSO
ZSC
SV
IA
ZT
TY
FC
DRAIN
CD2
3"
VENT
ZSC
ZSO
MO
DRAIN
ZT
PY
IA
FC
8"
SLOPE
NOTE 5
10"
X2
PIT
TE
TEW
LP BYPASS TO CONDENSER
LATER
12"
LSH
LSHH
SV
ZSC
ZSO
SLOPE
NOTE 3
LO
FO
DRAIN
LATER
DRAIN
A
X3
PIT
TE
TEW
SLOPE
NOTE 5
LP1
18"
LP STEAM STOP AND CONTROL VALVE
EXISTING
IP/LP STEAM TURBINE
LP STEAM TURBINE
TO SAMPLE PANEL
LATER
LP STEAM FROM HRSG 1
LP1
X2
FT
FE
PIT
TE
TEW
VENT
ZSC
ZSO
MO
12"
SLOPE
NOTE 5
LP1
8"
LSHH
LSH
SV
ZSC
ZSO
IA
DRAIN TO HRSG BLOWDOWN TANK
LATER
NOTE 3
SLOPE
NOTE 3
FO
LO
DRAIN
TO SAMPLE PANEL
LATER
LP STEAM FROM HRSG 2
LP1
X2
FT
FE
PIT
TE
TEW
VENT
ZSC
ZSO
MO
12"
SLOPE
NOTE 5
LP1
8"
LSHH
LSH
SV
ZSC
ZSO
IA
DRAIN TO HRSG BLOWDOWN TANK
LATER
NOTE 3
SLOPE
NOTE 3
FO
LO
NOTE 3
SLOPE
VENT
ZSC
ZSO
MO
DRAIN

REV	DATE RELEASED	PURPOSE	
			PREPARED
			REVIEWED
			APPROVED
C	07/22/2011	ISSUED FOR USE	M. WEILER / C. WOODS
B	07/12/2011	FOR ESTIMATING	M. WEILER / C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	M. WEILER / C. WOODS

DRAWING RELEASE RECORD

PROFESSIONAL ENGINEER'S STAMP

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/ INSTALLER'S EMPLOYEES, FOR THAT OF ITS SUBCONTRACTORS IS PERFORMING THE WORK.

DATE	NO.	DESCRIPTION	APPD.
		REVISIONS	

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

U1 REPOWERING OPTION 2 COST ESTIMATE STUDY LOW PRESSURE STEAM

DWG. NO. RPMSK-OPT2-LP-001

SCALE: 1"=00'-0"

DR:

CH:

APPROVED BY

DATE:

AEP AMERICAN ELECTRIC POWER
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE- DD-MMM-YYYY
SYSTEM TIME- HH:MM:NN:TT

IGS0694

NOTE 1

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	PIPE MATERIAL	REMARKS
MS1	2250	1070	9 CR - 1 MO-V ALLOY STEEL	SCH. 160
MS2	675	1070	9 CR - 1 MO-V ALLOY STEEL	SCH. 60
CR1	675	775	ASTM A335 GR. P11	SCH. 40
FW2	650	340	ASTM A106 GR. C CARBON STEEL	SCH. 40

NOTES:
1. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
2. VENTS AND DRAINS TO BE LOCATED AT ALL SYSTEM HIGH AND LOW POINTS PER THE PIPE ROUTING. TYPICAL VENT AND DRAIN CONFIGURATION IS SHOWN FOR REFERENCE.
3. PIPING SHALL BE SLOPED AT A MINIMUM OF 1/4 INCH PER FOOT.
4. ALL STEAM PIPE INCLUDING VENTS AND DRAINS SHALL BE INSULATED.
5. STEAM PIPE IN THE PIPE RACK SHALL BE ROUTED WITH A MINIMUM SLOPE TO ENSURE DRAINAGE.

IP FEEDWATER FW-2
HP STEAM FROM HRSG 1
HP STEAM FROM HRSG 2
TO SAMPLE PANEL
MS BYPASS TO HRSG 1 COLD REHEAT CR-1
MS BYPASS TO HRSG 2 COLD REHEAT CR-1
MS TO STEAM TURBINE MS-2
DRAIN TO HRSG BLOWDOWN TANK LATER
DRAIN LATER
DRAIN
VENT
NOTE 3 VENT
SLOPE NOTE 3
SLOPE NOTE 5
MS1 MS2
MS2 CR1
FW2
CR1
MO
FC
FO
LO
IA
X2

REV	DATE RELEASED	PURPOSE	
C	07/22/2011	ISSUED FOR USE	M. WEILER / C. WOODS
B	07/12/2011	FOR ESTIMATING	M. WEILER / C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	M. WEILER / C. WOODS

DRAWING RELEASE RECORD

PREPARED / REVIEWED / APPROVED

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/ INSTALLER'S PERSONNEL FOR THAT OF ITS SUBCONTRACTORS PERFORMING THE WORK.

Sargent & Lundy

DATE	NO.	DESCRIPTION	APPD.
		REVISIONS	

KENTUCKY POWER CO.
BIG SANDY PLANT
BIG SANDY KENTUCKY

U1 REPOWERING OPTION 2 COST ESTIMATE STUDY MAIN STEAM

DWG. NO. RPMSK-OPT2-MS-001

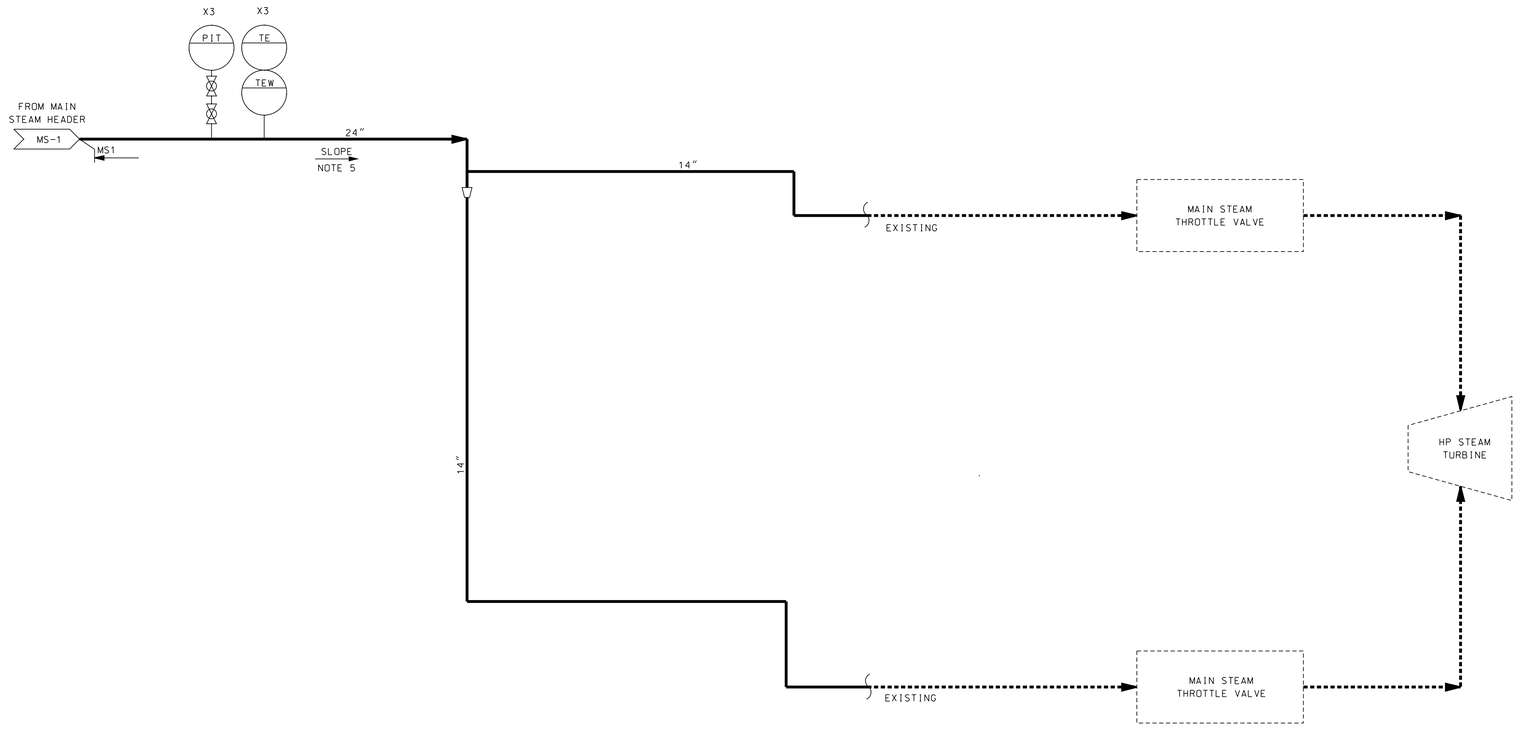
SCALE: 1"=100'-0"
DR:
CH:
APPROVED BY:
DATE:

AEP AMERICAN ELECTRIC POWER
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

IGS0694

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOUR:MINUTE

DWG. NO.



NOTES:
1. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
2. VENTS AND DRAINS TO BE LOCATED AT ALL SYSTEM HIGH AND LOW POINTS PER THE PIPE ROUTING. TYPICAL VENT AND DRAIN CONFIGURATION IS SHOWN FOR REFERENCE.
3. PIPING SHALL BE SLOPED AT A MINIMUM OF 1/4 INCH PER FOOT.
4. ALL STEAM PIPE INCLUDING VENTS AND DRAINS SHALL BE INSULATED.
5. STEAM PIPE IN THE PIPE RACK SHALL BE ROUTED WITH A MINIMUM SLOPE TO ENSURE DRAINAGE.
6. DASHED PIPELINES, EQUIPMENT AND COMPONENTS ARE EXISTING. SEE DWG. NO. 1-5005-24 FOR DETAILS OF EXISTING SYSTEMS.

NOTE 1

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	PIPE MATERIAL	REMARKS
MS1	2250	1070	9 CR - 1 MO-V ALLOY STEEL	SCH. 160
MS2	675	1070	9 CR - 1 MO-V ALLOY STEEL	SCH. 60

REV	DATE RELEASED	PURPOSE	
C	07/22/2011	ISSUED FOR USE	M. WEILER / C. WOODS
B	07/12/2011	FOR ESTIMATING	M. WEILER / C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	M. WEILER / C. WOODS
			PREPARED
		DRAWING RELEASE RECORD	REVIEWED
			APPROVED

PROFESSIONAL ENGINEER'S STAMP

Sargent & Lundy

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PERSONS LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/ INSTALLER'S PERSONNEL FOR THAT OF ITS SUBCONTRACTORS IS PERFORMING THE WORK

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

U1 REPOWERING OPTION 2 COST ESTIMATE STUDY MAIN STEAM

DWG. NO. RPMSK-OPT2-MS-002

SCALE: 1"=100'-0"

DR:

CH:

APPROVED BY

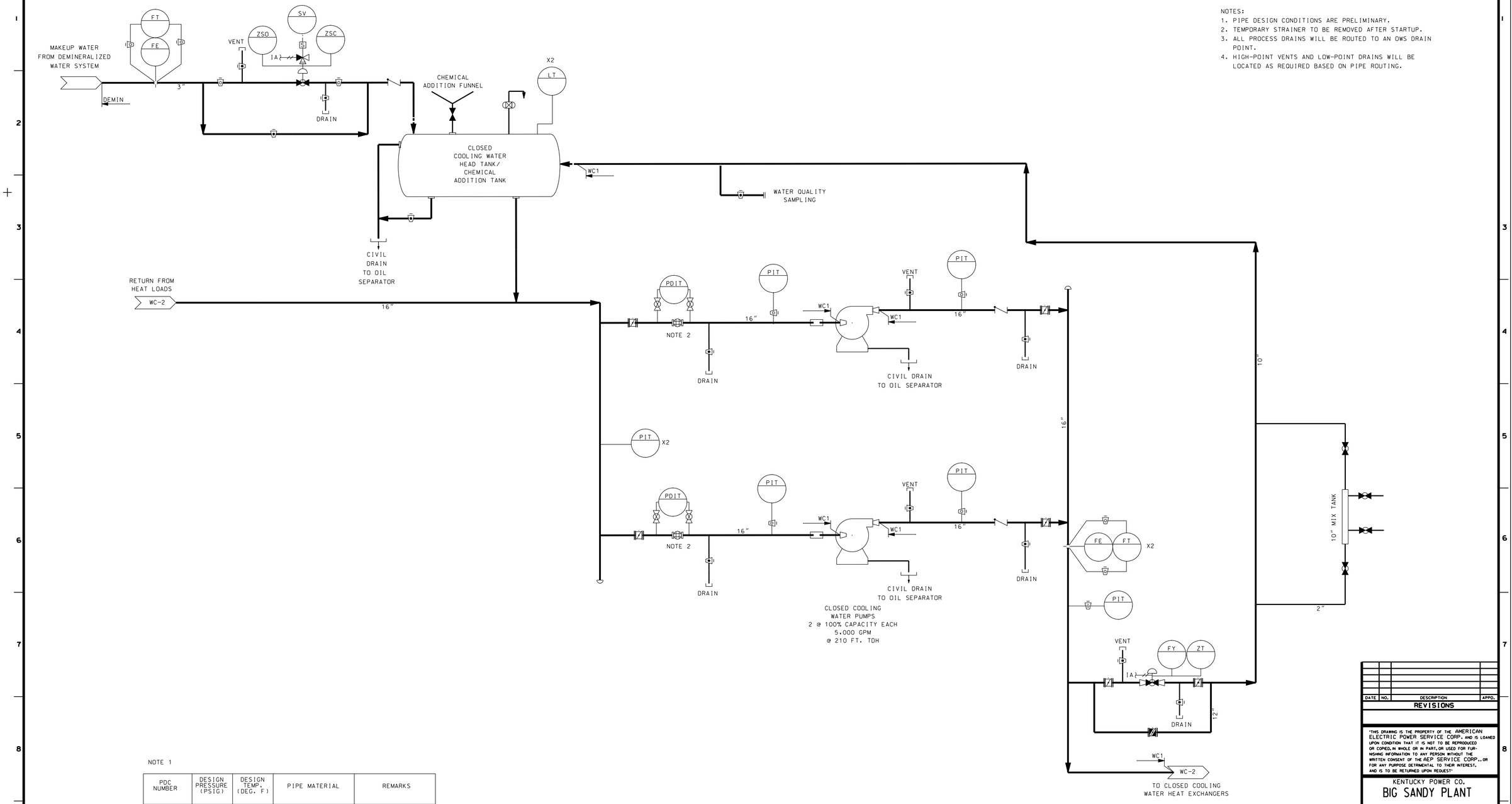
DATE:

AEP AMERICAN ELECTRIC POWER
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

IGS0694

SYSTEM DATE- DD-MMM-YYYY
SYSTEM TIME- HOURMINUTE

DWG. NO.



NOTES:
1. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
2. TEMPORARY STRAINER TO BE REMOVED AFTER STARTUP.
3. ALL PROCESS DRAINS WILL BE ROUTED TO AN OWS DRAIN POINT.
4. HIGH-POINT VENTS AND LOW-POINT DRAINS WILL BE LOCATED AS REQUIRED BASED ON PIPE ROUTING.

NOTE 1

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	PIPE MATERIAL	REMARKS
DEMIN	80	100	ASTM A312 304 STAINLESS STEEL	PDT S&L-0145
WC1	130	135	ASTM A106 GR. B CARBON STEEL	PDT S&L-0105

REV	DATE RELEASED	PURPOSE	
C	07/22/2011	ISSUED FOR USE	M. WEILER / C. WOODS
B	07/12/2011	FOR ESTIMATING	M. WEILER / C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	M. WEILER / C. WOODS

DRAWING RELEASE RECORD — PREPARED / REVIEWED / APPROVED

PROFESSIONAL ENGINEER'S STAMP

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE PERFORMING THE WORK. THIS INCLUDES THE CONTRACTOR'S/ INSTALLER'S PERSONNEL, AND THAT OF ITS SUBCONTRACTORS.

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

U1 REPOWERING OPTION 2 COST ESTIMATE STUDY CLOSED COOLING WATER

DWG. NO. RPMSK-OPT2-WC-001

SCALE: 1"=100'-0"

DR:

CH:

APPROVED BY

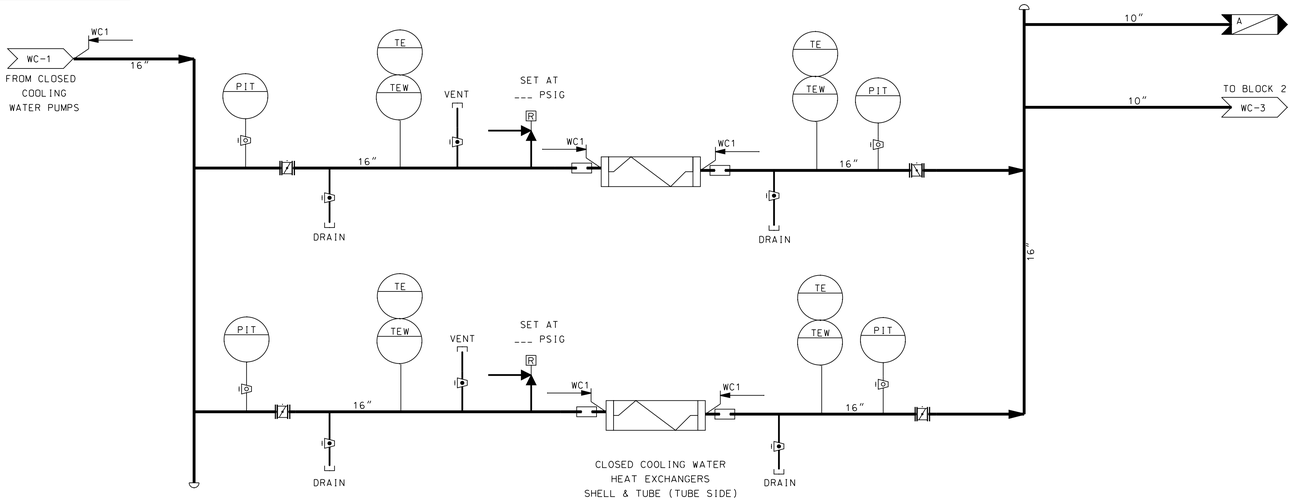
DATE:

AEP AMERICAN ELECTRIC POWER
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

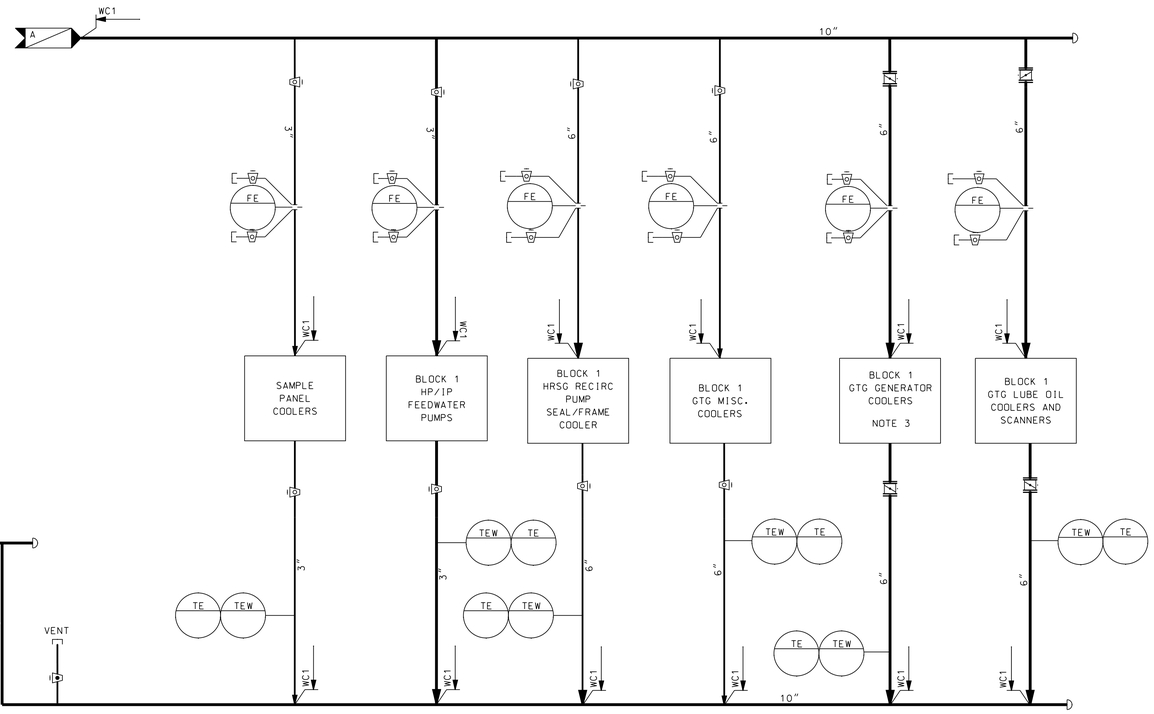
SYSTEM DATE- DD-MMM-YYYY
SYSTEM TIME- HOUR:MINUTE

IGS0694

DWG. NO.



NOTES:
1. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
2. ALL PROCESS DRAINS WILL BE ROUTED TO AN OWS DRAIN POINT.
3. HIGH-POINT VENTS AND LOW-POINT DRAINS WILL BE LOCATED AS REQUIRED BASED ON PIPE ROUTING.



NOTE 1

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	PIPE MATERIAL	REMARKS
WC1	130	135	ASTM A106 GR. B CARBON STEEL	PDT S&L-0105

REV	DATE RELEASED	PURPOSE	
C	07/22/2011	ISSUED FOR USE	M. WEILER / C. WOODS
B	07/12/2011	FOR ESTIMATING	M. WEILER / C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	M. WEILER / C. WOODS
			PREPARED
			REVIEWED
			APPROVED

DRAWING RELEASE RECORD

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/ INSTALLER'S PERSONNEL OR THAT OF ITS SUBCONTRACTORS PERFORMING THE WORK.

PROFESSIONAL ENGINEER'S STAMP

Sargent & Lundy

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

U1 REPOWERING OPTION 2 COST ESTIMATE STUDY CLOSED COOLING WATER

DWG. NO. RPMSK-OPT2-WC-002

SCALE: 1"=100'-0"

DR:

CH:

APPROVED BY

DATE:

AEP AMERICAN ELECTRIC POWER

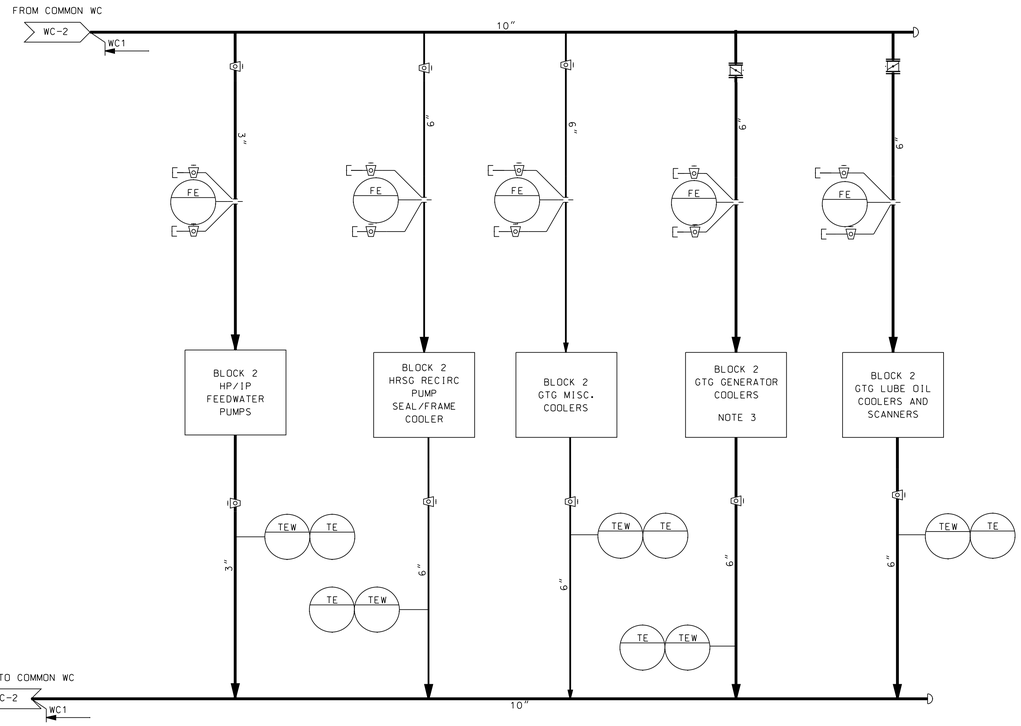
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOUR:MINUTE

IGS0694

DWG. NO.

NOTES:
1. PIPE DESIGN CONDITIONS ARE PRELIMINARY.
2. ALL PROCESS DRAINS WILL BE ROUTED TO AN OWS DRAIN POINT.
3. HIGH-POINT VENTS AND LOW-POINT DRAINS WILL BE LOCATED AS REQUIRED BASED ON PIPE ROUTING.



NOTE 1

PDC NUMBER	DESIGN PRESSURE (PSIG)	DESIGN TEMP. (DEG. F)	PIPE MATERIAL	REMARKS
WC1	130	135	ASTM A106 GR. B CARBON STEEL	PDT S&L-0105

REV	DATE RELEASED	PURPOSE	
C	07/22/2011	ISSUED FOR USE	M. WEILER / C. WOODS
B	07/12/2011	FOR ESTIMATING	M. WEILER / C. WOODS
A	06/14/2011	FOR CLIENT COMMENTS	M. WEILER / C. WOODS

DRAWING RELEASE RECORD

PREPARED
REVIEWED
APPROVED

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/ SUBCONTRACTOR'S PERSONNEL FOR THAT OF ITS SUBCONTRACTOR'S PERFORMING THE WORK.

PROFESSIONAL ENGINEER'S STAMP

Bergmann Associates

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

U1 REPOWERING OPTION 2 COST ESTIMATE STUDY CLOSED COOLING WATER

DWG. NO. RPMSK-OPT2-WC-003

SCALE: 1"=100'-0"
DR:
CK:
APPROVED BY
DATE:

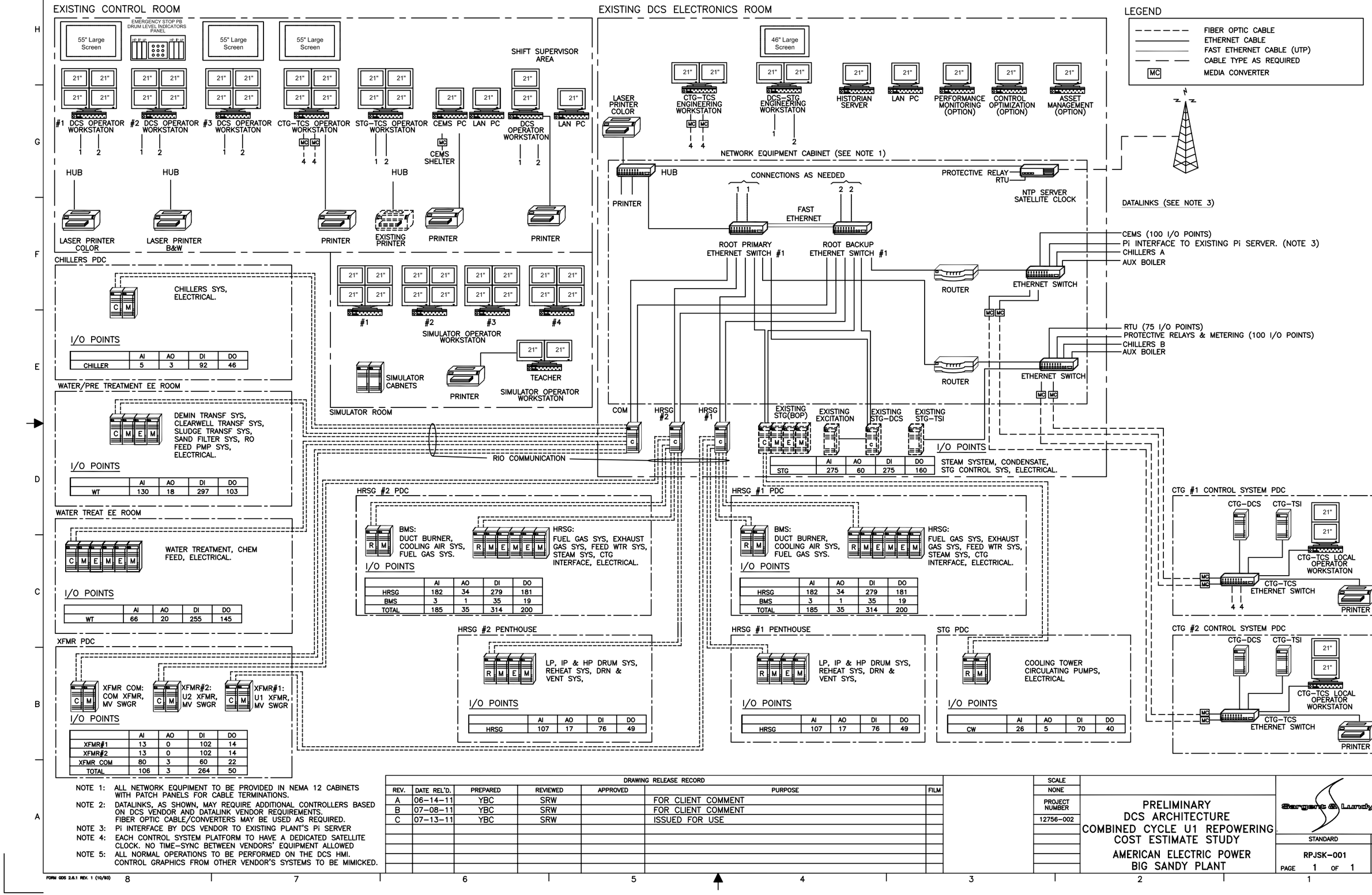
AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

IGS0694

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOUR:MINUTE

ATTACHMENT 1-9
DCS Architecture Diagram



NOTE 1: ALL NETWORK EQUIPMENT TO BE PROVIDED IN NEMA 12 CABINETS WITH PATCH PANELS FOR CABLE TERMINATIONS.

NOTE 2: DATALINKS, AS SHOWN, MAY REQUIRE ADDITIONAL CONTROLLERS BASED ON DCS VENDOR AND DATALINK VENDOR REQUIREMENTS. FIBER OPTIC CABLE/CONVERTERS MAY BE USED AS REQUIRED.

NOTE 3: Pi INTERFACE BY DCS VENDOR TO EXISTING PLANT'S Pi SERVER

NOTE 4: EACH CONTROL SYSTEM PLATFORM TO HAVE A DEDICATED SATELLITE CLOCK. NO TIME-SYNC BETWEEN VENDORS' EQUIPMENT ALLOWED

NOTE 5: ALL NORMAL OPERATIONS TO BE PERFORMED ON THE DCS HMI. CONTROL GRAPHICS FROM OTHER VENDOR'S SYSTEMS TO BE MIMICKED.

DRAWING RELEASE RECORD

REV.	DATE REL'D.	PREPARED	REVIEWED	APPROVED	PURPOSE	FILM
A	06-14-11	YBC	SRW		FOR CLIENT COMMENT	
B	07-08-11	YBC	SRW		FOR CLIENT COMMENT	
C	07-13-11	YBC	SRW		ISSUED FOR USE	

SCALE: NONE

PROJECT NUMBER: 12756-002

PRELIMINARY DCS ARCHITECTURE COMBINED CYCLE U1 REPOWERING COST ESTIMATE STUDY

AMERICAN ELECTRIC POWER
BIG SANDY PLANT

Sargent & Lundy

STANDARD | REV.

RPJSK-001 | C

PAGE 1 OF 1

FORM GDS 2.6.1 REV. 1 (10/93)

NOTE:
ENGINEERING ROOM, SIMULATOR ROOM & SHIFT SUPERVISOR ROOM WILL BE LOCATED IN NEW BUILDING ADJACENT TO EXISTING U1 CONTROL ROOM. A NEW OPENING WILL BE REQUIRED ON THE NORTH WALL OF THE CONTROL ROOM WITH STAIRS TO PROVIDE ACCESS TO THIS NEW BUILDING.

NOTES

ENGINEERING ROOM
SIMULATOR ROOM
SHIFT SUPERVISOR ROOM
CONTROL ROOM
ELECTRONICS ROOM
TOILET
KITCHEN
LOCKERS
SPACE
CEMS
LAN
TRIP BP
DRUM LEVEL INDICATOR
CONTROL OPTIMIZATION
ASSET MANAGEMENT
PERFORMANCE MONITORING
HISTORIAN SERVER
LAN PC
(OPTION)
SIMULATOR OPERATOR STATION #1
SIMULATOR OPERATOR STATION #2
SIMULATOR OPERATOR STATION #3
SIMULATOR OPERATOR STATION #4
DCS OPERATOR STATION
LASER PRINTER
FILE CABINETS
SIMULATOR CABINETS
EWS COLOR PRINTER
46" LCD DCS LARGE CREEN
DCS-STG EWS
CTG EWS
55" LCD DCS LARGE CREEN
CTG OPERATOR STATION
STG OPERATOR STATION
LASER PRINTER (CEMS) (STG) (CTG)
(SPACE)
(B&W) (COLOR) LASER PRINTER (DCS)
NET CAB
COM CAB
HRSG #2 CAB
HRSG #1 CAB
RTU CAB
TSI
EXP 5-3
FTC 5-2T
EXP 5-2
CTLR 5-1
DROP 5
DROP 7
DROP 6
ELEV 595'-0"
ELEV 599'-0"
13'
27'
6'
15'
17'-10"
7'
20'
4'
6'
14'
24'
32'-5"
27'-7"
9'-8"
15'
2'-6"
25'
24'-6"
20'
9'-6"
6'-9"
13'

REV	DATE RELEASED	PURPOSE	PREPARED / REVIEWED / APPROVED
C	07/19/2011	ISSUED FOR USE	Y. CHEN / S. WYLIE
B	07/13/2011	ISSUED FOR USE	Y. CHEN / S. WYLIE
A	07/08/2011	FOR CLIENT COMMENTS	Y. CHEN / S. WYLIE

DRAWING RELEASE RECORD

DATE | NO. | DESCRIPTION | APPD.
REVISIONS

PLANT NORTH

KENTUCKY POWER CO.
BIG SANDY PLANT
BIG SANDY KENTUCKY

COMBINED CYCLE U1 REPOWERING
COST ESTIMATE STUDY
U1 CONTROL ROOM LAYOUT

DWG. NO. RPJSK-002
SCALE: 1"=3'-0"
DR:
CH:
DATE:
APPROVED BY

FILE NAME: RPSK-OPT1-GA-M-002.DGN

GRA_250971 3' 6'

PROFESSIONAL ENGINEER'S STAMP

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE SAFETY PRECAUTIONS FOR THE SAFETY OF ALL PERSONS LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S, INSTALLER'S PERSONNEL (OR THAT OF ITS SUBCONTRACTOR(S) PERFORMING THE WORK.

AEP AMERICAN ELECTRIC POWER
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE= DD-MMM-YYYY
SYSTEM TIME= HOUR:MINUTE

IGS0694

ATTACHMENT 1-10
Option 1 Detailed Capital Cost Estimate No. 31238B

	A	B	C	D	E	F	H	I	L	M	O	Q	R	S	T	U
1															Estimate No.:	31238B
2				AEP											Project No.:	12756-002
3				Big Sandy Plant Unit 1 Repowering Cost Estimate Study											First Issue Date:	07/29/11
4		Cost Type: Est=Estimated, B=Bid and		Option 1 - 2x2 MHI 501GAC Combustion Turbines											Revision No.:	B
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8											Labor Productivity =			1.15	Reviewer:	BJD
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13																
14																
15	**10.00**	**GENERAL SITE WORK**														**15,052,615**
16																
17	**10.10**	**CIVIL**							**0**	**5,097,390**		**68,036**			**6,423,314**	**11,520,704**
18																
19	10.10.1	Relocate Existing Metal Cleaning Waste Tank and Pumphouse							0	224,134		4,160			355,291	579,425
20		Install New Pumphouse Foundation, Tank Foundation & Containment														
21		Excavation		Est.	4500	CY		0	0	0	0.2	1,035	EXFD	88.87	91,980	91,980
22		Well Graded Compacted Granular Backfill		Est.	10000	CY		19	0	190,000	0.15	1,725	EXFD	88.87	153,301	343,301
23		Liner - 50 Mil Polyethelene Flexible Membrane		Est.	4120	SY		1.2	0	4,944	0.2	948	MSTR	78.47	74,358	79,302
24		Topsoil & Seeding		Est.	600	CY		34	0	20,400	0.35	242	MSTR	78.47	18,951	39,351
25		Concrete		Est.	45	CY		120	0	5,400	1.5	78	COND	68.54	5,320	10,720
26		Reinforcing		Est.	3	TN		950	0	2,850	22.5	78	REIN	76.92	5,971	8,821
27		Formwork		Est.	240	SF		2.25	0	540	0.2	55	FORM	98.01	5,410	5,950
28		Install New Pumphouse	See Acct. 90.40													
29		Install New 70' Dia. Tank	See Subcontracts in Acct. 90.99													Included Elsewhere
30		Relocate Existing Pumps to New Pumphouse	See Acct. 90.60													Included Elsewhere
31		Demo Existing Tank & Pumphouse	Priced Separately After Estimate Totals													
32		Existing Metal Waste Cleaning Tank Area Restoration	Priced Separately After Estimate Totals													
33																
34	10.10.2	Relocate Existing RSO Trailers							0	0		345			30,270	30,270
35		Relocate Existing RSO Trailers		Est.	2	EA			0	0	150.00	345	MECH	87.74	30,270	30,270
36																
37	10.10.3	Construction Parking & Laydown Areas Preparation							0	1,923,056		20,682			2,411,610	4,334,666
38																
39		Blaine Creek Area							0	942,506		11,812			1,387,627	2,330,133
40		Erosion & Sediment Control														
41		Silt Fence		Est.	3,700	LF		1	0	3,700	0.02	85	LAND	59.88	5,096	8,796
42		Rock Check Dams		Est.	30	EA		500	0	15,000	12	414	LAND	59.88	24,790	39,790
43		Rock Construction Entrance	30' x 100' x 8" Thick Crushed Stone	Est.	1	EA		26000	0	26,000	50	58	BCSE	101.58	5,841	31,841
44		Stormwater (Sediment) Pond Restoration at End of Construction	Sediment Removal	Est.	75	CY		0	0	0	2	173	EXFD	88.87	15,330	15,330
45		Site Grading														
46		Topsoil & Organic Stripping	6" Removal Depth	Est.	8,400	CY		0	0	0	0.05	512	ETWK	175.40	89,801	89,801
47		Soil Cut	Assume 0.75' Cut Across the Entire Area	Est.	12,000	CY		0	0	0	0.08	1,104	ETWK	175.40	193,642	193,642
48		Fill	Assume 0.75' Fill Across the Entire Area	Est.	12,000	CY		0	0	0	0.08	1,104	ETWK	175.40	193,642	193,642
49		Riprap		Est.	200	CY		30	0	6,000	0.30	69	RRAP	69.95	4,827	10,827

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13																
14																
50		Roads & Surfacing														
51		Soil Cut	Minor Grading for Access Road Widening	Est.	2,500	CY		0	0	0	0.08	230	ETWK	175.40	40,342	40,342
52		Fill	Minor Grading for Access Road Widening	Est.	2,500	CY		0	0	0	0.08	230	ETWK	175.40	40,342	40,342
53		Laydown Area Access Road - Widen Existing Roadway 18' for a Total 30' Wide Road	Includes: 6" Base Course 10 OZ/SY Geotextile 12" Subgrade Prep	Est.	6400	SY		12	0	76,800	0.07	515	BCSE	101.58	52,334	129,134
54		Laydown Area Access Road - Improve Existing 12' Wide Roadway by Adding 8" of Gravel	Includes: 6" Base Course	Est.	4300	SY		11	0	47,300	0.05	247	BCSE	101.58	25,116	72,416
55		Aggregate Area Surfacing	Total Laydown Area of 10 Acres Includes: 6" Base Course 10 OZ/SY Geotextile 12" Subgrade Prep	Est.	50000	SY		12	0	600,000	0.07	4,025	BCSE	101.58	408,860	1,008,860
56		Fencing														
57		6' High w/ 3-Strand Barbed Wire		Est.	3200	LF		30	0	96,000	0.100	368	CARP	70.49	25,940	121,940
58		24' Double Wide Swing Gate		Est.	4	EA		3500	0	14,000	50.000	230	CARP	70.49	16,213	30,213
59		Stormwater Runoff / Sediment Control Pond	Earthwork													
60		Soil Cut		Est.	3,000	CY		0	0	0	0.08	276	ETWK	175.40	48,410	48,410
61		Fill		Est.	3,000	CY		0	0	0	0.08	276	ETWK	175.40	48,410	48,410
62		4" Topsoil		Est.	650	CY		27.6	0	17,940	0.03	22	LAND	59.88	1,343	19,283
63		Grass Seeding, Fertilizing, & Mulch		Est.	1.2	AC		4930	0	5,916	240	331	MSTR	78.47	25,989	31,905
64		Riprap	Pond Inlet, Outlet, & Emergency Spillway Protection	Est.	200	CY		30	0	6,000	0.30	69	RRAP	69.95	4,827	10,827
65		Stormwater Pond Outlet Structure - CMP Riser							0	27,850		1,474			116,534	144,384
66		Excavation		Est.	1.5	CY		0	0	0	0.20	0	EXFD	88.87	31	31
67		Backfill		Est.	0.5	CY		0	0	0	0.15	0	EXFD	88.87	8	8
68		Reinforcing		Est.	0.3	TN		950	0	285	20	7	REIN	76.92	531	816
69		Concrete		Est.	2	CY		150	0	300	1.5	3	CONP	77.97	269	569
70		Piping	48" CMP	Est.	5	LF		75	0	375	4	23	YDPP	88.84	2,043	2,418
71		Piping	18" CMP	Est.	70	LF		32	0	2,240	0.75	60	YDPP	88.84	5,364	7,604
72		Grass Seeding, Fertilizing, & Mulch	For Topsoil & Spoils Waste Area	Est.	5	AC		4930	0	24,650	240	1,380	MSTR	78.47	108,289	132,939
73																
74		Area in Existing Plant							0	980,550		8,870			1,023,982	2,004,532
75		Erosion & Sediment Control														
76		Silt Fence		Est.	3,550	LF		1	0	3,550	0.02	82	LAND	59.88	4,889	8,439
77		Rock Check Dams		Est.	15	EA		500	0	7,500	12	207	LAND	59.88	12,395	19,895
78		Rock Construction Entrance	30' x 100' x 8" Thick Crushed Stone	Est.	1	EA		26000	0	26,000	50	58	BCSE	101.58	5,841	31,841
79		Stormwater (Sediment) Pond Restoration at End of Construction	Sediment Removal	Est.	75	CY		0	0	0	2	173	EXFD	88.87	15,330	15,330

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13																
14																
80		Fencing														
81		6' High w/ 3-Strand Barbed Wire		Est.	2000	LF		30	0	60,000	0.10	230	CARP	70.49	16,213	76,213
82		24' Double Wide Swing Gate		Est.	1	EA		3500	0	3,500	50	58	CARP	70.49	4,053	7,553
83		Man Gate		Est.	2	EA		500	0	1,000	12	28	CARP	70.49	1,946	2,946
84		Railroad Crossing	30' Wide, Crossing 2 Tracks, Wooden RR Tie Construction	Est.	1	LS		15000	0	15,000	180	207	RRTK	86.64	17,934	32,934
85		Site Grading														
86		Topsoil Stripping	6" Removal Depth, Includes 1 Mile Haul	Est.	8,800	CY		0	0	0	0.09	911	ETWK	175.40	159,754	159,754
87		Soil Cut		Est.	6,100	CY		0	0	0	0.08	561	ETWK	175.40	98,434	98,434
88		Fill		Est.	6,100	CY		0	0	0	0.08	561	ETWK	175.40	98,434	98,434
89		Roads & Surfacing														
90		Aggregate Area Surfacing	Includes: 6" Base Course 10 OZ/SY Geotextile 12" Subgrade Prep	Est.	72000	SY		12	0	864,000	0.07	5,796	BCSE	101.58	588,758	1,452,758
91																
92	10.10.4	Erosion & Sediment Control - New Power Block Area							0	66,000		564			38,538	104,538
93		Silt Fence		Est.	4,500	LF		1	0	4,500	0.02	104	LAND	59.88	6,198	10,698
94		Rock Check Dams		Est.	15	EA		500	0	7,500	12	207	LAND	59.88	12,395	19,895
95		Rock Construction Entrance	30' x 100' x 8" Thick Crushed Stone	Est.	2	EA		26000	0	52,000	50	115	BCSE	101.58	11,682	63,682
96		Stormwater (Sediment) Pond Restoration at End of Construction	Allowance	Est.	1	LS		2000	0	2,000	120	138	LAND	59.88	8,263	10,263
97																
98	10.10.5	Site Clearing & Stripping							0	0		2,956			518,395	518,395
99		Topsoil Stripping	6" Removal Depth, Includes 1 Mile Haul. Total 11.3 Acres.	Est.	9,000	CY		0	0	0	0.09	932	ETWK	175.40	163,385	163,385
100		Cut		Est.	11,000	CY		0	0	0	0.08	1,012	ETWK	175.40	177,505	177,505
101		Fill		Est.	11,000	CY		0	0	0	0.08	1,012	ETWK	175.40	177,505	177,505
102																
103	10.10.6	Roads & Surfacing							0	1,063,300		7,999			692,190	1,755,490
104		Plant Roads & Surfacing	Includes: 1.5" Asphalt Surface Course 1.5" Asphalt Binder Course 12" Base Course 10 OZ/SY Geotextile 12" Subgrade Prep	Est.	12500	SY		47	0	587,500	0.120	1,725	PBIT	88.22	152,180	739,680
105		Main Plant Access Road Resurfacing	Includes: 1.5" Asphalt Surface Course 1.5" Asphalt Binder Course 6" Base Course	Est.	1400	SY		29.5	0	41,300	0.090	145	PBIT	88.22	12,783	54,083

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13																
14																
106		Ammonia & Chemical Unloading Slabs	12" Reinforced Concrete, 10' x 150'	Est.	230	CY		250	0	57,500	8.000	2,116	CONP	77.97	164,985	222,485
107		New Helipad	12" Reinforced Concrete, 56' x 56'	Est.	120	CY		250	0	30,000	8.000	1,104	CONP	77.97	86,079	116,079
108		Concrete Pad Building Entrances	10" Reinforced Concrete	Est.	400	SY		80	0	32,000	1.500	690	CONP	77.97	53,799	85,799
109		Aggregate Area Surfacing	6" Base Course	Est.	25000	SY		12	0	300,000	0.070	2,013	BCSE	101.58	204,430	504,430
110		Railroad Crossing (Tank Access Inside of Coal Loop)	30' Wide, Crossing 2 Tracks, Wooden RR Tie Construction	Est.	1	LS		15000	0	15,000	180	207	RRTK	86.64	17,934	32,934
111																
112	10.10.7	Fencing							0	112,000		796			56,096	168,096
113		Plant Area Fencing														
114		6' High w/ 3-Strand Barbed Wire		Est.	2000	LF		30	0	60,000	0.100	230	CARP	70.49	16,213	76,213
115		24' Double Wide Swing Gate		Est.	4	EA		3500	0	14,000	50	230	CARP	70.49	16,213	30,213
116		Man Gate		Est.	4	EA		500	0	2,000	12.000	55	CARP	70.49	3,891	5,891
117		GSU Transformer Fencing														
118		6' High w/ 3-Strand Barbed Wire		Est.	1000	LF		30	0	30,000	0.100	115	CARP	70.49	8,106	38,106
119		20' Wide Slide Gate		Est.	3	EA		1500	0	4,500	36.000	124	CARP	70.49	8,755	13,255
120		Man Gate		Est.	3	EA		500	0	1,500	12.000	41	CARP	70.49	2,918	4,418
121																
122	10.10.8	Stormwater Drainage Trench							0	930,000		17,768			1,217,784	2,147,784
123		Cast In Place Concrete Trench	2' W x 1.5' Deep, w/ Reinforcing and HS-20 Rated Grate Covers	Est.	1900	LF		220	0	418,000	3.500	7,648	COND	68.54	524,160	942,160
124		Cast In Place Concrete Trench	3' W x 3' Deep, w/ Reinforcing and HS-20 Rated Grate Covers	Est.	1600	LF		320	0	512,000	5.500	10,120	COND	68.54	693,625	1,205,625
125																
126	10.10.9	Stormwater Runoff Pond							0	35,475		511			38,966	74,441
127		Excavation	Included w/ Site Grading													
128		4" Topsoil		Est.	800	CY		27.6	0	22,080	0.030	28	LAND	59.88	1,653	23,733
129		Grass Seeding, Fertilizing, & Mulch		Est.	1.5	AC		4930	0	7,395	240.000	414	MSTR	78.47	32,487	39,882
130		Riprap	For Pond Inlet Areas	Est.	200	CY		30	0	6,000	0.300	69	RRAP	69.95	4,827	10,827
131																
132	10.10.10	Stormwater Pond Outlet Structure	Allowance for Pond Drainage Outlet Structure, Either by Jacking Under RR Tracks & Gravity Drainage to the River or by Pumping to an Existing Outfall.	Est.	1	LS		145000	0	145,000	4500	5,175	EXFD	88.87	459,902	604,902
133																
134	10.10.11	Temporary Construction Guard House	Allowance	Est.	1	LS	0	20000	0	20,000	500.000	575	CARP	70.49	40,532	60,532
135																
136	10.10.12	Concrete Filled Pipe Bollards	Includes Installation Labor	Est.	100	EA	0	250	0	25,000						25,000
137																

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13																
14																
138	10.10.13	Spur Track Upgrade							0	548,425		6,484			561,748	1,110,173
139		Remove and Replace 8" of Ballast	Includes Disposal of Removed Ballast	Est.	2300	LF	0	12.25	0	28,175	0.160	423	RRTK	86.64	36,666	64,841
140		Replace 75% of the Existing Wooden Railroad Ties	Includes Tie Plates, Spikes, and Bolts	Est.	2300	LF	0	80	0	184,000	0.850	2,248	RRTK	86.64	194,788	378,788
141		Remove the Existing Rail and Replace with 132-lb Rail		Est.	2300	LF	0	87.5	0	201,250	1.050	2,777	RRTK	86.64	240,621	441,871
142		Replace Existing #8 Turnouts		Est.	3	EA	0	45000	0	135,000	300.000	1,035	RRTK	86.64	89,672	224,672
143																
144	10.10.14	Install New Stops at Track Sections Being Demolished							0	5,000		23			1,993	6,993
145		Track Demolition	Included w/ Demolition & Removal Costs at End of This Estimate													Included Elsewhere
146		Rail Stops (Dead Ends)		Est.	1	EA	0	5000	0	5,000	20	23	RRTK	86.64	1,993	6,993
147																
166	**10.89**	**SUBTOTAL - DIRECT COSTS, GENERAL SITE WORK**							**0**	**5,097,390**		**68,036**		**94.41**	**6,423,314**	**11,520,704**
167																
168	**10.90**	**CONSTRUCTION INDIRECTS, GENERAL SITE WORK**							**0**	**1,197,887**		**5,916**			**2,334,024**	**3,531,911**
169		Additional Crane Allowance			1	LS				0					0	0
170		Mobilization / Demobilization - Included in Wage Rates Above														
171		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
172		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						5,916		94.41	559,000	559,000
173		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					7,395				586,711	586,711
174		Per Diem	None		0.00	HR						0			0	0
175		Consumables - % of Subtotal Above			0.5	%				25,487					32,117	57,604
176		Freight on Material - % of Subtotal Above			5.0	%				254,870						254,870
177		Freight on Equipment - % of Subtotal Above			5.0	%			0							0
178		Scaffolding - % of Subtotal Above			3.0	%				152,922					192,699	345,621
179		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				764,609					963,497	1,728,106
181	**10.98**	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, GENERAL SITE WORK**							**0**	**6,295,277**		**73,952**		**118.42**	**8,757,338**	**15,052,615**
182																
183	**10.99**	**SUBCONTRACTS**							**0**	**0**		**0**			**0**	**0**
186																
187	**10.00**	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, GENERAL SITE WORK**							**0**	**6,295,277**		**73,952**		**118.42**	**8,757,338**	**15,052,615**
188																
189																
190																

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13																
14																
191	**11.00**	**UNDERGROUND**														**24,530,759**
192																
193	**11.10**	**CIVIL**							**7,500**	**601,925**		**33,223**			**2,925,082**	**3,534,507**
194																
195		Site Drainage System														
196	11.10.1	Oily Water Sewer System							6,000	272,075		8,527			757,636	1,035,711
197		Piping	6" CS	Est.	1700	LF		52	0	88,400	1.190	2,326	YDPP	88.84	206,682	295,082
198		Piping	8" CS	Est.	1600	LF		69	0	110,400	1.260	2,318	YDPP	88.84	205,967	316,367
199		Post Indicator Valve		Est.	8	EA	750	0	6,000	0	6.000	55	YDPP	88.84	4,904	10,904
200		Manholes	4' Internal Diameter	Est.	43	EA		1575	0	67,725	20.000	989	YDPP	88.84	87,863	155,588
201		Excavation / Backfill		Est.	7400	CY		0	0	0	0.30	2,553	EXFD	88.87	226,885	226,885
202		Bedding Material		Est.	370	CY		15	0	5,550	0.67	285	EXFD	88.87	25,336	30,886
203																
204	11.10.2	Modifications to Existing Storm Sewers							0	128,300		6,261			553,979	682,279
205		Underground Pipe Removal	Allowance for 24" Pipe, 5' Deep	Est.	2200	LF		0	0	0	0.300	759	YDPP	88.84	67,430	67,430
206		Removal of Manholes & Catchbasins		Est.	11	EA		0	0	0	6.000	76	WRKG	119.15	9,043	9,043
207		Excavation / Backfill	For Underground Pipe & Manhole Removal	Est.	3700	CY		0	0	0	0.200	851	EXFD	88.87	75,628	75,628
208		Rerouting of Existing Storm Sewers														
209		Piping	30" CHDPE	Est.	650	LF		45	0	29,250	0.75	561	YDPP	88.84	49,806	79,056
210		Piping	15" CHDPE	Est.	200	LF		18	0	3,600	0.55	127	YDPP	88.84	11,238	14,838
211		Manholes	5' Internal Diameter	Est.	5	EA		2000	0	10,000	24	138	YDPP	88.84	12,260	22,260
212		Excavation / Backfill		Est.	2500	CY		0	0	0	0.30	863	EXFD	88.87	76,650	76,650
213		Bedding Material		Est.	60	CY		15	0	900	0.67	46	EXFD	88.87	4,108	5,008
214		Existing Storm Sewer Improvement / Reinforcement Beneath PDC														
215		Underground Pipe Removal	Allowance for 42" Pipe, 10' Deep	Est.	200	LF		0	0	0	0.7	161	YDPP	88.84	14,303	14,303
216		Piping	42" CHDPE, 10' Deep	Est.	200	LF		79	0	15,800	0.960	221	YDPP	88.84	19,616	35,416
217		Hydro Excavation / Backfill		Est.	1100	CY		17	0	18,700	1.5	1,898	EXFD	88.87	168,631	187,331
218		Bedding Material		Est.	170	CY		15	0	2,550	0.67	131	EXFD	88.87	11,641	14,191
219		Flowable Fill (CLSM)		Est.	500	CY		95	0	47,500	0.75	431	CONP	77.97	33,625	81,125
220																
221	11.10.3	Stormwater Drainage System							1,500	57,000		2,608			231,703	290,203
222		Piping	6" CS	Est.	100	LF		52	0	5,200	1.190	137	YDPP	88.84	12,158	17,358
223		Piping	18" Dia. CHDPE	Est.	700	LF		20	0	14,000	0.600	483	YDPP	88.84	42,910	56,910
224		Piping	24" Dia. CHDPE	Est.	450	LF		28	0	12,600	0.620	321	YDPP	88.84	28,504	41,104
225		Manholes	4' Internal Diameter	Est.	7	EA		1575	0	11,025	20.000	161	YDPP	88.84	14,303	25,328
226		Manholes	5' Internal Diameter	Est.	3	EA		2475	0	7,425	32.000	110	YDPP	88.84	9,808	17,233
227		Post Indicator Valve		Est.	2	EA	750	0	1,500	0	6.000	14	YDPP	88.84	1,226	2,726
228		Excavation / Backfill		Est.	3000	CY		0	0	0	0.30	1,035	EXFD	88.87	91,980	91,980
229		Bedding Material		Est.	450	CY		15	0	6,750	0.67	347	EXFD	88.87	30,813	37,563
230																
231	11.10.4	Sanitary Sewer System	Use Existing						0	0		0			0	0
232																

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13																
14																
233	11.10.5	Mechanical Excavation (for process pipe trenches)							0	0		12,118			1,076,938	1,076,938
234		Depths - 5' to 10'	25,000 LF of trench @ 2.81 CY/LF	Est.	70,250	CY		0	0	0	0.15	12,118	EXFD	88.87	1,076,938	1,076,938
235		Depths - over 10'	None	Est.	0	CY		0	0	0	0.25	0	EXFD	88.87	0	0
236																
237	11.10.6	Hydro Excavation for Mechanical and Electrical Services	Allowance, Based on 1500' x 5' x 4' Deep	Est.	1150	CY		17	0	19,550	1.500	1,984	EXFD	88.87	176,296	195,846
238																
239	11.10.7	Relocation of Miscellaneous Underground Utilities	Allowance	Est.	1	LS		125000	0	125,000	1,500.000	1,725	ECND	74.51	128,530	253,530
240																
241	**11.20**	**CONCRETE**							**0**	**9,000**		**345**			**23,646**	**32,646**
242																
243	11.20.1	Concrete Thrust Blocks for Piping Systems	Allowance	Est.	50	Ea.		180.00	0	9,000	6.00	345	COND	68.54	23,646	32,646
244																
251	**11.50**	**ELECTRICAL**							**0**	**1,627,401**		**53,121**			**4,497,235**	**6,124,636**
252																
253	11.50.1	Electrical Ductbanks & Trenches							0	555,725		36,436			3,128,297	3,684,022
254		Ductbanks	Per RPESK-018 & RPESK-1-019													
255		Excavation / Backfill	11.5 ft below ground	Est.	56200	CY		0	0	0	0.30	19,389	EXFD	88.87	1,723,100	1,723,100
256		Concrete		Est.	2810	CY		120	0	337,200	1.90	6,140	COND	68.54	420,825	758,025
257		Reinforcing		Est.	34	TN		950	0	32,300	22.50	880	REIN	76.92	67,670	99,970
258		Formwork		Est.	33700	SF		2.25	0	75,825	0.20	7,751	FORM	98.01	759,676	835,501
259		Manholes		Est.	14	EA			0	78,500		2,099			143,848	222,348
260		14'x14'x12' deep		Est.	1	Ea		20000	0	20,000	380	437	COND	68.54	29,952	49,952
261		12'x12'x10' deep		Est.	1	Ea		15000	0	15,000	350	403	COND	68.54	27,587	42,587
262		6'x6'x8' deep		Est.	9	Ea		4000	0	36,000	100	1,035	COND	68.54	70,939	106,939
263		4'x4'x6' deep		Est.	3	Ea		2500	0	7,500	65	224	COND	68.54	15,370	22,870
264																
265		Trenwa Trench	UAT 1B to Transformer PDC													
266		Excavation / Backfill		Est.	147	CY		0	0	0	0.30	51	EXFD	88.87	4,507	4,507
267		Trenwa- MS-20 With concrete cover	Road crossing type	Est.	220	LF		145	0	31,900	0.50	127	COND	68.54	8,670	40,570
268																
269	11.50.2	Conduits	Per RPESK-018 & 019						0	807,573		11,153			830,994	1,638,567
270		Conduit-Below Grade in Ductruns														
271		2" PVC Conduit		Est.	20,091	LF		3.88	0	77,953	0.04	1,017	ECND	74.51	75,747	153,700
272		3" PVC Conduit		Est.	8,437	LF		7.95	0	67,074	0.08	786	ECND	74.51	58,558	125,632
273		4" PVC Conduit		Est.	38,369	LF		11.75	0	450,836	0.10	4,457	ECND	74.51	332,058	782,894
274		5" PVC Conduit		Est.	1,808	LF		16.2	0	29,290	0.14	291	ECND	74.51	21,689	50,979
275		6" PVC Conduit		Est.	1,143	LF		22.5	0	25,718	0.20	263	ECND	74.51	19,588	45,305
276		2" RGS Conduit		Est.	1,816	LF		8.76	0	15,908	0.26	551	ECND	74.51	41,080	56,988
277		3" RGS Conduit		Est.	1,400	LF		18.28	0	25,592	0.48	779	ECND	74.51	58,031	83,623
278		4" RGS Conduit		Est.	3,864	LF		25.84	0	99,846	0.61	2,689	ECND	74.51	200,394	300,240
279		5" RGS Conduit		Est.	128	LF		45.6	0	5,837	0.85	124	ECND	74.51	9,271	15,107
280		6" RGS Conduit		Est.	136	LF		70	0	9,520	1.25	196	ECND	74.51	14,578	24,098
281																

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13																
14																
282	11.50.3	Grounding	Per RPESK-010						0	187,584		4,265			414,668	602,252
283		Ground Rod (3/4" -10'L)		Est.	141	EA		175	0	24,675	1.500	243	WIRE	97.23	23,649	48,324
284		Exothermic weld (Ground cable to Ground rods +test)		Est.	141	EA		15	0	2,115	1.500	243	WIRE	97.23	23,649	25,764
285		ExothermicTee weld		Est.	106	EA		20	0	2,120	1.750	213	WIRE	97.23	20,742	22,862
286		#4/0 KCMIL Bare cooper wire		Est.	37,598	EA		3.0825	0	115,896	0.060	2,594	WIRE	97.23	252,240	368,136
287		#500 KCMIL Bare cooper wire		Est.	1,320	EA		6.72	0	8,870	0.087	131	WIRE	97.23	12,767	21,637
288		#4/0 KCMIL Bare cooper wire - Duct Banks		Est.	11,000	EA		3.0825	0	33,908	0.060	759	WIRE	97.23	73,798	107,705
289		Megger resistance test	Testing & Documentation	Est.	1	LS			0	0	70	80	WIRE	97.23	7,824	7,824
290																
291	11.50.4	Cathodic Protection	Per RPESK-008						0	76,519		1,268			123,275	199,794
292		Transformer Rectifier	15KVA, 480	Est.	2	EA		25000	0	50,000	40.000	92	WIRE	97.23	8,945	58,945
293		Anode Junction Box		Est.	4	EA		500	0	2,000	6.000	28	WIRE	97.23	2,684	4,684
294		Bond Box		Est.	3	EA		150	0	450	4.000	14	WIRE	97.23	1,342	1,792
295		Bond Testing Station		Est.	5	LS		350	0	1,750	4.000	23	WIRE	97.23	2,236	3,986
296		Electrode		Est.	10	EA		500	0	5,000	6.000	69	WIRE	97.23	6,709	11,709
297		SPL FBR Anode		Est.	6,000	LF		2.7	0	16,200	0.120	828	WIRE	97.23	80,506	96,706
298		#6 PVC Cable		Est.	1,865	LF		0.6	0	1,119	0.100	214	WIRE	97.23	20,853	21,972
299																
302	**11.60**	**MECHANICAL**							**100,000**	**0**		**1,288**			**114,426**	**214,426**
303																
304	11.60.1	Oil/Water Separator Including Lift Stations	500 GPM w/ Integral Lift Station	Est.	2	EA	50000	0	100,000	0	560.000	1,288	YDPP	88.84	114,426	214,426
305																
306	11.60.2	Sanitary Sewage Treatment Plant	Use Existing Plant System													Existing
307																
308	**11.70**	**PIPING**							**0**	**3,016,428**		**58,794**			**5,223,237**	**8,239,664**
309																
310	11.70.1	Large Bore BOP Pipe 2-1/2" & Larger - Below Ground	Incl. Coating & Wrapping		54,150	LF			0	3,016,428		58,794			5,223,237	8,239,664
311		Off-Site Fuel Gas Supply Line	By Others													
312		Ammonia System	SS, 3"dia. Sch 40S	Est.	600	LF		46.6	0	27,960	0.83	573	YDPP	88.84	50,879	78,839
313		Blowdown Drains System	CS, 10" dia., Sch. 40	Est.	350	LF		103.6	0	36,260	1.21	487	YDPP	88.84	43,267	79,527
314		Bottle Gas System	SS, 3"dia. Sch 40S	Est.	4,200	LF		46.6	0	195,720	0.83	4,009	YDPP	88.84	356,151	551,871
315		Bottle Gas System	SS, 3"dia. Sch 40S w/ PVC Secondary Containment	Est.	1,400	LF		75	0	105,000	1.50	2,415	YDPP	88.84	214,549	319,549
316		Chilled Water System	HDPE, SDR11, 24" dia.	Est.	1,800	LF		84.7	0	152,460	1.41	2,919	YDPP	88.84	259,297	411,757
317		Circulating Water Blowdown System	HDPE, SDR11, 10" dia.	Est.	500	LF		22	0	11,000	0.85	489	YDPP	88.84	43,421	54,421
318		Fire Protection System	HDPE(FM), SDR9, 12" dia.	Est.	11,500	LF		36.5	0	419,750	1.09	14,415	YDPP	88.84	1,280,651	1,700,401
319		Fuel Gas System	CS, 16" dia. Sch 60	Est.	2,100	LF		288.3	0	605,430	2.38	5,748	YDPP	88.84	510,626	1,116,056
320		Fuel Gas System	CS, 8" dia. Sch 60	Est.	300	LF		85	0	25,500	1.39	480	YDPP	88.84	42,603	68,103
321		Fuel Gas System	CS, 6" dia. Sch 60	Est.	250	LF		55.75	0	13,938	1.05	302	YDPP	88.84	26,819	40,756
322		Fuel Oil System	Encased CS, 8" dia. Sch 40	Est.	3,000	LF		220	0	660,000	1.60	5,520	YDPP	88.84	490,397	1,150,397
323		Fuel Oil System	Encased CS, 6" dia. Sch 40	Est.	600	LF		120	0	72,000	1.40	966	YDPP	88.84	85,819	157,819
324		Fuel Oil Demin Water System	HDPE, SDR11, 4" dia.	Est.	3,600	LF		2.8	0	10,080	0.40	1,656	YDPP	88.84	147,119	157,199
325		Instrument Air System	SS, 3"dia. Sch 40S	Est.	4,100	LF		46.6	0	191,060	0.83	3,913	YDPP	88.84	347,671	538,731
326		Matal Cleaning Waste System	CS, 12" dia. Sch Std.	Est.	1,400	LF		175	0	245,000	1.43	2,302	YDPP	88.84	204,536	449,536

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13																
14																
327		Oily Water Drains System	HDPE, SDR11, 4" dia.	Est.	1,100	LF		2.8	0	3,080	0.40	506	YDPP	88.84	44,953	48,033
328		Oily Water Drains System	CS, 3" dia., Sch. 40	Est.	2,000	LF		19.2	0	38,400	0.67	1,541	YDPP	88.84	136,902	175,302
329		Potable Water System	HDPE, SDR11, 4" dia.	Est.	3,700	LF		2.8	0	10,360	0.40	1,702	YDPP	88.84	151,206	161,566
330		Potable Water System	HDPE, SDR11, 3" dia.	Est.	1,000	LF		2.1	0	2,100	0.46	529	YDPP	88.84	46,996	49,096
331		Raw Water System	HDPE, SDR11, 20" dia.	Est.	1,000	LF		60.7	0	60,700	1.26	1,449	YDPP	88.84	128,729	189,429
332		Service Air System	CS, 3" dia., Sch. 40	Est.	4,300	LF		19.2	0	82,560	0.67	3,313	YDPP	88.84	294,340	376,900
333		Service Water System	HDPE, SDR9, 20" dia.	Est.	200	LF		72.8	0	14,560	1.45	334	YDPP	88.84	29,628	44,188
334		Service Water System	HDPE, SDR9, 8" dia.	Est.	500	LF		14.1	0	7,050	0.83	477	YDPP	88.84	42,399	49,449
335		Service Water System	HDPE, SDR9, 4" dia.	Est.	3,600	LF		3.4	0	12,240	0.46	1,904	YDPP	88.84	169,187	181,427
336		Waste Water System	HDPE, SDR11, 12" dia.	Est.	300	LF		30.4	0	9,120	0.95	328	YDPP	88.84	29,117	38,237
337		Waste Water System	HDPE, SDR11, 6" dia.	Est.	750	LF		6.8	0	5,100	0.60	518	YDPP	88.84	45,975	51,075
338																
341	**11.89**	**SUBTOTAL - DIRECT COSTS, UNDERGROUND**							**107,500**	**5,254,753**		**146,771**		**87.10**	**12,783,626**	**18,145,879**
342																
343	**11.90**	**CONSTRUCTION INDIRECTS, UNDERGROUND**							**5,375**	**1,234,867**		**12,763**			**4,644,638**	**5,884,880**
344		Additional Crane Allowance			1	LS				0					0	0
345		Mobilization / Demobilization - Included in Wage Rates Above														
346		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
347		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						12,763		87.10	1,112,000	1,112,000
348		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					15,953				1,167,668	1,167,668
349		Per Diem	None		0.00	HR						0			0	0
350		Consumables - % of Subtotal Above			0.5	%				26,274					63,918	90,192
351		Freight on Material - % of Subtotal Above			5.0	%				262,738						262,738
352		Freight on Equipment - % of Subtotal Above			5.0	%			5,375							5,375
353		Scaffolding - % of Subtotal Above			3.0	%				157,643					383,509	541,151
354		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				788,213					1,917,544	2,705,757
356	**11.98**	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, UNDERGROUND**							**112,875**	**6,489,620**		**159,533**		**109.25**	**17,428,264**	**24,030,759**
357																
358	**11.99**	**SUBCONTRACTS**	Jack & Bore Under RR Tracks						**0**	**150,000**		**0**			**350,000**	**500,000**
359																
360		Jack & Bore Subcontract - Utility Piping Under Existing Coal Loop RR Track Near Metal Cleaning Waste Tank			1	LS				150,000					350,000	500,000
361																
362	**11.00**	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, UNDERGROUND**							**112,875**	**6,639,620**		**159,533**		**111.44**	**17,778,264**	**24,530,759**
363																
364																
365																

	A	B	C	D	E	F	H	I	L	M	O	Q	R	S	T	U
1															Estimate No.:	31238B
2				AEP											Project No.:	12756-002
3				Big Sandy Plant Unit 1 Repowering Cost Estimate Study											First Issue Date:	07/29/11
4		Cost Type: Est=Estimated, B=Bid and		Option 1 - 2x2 MHI 501GAC Combustion Turbines											Revision No.:	B
5		OPB=Other Project Bid		Conceptual Project Cost Estimate											Revision Date:	08/26/11
6		DOR:		-CONFIDENTIAL-											Run Date:	08/26/11
7											Wage Rates Based on:			11BS_90NMA	Preparer:	TJM
8											Labor Productivity =			1.15	Reviewer:	BJD
9																
10																
11																
12	Account No.	Item Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equipment Cost	Unit Material Cost	Total Equipment Cost	Total Material Cost	Unit Man-hours (Base)	Total Man-hours, w/ Productivity	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Total Projected Cost
13																
14																
366	**21.00**	**CTG A**														**79,472,035**
367																
370	**21.20**	**CONCRETE**							**0**	**466,325**		**11,102**			**890,088**	**1,356,413**
371																
372	21.20.1	Combustion Turbine A Foundation	Isolated Mat Foundation, 110' x 35'						0	278,550		4,344			332,214	610,764
373		Excavation		Est.	1250	CY		0	0	0	0.20	288	EXFD	88.87	25,550	25,550
374		Backfill		Est.	180	CY		0	0	0	0.15	31	EXFD	88.87	2,759	2,759
375		Concrete		Est.	1000	CY		120	0	120,000	1.90	2,185	COND	68.54	149,760	269,760
376		Reinforcing		Est.	48	TN		950	0	45,600	22.50	1,242	REIN	76.92	95,535	141,135
377		Formwork		Est.	2600	SF		2.25	0	5,850	0.20	598	FORM	98.01	58,610	64,460
378		Piles	16" Dia. X 68' Long Augercast Piles	Est.	45	EA		2380	0	107,100	incl w/matl	incl w/matl				107,100
379																
380	21.20.2	Combustion Turbine A Piers / Pedestal							0	161,550		5,756			471,466	633,016
381		Concrete		Est.	300	CY		120	0	36,000	1.90	656	COND	68.54	44,928	80,928
382		Reinforcing		Est.	30	TN		950	0	28,500	22.50	776	REIN	76.92	59,709	88,209
383		Embeds		Est.	15	TN		5,000	0	75,000	120.00	2,070	CARP	70.49	145,914	220,914
384		Formwork		Est.	4500	SF		2.25	0	10,125	0.20	1,035	FORM	98.01	101,440	111,565
385		Formwork Shoring	Allowance	Est.	2650	SF		4.5	0	11,925	0.40	1,219	FORM	98.01	119,474	131,399
386																
387	21.20.3	Combustion Turbine A Excitation & Isolation Transformer Foundations	Includes Mat, Piers, Firewalls, and Containment						0	20,050		816			71,172	91,222
388		Excavation		Est.	100	CY		0	0	0	0.20	23	EXFD	88.87	2,044	2,044
389		Backfill		Est.	40	CY		0	0	0	0.15	7	EXFD	88.87	613	613
390		Concrete		Est.	90	CY		120	0	10,800	1.90	197	COND	68.54	13,478	24,278
391		Reinforcing		Est.	5	TN		950	0	4,750	22.50	129	REIN	76.92	9,952	14,702
392		Formwork		Est.	2000	SF		2.25	0	4,500	0.20	460	FORM	98.01	45,085	49,585
393																
394	21.20.4	Combustion Turbine A Miscellaneous Equipment Pads	Pads in Building and Small Foundations Outside Building						0	6,175		186			15,236	21,411
395		Concrete		Est.	30	CY		120	0	3,600	1.90	66	COND	68.54	4,493	8,093
396		Reinforcing		Est.	2	TN		950	0	1,900	22.50	52	REIN	76.92	3,981	5,881
397		Formwork		Est.	300	SF		2.25	0	675	0.20	69	FORM	98.01	6,763	7,438
398																
399	**21.30**	**STRUCTURAL STEEL**							**0**	**6,712**		**61**			**5,336**	**12,048**
400																
401	21.30.1	Miscellaneous Steel for Transformer Containments							0	6,712		61			5,336	12,048
402		Framing		Est.	0.5	TN	0	3710	0	1,855	22.000	13	STST	104.09	1,317	3,172
403		Grating	1-1/2" Galvanized	Est.	300	SF	0	16.19	0	4,857	0.14	48	GALL	83.21	4,019	8,876
406																
407	**21.45**	**PAINTING / COATING**							**0**	**0**		**1,208**			**81,470**	**81,470**
408																
409	21.45.1	Touch Up Painting, CTG A	Allowance at 3.5% of CT Installation Manhours	Est.	1	LS			0	0	1,050.00	1,208	PNTR	67.47	81,470	81,470
413																

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8											Labor Productivity =			1.15	Reviewer:	BJD
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12	Account No.	Item Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equipment Cost	Unit Material Cost	Total Equipment Cost	Total Material Cost	Unit Man-hours (Base)	Total Man-hours, w/ Productivity	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Total Projected Cost
13																
14																
414	**21.60**	**MECHANICAL**							**72,045,000**	**0**		**36,386**			**3,192,513**	**75,237,513**
415																
416	21.60.1	Combustion Turbine & Accessories							70,880,000	0		34,995			3,070,417	73,950,417
417		Combustion Turbine	MHI M501GAC C/T. - Nominal 268 mW, Firing Natural Gas or Fuel Oil, w/Dry Low Nox Burners, Inlet Air Filters, Standard Accessories.	B	1	Ea.	68880000		68,880,000	0	30,000	34,500	MECH	87.74	3,027,030	71,907,030
418		Pulse Type Inlet Air Filter	Included Above													Included Above
419		Water Wash Skid	(1) Included Above, Common to (2) CTG's	Est.	1	Ea.			0	0	30	35	MECH	87.74	3,027	3,027
420		Dual Fuel Capability	Included Above													Included Above
421		Skid Interconnecting Piping	Included Above													Included Above
422		Ocean Freight	Included Above													Included Above
423		Delivery from Port of Import to Station	Included Above													Included Above
424		Technical Field Assistance (TFA)	Included Above													Included Above
425		Training	Included Above													Included Above
426		Special Acoustic Treatments - C/T	Not Included													Not Included
427		Inlet Chilling Coils	Allowance	Est.	1	LS	2000000		2,000,000	0	400	460	MECH	87.74	40,360	2,040,360
428																
429	21.60.2	Fuel Gas Conditioning							1,150,000	0		805			70,631	1,220,631
430		Fuel Gas Conditioning Skid	Skid Mounted, Includes Separators, Coalescing Filters, & Dewpoint Heater. Serves (1) C/T's	Est.	1	Ea.	1150000		1,150,000	0	700	805	MECH	87.74	70,631	1,220,631
431		Fuel Gas Startup Electric Heater	Included Above		1	Ea.										Included Above
432																
433	21.60.3	Heat Exchangers							0	0		518			45,405	45,405
434		Fuel Gas Preheater (Performance Heater)	Equipment Furnished w/ Major Equipment	Est.	1	Ea.	0		0	0	450	518	MECH	87.74	45,405	45,405
435																
436	21.60.4	Shop Fabricated Tanks							15,000	0		69			6,060	21,060
437		Water Wash Drain Tank	(1) 100% per C/T	Est.	1	Ea.	15000		15,000	0	60	69	TANK	87.82	6,060	21,060
438																
443	**21.89**	**SUBTOTAL - DIRECT COSTS, CTG A**							**72,045,000**	**473,037**		**48,756**		**85.52**	**4,169,407**	**76,687,444**
444																
445	**21.90**	**CONSTRUCTION INDIRECTS, CTG A**							**158,250**	**111,164**		**4,240**			**1,515,178**	**1,784,591**
446		Additional Crane Allowance			1	LS				0					0	0
447		Mobilization / Demobilization - Included in Wage Rates Above														
448		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
449		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						4,240		85.52	363,000	363,000
450		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					5,300				380,837	380,837

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3								Big Sandy Plant Unit 1 Repowering Cost Estimate Study							First Issue Date:	07/29/11
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5		OPB=Other Project Bid						Conceptual Project Cost Estimate							Revision Date:	08/26/11
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8											Labor Productivity =			1.15	Reviewer:	BJD
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12	Account No.	Item Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equipment Cost	Unit Material Cost	Total Equipment Cost	Total Material Cost	Unit Man-hours (Base)	Total Man-hours, w/ Productivity	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Total Projected Cost
13																
14																
451		Per Diem	None		0.00	HR						0			0	0
452		Consumables - % of Subtotal Above			0.5	%				2,365					20,847	23,212
453		Freight on Material - % of Subtotal Above			5.0	%				23,652						23,652
454		Freight on Equipment - % of Subtotal Above	C/T Excluded.		5.0	%			158,250							158,250
455		Scaffolding - % of Subtotal Above			3.0	%				14,191					125,082	139,273
456		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				70,956					625,411	696,367
458	21.98	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, CTG A**							**72,203,250**	**584,201**		**52,996**		**107.27**	**5,684,584**	**78,472,035**
459																
460	21.99	**SUBCONTRACTS**							**0**	**0**		**0**			**1,000,000**	**1,000,000**
461																
462		Heavy Haul Subcontract for CTG A Offloading & Staging	Allowance		1	LS									1,000,000	1,000,000
463																
464	21.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, CTG A**							**72,203,250**	**584,201**		**52,996**		**126.13**	**6,684,584**	**79,472,035**
465																
466																
467																
468	**22.00**	**CTG B**														**79,467,172**
469																
472	**22.20**	**CONCRETE**							**0**	**466,325**		**11,102**			**890,088**	**1,356,413**
473																
474	22.20.1	Combustion Turbine B Foundation	Isolated Mat Foundation, 110' x 35'						0	278,550		4,344			332,214	610,764
475		Excavation		Est.	1250	CY		0	0	0	0.20	288	EXFD	88.87	25,550	25,550
476		Backfill		Est.	180	CY		0	0	0	0.15	31	EXFD	88.87	2,759	2,759
477		Concrete		Est.	1000	CY		120	0	120,000	1.90	2,185	COND	68.54	149,760	269,760
478		Reinforcing		Est.	48	TN		950	0	45,600	22.50	1,242	REIN	76.92	95,535	141,135
479		Formwork		Est.	2600	SF		2.25	0	5,850	0.20	598	FORM	98.01	58,610	64,460
480		Piles	16" Dia. X 68' Long Augercast Piles	Est.	45	EA		2380	0	107,100	incl w/matl	incl w/matl				107,100
481																
482	22.20.2	Combustion Turbine B Piers / Pedestal							0	161,550		5,756			471,466	633,016
483		Concrete		Est.	300	CY		120	0	36,000	1.90	656	COND	68.54	44,928	80,928
484		Reinforcing		Est.	30	TN		950	0	28,500	22.50	776	REIN	76.92	59,709	88,209
485		Embeds		Est.	15	TN		5,000	0	75,000	120.00	2,070	CARP	70.49	145,914	220,914
486		Formwork		Est.	4500	SF		2.25	0	10,125	0.20	1,035	FORM	98.01	101,440	111,565
487		Formwork Shoring	Allowance	Est.	2650	SF		4.5	0	11,925	0.40	1,219	FORM	98.01	119,474	131,399
488																
489	22.20.3	Combustion Turbine B Excitation & Isolation Transformer Foundations	Includes Mat, Piers, Firewalls, and Containment						0	20,050		816			71,172	91,222
490		Excavation		Est.	100	CY		0	0	0	0.20	23	EXFD	88.87	2,044	2,044
491		Backfill		Est.	40	CY		0	0	0	0.15	7	EXFD	88.87	613	613
492		Concrete		Est.	90	CY		120	0	10,800	1.90	197	COND	68.54	13,478	24,278
493		Reinforcing		Est.	5	TN		950	0	4,750	22.50	129	REIN	76.92	9,952	14,702
494		Formwork		Est.	2000	SF		2.25	0	4,500	0.20	460	FORM	98.01	45,085	49,585

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13																
14																
495																
496	22.20.4	Combustion Turbine B Miscellaneous Equipment Pads	Pads in Building and Small Foundations Outside Building						0	6,175		186			15,236	21,411
497		Concrete		Est.	30	CY		120	0	3,600	1.90	66	COND	68.54	4,493	8,093
498		Reinforcing		Est.	2	TN		950	0	1,900	22.50	52	REIN	76.92	3,981	5,881
499		Formwork		Est.	300	SF		2.25	0	675	0.20	69	FORM	98.01	6,763	7,438
500																
501	**22.30**	**STRUCTURAL STEEL**							**0**	**6,712**		**61**			**5,336**	**12,048**
502																
503	22.30.1	Miscellaneous Steel for Transformer Containments							0	6,712		61			5,336	12,048
504		Framing		Est.	0.5	TN	0	3710	0	1,855	22.00	13	STST	104.09	1,317	3,172
505		Grating	1-1/2" Galvanized	Est.	300	SF	0	16.19	0	4,857	0.14	48	GALL	83.21	4,019	8,876
506																
509	**22.45**	**PAINTING / COATING**							**0**	**0**		**1,208**			**81,470**	**81,470**
510																
511	22.45.1	Touch Up Painting, CTG B	Allowance at 3.5% of CT Installation Manhours	Est.	1	LS			0	0	1,050.00	1,208	PNTR	67.47	81,470	81,470
512																
517	**22.60**	**MECHANICAL**							**72,045,000**	**0**		**36,352**			**3,189,486**	**75,234,486**
518																
519	22.60.1	Combustion Turbine & Accessories							70,880,000	0		34,960			3,067,390	73,947,390
520		Combustion Turbine	MHI M501GAC C/T. - Nominal 268 mW, Firing Natural Gas or Fuel Oil, w/Dry Low Nox Burners, Inlet Air Filters, Standard Accessories.	B	1	Ea.	68880000		68,880,000	0	30,000	34,500	MECH	87.74	3,027,030	71,907,030
521		Pulse Type Inlet Air Filter	Included Above													Included Above
522		Water Wash Skid	Common to (2) C/T's, Included w/ CTG A													Included Elsewhere
523		Dual Fuel Capability	Included Above													Included Above
524		Skid Interconnecting Piping	Included Above													Included Above
525		Ocean Freight	Included Above													Included Above
526		Delivery from Port of Import to Station	Included Above													Included Above
527		Technical Field Assistance (TFA)	Included Above													Included Above
528		Training	Included Above													Included Above
529		Special Acoustic Treatments - C/T	Not Included													Not Included
530		Inlet Chilling Coils	Allowance	Est.	1	LS	2000000		2,000,000	0	400	460	MECH	87.74	40,360	2,040,360
531																
532	22.60.2	Fuel Gas Conditioning							1,150,000	0		805			70,631	1,220,631
533		Fuel Gas Conditioning Skid	Skid Mounted, Includes Separators, Coalescing Filters, & Dewpoint Heater. Serves (1) C/T's	Est.	1	Ea.	1150000		1,150,000	0	700	805	MECH	87.74	70,631	1,220,631
534		Fuel Gas Startup Electric Heater	Included Above		1	Ea.										Included Above
535																

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13																
14																
536	22.60.3	Heat Exchangers							0	0		518			45,405	45,405
537		Fuel Gas Preheater (Performance Heater)	Equipment Furnished w/ Major Equipment	Est.	1	Ea.	0		0	0	450	518	MECH	87.74	45,405	45,405
538																
539	22.60.4	Shop Fabricated Tanks							15,000	0		69			6,060	21,060
540		Water Wash Drain Tanks	(1) 100% per C/T	Est.	1	Ea.	15000		15,000	0	60	69	TANK	87.82	6,060	21,060
541																
546	**22.89**	**SUBTOTAL - DIRECT COSTS, CTG B**							**72,045,000**	**473,037**		**48,721**		**85.51**	**4,166,380**	**76,684,417**
547																
548	**22.90**	**CONSTRUCTION INDIRECTS, CTG B**							**158,250**	**111,164**		**4,237**			**1,513,341**	**1,782,755**
549		Additional Crane Allowance			1	LS				0					0	0
550		Mobilization / Demobilization - Included in Wage Rates Above														
551		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
552		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						4,237		85.51	362,000	362,000
553		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					5,296				380,561	380,561
554		Per Diem	None		0.00	HR						0			0	0
555		Consumables - % of Subtotal Above			0.5	%				2,365					20,832	23,197
556		Freight on Material - % of Subtotal Above			5.0	%				23,652						23,652
557		Freight on Equipment - % of Subtotal Above	C/T Excluded		5.0	%			158,250							158,250
558		Scaffolding - % of Subtotal Above			3.0	%				14,191					124,991	139,183
559		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				70,956					624,957	695,913
561	**22.98**	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, CTG B**							**72,203,250**	**584,201**		**52,958**		**107.25**	**5,679,721**	**78,467,172**
562																
563	**22.99**	**SUBCONTRACTS**							**0**	**0**		**0**			**1,000,000**	**1,000,000**
564																
565		Heavy Haul Subcontract for CTG B Offloading & Staging	Allowance		1	LS									1,000,000	1,000,000
566																
567	**22.00**	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, CTG B**							**72,203,250**	**584,201**		**52,958**		**126.13**	**6,679,721**	**79,467,172**
568																
569																
570																

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6		DOR:		-CONFIDENTIAL-											Run Date:	08/26/11
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8											Labor Productivity =			1.15	Reviewer:	BJD
9																
10																
11																
12	Account No.	Item Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equipment Cost	Unit Material Cost	Total Equipment Cost	Total Material Cost	Unit Man-hours (Base)	Total Man-hours, w/ Productivity	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Total Projected Cost
13																
14																
571	**31.00**	**HRSG A**														**46,187,800**
572																
575	**31.20**	**CONCRETE**							**0**	**665,005**		**9,801**			**750,851**	**1,415,856**
576																
577	31.20.1	HRSG A Foundation (Incl. Stack)	Mat Foundation, 180' x 45'						0	563,200		7,642			572,842	1,136,042
578		Excavation		Est.	1250	CY		0	0	0	0.2	288	EXFD	88.87	25,550	25,550
579		Backfill		Est.	200	CY		0	0	0	0.15	35	EXFD	88.87	3,066	3,066
580		Concrete		Est.	1320	CY		120	0	158,400	1.5	2,277	COND	68.54	156,066	314,466
581		Reinforcing		Est.	90	TN		950	0	85,500	22.5	2,329	REIN	76.92	179,127	264,627
582		Embeds		Est.	15	TN		5,000	0	75,000	120.00	2,070	CARP	70.49	145,914	220,914
583		Formwork		Est.	2800	SF		2.25	0	6,300	0.2	644	FORM	98.01	63,118	69,418
584		Piles	16" Dia. X 68' Long Augercast Piles	Est.	100	EA		2380	0	238,000	incl w/matl	incl w/matl				238,000
585																
586	31.20.2	Boiler Feed Pump Enclosure Foundation	Foundation 65'x28'						0	76,510		1,114			86,044	162,554
587		Excavation		Est.	225	CY		0	0	0	0.2	52	EXFD	88.87	4,599	4,599
588		Backfill		Est.	60	CY		0	0	0	0.15	10	EXFD	88.87	920	920
589		Concrete		Est.	230	CY		120	0	27,600	1.5	397	COND	68.54	27,193	54,793
590		Reinforcing		Est.	20	TN		950	0	19,000	22.5	518	REIN	76.92	39,806	58,806
591		Formwork		Est.	600	SF		2.25	0	1,350	0.2	138	FORM	98.01	13,525	14,875
592		Piles	16" Dia. X 68' Long Augercast Piles	Est.	12	EA		2380	0	28,560	incl w/matl	incl w/matl				28,560
593																
594	31.20.3	Misc HRSG Equipment Pads / Foundations							0	25,295		1,045			91,966	117,261
595		Blowdown Tank Pit / Trenches														
596		Excavation		Est.	320	CY		0	0	0	0.2	74	EXFD	88.87	6,541	6,541
597		Backfill		Est.	170	CY		0	0	0	0.15	29	EXFD	88.87	2,606	2,606
598		Concrete		Est.	80	CY		120	0	9,600	1.5	138	COND	68.54	9,459	19,059
599		Reinforcing		Est.	5	TN		950	0	4,750	22.5	129	REIN	76.92	9,952	14,702
600		Formwork		Est.	2070	SF		2.25	0	4,658	0.2	476	FORM	98.01	46,663	51,320
601		SCR Skid														
602		Excavation		Est.	30	CY		0	0	0	0.2	7	EXFD	88.87	613	613
603		Backfill		Est.	10	CY		0	0	0	0.15	2	EXFD	88.87	153	153
604		Concrete		Est.	20	CY		120	0	2,400	1.5	35	COND	68.54	2,365	4,765
605		Reinforcing		Est.	1	TN		950	0	950	22.5	26	REIN	76.92	1,990	2,940
606		Formwork		Est.	200	SF		2.25	0	450	0.2	46	FORM	98.01	4,508	4,958
607		Duct Burner Blower Skid Foundation														
608		Excavation		Est.	20	CY		0	0	0	0.2	5	EXFD	88.87	409	409
609		Backfill		Est.	10	CY		0	0	0	0.15	2	EXFD	88.87	153	153
610		Concrete		Est.	10	CY		120	0	1,200	1.5	17	COND	68.54	1,182	2,382
611		Reinforcing		Est.	1	TN		950	0	950	22.5	26	REIN	76.92	1,990	2,940
612		Formwork		Est.	150	SF		2.25	0	338	0.2	35	FORM	98.01	3,381	3,719
613																

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13																
14																
614	**31.30**	**STRUCTURAL STEEL**							**0**	**48,153**		**342**			**32,646**	**80,799**
615																
616	31.30.1	Blowdown Tant Pit / Trenches							0	48,153		342			32,646	80,799
617		Framing		Est.	8	TN	0	3710	0	29,680	22.000	202	STST	104.09	21,068	50,748
618		Handrail		Est.	70	LF	0	33.5	0	2,345	0.100	8	GALL	83.21	670	3,015
619		Grating	2" Galvanized	Est.	600	SF	0	26.88	0	16,128	0.19	131	GALL	83.21	10,909	27,037
620																
621	**31.40**	**ARCHITECTURAL**							**0**	**147,560**		**0**			**0**	**147,560**
622																
623	31.40.1	Boiler Feed Pump Enclosure							0	147,560		0			0	147,560
624		Pre Engineered Building, Incl. HVAC, 28' x 62' x 16' High	Subcontract Price, Includes Installation Labor	Est.	1,736	SF		85	0	147,560	incl w/matl	incl w/matl				147,560
625																
626	**31.45**	**PAINTING / COATING**							**0**	**0**		**3,240**			**218,611**	**218,611**
627																
628	31.45.1	Touch Up Painting, HRSG A	Allowance at 3.5% of HRSG Installation Manhours	Est.	1	LS			0	0	2,817.50	3,240	PNTR	67.47	218,611	218,611
629																
634	**31.60**	**MECHANICAL**							**27,874,000**	**0**		**95,358**			**10,210,298**	**38,084,298**
635																
636	31.60.1	HRSG & Accessories	3-Press HRSG w\Reheat. Supplemental Duct Burners Incl. Integral Deaerator Incl. SCR and CO Catalyst Incl. 200 Foot Steel Stack Incl.	B	1	Ea.	25764000		25,764,000	0	80,500	92,575	SGEN	107.70	9,970,328	35,734,328
637		Duct Burners	Included Above													Included Above
638		SCR	Included Above													Included Above
639		CO Catalyst	Included Above													Included Above
640		Integral Deaerator	Included Above													Included Above
641		Penthouse Enclosure & Lower Level Skirting	Included Above													Included Above
642		Elevator to Drum Level	Included Above													Included Above
643		Spargers & Accessories for Heating of HRSG w/ External Steam (Aux. Boiler).		Est.	1	LS	50000		50,000		Incl. w/ HRSG					50,000
644		Technical Field Assistance (TFA), HRSG	Included Above													Included Above
645		Stack Damper	Included Above													Included Above
646		Delivery to Jobsite	Included Above													Included Above
647																
648	31.60.2	Boiler Feed Pumps & Accessories	Incl. VFD's						1,900,000	0		2,530			218,035	2,118,035
649		Boiler Feed Pumps & Drives	(2) 100% Capacity Per HRSG With Capability For Supplying Both HP & IP Stages. Horizontal Multistage, Ring Section, incl. Motor	Est	2	Ea.	950000		1,900,000	0	1,100	2,530	PUMP	86.18	218,035	2,118,035
650		Boiler Feed Pump Variable Frequency Drives	Included Above													Included Above
651		Boiler Feed Pump Hydraulic Couplings	Not Included													Not Included
652																

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13																
14																
653	31.60.3	Shop Fabricated Tanks							50,000	0		81			7,070	57,070
654		HRSG Blowdown Tank, Atmospheric	15,000 gal.	Est	1	Ea.	50000		50,000	0	70	81	TANK	87.82	7,070	57,070
655																
656	31.60.4	Miscellaneous Pumps							110,000	0		173			14,866	124,866
657		Blowdown Water Sump Pumps	3 x 50% in Common Sump for (2) HRSG's	B	3	Ea.	36667		110,000	0	50	173	PUMP	86.18	14,866	124,866
658																
663	**31.89**	**SUBTOTAL - DIRECT COSTS, HRSG A**							**27,874,000**	**860,718**		**108,741**		**103.11**	**11,212,407**	**39,947,125**
664																
665	**31.90**	**CONSTRUCTION INDIRECTS, HRSG A**							**1,114,960**	**202,269**		**9,456**			**4,073,447**	**5,390,675**
666		Additional Crane Allowance			1	LS				0					0	0
667		Mobilization / Demobilization - Included in Wage Rates Above														
668		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
669		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						9,456		103.11	975,000	975,000
670		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					11,820				1,024,151	1,024,151
671		Per Diem	None		0.00	HR						0			0	0
672		Consumables - % of Subtotal Above			0.5	%				4,304					56,062	60,366
673		Freight on Material - % of Subtotal Above			5.0	%				43,036						43,036
674		Freight on Equipment - % of Subtotal Above	HRSG Excluded		5.0	%			1,114,960							1,114,960
675		Scaffolding - % of Subtotal Above			3.0	%				25,822					336,372	362,194
676		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				129,108					1,681,861	1,810,969
678	**31.98**	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, HRSG A**							**28,988,960**	**1,062,987**		**118,197**		**129.33**	**15,285,854**	**45,337,800**
679																
680	**31.99**	**SUBCONTRACTS**							**0**	**0**		**0**			**850,000**	**850,000**
681																
682		Heavy Haul Subcontract for HRSG A Offloading & Staging	Allowance		1	LS									850,000	850,000
683																
684	**31.00**	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, HRSG A**							**28,988,960**	**1,062,987**		**118,197**		**136.52**	**16,135,854**	**46,187,800**
685																
686																
687																

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13																
14																
688	**32.00**	**HRSG B**														**46,053,426**
689																
692	**32.20**	**CONCRETE**							**0**	**665,005**		**9,801**			**750,851**	**1,415,856**
693																
694	32.20.1	HRSG B Foundation (Incl. Stack)	Mat Foundation, 180' x 45'						0	563,200		7,642			572,842	1,136,042
695		Excavation		Est.	1250	CY		0	0	0	0.2	288	EXFD	88.87	25,550	25,550
696		Backfill		Est.	200	CY		0	0	0	0.15	35	EXFD	88.87	3,066	3,066
697		Concrete		Est.	1320	CY		120	0	158,400	1.5	2,277	COND	68.54	156,066	314,466
698		Reinforcing		Est.	90	TN		950	0	85,500	22.5	2,329	REIN	76.92	179,127	264,627
699		Embeds		Est.	15	TN		5,000	0	75,000	120.00	2,070	CARP	70.49	145,914	220,914
700		Formwork		Est.	2800	SF		2.25	0	6,300	0.2	644	FORM	98.01	63,118	69,418
701		Piles	16" Dia. X 68' Long Augercast Piles	Est.	100	EA		2380	0	238,000	incl w/matl	incl w/matl				238,000
702																
703	32.20.2	Boiler Feed Pump Enclosure Foundation	Foundation 65'x28'						0	76,510		1,114			86,044	162,554
704		Excavation		Est.	225	CY		0	0	0	0.2	52	EXFD	88.87	4,599	4,599
705		Backfill		Est.	60	CY		0	0	0	0.15	10	EXFD	88.87	920	920
706		Concrete		Est.	230	CY		120	0	27,600	1.5	397	COND	68.54	27,193	54,793
707		Reinforcing		Est.	20	TN		950	0	19,000	22.5	518	REIN	76.92	39,806	58,806
708		Formwork		Est.	600	SF		2.25	0	1,350	0.2	138	FORM	98.01	13,525	14,875
709		Piles	16" Dia. X 68' Long Augercast Piles	Est.	12	EA		2380	0	28,560	incl w/matl	incl w/matl				28,560
710																
711	32.20.3	Misc HRSG Equipment Pads / Foundations							0	25,295		1,045			91,966	117,261
712		Blowdown Tank Pit / Trenches														
713		Excavation		Est.	320	CY		0	0	0	0.2	74	EXFD	88.87	6,541	6,541
714		Backfill		Est.	170	CY		0	0	0	0.15	29	EXFD	88.87	2,606	2,606
715		Concrete		Est.	80	CY		120	0	9,600	1.5	138	COND	68.54	9,459	19,059
716		Reinforcing		Est.	5	TN		950	0	4,750	22.5	129	REIN	76.92	9,952	14,702
717		Formwork		Est.	2070	SF		2.25	0	4,658	0.2	476	FORM	98.01	46,663	51,320
718		SCR Skid														
719		Excavation		Est.	30	CY		0	0	0	0.2	7	EXFD	88.87	613	613
720		Backfill		Est.	10	CY		0	0	0	0.15	2	EXFD	88.87	153	153
721		Concrete		Est.	20	CY		120	0	2,400	1.5	35	COND	68.54	2,365	4,765
722		Reinforcing		Est.	1	TN		950	0	950	22.5	26	REIN	76.92	1,990	2,940
723		Formwork		Est.	200	SF		2.25	0	450	0.2	46	FORM	98.01	4,508	4,958
724		Duct Burner Blower Skid Foundation														
725		Excavation		Est.	20	CY		0	0	0	0.2	5	EXFD	88.87	409	409
726		Backfill		Est.	10	CY		0	0	0	0.15	2	EXFD	88.87	153	153
727		Concrete		Est.	10	CY		120	0	1,200	1.5	17	COND	68.54	1,182	2,382
728		Reinforcing		Est.	1	TN		950	0	950	22.5	26	REIN	76.92	1,990	2,940
729		Formwork		Est.	150	SF		2.25	0	338	0.2	35	FORM	98.01	3,381	3,719
730																

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12	Account No.	Item Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equipment Cost	Unit Material Cost	Total Equipment Cost	Total Material Cost	Unit Man-hours (Base)	Total Man-hours, w/ Productivity	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Total Projected Cost
13																
14																
731	**32.30**	**STRUCTURAL STEEL**							**0**	**48,153**		**342**			**32,646**	**80,799**
732																
733	32.30.1	Blowdown Tank Pit / Trenches							0	48,153		342			32,646	80,799
734		Framing		Est.	8	TN	0	3710	0	29,680	22.00	202	STST	104.09	21,068	50,748
735		Handrail		Est.	70	LF	0	33.5	0	2,345	0.10	8	GALL	83.21	670	3,015
736		Grating	2" Galvanized	Est.	600	SF	0	26.88	0	16,128	0.19	131	GALL	83.21	10,909	27,037
737																
738	**32.40**	**ARCHITECTURAL**							**0**	**147,560**		**0**			**0**	**147,560**
739																
740	32.40.1	Boiler Feed Pump Enclosure							0	147,560		0			0	147,560
741		Pre Engineered Building, Incl. HVAC, 28' x 62' x 16' High	Subcontract Price, Includes Installation Labor	Est.	1,736	SF		85	0	147,560	incl w/matl	incl w/matl				147,560
742																
743	**32.45**	**PAINTING / COATING**							**0**	**0**		**3,240**			**218,611**	**218,611**
744																
745	32.45.1	Touch Up Painting, HRSG B	Allowance at 3.5% of HRSG Installation Manhours	Est.	1	LS			0	0	2,817.50	3,240	PNTR	67.47	218,611	218,611
746																
751	**32.60**	**MECHANICAL**							**27,764,000**	**0**		**95,186**			**10,195,432**	**37,959,432**
752																
753	32.60.1	HRSG & Accessories	3-Press HRSG w\Reheat. Supplemental Duct Burners Incl. Integral Deaerator Incl. SCR and CO Catalyst Incl. 200 Foot Steel Stack Incl.	B	1	Ea.	25764000		25,764,000	0	80,500	92,575	SGEN	107.70	9,970,328	35,734,328
754		Duct Burners	Included Above													Included Above
755		SCR	Included Above													Included Above
756		CO Catalyst	Included Above													Included Above
757		Integral Deaerator	Included Above													Included Above
758		Penthouse Enclosure & Lower Level Skirting	Included Above													Included Above
759		Elevator to Drum Level	Included Above													Included Above
760		Spargers & Accessories for Heating of HRSG w/ External Steam (Aux. Boiler).		Est.	1	LS	50000		50,000		Incl. w/ HRSG					50,000
761		Technical Field Assistance (TFA), HRSG	Included Above													Included Above
762		Stack Damper	Included Above													Included Above
763		Delivery to Jobsite	Included Above													Included Above
764																
765	32.60.2	Boiler Feed Pumps & Accessories	Incl. VFD's						1,900,000	0		2,530			218,035	2,118,035
766		Boiler Feed Pumps & Drives	(2) 100% Capacity Per HRSG With Capability For Supplying Both HP & IP Stages. Horizontal Multistage, Ring Section, incl. Motor	Est	2	Ea.	950000		1,900,000	0	1,100	2,530	PUMP	86.18	218,035	2,118,035
767		Boiler Feed Pump Variable Frequency Drives	Included Above													Included Above
768		Boiler Feed Pump Hydraulic Couplings	Not Included													Not Included
769																

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8											Labor Productivity =			1.15	Reviewer:	BJD
9																
10																
11																
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13																
14																
770	32.60.3	Shop Fabricated Tanks							50,000	0		81			7,070	57,070
771		HRSG Blowdown Tank, Atmospheric	15,000 gal.	Est	1	Ea.	50000		50,000	0	70	81	TANK	87.82	7,070	57,070
772																
773	32.60.4	Miscellaneous Pumps							0	0		0			0	0
774		Blowdown Water Sump Pumps	Not Required. Common Pumps Included w/ HRSG A													Not Required
775																
780	**32.89**	**SUBTOTAL - DIRECT COSTS, HRSG B**							**27,764,000**	**860,718**		**108,569**		**103.14**	**11,197,541**	**39,822,259**
781																
782	**32.90**	**CONSTRUCTION INDIRECTS, HRSG B**							**1,110,560**	**202,269**		**9,441**			**4,068,338**	**5,381,167**
783		Additional Crane Allowance			1	LS				0					0	0
784		Mobilization / Demobilization - Included in Wage Rates Above														
785		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
786		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						9,441		103.14	974,000	974,000
787		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					11,801				1,022,793	1,022,793
788		Per Diem	None		0.00	HR						0			0	0
789		Consumables - % of Subtotal Above			0.5	%				4,304					55,988	60,291
790		Freight on Material - % of Subtotal Above			5.0	%				43,036						43,036
791		Freight on Equipment - % of Subtotal Above	HRSG Excluded		5.0	%			1,110,560							1,110,560
792		Scaffolding - % of Subtotal Above			3.0	%				25,822					335,926	361,748
793		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				129,108					1,679,631	1,808,739
795	**32.98**	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, HRSG B**							**28,874,560**	**1,062,987**		**118,009**		**129.36**	**15,265,880**	**45,203,426**
796																
797	**32.99**	**SUBCONTRACTS**	HRSG B Heavy Haul						**0**	**0**		**0**			**850,000**	**850,000**
798																
799		Heavy Haul Subcontract for HRSG B Offloading & Staging	Allowance		1	LS									850,000	850,000
800																
801	**32.00**	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, HRSG B**							**28,874,560**	**1,062,987**		**118,009**		**136.56**	**16,115,880**	**46,053,426**
802																
803																
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13																
14																
805	**41.00**	**STEAM TURBINE**														**27,751,446**
806																
809	**41.20**	**CONCRETE**							**0**	**0**		**0**			**0**	**0**
810																
811	41.20.1	STG Pedestal Foundation	Existing													Existing
812																
813	41.20.2	STG Pedestal	Existing													Existing
814																
815	41.20.3	STG Excitation Transformer Foundation	Existing													Existing
816																
817	41.20.4	STG Equipment Pads	Existing													Existing
818																
829	**41.60**	**MECHANICAL**							**3,570,000**	**150,000**		**5,118**			**453,402**	**4,173,402**
830																
831	41.60.1	Steam Turbine Modifications	New Turning Gear - See Subcontracts for Additional Work						150,000	0		345			30,270	180,270
832		Steam Turbine Blade Modifications	Detailed Below in Subcontracts													
833		Install New Turning Gear Assembly		Est	1	LS	150000		150,000	0	300	345	MECH	87.74	30,270	180,270
834																
835	41.60.2	Condenser Modifications	Bypass Spargers - See Subcontracts for Additional Work						0	150,000		1,150			107,985	257,985
836		Add Bypass Spargers	Allowance	Est	1	LS	0	150000	0	150,000	1,000	1,150	CNDR	93.90	107,985	257,985
837		Vacuum Pumps	Existing													Existing
838		Steam Jet Air Ejectors	Not Included													Not Included
839		Tube Cleaning	Not Included													Not Included
840																
841	41.60.3	Pumps							840,000	0		1,725			148,661	988,661
842		Condensate Pumps	100% Capacity Pumps	Est	2	Ea.	137500		275,000	0	250	575	PUMP	86.18	49,554	324,554
843		Condensate Booster Pumps	100% Capacity Pumps	Est	2	Ea.	212500		425,000	0	350	805	PUMP	86.18	69,375	494,375
844		LP Heater No. 1 Drain Pumps	100% Capacity Pumps	Est	2	Ea.	70000		140,000	0	150	345	PUMP	86.18	29,732	169,732
845		STG Sump Pumps	Existing													Existing
846																
847	41.60.4	Condensate Polishing Equipment							2,500,000	0		1,725			151,352	2,651,352
848		Condensate Polisher Skid		Est	1	LS	2500000		2,500,000	0	1,500	1,725	MECH	87.74	151,352	2,651,352
849																
850	41.60.5	Gland Steam Condenser							80,000	0		173			15,135	95,135
851		Install New Gland Steam Condenser		Est	1	EA	80000		80,000	0	150	173	MECH	87.74	15,135	95,135
852																
857	**41.89**	**SUBTOTAL - DIRECT COSTS, STEAM TURBINE**							**3,570,000**	**150,000**		**5,118**		**88.60**	**453,402**	**4,173,402**
858																

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13																
14																
859	**41.90**	**CONSTRUCTION INDIRECTS, STEAM TURBINE**							**178,500**	**35,250**		**445**			**164,294**	**378,044**
860		Additional Crane Allowance			1	LS				0					0	0
861		Mobilization / Demobilization - Included in Wage Rates Above														
862		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
863		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						445		88.60	39,000	39,000
864		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					556				41,414	41,414
865		Per Diem	None		0.00	HR						0			0	0
866		Consumables - % of Subtotal Above			0.5	%				750					2,267	3,017
867		Freight on Material - % of Subtotal Above			5.0	%				7,500						7,500
868		Freight on Equipment - % of Subtotal Above			5.0	%			178,500							178,500
869		Scaffolding - % of Subtotal Above			3.0	%				4,500					13,602	18,102
870		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				22,500					68,010	90,510
872	**41.98**	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, STEAM TURBINE**							**3,748,500**	**185,250**		**5,563**		**111.05**	**617,696**	**4,551,446**
873																
874	**41.99**	**SUBCONTRACTS**	ST Blade Mods, ST Generator Rewind, and Condenser Cleaning						**23,200,000**	**0**		**0**			**0**	**23,200,000**
875																
876		Steam Turbine Blade Modifications		Est.	1	LS	17000000		17,000,000	0	incl w/equip.	incl w/equip.				17,000,000
877																
878		Steam Turbine Generator Rewind	Allowance	Est.	1	LS	6000000		6,000,000	0	incl w/equip.	incl w/equip.				6,000,000
879																
880		Condenser Modifications	Condenser Cleaning, Eddy Current Testing, and Staking of Tubes	Est.	1	LS	200000		200,000	0	incl w/equip.	incl w/equip.				200,000
881																
882	**41.00**	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, STEAM TURBINE**							**26,948,500**	**185,250**		**5,563**		**111.05**	**617,696**	**27,751,446**
883																
884																
885																
886	**50.00**	**COOLING TOWER**														**12,238,877**
887																
890	**50.20**	**CONCRETE**							**0**	**0**		**0**			**0**	**0**
891																
892	50.20.1	Cooling Tower Pump Structure	Existing													Existing
893																
894	50.20.2	Natural Draft Cooling Tower Basin	Existing													Existing
895																

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13																
14																
896	**50.30**	**STRUCTURAL STEEL**							**0**	**0**		**0**			**0**	**0**
897																
898	50.30.1	Miscellaneous Steel for Cooling Tower Pump Intake	Existing													Existing
899																
908	**50.60**	**MECHANICAL**							**80,000**	**0**		**2,599**			**223,982**	**303,982**
909																
910		Natural Draft Cooling Tower w/ Accessories	Existing													Existing
911		Natural Draft Cooling Tower Repairs	Replace Fill - See Subcontracts Below													Included Elsewhere
912																
913	50.60.1	Cooling Tower Fire Protection System	Not Included													Not Included
914																
915	50.60.2	Trash Screens	Not Included													Not Included
916																
917	50.60.3	Circulating Water Chemical Feed System	Existing													Existing
918																
919	50.60.4	Pumps							80,000	0		2,599			223,982	303,982
920		Circulating Water Pumps & Motors	Remove & Reinstall After Refurbishment	Est	2	Ea	0		0	0	1000	2,300	PUMP	86.18	198,214	198,214
921		Circulating Water Pump & Motor Refurbishment	Listed Below with Subcontracts													
922		Miscellaneous Pumps														
923		Cooling Tower Makeup Pumps		Est	2	Ea	40000		80,000	0	130	299	PUMP	86.18	25,768	105,768
924																
929	**50.89**	**SUBTOTAL - DIRECT COSTS, COOLING TOWER**							**80,000**	**0**		**2,599**		**86.18**	**223,982**	**303,982**
930																
931	**50.90**	**CONSTRUCTION INDIRECTS, COOLING TOWER**							**4,000**	**0**		**226**			**80,895**	**84,895**
932		Additional Crane Allowance			1	LS				0					0	0
933		Mobilization / Demobilization - Included in Wage Rates Above														
934		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
935		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						226		86.18	19,000	19,000
936		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					283				20,459	20,459
937		Per Diem	None		0.00	HR						0			0	0
938		Consumables - % of Subtotal Above			0.5	%				0					1,120	1,120
939		Freight on Material - % of Subtotal Above			5.0	%				0						0
940		Freight on Equipment - % of Subtotal Above			5.0	%			4,000							4,000
941		Scaffolding - % of Subtotal Above			3.0	%				0					6,719	6,719
942		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				0					33,597	33,597
944	**50.98**	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, COOLING TOWER**							**84,000**	**0**		**2,825**		**107.92**	**304,877**	**388,877**
945																

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13																
14																
946	50.99	SUBCONTRACTS	Cooling Tower Fill Replacement						11,850,000	0		0			0	11,850,000
947																
948		Natural Draft Cooling Tower Fill Replacement	Based on SPX 05/12/11 Proposal - 7.88' of DF254 Fill.	B	1	Ea.	11450000		11,450,000	0	incl w/equip.	incl w/equip.				11,450,000
949		Existing Circulating Water Pump & Motor Refurbishment	Recoat Pump Impellers & Refurbish Motors	Est.	2	LS	200000		400,000	0	incl w/equip.	incl w/equip.				400,000
950																
951	50.00	TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, COOLING TOWER							11,934,000	0		2,825		107.92	304,877	12,238,877
952																
953																
954																
955	55.00	WATER TREATMENT														8,815,107
956																
959	55.20	CONCRETE							0	599,125		10,001			743,906	1,343,031
960																
961	55.20.1	Water Treatment Building Foundation	Mat Foundation, 152' x 89'						0	526,225		8,484			622,474	1,148,699
962		Excavation		Est.	1,500	CY		0	0	0	0.2	345	EXFD	88.87	30,660	30,660
963		Backfill		Est.	250	CY		0	0	0	0.15	43	EXFD	88.87	3,833	3,833
964		Concrete		Est.	1650	CY		120	0	198,000	1.9	3,605	COND	68.54	247,104	445,104
965		Reinforcing		Est.	75	TN		950	0	71,250	22.5	1,941	REIN	76.92	149,273	220,523
966		Embeds		Est.	15	TN		5,000	0	75,000	120.00	2,070	CARP	70.49	145,914	220,914
967		Formwork		Est.	1700	SF		2.25	0	3,825	0.2	391	FORM	98.01	38,322	42,147
968		Grating, FRP	Trenches & Sumps	Est.	550	SF		21	0	11,550	0.14	89	GALL	83.21	7,368	18,918
969		Piles	16" Dia. X 68' Long Augercast Piles	Est.	70	EA		2380	0	166,600	incl w/matl	incl w/matl				166,600
970																
971	55.20.2	Misc. Equipment Pads in Building							0	13,008		344			28,542	41,550
972		Concrete		Est.	80	CY		120	0	9,600	1.5	138	COND	68.54	9,459	19,059
973		Reinforcing		Est.	2	TN		950	0	1,900	22.5	52	REIN	76.92	3,981	5,881
974		Formwork		Est.	670	SF		2.25	0	1,508	0.2	154	FORM	98.01	15,103	16,611
975																
976	55.20.3	Chemical Storage Foundation							0	17,830		440			35,022	52,852
977		Excavation		Est.	100	CY		0	0	0	0.2	23	EXFD	88.87	2,044	2,044
978		Backfill		Est.	25	CY		0	0	0	0.15	4	EXFD	88.87	383	383
979		Concrete		Est.	100	CY		120	0	12,000	1.5	173	COND	68.54	11,823	23,823
980		Reinforcing		Est.	5	TN		950	0	4,750	22.5	129	REIN	76.92	9,952	14,702
981		Formwork		Est.	480	SF		2.25	0	1,080	0.2	110	FORM	98.01	10,820	11,900
982																
983	55.20.4	Water Treatment Laboratory Foundation	Mat Foundation 40' x 18'						0	24,233		294			22,845	47,077
984		Excavation		Est.	85	CY		0	0	0	0.2	20	EXFD	88.87	1,737	1,737
985		Backfill		Est.	15	CY		0	0	0	0.15	3	EXFD	88.87	230	230
986		Concrete		Est.	60	CY		120	0	7,200	1.5	104	COND	68.54	7,094	14,294
987		Reinforcing		Est.	5	TN		950	0	4,750	22.5	129	REIN	76.92	9,952	14,702
988		Formwork		Est.	170	SF		2.25	0	383	0.2	39	FORM	98.01	3,832	4,215
989		Piles	16" Dia. X 68' Long Augercast Piles	Est.	5	EA		2380	0	11,900	incl w/matl	incl w/matl				11,900

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13																
14																
990																
991	55.20.5	Demin Water Storage Tank Foundation	Includes Pump Pad						0	17,830		440			35,022	52,852
992		Excavation		Est.	100	CY		0	0	0	0.2	23	EXFD	88.87	2,044	2,044
993		Backfill		Est.	25	CY		0	0	0	0.15	4	EXFD	88.87	383	383
994		Concrete		Est.	100	CY		120	0	12,000	1.5	173	COND	68.54	11,823	23,823
995		Reinforcing		Est.	5	TN		950	0	4,750	22.5	129	REIN	76.92	9,952	14,702
996		Formwork		Est.	480	SF		2.25	0	1,080	0.2	110	FORM	98.01	10,820	11,900
997																
1000	**55.40**	**ARCHITECTURAL**							**75,000**	**1,590,656**		**1,159**			**86,208**	**1,751,864**
1001																
1002	55.40.1	Water Treatment Building							75,000	1,515,056		1,159			86,208	1,676,264
1003		Pre Engineered Building, Incl. HVAC, 89' x 152' x 30' High	Subcontract Price, Includes Installation Labor	Est.	13,528	SF		105	0	1,420,440	incl w/matl	incl w/matl				1,420,440
1004		Additional HVAC for Electrical Equipment Room	40T Packaged Unit for Electrical Equipment Room. Includes Allowance for Concrete Pad and Electrical Work	Est.	1	LS	75000	30000	75,000	30,000	400	460	HVAC	80.08	36,837	141,837
1005		Interior Finishes														
1006		8" CMU	Glazed, Double Faced	Est.	400	SF	0	19	0	7,600	0.17	78	MSRY	71.99	5,630	13,230
1007		Gypsum Board		Est.	6,550	SF	0	0.65	0	4,258	0.03	226	CARP	70.49	15,929	20,186
1008		Metal Stud/Runner		Est.	4,090	LF	0	0.76	0	3,108	0.024	113	CARP	70.49	7,957	11,066
1009		Suspended Acoustical Tile Ceiling		Est.	1,050	SF	0	4	0	4,200	0.05	60	SSCL	69.73	4,210	8,410
1010		Double Door		Est.	1	EA	0	2900	0	2,900	12	14	CARP	70.49	973	3,873
1011		Man Door		Est.	7	EA	0	1500	0	10,500	8	64	CARP	70.49	4,540	15,040
1012		Rolling Steel Door		Est.	3	EA	0	10000	0	30,000	36	124	CARP	70.49	8,755	38,755
1013		Water Closet		Est.	1	LS	0	1450	0	1,450	9	10	CARP	70.49	730	2,180
1014		Lavatory		Est.	1	LS	0	600	0	600	8	9	CARP	70.49	649	1,249
1015																
1016	55.40.2	Water Treatment Laboratory Building							0	75,600		0			0	75,600
1017		Pre Engineered Building, Incl. HVAC, 40' x 18' x 12' High	Subcontract Price, Includes Installation Labor	Est.	720	SF		105	0	75,600	incl w/matl	incl w/matl				75,600
1018																
1019	**55.45**	**PAINTING / COATING**							**0**	**30,000**		**2,760**			**186,217**	**216,217**
1020																
1021	55.45.1	Special Coatings	Allowance, Demin Areas	Est.	12,000	SF		2.5	0	30,000	0.20	2,760	PNTR	67.47	186,217	216,217
1022																
1027	**55.60**	**MECHANICAL**							**3,102,600**	**0**		**11,075**			**991,125**	**4,093,725**
1028																
1029	55.60.1	Water Treatment Equipment							3,005,600	0		10,350			928,499	3,934,099
1030		Demineralizer System	150 gpm Ultrafilter & RO System, w/ Cartridge Filters, Feed Pumps, Chemical Injection, Break Tank, and CIP Skids	B	1	LS	3005600		3,005,600	0	9000	10,350	WTRT	89.71	928,499	3,934,099
1031																

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13																
14																
1032	55.60.2	Miscellaneous Pumps							72,000	0		610			52,527	124,527
1033		Demineralized Water Pumps	100%	B	2	Ea	15000		30,000	0	130	299	PUMP	86.18	25,768	55,768
1034		WTB Sump Pumps	50%	B	3	Ea.	14000		42,000	0	90	311	PUMP	86.18	26,759	68,759
1035																
1036	55.60.3	Shop Fabricated Tanks							25,000	0		115			10,099	35,099
1037		Demineralized Water Storage Tank	12,000 Gal. Capacity, FRP Construction	B	1	Ea	25000		25,000	0	100	115	TANK	87.82	10,099	35,099
1038																
1043	**55.89**	**SUBTOTAL - DIRECT COSTS, WATER TREATMENT**							**3,177,600**	**2,219,781**		**24,995**		**80.32**	**2,007,455**	**7,404,836**
1044																
1045	**55.90**	**CONSTRUCTION INDIRECTS, WATER TREATMENT**							**158,880**	**521,649**		**2,173**			**729,742**	**1,410,270**
1046		Additional Crane Allowance			1	LS				0					0	0
1047		Mobilization / Demobilization - Included in Wage Rates Above														
1048		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
1049		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						2,173		80.32	175,000	175,000
1050		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					2,717				183,363	183,363
1051		Per Diem	None		0.00	HR						0			0	0
1052		Consumables - % of Subtotal Above			0.5	%				11,099					10,037	21,136
1053		Freight on Material - % of Subtotal Above			5.0	%				110,989						110,989
1054		Freight on Equipment - % of Subtotal Above			5.0	%			158,880							158,880
1055		Scaffolding - % of Subtotal Above			3.0	%				66,593					60,224	126,817
1056		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				332,967					301,118	634,085
1058	**55.98**	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, WATER TREATMENT**							**3,336,480**	**2,741,429**		**27,168**		**100.75**	**2,737,197**	**8,815,107**
1059																
1060	**55.99**	**SUBCONTRACTS**							**0**	**0**		**0**			**0**	**0**
1063																
1064	**55.00**	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, WATER TREATMENT**							**3,336,480**	**2,741,429**		**27,168**		**100.75**	**2,737,197**	**8,815,107**
1065																
1066																
1067																
1068	**56.00**	**PRE-TREATMENT**														**13,608,992**
1069																
1070	**56.10**	**CIVIL**							**0**	**0**		**0**			**0**	**0**
1071																
1072		River Water Intake Structure	Existing													Existing
1073																

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13																
14																
1074	**56.20**	**CONCRETE**							**0**	**1,673,168**		**22,889**			**1,774,479**	**3,447,647**
1075																
1076	56.20.1	Clarifier Foundations (2 Total)	85' Dia. Steel Clarifier on Mat Fdn.						0	536,743		6,406			490,847	1,027,590
1077		Excavation		Est.	1,500	CY		0	0	0	0.2	345	EXFD	88.87	30,660	30,660
1078		Backfill		Est.	310	CY		0	0	0	0.15	53	EXFD	88.87	4,752	4,752
1079		Concrete		Est.	1350	CY		120	0	162,000	1.9	2,950	COND	68.54	202,176	364,176
1080		Reinforcing		Est.	85	TN		950	0	80,750	22.5	2,199	REIN	76.92	169,176	249,926
1081		Formwork		Est.	3730	SF		2.25	0	8,393	0.2	858	FORM	98.01	84,083	92,475
1082		Piles	16" Dia. X 68' Long Augercast Piles	Est.	120	EA		2380	0	285,600	incl w/matl	incl w/matl				285,600
1083																
1084	56.20.2	Sludge Holding Tank Foundations (2 Total)	45' Dia. Tanks on Mat Fdns.						0	150,600		2,082			169,189	319,789
1085		Excavation		Est.	550	CY		0	0	0	0.2	127	EXFD	88.87	11,242	11,242
1086		Backfill		Est.	170	CY		0	0	0	0.15	29	EXFD	88.87	2,606	2,606
1087		Concrete		Est.	350	CY		120	0	42,000	1.9	765	COND	68.54	52,416	94,416
1088		Reinforcing		Est.	20	TN		950	0	19,000	22.5	518	REIN	76.92	39,806	58,806
1089		Formwork		Est.	2800	SF		2.25	0	6,300	0.2	644	FORM	98.01	63,118	69,418
1090		Piles	16" Dia. X 68' Long Augercast Piles	Est.	35	EA		2380	0	83,300	incl w/matl	incl w/matl				83,300
1091																
1092	56.20.3	Raw Water Storage Tank Foundation	45' Dia. Tank on Mat Fdn.						0	114,638		1,188			93,580	208,217
1093		Excavation		Est.	200	CY		0	0	0	0.2	46	EXFD	88.87	4,088	4,088
1094		Backfill		Est.	50	CY		0	0	0	0.15	9	EXFD	88.87	767	767
1095		Concrete		Est.	220	CY		120	0	26,400	1.9	481	COND	68.54	32,947	59,347
1096		Reinforcing		Est.	15	TN		950	0	14,250	22.5	388	REIN	76.92	29,855	44,105
1097		Formwork		Est.	1150	SF		2.25	0	2,588	0.2	265	FORM	98.01	25,924	28,511
1098		Piles	16" Dia. X 68' Long Augercast Piles	Est.	30	EA		2380	0	71,400	incl w/matl	incl w/matl				71,400
1099																
1100	56.20.4	Clearwell Tank Foundations (2 Total)	45' Dia. Tank on Mat Fdn.						0	150,600		2,082			169,189	319,789
1101		Excavation		Est.	550	CY		0	0	0	0.2	127	EXFD	88.87	11,242	11,242
1102		Backfill		Est.	170	CY		0	0	0	0.15	29	EXFD	88.87	2,606	2,606
1103		Concrete		Est.	350	CY		120	0	42,000	1.9	765	COND	68.54	52,416	94,416
1104		Reinforcing		Est.	20	TN		950	0	19,000	22.5	518	REIN	76.92	39,806	58,806
1105		Formwork		Est.	2800	SF		2.25	0	6,300	0.2	644	FORM	98.01	63,118	69,418
1106		Piles	16" Dia. X 68' Long Augercast Piles	Est.	35	EA		2380	0	83,300	incl w/matl	incl w/matl				83,300
1107																
1108	56.20.5	Filter Press Building Foundation	Mat Foundation						0	192,363		2,564			200,543	392,906
1109		Excavation		Est.	450	CY		0	0	0	0.2	104	EXFD	88.87	9,198	9,198
1110		Backfill		Est.	120	CY		0	0	0	0.15	21	EXFD	88.87	1,840	1,840
1111		Concrete		Est.	450	CY		120	0	54,000	1.9	983	COND	68.54	67,392	121,392
1112		Elevated Slab Concrete		Est.	60	CY		120	0	7,200	1.9	131	CONP	77.97	10,222	17,422
1113		Reinforcing		Est.	33	TN		950	0	31,350	22.5	854	REIN	76.92	65,680	97,030
1114		Formwork		Est.	2050	SF		2.25	0	4,613	0.2	472	FORM	98.01	46,212	50,824
1115		Piles	16" Dia. X 68' Long Augercast Piles	Est.	40	EA		2380	0	95,200	incl w/matl	incl w/matl				95,200
1116																

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13																
14																
1117	56.20.6	Filter Press Building Equipment Pads							0	4,138		150			12,875	17,013
1118		Concrete		Est.	20	CY		120	0	2,400	1.9	44	COND	68.54	2,995	5,395
1119		Reinforcing		Est.	1	TN		950	0	950	22.5	26	REIN	76.92	1,990	2,940
1120		Formwork		Est.	350	SF		2.25	0	788	0.2	81	FORM	98.01	7,890	8,677
1121																
1122	56.20.7	Pre-Treatment Building Foundation	Mat Foundation						0	499,638		7,656			575,287	1,074,924
1123		Excavation		Est.	1,150	CY		0	0	0	0.2	265	EXFD	88.87	23,506	23,506
1124		Backfill		Est.	150	CY		0	0	0	0.15	26	EXFD	88.87	2,300	2,300
1125		Concrete		Est.	1200	CY		120	0	144,000	1.9	2,622	COND	68.54	179,712	323,712
1126		Reinforcing		Est.	70	TN		950	0	66,500	22.5	1,811	REIN	76.92	139,321	205,821
1127		Embeds		Est.	15	TN		5,000	0	75,000	120.00	2,070	CARP	70.49	145,914	220,914
1128		Formwork		Est.	3750	SF		2.25	0	8,438	0.2	863	FORM	98.01	84,534	92,971
1129		Piles	16" Dia. X 68' Long Augercast Piles	Est.	55	EA		3740	0	205,700	incl w/matl	incl w/matl				205,700
1130																
1131	56.20.8	Pre-Treatment Building Equipment Pads							0	24,450		761			62,970	87,420
1132		Concrete		Est.	130	CY		120	0	15,600	1.9	284	COND	68.54	19,469	35,069
1133		Reinforcing		Est.	6	TN		950	0	5,700	22.5	155	REIN	76.92	11,942	17,642
1134		Formwork		Est.	1400	SF		2.25	0	3,150	0.2	322	FORM	98.01	31,559	34,709
1135																
1136	**56.30**	**STRUCTURAL STEEL**							**0**	**127,305**		**891**			**90,291**	**217,596**
1137																
1138	56.30.1	Filter Press Building Steel	Framing, Upper Floor						0	127,305		891			90,291	217,596
1139		Steel Framing	Independent Upper Floor	Est.	40	TN	0	2610	0	104,400	17.000	782	STST	104.09	81,398	185,798
1140		Metal Floor Decking		Est.	2,100	SF	0	2.8	0	5,880	0.01	34	DCKG	79.06	2,673	8,553
1141		Handrail		Est.	150	LF	0	33.5	0	5,025	0.10	17	GALL	83.21	1,435	6,460
1142		Stair Treads, 3' Wide		Est.	50	EA	0	240	0	12,000	1.00	58	GALL	83.21	4,785	16,785
1143																
1144	**56.40**	**ARCHITECTURAL**							**95,000**	**1,742,855**		**2,564**			**187,916**	**2,025,771**
1145																
1146	56.40.1	Pre-Treatment Building							75,000	1,104,675		403			32,232	1,211,907
1147		Pre Engineered Building, Incl. HVAC, 115' x 89' x 25' High	Subcontract Price, Includes Installation Labor	Est.	10,235	SF		105	0	1,074,675	incl w/matl	incl w/matl				1,074,675
1148		Additional HVAC for Electrical Equipment Room	40T Packaged Unit for Electrical Equipment Room. Includes Allowance for Concrete Pad and Electrical Work	Est.	1	LS	75000	30000	75,000	30,000	350	403	HVAC	80.08	32,232	137,232
1149																
1150	56.40.2	Filter Press Building							20,000	430,000		345			27,628	477,628
1151		Pre Engineered Building, Incl. HVAC, 50' x 70' x 40' High	Subcontract Price, Includes Installation Labor	Est.	3,500	SF		120	0	420,000	incl w/matl	incl w/matl				420,000
1152		Additional HVAC for Electrical Equipment Room	Packaged Unit for Electrical Equipment Room. Includes Allowance for Concrete Pad and Electrical Work	Est.	1	LS	20000	10000	20,000	10,000	300	345	HVAC	80.08	27,628	57,628
1153																

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13																
14																
1154	56.40.3	Interior Finishes							0	208,180		1,817			128,056	336,236
1155		12" CMU	Glazed, Double Faced	Est.	6,570	SF	0	24	0	157,680	0.21	1,587	CARP	70.49	111,843	269,523
1156		Double Door		Est.	5	EA	0	2900	0	14,500	12	69	CARP	70.49	4,864	19,364
1157		Man Door		Est.	4	EA	0	1500	0	6,000	8	37	CARP	70.49	2,594	8,594
1158		Rolling Steel Door		Est.	3	EA	0	10000	0	30,000	36	124	CARP	70.49	8,755	38,755
1159																
1160	56.40.4	River Water Intake Structure Building	Existing													Existing
1161																
1162	**56.45**	**PAINTING / COATING**							**0**	**20,000**		**1,840**			**124,145**	**144,145**
1163																
1164	56.45.1	Special Coatings		Est.	8,000	SF		2.5	0	20,000	0.20	1,840	PNTR	67.47	124,145	144,145
1165																
1170	**56.60**	**MECHANICAL**							**3,209,000**	**0**		**16,963**			**1,519,738**	**4,728,738**
1171																
1172	56.60.1	Water Pre-Treatment Equipment							3,014,000	0		16,100			1,444,331	4,458,331
1173		River Water Pre-Treatment Equipment Package	4,500 GPM, w/ Chemical Dosing and Filter Presses	B	1	LS	3014000		3,014,000	0	14000	16,100	WTRT	89.71	1,444,331	4,458,331
1174																
1175	56.60.2	Miscellaneous Pumps							55,000	0		173			14,866	69,866
1176		Raw Water Pumps	Not Required													Not Required
1177		Pretreatment Area Sump Pumps	50%	B	3	Ea.	18333		55,000	0	50	173	PUMP	86.18	14,866	69,866
1178																
1179	56.60.3	River Water Intake Screens							140,000	0		690			60,541	200,541
1180		Install New Raw Water Intake Screens	Johnson Screens	Est.	1	LS	140000		140,000	0	600	690	MECH	87.74	60,541	200,541
1181																
1186	**56.89**	**SUBTOTAL - DIRECT COSTS, PRE-TREATMENT**							**3,304,000**	**3,563,328**		**45,146**		**81.88**	**3,696,569**	**10,563,897**
1187																
1188	**56.90**	**CONSTRUCTION INDIRECTS, PRE-TREATMENT**							**165,200**	**837,382**		**3,926**			**1,342,513**	**2,345,095**
1189		Additional Crane Allowance			1	LS				0					0	0
1190		Mobilization / Demobilization - Included in Wage Rates Above														
1191		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
1192		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						3,926		81.88	321,000	321,000
1193		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					4,907				337,648	337,648
1194		Per Diem	None		0.00	HR						0			0	0
1195		Consumables - % of Subtotal Above			0.5	%				17,817					18,483	36,299
1196		Freight on Material - % of Subtotal Above			5.0	%				178,166						178,166
1197		Freight on Equipment - % of Subtotal Above			5.0	%			165,200							165,200
1198		Scaffolding - % of Subtotal Above			3.0	%				106,900					110,897	217,797
1199		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				534,499					554,485	1,088,984

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13																
14																
1201	56.98	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, PRE TREATMENT**							**3,469,200**	**4,400,709**		**49,072**		**102.69**	**5,039,082**	**12,908,992**
1202																
1203	**56.99**	**SUBCONTRACTS**	Raw Water Tank						**700,000**	**0**		**0**			**0**	**700,000**
1204																
1205		Field Erected Tanks														
1206		Raw Water Storage Tank	Approx. 500,000 Gal. Vertical, API 650, cone roof, 45' dia x 44' high, incl stairs, ladders, manways, & cathodic protection. CS w/ Epoxy Coating, Heaters, & Exterior Finish Paint.	Est.	1	Ea.	700000		700,000	0	incl w/equip.	incl w/equip.				700,000
1207																
1208	**56.00**	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, PRE-TREATMENT**							**4,169,200**	**4,400,709**		**49,072**		**102.69**	**5,039,082**	**13,608,992**
1209																
1210																
1211																
1212	**60.00**	**PIPE RACK**														**8,344,038**
1213																
1216	**60.20**	**CONCRETE**							**0**	**522,050**		**7,245**			**573,358**	**1,095,408**
1217																
1218	60.20.1	Piperack Foundations @ New Powerblock	Individual Footings. Half of Pipe Rack Columns on Other Foundations						0	381,400		4,870			379,241	760,641
1219		Excavation		Est.	1,400	CY		0	0	0	0.20	322	EXFD	88.87	28,616	28,616
1220		Backfill		Est.	1,200	CY		0	0	0	0.15	207	EXFD	88.87	18,396	18,396
1221		Concrete		Est.	350	CY		120	0	42,000	1.90	765	COND	68.54	52,416	94,416
1222		Reinforcing		Est.	60	TN		950	0	57,000	22.50	1,553	REIN	76.92	119,418	176,418
1223		Formwork (Footing)		Est.	1,400	SF		2.25	0	3,150	0.20	322	FORM	98.01	31,559	34,709
1224		Formwork (Piers & Pedestals)		Est.	1,400	SF		2.25	0	3,150	0.20	322	FORM	98.01	31,559	34,709
1225		Embeds		Est.	10	TN		5,000	0	50,000	120.00	1,380	CARP	70.49	97,276	147,276
1226		Piles	16" Dia. X 68' Long Augercast Piles	Est.	95	EA		2380	0	226,100	incl w/matl	incl w/matl				226,100
1227																
1228	60.20.2	Piperack Foundations @ Exterior Rack East & South of Unit 1							0	140,650		2,375			194,117	334,767
1229		Excavation		Est.	550	CY		0	0	0	0.20	127	EXFD	88.87	11,242	11,242
1230		Backfill		Est.	400	CY		0	0	0	0.15	69	EXFD	88.87	6,132	6,132
1231		Concrete		Est.	200	CY		120	0	24,000	1.90	437	COND	68.54	29,952	53,952
1232		Reinforcing		Est.	30	TN		950	0	28,500	22.50	776	REIN	76.92	59,709	88,209
1233		Formwork (Footing)		Est.	1,800	SF		2.25	0	4,050	0.20	414	FORM	98.01	40,576	44,626
1234		Formwork (Piers & Pedestals)		Est.	1,200	SF		2.25	0	2,700	0.20	276	FORM	98.01	27,051	29,751
1235		Embeds		Est.	2	TN		5,000	0	10,000	120.00	276	CARP	70.49	19,455	29,455
1236		Piles	16" Dia. X 68' Long Augercast Piles	Est.	30	EA		2380	0	71,400	incl w/matl	incl w/matl				71,400
1237																

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13																
14																
1238	**60.30**	**STRUCTURAL STEEL**							**0**	**2,727,330**		**20,748**			**2,101,053**	**4,828,383**
1239																
1240	60.30.1	Structural Steel, Pipe Rack @ New Power Block	330' L x 12' W x 25' H, 1 Level and 660' L x 24' W x 40' H, 2 Levels.						0	2,107,605		14,700			1,482,554	3,590,159
1241		Framing		Est.	675	TN		2,650	0	1,788,750	16	12,420	STST	104.09	1,292,798	3,081,548
1242		Grating	1-1/4" Galvanized	Est.	10,500	SF	0	14	0	147,000	0.14	1,691	GALL	83.21	140,667	287,667
1243		Handrail		Est.	5,130	LF	0	33.5	0	171,855	0.10	590	GALL	83.21	49,090	220,945
1244																
1245	60.30.2	Structural Steel Framing Inside Existing Boiler Room							0	168,700		2,972			304,896	473,596
1246		Framing	Labor Unit Rate Tripled for Work Inside Existing Unit	Est.	50	TN		2,650	0	132,500	48	2,760	STST	104.09	287,288	419,788
1247		Grating	1-1/4" Galvanized	Est.	600	SF	0	14	0	8,400	0.14	97	GALL	83.21	8,038	16,438
1248		Handrail		Est.	400	LF	0	33.5	0	13,400	0.10	46	GALL	83.21	3,828	17,228
1249		Stair Treads		Est.	60	EA	0	240	0	14,400	1.00	69	GALL	83.21	5,741	20,141
1250																
1251	60.30.3	Exterior Structural Steel Framing East & South of Unit 1							0	451,025		3,076			313,604	764,629
1252		Framing		Est.	150	TN		2,650	0	397,500	16	2,760	STST	104.09	287,288	684,788
1253		Grating	1-1/4" Galvanized	Est.	1,000	SF	0	14	0	14,000	0.14	161	GALL	83.21	13,397	27,397
1254		Handrail		Est.	750	LF	0	33.5	0	25,125	0.10	86	GALL	83.21	7,177	32,302
1255		Stair Treads		Est.	60	EA	0	240	0	14,400	1.00	69	GALL	83.21	5,741	20,141
1256																
1259	**60.45**	**PAINTING / COATING**							**0**	**105,000**		**6,038**			**407,350**	**512,350**
1260																
1261	60.45.1	Touch-up Painting	Allowance	Est.	105,000	SF		1	0	105,000	0.05	6,038	PNTR	67.47	407,350	512,350
1262																
1273	**60.89**	**SUBTOTAL - DIRECT COSTS, PIPE RACK**							**0**	**3,354,380**		**34,031**		**90.56**	**3,081,762**	**6,436,142**
1274																
1275	**60.90**	**CONSTRUCTION INDIRECTS, PIPE RACK**							**0**	**788,279**		**2,959**			**1,119,617**	**1,907,896**
1276		Additional Crane Allowance			1	LS				0					0	0
1277		Mobilization / Demobilization - Included in Wage Rates Above														
1278		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
1279		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						2,959		90.56	268,000	268,000
1280		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					3,699				281,491	281,491
1281		Per Diem	None		0.00	HR						0			0	0
1282		Consumables - % of Subtotal Above			0.5	%				16,772					15,409	32,181
1283		Freight on Material - % of Subtotal Above			5.0	%				167,719						167,719
1284		Freight on Equipment - % of Subtotal Above			5.0	%			0							0
1285		Scaffolding - % of Subtotal Above			3.0	%				100,631					92,453	193,084
1286		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				503,157					462,264	965,421

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13																
14																
1288	60.98	TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, PIPE RACK							0	4,142,659		36,990		113.58	4,201,379	8,344,038
1289																
1290	60.99	SUBCONTRACTS							0	0		0			0	0
1293																
1294	60.00	TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, PIPE RACK							0	4,142,659		36,990		113.58	4,201,379	8,344,038
1295																
1296																
1297																
1298	70.00	ELECTRICAL POWER DISTRIBUTION														55,771,135
1299																
1302	70.20	CONCRETE							0	732,918		17,353			1,464,184	2,197,102
1303																
1304	70.20.1	GSU Foundations (2 Total)	Includes Mat, Piers, Firewall, & Containment						0	200,800		6,117			522,112	722,912
1305		Excavation		Est.	800	CY		0	0	0	0.20	184	EXFD	88.87	16,352	16,352
1306		Backfill		Est.	360	CY		0	0	0	0.15	62	EXFD	88.87	5,519	5,519
1307		Concrete		Est.	500	CY		120	0	60,000	1.90	1,093	COND	68.54	74,880	134,880
1308		Reinforcing		Est.	30	TN		950	0	28,500	22.50	776	REIN	76.92	59,709	88,209
1309		Formwork		Est.	13,200	SF		2.25	0	29,700	0.20	3,036	FORM	98.01	297,558	327,258
1310		Embeds		Est.	7	TN		5,000	0	35,000	120.00	966	CARP	70.49	68,093	103,093
1311		Piles	16" Dia. X 68' Long Augercast Piles	Est.	20	EA		2380	0	47,600	incl w/matl	incl w/matl				47,600
1312																
1313	70.20.2	Aux Transformer Foundations (2 Total)	Includes Mat, Piers, Firewall, & Containment						0	68,178		2,377			213,882	282,060
1314		Excavation		Est.	300	CY		0	0	0	0.20	69	EXFD	88.87	6,132	6,132
1315		Backfill		Est.	80	CY		0	0	0	0.15	14	EXFD	88.87	1,226	1,226
1316		Concrete		Est.	200	CY		120	0	24,000	1.90	437	COND	68.54	29,952	53,952
1317		Reinforcing		Est.	10	TN		950	0	9,500	22.50	259	REIN	76.92	19,903	29,403
1318		Formwork		Est.	6,950	SF		2.25	0	15,638	0.20	1,599	FORM	98.01	156,669	172,306
1319		Piles	16" Dia. X 68' Long Augercast Piles	Est.	8	EA		2380	0	19,040	incl w/matl	incl w/matl				19,040
1320																
1321	70.20.3	Transformer PDC Foundation	Mat Foundation w/ Conc. Piers for Elevated PDC						0	142,625		2,262			185,997	328,622
1322		Excavation		Est.	350	CY		0	0	0	0.20	81	EXFD	88.87	7,154	7,154
1323		Backfill		Est.	50	CY		0	0	0	0.15	9	EXFD	88.87	767	767
1324		Concrete		Est.	330	CY		120	0	39,600	1.90	721	COND	68.54	49,421	89,021
1325		Reinforcing		Est.	25	TN		950	0	23,750	22.50	647	REIN	76.92	49,758	73,508
1326		Formwork		Est.	3,500	SF		2.25	0	7,875	0.20	805	FORM	98.01	78,898	86,773
1327		Piles	16" Dia. X 68' Long Augercast Piles	Est.	30	EA		2380	0	71,400	incl w/matl	incl w/matl				71,400
1328																

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13																
14																
1329	70.20.4	STG PDC Foundation	Mat Foundation w/ Conc. Piers for Elevated PDC						0	94,600		1,876			153,953	248,553
1330		Excavation		Est.	370	CY		0	0	0	0.20	85	EXFD	88.87	7,563	7,563
1331		Backfill		Est.	100	CY		0	0	0	0.15	17	EXFD	88.87	1,533	1,533
1332		Concrete		Est.	280	CY		120	0	33,600	1.90	612	COND	68.54	41,933	75,533
1333		Reinforcing		Est.	20	TN		950	0	19,000	22.50	518	REIN	76.92	39,806	58,806
1334		Formwork		Est.	2,800	SF		2.25	0	6,300	0.20	644	FORM	98.01	63,118	69,418
1335		Piles	16" Dia. X 68' Long Augercast Piles	Est.	15	EA		2380	0	35,700	incl w/matl	incl w/matl				35,700
1336																
1337	70.20.5	HRSG PDC Foundations (2 Total)	Mat Foundation w/ Conc. Piers for Elevated PDC						0	115,340		2,347			193,968	309,308
1338		Excavation		Est.	350	CY		0	0	0	0.20	81	EXFD	88.87	7,154	7,154
1339		Backfill		Est.	80	CY		0	0	0	0.15	14	EXFD	88.87	1,226	1,226
1340		Concrete		Est.	335	CY		120	0	40,200	1.90	732	COND	68.54	50,170	90,370
1341		Reinforcing		Est.	25	TN		950	0	23,750	22.50	647	REIN	76.92	49,758	73,508
1342		Formwork		Est.	3,800	SF		2.25	0	8,550	0.20	874	FORM	98.01	85,661	94,211
1343		Piles	16" Dia. X 68' Long Augercast Piles	Est.	18	EA		2380	0	42,840	incl w/matl	incl w/matl				42,840
1344																
1345	70.20.6	CT Chiller PDC Foundations	Mat Foundation w/ Conc. Piers for Elevated PDC						0	94,600		1,876			153,953	248,553
1346		Excavation		Est.	370	CY		0	0	0	0.20	85	EXFD	88.87	7,563	7,563
1347		Backfill		Est.	100	CY		0	0	0	0.15	17	EXFD	88.87	1,533	1,533
1348		Concrete		Est.	280	CY		120	0	33,600	1.90	612	COND	68.54	41,933	75,533
1349		Reinforcing		Est.	20	TN		950	0	19,000	22.50	518	REIN	76.92	39,806	58,806
1350		Formwork		Est.	2,800	SF		2.25	0	6,300	0.20	644	FORM	98.01	63,118	69,418
1351		Piles	16" Dia. X 68' Long Augercast Piles	Est.	15	EA		2380	0	35,700	incl w/matl	incl w/matl				35,700
1352																
1353	70.20.7	Iso-Phase Bus / Cable Bus Foundations	Individual Drilled Concrete Piers, 30" Dia. X 10' Long						0	7,900		173			12,491	20,391
1354		Excavation		Est.	50	CY		0	0	0	0.20	12	EXFD	88.87	1,022	1,022
1355		Backfill		Est.	0	CY		0	0	0	0.15	0	EXFD	88.87	0	0
1356		Concrete		Est.	50	CY		120	0	6,000	1.90	109	COND	68.54	7,488	13,488
1357		Reinforcing		Est.	2	TN		950	0	1,900	22.50	52	REIN	76.92	3,981	5,881
1358																
1359	70.20.8	Emergency Diesel Generator Foundation							0	8,875		326			27,828	36,703
1360		Excavation		Est.	50	CY		0	0	0	0.20	12	EXFD	88.87	1,022	1,022
1361		Backfill		Est.	20	CY		0	0	0	0.15	3	EXFD	88.87	307	307
1362		Concrete		Est.	45	CY		120	0	5,400	1.90	98	COND	68.54	6,739	12,139
1363		Reinforcing		Est.	2	TN		950	0	1,900	22.50	52	REIN	76.92	3,981	5,881
1364		Formwork		Est.	700	SF		2.25	0	1,575	0.20	161	FORM	98.01	15,780	17,355
1365																

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13																
14																
1366	**70.30**	**STRUCTURAL STEEL**							**0**	**163,195**		**1,332**			**121,640**	**284,835**
1367																
1368	70.30.1	Miscellaneous Steel for GSU Containments (2 Total)							0	45,365		411			36,011	81,376
1369		Framing		Est.	3.5	TN	0	3710	0	12,985	22.000	89	STST	104.09	9,217	22,202
1370		Grating	1-1/2" Galvanized	Est.	2,000	SF	0	16.19	0	32,380	0.14	322	GALL	83.21	26,794	59,174
1371																
1372	70.30.2	Miscellaneous Steel for Aux Transformer Containments (2 Total)							0	23,610		212			18,664	42,274
1373		Framing		Est.	2	TN	0	3710	0	7,420	22.000	51	STST	104.09	5,267	12,687
1374		Grating	1-1/2" Galvanized	Est.	1,000	SF	0	16.19	0	16,190	0.14	161	GALL	83.21	13,397	29,587
1375																
1376	70.30.3	STG PDC Galleries							0	12,930		98			9,190	22,120
1377		Framing		Est.	2	TN	0	3710	0	7,420	22.000	51	STST	104.09	5,267	12,687
1378		Grating	1-1/4" Galvanized	Est.	250	SF	0	14	0	3,500	0.14	40	GALL	83.21	3,349	6,849
1379		Handrail		Est.	60	LF	0	33.5	0	2,010	0.10	7	GALL	83.21	574	2,584
1380																
1381	70.30.4	HRSG PDC Galleries (2 Total)							0	22,150		170			15,747	37,897
1382		Framing		Est.	3	TN	0	3710	0	11,130	22.000	76	STST	104.09	7,900	19,030
1383		Grating	1-1/4" Galvanized	Est.	500	SF	0	14	0	7,000	0.14	81	GALL	83.21	6,698	13,698
1384		Handrail		Est.	120	LF	0	33.5	0	4,020	0.10	14	GALL	83.21	1,148	5,168
1385																
1386	70.30.5	Transformer PDC Galleries							0	22,150		170			15,747	37,897
1387		Framing		Est.	3	TN	0	3710	0	11,130	22.000	76	STST	104.09	7,900	19,030
1388		Grating	1-1/4" Galvanized	Est.	500	SF	0	14	0	7,000	0.14	81	GALL	83.21	6,698	13,698
1389		Handrail		Est.	120	LF	0	33.5	0	4,020	0.10	14	GALL	83.21	1,148	5,168
1390																
1391	70.30.6	HVAC PDC Support Framing & Galleries							0	24,060		174			17,091	41,151
1392		Framing		Est.	5	TN	0	3710	0	18,550	22.000	127	STST	104.09	13,167	31,717
1393		Grating	1-1/4" Galvanized	Est.	250	SF	0	14	0	3,500	0.14	40	GALL	83.21	3,349	6,849
1394		Handrail		Est.	60	LF	0	33.5	0	2,010	0.10	7	GALL	83.21	574	2,584
1395																
1396	70.30.7	CT Chiller PDC Galleries							0	12,930		98			9,190	22,120
1397		Framing		Est.	2	TN	0	3710	0	7,420	22.000	51	STST	104.09	5,267	12,687
1398		Grating	1-1/4" Galvanized	Est.	250	SF	0	14	0	3,500	0.14	40	GALL	83.21	3,349	6,849
1399		Handrail		Est.	60	LF	0	33.5	0	2,010	0.10	7	GALL	83.21	574	2,584
1400																
1405	**70.50**	**ELECTRICAL**							**22,658,610**	**4,700,829**		**187,466**			**16,618,068**	**43,977,506**
1406																
1407		Electrical Equipment							22,571,410	2,000		40,901			3,234,288	25,807,697
1408																
1409	70.50.1	Generator Circuit Breakers (18KV)	GCB: 1A, 1B	Est.	2	Ea.	550000		1,100,000	0	550	1,265	EHEC	79.78	100,922	1,200,922
1410																

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13																
14																
1411	70.50.2	Generator Step Up Transformers							5,286,500	0		5,796			462,405	5,748,905
1412		CT Generator Step Up Transformers (GSU: 1A, 1B) ▼-Y	18kV-141.5kV @ 210/280/355MVA, 2-winding	B	2	Ea.	2643250		5,286,500	0	2,520	5,796	EHEC	79.78	462,405	5,748,905
1413		ST Generator Step Up Transformer (GSU: 1S) ▼-Y	Existing													Existing
1414																
1415	70.50.3	Unit Substation Transformers	Equipment Cost Included Below w/ 480V Switchgear						0	0		3,335			266,066	266,066
1416		UST: 21A, 21B, 22A, 22B, 23A, 23B, 24A & 24B	4.16kV-480V @ 2000/2600KVA	Est.	8	Ea.	0		0	0	250	2,300	EHEC	79.78	183,494	183,494
1417		UST: 11A, 11B	4.16kV-600V @ 1000KVA	Est.	2	Ea.	0		0	0	120	276	EHEC	79.78	22,019	22,019
1418		UST: 25A, 25B, 26A, 26B	4.16kV-480V @ 1500/2000KVA	Est.	4	Ea.	0		0	0	165	759	EHEC	79.78	60,553	60,553
1419																
1420	70.50.4	Unit Auxiliary Transformers (UAT: 1A, 1B)	18KV-4.26kV @ 27/36, 13.5/18, 13.5/18MVA	Est.	2	Ea.	650000		1,300,000	0	980	2,254	EHEC	79.78	179,824	1,479,824
1421																
1422	70.50.5	4.16kV Switchgear							3,444,200	0		0			0	3,444,200
1423		4.16kV Switchgear, 3000A MAIN & 3000A TI BKR, Double Ended	12A&B, 13A&B. Installed in PDC's	Est.	2	EA	931500		1,863,000	0					0	1,863,000
1424		4.16kV Switchgear, 1600A MAIN & 1600A Reserve.	1A, 1B. Installed in PDC's (ST Bldg - Repowers Existing Loads)	Est.	2	EA	375250		750,500	0					0	750,500
1425		4.16kV Switchgear, 1600A MAIN.	14A, 14B - Installed in PDC's (Chillers)	Est.	2	EA	415350		830,700	0					0	830,700
1426																
1427	70.50.6	480V Switchgear							3,021,600	0		690			53,717	3,075,317
1428		480V Switchgear, 4000A MAIN & 4000A TI BKR	31A, 31B - Installed in PDC's	Est.	1	EA	443800		443,800	0					0	443,800
1429		480V Switchgear, 4000A MAIN & 4000A TI BKR	32A, 32B - Installed in PDC's	Est.	1	EA	453800		453,800	0					0	453,800
1430		480V Switchgear, 4000A MAIN & 4000A TI BKR	33A, 33B (Water Treatment Building)	Est.	1	EA	393500		393,500	0	300	345	EHEA	77.85	26,858	420,358
1431		480V Switchgear, 3000A MAIN & 3000A TI BKR	34A, 34B (Water Pretreatment BLDG)	Est.	1	EA	393500		393,500	0	300	345	EHEA	77.85	26,858	420,358
1432		480V Switchgear, 3000A MAIN & 3000A TI BKR	35A, 35B, 36A, 36B (Chiller BLDG) - Installed in PDC	Est.	2	EA	393500		787,000	0					0	787,000
1433		600V Switchgear, 1600A MAIN & 1600A TI BKR	11A, 11B (ST Bldg - Repowers Existing Loads) - Installed in PDC	Est.	1	EA	550000		550,000	0					0	550,000
1434																
1435	70.50.7	Isolated Phase Bus Duct	Includes Main & Tap Buses, in Single Phase Feet	Est.	844	LF	1060.426		895,000	0	4.40	4,271	EHEA	77.85	332,469	1,227,469
1436																
1437	70.50.8	480V-800A, Motor Control Centers			23	EA	114,000		1,311,000	0		552			42,973	1,353,973
1438		480V-800A, Motor Control Centers	480V, 3Phase - Installed in PDC's	Est.	15	EA	57000		855,000	0						855,000
1439		480V-800A, Motor Control Centers	Buildings	Est.	8	EA	57000		456,000	0	60.00	552	EHEA	77.85	42,973	498,973
1440																
1441	70.50.9	Non-Seg/Cable Bus	MV and LV	Est.	1	LS	868720		868,720	0	11,150	12,823	EHEA	77.85	998,232	1,866,952
1442																

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13																
14																
1443	70.50.10	Emergency Power System	125VDC Batteries	Est.	1	LS	257500		257,500	0	450	518	EHEA	77.85	40,287	297,787
1444		2 Battery Chargers	Included Above													Included Above
1445		UPS	Included Above													Included Above
1446		Alternet Source Transformer (45KVA, 480/120VAC)	Included Above													Included Above
1447		Satellite UPS (Fuel Oil PDC)	Included Above													Included Above
1448																
1449	70.50.11	PDCs		Est.	9545	SF	375		3,579,375	0	0.5	5,488	EHEC	79.78	437,863	4,017,238
1450		Transformer Power Distribution PDC			1	EA										Included Above
1451		STG Power Distribution Center PDC			1	EA										Included Above
1452		HRSG Power Distribution Center PDC			2	EA										Included Above
1453		HRSG PDC- Upper			2	EA										Included Above
1454		CTG HVAC PDC			1	EA										Included Above
1455		Chiller PDC			1	EA										Included Above
1456																
1457	70.50.12	Panelboards							152,000	0		196			15,220	167,220
1458		AC/UPS Panelboards/Switchboards		Est.	1	LS	152000		152,000	0	170	196	EHEA	77.85	15,220	167,220
1459		DC Panelboards/Switchboards	Included Above	Est.	1	LS										Included Above
1460																
1461	70.50.13	Generator/Transformer Relay & Protection Panels							276,000	2,000		679			59,043	337,043
1462		New Panels		Est.	1	LS	276000		276,000	0	340	391	INEL	87.02	34,025	310,025
1463		Modify Existing Protection Relay Panels	Allowance	Est.	1	LS	0	2000	0	2,000	250	288	INEL	87.02	25,018	27,018
1464																
1465	70.50.14	Communication		Est.	1	LS	81835		81,835	0	120	138	EHEA	77.85	10,743	92,578
1466																
1467	70.50.15	Digital Fault Recorder		Est.	1	LS	125680		125,680	0	200	230	EHEA	77.85	17,906	143,586
1468																
1469	70.50.16	Diesel Generator	1,000 kW Capacity	Est.	1	LS	550000		550,000	0	1000	1,150	EHEA	77.85	89,528	639,528
1470																
1471	70.50.17	Security System	Allowance	Est.	1	LS	145000		145,000	0	400	460	WIRE	97.23	44,726	189,726
1472																
1473	70.50.18	Cable Splice Boxes							177,000	0		1,058			82,365	259,365
1474		4.16 kV	Allowance	Est.	7	EA	9000		63,000	0	50	403	EHEA	77.85	31,335	94,335
1475		600V	Allowance	Est.	19	EA	6000		114,000	0	30	656	EHEA	77.85	51,031	165,031
1476																
1477		Electrical BOP							87,200	4,698,829		146,565			13,383,780	18,169,809
1478																
1479	70.50.19	Cable	Per RPESK-013		478,612	LF			0	2,673,346		77,176			7,503,834	10,177,180
1480		MV Power Cable		Est.	59,986	LF			0	593,447		11,280			1,096,771	1,690,218
1481		1/C #1550 KCMIL 2KV		Est.	1,020	LF		19.15	0	19,533	0.190	223	WIRE	97.23	21,670	41,203
1482		1/C #1000 KCMIL 8KV		Est.	5,925	LF		15.96	0	94,563	0.173	1,179	WIRE	97.23	114,613	209,176
1483		1/C #750 KCMIL 5KV		Est.	15,420	LF		13.87	0	213,875	0.173	3,068	WIRE	97.23	298,283	512,158
1484		1/C #500 KCMIL 5KV		Est.	18,180	LF		9.39	0	170,710	0.170	3,554	WIRE	97.23	345,574	516,284
1485		1/C #250 KCMIL 5KV		Est.	7,080	LF		5.46	0	38,657	0.170	1,384	WIRE	97.23	134,580	173,237
1486		1/C #4/0 KCMIL 5KV		Est.	4,200	LF		4.76	0	19,992	0.120	580	WIRE	97.23	56,355	76,347
1487		1/C #2/0 KCMIL 5KV		Est.	8,160	LF		3.00	0	24,480	0.120	1,126	WIRE	97.23	109,489	133,969
1488		Terminations		Est.	1	LS				11,636		167	WIRE	97.23	16,208	27,845

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13																
14																
1489									0							
1490		600V Large Power Cable	Per RPESK-013	Est.	77,043	LF			0	1,378,641		41,643			4,048,917	5,427,558
1491		3/C # 500 KCMIL - 600V & 1000V		Est.	30,180	LF		31.29	0	944,332	0.690	23,948	WIRE	97.23	2,328,448	3,272,780
1492		3/C # 250 KCMIL - 600V		Est.	6,920	LF		16.28	0	112,658	0.690	5,491	WIRE	97.23	533,892	646,549
1493		3/C # 4/0 KCMIL - 600V & 1000V		Est.	8,890	LF		16.04	0	142,596	0.520	5,316	WIRE	97.23	516,896	659,492
1494		1/C # 500 KCMIL - 600V		Est.	120	LF		8.96	0	1,075	0.173	24	WIRE	97.23	2,321	3,396
1495		1/C # 250 KCMIL - 600V		Est.	30,932	LF		4.88	0	150,948	0.170	6,047	WIRE	97.23	587,970	738,918
1496		Terminations		Est.	1	LS				27,032		817	WIRE	97.23	79,391	106,423
1497																
1498		600V Small Power Cable	Per RPESK-OPT1-005	Est.	341,583	LF			0	701,258		24,253			2,358,146	3,059,405
1499		2/C # 10 W/G, 600V		Est.	90,753	LF		1.85	0	167,894	0.027	2,818	WIRE	97.23	273,984	441,878
1500		2/C # 12 W/G, 600V		Est.	37,414	LF		0.66	0	24,693	0.030	1,291	WIRE	97.23	125,503	150,196
1501		3/C # 2 W/G, 600V		Est.	12,793	LF		5.84	0	74,709	0.350	5,149	WIRE	97.23	500,639	575,348
1502		3/C # 6 W/G, 600V		Est.	12,188	LF		3.37	0	41,074	0.090	1,261	WIRE	97.23	122,652	163,725
1503		3/C # 8 W/G, 600V		Est.	8,737	LF		2.65	0	23,152	0.053	532	WIRE	97.23	51,774	74,926
1504		3/C # 10 W/G, 600V		Est.	33,965	LF		2.06	0	69,968	0.053	2,070	WIRE	97.23	201,282	271,250
1505		3/C # 2/0 W/G, 600V		Est.	4,513	LF		9.26	0	41,787	0.520	2,699	WIRE	97.23	262,379	304,165
1506		3/C # 2/0 W/G, W/S, 1KV		Est.	1,089	LF		9.26	0	10,085	0.520	651	WIRE	97.23	63,321	73,406
1507		2/C # 10 W/G, 600V		Est.	3,259	LF		1.85	0	6,029	0.027	101	WIRE	97.23	9,839	15,869
1508		2/C # 12 W/G, 600V		Est.	16,542	LF		0.66	0	10,917	0.030	571	WIRE	97.23	55,488	66,405
1509		2/C # 14, 600V		Est.	11,136	LF		0.56	0	6,236	0.027	346	WIRE	97.23	33,619	39,856
1510		3/C # 2 W/G, 600V		Est.	454	LF		5.84	0	2,653	0.350	183	WIRE	97.23	17,777	20,430
1511		3/C # 6 W/G, 600V		Est.	1,047	LF		3.37	0	3,527	0.090	108	WIRE	97.23	10,531	14,058
1512		3/C # 10 W/G, 600V		Est.	6,803	LF		2.06	0	14,015	0.053	415	WIRE	97.23	40,318	54,333
1513		3/C # 2/0 W/G, 600V		Est.	840	LF		9.26	0	7,774	0.520	502	WIRE	97.23	48,812	56,585
1514		4/C # 10, 600V		Est.	8,723	LF		2.21	0	19,277	0.064	642	WIRE	97.23	62,421	81,698
1515		4/C # 14, 600V		Est.	5,959	LF		0.8	0	4,767	0.032	219	WIRE	97.23	21,322	26,089
1516		7/C # 14, 600V		Est.	11,172	LF		1.24	0	13,853	0.040	514	WIRE	97.23	49,968	63,821
1517		12/C # 14, 600V		Est.	3,197	LF		1.92	0	6,138	0.070	257	WIRE	97.23	25,023	31,161
1518		1/C # 14, W/S, 600V, FP		Est.	2,401	LF		0.14	0	336	0.024	66	WIRE	97.23	6,444	6,780
1519		1/C #14, 600V, JMPR		Est.	21	LF		0.14	0	3	0.024	1	WIRE	97.23	56	58
1520		2/C # 10 W/G, 600V, AEP Cable		Est.	2,328	LF		1.85	0	4,306	0.027	72	WIRE	97.23	7,027	11,333
1521		3/C # 6 W/G, W/S, 1000V		Est.	368	LF		3.37	0	1,240	0.090	38	WIRE	97.23	3,703	4,943
1522		1 PR # 16, W/S, 600V		Est.	1,190	LF		0.17	0	202	0.027	37	WIRE	97.23	3,593	3,795
1523		FIBER 12MM, 12SM		Est.	321	LF		5.11	0	1,640	0.140	52	WIRE	97.23	5,025	6,665
1524		FO-12 FIBER MULTIMODE		Est.	413	LF		5.11	0	2,110	0.140	66	WIRE	97.23	6,465	8,576
1525		FO-2 FIBER MULTIMODE		Est.	32	LF		5.11	0	164	0.140	5	WIRE	97.23	501	664
1526		FIBER 24MM, 24SM		Est.	45	LF		10.19	0	459	0.280	14	WIRE	97.23	1,409	1,867
1527		FO-12 FIBER MULTIMODE		Est.	256	LF		5.11	0	1,308	0.140	41	WIRE	97.23	4,007	5,316
1528		FIBER 24MM, 24SM		Est.	1,840	LF		10.19	0	18,750	0.280	592	WIRE	97.23	57,607	76,356
1529		1/C # 2/0, 25KV		Est.	115	LF		4.86	0	559	0.117	15	WIRE	97.23	1,504	2,063
1530		2/C # 14, 600V		Est.	58	LF		0.56	0	32	0.027	2	WIRE	97.23	175	208
1531		2/C # 10 W/G, 600V, AEP CABLE		Est.	2,185	LF		1.85	0	4,042	0.027	68	WIRE	97.23	6,596	10,639
1532		4/C # 14, 600V, PDC CABLE		Est.	35	LF		0.8	0	28	0.032	1	WIRE	97.23	125	153
1533		16/C # 14, 600V, AEP CABLE		Est.	2,185	LF		2.33	0	5,091	0.080	201	WIRE	97.23	19,545	24,636
1534		1 PR # 16, W/S, 600V		Est.	16,392	LF		0.17	0	2,787	0.027	509	WIRE	97.23	49,487	52,274

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13																
14																
1535		1 PR # 16, W/S, 600V, TYPE K		Est.	8,740	LF		0.92	0	8,041	0.027	271	WIRE	97.23	26,386	34,427
1536		1 PR # 18, W/IOS, 600V, TYPE KXH		Est.	6,723	LF		0.87	0	5,849	0.027	209	WIRE	97.23	20,297	26,146
1537		1 PR # 16, W/IOS, 600V, TYPE SIH		Est.	169	LF		0.82	0	139	0.027	5	WIRE	97.23	510	649
1538		1 PR # 16, W/S, 600V		Est.	3,406	LF		0.17	0	579	0.027	106	WIRE	97.23	10,283	10,862
1539		2 PR # 16, W/IOS, 600V		Est.	7,697	LF		1.44	0	11,084	0.053	469	WIRE	97.23	45,614	56,697
1540		2 PR # 16, W/IOS, 600V, PDC CABLE		Est.	472	LF		1.44	0	680	0.053	29	WIRE	97.23	2,797	3,477
1541		4 PR # 16, W/IOS, 600V		Est.	3,124	LF		1.44	0	4,499	0.053	190	WIRE	97.23	18,513	23,012
1542		4 PR # 16, W/IOS, 600V, TYPE K		Est.	109	LF		6.87	0	749	0.027	3	WIRE	97.23	329	1,078
1543		4 PR # 16, W/IOS, 600V, PDC CABLE		Est.	101	LF		6.87	0	694	0.027	3	WIRE	97.23	305	999
1544		4 PR # 16, W/IOS, 600V		Est.	755	LF		3.94	0	2,975	0.053	46	WIRE	97.23	4,474	7,449
1545		8 PR # 16, W/IOS, 600V		Est.	3,042	LF		8.95	0	27,226	0.053	185	WIRE	97.23	18,027	45,253
1546		8 PR # 16, W/IOS, 600V, AEP CABLE		Est.	2,162	LF		8.95	0	19,350	0.053	132	WIRE	97.23	12,812	32,162
1547		8 PR # 16, W/IOS, 600V, TYPE KX		Est.	860	LF		14.8	0	12,728	0.027	27	WIRE	97.23	2,596	15,324
1548		COAX CABLE TYPE RG6		Est.	705	LF		0.77	0	543	0.027	22	WIRE	97.23	2,128	2,671
1549		SPG CABLE (COAX)		Est.	644	LF		0.77	0	496	0.027	20	WIRE	97.23	1,944	2,440
1550		CAT CABLE (Ethernet Cable)		Est.	2,106	LF		0.13	0	274	0.027	65	WIRE	97.23	6,358	6,632
1551		Termination		Est.	1	LT			0	13,750		358	WIRE	97.23	34,849	48,600
1552																
1553	70.50.20	Heat Tracing	Per RPESK-007						87,200	440,105		12,407			1,206,361	1,733,666
1554		Freeze Protection, Heat Tracing														
1555		Heat Tracing XFMR, 45KVA. 480-208/120V		Est.	6	EA	5000		30,000	0	16.00	110	WIRE	97.23	10,734	40,734
1556		Heat Tracing Distribution Panel-208/120VAC-30CKT BRK		Est.	6	EA	1200		7,200	0	8.00	55	WIRE	97.23	5,367	12,567
1557		Heat Tracing Zone control Panel		Est.	2	EA	25000		50,000	0	24.00	55	WIRE	97.23	5,367	55,367
1558		Heat Tracing MI Cable		Est.	30,938	LF		9.5	0	293,911	0.20	7,116	WIRE	97.23	691,863	985,774
1559		Heat Tracing Self Limiting Cable		Est.	10,313	LF		11.25	0	116,021	0.20	2,372	WIRE	97.23	230,629	346,650
1560		Heat Tracing Junction Boxes + MTG supports		Est.	447	EA		12.5	0	5,588	2.75	1,414	WIRE	97.23	137,448	143,035
1561		Heat Tracing Power Circuits & Thermostats		Est.	1	LS		22350	0	22,350	894	1,028	WIRE	97.23	99,962	122,312
1562		Test & calibrations + label & tag with documentations		Est.	1	LS		2235	0	2,235	224	257	WIRE	97.23	24,991	27,226
1563																
1564	70.50.21	Conduit-Above Ground	Per RPESK-OPT1-023		34,697	LF			0	268,977		11,217			835,812	1,104,789
1565		3/4" RGS Conduit		Est.	14,833	LF		3.48	0	51,619	0.194	3,309	ECND	74.51	246,572	298,190
1566		1" RGS Conduit		Est.	3,082	LF		4.92	0	15,163	0.239	847	ECND	74.51	63,117	78,280
1567		1-1/2" RGS Conduit		Est.	11,826	LF		8.5	0	100,521	0.284	3,862	ECND	74.51	287,785	388,306
1568		2" RGS Conduit		Est.	2,329	LF		10.95	0	25,503	0.352	943	ECND	74.51	70,246	95,749
1569		3" RGS Conduit		Est.	1,567	LF		22.85	0	35,806	0.645	1,162	ECND	74.51	86,605	122,411
1570		4" RGS Conduit		Est.	949	LF		32.30	0	30,653	0.807	881	ECND	74.51	65,622	96,275
1571		6" RGS Conduit		Est.	111	LF		87.5	0	9,713	1.668	213	ECND	74.51	15,865	25,577
1572																
1573	70.50.22	Embedded Conduits	Per RPESK-OPT1-012						0	24,048		814			60,677	84,725
1574		1" RGS Conduit		Est.	47	LF		4.92	0	231	0.239	13	ECND	74.51	963	1,194
1575		2" RGS Conduit		Est.	837	LF		10.95	0	9,165	0.352	339	ECND	74.51	25,245	34,410
1576		3" RGS Conduit		Est.	616	LF		22.85	0	14,076	0.645	457	ECND	74.51	34,045	48,121
1577		4" PVC Conduit		Est.	49	LF		11.75	0	576	0.101	6	ECND	74.51	424	1,000
1578																

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1579	70.50.23	Cable Tray							0	389,598		25,753			1,928,649	2,318,247
1580		CT/STG Area	Per RPESK-014						0	289,066		19,086			1,422,077	1,711,143
1581		Sizes 6" & 9"		Est.	1,692	LF		16.01	0	27,080	0.89	1,728	ECND	74.51	128,744	155,824
1582		Sizes 12"		Est.	5,298	LF		21.34	0	113,059	1.110	6,763	ECND	74.51	503,903	616,963
1583		Sizes 18"		Est.	1,620	LF		24.38	0	39,496	1.450	2,701	ECND	74.51	201,278	240,773
1584		Sizes 24"		Est.	1,869	LF		27.79	0	51,940	1.750	3,761	ECND	74.51	280,259	332,199
1585		Sizes 30"		Est.	923	LF		30.69	0	28,327	1.950	2,070	ECND	74.51	154,223	182,550
1586		Sizes 36"		Est.	854	LF		34.15	0	29,164	2.100	2,062	ECND	74.51	153,670	182,834
1587		Water Treating Area	Per RPESK-015						0	55,076		3,725			277,540	332,616
1588		Size 12"		Est.	712	LF		21.34	0	15,194	1.110	909	ECND	74.51	67,720	82,914
1589		Size 18"		Est.	632	LF		24.38	0	15,408	1.450	1,054	ECND	74.51	78,523	93,931
1590		Size 24"		Est.	569	LF		27.79	0	15,813	1.750	1,145	ECND	74.51	85,322	101,135
1591		Size 30"		Est.	63	LF		30.69	0	1,933	1.950	141	ECND	74.51	10,527	12,460
1592		Size 36"		Est.	197	LF		34.15	0	6,728	2.100	476	ECND	74.51	35,449	42,176
1593		Water Pre-Treatment Area	Per RPESK-016						0	45,457		2,942			229,032	274,489
1594		Sizes 6" & 9"		Est.	324	LF		16.01	0	5,186	0.89	331	EHEA	77.85	25,758	30,944
1595		Size 12"		Est.	1,052	LF		21.34	0	22,450	1.11	1,343	EHEA	77.85	104,543	126,993
1596		Size 18"		Est.	202	LF		24.38	0	4,925	1.45	337	EHEA	77.85	26,223	31,147
1597		Size 24"		Est.	410	LF		27.79	0	11,394	1.75	825	EHEA	77.85	64,236	75,630
1598		Size 36"		Est.	44	LF		34.15	0	1,503	2.10	106	EHEA	77.85	8,272	9,775
1599		Cooling Tower Area	Existing													Existing
1600																
1601	70.50.24	Lighting and Distribution							0	757,000		14,950			1,453,589	2,210,589
1602		New Lighting	Per RPESK-011	Est.	1	LS		747000	0	747,000	12,600	14,490	WIRE	97.23	1,408,863	2,155,863
1603		Upgrade Existing Control Room Lighting	Allowance	Est.	1	LS		10000	0	10,000	400	460	WIRE	97.23	44,726	54,726
1604																
1605	70.50.25	Laydown Area Lighting	Costs Covered in Site Overheads (In Crew Wage Rates)						0	0		0			0	0
1606																
1607	70.50.26	Miscellaneous Electrical Devices	Welding Receptacles, Junction Boxes, etc.	Est.	1	LS		100000	0	100,000	2,000	2,300	WIRE	97.23	223,629	323,629
1608																
1609	70.50.27	Lightning Protection	Per RPESK-006						0	15,674		871			84,720	100,394
1610		#2/0 Bare copper wire	CTG Building	Est.	874	LF		2.57	0	2,246	0.12	121	WIRE	97.23	11,727	13,973
1611		#2/0 Bare copper wire	Water treatment Building	Est.	580	LF		2.57	0	1,491	0.12	80	WIRE	97.23	7,782	9,273
1612		#2/0 Bare copper wire	Transformer PDC	Est.	260	LF		2.57	0	668	0.12	36	WIRE	97.23	3,489	4,157
1613		#2/0 Bare copper wire	Pre Treatment Building	Est.	520	LF		2.57	0	1,336	0.120	72	WIRE	97.23	6,977	8,314
1614		#2/0 Bare copper wire	Filter Building	Est.	290	LF		2.57	0	745	0.120	40	WIRE	97.23	3,891	4,636
1615		#2/0 Bare copper wire	Fire Protection Building	Est.	290	LF		2.57	0	745	0.120	40	WIRE	97.23	3,891	4,636
1616		#2/0 Bare copper wire	Chiller PDC	Est.	250	LF		2.57	0	643	0.120	35	WIRE	97.23	3,354	3,997
1617		5/8' X 2' Air Terminal		Est.	130	EA		50	0	6,500	2.00	299	WIRE	97.23	29,072	35,572
1618		#2/0 Splicing & terminations + Tag	Including test and documentations	Est.	260	EA		5	0	1,300	0.50	150	WIRE	97.23	14,536	15,836
1619																

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13																
14																
1620	70.50.28	Above Ground Grounding	Per RPESK-022						0	22,581		932			72,533	95,114
1621		Cable Tray Grounding														
1622		Cable Tray #4/0 KCMIL Bare Copper Wire		Est.	5,660	LF		3.08	0	17,447	0.06	391	EHEA	77.85	30,404	47,850
1623		Equipment Grounding														
1624		#6 AWG Bare Copper Wire		Est.	8,556	LF		0.6	0	5,134	0.055	541	EHEA	77.85	42,130	47,263
1625																
1626	70.50.29	Electrical Allowance for Relocated Bulk Gas Storage Facility	Includes Lighting	Est.	1	LS		7500	0	7,500	125	144	WIRE	97.23	13,977	21,477
1627																
1636	**70.89**	**SUBTOTAL - DIRECT COSTS, ELECTRICAL POWER DISTRIBUTION**							**22,658,610**	**5,596,941**		**206,150**		**88.30**	**18,203,893**	**46,459,443**
1637																
1638	**70.90**	**CONSTRUCTION INDIRECTS, ELECTRICAL POWER DISTRIBUTION**							**1,132,930**	**1,315,281**		**17,926**			**6,613,480**	**9,061,691**
1639		Additional Crane Allowance			1	LS				0					0	0
1640		Mobilization / Demobilization - Included in Wage Rates Above														
1641		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
1642		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						17,926		88.30	1,583,000	1,583,000
1643		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					22,408				1,662,760	1,662,760
1644		Per Diem	None		0.00	HR						0			0	0
1645		Consumables - % of Subtotal Above			0.5	%				27,985					91,019	119,004
1646		Freight on Material - % of Subtotal Above			5.0	%				279,847						279,847
1647		Freight on Equipment - % of Subtotal Above			5.0	%			1,132,930							1,132,930
1648		Scaffolding - % of Subtotal Above			3.0	%				167,908					546,117	714,025
1649		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				839,541					2,730,584	3,570,125
1651	**70.98**	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, ELECTRICAL POWER DISTRIBUTION**							**23,791,540**	**6,912,222**		**224,076**		**110.75**	**24,817,372**	**55,521,135**
1652																
1653	**70.99**	**SUBCONTRACTS**	GSU Heavy Haul						**0**	**0**		**0**			**250,000**	**250,000**
1654																
1655		Heavy Haul Subcontract for GSU Offloading & Staging	Allowance		1	LS									250,000	250,000
1656																
1657	**70.00**	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, ELECTRICAL POWER DISTRIBUTION**							**23,791,540**	**6,912,222**		**224,076**		**111.87**	**25,067,372**	**55,771,135**
1658																
1659																
1660																

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14																
1661	**75.00**	**DCS**														**13,327,629**
1662																
1665	**75.20**	**CONCRETE**							**0**	**7,420**		**223**			**18,125**	**25,545**
1666																
1667	75.20.1	CEMS Foundation (2 Total)							0	7,420		223			18,125	25,545
1668		Excavation		Est.	40	CY		0	0	0	0.20	9	EXFD	88.87	818	818
1669		Backfill		Est.	8	CY		0	0	0	0.15	1	EXFD	88.87	123	123
1670		Concrete		Est.	40	CY		120	0	4,800	1.90	87	COND	68.54	5,990	10,790
1671		Reinforcing		Est.	2	TN		950	0	1,900	22.50	52	REIN	76.92	3,981	5,881
1672		Formwork		Est.	320	SF		2.25	0	720	0.20	74	FORM	98.01	7,214	7,934
1675																
1680	**75.50**	**ELECTRICAL**							**0**	**716,114**		**24,634**			**2,167,748**	**2,883,862**
1681																
1682	75.50.1	600V Small Power Cable	Per RPESK-OPT1-005		338,564	LF			0	468,546		14,626			1,422,055	1,890,601
1683		2/C # 14, 600V		Est.	44,543	LF		0.56	0	24,944	0.027	1,383	WIRE	97.23	134,475	159,419
1684		4/C # 14, 600V		Est.	23,834	LF		0.80	0	19,067	0.032	877	WIRE	97.23	85,280	104,347
1685		7/C # 14, 600V		Est.	44,686	LF		1.24	0	55,411	0.040	2,056	WIRE	97.23	199,862	255,272
1686		12/C # 14, 600V		Est.	12,789	LF		1.92	0	24,555	0.070	1,030	WIRE	97.23	100,100	124,655
1687		1 PR # 16, W/S, 600V		Est.	1,720	LF		0.17	0	292	0.027	53	WIRE	97.23	5,193	5,485
1688		FIBER 12MM, 12SM		Est.	1,282	LF		5.11	0	6,551	0.140	206	WIRE	97.23	20,068	26,619
1689		FO-12 FIBER MULTIMODE		Est.	1,652	LF		5.11	0	8,442	0.140	266	WIRE	97.23	25,860	34,302
1690		FO-2 FIBER MULTIMODE		Est.	130	LF		5.11	0	664	0.140	21	WIRE	97.23	2,035	2,699
1691		FIBER 24MM, 24SM		Est.	179	LF		10.19	0	1,824	0.280	58	WIRE	97.23	5,604	7,428
1692		FO-12 FIBER MULTIMODE		Est.	1,025	LF		5.11	0	5,238	0.140	165	WIRE	97.23	16,045	21,283
1693		2/C # 14, 600V		Est.	230	LF		0.56	0	129	0.027	7	WIRE	97.23	694	823
1694		4/C # 14, 600V, PDC CABLE		Est.	138	LF		0.8	0	110	0.032	5	WIRE	97.23	494	604
1695		1 PR # 16, W/S, 600V		Est.	65,567	LF		0.17	0	11,146	0.027	2,036	WIRE	97.23	197,946	209,093
1696		1 PR # 16, W/S, 600V, TYPE K		Est.	34,960	LF		0.92	0	32,163	0.027	1,086	WIRE	97.23	105,544	137,707
1697		1 PR # 18, W/IOS, 600V, TYPE KXH		Est.	26,893	LF		0.87	0	23,397	0.027	835	WIRE	97.23	81,190	104,587
1698		1 PR # 16, W/IOS, 600V, TYPE SIH		Est.	674	LF		0.82	0	553	0.027	21	WIRE	97.23	2,035	2,587
1699		1 PR # 16, W/S, 600V		Est.	13,623	LF		0.17	0	2,316	0.027	423	WIRE	97.23	41,128	43,444
1700		2 PR # 16, W/IOS, 600V		Est.	30,787	LF		1.44	0	44,333	0.053	1,876	WIRE	97.23	182,449	226,782
1701		2 PR # 16, W/IOS, 600V, PDC CABLE		Est.	1,886	LF		1.44	0	2,716	0.053	115	WIRE	97.23	11,177	13,893
1702		4 PR # 16, W/IOS, 600V		Est.	12,495	LF		1.44	0	17,993	0.053	762	WIRE	97.23	74,047	92,040
1703		4 PR # 16, W/IOS, 600V, TYPE K		Est.	435	LF		6.87	0	2,988	0.027	14	WIRE	97.23	1,313	4,302
1704		4 PR # 16, W/IOS, 600V, PDC CABLE		Est.	404	LF		6.87	0	2,775	0.027	13	WIRE	97.23	1,220	3,995
1705		4 PR # 16, W/IOS, 600V		Est.	3,021	LF		3.94	0	11,903	0.053	184	WIRE	97.23	17,903	29,806
1706		8 PR # 16, W/IOS, 600V		Est.	12,170	LF		8.95	0	108,922	0.053	742	WIRE	97.23	72,121	181,043
1707		8 PR # 16, W/IOS, 600V, TYPE KX		Est.	3,441	LF		14.80	0	50,927	0.027	107	WIRE	97.23	10,388	61,315
1708		Termination		Est.	1	LT				9,187		287	WIRE	97.23	27,883	37,071
1709																

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13																
14																
1710	75.50.2	Conduit-Above Ground	Per RPESK-OPT1-023		22,755	LF			0	166,802		7,252			540,315	707,117
1711		3/4" RGS Conduit		Est.	7,362	LF		3.48	0	25,620	0.194	1,642	ECND	74.51	122,380	148,000
1712		1" RGS Conduit		Est.	5,330	LF		4.92	0	26,224	0.239	1,465	ECND	74.51	109,153	135,377
1713		1-1/2" RGS Conduit		Est.	5,570	LF		8.5	0	47,345	0.284	1,819	ECND	74.51	135,546	182,891
1714		2" RGS Conduit		Est.	3,094	LF		10.95	0	33,879	0.352	1,252	ECND	74.51	93,320	127,199
1715		3" RGS Conduit		Est.	1,212	LF		22.85	0	27,694	0.645	899	ECND	74.51	66,985	94,679
1716		4" RGS Conduit		Est.	187	LF		32.3	0	6,040	0.807	174	ECND	74.51	12,931	18,971
1717		6" RGS Conduit		Est.	0	LF		87.5	0	0	1.668	0	ECND	74.51	0	0
1718																
1719	75.50.3	Embedded Conduits	Per RPESK-OPT1-012						0	80,765		2,756			205,378	286,144
1720		1" RGS Conduit		Est.	3	LF		4.92	0	15	0.239	1	ECND	74.51	61	76
1721		2" RGS Conduit		Est.	2,721	LF		10.95	0	29,795	0.352	1,101	ECND	74.51	82,070	111,865
1722		3" RGS Conduit		Est.	2,230	LF		22.85	0	50,956	0.645	1,654	ECND	74.51	123,247	174,203
1723																
1724	**75.55**	**INSTRUMENTATION**							**5,606,400**	**813,026**		**23,595**			**1,879,857**	**8,299,283**
1725																
1726	75.55.1	DCS							2,900,000	0		3,853			335,245	3,235,245
1727		New DCS	Based on 3,710 IO Points	Est.	1	LS	2600000		2,600,000	0	2,900	3,335	INEL	87.02	290,212	2,890,212
1728		Turbine Control System Upgrade	Based on770 IO Points (Most Existing)	Est.	1	LS	300000		300,000	0	450	518	INEL	87.02	45,033	345,033
1729																
1730	75.55.2	High Fidelity Simulator		Est.	1	LS	1346000		1,346,000	0	1,500	1,725	INEL	87.02	150,110	1,496,110
1731																
1732	75.55.3	CEMS	(2) Shelters, (2) Sets of Stack Monitoring Equipment	Est.	2	LS	330000		660,000	0	600	1,380	INEL	87.02	120,088	780,088
1733		CEMS on Auxiliary Boiler Stack	Not Included													Not Included
1734																
1735	75.55.4	BOP Field Mounted Instruments							700,400	545,310		11,117			851,566	2,097,276
1736		Analyzers		Est.	8	EA	3000		24,000	0	7	64	INPE	76.60	4,933	28,933
1737		Tubing w/Fittings, Adapters, Supports, & Insulation		Est.	240	LF		6.5	0	1,560	0.35	97	INPE	76.60	7,400	8,960
1738		Flow Elements		Est.	57	EA	3000		171,000	0	6	393	INPE	76.60	30,127	201,127
1739		Level Switches		Est.	41	EA	300		12,300	0	7	330	INPE	76.60	25,282	37,582
1740		Valves		Est.	82	EA		200	0	16,400	1	94	INPE	76.60	7,223	23,623
1741		Transmitters		Est.	265	EA	1700		450,500	0	7	2,133	INPE	76.60	163,407	613,907
1742		Tubing w/Fittings, Adapters, Supports, & Insulation		Est.	15,900	LF		6.5	0	103,350	0.35	6,400	INPE	76.60	490,221	593,571
1743		Valves		Est.	795	EA		200	0	159,000	1	914	INPE	76.60	70,032	229,032
1744		Temperature Elements		Est.	142	EA	300		42,600	0	0.50	82	INPE	76.60	6,254	48,854
1745		Instrument Stands / Racks / Heated Enclosures		Est.	1	LS		265000	0	265,000	530	610	INPE	76.60	46,688	311,688
1746																
1747	75.55.5	Vendor Furnished Field Mounted Instruments							0	267,716		5,520			422,850	690,566
1748		CTG Related Instruments	Installation Incl w/ Equipment	Est.	390	EA	0		0	0						0
1749		Tubing w/Fittings, Adapters, Supports, & Insulation		Est.	4,680	LF		6.5	0	30,420	0.35	1,884	INPE	76.60	144,291	174,711
1750		Valves		Est.	351	EA		200	0	70,200	1	404	INPE	76.60	30,920	101,120

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14																
1751		HRSG Related Instruments	Installation Incl w/ Equipment	Est.	462	EA	0		0	0						0
1752		Tubing w/Fittings, Adapters, Supports, & Insulation		Est.	5,544	LF		6.5	0	36,036	0.35	2,231	INPE	76.60	170,930	206,966
1753		Valves		Est.	416	EA		200	0	83,160	1	478	INPE	76.60	36,628	119,788
1754		Enclosures		Est.	50	EA		700	0	35,000	4	230	INPE	76.60	17,618	52,618
1755		BOP Vendor Related Instruments	Installation Incl w/ Equipment	Est.	50	EA	0		0	0						0
1756		Tubing w/Fittings, Adapters, Supports, & Insulation		Est.	600	LF		6.5	0	3,900	0.35	242	INPE	76.60	18,499	22,399
1757		Valves		Est.	45	EA		200	0	9,000	1	52	INPE	76.60	3,964	12,964
1758																
1765	**75.89**	**SUBTOTAL - DIRECT COSTS, DCS**							**5,606,400**	**1,536,560**		**48,452**		**83.91**	**4,065,730**	**11,208,690**
1766																
1767	**75.90**	**CONSTRUCTION INDIRECTS, DCS**							**280,320**	**361,091**		**4,213**			**1,477,527**	**2,118,939**
1768		Additional Crane Allowance			1	LS				0					0	0
1769		Mobilization / Demobilization - Included in Wage Rates Above														
1770		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
1771		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						4,213		83.91	354,000	354,000
1772		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					5,266				371,367	371,367
1773		Per Diem	None		0.00	HR						0			0	0
1774		Consumables - % of Subtotal Above			0.5	%				7,683					20,329	28,011
1775		Freight on Material - % of Subtotal Above			5.0	%				76,828						76,828
1776		Freight on Equipment - % of Subtotal Above			5.0	%			280,320							280,320
1777		Scaffolding - % of Subtotal Above			3.0	%				46,097					121,972	168,069
1778		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				230,484					609,860	840,343
1780	**75.98**	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, DCS**							**5,886,720**	**1,897,651**		**52,665**		**105.26**	**5,543,258**	**13,327,629**
1781																
1782	**75.99**	**SUBCONTRACTS**							**0**	**0**		**0**			**0**	**0**
1786																
1787	**75.00**	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, DCS**							**5,886,720**	**1,897,651**		**52,665**		**105.26**	**5,543,258**	**13,327,629**
1788																
1789																
1790																

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13																
14																
1791	**80.00**	**BOP**														**87,188,815**
1792																
1795	**80.20**	**CONCRETE**							**0**	**286,062**		**6,881**			**563,341**	**849,402**
1796																
1797	80.20.1	CTG Inlet Air Chiller Foundations	Individual Drilled Concrete Piers, 36" Dia. X 10' Long						0	16,750		325			23,819	40,569
1798		Excavation		Est.	100	CY		0	0	0	0.2	23	EXFD	88.87	2,044	2,044
1799		Backfill		Est.	0	CY		0	0	0	0.15	0	EXFD	88.87	0	0
1800		Concrete		Est.	100	CY		120	0	12,000	1.5	173	COND	68.54	11,823	23,823
1801		Reinforcing		Est.	5	TN		950	0	4,750	22.5	129	REIN	76.92	9,952	14,702
1802																
1803	80.20.2	Ammonia Storage Tank Foundation	Includes Mat, Piers, Pump Pads, and Curbs						0	58,038		1,278			111,948	169,986
1804		Excavation		Est.	200	CY		0	0	0	0.2	46	EXFD	88.87	4,088	4,088
1805		Backfill		Est.	40	CY		0	0	0	0.15	7	EXFD	88.87	613	613
1806		Concrete		Est.	155	CY		120	0	18,600	1.5	267	COND	68.54	18,326	36,926
1807		Reinforcing		Est.	9	TN		950	0	8,550	22.5	233	REIN	76.92	17,913	26,463
1808		Formwork		Est.	3150	SF		2.25	0	7,088	0.2	725	FORM	98.01	71,008	78,096
1809		Piles	16" Dia. X 68' Long Augercast Piles	Est.	10	EA		2380	0	23,800	incl w/matl	incl w/matl				23,800
1810																
1811	80.20.3	HRSG Blowdown Sump							0	46,465		2,223			196,424	242,889
1812		Excavation		Est.	1100	CY		0	0	0	0.2	253	EXFD	88.87	22,484	22,484
1813		Backfill		Est.	700	CY		0	0	0	0.15	121	EXFD	88.87	10,731	10,731
1814		Concrete		Est.	140	CY		120	0	16,800	1.5	242	COND	68.54	16,552	33,352
1815		Reinforcing		Est.	20	TN		950	0	19,000	22.5	518	REIN	76.92	39,806	58,806
1816		Formwork		Est.	4500	SF		2.25	0	10,125	0.2	1,035	FORM	98.01	101,440	111,565
1817		Formwork Shoring	Allowance	Est.	120	SF		4.5	0	540	0.40	55	FORM	98.01	5,410	5,950
1818																
1819	80.20.4	Aux Boiler Foundation	Mat Foundation, 65' x 30'						0	83,125		882			70,174	153,299
1820		Excavation		Est.	250	CY		0	0	0	0.2	58	EXFD	88.87	5,110	5,110
1821		Backfill		Est.	80	CY		0	0	0	0.15	14	EXFD	88.87	1,226	1,226
1822		Concrete		Est.	200	CY		120	0	24,000	1.5	345	COND	68.54	23,646	47,646
1823		Reinforcing		Est.	10	TN		950	0	9,500	22.5	259	REIN	76.92	19,903	29,403
1824		Formwork		Est.	900	SF		2.25	0	2,025	0.2	207	FORM	98.01	20,288	22,313
1825		Piles	16" Dia. X 68' Long Augercast Piles	Est.	20	EA		2380	0	47,600	incl w/matl	incl w/matl				47,600
1826																
1827	80.20.5	Bulk Gas Storage Pad							0	30,275		748			59,896	90,171
1828		Excavation		Est.	200	CY		0	0	0	0.2	46	EXFD	88.87	4,088	4,088
1829		Backfill		Est.	20	CY		0	0	0	0.15	3	EXFD	88.87	307	307
1830		Concrete		Est.	180	CY		120	0	21,600	1.5	311	COND	68.54	21,282	42,882
1831		Reinforcing		Est.	7	TN		950	0	6,650	22.5	181	REIN	76.92	13,932	20,582
1832		Formwork		Est.	900	SF		2.25	0	2,025	0.2	207	FORM	98.01	20,288	22,313
1833																

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14																
1834	80.20.6	CO2 Storage Tank (Relocated)	6' x 15' x 2' Thick						0	1,409		45			3,803	5,212
1835		Excavation		Est.	11	CY		0	0	0	0.2	3	EXFD	88.87	225	225
1836		Backfill		Est.	4	CY		0	0	0	0.15	1	EXFD	88.87	61	61
1837		Concrete		Est.	7	CY		120	0	840	1.5	12	COND	68.54	828	1,668
1838		Reinforcing		Est.	0.4	TN		950	0	380	22.5	10	REIN	76.92	796	1,176
1839		Formwork		Est.	84	SF		2.25	0	189	0.2	19	FORM	98.01	1,894	2,083
1840																
1841	80.20.7	BOP Foundation Embedments							0	50,000		1,380			97,276	147,276
1842		Embeds		Est.	10	TN		5,000	0	50,000	120.00	1,380	CARP	70.49	97,276	147,276
1843																
1844	**80.30**	**STRUCTURAL STEEL**							**0**	**3,350**		**12**			**957**	**4,307**
1845																
1846	80.30.1	HRSG Blowdown Sump Handrails							0	3,350		12			957	4,307
1847		Handrail		Est.	100	SF	0	33.5	0	3,350	0.10	12	GALL	83.21	957	4,307
1848																
1849	**80.40**	**ARCHITECTURAL**							**0**	**123,750**		**0**			**0**	**123,750**
1850																
1851	80.40.1	Bulk Gas Storage Enclosure							0	123,750		0			0	123,750
1852		Pre Engineered Building, 55' x 30' x 20' High (Siding on 3 Sides, Open 4th Side)	Subcontract Price, Includes Installation Labor	Est.	1,650	SF		75	0	123,750	incl w/matl	incl w/matl				123,750
1853																
1854	**80.45**	**PAINTING / COATING**							**0**	**150,000**		**8,625**			**581,929**	**731,929**
1855																
1856	80.45.1	Touch-up & Finish Painting		Est.	150,000	SF		1	0	150,000	0.05	8,625	PNTR	67.47	581,929	731,929
1857																
1862	**80.60**	**MECHANICAL**							**12,801,000**	**0**		**19,125**			**1,816,271**	**14,617,271**
1863																
1864	80.60.1	CTG Inlet Air Chiller Equipment Package		B	2	LS	4500000		9,000,000	0	3,500	8,050	MECH	87.74	706,307	9,706,307
1865																
1866	80.60.2	Auxiliary Boiler	80,000 lb/hr	Est.	1	LS	1751000		1,751,000	0	6,000	6,900	SGEN	107.70	743,130	2,494,130
1867																
1868	80.60.3	Heat Exchangers							520,000	0		690			60,541	580,541
1869		CCW Heat Exchanger	Shell & Tube Design, 100% Each.	Est.	2	Ea.	260000		520,000	0	300	690	MECH	87.74	60,541	580,541
1870																
1871	80.60.4	Miscellaneous Pumps							220,000	0		736			63,428	283,428
1872		Auxiliary Cooling Water	Not Required													Not Required
1873		Closed Cooling Water		Est	2	Ea.	75000		150,000	0	200	460	PUMP	86.18	39,643	189,643
1874		Hydrogen Cooler Pumps		Est	2	Ea.	35000		70,000	0	120	276	PUMP	86.18	23,786	93,786
1875																
1876	80.60.5	Shop Fabricated Tanks							40,000	0		81			7,070	47,070
1877		CCW Head Tank	100%	Est	1	Ea.	15000		15,000	0	20	23	TANK	87.82	2,020	17,020
1878		Steam Turbine Drains Tank	10,500 Gal. Capacity	Est	1	Ea.	25000		25,000	0	50	58	TANK	87.82	5,050	30,050
1879																

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13																
14																
1880	80.60.6	Bulk Gas Storage Provisions							80,000	0		460			40,360	120,360
1881		Nitrogen Storage	Storage Tank w/ manifolds & Regulators	Est.	1	LS	30000		30,000	0	150	173	MECH	87.74	15,135	45,135
1882		Hydrogen Storage	Storage Tubes w/ manifolds & Regulators	Est.	1	LS	20000		20,000	0	100	115	MECH	87.74	10,090	30,090
1883		CO2 Storage	Storage Tank w/ manifolds & Regulators	Est.	1	LS	30000		30,000	0	150	173	MECH	87.74	15,135	45,135
1884																
1885	80.60.7	Ammonia Storage & Forwarding Equipment							450,000	0		978			85,766	535,766
1886		Aqueous Ammonia Storage & Forwarding Skid	Includes 20,000 gal. CS Tank for 10 Day Storage	Est.	1	LS	450000		450,000	0	850	978	MECH	87.74	85,766	535,766
1887																
1888	80.60.8	Air Compressors & Accessories							15,000	0		81			7,070	22,070
1889		Air Compressors	Existing													Existing
1890		Air Receiver	CS w/ Epoxy Coating	Est.	1	Ea.	15000		15,000	0	70	81	TANK	87.82	7,070	22,070
1891		Air Dryers	Existing													Existing
1892																
1893	80.60.9	Chemical Feed & Sample Systems							725,000	0		863			77,375	802,375
1894		Chemical Feed System	Chemical Feed system for FW system only	Est.	1	LS	425000		425,000	0	300	345	WTRT	89.71	30,950	455,950
1895		Steam & Water Analysis System	Complete System as Required	Est.	1	Ea.	300000		300,000	0	450	518	WTRT	89.71	46,425	346,425
1896																
1897	80.60.10	Relocate Existing CO2 Storage Tank		Est.	1	LS	0		0	0	250	288	MECH	87.74	25,225	25,225
1898																
1899	**80.70**	**PIPING**							**9,092,000**	**17,953,396**		**220,817**			**20,542,559**	**47,587,955**
1900																
1901	80.70.1	Alloy Piping							0	10,129,055		54,650			5,084,117	15,213,172
1902		Large Bore Alloy Pipe (Above Ground)			5,830	LF				10,002,180		48,205			4,484,469	14,486,649
1903		Main Steam System	P91, 24" dia., Sch. 160	Est.	500	LF		4100	0	2,050,000	12.45	7,159	SPNG	93.03	665,979	2,715,979
1904		Main Steam System	P91, 18" dia., Sch. 160	Est.	470	LF		2330	0	1,095,100	8.90	4,810	SPNG	93.03	447,516	1,542,616
1905		Main Steam System	P91, 14" dia., Sch. 160	Est.	100	LF		1590	0	159,000	7.00	805	SPNG	93.03	74,889	233,889
1906		Main Steam System	P91, 12" dia., Sch. 160	Est.	100	LF		1210	0	121,000	6.00	690	SPNG	93.03	64,191	185,191
1907		Main Steam System	P91, 6" dia., Sch. XXS	Est.	290	LF		334	0	96,860	3.10	1,034	SPNG	93.03	96,179	193,039
1908		Hot Reheat System	P91, 32" dia., 0.9" Wall	Est.	500	LF		2690	0	1,345,000	8.80	5,060	SPNG	93.03	470,732	1,815,732
1909		Hot Reheat System	P91, 24" dia., Sch. 60	Est.	450	LF		1850	0	832,500	8.00	4,140	SPNG	93.03	385,144	1,217,644
1910		Hot Reheat System	P91, 16" dia., Sch. 60	Est.	100	LF		850	0	85,000	4.40	506	SPNG	93.03	47,073	132,073
1911		Hot Reheat System	P91, 12" dia., Sch. 80	Est.	100	LF		690	0	69,000	4.20	483	SPNG	93.03	44,933	113,933
1912		Cold Reheat System	P11, 28" dia., 0.75" Wall	Est.	540	LF		1600	0	864,000	8.00	4,968	SPNG	93.03	462,173	1,326,173
1913		Cold Reheat System	P11, 20" dia., Sch. 40	Est.	530	LF		810	0	429,300	5.20	3,169	SPNG	93.03	294,849	724,149
1914		Cold Reheat System	P11, 12" dia., Sch. 40	Est.	100	LF		300	0	30,000	3.10	357	SPNG	93.03	33,165	63,165
1915		HR Bypass System	P91, 26" dia., Sch. XS	Est.	80	LF		1500	0	120,000	6.50	598	SPNG	93.03	55,632	175,632
1916		HR Bypass System	P22, 26" dia., Sch. Std	Est.	40	LF		630	0	25,200	4.10	189	SPNG	93.03	17,545	42,745
1917		HR Bypass System	P91, 24" dia., Sch. 60	Est.	1,240	LF		1850	0	2,294,000	8.00	11,408	SPNG	93.03	1,061,286	3,355,286
1918		MS Bypass System	P91, 20" dia., Sch. 60	Est.	60	LF		1260	0	75,600	6.10	421	SPNG	93.03	39,156	114,756

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13																
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1919		MS Bypass System	P91, 20" dia., Sch. 40	Est.	60	LF		930	0	55,800	5.10	352	SPNG	93.03	32,737	88,537
1920		MS Bypass System	P91, 16" dia., Sch. 160	Est.	60	LF		1850	0	111,000	7.70	531	SPNG	93.03	49,427	160,427
1921		Equipment Drains System	P91, 10" dia., Sch 40	Est.	255	LF		306	0	78,030	2.60	762	SPNG	93.03	70,931	148,961
1922		Equipment Drains System	P22, 10" dia., Sch. 40	Est.	255	LF		258	0	65,790	2.60	762	SPNG	93.03	70,931	136,721
1923		Small Bore Alloy Pipe (Above Ground)			4,200	LF				126,875		6,446			599,648	726,523
1924		Hot Reheat System	P91, 2" dia., Sch 80	Est.	1,450	LF		40	0	58,000	1.40	2,335	SPNG	93.03	217,179	275,179
1925		Main Steam System	P91, 1-1/2" dia., Sch 80	Est.	1,300	LF		29	0	37,700	1.30	1,944	SPNG	93.03	180,804	218,504
1926		Cold Reheat System	P11, 2" dia., Sch 80	Est.	1,450	LF		21.5	0	31,175	1.30	2,168	SPNG	93.03	201,666	232,841
1927																
1928	80.70.2	BOP Piping							0	4,874,341		137,117			12,756,013	17,630,354
1929																
1930		Large Bore BOP Pipe 2-1/2"& Larger - Above Ground			32,855	LF			0	3,911,826		88,923			8,272,507	12,184,333
1931		Ammonia System	SS, 3" dia., Sch 40S	Est.	170	LF		49	0	8,330	1.63	319	SPNG	93.03	29,645	37,975
1932		Auxiliary Cooling Water System	CS, 20" dia., Sch. Std.	Est.	150	LF		376	0	56,400	4.69	809	SPNG	93.03	75,264	131,664
1933		Auxiliary Steam System	CS, 10" dia., Sch. 40	Est.	900	LF		110	0	99,000	2.40	2,484	SPNG	93.03	231,087	330,087
1934		Auxiliary Steam System	CS, 3" dia., Sch. 40	Est.	1,300	LF		20	0	26,000	1.34	2,003	SPNG	93.03	186,367	212,367
1935		Boiler Drains System	CS, 10" dia., Sch. 40	Est.	60	LF		110	0	6,600	2.40	166	SPNG	93.03	15,406	22,006
1936		Bottle Gas System	SS, 3" dia., Sch 40S	Est.	600	LF		49	0	29,400	1.63	1,125	SPNG	93.03	104,631	134,031
1937		Chilled Water System	CS, 24" dia., Sch. Std.	Est.	200	LF		456	0	91,200	5.34	1,228	SPNG	93.03	114,259	205,459
1938		Chilled Water System	CS, 14" dia., Sch. Std.	Est.	300	LF		206	0	61,800	2.87	990	SPNG	93.03	92,114	153,914
1939		Chilled Water System	CS, 4" dia., Sch. 40	Est.	120	LF		23	0	2,760	1.48	204	SPNG	93.03	19,000	21,760
1940		Circulating Water Makeup System	SS, 16" dia., Sch STD	Est.	250	LF		366	0	91,500	4.25	1,222	SPNG	93.03	113,671	205,171
1941		Circulating Water Blowdown and Makeup System	CS, 8" dia., Sch. 40	Est.	100	LF		61.5	0	6,150	1.92	221	SPNG	93.03	20,541	26,691
1942		Circulating Water Blowdown and Makeup System	CS, 4" dia., Sch. 40	Est.	200	LF		23	0	4,600	1.48	340	SPNG	93.03	31,667	36,267
1943		Closed Cooling Water System	CS, 20" dia., Sch. Std.	Est.	1,300	LF		345	0	448,500	4.50	6,728	SPNG	93.03	625,859	1,074,359
1944		Closed Cooling Water System	CS, 16" dia., Sch. Std.	Est.	2,000	LF		245	0	490,000	3.45	7,935	SPNG	93.03	738,193	1,228,193
1945		Closed Cooling Water System	CS, 12" dia., Sch. Std.	Est.	200	LF		189	0	37,800	2.80	644	SPNG	93.03	59,911	97,711
1946		Closed Cooling Water System	CS, 4" dia., Sch. 40	Est.	1,200	LF		23	0	27,600	1.48	2,042	SPNG	93.03	190,004	217,604
1947		Condensate System	A106C CS, 20" dia., Sch. Std.	Est.	80	LF		528	0	42,240	5.86	539	SPNG	93.03	50,154	92,394
1948		Condensate System	A106C CS, 12" dia., Sch. Std.	Est.	940	LF		207.9	0	195,426	2.80	3,027	SPNG	93.03	281,583	477,009
1949		Condensate System	A106C CS, 10" dia., Sch. 40	Est.	400	LF		121	0	48,400	2.40	1,104	SPNG	93.03	102,705	151,105
1950		Condensate System	A106C CS, 8" dia., Sch. 40	Est.	220	LF		67.65	0	14,883	1.92	486	SPNG	93.03	45,190	60,073
1951		Condensate System	A106C CS, 6" dia., Sch. 40	Est.	180	LF		45.87	0	8,257	1.61	333	SPNG	93.03	31,004	39,261
1952		Condensate System	A106C CS, 4" dia., Sch. 40	Est.	520	LF		25.3	0	13,156	1.48	885	SPNG	93.03	82,335	95,491
1953		Condensate System	A106C CS, 3" dia., Sch. 40	Est.	160	LF		22	0	3,520	1.34	247	SPNG	93.03	22,937	26,457
1954		Condenser Vacuum System	Existing													
1955		Demineralized Water System	SS, 6" dia., Sch 40S	Est.	600	LF		111	0	66,600	2.02	1,394	SPNG	93.03	129,665	196,265
1956		Demineralized Water System	SS, 3" dia., Sch 40S	Est.	800	LF		49	0	39,200	1.63	1,500	SPNG	93.03	139,508	178,708
1957		Equipment Drains System	CS, 10" dia., Sch. 40	Est.	255	LF		110	0	28,050	2.40	704	SPNG	93.03	65,475	93,525
1958		Equipment Drains System	CS, 4" dia., Sch. 40	Est.	1,200	LF		23	0	27,600	1.48	2,042	SPNG	93.03	190,004	217,604
1959		Feed Water System	A106C CS, 12" dia., Sch. Std.	Est.	200	LF		207.9	0	41,580	2.80	644	SPNG	93.03	59,911	101,491
1960		Feed Water System	A106C CS, 10" dia., Sch. 160	Est.	160	LF		392.7	0	62,832	6.00	1,104	SPNG	93.03	102,705	165,537
1961		Feed Water System	A106C CS, 10" dia., Sch. 40	Est.	80	LF		121	0	9,680	2.40	221	SPNG	93.03	20,541	30,221
1962		Feed Water System	A106C CS, 6" dia., Sch. 160	Est.	2,260	LF		187	0	422,620	3.12	8,109	SPNG	93.03	754,369	1,176,989

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1963		Feed Water System	A106C CS, 4" dia., Sch. 160	Est.	1,740	LF		91.3	0	158,862	2.57	5,143	SPNG	93.03	478,413	637,275
1964		Feed Water System	A106C CS, 4" dia., Sch. 40	Est.	480	LF		25.3	0	12,144	1.48	817	SPNG	93.03	76,002	88,146
1965		Feed Water System	A106C CS, 3" dia., Sch. 40	Est.	200	LF		22	0	4,400	1.34	308	SPNG	93.03	28,672	33,072
1966		Fire Protection System	CS, 8" dia., Sch. 40	Est.	100	LF		61.5	0	6,150	1.92	221	SPNG	93.03	20,541	26,691
1967		Fuel Gas System	CS, 16" dia., Sch. 60	Est.	40	LF		372	0	14,880	5.23	241	SPNG	93.03	22,381	37,261
1968		Fuel Gas System	SS, 8" dia., Sch. 80S	Est.	280	LF		270	0	75,600	3.70	1,191	SPNG	93.03	110,836	186,436
1969		Fuel Gas System	CS, 8" dia., Sch. 60	Est.	280	LF		76.7	0	21,476	2.18	702	SPNG	93.03	65,303	86,779
1970		Fuel Gas System	CS, 6" dia., Sch. 60	Est.	280	LF		51.2	0	14,336	1.80	580	SPNG	93.03	53,920	68,256
1971		Fuel Gas System	CS, 4" dia., Sch. 60	Est.	200	LF		30.8	0	6,160	1.62	373	SPNG	93.03	34,663	40,823
1972		HR Steam Bypass System	CS, 26" dia., Sch. Std.	Est.	200	LF		540	0	108,000	8.40	1,932	SPNG	93.03	179,734	287,734
1973		Instrument Air System	SS, 6" dia., Sch 40S	Est.	435	LF		111	0	48,285	2.02	1,011	SPNG	93.03	94,007	142,292
1974		Instrument Air System	SS, 4" dia., Sch 40S	Est.	850	LF		68.3	0	58,055	1.82	1,779	SPNG	93.03	165,505	223,560
1975		Instrument Air System	SS, 3" dia., Sch 40S	Est.	1,100	LF		49	0	53,900	1.63	2,062	SPNG	93.03	191,823	245,723
1976		LP Steam System	CS, 20" dia., Sch. Std.	Est.	620	LF		345	0	213,900	4.50	3,209	SPNG	93.03	298,487	512,387
1977		LP Steam System	CS, 16" dia., Sch. Std.	Est.	410	LF		245	0	100,450	3.45	1,627	SPNG	93.03	151,330	251,780
1978		LP Steam System	CS, 12" dia., Sch. Std.	Est.	100	LF		189	0	18,900	2.80	322	SPNG	93.03	29,956	48,856
1979		LP Steam Bypass System	CS, 16" dia., Sch. Std.	Est.	220	LF		245	0	53,900	3.45	873	SPNG	93.03	81,201	135,101
1980		LP Steam Bypass System	CS, 12" dia., Sch. Std.	Est.	670	LF		189	0	126,630	2.80	2,157	SPNG	93.03	200,703	327,333
1981		Oily Water System	CS, 6" dia., Sch. 40	Est.	600	LF		41.7	0	25,020	1.61	1,111	SPNG	93.03	103,347	128,367
1982		Potable Water System (Tepid Recirc)	SS, 3" dia., Sch 40S	Est.	450	LF		49	0	22,050	1.63	844	SPNG	93.03	78,473	100,523
1983		Service Air System	CS, 6" dia., Sch. 40	Est.	435	LF		41.7	0	18,140	1.61	805	SPNG	93.03	74,927	93,066
1984		Service Air System	CS, 4" dia., Sch. 40	Est.	1,050	LF		23	0	24,150	1.48	1,787	SPNG	93.03	166,254	190,404
1985		Service Air System	CS, 3" dia., Sch. 40	Est.	1,800	LF		20	0	36,000	1.34	2,774	SPNG	93.03	258,047	294,047
1986		Service Water System	SS, 6" dia., Sch 40S	Est.	120	LF		111	0	13,320	2.02	279	SPNG	93.03	25,933	39,253
1987		Service Water System	SS, 4" dia., Sch 40S	Est.	1,050	LF		68.3	0	71,715	1.82	2,198	SPNG	93.03	204,447	276,162
1988		Service Water System	SS, 3" dia., Sch 40S	Est.	1,800	LF		49	0	88,200	1.63	3,374	SPNG	93.03	313,893	402,093
1989		Waste Water System	CS, 4" dia., Sch. 40	Est.	240	LF		23	0	5,520	1.48	408	SPNG	93.03	38,001	43,521
1990		Small Bore BOP Pipe 2" & Smaller - Above Ground			32,700	LF			0	962,515		48,194			4,483,506	5,446,021
1991		Auxiliary Steam System	CS, 2" dia., Sch. 80	Est.	950	LF		22.2	0	21,090	1.26	1,377	SPNG	93.03	128,060	149,150
1992		Chemical Feed System	SS, 2" dia., Sch. 80S	Est.	1,200	LF		67.3	0	80,760	2.00	2,760	SPNG	93.03	256,763	337,523
1993		Chemical Feed System	A20, 2" dia., Sch. 80S	Est.	350	LF		87	0	30,450	2.20	886	SPNG	93.03	82,378	112,828
1994		Chemical Feed System	CPVC, 2" dia., Sch. 80	Est.	350	LF		2	0	700	0.50	201	SPNG	93.03	18,722	19,422
1995		Chilled Water System	CS, 2" dia., Sch. 80	Est.	50	LF		22.2	0	1,110	1.26	72	SPNG	93.03	6,740	7,850
1996		Closed Cooling Water System	CS, 2" dia., Sch. 80	Est.	2,800	LF		22.2	0	62,160	1.26	4,057	SPNG	93.03	377,441	439,601
1997		Cold Reheat System	CS, 2" dia., Sch. 80	Est.	1,950	LF		22.2	0	43,290	1.26	2,826	SPNG	93.03	262,861	306,151
1998		Condensate System	CS, 1-1/2" dia., Sch. 80	Est.	200	LF		19.3	0	3,860	1.16	267	SPNG	93.03	24,820	28,680
1999		Demineralized Water System	SS, 1-1/2" dia., Sch. 40S	Est.	1,600	LF		33.7	0	53,920	1.32	2,429	SPNG	93.03	225,951	279,871
2000		Feedwater System	CS, 2" dia., Sch. 80	Est.	2,050	LF		22.2	0	45,510	1.26	2,970	SPNG	93.03	276,341	321,851
2001		Fuel Gas System	SS, 2" dia., Sch. 80S	Est.	500	LF		67.3	0	33,650	2.00	1,150	SPNG	93.03	106,985	140,635
2002		Fuel Gas System	CS, 2" dia., Sch. 80	Est.	850	LF		22.2	0	18,870	1.26	1,232	SPNG	93.03	114,580	133,450
2003		Fuel Oil System	CS, 2" dia., Sch. 80	Est.	850	LF		22.2	0	18,870	1.26	1,232	SPNG	93.03	114,580	133,450
2004		HRSG Vents & Drains System	CS, 1-1/2" dia., Sch. 80	Est.	500	LF		19.3	0	9,650	1.16	667	SPNG	93.03	62,051	71,701
2005		Bulk Gas System	SS, 2" dia., Sch. 80S	Est.	2,400	LF		67.3	0	161,520	2.00	5,520	SPNG	93.03	513,526	675,046
2006		Instrument Air System	SS, 1-1/2" dia., Sch. 40S	Est.	6,200	LF		33.7	0	208,940	1.32	9,412	SPNG	93.03	875,561	1,084,501

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14																
2007		LP Steam System	CS, 2" dia., Sch. 80	Est.	2,000	LF		22.2	0	44,400	1.26	2,898	SPNG	93.03	269,601	314,001
2008		Potable Water System	SS, 2" dia., Sch. 40S	Est.	100	LF		48.8	0	4,880	1.44	166	SPNG	93.03	15,406	20,286
2009		Process Sampling System	CS, 1/2" avg. dia. (Sample Tubing)	Est.	4,450	LF		6.5	0	28,925	0.60	3,071	SPNG	93.03	285,649	314,574
2010		Raw Water System	CS, 2" dia., Sch. 80	Est.	150	LF		22.2	0	3,330	1.26	217	SPNG	93.03	20,220	23,550
2011		Service Air System	CS, 1-1/2" dia., Sch. 80	Est.	2,400	LF		19.3	0	46,320	1.16	3,202	SPNG	93.03	297,845	344,165
2012		Service Water System	SS, 2" dia., Sch. 80S	Est.	500	LF		67.3	0	33,650	2.00	1,150	SPNG	93.03	106,985	140,635
2013		Waste Water System	CS, 2" dia., Sch. 80	Est.	300	LF		22.2	0	6,660	1.26	435	SPNG	93.03	40,440	47,100
2014																
2015	80.70.3	Pipe Supports, HP (Engineered Supports)		Est.	1	Lot		2100000	0	2,100,000	3,040	3,496	SPNG	93.03	325,233	2,425,233
2016																
2017	80.70.4	Pipe Supports, LP		Est.	1	Lot		850000	0	850,000	5,300	6,095	SPNG	93.03	567,018	1,417,018
2018																
2019	80.70.5	C/T Interconnecting Piping	Mat'l Supplied w/ CT's	Est.	2	LS		0	0	0	2,000	4,600	SPNG	93.03	427,938	427,938
2020																
2021	80.70.6	Valves & Specialties							9,092,000	0		14,858			1,382,240	10,474,240
2022		Turbine Bypass Valves		Est.	1	LS	800000		800,000	0	1,070	1,231	SPNG	93.03	114,473	914,473
2023		Turbine Bypass Attemperator Valves	Included Above													Included Above
2024		CR Check Valves		Est.	1	Ea.	80000		80,000	0	80	92	SPNG	93.03	8,559	88,559
2025		Reheater Relief Valves		B	4	Ea.	15500		62,000	0	16	74	SPNG	93.03	6,847	68,847
2026		Large OD CW Butterfly Valves, W/ Operators	Existing													Existing
2027		Large Bore HP Valves 2-1/2" & Larger		Est.	120	Ea.	30000		3,600,000	0	16	2,208	SPNG	93.03	205,410	3,805,410
2028		Small Bore HP Valves <2-1/2"		Est.	450	Ea.	2500		1,125,000	0	6	3,105	SPNG	93.03	288,858	1,413,858
2029		Control Valves		Est.	73	Ea.	15068.49		1,100,000	0	12	1,007	SPNG	93.03	93,718	1,193,718
2030		Large Bore BOP Valves 2-1/2" & Larger		Est.	375	Ea.	3500		1,312,500	0	6	2,588	SPNG	93.03	240,715	1,553,215
2031		Small Bore BOP Valves <2-1/2"		Est.	900	Ea.	325		292,500	0	3	3,105	SPNG	93.03	288,858	581,358
2032		Circulating Water Expansion Joints	Existing													Existing
2033		Specialties		Est.	60	Ea.	4000		240,000	0	14	966	SPNG	93.03	89,867	329,867
2034		Boiler Feed Pump Suction Duplex Strainers		Est.	4	Ea.	80000		320,000	0	60	276	SPNG	93.03	25,676	345,676
2035		Condensate Pump Suction Duplex Strainers		Est.	2	Ea.	45000		90,000	0	60	138	SPNG	93.03	12,838	102,838
2036		CCW Duplex Strainers		Est.	2	Ea.	35000		70,000	0	30	69	SPNG	93.03	6,419	76,419
2037																
2038	**80.80**	**INSULATION**							**0**	**1,545,000**		**72,312**			**5,413,660**	**6,958,660**
2039																
2040	80.80.1	Thermal Insulation/Lagging	Allowance	Est.	50,000	SF		19	0	950,000	1.03	59,225	INSL	74.51	4,412,855	5,362,855
2041																
2042	80.80.2	HRSG Piping & Drum Insulation and Lagging	Allowance	Est.	2	LS		200000	0	400,000	4,000	9,200	INSL	74.51	685,492	1,085,492
2043																
2044	80.80.3	HRSG Stack Insulation to Damper Elevation	Allowance	Est.	13,000	SF		15	0	195,000	0	3,887	DINS	81.12	315,313	510,313
2045																
2046	**80.89**	**SUBTOTAL - DIRECT COSTS, BOP**							**21,893,000**	**20,061,558**		**327,770**		**88.23**	**28,918,718**	**70,873,275**
2047																

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13																
14																
2048	**80.90**	**CONSTRUCTION INDIRECTS, BOP**							**1,094,650**	**4,714,466**		**28,502**			**10,506,424**	**16,315,540**
2049		Additional Crane Allowance			1	LS				0					0	0
2050		Mobilization / Demobilization - Included in Wage Rates Above														
2051		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
2052		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						28,502		88.23	2,515,000	2,515,000
2053		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					35,627				2,641,461	2,641,461
2054		Per Diem	None		0.00	HR						0			0	0
2055		Consumables - % of Subtotal Above			0.5	%				100,308					144,594	244,901
2056		Freight on Material - % of Subtotal Above			5.0	%				1,003,078						1,003,078
2057		Freight on Equipment - % of Subtotal Above			5.0	%			1,094,650							1,094,650
2058		Scaffolding - % of Subtotal Above			3.0	%				601,847					867,562	1,469,408
2059		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				3,009,234					4,337,808	7,347,041
2061	**80.98**	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, BOP**							**22,987,650**	**24,776,024**		**356,272**		**110.66**	**39,425,141**	**87,188,815**
2062																
2063	**80.99**	**SUBCONTRACTS**							**0**	**0**		**0**			**0**	**0**
2067																
2068	**80.00**	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, BOP**							**22,987,650**	**24,776,024**		**356,272**		**110.66**	**39,425,141**	**87,188,815**
2069																
2070																
2071																
2072	**90.00**	**COMMON**														**26,908,001**
2073																
2076	**90.20**	**CONCRETE**							**0**	**1,751,594**		**24,700**			**1,846,933**	**3,598,527**
2077																
2078	90.20.1	Combustion Turbine Building Foundation	Mat Foundation						0	1,512,788		21,839			1,612,720	3,125,507
2079		Excavation		Est.	2,900	CY		0	0	0	0.2	667	EXFD	88.87	59,276	59,276
2080		Backfill		Est.	400	CY		0	0	0	0.15	69	EXFD	88.87	6,132	6,132
2081		Concrete		Est.	4275	CY		120	0	513,000	1.9	9,341	COND	68.54	640,224	1,153,224
2082		Reinforcing		Est.	311	TN		950	0	295,450	22.5	8,047	REIN	76.92	618,985	914,435
2083		Embeds		Est.	20	TN		5,000	0	100,000	120.00	2,760	CARP	70.49	194,552	294,552
2084		Formwork		Est.	4150	SF		2.25	0	9,338	0.2	955	FORM	98.01	93,551	102,888
2085		Piles	16" Dia. X 68' Long Augercast Piles	Est.	250	EA		2380	0	595,000	incl w/matl	incl w/matl				595,000
2086																

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14																
2087	90.20.2	Steam Turbine Building Foundation	Additions in Existing Building						0	3,723		146			12,021	15,744
2088		CCW Heat Exchanger Foundations	(2) @ 4' x 15' x 2' High													
2089		Hilti Epoxy Grout Dowels	#4 x 8" Long	Est.	36	EA		10	0	360	0.60	25	REIN	76.92	1,911	2,271
2090		Concrete		Est.	9	CY		120	0	1,080	1.9	20	COND	68.54	1,348	2,428
2091		Reinforcing		Est.	0.4	TN		950	0	380	22.5	10	REIN	76.92	796	1,176
2092		Formwork		Est.	150	SF		2.25	0	338	0.2	35	FORM	98.01	3,381	3,719
2093		Drain Tank Foundation	@ 10' x 10' x 2' High													
2094		Hilti Epoxy Grout Dowels	#4 x 8" Long	Est.	20	EA		10	0	200	0.60	14	REIN	76.92	1,061	1,261
2095		Concrete		Est.	7.5	CY		120	0	900	1.9	16	COND	68.54	1,123	2,023
2096		Reinforcing		Est.	0.3	TN		950	0	285	22.5	8	REIN	76.92	597	882
2097		Formwork		Est.	80	SF		2.25	0	180	0.2	18	FORM	98.01	1,803	1,983
2098																
2099	90.20.3	Steam Turbine Building Elevated Slabs	Modify Existing						0	0		10			1,206	1,206
2100		New Penetration for CCW Piping														
2101		4' x 8' Floor Penetration	Saw Cut, 4" Slab	Est.	24	LF		0	0	0	0.30	8	WRKG	119.15	987	987
2102		Remove & Dispose of Concrete		Est.	0.4	CY		0	0	0	4.00	2	WRKG	119.15	219	219
2103																
2104	90.20.4	Boiler Building Concrete Work	Additions in Existing Building						0	2,390		52			3,787	6,177
2105		Control Room Extension														
2106		Concrete		Est.	12	CY		120	0	1,440	1.9	26	COND	68.54	1,797	3,237
2107		Reinforcing		Est.	1	TN		950	0	950	22.5	26	REIN	76.92	1,990	2,940
2108																
2109	90.20.5	Admin / Warehouse / Storage Building Foundation	Not Included													Not Included
2110																
2111	90.20.6	Fire Water Pumphouse Foundation	Existing													Existing
2112																
2113	90.20.7	Service Water Pump Foundation	Existing													Existing
2114																
2115	90.20.8	Tower Crane Foundation	Allowance	Est.	1	LS		200,000	0	200,000	1050	1,208	CONP	77.97	94,149	294,149
2116																
2117	90.20.9	New Foundation for Fire House (Truck Parking)	20' x 30'						0	4,581		129			10,253	14,835
2118		Excavation & Backfill		Est.	30	CY		0	0	0	0.15	5	EXFD	88.87	460	460
2119		Concrete		Est.	20	CY		120	0	2,400	1.9	44	COND	68.54	2,995	5,395
2120		Reinforcing		Est.	2	TN		950	0	1,900	22.5	52	REIN	76.92	3,981	5,881
2121		Formwork		Est.	125	SF		2.25	0	281	0.2	29	FORM	98.01	2,818	3,099
2122																
2123	90.20.10	Overflow Sump	30' x 15' x 10' Deep						0	28,113		1,317			112,797	140,909
2124		Excavation		Est.	800	CY		0	0	0	0.2	184	EXFD	88.87	16,352	16,352
2125		Backfill		Est.	620	CY		0	0	0	0.15	107	EXFD	88.87	9,505	9,505
2126		Concrete		Est.	80	CY		120	0	9,600	1.9	175	COND	68.54	11,981	21,581
2127		Reinforcing		Est.	12	TN		950	0	11,400	22.5	311	REIN	76.92	23,884	35,284
2128		Embeds		Est.	0.5	TN		5,000	0	2,500	120.00	69	CARP	70.49	4,864	7,364
2129		Formwork		Est.	2050	SF		2.25	0	4,613	0.2	472	FORM	98.01	46,212	50,824
2130																

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13																
14																
2131	**90.30**	**STRUCTURAL STEEL**							**0**	**3,902,118**		**30,877**			**3,190,630**	**7,092,748**
2132																
2133	90.30.1	Combustion Turbine Building Steel	75' x 300' x 80' H plus 55' x 300' x 40' H						0	3,730,800		27,710			2,862,861	6,593,661
2134		Steel Framing		Est.	1,450	TN	0	2460	0	3,567,000	16.00	26,680	STST	104.09	2,777,121	6,344,121
2135		Grating	1-1/4" Galvanized	Est.	3,000	SF	0	14	0	42,000	0.14	483	GALL	83.21	40,190	82,190
2136		Handrail		Est.	1,800	LF	0	33.5	0	60,300	0.10	207	GALL	83.21	17,224	77,524
2137		Stair Treads, 3' Wide		Est.	200	EA	0	240	0	48,000	1.00	230	GALL	83.21	19,138	67,138
2138		Ladder, w/ Cage		Est.	150	LF	0	90	0	13,500	0.64	110	GALL	83.21	9,186	22,686
2139																
2140	90.30.2	Steam Turbine Building Steel	Modifications to Existing						0	53,342		1,092			112,796	166,138
2141		Provisions for New CCW Head Tank														
2142		Steel Framing	Labor Unit Rate Tripled for Work Inside Existing Unit	Est.	6	TN	0	2650	0	15,900	48.00	331	STST	104.09	34,475	50,375
2143		Grating	1-1/4" Galvanized	Est.	200	SF	0	14	0	2,800	0.14	32	GALL	83.21	2,679	5,479
2144		Handrail		Est.	75	LF	0	33.5	0	2,513	0.10	9	GALL	83.21	718	3,230
2145		Reinforce Existing Steel		Est.	2	TN	0	5000	0	10,000	100.00	230	STST	104.09	23,941	33,941
2146		New Penetration for CCW Piping	4' x 8'													
2147		Steel Framing - (2) New Posts from El. 551' to 567'	Labor Unit Rate Tripled for Work Inside Existing Unit	Est.	0.5	TN	0	2650	0	1,325	48.00	28	STST	104.09	2,873	4,198
2148		Handrail		Est.	24	LF	0	33.5	0	804	0.10	3	GALL	83.21	230	1,034
2149		Turbine Floor Framing Reinforcing	For Bypass Piping Loads	Est.	4	TN	0	5000	0	20,000	100.00	460	STST	104.09	47,881	67,881
2150																
2151	90.30.3	Boiler Building Steel	Modifications to Existing						0	117,976		2,075			214,973	332,949
2152		New Girt Framing at Former Combustion Air Coil Room		Est.	8	TN	0	3710	0	29,680	22.00	202	STST	104.09	21,068	50,748
2153		Heater Bay El. 595' Floor Framing Reinforcing	For Piping & Cable Tray Loads	Est.	8	TN	0	5000	0	40,000	100.00	920	STST	104.09	95,763	135,763
2154		Heater Bay Floor Framing Reinforcing	For CR Piping Loads	Est.	2	TN	0	5000	0	10,000	100.00	230	STST	104.09	23,941	33,941
2155		Heater Bay El. 595' & 587' Floor Framing Reinforcing	For PDC Cable Tray Loads	Est.	2	TN	0	5000	0	10,000	100.00	230	STST	104.09	23,941	33,941
2156																
2157		Control Room Extension														
2158		Reinforce Existing Framing		Est.	2	TN	0	5000	0	10,000	100.00	230	STST	104.09	23,941	33,941
2159		New Steel Framing	Labor Unit Rate Tripled for Work Inside Existing Unit	Est.	4	TN	0	2650	0	10,600	48.00	221	STST	104.09	22,983	33,583
2160		Metal Floor Decking		Est.	860	SF	0	2.8	0	2,408	0.014	14	DCKG	79.06	1,095	3,503
2161		Metal Roof Decking		Est.	860	SF	0	2.8	0	2,408	0.014	14	DCKG	79.06	1,095	3,503
2162		Stair Treads, 3' Wide		Est.	12	EA	0	240	0	2,880	1.00	14	GALL	83.21	1,148	4,028
2163																
2164	**90.40**	**ARCHITECTURAL**							**0**	**1,549,956**		**12,832**			**1,158,903**	**2,708,859**
2165																
2166	90.40.1	Combustion Turbine Building							0	1,301,792		10,991			1,008,287	2,310,079
2167		Insulated Metal Siding		Est.	56,200	SF	0	12.2	0	685,640	0.09	5,817	SDNG	92.14	535,951	1,221,591
2168		Insulated Metal Standing Seam Roof		Est.	39,300	SF	0	14.64	0	575,352	0.11	4,971	SDNG	92.14	458,069	1,033,421
2169		Double Door		Est.	2	EA	0	2900	0	5,800	12	28	CARP	70.49	1,946	7,746
2170		Man Door		Est.	10	EA	0	1500	0	15,000	8	92	CARP	70.49	6,485	21,485
2171		Rolling Steel Door		Est.	2	EA	0	10000	0	20,000	36	83	CARP	70.49	5,837	25,837
2172																

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13																
14																
2173	90.40.2	Steam Turbine Building	Existing. No Mods Required						0	0		0			0	0
2181																
2182	90.40.3	Boiler Building	Modifications to Existing Building						0	148,164		1,842			150,616	298,780
2183		New Insulated Siding at Former Combustion Air Coil Room		Est.	2,200	SF	0	12.2	0	26,840	0.09	228	SDNG	92.14	20,980	47,820
2184		Remove & Dispose of Siding (Transite), El. 569' to 600', East Wall, for Piping Penetrations	Covered in Demolition & Removal at End of This Estimate													
2185		Remove & Dispose of Siding (Transite), El. 569' to 594', South Wall, for Piping Penetrations	Covered in Demolition & Removal at End of This Estimate													
2186		New Insulated Siding at East and South Walls		Est.	7,000	SF	0	12.2	0	85,400	0.09	725	SDNG	92.14	66,755	152,155
2187																
2188		New Control Room Extension	42' x 20-'6" x 12' High													
2189		Cut Door Openings in Existing Block Wall		Est.	2	EA	0	500	0	1,000	60	138	MSRY	71.99	9,935	10,935
2190		Metal Stud/Runner		Est.	1,650	LF	0	0.76	0	1,254	0.024	46	CARP	70.49	3,210	4,464
2191		Gypsum Board		Est.	3,200	SF	0	0.65	0	2,080	0.03	110	CARP	70.49	7,782	9,862
2192		Suspended Acoustical Tile Ceiling		Est.	860	SF	0	4	0	3,440	0.05	49	SSCL	69.73	3,448	6,888
2193		Vinyl Floor Tile		Est.	860	SF	0	2.5	0	2,150	0.05	49	CARP	70.49	3,486	5,636
2194		Man Door		Est.	4	EA	0	1500	0	6,000	8	37	CARP	70.49	2,594	8,594
2195																
2196		Install New Control Room Bathroom Walls & Fixtures	Allowance	Est.	1	LS		10000	0	10,000	200.00	230	CARP	70.49	16,213	26,213
2197																
2198		Replace Existing Control Room Flooring	Allowance	Est.	1	LS		10000	0	10,000	200.00	230	CARP	70.49	16,213	26,213
2199																
2200	90.40.4	Admin / Warehouse / Storage Building	Not Included													Not Included
2201																
2202	90.40.5	Relocate Existing Warehouse Building	Not Required													Not Required
2203																
2204	90.40.6	New Metal Cleaning Waste Pumphouse							0	40,000		0			0	40,000
2205		Pre Engineered Building, Incl. Ventilation, Lighting, & Power, 20' x 20' x 12' High	Subcontract Price, Includes Installation Labor	Est.	400	SF		100	0	40,000	incl w/matl	incl w/matl				40,000
2206																
2207	90.40.7	New Fire House (Truck Parking)							0	60,000		0			0	60,000
2208		Pre Engineered Building, Incl. HVAC, 20' x 30' x 12' High	Subcontract Price, Includes Installation Labor	Est.	600	SF		100	0	60,000	incl w/matl	incl w/matl				60,000
2209																
2210	**90.45**	**PAINTING / COATING**							**0**	**100,000**		**5,750**			**387,953**	**487,953**
2211																
2212	90.45.1	Touch-up & Finish Painting	Allowance	Est.	100,000	SF		1	0	100,000	0.05	5,750	PNTR	67.47	387,953	487,953
2213																
2218	**90.60**	**MECHANICAL**							**1,980,000**	**67,350**		**8,697**			**766,904**	**2,814,254**
2219																
2220	90.60.1	Diesel Driven Fire Pump Package	3,500 gpm	Est.	1	EA	160000	0	160,000	0	200	230	PUMP	86.18	19,821	179,821
2221																
2222	90.60.2	Miscellaneous Pumps							0	0					3,964	3,964
2223		Service Water	Existing													Existing
2224		Relocate Existing Matal Cleaning Wastewater Pumps to New Pumphouse		Est.	1	LS			0	0	40.00	46	PUMP	86.18	3,964	3,964

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13																
14																
2225																
2226	90.60.3	Cranes & Hoists							770,000	0		2,990			261,446	1,031,446
2227		C/T	70/20 TN Capacity Bridge Crane	Est.	1	LS	520000		520,000	0	2,100	2,415	MECH	87.74	211,892	731,892
2228		Steam Turbine	Existing													Existing
2229		Miscellaneous Hoists and Trolleys	Allowance	Est.	1	LS	250000		250,000	0	500	575	PUMP	86.18	49,554	299,554
2230																
2231	90.60.4	Fuel Gas Check Metering Station		Est.	1	LS	800000		800,000	0	1,500	1,725	MECH	87.74	151,352	951,352
2232																
2233	90.60.5	Potable Water Tepid Recirculation System		Est.	1	LS	250000		250,000	0	600	690	MECH	87.74	60,541	310,541
2234																
2235	90.60.6	HVAC for New Control Room Extension	Allowance	Est.	1	LS		25,000	0	25,000	800	920	HVAC	80.08	73,674	98,674
2236																
2237	90.60.7	Plumbing & Fixtures		Est.	1	LS		30,000	0	30,000	1,200	1,380	SPNG	93.03	128,381	158,381
2238																
2239	90.60.8	Install Blanking Plate at Existing Chimney							0	12,350		716			67,726	80,076
2240		Remove & Dispose of Existing Insulation		Est.	250	SF	0		0	0	0.15	43	DINS	81.12	3,498	3,498
2241		Remove & Dispose of Existing 10' x 18' Damper		Est.	180	SF	0		0	0	1.50	311	MECH	87.74	27,243	27,243
2242		Demo Portion of Existing Ductwork		Est.	3	TN	0		0	0	30.00	104	FLDU	108.65	11,245	11,245
2243		Install New Duct Blanking Plate		Est.	3	TN	0	3500	0	8,750	60.00	173	FLDU	108.65	18,742	27,492
2244		Install New Insulation		Est.	300	SF	0	12	0	3,600	0.25	86	DINS	81.12	6,997	10,597
2245																
2250	**90.89**	**SUBTOTAL - DIRECT COSTS, COMMON**							**1,980,000**	**7,371,017**		**82,857**		**88.72**	**7,351,323**	**16,702,340**
2251																
2252	**90.90**	**CONSTRUCTION INDIRECTS, COMMON**							**99,000**	**1,732,189**		**7,205**			**4,370,471**	**6,201,660**
2253		Additional Crane Allowance	Tower Crane, 18 Months, Including Operator		1	LS				0					1,700,000	1,700,000
2254		Mobilization / Demobilization - Included in Wage Rates Above														
2255		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
2256		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						7,205		88.72	639,000	639,000
2257		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					9,006				671,476	671,476
2258		Per Diem	None		0.00	HR						0			0	0
2259		Consumables - % of Subtotal Above			0.5	%				36,855					36,757	73,612
2260		Freight on Material - % of Subtotal Above			5.0	%				368,551						368,551
2261		Freight on Equipment - % of Subtotal Above			5.0	%			99,000							99,000
2262		Scaffolding - % of Subtotal Above			3.0	%				221,131					220,540	441,670
2263		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				1,105,653					1,102,698	2,208,351

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13																
14																
2265	90.98	TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, COMMON							2,079,000	9,103,206		90,062		130.15	11,721,794	22,904,001
2266																
2267	90.99	SUBCONTRACTS	Metal Cleaning Waste Tank, Fire Protection Systems, & Site Bussing Services						4,004,000	0		0			0	4,004,000
2268																
2269		Field Erected Tanks														
2270		Metal Cleaning Waste Tank	Approx. 1,000,000 Gal. Vertical, API 650, cone roof, incl stairs, ladders, manways, & cathodic protection. CS w/ Epoxy Coating & Exterior Finish Paint..	Est.	1	Ea.	1000000		1,000,000	0	incl w/equip.	incl w/equip.				1,000,000
2271																
2272		Fire Protection														
2273		Fire Protection & Detection	Based on a Single Site Subcontract, Including Building Systems, Transformer Deluge, Detection, and Portable Extinguishers.	Est.	1	LS	1750000		1,750,000	0	incl w/equip.	incl w/equip.				1,750,000
2274																
2275		Bussing Services Between Remote Parking Areas and Plant Construction Area	Allowance for 33 Month Construction Period Based on 2 Busses Operating Continuously for 5x10 Work Week. Includes Equipment, Supplies, and Labor (Drivers, Fuel, & Maintenance).	Est.	33	MO	38000		1,254,000	0	incl w/equip.	incl w/equip.				1,254,000
2276																
2277	90.00	TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, COMMON							6,083,000	9,103,206		90,062		130.15	11,721,794	26,908,001
2278																
2279																
2280																
2281		OVERALL PROJECT SUBTOTALS														544,717,846
2282																
2283	OP.89	SUBTOTAL - DIRECT COSTS, OVERALL PROJECT SUBTOTALS							262,105,109	56,873,217		1,306,711		90.27	117,955,509	436,933,835
2284																
2285	OP.90	CONSTRUCTION INDIRECTS, OVERALL PROJECT SUBTOTALS							5,660,875	13,365,206		113,627			44,553,930	63,580,011
2286		Additional Crane Allowance			1	LS				0					1,700,000	1,700,000
2287		Mobilization / Demobilization - Included in Wage Rates Above														

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13																
14																
2288		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
2289		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						113,627		90.27	10,258,000	10,258,000
2290		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					142,034				10,774,160	10,774,160
2291		Per Diem	None		0.00	HR						0			0	0
2292		Consumables - % of Subtotal Above			0.5	%				284,366					589,778	874,144
2293		Freight on Material - % of Subtotal Above			5.0	%				2,843,661						2,843,661
2294		Freight on Equipment - % of Subtotal Above			5.0	%			5,660,875							5,660,875
2295		Scaffolding - % of Subtotal Above			3.0	%				1,706,197					3,538,665	5,244,862
2296		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				8,530,983					17,693,326	26,224,309
2298	OP.98	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, OVERALL PROJECT SUBTOTALS**							**267,765,985**	**70,238,423**		**1,420,338**		**114.42**	**162,509,438**	**500,513,846**
2299																
2300	OP.99	**TOTAL SUBCONTRACTS OVERALL PROJECT SUBTOTALS**							**39,754,000**	**150,000**		**0**			**4,300,000**	**44,204,000**
2301																
2302	OP.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, OVERALL PROJECT SUBTOTALS**							**307,519,985**	**70,388,423**		**1,420,338**		**117.44**	**166,809,438**	**544,717,846**
2303																
2304																
2305																
2306	**PI.00**	**OVERALL PROJECT INDIRECT COSTS**														**38,334,200**
2307																
2308	PI.01	Engineering, Design, and Procurement Services			1	LS										29,000,000
2309	PI.02	Field Engineering Support for Construction Management			1	LS										2,000,000
2310	PI.03	Field Engineering Support for S-U/Commissioning			1	LS										1,750,000
2311	PI.04	Craft Start-Up Support	Cost Included on Owner's Costs													Not Included
2312		Initial Fills			0.3	%										1,634,200
2313		Operator Training & Manuals			1	LS										450,000
2314		Subcontracts			1	LS										500,000
2315		Site Survey	Included Above													Included Above
2316		Geotechnical Investigation	Included Above													Included Above
2317		Underground Utility Investigation	Included Above													Included Above
2318		Noise Abatement Consultant	Included Above													Included Above
2319		Noise Abatement for 85 DBA Requirements			1	LS										3,000,000
2320		Interest On Retention	Not Included													Not Included
2321		TFA	Included with Equipment Costs		1	LS										Included with Equipment Costs
2322																

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13																
14																
2323		TOTAL OVERALL PROJECT INDIRECT COSTS														38,334,200
2324																
2325																
2326																
2327		**TOTAL OVERALL PROJECT DIRECT AND INDIRECT COSTS**														**583,052,046**
2328																
2329		**Spare Parts**							**4,612,800**							**4,612,800**
2330		Operating Spare Parts - Capitalized			0.90	%			2,767,700							2,767,700
2331		Operating Spare Parts - First Year of Operation			0.60	%			1,845,100							1,845,100
2332																
2333		**Contingency**														**76,810,500**
2334		Project Contingency @ 13.07%	Contingency applied to Direct and Indirect Costs, Based on 95% Confidence Factor from Range Analysis		13.07	%										76,810,500
2335																
2336		**Escalation**														**56,305,259**
2337		Equipment	Based on 4.4% Annual Rate		1	LS			27,657,117							27,657,117
2338		Material	Based on 6.2% Annual Rate		1	LS				13,454,410						13,454,410
2339		Labor	Based on 2.4% Annual Rate		1	LS									11,766,406	11,766,406
2340		Indirects	Based on 2.7% Annual Rate		1	LS										3,427,326
2341																
2342		**Subtotal Project Cost**														**720,780,605**
2343																
2344		**Owner's Costs**	**Not Included**													**0**
2345																
2346		**AFUDC (Interest During Construction)**	**Not Included**													**0**
2347																
2348		**Total Project Cost**														**720,780,605**
2349																
2350																

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13																
14																
2351																
2352		**ADDITIONAL REFERENCE COSTS:**														
2353																
2354																
2355	A	**Demolition & Removal**														
2356																
2357	A.1	Existing Metal Cleaning Waste Tank Area Restoration	Pump Relocation Detailed Above						0	2,850		690			55,548	58,398
2358		Remove Contaminated Sludge from Tank Interior	See Subcontracts Below													
2359		Demo Existing Tank	Demo Cost Expected to be Offset by Scrap Value of Tank.	Est.	1	EA			0	0					0	0
2360		Demo Pumphouse		Est.	1	LS	0	0	0	0	30.00	35	WRKG	119.15	4,111	4,111
2361		Soil Remediation in Tank Area	See Subcontracts Below													
2362		Remove & Dispose of Existing Geomenbrane Liner		Est.	3,800	SY	0	0.75	0	2,850	0.15	656	MSTR	78.47	51,437	54,287
2363																
2364	A.2	Demolish Existing Fire House (Truck Parking)	25' x 16' x 12' High						0	0		50			5,919	5,919
2365		Demo Single Story Structure, 25' x 16' x 12' Tall		Est.	4,800	CF	0	0	0	0	0.004	22	WRKG	119.15	2,631	2,631
2366		Demo Slab Foundation, 40' x 40'		Est.	30	CY	0	0	0	0	0.80	28	WRKG	119.15	3,289	3,289
2367																
2368	A.3	Demolish Existing Coal Handling Structures							0	0		2,800			333,672	333,672
2369		Coal Conveyor System														
2370		Transite Panel Removal & Disposal, Conveyor Belt Enclosures	See Subcontracts Below													
2371		Conveyor & Truss	36" Belt Conveyor	Est.	850	LF	0	0	0	0	0.1	98	WRKG	119.15	11,647	11,647
2372		Take Up Tower	Approx. 70' Tall	Est.	28	TN	0	0	0	0	1.1	35	WRKG	119.15	4,220	4,220
2373		Conveyor Support Bents	(3) @ Avg. Height 60'	Est.	78	TN	0	0	0	0	1.1	99	WRKG	119.15	11,757	11,757
2374		Transfer House	Approx. 30' x 30' x 60' High, Transite Siding													
2375		Transite Siding Removal & Disposal	See Subcontracts Below													
2376		Remove Remaining Equipment & Motors	Allowance	Est.	1	LS	0	0	0	0	160	184	WRKG	119.15	21,924	21,924
2377		Demolish Main Structure		Est.	54,000	CF	0	0	0	0	0.004	248	WRKG	119.15	29,597	29,597
2378		Demolish Deluge Valve House		Est.	1	LS	0	0	0	0	20	23	WRKG	119.15	2,740	2,740
2379		Demolish Foundations		Est.	160	CY	0	0	0	0	1.1	202	WRKG	119.15	24,116	24,116
2380																
2381		Coal Car Thawing Building	60' x 18' x 18' High	Est.	19,440	CF	0	0	0	0	0.004	89	WRKG	119.15	10,655	10,655
2382		Demolish Foundation		Est.	50	CY	0	0	0	0	1.1	63	WRKG	119.15	7,536	7,536
2383																
2384		Locomotive House	50' x 44' x 27' High, Concrete Block	Est.	59,400	CF	0	0	0	0	0.006	410	WRKG	119.15	48,835	48,835
2385																

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12	Account No.	Item Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equipment Cost	Unit Material Cost	Total Equipment Cost	Total Material Cost	Unit Man-hours (Base)	Total Man-hours, w/ Productivity	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Total Projected Cost
13																
14																
2386		Tractor Shed	50' x 26' x 12' High, Asbestos Siding, Roofing, & Louvers. Open One Side.													
2387		Asbestos Siding & Roofing Removal & Disposal	See Subcontracts Below													
2388		Demolish Building Structure		Est.	15,600	CF	0	0	0	0	0.004	72	WRKG	119.15	8,550	8,550
2389		Demolish Foundations		Est.	100	CY	0	0	0	0	1.1	127	WRKG	119.15	15,072	15,072
2390		Demo Yard Lighting, Paving, & Remaining Electrical Facilities in Coal Handling Area	Allowance	Est.	1	LS	0	0	0	0	1000.000	1,150	WRKG	119.15	137,023	137,023
2391																
2392	A.4	Demolish Existing Railroad Tracks							0	0		476			41,249	41,249
2393		Remove and Dispose of Existing Rail & Ties		Est.	1,500	LF	0	0	0	0	0.17	293	RRTK	86.64	25,407	25,407
2394		Remove and Dispose of Existing Ballast		Est.	1,500	LF	0	0	0	0	0.106	183	RRTK	86.64	15,842	15,842
2395																
2396	A.5	Demolish Existing Helipad	Included w/ Coal Handling Removals in A.3						0	0		0			0	0
2397																
2398	A.6	Demolish Existing Sun Shelter							0	0		110			13,154	13,154
2399		Demo Single Story Structure, 60' x 25' x 12' Tall	Open All Sides	Est.	18,000	CF	0	0	0	0	0.004	83	WRKG	119.15	9,866	9,866
2400		Demo Foundation		Est.	30	CY	0	0	0	0	0.8	28	WRKG	119.15	3,289	3,289
2401																
2402	A.7	Demolish Unit 1 Boiler Building Combustion Air Coil Room							0	0		574			68,388	68,388
2403		Transite Siding Removal & Disposal	See Subcontracts Below													
2404		Demo Coil Piping	Allowance	Est.	1	LS	0	0	0	0	100	115	WRKG	119.15	13,702	13,702
2405		Demo Coils		Est.	1	LS	0	0	0	0	300	345	WRKG	119.15	41,107	41,107
2406		Demo Fans		Est.	1	LS	0	0	0	0	30	35	WRKG	119.15	4,111	4,111
2407		Demo Concrete Roofs & Floors		Est.	18	CY	0	0	0	0	0.6	12	WRKG	119.15	1,480	1,480
2408		Demo 4" Masonry Walls		Est.	1,000	SF	0	0	0	0	0.044	51	WRKG	119.15	6,029	6,029
2409		Demo Building Steel		Est.	13	TN	0	0	0	0	1.1	16	WRKG	119.15	1,959	1,959
2410		New Girt Framing & Siding	Detailed Above in Common, Steel and Architectural													
2411																
2412	A.8	Demolish Unit 1 Boiler Building Platform at El. 586'-9" (Row 8 to 12)							0	0		89			10,606	10,606
2413		Demo Grating		Est.	270	SF	0	0	0	0	0.1	31	WRKG	119.15	3,700	3,700
2414		Demo 4" Concrete Slab		Est.	480	SF	0	0	0	0	0.03	17	WRKG	119.15	1,973	1,973
2415		Demo Steel Framing		Est.	6	TN	0	0	0	0	6	41	WRKG	119.15	4,933	4,933
2416																

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13																
14																
2417	A.9	Secure Existing Track Hopper for Abandonment							0	54,930		934			97,942	152,872
2418		Demo Car Shake Out Structure	Allowance	Est.	1	LS	0	0	0	0	120	138	WRKG	119.15	16,443	16,443
2419		New Steel Framing at Existing Grizzly		Est.	15	TN	0	2650	0	39,750	16	276	STST	104.09	28,729	68,479
2420		Reinforce Existing Steel		Est.	2	TN	0	5000	0	10,000	100	230	STST	104.09	23,941	33,941
2421		Metal Floor Decking		Est.	600	SF	0	2.8	0	1,680	0.014	10	DCKG	79.06	764	2,444
2422		Concrete Reinforcing		Est.	1	TN		950	0	950	22.5	26	REIN	76.92	1,990	2,940
2423		Concrete		Est.	15	CY		120	0	1,800	1.9	33	COND	68.54	2,246	4,046
2424		Excavation at Tunnel	Allowance	Est.	100	CY		0	0	0	0.2	23	EXFD	88.87	2,044	2,044
2425		Demo Tunnel Concrete to 4' Below Grade		Est.	115	CY	0	0	0	0	1.1	145	WRKG	119.15	17,333	17,333
2426		Install 9.5' x 8.5' Concrete Bulkhead, 1' Thick	On Existing Tunnel	Est.	3	CY		250	0	750	8	28	CONP	77.97	2,152	2,902
2427		Backfill	Allowance	Est.	150	CY		0	0	0	0.15	26	EXFD	88.87	2,300	2,300
2428																
2429	A.10	Demolish Gas Cylinder Storage Shed							0	0		77			9,208	9,208
2430		Demo Single Story Structure, 30' x 30' x 12' Tall	Oper All Sides	Est.	10,800	CF	0	0	0	0	0.004	50	WRKG	119.15	5,919	5,919
2431		Demo Foundation		Est.	30	CY	0	0	0	0	0.80	28	WRKG	119.15	3,289	3,289
2432																
2433	A.11	Demolish CO2 Storage Tank Foundation		Est.	30	CY	0	0	0	0	0.80	28	WRKG	119.15	3,289	3,289
2434																
2435	A.12	Remove & Dispose of Existing Relays serving ST GSU, UAT, RAT, and Generator Protection	Allowance	Est.	1	LS	0	0	0	0	100	115	WRKG	119.15	13,702	13,702
2436																
2437	A.13	Remove & Dispose of Existing 4.16 kV Switchgear Sections in Existing STG Building		Est.	7	EA	0	0	0	0	180	1,449	WRKG	119.15	172,648	172,648
2438																
2439	A.14	Remove & Dispose of Existing 600V Switchgear Sections in Existing STG Building		Est.	19	EA	0	0	0	0	120	2,622	WRKG	119.15	312,411	312,411
2440																
2441	A.15	Remove & Dispose of Existing Oil Filled 4.16kV/600V 1.5 MVA Transformers in Existing STG Building		Est.	2	EA	0	0	0	0	200	460	WRKG	119.15	54,809	54,809
2442																
2443	A.16	Control Room Demolition & Removals							0	0		1,035			123,320	123,320
2444		Demo Freestanding Control and Ovation Panels		Est.	2	LS	0	0	0	0	120	276	WRKG	119.15	32,885	32,885
2445		Demo Existing Boiler Instrumentation & Electrical Devices On and Behind Main Control boards	Allowance	Est.	1	LS	0	0	0	0	500	575	WRKG	119.15	68,511	68,511
2446		Demo Walls, Fixtures, and Plumbing at Existing Control Room Bathroom	Allowance	Est.	1	LS	0	0	0	0	160	184	WRKG	119.15	21,924	21,924
2447																
2448	A.17	Remove Existing Pumps							0	0		1,311			112,982	112,982
2449		Remove & Dispose of Existing Hotwell Pumps		Est.	2	EA	0	0	0	0	200	460	PUMP	86.18	39,643	39,643
2450		Remove & Dispose of Existing Condensate Booster Pumps		Est.	2	EA	0	0	0	0	250	575	PUMP	86.18	49,554	49,554
2451		Remove & Dispose of Existing LP Heater No. 1 Drain Pumps		Est.	2	EA	0	0	0	0	60	138	PUMP	86.18	11,893	11,893
2452		Remove & Dispose of Existing Diesel Driven Fire Pump Package	1,500 gpm	Est.	1	LS	0	0	0	0	120	138	PUMP	86.18	11,893	11,893

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13																
14																
2453																
2454	A.18	Remove & Dispose of Existing Gland Steam Condenser		Est.	1	EA	0	0	0	0	200	230	PUMP	86.18	19,821	19,821
2455																
2456	A.19	Remove & Dispose of Existing ST Turning Gear Assembly		Est.	1	LS	0	0	0	0	200	230	MECH	87.74	20,180	20,180
2457																
2458	A.20	Remove & Dispose of Existing Raw Water Intake Screens	Johnson Screens	Est.	1	LS	0		0	0	400	460	MECH	87.74	40,360	40,360
2459																
2460	A.21	Remove & Dispose of Existing Insulation & Lagging on Ductwork Above Boiler Room Roof	Allowance - Not Asbestos Insulation.	Est.	17,000	SF	0		0	0	0.1	1,955	DINS	81.12	158,590	158,590
2461																
2462	A.22	Remove & Dispose of Existing Piping & Mechanical Items In Existing Powerhouse As Required	Allowance	Est.	1	LS	0		0	0	2,500	2,875	SPNG	93.03	267,461	267,461
2463																
2464	A.23	Remove & Dispose of Existing Conduits & Electrical Items In Existing Powerhouse As Required	Allowance	Est.	1	LS	0		0	0	2,500	2,875	EHEA	77.85	223,819	223,819
2465																
2466	**A.89**	**SUBTOTAL - DIRECT COSTS, Demolition & Removal**							**0**	**57,780**		**21,446**		**6,445**	**2,159,078**	**2,216,858**
2467																
2468	**A.90**	**CONSTRUCTION INDIRECTS, Demolition & Removal**							**0**	**13,578**		**1,865**			**784,642**	**798,220**
2469		Additional Crane Allowance	None		1	LS				0					0	0
2470		Mobilization / Demobilization - Included in Wage Rates Above														
2471		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
2472		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						1,865		100.68	188,000	188,000
2473		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					2,331				197,212	197,212
2474		Per Diem	None		0.00	HR						0			0	0
2475		Consumables - % of Subtotal Above			0.5	%				289					10,795	11,084
2476		Freight on Material - % of Subtotal Above			5.0	%				2,889						2,889
2477		Freight on Equipment - % of Subtotal Above			5.0	%			0							0
2478		Scaffolding - % of Subtotal Above			3.0	%				1,733					64,772	66,506
2479		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				8,667					323,862	332,529
2481	**A.98**	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, Demolition & Removal**							**0**	**71,358**		**23,311**		**126.28**	**2,943,720**	**3,015,078**
2482																

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13																
14																
2483	**A.99**	**SUBCONTRACTS**	Sludge Disposal, Soil Remediation & Asbestos Removal						**1,504,100**	**0**		**0**			**0**	**1,504,100**
2484																
2485		Remove & Dispose of Contaminated Sludge in Existing Metal Cleaning Waste Tank	Allowance. Assume 6" Accumulation	Est.	72	CY	250	0	18,000	0						18,000
2486		Soil Remediation in Metal Cleaning Waste Tank Area - Assumes Removing 1' of Material from the Bottom of the Existing Containment, Above the Liner.	Allowance for soil remediation and disposal in an EPA approved landfill. Subcontract cost includes labor. Used lower end of the range $118-355/CY. Cost could be lower ($59-118/CY) if sold to a bituminous concrete batch plant.	Est.	1,000	CY	150	0	150,000	0						150,000
2487		Soil Remediation in Former Diesel Oil & Gasoline Tanks and Pump Area - 100' x 100' x 5' Deep	Allowance for soil remediation and disposal in an EPA approved landfill. Subcontract cost includes labor. Used lower end of the range $118-355/CY. Cost could be lower ($59-118/CY) if sold to a bituminous concrete batch plant.	Est.	1,850	CY	150	0	277,500	0						277,500
2488		Transite Panel Removal & Disposal, Conveyor Belt Enclosures	Subcontract Price	Est.	11,900	SF	10	0	119,000	0						119,000
2489		Transite Siding Removal & Disposal, Transfer House Siding	Subcontract Price	Est.	7,200	SF	10	0	72,000	0						72,000
2490		Asbestos Siding & Roofing Removal & Disposal, Tractor Shed	Subcontract Price	Est.	2,210	SF	10	0	22,100	0						22,100
2491		Transite Siding Removal & Disposal, Boiler Building Combustion Air Coil Room	Subcontract Price	Est.	2,600	SF	10	0	26,000	0						26,000
2492		Transite Siding Removal & Disposal, Boiler Building East Wall for Piping Penetrations	Subcontract Price	Est.	5,700	SF	10	0	57,000	0						57,000
2493		Transite Siding Removal & Disposal, Boiler Building South Wall for Piping Penetrations	Subcontract Price	Est.	1,250	SF	10	0	12,500	0						12,500
2494		Arsenic, Asbestos, & Lead Abatement In Existing Power Block	Allowance	Est.	1	LS	750000	0	750,000	0						750,000
2495																
2496	**A.00**	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, Demolition & Removal**							**1,504,100**	**71,358**		**23,311**		**126.28**	**2,943,720**	**4,519,178**
2497																

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9																
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13																
14																
2498	PI.00	**Indirect Costs**	Included Above w/ Overall Project Indirect Costs													Included Elsewhere
2499																
2500		**Contingency**														**1,265,700**
2501		Project Contingency @ 28.007%	Contingency applied to Direct and Indirect Costs, Based on 95% Confidence Factor from Range Analysis		28.007	%										1,265,700
2502																
2503		**Escalation**	Pro-Rated from Main Estimate Above													**356,557**
2504		Equipment	Based on 4.4% Annual Rate		1	LS			135,273							135,273
2505		Material	Based on 6.2% Annual Rate		1	LS				13,640						13,640
2506		Labor	Based on 2.4% Annual Rate		1	LS									207,644	207,644
2507		Indirects	Based on 2.7% Annual Rate		1	LS										0
2508																
2509		**Total Demolition & Removal Cost**														**6,141,435**
2510																

ATTACHMENT 1-11
Option 2 Detailed Capital Cost Estimate No. 31239B

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8											Labor Productivity =			1.15	Reviewer:	BJD
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13																
14																
15	**10.00**	**GENERAL SITE WORK**														**15,052,615**
16																
17	**10.10**	**CIVIL**							**0**	**5,097,390**		**68,036**			**6,423,314**	**11,520,704**
18																
19	10.10.1	Relocate Existing Metal Cleaning Waste Tank and Pumphouse							0	224,134		4,160			355,291	579,425
20		Install New Pumphouse Foundation, Tank Foundation & Containment														
21		Excavation		Est.	4500	CY		0	0	0	0.2	1,035	EXFD	88.87	91,980	91,980
22		Well Graded Compacted Granular Backfill		Est.	10000	CY		19	0	190,000	0.15	1,725	EXFD	88.87	153,301	343,301
23		Liner - 50 Mil Polyethelene Flexible Membrane		Est.	4120	SY		1.2	0	4,944	0.2	948	MSTR	78.47	74,358	79,302
24		Topsoil & Seeding		Est.	600	CY		34	0	20,400	0.35	242	MSTR	78.47	18,951	39,351
25		Concrete		Est.	45	CY		120	0	5,400	1.5	78	COND	68.54	5,320	10,720
26		Reinforcing		Est.	3	TN		950	0	2,850	22.5	78	REIN	76.92	5,971	8,821
27		Formwork		Est.	240	SF		2.25	0	540	0.2	55	FORM	98.01	5,410	5,950
28		Install New Pumphouse	See Acct. 90.40													
29		Install New 70' Dia. Tank	See Subcontracts in Acct. 90.99													Included Elsewhere
30		Relocate Existing Pumps to New Pumphouse	See Acct. 90.60													Included Elsewhere
31		Demo Existing Tank & Pumphouse	Priced Separately After Estimate Totals													
32		Existing Metal Waste Cleaning Tank Area Restoration	Priced Separately After Estimate Totals													
33																
34	10.10.2	Relocate Existing RSO Trailers							0	0		345			30,270	30,270
35		Relocate Existing RSO Trailers		Est.	2	EA			0	0	150.00	345	MECH	87.74	30,270	30,270
36																
37	10.10.3	Construction Parking & Laydown Areas Preparation							0	1,923,056		20,682			2,411,610	4,334,666
38																
39		Blaine Creek Area							0	942,506		11,812			1,387,627	2,330,133
40		Erosion & Sediment Control														
41		Silt Fence		Est.	3,700	LF		1	0	3,700	0.02	85	LAND	59.88	5,096	8,796
42		Rock Check Dams		Est.	30	EA		500	0	15,000	12	414	LAND	59.88	24,790	39,790
43		Rock Construction Entrance	30' x 100' x 8" Thick Crushed Stone	Est.	1	EA		26000	0	26,000	50	58	BCSE	101.58	5,841	31,841
44		Stormwater (Sediment) Pond Restoration at End of Construction	Sediment Removal	Est.	75	CY		0	0	0	2	173	EXFD	88.87	15,330	15,330
45		Site Grading														
46		Topsoil & Organic Stripping	6" Removal Depth	Est.	8,400	CY		0	0	0	0.05	512	ETWK	175.40	89,801	89,801
47		Soil Cut	Assume 0.75' Cut Across the Entire Area	Est.	12,000	CY		0	0	0	0.08	1,104	ETWK	175.40	193,642	193,642
48		Fill	Assume 0.75' Fill Across the Entire Area	Est.	12,000	CY		0	0	0	0.08	1,104	ETWK	175.40	193,642	193,642
49		Riprap		Est.	200	CY		30	0	6,000	0.30	69	RRAP	69.95	4,827	10,827

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13																
14																
50		Roads & Surfacing														
51		Soil Cut	Minor Grading for Access Road Widening	Est.	2,500	CY		0	0	0	0.08	230	ETWK	175.40	40,342	40,342
52		Fill	Minor Grading for Access Road Widening	Est.	2,500	CY		0	0	0	0.08	230	ETWK	175.40	40,342	40,342
53		Laydown Area Access Road - Widen Existing Roadway 18' for a Total 30' Wide Road	Includes: 6" Base Course 10 OZ/SY Geotextile 12" Subgrade Prep	Est.	6400	SY		12	0	76,800	0.07	515	BCSE	101.58	52,334	129,134
54		Laydown Area Access Road - Improve Existing 12' Wide Roadway by Adding 8" of Gravel	Includes: 6" Base Course	Est.	4300	SY		11	0	47,300	0.05	247	BCSE	101.58	25,116	72,416
55		Aggregate Area Surfacing	Total Laydown Area of 10 Acres Includes: 6" Base Course 10 OZ/SY Geotextile 12" Subgrade Prep	Est.	50000	SY		12	0	600,000	0.07	4,025	BCSE	101.58	408,860	1,008,860
56		Fencing														
57		6' High w/ 3-Strand Barbed Wire		Est.	3200	LF		30	0	96,000	0.100	368	CARP	70.49	25,940	121,940
58		24' Double Wide Swing Gate		Est.	4	EA		3500	0	14,000	50.000	230	CARP	70.49	16,213	30,213
59		Stormwater Runoff / Sediment Control Pond	Earthwork													
60		Soil Cut		Est.	3,000	CY		0	0	0	0.08	276	ETWK	175.40	48,410	48,410
61		Fill		Est.	3,000	CY		0	0	0	0.08	276	ETWK	175.40	48,410	48,410
62		4" Topsoil		Est.	650	CY		27.6	0	17,940	0.03	22	LAND	59.88	1,343	19,283
63		Grass Seeding, Fertilizing, & Mulch		Est.	1.2	AC		4930	0	5,916	240	331	MSTR	78.47	25,989	31,905
64		Riprap	Pond Inlet, Outlet, & Emergency Spillway Protection	Est.	200	CY		30	0	6,000	0.30	69	RRAP	69.95	4,827	10,827
65		Stormwater Pond Outlet Structure - CMP Riser							0	27,850		1,474			116,534	144,384
66		Excavation		Est.	1.5	CY		0	0	0	0.20	0	EXFD	88.87	31	31
67		Backfill		Est.	0.5	CY		0	0	0	0.15	0	EXFD	88.87	8	8
68		Reinforcing		Est.	0.3	TN		950	0	285	20	7	REIN	76.92	531	816
69		Concrete		Est.	2	CY		150	0	300	1.5	3	CONP	77.97	269	569
70		Piping	48" CMP	Est.	5	LF		75	0	375	4	23	YDPP	88.84	2,043	2,418
71		Piping	18" CMP	Est.	70	LF		32	0	2,240	0.75	60	YDPP	88.84	5,364	7,604
72		Grass Seeding, Fertilizing, & Mulch	For Topsoil & Spoils Waste Area	Est.	5	AC		4930	0	24,650	240	1,380	MSTR	78.47	108,289	132,939
73																
74		Area in Existing Plant							0	980,550		8,870			1,023,982	2,004,532
75		Erosion & Sediment Control														
76		Silt Fence		Est.	3,550	LF		1	0	3,550	0.02	82	LAND	59.88	4,889	8,439
77		Rock Check Dams		Est.	15	EA		500	0	7,500	12	207	LAND	59.88	12,395	19,895
78		Rock Construction Entrance	30' x 100' x 8" Thick Crushed Stone	Est.	1	EA		26000	0	26,000	50	58	BCSE	101.58	5,841	31,841
79		Stormwater (Sediment) Pond Restoration at End of Construction	Sediment Removal	Est.	75	CY		0	0	0	2	173	EXFD	88.87	15,330	15,330
80		Fencing														
81		6' High w/ 3-Strand Barbed Wire		Est.	2000	LF		30	0	60,000	0.10	230	CARP	70.49	16,213	76,213
82		24' Double Wide Swing Gate		Est.	1	EA		3500	0	3,500	50	58	CARP	70.49	4,053	7,553
83		Man Gate		Est.	2	EA		500	0	1,000	12	28	CARP	70.49	1,946	2,946

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13																
14																
84		Railroad Crossing	30' Wide, Crossing 2 Tracks, Wooden RR Tie Construction	Est.	1	LS		15000	0	15,000	180	207	RRTK	86.64	17,934	32,934
85		Site Grading														
86		Topsoil Stripping	6" Removal Depth, Includes 1 Mile Haul	Est.	8,800	CY		0	0	0	0.09	911	ETWK	175.40	159,754	159,754
87		Soil Cut		Est.	6,100	CY		0	0	0	0.08	561	ETWK	175.40	98,434	98,434
88		Fill		Est.	6,100	CY		0	0	0	0.08	561	ETWK	175.40	98,434	98,434
89		Roads & Surfacing														
90		Aggregate Area Surfacing	Includes: 6" Base Course 10 OZ/SY Geotextile 12" Subgrade Prep	Est.	72000	SY		12	0	864,000	0.07	5,796	BCSE	101.58	588,758	1,452,758
91																
92	10.10.4	Erosion & Sediment Control - New Power Block Area							0	66,000		564			38,538	104,538
93		Silt Fence		Est.	4,500	LF		1	0	4,500	0.02	104	LAND	59.88	6,198	10,698
94		Rock Check Dams		Est.	15	EA		500	0	7,500	12	207	LAND	59.88	12,395	19,895
95		Rock Construction Entrance	30' x 100' x 8" Thick Crushed Stone	Est.	2	EA		26000	0	52,000	50	115	BCSE	101.58	11,682	63,682
96		Stormwater (Sediment) Pond Restoration at End of Construction	Allowance	Est.	1	LS		2000	0	2,000	120	138	LAND	59.88	8,263	10,263
97																
98	10.10.5	Site Clearing & Stripping							0	0		2,956			518,395	518,395
99		Topsoil Stripping	6" Removal Depth, Includes 1 Mile Haul. Total 11.3 Acres.	Est.	9,000	CY		0	0	0	0.09	932	ETWK	175.40	163,385	163,385
100		Cut		Est.	11,000	CY		0	0	0	0.08	1,012	ETWK	175.40	177,505	177,505
101		Fill		Est.	11,000	CY		0	0	0	0.08	1,012	ETWK	175.40	177,505	177,505
102																
103	10.10.6	Roads & Surfacing							0	1,063,300		7,999			692,190	1,755,490
104		Plant Roads & Surfacing	Includes: 1.5" Asphalt Surface Course 1.5" Asphalt Binder Course 12" Base Course 10 OZ/SY Geotextile 12" Subgrade Prep	Est.	12500	SY		47	0	587,500	0.120	1,725	PBIT	88.22	152,180	739,680
105		Main Plant Access Road Resurfacing	Includes: 1.5" Asphalt Surface Course 1.5" Asphalt Binder Course 6" Base Course	Est.	1400	SY		29.5	0	41,300	0.090	145	PBIT	88.22	12,783	54,083
106		Ammonia & Chemical Unloading Slabs	12" Reinforced Concrete, 10' x 150'	Est.	230	CY		250	0	57,500	8.000	2,116	CONP	77.97	164,985	222,485

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13																
14																
107		New Helipad	12" Reinforced Concrete, 56' x 56'	Est.	120	CY		250	0	30,000	8.000	1,104	CONP	77.97	86,079	116,079
108		Concrete Pad Building Entrances	10" Reinforced Concrete	Est.	400	SY		80	0	32,000	1.500	690	CONP	77.97	53,799	85,799
109		Aggregate Area Surfacing	6" Base Course	Est.	25000	SY		12	0	300,000	0.070	2,013	BCSE	101.58	204,430	504,430
110		Railroad Crossing (Tank Access Inside of Coal Loop)	30' Wide, Crossing 2 Tracks, Wooden RR Tie Construction	Est.	1	LS		15000	0	15,000	180	207	RRTK	86.64	17,934	32,934
111																
112	10.10.7	Fencing							0	112,000		796			56,096	168,096
113		Plant Area Fencing														
114		6' High w/ 3-Strand Barbed Wire		Est.	2000	LF		30	0	60,000	0.100	230	CARP	70.49	16,213	76,213
115		24' Double Wide Swing Gate		Est.	4	EA		3500	0	14,000	50	230	CARP	70.49	16,213	30,213
116		Man Gate		Est.	4	EA		500	0	2,000	12.000	55	CARP	70.49	3,891	5,891
117		GSU Transformer Fencing														
118		6' High w/ 3-Strand Barbed Wire		Est.	1000	LF		30	0	30,000	0.100	115	CARP	70.49	8,106	38,106
119		20' Wide Slide Gate		Est.	3	EA		1500	0	4,500	36.000	124	CARP	70.49	8,755	13,255
120		Man Gate		Est.	3	EA		500	0	1,500	12.000	41	CARP	70.49	2,918	4,418
121																
122	10.10.8	Stormwater Drainage Trench							0	930,000		17,768			1,217,784	2,147,784
123		Cast In Place Concrete Trench	2' W x 1.5' Deep, w/ Reinforcing and HS-20 Rated Grate Covers	Est.	1900	LF		220	0	418,000	3.500	7,648	COND	68.54	524,160	942,160
124		Cast In Place Concrete Trench	3' W x 3' Deep, w/ Reinforcing and HS-20 Rated Grate Covers	Est.	1600	LF		320	0	512,000	5.500	10,120	COND	68.54	693,625	1,205,625
125																
126	10.10.9	Stormwater Runoff Pond							0	35,475		511			38,966	74,441
127		Excavation	Included w/ Site Grading					0	0	0	0.065	0	ETWK	175.40	0	0
128		4" Topsoil		Est.	800	CY		27.6	0	22,080	0.030	28	LAND	59.88	1,653	23,733
129		Grass Seeding, Fertilizing, & Mulch		Est.	1.5	AC		4930	0	7,395	240.000	414	MSTR	78.47	32,487	39,882
130		Riprap	For Pond Inlet Areas	Est.	200	CY		30	0	6,000	0.300	69	RRAP	69.95	4,827	10,827
131																
132	10.10.10	Stormwater Pond Outlet Structure	Allowance for Pond Drainage Outlet Structure, Either by Jacking Under RR Tracks & Gravity Drainage to the River or by Pumping to an Existing Outfall.	Est.	1	LS		145000	0	145,000	4500	5,175	EXFD	88.87	459,902	604,902
133																
134	10.10.11	Temporary Construction Guard House	Allowance	Est.	1	LS	0	20000	0	20,000	500.000	575	CARP	70.49	40,532	60,532
135																
136	10.10.12	Concrete Filled Pipe Bollards	Includes Installation Labor	Est.	100	EA	0	250	0	25,000						25,000
137																

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13																
14																
138	10.10.13	Spur Track Upgrade							0	548,425		6,484			561,748	1,110,173
139		Remove and Replace 8" of Ballast	Includes Disposal of Removed Ballast	Est.	2300	LF	0	12.25	0	28,175	0.160	423	RRTK	86.64	36,666	64,841
140		Replace 75% of the Existing Wooden Railroad Ties	Includes Tie Plates, Spikes, and Bolts	Est.	2300	LF	0	80	0	184,000	0.850	2,248	RRTK	86.64	194,788	378,788
141		Remove the Existing Rail and Replace with 132-lb Rail		Est.	2300	LF	0	87.5	0	201,250	1.050	2,777	RRTK	86.64	240,621	441,871
142		Replace Existing #8 Turnouts		Est.	3	EA	0	45000	0	135,000	300.000	1,035	RRTK	86.64	89,672	224,672
143																
144	10.10.14	Install New Stops at Track Sections Being Demolished							0	5,000		23			1,993	6,993
145		Track Demolition	Included w/ Demolition & Removal Costs at End of This Estimate													Included Elsewhere
146		Rail Stops (Dead Ends)		Est.	1	EA	0	5000	0	5,000	20	23	RRTK	86.64	1,993	6,993
147																
166	**10.89**	**SUBTOTAL - DIRECT COSTS, GENERAL SITE WORK**							**0**	**5,097,390**		**68,036**		**94.41**	**6,423,314**	**11,520,704**
167																
168	**10.90**	**CONSTRUCTION INDIRECTS, GENERAL SITE WORK**							**0**	**1,197,887**		**5,916**			**2,334,024**	**3,531,911**
169		Additional Crane Allowance			1	LS				0					0	0
170		Mobilization / Demobilization - Included in Wage Rates Above														
171		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
172		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						5,916		94.41	559,000	559,000
173		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					7,395				586,711	586,711
174		Per Diem	None		0.00	HR						0			0	0
175		Consumables - % of Subtotal Above			0.5	%				25,487					32,117	57,604
176		Freight on Material - % of Subtotal Above			5.0	%				254,870						254,870
177		Freight on Equipment - % of Subtotal Above			5.0	%			0							0
178		Scaffolding - % of Subtotal Above			3.0	%				152,922					192,699	345,621
179		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				764,609					963,497	1,728,106
181	**10.98**	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, GENERAL SITE WORK**							**0**	**6,295,277**		**73,952**		**118.42**	**8,757,338**	**15,052,615**
182																
183	**10.99**	**SUBCONTRACTS**							**0**	**0**		**0**			**0**	**0**
186																
187	**10.00**	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, GENERAL SITE WORK**							**0**	**6,295,277**		**73,952**		**118.42**	**8,757,338**	**15,052,615**
188																
189																
190																

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13																
14																
191	**11.00**	**UNDERGROUND**														**24,506,577**
192																
193	**11.10**	**CIVIL**							**7,500**	**601,925**		**33,223**			**2,925,082**	**3,534,507**
194																
195		Site Drainage System														
196	11.10.1	Oily Water Sewer System							6,000	272,075		8,527			757,636	1,035,711
197		Piping	6" CS	Est.	1700	LF		52	0	88,400	1.190	2,326	YDPP	88.84	206,682	295,082
198		Piping	8" CS	Est.	1600	LF		69	0	110,400	1.260	2,318	YDPP	88.84	205,967	316,367
199		Post Indicator Valve		Est.	8	EA	750	0	6,000	0	6.000	55	YDPP	88.84	4,904	10,904
200		Manholes	4' Internal Diameter	Est.	43	EA		1575	0	67,725	20.000	989	YDPP	88.84	87,863	155,588
201		Excavation / Backfill		Est.	7400	CY		0	0	0	0.30	2,553	EXFD	88.87	226,885	226,885
202		Bedding Material		Est.	370	CY		15	0	5,550	0.67	285	EXFD	88.87	25,336	30,886
203																
204	11.10.2	Modifications to Existing Storm Sewers							0	128,300		6,261			553,979	682,279
205		Underground Pipe Removal	Allowance for 24" Pipe, 5' Deep	Est.	2200	LF		0	0	0	0.300	759	YDPP	88.84	67,430	67,430
206		Removal of Manholes & Catchbasins		Est.	11	EA		0	0	0	6.000	76	WRKG	119.15	9,043	9,043
207		Excavation / Backfill	For Underground Pipe & Manhole Removal	Est.	3700	CY		0	0	0	0.200	851	EXFD	88.87	75,628	75,628
208		Rerouting of Existing Storm Sewers														
209		Piping	30" CHDPE	Est.	650	LF		45	0	29,250	0.75	561	YDPP	88.84	49,806	79,056
210		Piping	15" CHDPE	Est.	200	LF		18	0	3,600	0.55	127	YDPP	88.84	11,238	14,838
211		Manholes	5' Internal Diameter	Est.	5	EA		2000	0	10,000	24	138	YDPP	88.84	12,260	22,260
212		Excavation / Backfill		Est.	2500	CY		0	0	0	0.30	863	EXFD	88.87	76,650	76,650
213		Bedding Material		Est.	60	CY		15	0	900	0.67	46	EXFD	88.87	4,108	5,008
214		Existing Storm Sewer Improvement / Reinforcement Beneath PDC														
215		Underground Pipe Removal	Allowance for 42" Pipe, 10' Deep	Est.	200	LF		0	0	0	0.7	161	YDPP	88.84	14,303	14,303
216		Piping	42" CHDPE, 10' Deep	Est.	200	LF		79	0	15,800	0.960	221	YDPP	88.84	19,616	35,416
217		Hydro Excavation / Backfill		Est.	1100	CY		17	0	18,700	1.5	1,898	EXFD	88.87	168,631	187,331
218		Bedding Material		Est.	170	CY		15	0	2,550	0.67	131	EXFD	88.87	11,641	14,191
219		Flowable Fill (CLSM)		Est.	500	CY		95	0	47,500	0.75	431	CONP	77.97	33,625	81,125
220																
221	11.10.3	Stormwater Drainage System							1,500	57,000		2,608			231,703	290,203
222		Piping	6" CS	Est.	100	LF		52	0	5,200	1.190	137	YDPP	88.84	12,158	17,358
223		Piping	18" Dia. CHDPE	Est.	700	LF		20	0	14,000	0.600	483	YDPP	88.84	42,910	56,910
224		Piping	24" Dia. CHDPE	Est.	450	LF		28	0	12,600	0.620	321	YDPP	88.84	28,504	41,104
225		Manholes	4' Internal Diameter	Est.	7	EA		1575	0	11,025	20.000	161	YDPP	88.84	14,303	25,328
226		Manholes	5' Internal Diameter	Est.	3	EA		2475	0	7,425	32.000	110	YDPP	88.84	9,808	17,233
227		Post Indicator Valve		Est.	2	EA	750	0	1,500	0	6.000	14	YDPP	88.84	1,226	2,726
228		Excavation / Backfill		Est.	3000	CY		0	0	0	0.30	1,035	EXFD	88.87	91,980	91,980
229		Bedding Material		Est.	450	CY		15	0	6,750	0.67	347	EXFD	88.87	30,813	37,563
230																
231	11.10.4	Sanitary Sewer System	Use Existing						0	0		0			0	0
232																

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13																
14																
233	11.10.5	Mechanical Excavation (for process pipe trenches)							0	0		12,118			1,076,938	1,076,938
234		Depths - 5' to 10'	25,000 LF of trench @ 2.81 CY/LF	Est.	70,250	CY		0	0	0	0.15	12,118	EXFD	88.87	1,076,938	1,076,938
235		Depths - over 10'	None	Est.	0	CY		0	0	0	0.25	0	EXFD	88.87	0	0
236																
237	11.10.6	Hydro Excavation for Mechanical and Electrical Services	Allowance, Based on 1500' x 5' x 4' Deep	Est.	1150	CY		17	0	19,550	1.500	1,984	EXFD	88.87	176,296	195,846
238																
239	11.10.7	Relocation of Miscellaneous Underground Utilities	Allowance	Est.	1	LS		125000	0	125,000	1,500.000	1,725	ECND	74.51	128,530	253,530
240																
241	**11.20**	**CONCRETE**							**0**	**9,000**		**345**			**23,646**	**32,646**
242																
243	11.20.1	Concrete Thrust Blocks for Piping Systems	Allowance	Est.	50	Ea.		180.00	0	9,000	6.00	345	COND	68.54	23,646	32,646
244																
251	**11.50**	**ELECTRICAL**							**0**	**1,627,401**		**53,121**			**4,497,235**	**6,124,636**
252																
253	11.50.1	Electrical Ductbanks & Trenches							0	555,725		36,436			3,128,297	3,684,022
254		Ductbanks	Per RPESK-018 & RPESK-1-019													
255		Excavation / Backfill	11.5 ft below ground	Est.	56200	CY		0	0	0	0.30	19,389	EXFD	88.87	1,723,100	1,723,100
256		Concrete		Est.	2810	CY		120	0	337,200	1.90	6,140	COND	68.54	420,825	758,025
257		Reinforcing		Est.	34	TN		950	0	32,300	22.50	880	REIN	76.92	67,670	99,970
258		Formwork		Est.	33700	SF		2.25	0	75,825	0.20	7,751	FORM	98.01	759,676	835,501
259		Manholes		Est.	14	EA			0	78,500		2,099			143,848	222,348
260		14'x14'x12' deep		Est.	1	Ea		20000	0	20,000	380	437	COND	68.54	29,952	49,952
261		12'x12'x10' deep		Est.	1	Ea		15000	0	15,000	350	403	COND	68.54	27,587	42,587
262		6'x6'x8' deep		Est.	9	Ea		4000	0	36,000	100	1,035	COND	68.54	70,939	106,939
263		4'x4'x6' deep		Est.	3	Ea		2500	0	7,500	65	224	COND	68.54	15,370	22,870
264																
265		Trenwa Trench	UAT 1B to Transformer PDC													
266		Excavation / Backfill		Est.	147	CY		0	0	0	0.30	51	EXFD	88.87	4,507	4,507
267		Trenwa- MS-20 With concrete cover	Road crossing type	Est.	220	LF		145	0	31,900	0.50	127	COND	68.54	8,670	40,570
268																
269	11.50.2	Conduits	Per RPESK-018 & 019						0	807,573		11,153			830,994	1,638,567
270		Conduit-Below Grade in Ductruns														
271		2" PVC Conduit		Est.	20,091	LF		3.88	0	77,953	0.04	1,017	ECND	74.51	75,747	153,700
272		3" PVC Conduit		Est.	8,437	LF		7.95	0	67,074	0.08	786	ECND	74.51	58,558	125,632
273		4" PVC Conduit		Est.	38,369	LF		11.75	0	450,836	0.10	4,457	ECND	74.51	332,058	782,894
274		5" PVC Conduit		Est.	1,808	LF		16.2	0	29,290	0.14	291	ECND	74.51	21,689	50,979
275		6" PVC Conduit		Est.	1,143	LF		22.5	0	25,718	0.20	263	ECND	74.51	19,588	45,305
276		2" RGS Conduit		Est.	1,816	LF		8.76	0	15,908	0.26	551	ECND	74.51	41,080	56,988
277		3" RGS Conduit		Est.	1,400	LF		18.28	0	25,592	0.48	779	ECND	74.51	58,031	83,623
278		4" RGS Conduit		Est.	3,864	LF		25.84	0	99,846	0.61	2,689	ECND	74.51	200,394	300,240
279		5" RGS Conduit		Est.	128	LF		45.6	0	5,837	0.85	124	ECND	74.51	9,271	15,107
280		6" RGS Conduit		Est.	136	LF		70	0	9,520	1.25	196	ECND	74.51	14,578	24,098
281																

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13																
14																
282	11.50.3	Grounding	Per RPESK-010						0	187,584		4,265			414,668	602,252
283		Ground Rod (3/4" -10'L)		Est.	141	EA		175	0	24,675	1.500	243	WIRE	97.23	23,649	48,324
284		Exothermic weld (Ground cable to Ground rods +test)		Est.	141	EA		15	0	2,115	1.500	243	WIRE	97.23	23,649	25,764
285		ExothermicTee weld		Est.	106	EA		20	0	2,120	1.750	213	WIRE	97.23	20,742	22,862
286		#4/0 KCMIL Bare cooper wire		Est.	37,598	EA		3.0825	0	115,896	0.060	2,594	WIRE	97.23	252,240	368,136
287		#500 KCMIL Bare cooper wire		Est.	1,320	EA		6.72	0	8,870	0.087	131	WIRE	97.23	12,767	21,637
288		#4/0 KCMIL Bare cooper wire - Duct Banks		Est.	11,000	EA		3.0825	0	33,908	0.060	759	WIRE	97.23	73,798	107,705
289		Megger resistance test	Testing & Documentation	Est.	1	LS			0	0	70	80	WIRE	97.23	7,824	7,824
290																
291	11.50.4	Cathodic Protection	Per RPESK-008						0	76,519		1,268			123,275	199,794
292		Transformer Rectifier	15KVA, 480	Est.	2	EA		25000	0	50,000	40.000	92	WIRE	97.23	8,945	58,945
293		Anode Junction Box		Est.	4	EA		500	0	2,000	6.000	28	WIRE	97.23	2,684	4,684
294		Bond Box		Est.	3	EA		150	0	450	4.000	14	WIRE	97.23	1,342	1,792
295		Bond Testing Station		Est.	5	LS		350	0	1,750	4.000	23	WIRE	97.23	2,236	3,986
296		Electrode		Est.	10	EA		500	0	5,000	6.000	69	WIRE	97.23	6,709	11,709
297		SPL FBR Anode		Est.	6,000	LF		2.7	0	16,200	0.120	828	WIRE	97.23	80,506	96,706
298		#6 PVC Cable		Est.	1,865	LF		0.6	0	1,119	0.100	214	WIRE	97.23	20,853	21,972
299																
302	**11.60**	**MECHANICAL**							**100,000**	**0**		**1,288**			**114,426**	**214,426**
303																
304	11.60.1	Oil/Water Separator Including Lift Stations	500 GPM w/ Integral Lift Station	Est.	2	EA	50000	0	100,000	0	560.000	1,288	YDPP	88.84	114,426	214,426
305																
306	11.60.2	Sanitary Sewage Treatment Plant	Use Existing Plant System													Existing
307																
308	**11.70**	**PIPING**							**0**	**3,009,060**		**58,670**			**5,212,203**	**8,221,262**
309																
310	11.70.1	Large Bore BOP Pipe 2-1/2" & Larger - Below Ground	Incl. Coating & Wrapping		54,030	LF			0	3,009,060		58,670			5,212,203	8,221,262
311		Off-Site Fuel Gas Supply Line	By Others													
312		Ammonia System	SS, 3"dia. Sch 40S	Est.	600	LF		46.6	0	27,960	0.83	573	YDPP	88.84	50,879	78,839
313		Blowdown Drains System	CS, 10" dia., Sch. 40	Est.	350	LF		103.6	0	36,260	1.21	487	YDPP	88.84	43,267	79,527
314		Bottle Gas System	SS, 3"dia. Sch 40S	Est.	4,200	LF		46.6	0	195,720	0.83	4,009	YDPP	88.84	356,151	551,871
315		Bottle Gas System	SS, 3"dia. Sch 40S w/ PVC Secondary Containment	Est.	1,400	LF		75	0	105,000	1.50	2,415	YDPP	88.84	214,549	319,549
316		Chilled Water System	HDPE, SDR11, 24" dia.	Est.	1,800	LF		84.7	0	152,460	1.41	2,919	YDPP	88.84	259,297	411,757
317		Circulating Water Blowdown System	HDPE, SDR11, 10" dia.	Est.	500	LF		22	0	11,000	0.85	489	YDPP	88.84	43,421	54,421
318		Fire Protection System	HDPE(FM), SDR9, 12" dia.	Est.	11,500	LF		36.5	0	419,750	1.09	14,415	YDPP	88.84	1,280,651	1,700,401
319		Fuel Gas System	CS, 16" dia. Sch 60	Est.	2,100	LF		288.3	0	605,430	2.38	5,748	YDPP	88.84	510,626	1,116,056
320		Fuel Gas System	CS, 8" dia. Sch 60	Est.	300	LF		85	0	25,500	1.39	480	YDPP	88.84	42,603	68,103
321		Fuel Gas System	CS, 6" dia. Sch 60	Est.	250	LF		55.75	0	13,938	1.05	302	YDPP	88.84	26,819	40,756
322		Fuel Oil System	Encased CS, 8" dia. Sch 40	Est.	3,000	LF		220	0	660,000	1.60	5,520	YDPP	88.84	490,397	1,150,397
323		Fuel Oil System	Encased CS, 6" dia. Sch 40	Est.	540	LF		120	0	64,800	1.40	869	YDPP	88.84	77,237	142,037
324		Fuel Oil Demin Water System	HDPE, SDR11, 4" dia.	Est.	3,540	LF		2.8	0	9,912	0.40	1,628	YDPP	88.84	144,667	154,579
325		Instrument Air System	SS, 3"dia. Sch 40S	Est.	4,100	LF		46.6	0	191,060	0.83	3,913	YDPP	88.84	347,671	538,731
326		Matal Cleaning Waste System	CS, 12" dia. Sch Std.	Est.	1,400	LF		175	0	245,000	1.43	2,302	YDPP	88.84	204,536	449,536

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14																
327		Oily Water Drains System	HDPE, SDR11, 4" dia.	Est.	1,100	LF		2.8	0	3,080	0.40	506	YDPP	88.84	44,953	48,033
328		Oily Water Drains System	CS, 3" dia., Sch. 40	Est.	2,000	LF		19.2	0	38,400	0.67	1,541	YDPP	88.84	136,902	175,302
329		Potable Water System	HDPE, SDR11, 4" dia.	Est.	3,700	LF		2.8	0	10,360	0.40	1,702	YDPP	88.84	151,206	161,566
330		Potable Water System	HDPE, SDR11, 3" dia.	Est.	1,000	LF		2.1	0	2,100	0.46	529	YDPP	88.84	46,996	49,096
331		Raw Water System	HDPE, SDR11, 20" dia.	Est.	1,000	LF		60.7	0	60,700	1.26	1,449	YDPP	88.84	128,729	189,429
332		Service Air System	CS, 3" dia., Sch. 40	Est.	4,300	LF		19.2	0	82,560	0.67	3,313	YDPP	88.84	294,340	376,900
333		Service Water System	HDPE, SDR9, 20" dia.	Est.	200	LF		72.8	0	14,560	1.45	334	YDPP	88.84	29,628	44,188
334		Service Water System	HDPE, SDR9, 8" dia.	Est.	500	LF		14.1	0	7,050	0.83	477	YDPP	88.84	42,399	49,449
335		Service Water System	HDPE, SDR9, 4" dia.	Est.	3,600	LF		3.4	0	12,240	0.46	1,904	YDPP	88.84	169,187	181,427
336		Waste Water System	HDPE, SDR11, 12" dia.	Est.	300	LF		30.4	0	9,120	0.95	328	YDPP	88.84	29,117	38,237
337		Waste Water System	HDPE, SDR11, 6" dia.	Est.	750	LF		6.8	0	5,100	0.60	518	YDPP	88.84	45,975	51,075
338																
341	**11.89**	**SUBTOTAL - DIRECT COSTS, UNDERGROUND**							**107,500**	**5,247,385**		**146,647**		**87.10**	**12,772,592**	**18,127,477**
342																
343	**11.90**	**CONSTRUCTION INDIRECTS, UNDERGROUND**							**5,375**	**1,233,135**		**12,752**			**4,640,589**	**5,879,100**
344		Additional Crane Allowance			1	LS				0					0	0
345		Mobilization / Demobilization - Included in Wage Rates Above														
346		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
347		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						12,752		87.10	1,111,000	1,111,000
348		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					15,940				1,166,660	1,166,660
349		Per Diem	None		0.00	HR						0			0	0
350		Consumables - % of Subtotal Above			0.5	%				26,237					63,863	90,100
351		Freight on Material - % of Subtotal Above			5.0	%				262,369						262,369
352		Freight on Equipment - % of Subtotal Above			5.0	%			5,375							5,375
353		Scaffolding - % of Subtotal Above			3.0	%				157,422					383,178	540,599
354		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				787,108					1,915,889	2,702,997
356	**11.98**	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, UNDERGROUND**							**112,875**	**6,480,521**		**159,398**		**109.24**	**17,413,181**	**24,006,577**
357																
358	**11.99**	**SUBCONTRACTS**	Jack & Bore Under RR Tracks						**0**	**150,000**		**0**			**350,000**	**500,000**
359																
360		Jack & Bore Subcontract - Utility Piping Under Existing Coal Loop RR Track Near Metal Cleaning Waste Tank			1	LS				150,000					350,000	500,000
361																
362	**11.00**	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, UNDERGROUND**							**112,875**	**6,630,521**		**159,398**		**111.44**	**17,763,181**	**24,506,577**
363																
364																
365																

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13																
14																
366	**21.00**	**CTG A**														**62,647,341**
367																
370	**21.20**	**CONCRETE**							**0**	**377,807**		**8,304**			**665,709**	**1,043,515**
371																
372	21.20.1	Combustion Turbine A Foundation	Isolated Mat Foundation, 110' x 35'						0	243,880		3,464			264,975	508,855
373		Excavation		Est.	1000	CY		0	0	0	0.20	230	EXFD	88.87	20,440	20,440
374		Backfill		Est.	144	CY		0	0	0	0.15	25	EXFD	88.87	2,208	2,208
375		Concrete		Est.	800	CY		120	0	96,000	1.90	1,748	COND	68.54	119,808	215,808
376		Reinforcing		Est.	38	TN		950	0	36,100	22.50	983	REIN	76.92	75,632	111,732
377		Formwork		Est.	2080	SF		2.25	0	4,680	0.20	478	FORM	98.01	46,888	51,568
378		Piles	16" Dia. X 68' Long Augercast Piles	Est.	45	EA		2380	0	107,100	incl w/matl	incl w/matl				107,100
379																
380	21.20.2	Combustion Turbine A Piers / Pedestal							0	107,702		3,837			314,326	422,027
381		Concrete		Est.	200	CY		120	0	24,000	1.90	437	COND	68.54	29,952	53,952
382		Reinforcing		Est.	20	TN		950	0	19,000	22.50	518	REIN	76.92	39,806	58,806
383		Embeds		Est.	10	TN		5,000	0	50,000	120.00	1,380	CARP	70.49	97,276	147,276
384		Formwork		Est.	3000	SF		2.25	0	6,750	0.20	690	FORM	98.01	67,627	74,377
385		Formwork Shoring	Allowance	Est.	1767	SF		4.5	0	7,952	0.40	813	FORM	98.01	79,664	87,616
386																
387	21.20.3	Combustion Turbine A Excitation & Isolation Transformer Foundations	Includes Mat, Piers, Firewalls, and Containment						0	20,050		816			71,172	91,222
388		Excavation		Est.	100	CY		0	0	0	0.20	23	EXFD	88.87	2,044	2,044
389		Backfill		Est.	40	CY		0	0	0	0.15	7	EXFD	88.87	613	613
390		Concrete		Est.	90	CY		120	0	10,800	1.90	197	COND	68.54	13,478	24,278
391		Reinforcing		Est.	5	TN		950	0	4,750	22.50	129	REIN	76.92	9,952	14,702
392		Formwork		Est.	2000	SF		2.25	0	4,500	0.20	460	FORM	98.01	45,085	49,585
393																
394	21.20.4	Combustion Turbine A Miscellaneous Equipment Pads	Pads in Building and Small Foundations Outside Building						0	6,175		186			15,236	21,411
395		Concrete		Est.	30	CY		120	0	3,600	1.90	66	COND	68.54	4,493	8,093
396		Reinforcing		Est.	2	TN		950	0	1,900	22.50	52	REIN	76.92	3,981	5,881
397		Formwork		Est.	300	SF		2.25	0	675	0.20	69	FORM	98.01	6,763	7,438
398																
399	**21.30**	**STRUCTURAL STEEL**							**0**	**6,712**		**61**			**5,336**	**12,048**
400																
401	21.30.1	Miscellaneous Steel for Transformer Containments							0	6,712		61			5,336	12,048
402		Framing		Est.	0.5	TN	0	3710	0	1,855	22.000	13	STST	104.09	1,317	3,172
403		Grating	1-1/2" Galvanized	Est.	300	SF	0	16.19	0	4,857	0.14	48	GALL	83.21	4,019	8,876
404																
407	**21.45**	**PAINTING / COATING**							**0**	**0**		**1,135**			**76,582**	**76,582**
408																
409	21.45.1	Touch Up Painting, CTG A	Allowance at 3.5% of CT Installation Manhours	Est.	1	LS			0	0	987.00	1,135	PNTR	67.47	76,582	76,582
410																

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5		OPB=Other Project Bid		Conceptual Project Cost Estimate											Revision Date:	08/26/11
6		DOR:		-CONFIDENTIAL-											Run Date:	08/26/11
7											Wage Rates Based on:			11BS_90NMA	Preparer:	TJM
8											Labor Productivity =			1.15	Reviewer:	BJD
9																
10																
11																
12	Account No.	Item Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equipment Cost	Unit Material Cost	Total Equipment Cost	Total Material Cost	Unit Man-hours (Base)	Total Man-hours, w/ Productivity	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Total Projected Cost
13																
14																
415	**21.60**	**MECHANICAL**							**55,915,000**	**0**		**34,259**			**3,005,846**	**58,920,846**
416																
417	21.60.1	Combustion Turbine & Accessories							54,600,000	0		32,867			2,883,751	57,483,751
418		Combustion Turbine	GE 7FA.05 C/T. - Nominal 210 mW, Firing Natural Gas or Fuel Oil, w/Dry Low Nox Burners, Inlet Air Filters, Standard Accessories.	Est.	1	Ea.	53100000		53,100,000	0	28,200	32,430	MECH	87.74	2,845,408	55,945,408
419		Pulse Type Inlet Air Filter	Included Above													Included Above
420		Water Wash Skid	(1) Included Above, Common to (2) CTG's	Est.	1	Ea.			0	0	30	35	MECH	87.74	3,027	3,027
421		Dual Fuel Capability	Included Above													Included Above
422		Skid Interconnecting Piping	Included Above													Included Above
423		Ocean Freight	Included Above													Included Above
424		Delivery from Port of Import to Station	Included Above													Included Above
425		Technical Field Assistance (TFA)	Included Above													Included Above
426		Training	Included Above													Included Above
427		Special Acoustic Treatments - C/T	Not Included													Not Included
428		Inlet Chilling Coils	Allowance	Est.	1	LS	1500000		1,500,000	0	350	403	MECH	87.74	35,315	1,535,315
429																
430	21.60.2	Fuel Gas Conditioning							1,150,000	0		805			70,631	1,220,631
431		Fuel Gas Conditioning Skid	Skid Mounted, Includes Separators, Coalescing Filters, & Dewpoint Heater. Serves (1) C/T's	Est.	1	Ea.	1150000		1,150,000	0	700	805	MECH	87.74	70,631	1,220,631
432		Fuel Gas Startup Electric Heater	Included Above		1	Ea.										Included Above
433																
434	21.60.3	Heat Exchangers							150,000	0		518			45,405	195,405
435		Fuel Gas Preheater (Performance Heater)		Est.	1	Ea.	150000		150,000	0	450	518	MECH	87.74	45,405	195,405
436																
437	21.60.4	Shop Fabricated Tanks							15,000	0		69			6,060	21,060
438		Water Wash Drain Tank	(1) 100% per C/T	Est.	1	Ea.	15000		15,000	0	60	69	TANK	87.82	6,060	21,060
439																
444	**21.89**	**SUBTOTAL - DIRECT COSTS, CTG A**							**55,915,000**	**384,519**		**43,759**		**85.78**	**3,753,473**	**60,052,991**
445																
446	**21.90**	**CONSTRUCTION INDIRECTS, CTG A**							**140,750**	**90,362**		**3,805**			**1,363,238**	**1,594,350**
447		Additional Crane Allowance			1	LS				0					0	0
448		Mobilization / Demobilization - Included in Wage Rates Above														
449		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
450		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						3,805		85.78	326,000	326,000
451		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					4,756				342,846	342,846

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8											Labor Productivity =			1.15	Reviewer:	BJD
9																
10																
11																
12	Account No.	Item Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equipment Cost	Unit Material Cost	Total Equipment Cost	Total Material Cost	Unit Man-hours (Base)	Total Man-hours, w/ Productivity	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Total Projected Cost
13																
14																
452		Per Diem	None		0.00	HR						0			0	0
453		Consumables - % of Subtotal Above			0.5	%				1,923					18,767	20,690
454		Freight on Material - % of Subtotal Above			5.0	%				19,226						19,226
455		Freight on Equipment - % of Subtotal Above	C/T Excluded.		5.0	%			140,750							140,750
456		Scaffolding - % of Subtotal Above			3.0	%				11,536					112,604	124,140
457		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				57,678					563,021	620,699
459	21.98	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, CTG A**							**56,055,750**	**474,880**		**47,564**		**107.58**	**5,116,710**	**61,647,341**
460																
461	21.99	**SUBCONTRACTS**							**0**	**0**		**0**			**1,000,000**	**1,000,000**
462																
463		Heavy Haul Subcontract for CTG A Offloading & Staging	Allowance		1	LS									1,000,000	1,000,000
464																
465	21.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, CTG A**							**56,055,750**	**474,880**		**47,564**		**128.60**	**6,116,710**	**62,647,341**
466																
467																
468																
469	**22.00**	**CTG B**														**62,643,477**
470																
473	22.20	**CONCRETE**							**0**	**377,807**		**8,304**			**665,709**	**1,043,515**
474																
475	22.20.1	Combustion Turbine B Foundation	Isolated Mat Foundation, 110' x 35'						0	243,880		3,464			264,975	508,855
476		Excavation		Est.	1000	CY		0	0	0	0.20	230	EXFD	88.87	20,440	20,440
477		Backfill		Est.	144	CY		0	0	0	0.15	25	EXFD	88.87	2,208	2,208
478		Concrete		Est.	800	CY		120	0	96,000	1.90	1,748	COND	68.54	119,808	215,808
479		Reinforcing		Est.	38	TN		950	0	36,100	22.50	983	REIN	76.92	75,632	111,732
480		Formwork		Est.	2080	SF		2.25	0	4,680	0.20	478	FORM	98.01	46,888	51,568
481		Piles	16" Dia. X 68' Long Augercast Piles	Est.	45	EA		2380	0	107,100	incl w/matl	incl w/matl				107,100
482																
483	22.20.2	Combustion Turbine B Piers / Pedestal							0	107,702		3,837			314,326	422,027
484		Concrete		Est.	200	CY		120	0	24,000	1.90	437	COND	68.54	29,952	53,952
485		Reinforcing		Est.	20	TN		950	0	19,000	22.50	518	REIN	76.92	39,806	58,806
486		Embeds		Est.	10	TN		5,000	0	50,000	120.00	1,380	CARP	70.49	97,276	147,276
487		Formwork		Est.	3000	SF		2.25	0	6,750	0.20	690	FORM	98.01	67,627	74,377
488		Formwork Shoring	Allowance	Est.	1767	SF		4.5	0	7,952	0.40	813	FORM	98.01	79,664	87,616
489																
490	22.20.3	Combustion Turbine B Excitation & Isolation Transformer Foundations	Includes Mat, Piers, Firewalls, and Containment						0	20,050		816			71,172	91,222
491		Excavation		Est.	100	CY		0	0	0	0.20	23	EXFD	88.87	2,044	2,044
492		Backfill		Est.	40	CY		0	0	0	0.15	7	EXFD	88.87	613	613
493		Concrete		Est.	90	CY		120	0	10,800	1.90	197	COND	68.54	13,478	24,278
494		Reinforcing		Est.	5	TN		950	0	4,750	22.50	129	REIN	76.92	9,952	14,702
495		Formwork		Est.	2000	SF		2.25	0	4,500	0.20	460	FORM	98.01	45,085	49,585

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8											Labor Productivity =			1.15	Reviewer:	BJD
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10																
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12	Account No.	Item Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equipment Cost	Unit Material Cost	Total Equipment Cost	Total Material Cost	Unit Man-hours (Base)	Total Man-hours, w/ Productivity	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Total Projected Cost
13																
14																
496																
497	22.20.4	Combustion Turbine B Miscellaneous Equipment Pads	Pads in Building and Small Foundations Outside Building						0	6,175		186			15,236	21,411
498		Concrete		Est.	30	CY		120	0	3,600	1.90	66	COND	68.54	4,493	8,093
499		Reinforcing		Est.	2	TN		950	0	1,900	22.50	52	REIN	76.92	3,981	5,881
500		Formwork		Est.	300	SF		2.25	0	675	0.20	69	FORM	98.01	6,763	7,438
501																
502	**22.30**	**STRUCTURAL STEEL**							**0**	**6,712**		**61**			**5,336**	**12,048**
503																
504	22.30.1	Miscellaneous Steel for Transformer Containments							0	6,712		61			5,336	12,048
505		Framing		Est.	0.5	TN	0	3710	0	1,855	22.00	13	STST	104.09	1,317	3,172
506		Grating	1-1/2" Galvanized	Est.	300	SF	0	16.19	0	4,857	0.14	48	GALL	83.21	4,019	8,876
509																
510	**22.45**	**PAINTING / COATING**							**0**	**0**		**1,135**			**76,582**	**76,582**
511																
512	22.45.1	Touch Up Painting, CTG B	Allowance at 3.5% of CT Installation Manhours	Est.	1	LS			0	0	987.00	1,135	PNTR	67.47	76,582	76,582
513																
518	**22.60**	**MECHANICAL**							**55,915,000**	**0**		**34,224**			**3,002,819**	**58,917,819**
519																
520	22.60.1	Combustion Turbine & Accessories							54,600,000	0		32,833			2,880,724	57,480,724
521		Combustion Turbine	GE 7FA.05 C/T. - Nominal 210 mW, Firing Natural Gas or Fuel Oil, w/Dry Low Nox Burners, Inlet Air Filters, Standard Accessories.	Est.	1	Ea.	53100000		53,100,000	0	28,200	32,430	MECH	87.74	2,845,408	55,945,408
522		Pulse Type Inlet Air Filter	Included Above													Included Above
523		Water Wash Skid	Common to (2) C/T's, Included w/ CTG A													Included Elsewhere
524		Dual Fuel Capability	Included Above													Included Above
525		Skid Interconnecting Piping	Included Above													Included Above
526		Ocean Freight	Included Above													Included Above
527		Delivery from Port of Import to Station	Included Above													Included Above
528		Technical Field Assistance (TFA)	Included Above													Included Above
529		Training	Included Above													Included Above
530		Special Acoustic Treatments - C/T	Not Included													Not Included
531		Inlet Chilling Coils	Allowance	Est.	1	LS	1500000		1,500,000	0	350	403	MECH	87.74	35,315	1,535,315
532																
533	22.60.2	Fuel Gas Conditioning							1,150,000	0		805			70,631	1,220,631
534		Fuel Gas Conditioning Skid	Skid Mounted, Includes Separators, Coalescing Filters, & Dewpoint Heater. Serves (1) C/T's	Est.	1	Ea.	1150000		1,150,000	0	700	805	MECH	87.74	70,631	1,220,631
535		Fuel Gas Startup Electric Heater	Included Above		1	Ea.										Included Above
536																
537	22.60.3	Heat Exchangers							150,000	0		518			45,405	195,405
538		Fuel Gas Preheater (Performance Heater)		Est.	1	Ea.	150000		150,000	0	450	518	MECH	87.74	45,405	195,405
539																

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12	Account No.	Item Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equipment Cost	Unit Material Cost	Total Equipment Cost	Total Material Cost	Unit Man-hours (Base)	Total Man-hours, w/ Productivity	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Total Projected Cost
13																
14																
540	22.60.4	Shop Fabricated Tanks							15,000	0		69			6,060	21,060
541		Water Wash Drain Tanks	(1) 100% per C/T	Est.	1	Ea.	15000		15,000	0	60	69	TANK	87.82	6,060	21,060
542																
547	**22.89**	**SUBTOTAL - DIRECT COSTS, CTG B**							**55,915,000**	**384,519**		**43,724**		**85.78**	**3,750,446**	**60,049,964**
548																
549	**22.90**	**CONSTRUCTION INDIRECTS, CTG B**							**140,750**	**90,362**		**3,802**			**1,362,401**	**1,593,513**
550		Additional Crane Allowance			1	LS				0					0	0
551		Mobilization / Demobilization - Included in Wage Rates Above														
552		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
553		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						3,802		85.78	326,000	326,000
554		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					4,753				342,569	342,569
555		Per Diem	None		0.00	HR						0			0	0
556		Consumables - % of Subtotal Above			0.5	%				1,923					18,752	20,675
557		Freight on Material - % of Subtotal Above			5.0	%				19,226						19,226
558		Freight on Equipment - % of Subtotal Above	C/T Excluded		5.0	%			140,750							140,750
559		Scaffolding - % of Subtotal Above			3.0	%				11,536					112,513	124,049
560		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				57,678					562,567	620,245
562	**22.98**	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, CTG B**							**56,055,750**	**474,880**		**47,526**		**107.58**	**5,112,847**	**61,643,477**
563																
564	**22.99**	**SUBCONTRACTS**							**0**	**0**		**0**			**1,000,000**	**1,000,000**
565																
566		Heavy Haul Subcontract for CTG B Offloading & Staging	Allowance		1	LS									1,000,000	1,000,000
567																
568	**22.00**	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, CTG B**							**56,055,750**	**474,880**		**47,526**		**128.62**	**6,112,847**	**62,643,477**
569																
570																
571																

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8											Labor Productivity =			1.15	Reviewer:	BJD
9																
10																
11																
12	Account No.	Item Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equipment Cost	Unit Material Cost	Total Equipment Cost	Total Material Cost	Unit Man-hours (Base)	Total Man-hours, w/ Productivity	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Total Projected Cost
13																
14																
572	**31.00**	**HRSG A**														**42,975,069**
573																
576	**31.20**	**CONCRETE**							**0**	**605,368**		**8,961**			**687,817**	**1,293,184**
577																
578	31.20.1	HRSG A Foundation (Incl. Stack)	Mat Foundation, 160' x 45'						0	503,563		6,801			509,808	1,013,370
579		Excavation		Est.	1110	CY		0	0	0	0.2	255	EXFD	88.87	22,689	22,689
580		Backfill		Est.	178	CY		0	0	0	0.15	31	EXFD	88.87	2,729	2,729
581		Concrete		Est.	1173	CY		120	0	140,760	1.5	2,023	COND	68.54	138,686	279,446
582		Reinforcing		Est.	80	TN		950	0	76,000	22.5	2,070	REIN	76.92	159,224	235,224
583		Embeds		Est.	13.4	TN		5,000	0	67,000	120.00	1,849	CARP	70.49	130,350	197,350
584		Formwork		Est.	2490	SF		2.25	0	5,603	0.2	573	FORM	98.01	56,130	61,733
585		Piles	16" Dia. X 68' Long Augercast Piles	Est.	90	EA		2380	0	214,200	incl w/matl	incl w/matl				214,200
586																
587	31.20.2	Boiler Feed Pump Enclosure Foundation	Foundation 65'x28'						0	76,510		1,114			86,044	162,554
588		Excavation		Est.	225	CY		0	0	0	0.2	52	EXFD	88.87	4,599	4,599
589		Backfill		Est.	60	CY		0	0	0	0.15	10	EXFD	88.87	920	920
590		Concrete		Est.	230	CY		120	0	27,600	1.5	397	COND	68.54	27,193	54,793
591		Reinforcing		Est.	20	TN		950	0	19,000	22.5	518	REIN	76.92	39,806	58,806
592		Formwork		Est.	600	SF		2.25	0	1,350	0.2	138	FORM	98.01	13,525	14,875
593		Piles	16" Dia. X 68' Long Augercast Piles	Est.	12	EA		2380	0	28,560	incl w/matl	incl w/matl				28,560
594																
595	31.20.3	Misc HRSG Equipment Pads / Foundations							0	25,295		1,045			91,966	117,261
596		Blowdown Tank Pit / Trenches														
597		Excavation		Est.	320	CY		0	0	0	0.2	74	EXFD	88.87	6,541	6,541
598		Backfill		Est.	170	CY		0	0	0	0.15	29	EXFD	88.87	2,606	2,606
599		Concrete		Est.	80	CY		120	0	9,600	1.5	138	COND	68.54	9,459	19,059
600		Reinforcing		Est.	5	TN		950	0	4,750	22.5	129	REIN	76.92	9,952	14,702
601		Formwork		Est.	2070	SF		2.25	0	4,658	0.2	476	FORM	98.01	46,663	51,320
602		SCR Skid														
603		Excavation		Est.	30	CY		0	0	0	0.2	7	EXFD	88.87	613	613
604		Backfill		Est.	10	CY		0	0	0	0.15	2	EXFD	88.87	153	153
605		Concrete		Est.	20	CY		120	0	2,400	1.5	35	COND	68.54	2,365	4,765
606		Reinforcing		Est.	1	TN		950	0	950	22.5	26	REIN	76.92	1,990	2,940
607		Formwork		Est.	200	SF		2.25	0	450	0.2	46	FORM	98.01	4,508	4,958
608		Duct Burner Blower Skid Foundation														
609		Excavation		Est.	20	CY		0	0	0	0.2	5	EXFD	88.87	409	409
610		Backfill		Est.	10	CY		0	0	0	0.15	2	EXFD	88.87	153	153
611		Concrete		Est.	10	CY		120	0	1,200	1.5	17	COND	68.54	1,182	2,382
612		Reinforcing		Est.	1	TN		950	0	950	22.5	26	REIN	76.92	1,990	2,940
613		Formwork		Est.	150	SF		2.25	0	338	0.2	35	FORM	98.01	3,381	3,719
614																

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8											Labor Productivity =			1.15	Reviewer:	BJD
9																
10																
11																
12	Account No.	Item Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equipment Cost	Unit Material Cost	Total Equipment Cost	Total Material Cost	Unit Man-hours (Base)	Total Man-hours, w/ Productivity	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Total Projected Cost
13																
14																
615	**31.30**	**STRUCTURAL STEEL**							**0**	**48,153**		**342**			**32,646**	**80,799**
616																
617	31.30.1	Blowdown Tant Pit / Trenches							0	48,153		342			32,646	80,799
618		Framing		Est.	8	TN	0	3710	0	29,680	22.000	202	STST	104.09	21,068	50,748
619		Handrail		Est.	70	LF	0	33.5	0	2,345	0.100	8	GALL	83.21	670	3,015
620		Grating	2" Galvanized	Est.	600	SF	0	26.88	0	16,128	0.19	131	GALL	83.21	10,909	27,037
621																
622	**31.40**	**ARCHITECTURAL**							**0**	**147,560**		**0**			**0**	**147,560**
623																
624	31.40.1	Boiler Feed Pump Enclosure							0	147,560		0			0	147,560
625		Pre Engineered Building, Incl. HVAC, 28' x 62' x 16' High	Subcontract Price, Includes Installation Labor	Est.	1,736	SF		85	0	147,560	incl w/matl	incl w/matl				147,560
626																
627	**31.45**	**PAINTING / COATING**							**0**	**0**		**2,826**			**190,640**	**190,640**
628																
629	31.45.1	Touch Up Painting, HRSG A	Allowance at 3.5% of HRSG Installation Manhours	Est.	1	LS			0	0	2,457	2,826	PNTR	67.47	190,640	190,640
630																
635	**31.60**	**MECHANICAL**							**26,764,000**	**0**		**83,502**			**8,933,582**	**35,697,582**
636																
637	31.60.1	HRSG & Accessories	3-Press HRSG w\Reheat. Supplemental Duct Burners Incl. Integral Deaerator Incl. SCR and CO Catalyst Incl. 200 Foot Steel Stack Incl.	Est.	1	Ea.	24664000		24,664,000	0	70,200	80,730	SGEN	107.70	8,694,621	33,358,621
638		Duct Burners	Included Above													Included Above
639		SCR	Included Above													Included Above
640		CO Catalyst	Included Above													Included Above
641		Integral Deaerator	Included Above													Included Above
642		Penthouse Enclosure & Lower Level Skirting	Included Above													Included Above
643		Elevator to Drum Level	Included Above													Included Above
644		Spargers & Accessories for Heating of HRSG w/ External Steam (Aux. Boiler).		Est.	1	LS	50000		50,000		Incl. w/ HRSG					50,000
645		Technical Field Assistance (TFA), HRSG	Included Above													Included Above
646		Stack Damper	Included Above													Included Above
647		Delivery to Jobsite	Included Above													Included Above
648																
649	31.60.2	Boiler Feed Pumps & Accessories	Incl. VFD's						1,900,000	0		2,530			218,035	2,118,035
650		Boiler Feed Pumps & Drives	(2) 100% Capacity Per HRSG With Capability For Supplying Both HP & IP Stages. Horizontal Multistage, Ring Section, incl. Motor	Est	2	Ea.	950000		1,900,000	0	1,100	2,530	PUMP	86.18	218,035	2,118,035
651		Boiler Feed Pump Variable Frequency Drives	Included Above													Included Above
652		Boiler Feed Pump Hydraulic Couplings	Not Included													Not Included
653																

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12	Account No.	Item Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equipment Cost	Unit Material Cost	Total Equipment Cost	Total Material Cost	Unit Man-hours (Base)	Total Man-hours, w/ Productivity	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Total Projected Cost
13																
14																
654	31.60.3	Shop Fabricated Tanks							40,000	0		69			6,060	46,060
655		HRSG Blowdown Tank, Atmospheric	12,000 gal.	Est	1	Ea.	40000		40,000	0	60	69	TANK	87.82	6,060	46,060
656																
657	31.60.4	Miscellaneous Pumps							110,000	0		173			14,866	124,866
658		Blowdown Water Sump Pumps	3 x 50% in Common Sump for (2) HRSG's	B	3	Ea.	36667		110,000	0	50	173	PUMP	86.18	14,866	124,866
659																
664	**31.89**	**SUBTOTAL - DIRECT COSTS, HRSG A**							**26,764,000**	**801,081**		**95,630**		**102.95**	**9,844,685**	**37,409,766**
665																
666	**31.90**	**CONSTRUCTION INDIRECTS, HRSG A**							**1,070,560**	**188,254**		**8,316**			**3,576,489**	**4,835,303**
667		Additional Crane Allowance			1	LS				0					0	0
668		Mobilization / Demobilization - Included in Wage Rates Above														
669		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
670		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						8,316		102.95	856,000	856,000
671		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					10,395				899,222	899,222
672		Per Diem	None		0.00	HR						0			0	0
673		Consumables - % of Subtotal Above			0.5	%				4,005					49,223	53,229
674		Freight on Material - % of Subtotal Above			5.0	%				40,054						40,054
675		Freight on Equipment - % of Subtotal Above	HRSG Excluded		5.0	%			1,070,560							1,070,560
676		Scaffolding - % of Subtotal Above			3.0	%				24,032					295,341	319,373
677		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				120,162					1,476,703	1,596,865
679	**31.98**	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, HRSG A**							**27,834,560**	**989,334**		**103,945**		**129.12**	**13,421,174**	**42,245,069**
680																
681	**31.99**	**SUBCONTRACTS**							**0**	**0**		**0**			**730,000**	**730,000**
682																
683		Heavy Haul Subcontract for HRSG A Offloading & Staging	Allowance		1	LS									730,000	730,000
684																
685	**31.00**	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, HRSG A**							**27,834,560**	**989,334**		**103,945**		**136.14**	**14,151,174**	**42,975,069**
686																
687																
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8											Labor Productivity =			1.15	Reviewer:	BJD
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12	Account No.	Item Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equipment Cost	Unit Material Cost	Total Equipment Cost	Total Material Cost	Unit Man-hours (Base)	Total Man-hours, w/ Productivity	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Total Projected Cost
13																
14																
689	**32.00**	**HRSG B**														**42,840,694**
690																
693	**32.20**	**CONCRETE**							**0**	**605,368**		**8,961**			**687,817**	**1,293,184**
694																
695	32.20.1	HRSG B Foundation (Incl. Stack)	Mat Foundation, 160' x 45'						0	503,563		6,801			509,808	1,013,370
696		Excavation		Est.	1110	CY		0	0	0	0.2	255	EXFD	88.87	22,689	22,689
697		Backfill		Est.	178	CY		0	0	0	0.15	31	EXFD	88.87	2,729	2,729
698		Concrete		Est.	1173	CY		120	0	140,760	1.5	2,023	COND	68.54	138,686	279,446
699		Reinforcing		Est.	80	TN		950	0	76,000	22.5	2,070	REIN	76.92	159,224	235,224
700		Embeds		Est.	13.4	TN		5,000	0	67,000	120.00	1,849	CARP	70.49	130,350	197,350
701		Formwork		Est.	2490	SF		2.25	0	5,603	0.2	573	FORM	98.01	56,130	61,733
702		Piles	16" Dia. X 68' Long Augercast Piles	Est.	90	EA		2380	0	214,200	incl w/matl	incl w/matl				214,200
703																
704	32.20.2	Boiler Feed Pump Enclosure Foundation	Foundation 65'x28'						0	76,510		1,114			86,044	162,554
705		Excavation		Est.	225	CY		0	0	0	0.2	52	EXFD	88.87	4,599	4,599
706		Backfill		Est.	60	CY		0	0	0	0.15	10	EXFD	88.87	920	920
707		Concrete		Est.	230	CY		120	0	27,600	1.5	397	COND	68.54	27,193	54,793
708		Reinforcing		Est.	20	TN		950	0	19,000	22.5	518	REIN	76.92	39,806	58,806
709		Formwork		Est.	600	SF		2.25	0	1,350	0.2	138	FORM	98.01	13,525	14,875
710		Piles	16" Dia. X 68' Long Augercast Piles	Est.	12	EA		2380	0	28,560	incl w/matl	incl w/matl				28,560
711																
712	32.20.3	Misc HRSG Equipment Pads / Foundations							0	25,295		1,045			91,966	117,261
713		Blowdown Tank Pit / Trenches														
714		Excavation		Est.	320	CY		0	0	0	0.2	74	EXFD	88.87	6,541	6,541
715		Backfill		Est.	170	CY		0	0	0	0.15	29	EXFD	88.87	2,606	2,606
716		Concrete		Est.	80	CY		120	0	9,600	1.5	138	COND	68.54	9,459	19,059
717		Reinforcing		Est.	5	TN		950	0	4,750	22.5	129	REIN	76.92	9,952	14,702
718		Formwork		Est.	2070	SF		2.25	0	4,658	0.2	476	FORM	98.01	46,663	51,320
719		SCR Skid														
720		Excavation		Est.	30	CY		0	0	0	0.2	7	EXFD	88.87	613	613
721		Backfill		Est.	10	CY		0	0	0	0.15	2	EXFD	88.87	153	153
722		Concrete		Est.	20	CY		120	0	2,400	1.5	35	COND	68.54	2,365	4,765
723		Reinforcing		Est.	1	TN		950	0	950	22.5	26	REIN	76.92	1,990	2,940
724		Formwork		Est.	200	SF		2.25	0	450	0.2	46	FORM	98.01	4,508	4,958
725		Duct Burner Blower Skid Foundation														
726		Excavation		Est.	20	CY		0	0	0	0.2	5	EXFD	88.87	409	409
727		Backfill		Est.	10	CY		0	0	0	0.15	2	EXFD	88.87	153	153
728		Concrete		Est.	10	CY		120	0	1,200	1.5	17	COND	68.54	1,182	2,382
729		Reinforcing		Est.	1	TN		950	0	950	22.5	26	REIN	76.92	1,990	2,940
730		Formwork		Est.	150	SF		2.25	0	338	0.2	35	FORM	98.01	3,381	3,719
731																

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13																
14																
732	**32.30**	**STRUCTURAL STEEL**							**0**	**48,153**		**342**			**32,646**	**80,799**
733																
734	32.30.1	Blowdown Tank Pit / Trenches							0	48,153		342			32,646	80,799
735		Framing		Est.	8	TN	0	3710	0	29,680	22.00	202	STST	104.09	21,068	50,748
736		Handrail		Est.	70	LF	0	33.5	0	2,345	0.10	8	GALL	83.21	670	3,015
737		Grating	2" Galvanized	Est.	600	SF	0	26.88	0	16,128	0.19	131	GALL	83.21	10,909	27,037
738																
739	**32.40**	**ARCHITECTURAL**							**0**	**147,560**		**0**			**0**	**147,560**
740																
741	32.40.1	Boiler Feed Pump Enclosure							0	147,560		0			0	147,560
742		Pre Engineered Building, Incl. HVAC, 28' x 62' x 16' High	Subcontract Price, Includes Installation Labor	Est.	1,736	SF		85	0	147,560	incl w/matl	incl w/matl				147,560
743																
744	**32.45**	**PAINTING / COATING**							**0**	**0**		**2,826**			**190,640**	**190,640**
745																
746	32.45.1	Touch Up Painting, HRSG B	Allowance at 3.5% of HRSG Installation Manhours	Est.	1	LS			0	0	2,457	2,826	PNTR	67.47	190,640	190,640
747																
752	**32.60**	**MECHANICAL**							**26,654,000**	**0**		**83,329**			**8,918,716**	**35,572,716**
753																
754	32.60.1	HRSG & Accessories	3-Press HRSG w\Reheat. Supplemental Duct Burners Incl. Integral Deaerator Incl. SCR and CO Catalyst Incl. 200 Foot Steel Stack Incl.	Est.	1	Ea.	24664000		24,664,000	0	70,200	80,730	SGEN	107.70	8,694,621	33,358,621
755		Duct Burners	Included Above													Included Above
756		SCR	Included Above													Included Above
757		CO Catalyst	Included Above													Included Above
758		Integral Deaerator	Included Above													Included Above
759		Penthouse Enclosure & Lower Level Skirting	Included Above													Included Above
760		Elevator to Drum Level	Included Above													Included Above
761		Spargers & Accessories for Heating of HRSG w/ External Steam (Aux. Boiler).		Est.	1	LS	50000		50,000		Incl. w/ HRSG					50,000
762		Technical Field Assistance (TFA), HRSG	Included Above													Included Above
763		Stack Damper	Included Above													Included Above
764		Delivery to Jobsite	Included Above													Included Above
765																
766	32.60.2	Boiler Feed Pumps & Accessories	Incl. VFD's						1,900,000	0		2,530			218,035	2,118,035
767		Boiler Feed Pumps & Drives	(2) 100% Capacity Per HRSG With Capability For Supplying Both HP & IP Stages. Horizontal Multistage, Ring Section, incl. Motor	Est	2	Ea.	950000		1,900,000	0	1,100	2,530	PUMP	86.18	218,035	2,118,035
768		Boiler Feed Pump Variable Frequency Drives	Included Above													Included Above
769		Boiler Feed Pump Hydraulic Couplings	Not Included													Not Included
770																

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12	Account No.	Item Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equipment Cost	Unit Material Cost	Total Equipment Cost	Total Material Cost	Unit Man-hours (Base)	Total Man-hours, w/ Productivity	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Total Projected Cost
13																
14																
771	32.60.3	Shop Fabricated Tanks							40,000	0		69			6,060	46,060
772		HRSG Blowdown Tank, Atmospheric	12,000 gal.	Est	1	Ea.	40000		40,000	0	60	69	TANK	87.82	6,060	46,060
773																
774	32.60.4	Miscellaneous Pumps							0	0		0			0	0
775		Blowdown Water Sump Pumps	Not Required. Common Pumps Included w/ HRSG A													Not Required
776																
781	**32.89**	**SUBTOTAL - DIRECT COSTS, HRSG B**							**26,654,000**	**801,081**		**95,457**		**102.98**	**9,829,819**	**37,284,900**
782																
783	**32.90**	**CONSTRUCTION INDIRECTS, HRSG B**							**1,066,160**	**188,254**		**8,301**			**3,571,381**	**4,825,795**
784		Additional Crane Allowance			1	LS				0					0	0
785		Mobilization / Demobilization - Included in Wage Rates Above														
786		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
787		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						8,301		102.98	855,000	855,000
788		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					10,376				897,864	897,864
789		Per Diem	None		0.00	HR						0			0	0
790		Consumables - % of Subtotal Above			0.5	%				4,005					49,149	53,154
791		Freight on Material - % of Subtotal Above			5.0	%				40,054						40,054
792		Freight on Equipment - % of Subtotal Above	HRSG Excluded		5.0	%			1,066,160							1,066,160
793		Scaffolding - % of Subtotal Above			3.0	%				24,032					294,895	318,927
794		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				120,162					1,474,473	1,594,635
796	**32.98**	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, HRSG B**							**27,720,160**	**989,334**		**103,758**		**129.16**	**13,401,200**	**42,110,694**
797																
798	**32.99**	**SUBCONTRACTS**	HRSG B Heavy Haul						**0**	**0**		**0**			**730,000**	**730,000**
799																
800		Heavy Haul Subcontract for HRSG B Offloading & Staging	Allowance		1	LS									730,000	730,000
801																
802	**32.00**	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, HRSG B**							**27,720,160**	**989,334**		**103,758**		**136.19**	**14,131,200**	**42,840,694**
803																
804																
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8											Labor Productivity =			1.15	Reviewer:	BJD
9																
10																
11																
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13																
14																
806	**41.00**	**STEAM TURBINE**														**27,740,946**
807																
810	**41.20**	**CONCRETE**							**0**	**0**		**0**			**0**	**0**
811																
812	41.20.1	STG Pedestal Foundation	Existing													Existing
813																
814	41.20.2	STG Pedestal	Existing													Existing
815																
816	41.20.3	STG Excitation Transformer Foundation	Existing													Existing
817																
818	41.20.4	STG Equipment Pads	Existing													Existing
819																
830	**41.60**	**MECHANICAL**							**3,560,000**	**150,000**		**5,118**			**453,402**	**4,163,402**
831																
832	41.60.1	Steam Turbine Modifications	New Turning Gear - See Subcontracts for Additional Work						150,000	0		345			30,270	180,270
833		Steam Turbine Blade Modifications	Detailed Below in Subcontracts													
834		Install New Turning Gear Assembly		Est	1	LS	150000		150,000	0	300	345	MECH	87.74	30,270	180,270
835																
836	41.60.2	Condenser Modifications	Bypass Spargers - See Subcontracts for Additional Work						0	150,000		1,150			107,985	257,985
837		Add Bypass Spargers	Allowance	Est	1	LS	0	150000	0	150,000	1,000	1,150	CNDR	93.90	107,985	257,985
838		Vacuum Pumps	Existing													Existing
839		Steam Jet Air Ejectors	Not Included													Not Included
840		Tube Cleaning	Not Included													Not Included
841																
842	41.60.3	Pumps							830,000	0		1,725			148,661	978,661
843		Condenser Hotwell (Condensate) Pumps	100% Capacity Pumps	Est	2	Ea.	132500		265,000	0	250	575	PUMP	86.18	49,554	314,554
844		Condensate Booster Pumps	100% Capacity Pumps	Est	2	Ea.	212500		425,000	0	350	805	PUMP	86.18	69,375	494,375
845		LP Heater No. 1 Drain Pumps	100% Capacity Pumps	Est	2	Ea.	70000		140,000	0	150	345	PUMP	86.18	29,732	169,732
846		STG Sump Pumps	Existing													Existing
847																
848	41.60.4	Condensate Polishing Equipment							2,500,000	0		1,725			151,352	2,651,352
849		Condensate Polisher Skid		Est	1	LS	2500000		2,500,000	0	1,500	1,725	MECH	87.74	151,352	2,651,352
850																
851	41.60.5	Gland Steam Condenser							80,000	0		173			15,135	95,135
852		Install New Gland Steam Condenser		Est	1	EA	80000		80,000	0	150	173	MECH	87.74	15,135	95,135
853																
858	**41.89**	**SUBTOTAL - DIRECT COSTS, STEAM TURBINE**							**3,560,000**	**150,000**		**5,118**		**88.60**	**453,402**	**4,163,402**
859																

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13																
14																
860	**41.90**	**CONSTRUCTION INDIRECTS, STEAM TURBINE**							**178,000**	**35,250**		**445**			**164,294**	**377,544**
861		Additional Crane Allowance			1	LS				0					0	0
862		Mobilization / Demobilization - Included in Wage Rates Above														
863		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
864		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						445		88.60	39,000	39,000
865		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					556				41,414	41,414
866		Per Diem	None		0.00	HR						0			0	0
867		Consumables - % of Subtotal Above			0.5	%				750					2,267	3,017
868		Freight on Material - % of Subtotal Above			5.0	%				7,500						7,500
869		Freight on Equipment - % of Subtotal Above			5.0	%			178,000							178,000
870		Scaffolding - % of Subtotal Above			3.0	%				4,500					13,602	18,102
871		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				22,500					68,010	90,510
873	**41.98**	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, STEAM TURBINE**							**3,738,000**	**185,250**		**5,563**		**111.05**	**617,696**	**4,540,946**
874																
875	**41.99**	**SUBCONTRACTS**	ST Blade Mods, ST Generator Rewind, and Condenser Cleaning						**23,200,000**	**0**		**0**			**0**	**23,200,000**
876																
877		Steam Turbine Blade Modifications		Est.	1	LS	17000000		17,000,000	0	incl w/equip.	incl w/equip.				17,000,000
878																
879		Steam Turbine Generator Rewind	Allowance	Est.	1	LS	6000000		6,000,000	0	incl w/equip.	incl w/equip.				6,000,000
880																
881		Condenser Modifications	Condenser Cleaning, Eddy Current Testing, and Staking of Tubes	Est.	1	LS	200000		200,000	0	incl w/equip.	incl w/equip.				200,000
882																
883	**41.00**	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, STEAM TURBINE**							**26,938,000**	**185,250**		**5,563**		**111.05**	**617,696**	**27,740,946**
884																
885																
886																
887	**50.00**	**COOLING TOWER**														**12,238,877**
888																
891	**50.20**	**CONCRETE**							**0**	**0**		**0**			**0**	**0**
892																
893	50.20.1	Cooling Tower Pump Structure	Existing													Existing
894																
895	50.20.2	Natural Draft Cooling Tower Basin	Existing													Existing
896																

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13																
14																
897	**50.30**	**STRUCTURAL STEEL**							**0**	**0**		**0**			**0**	**0**
898																
899	50.30.1	Miscellaneous Steel for Cooling Tower Pump Intake	Not Required													Not Required
900																
909	**50.60**	**MECHANICAL**							**80,000**	**0**		**2,599**			**223,982**	**303,982**
910																
911		Natural Draft Cooling Tower w/ Accessories	Existing													Existing
912		Natural Draft Cooling Tower Repairs	Replace Fill - See Subcontracts Below													Included Elsewhere
913																
914	50.60.1	Cooling Tower Fire Protection System	Not Included													Not Included
915																
916	50.60.2	Trash Screens	Not Included													Not Included
917																
918	50.60.3	Circulating Water Chemical Feed System	Existing													Existing
919																
920	50.60.4	Pumps							80,000	0		2,599			223,982	303,982
921		Circulating Water Pumps & Motors	Remove & Reinstall After Refurbishment	Est	2	Ea	0		0	0	1000	2,300	PUMP	86.18	198,214	198,214
922		Circulating Water Pump & Motor Refurbishment	Listed Below with Subcontracts													
923		Miscellaneous Pumps														
924		Cooling Tower Makeup Pumps		Est	2	Ea	40000		80,000	0	130	299	PUMP	86.18	25,768	105,768
925																
930	**50.89**	**SUBTOTAL - DIRECT COSTS, COOLING TOWER**							**80,000**	**0**		**2,599**		**86.18**	**223,982**	**303,982**
931																
932	**50.90**	**CONSTRUCTION INDIRECTS, COOLING TOWER**							**4,000**	**0**		**226**			**80,895**	**84,895**
933		Additional Crane Allowance			1	LS				0					0	0
934		Mobilization / Demobilization - Included in Wage Rates Above														
935		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
936		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						226		86.18	19,000	19,000
937		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					283				20,459	20,459
938		Per Diem	None		0.00	HR						0			0	0
939		Consumables - % of Subtotal Above			0.5	%				0					1,120	1,120
940		Freight on Material - % of Subtotal Above			5.0	%				0						0
941		Freight on Equipment - % of Subtotal Above			5.0	%			4,000							4,000
942		Scaffolding - % of Subtotal Above			3.0	%				0					6,719	6,719
943		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				0					33,597	33,597

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13																
14																
945	**50.98**	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, COOLING TOWER**							**84,000**	**0**		**2,825**		**107.92**	**304,877**	**388,877**
946																
947	**50.99**	**SUBCONTRACTS**	Cooling Tower Fill Replacement & Circ Water Pump Refurbishment						**11,850,000**	**0**		**0**			**0**	**11,850,000**
948																
949		Natural Draft Cooling Tower Fill Replacement	Based on SPX 05/12/11 Proposal - 7.88' of DF254 Fill.	B	1	Ea.	11450000		11,450,000	0	incl w/equip.	incl w/equip.				11,450,000
950		Existing Circulating Water Pump & Motor Refurbishment	Recoat Pump Impellers & Refurbish Motors	Est.	2	LS	200000		400,000	0	incl w/equip.	incl w/equip.				400,000
951																
952	**50.00**	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, COOLING TOWER**							**11,934,000**	**0**		**2,825**		**107.92**	**304,877**	**12,238,877**
953																
954																
955																
956	**55.00**	**WATER TREATMENT**														**8,815,107**
957																
960	**55.20**	**CONCRETE**							**0**	**599,125**		**10,001**			**743,906**	**1,343,031**
961																
962	55.20.1	Water Treatment Building Foundation	Mat Foundation, 152' x 89'						0	526,225		8,484			622,474	1,148,699
963		Excavation		Est.	1,500	CY			0	0	0	345	EXFD	88.87	30,660	30,660
964		Backfill		Est.	250	CY			0	0	0	43	EXFD	88.87	3,833	3,833
965		Concrete		Est.	1650	CY			120	0	198,000	3,605	COND	68.54	247,104	445,104
966		Reinforcing		Est.	75	TN			950	0	71,250	1,941	REIN	76.92	149,273	220,523
967		Embeds		Est.	15	TN			5,000	0	75,000	2,070	CARP	70.49	145,914	220,914
968		Formwork		Est.	1700	SF			2.25	0	3,825	391	FORM	98.01	38,322	42,147
969		Grating, FRP	Trenches & Sumps	Est.	550	SF			21	0	11,550	89	GALL	83.21	7,368	18,918
970		Piles	16" Dia. X 68' Long Augercast Piles	Est.	70	EA			2380	0	166,600	incl w/matl				166,600
971																
972	55.20.2	Misc. Equipment Pads in Building							0	13,008		344			28,542	41,550
973		Concrete		Est.	80	CY			120	0	9,600	138	COND	68.54	9,459	19,059
974		Reinforcing		Est.	2	TN			950	0	1,900	52	REIN	76.92	3,981	5,881
975		Formwork		Est.	670	SF			2.25	0	1,508	154	FORM	98.01	15,103	16,611
976																
977	55.20.3	Chemical Storage Foundation							0	17,830		440			35,022	52,852
978		Excavation		Est.	100	CY			0	0	0	23	EXFD	88.87	2,044	2,044
979		Backfill		Est.	25	CY			0	0	0	4	EXFD	88.87	383	383
980		Concrete		Est.	100	CY			120	0	12,000	173	COND	68.54	11,823	23,823
981		Reinforcing		Est.	5	TN			950	0	4,750	129	REIN	76.92	9,952	14,702
982		Formwork		Est.	480	SF			2.25	0	1,080	110	FORM	98.01	10,820	11,900
983																

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13																
14																
984	55.20.4	Water Treatment Laboratory Foundation	Mat Foundation 40' x 18'						0	24,233		294			22,845	47,077
985		Excavation		Est.	85	CY		0	0	0	0.2	20	EXFD	88.87	1,737	1,737
986		Backfill		Est.	15	CY		0	0	0	0.15	3	EXFD	88.87	230	230
987		Concrete		Est.	60	CY		120	0	7,200	1.5	104	COND	68.54	7,094	14,294
988		Reinforcing		Est.	5	TN		950	0	4,750	22.5	129	REIN	76.92	9,952	14,702
989		Formwork		Est.	170	SF		2.25	0	383	0.2	39	FORM	98.01	3,832	4,215
990		Piles	16" Dia. X 68' Long Augercast Piles	Est.	5	EA		2380	0	11,900	incl w/matl	incl w/matl				11,900
991																
992	55.20.5	Demin Water Storage Tank Foundation	Includes Pump Pad						0	17,830		440			35,022	52,852
993		Excavation		Est.	100	CY		0	0	0	0.2	23	EXFD	88.87	2,044	2,044
994		Backfill		Est.	25	CY		0	0	0	0.15	4	EXFD	88.87	383	383
995		Concrete		Est.	100	CY		120	0	12,000	1.5	173	COND	68.54	11,823	23,823
996		Reinforcing		Est.	5	TN		950	0	4,750	22.5	129	REIN	76.92	9,952	14,702
997		Formwork		Est.	480	SF		2.25	0	1,080	0.2	110	FORM	98.01	10,820	11,900
998																
1001	**55.40**	**ARCHITECTURAL**							**75,000**	**1,590,656**		**1,159**			**86,208**	**1,751,864**
1002																
1003	55.40.1	Water Treatment Building							75,000	1,515,056		1,159			86,208	1,676,264
1004		Pre Engineered Building, Incl. HVAC, 89' x 152' x 30' High	Subcontract Price, Includes Installation Labor	Est.	13,528	SF		105	0	1,420,440	incl w/matl	incl w/matl				1,420,440
1005		Additional HVAC for Electrical Equipment Room	40T Packaged Unit for Electrical Equipment Room. Includes Allowance for Concrete Pad and Electrical Work	Est.	1	LS	75000	30000	75,000	30,000	400	460	HVAC	80.08	36,837	141,837
1006		Interior Finishes														
1007		8" CMU	Glazed, Double Faced	Est.	400	SF	0	19	0	7,600	0.17	78	MSRY	71.99	5,630	13,230
1008		Gypsum Board		Est.	6,550	SF	0	0.65	0	4,258	0.03	226	CARP	70.49	15,929	20,186
1009		Metal Stud/Runner		Est.	4,090	LF	0	0.76	0	3,108	0.024	113	CARP	70.49	7,957	11,066
1010		Suspended Acoustical Tile Ceiling		Est.	1,050	SF	0	4	0	4,200	0.05	60	SSCL	69.73	4,210	8,410
1011		Double Door		Est.	1	EA	0	2900	0	2,900	12	14	CARP	70.49	973	3,873
1012		Man Door		Est.	7	EA	0	1500	0	10,500	8	64	CARP	70.49	4,540	15,040
1013		Rolling Steel Door		Est.	3	EA	0	10000	0	30,000	36	124	CARP	70.49	8,755	38,755
1014		Water Closet		Est.	1	LS	0	1450	0	1,450	9	10	CARP	70.49	730	2,180
1015		Lavatory		Est.	1	LS	0	600	0	600	8	9	CARP	70.49	649	1,249
1016																
1017	55.40.2	Water Treatment Laboratory Building							0	75,600		0			0	75,600
1018		Pre Engineered Building, Incl. HVAC, 40' x 18' x 12' High	Subcontract Price, Includes Installation Labor	Est.	720	SF		105	0	75,600	incl w/matl	incl w/matl				75,600
1019																
1020	**55.45**	**PAINTING / COATING**							**0**	**30,000**		**2,760**			**186,217**	**216,217**
1021																
1022	55.45.1	Special Coatings	Allowance, Demin Areas	Est.	12,000	SF		2.5	0	30,000	0.20	2,760	PNTR	67.47	186,217	216,217
1023																

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12	Account No.	Item Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equipment Cost	Unit Material Cost	Total Equipment Cost	Total Material Cost	Unit Man-hours (Base)	Total Man-hours, w/ Productivity	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Total Projected Cost
13																
14																
1028	**55.60**	**MECHANICAL**							**3,102,600**	**0**		**11,075**			**991,125**	**4,093,725**
1029																
1030	55.60.1	Water Treatment Equipment							3,005,600	0		10,350			928,499	3,934,099
1031		Demineralizer System	150 gpm Ultrafilter & RO System, w/ Cartridge Filters, Feed Pumps, Chemical Injection, Break Tank, and CIP Skids	B	1	LS	3005600		3,005,600	0	9000	10,350	WTRT	89.71	928,499	3,934,099
1032																
1033	55.60.2	Miscellaneous Pumps							72,000	0		610			52,527	124,527
1034		Demineralized Water Pumps	100%	B	2	Ea	15000		30,000	0	130	299	PUMP	86.18	25,768	55,768
1035		WTB Sump Pumps	50%	B	3	Ea.	14000		42,000	0	90	311	PUMP	86.18	26,759	68,759
1036																
1037	55.60.3	Shop Fabricated Tanks							25,000	0		115			10,099	35,099
1038		Demineralized Water Storage Tank	12,000 Gal. Capacity, FRP Construction	B	1	Ea	25000		25,000	0	100	115	TANK	87.82	10,099	35,099
1039																
1044	**55.89**	**SUBTOTAL - DIRECT COSTS, WATER TREATMENT**							**3,177,600**	**2,219,781**		**24,995**		**80.32**	**2,007,455**	**7,404,836**
1045																
1046	**55.90**	**CONSTRUCTION INDIRECTS, WATER TREATMENT**							**158,880**	**521,649**		**2,173**			**729,742**	**1,410,270**
1047		Additional Crane Allowance			1	LS				0					0	0
1048		Mobilization / Demobilization - Included in Wage Rates Above														
1049		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
1050		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						2,173		80.32	175,000	175,000
1051		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					2,717				183,363	183,363
1052		Per Diem	None		0.00	HR						0			0	0
1053		Consumables - % of Subtotal Above			0.5	%				11,099					10,037	21,136
1054		Freight on Material - % of Subtotal Above			5.0	%				110,989						110,989
1055		Freight on Equipment - % of Subtotal Above			5.0	%			158,880							158,880
1056		Scaffolding - % of Subtotal Above			3.0	%				66,593					60,224	126,817
1057		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				332,967					301,118	634,085
1059	**55.98**	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, WATER TREATMENT**							**3,336,480**	**2,741,429**		**27,168**		**100.75**	**2,737,197**	**8,815,107**
1060																
1061	**55.99**	**SUBCONTRACTS**							**0**	**0**		**0**			**0**	**0**
1064																
1065	**55.00**	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, WATER TREATMENT**							**3,336,480**	**2,741,429**		**27,168**		**100.75**	**2,737,197**	**8,815,107**
1066																
1067																

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13																
14																
1068																
1069	**56.00**	**PRE-TREATMENT**														**13,608,992**
1070																
1071	**56.10**	**CIVIL**							**0**	**0**		**0**			**0**	**0**
1072																
1073		River Water Intake Structure	Existing													Existing
1074																
1075	**56.20**	**CONCRETE**							**0**	**1,673,168**		**22,889**			**1,774,479**	**3,447,647**
1076																
1077	56.20.1	Clarifier Foundations (2 Total)	85' Dia. Steel Clarifier on Mat Fdn.						0	536,743		6,406			490,847	1,027,590
1078		Excavation		Est.	1,500	CY		0	0	0	0.2	345	EXFD	88.87	30,660	30,660
1079		Backfill		Est.	310	CY		0	0	0	0.15	53	EXFD	88.87	4,752	4,752
1080		Concrete		Est.	1350	CY		120	0	162,000	1.9	2,950	COND	68.54	202,176	364,176
1081		Reinforcing		Est.	85	TN		950	0	80,750	22.5	2,199	REIN	76.92	169,176	249,926
1082		Formwork		Est.	3730	SF		2.25	0	8,393	0.2	858	FORM	98.01	84,083	92,475
1083		Piles	16" Dia. X 68' Long Augercast Piles	Est.	120	EA		2380	0	285,600	incl w/matl	incl w/matl				285,600
1084																
1085	56.20.2	Sludge Holding Tank Foundations (2 Total)	45' Dia. Tanks on Mat Fdns.						0	150,600		2,082			169,189	319,789
1086		Excavation		Est.	550	CY		0	0	0	0.2	127	EXFD	88.87	11,242	11,242
1087		Backfill		Est.	170	CY		0	0	0	0.15	29	EXFD	88.87	2,606	2,606
1088		Concrete		Est.	350	CY		120	0	42,000	1.9	765	COND	68.54	52,416	94,416
1089		Reinforcing		Est.	20	TN		950	0	19,000	22.5	518	REIN	76.92	39,806	58,806
1090		Formwork		Est.	2800	SF		2.25	0	6,300	0.2	644	FORM	98.01	63,118	69,418
1091		Piles	16" Dia. X 68' Long Augercast Piles	Est.	35	EA		2380	0	83,300	incl w/matl	incl w/matl				83,300
1092																
1093	56.20.3	Raw Water Storage Tank Foundation	45' Dia. Tank on Mat Fdn.						0	114,638		1,188			93,580	208,217
1094		Excavation		Est.	200	CY		0	0	0	0.2	46	EXFD	88.87	4,088	4,088
1095		Backfill		Est.	50	CY		0	0	0	0.15	9	EXFD	88.87	767	767
1096		Concrete		Est.	220	CY		120	0	26,400	1.9	481	COND	68.54	32,947	59,347
1097		Reinforcing		Est.	15	TN		950	0	14,250	22.5	388	REIN	76.92	29,855	44,105
1098		Formwork		Est.	1150	SF		2.25	0	2,588	0.2	265	FORM	98.01	25,924	28,511
1099		Piles	16" Dia. X 68' Long Augercast Piles	Est.	30	EA		2380	0	71,400	incl w/matl	incl w/matl				71,400
1100																
1101	56.20.4	Clearwell Tank Foundations (2 Total)	45' Dia. Tank on Mat Fdn.						0	150,600		2,082			169,189	319,789
1102		Excavation		Est.	550	CY		0	0	0	0.2	127	EXFD	88.87	11,242	11,242
1103		Backfill		Est.	170	CY		0	0	0	0.15	29	EXFD	88.87	2,606	2,606
1104		Concrete		Est.	350	CY		120	0	42,000	1.9	765	COND	68.54	52,416	94,416
1105		Reinforcing		Est.	20	TN		950	0	19,000	22.5	518	REIN	76.92	39,806	58,806
1106		Formwork		Est.	2800	SF		2.25	0	6,300	0.2	644	FORM	98.01	63,118	69,418
1107		Piles	16" Dia. X 68' Long Augercast Piles	Est.	35	EA		2380	0	83,300	incl w/matl	incl w/matl				83,300
1108																

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13																
14																
1109	56.20.5	Filter Press Building Foundation	Mat Foundation						0	192,363		2,564			200,543	392,906
1110		Excavation		Est.	450	CY		0	0	0	0.2	104	EXFD	88.87	9,198	9,198
1111		Backfill		Est.	120	CY		0	0	0	0.15	21	EXFD	88.87	1,840	1,840
1112		Concrete		Est.	450	CY		120	0	54,000	1.9	983	COND	68.54	67,392	121,392
1113		Elevated Slab Concrete		Est.	60	CY		120	0	7,200	1.9	131	CONP	77.97	10,222	17,422
1114		Reinforcing		Est.	33	TN		950	0	31,350	22.5	854	REIN	76.92	65,680	97,030
1115		Formwork		Est.	2050	SF		2.25	0	4,613	0.2	472	FORM	98.01	46,212	50,824
1116		Piles	16" Dia. X 68' Long Augercast Piles	Est.	40	EA		2380	0	95,200	incl w/matl	incl w/matl				95,200
1117																
1118	56.20.6	Filter Press Building Equipment Pads							0	4,138		150			12,875	17,013
1119		Concrete		Est.	20	CY		120	0	2,400	1.9	44	COND	68.54	2,995	5,395
1120		Reinforcing		Est.	1	TN		950	0	950	22.5	26	REIN	76.92	1,990	2,940
1121		Formwork		Est.	350	SF		2.25	0	788	0.2	81	FORM	98.01	7,890	8,677
1122																
1123	56.20.7	Pre-Treatment Building Foundation	Mat Foundation						0	499,638		7,656			575,287	1,074,924
1124		Excavation		Est.	1,150	CY		0	0	0	0.2	265	EXFD	88.87	23,506	23,506
1125		Backfill		Est.	150	CY		0	0	0	0.15	26	EXFD	88.87	2,300	2,300
1126		Concrete		Est.	1200	CY		120	0	144,000	1.9	2,622	COND	68.54	179,712	323,712
1127		Reinforcing		Est.	70	TN		950	0	66,500	22.5	1,811	REIN	76.92	139,321	205,821
1128		Embeds		Est.	15	TN		5,000	0	75,000	120.00	2,070	CARP	70.49	145,914	220,914
1129		Formwork		Est.	3750	SF		2.25	0	8,438	0.2	863	FORM	98.01	84,534	92,971
1130		Piles	16" Dia. X 68' Long Augercast Piles	Est.	55	EA		3740	0	205,700	incl w/matl	incl w/matl				205,700
1131																
1132	56.20.8	Pre-Treatment Building Equipment Pads							0	24,450		761			62,970	87,420
1133		Concrete		Est.	130	CY		120	0	15,600	1.9	284	COND	68.54	19,469	35,069
1134		Reinforcing		Est.	6	TN		950	0	5,700	22.5	155	REIN	76.92	11,942	17,642
1135		Formwork		Est.	1400	SF		2.25	0	3,150	0.2	322	FORM	98.01	31,559	34,709
1136																
1137	**56.30**	**STRUCTURAL STEEL**							**0**	**127,305**		**891**			**90,291**	**217,596**
1138																
1139	56.30.1	Filter Press Building Steel	Framing, Upper Floor						0	127,305		891			90,291	217,596
1140		Steel Framing	Independent Upper Floor	Est.	40	TN	0	2610	0	104,400	17.000	782	STST	104.09	81,398	185,798
1141		Metal Floor Decking		Est.	2,100	SF	0	2.8	0	5,880	0.01	34	DCKG	79.06	2,673	8,553
1142		Handrail		Est.	150	LF	0	33.5	0	5,025	0.10	17	GALL	83.21	1,435	6,460
1143		Stair Treads, 3' Wide		Est.	50	EA	0	240	0	12,000	1.00	58	GALL	83.21	4,785	16,785
1144																
1145	**56.40**	**ARCHITECTURAL**							**95,000**	**1,742,855**		**2,564**			**187,916**	**2,025,771**
1146																
1147	56.40.1	Pre-Treatment Building							75,000	1,104,675		403			32,232	1,211,907
1148		Pre Engineered Building, Incl. HVAC, 115' x 89' x 25' High	Subcontract Price, Includes Installation Labor	Est.	10,235	SF		105	0	1,074,675	incl w/matl	incl w/matl				1,074,675
1149		Additional HVAC for Electrical Equipment Room	40T Packaged Unit for Electrical Equipment Room. Includes Allowance for Concrete Pad and Electrical Work	Est.	1	LS	75000	30000	75,000	30,000	350	403	HVAC	80.08	32,232	137,232
1150																

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13																
14																
1151	56.40.2	Filter Press Building							20,000	430,000		345			27,628	477,628
1152		Pre Engineered Building, Incl. HVAC, 50' x 70' x 40' High	Subcontract Price, Includes Installation Labor	Est.	3,500	SF		120	0	420,000	incl w/matl	incl w/matl				420,000
1153		Additional HVAC for Electrical Equipment Room	Packaged Unit for Electrical Equipment Room. Includes Allowance for Concrete Pad and Electrical Work	Est.	1	LS	20000	10000	20,000	10,000	300	345	HVAC	80.08	27,628	57,628
1154																
1155	56.40.3	Interior Finishes							0	208,180		1,817			128,056	336,236
1156		12" CMU	Glazed, Double Faced	Est.	6,570	SF	0	24	0	157,680	0.21	1,587	CARP	70.49	111,843	269,523
1157		Double Door		Est.	5	EA	0	2900	0	14,500	12	69	CARP	70.49	4,864	19,364
1158		Man Door		Est.	4	EA	0	1500	0	6,000	8	37	CARP	70.49	2,594	8,594
1159		Rolling Steel Door		Est.	3	EA	0	10000	0	30,000	36	124	CARP	70.49	8,755	38,755
1160																
1161	56.40.4	River Water Intake Structure Building	Existing													Existing
1162																
1163	**56.45**	**PAINTING / COATING**							**0**	**20,000**		**1,840**			**124,145**	**144,145**
1164																
1165	56.45.1	Special Coatings		Est.	8,000	SF		2.5	0	20,000	0.20	1,840	PNTR	67.47	124,145	144,145
1166																
1171	**56.60**	**MECHANICAL**							**3,209,000**	**0**		**16,963**			**1,519,738**	**4,728,738**
1172																
1173	56.60.1	Water Pre-Treatment Equipment							3,014,000	0		16,100			1,444,331	4,458,331
1174		River Water Pre-Treatment Equipment Package	4,500 GPM, w/ Chemical Dosing and Filter Presses	B	1	LS	3014000		3,014,000	0	14000	16,100	WTRT	89.71	1,444,331	4,458,331
1175																
1176	56.60.2	Miscellaneous Pumps							55,000	0		173			14,866	69,866
1177		Raw Water Pumps	Not Required													Not Required
1178		Pretreatment Area Sump Pumps	50%	B	3	Ea.	18333		55,000	0	50	173	PUMP	86.18	14,866	69,866
1179																
1180	56.60.3	River Water Intake Screens							140,000	0		690			60,541	200,541
1181		Install New Raw Water Intake Screens	Johnson Screens	Est.	1	LS	140000		140,000	0	600	690	MECH	87.74	60,541	200,541
1182																
1187	**56.89**	**SUBTOTAL - DIRECT COSTS, PRE-TREATMENT**							**3,304,000**	**3,563,328**		**45,146**		**81.88**	**3,696,569**	**10,563,897**
1188																
1189	**56.90**	**CONSTRUCTION INDIRECTS, PRE-TREATMENT**							**165,200**	**837,382**		**3,926**			**1,342,513**	**2,345,095**
1190		Additional Crane Allowance			1	LS				0					0	0
1191		Mobilization / Demobilization - Included in Wage Rates Above														
1192		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
1193		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						3,926		81.88	321,000	321,000
1194		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					4,907				337,648	337,648

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13																
14																
1195		Per Diem	None		0.00	HR						0			0	0
1196		Consumables - % of Subtotal Above			0.5	%				17,817					18,483	36,299
1197		Freight on Material - % of Subtotal Above			5.0	%				178,166						178,166
1198		Freight on Equipment - % of Subtotal Above			5.0	%			165,200							165,200
1199		Scaffolding - % of Subtotal Above			3.0	%				106,900					110,897	217,797
1200		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				534,499					554,485	1,088,984
1202	56.98	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, PRE TREATMENT**							**3,469,200**	**4,400,709**		**49,072**		**102.69**	**5,039,082**	**12,908,992**
1203																
1204	56.99	**SUBCONTRACTS**	Raw Water Tank						**700,000**	**0**		**0**			**0**	**700,000**
1205																
1206		Field Erected Tanks														
1207		Raw Water Storage Tank	Approx. 500,000 Gal. Vertical, API 650, cone roof, 45' dia x 44' high, incl stairs, ladders, manways, & cathodic protection. CS w/ Epoxy Coating, Heaters, & Exterior Finish Paint.	Est.	1	Ea.	700000		700,000	0	incl w/equip.	incl w/equip.				700,000
1208																
1209	56.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, PRE-TREATMENT**							**4,169,200**	**4,400,709**		**49,072**		**102.69**	**5,039,082**	**13,608,992**
1210																
1211																
1212																
1213	**60.00**	**PIPE RACK**														**8,050,174**
1214																
1217	**60.20**	**CONCRETE**							**0**	**522,050**		**7,245**			**573,358**	**1,095,408**
1218																
1219	60.20.1	Piperack Foundations @ New Powerblock	Individual Footings. Half of Pipe Rack Columns on Other Foundations						0	381,400		4,870			379,241	760,641
1220		Excavation		Est.	1,400	CY		0	0	0	0.20	322	EXFD	88.87	28,616	28,616
1221		Backfill		Est.	1,200	CY		0	0	0	0.15	207	EXFD	88.87	18,396	18,396
1222		Concrete		Est.	350	CY		120	0	42,000	1.90	765	COND	68.54	52,416	94,416
1223		Reinforcing		Est.	60	TN		950	0	57,000	22.50	1,553	REIN	76.92	119,418	176,418
1224		Formwork (Footing)		Est.	1,400	SF		2.25	0	3,150	0.20	322	FORM	98.01	31,559	34,709
1225		Formwork (Piers & Pedestals)		Est.	1,400	SF		2.25	0	3,150	0.20	322	FORM	98.01	31,559	34,709
1226		Embeds		Est.	10	TN		5,000	0	50,000	120.00	1,380	CARP	70.49	97,276	147,276
1227		Piles	16" Dia. X 68' Long Augercast Piles	Est.	95	EA		2380	0	226,100	incl w/matl	incl w/matl				226,100
1228																

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13																
14																
1229	60.20.2	Piperack Foundations @ Exterior Rack East & South of Unit 1							0	140,650		2,375			194,117	334,767
1230		Excavation		Est.	550	CY		0	0	0	0.20	127	EXFD	88.87	11,242	11,242
1231		Backfill		Est.	400	CY		0	0	0	0.15	69	EXFD	88.87	6,132	6,132
1232		Concrete		Est.	200	CY		120	0	24,000	1.90	437	COND	68.54	29,952	53,952
1233		Reinforcing		Est.	30	TN		950	0	28,500	22.50	776	REIN	76.92	59,709	88,209
1234		Formwork (Footing)		Est.	1,800	SF		2.25	0	4,050	0.20	414	FORM	98.01	40,576	44,626
1235		Formwork (Piers & Pedestals)		Est.	1,200	SF		2.25	0	2,700	0.20	276	FORM	98.01	27,051	29,751
1236		Embeds		Est.	2	TN		5,000	0	10,000	120.00	276	CARP	70.49	19,455	29,455
1237		Piles	16" Dia. X 68' Long Augercast Piles	Est.	30	EA		2380	0	71,400	incl w/matl	incl w/matl				71,400
1238																
1239	**60.30**	**STRUCTURAL STEEL**							**0**	**2,594,830**		**19,828**			**2,005,290**	**4,600,120**
1240																
1241	60.30.1	Structural Steel, Pipe Rack @ New Power Block	330' L x 12' W x 25' H, 1 Level and 660' L x 24' W x 40' H, 2 Levels.						0	1,975,105		13,780			1,386,791	3,361,896
1242		Framing		Est.	625	TN		2,650	0	1,656,250	16	11,500	STST	104.09	1,197,035	2,853,285
1243		Grating	1-1/4" Galvanized	Est.	10,500	SF	0	14	0	147,000	0.14	1,691	GALL	83.21	140,667	287,667
1244		Handrail		Est.	5,130	LF	0	33.5	0	171,855	0.10	590	GALL	83.21	49,090	220,945
1245																
1246	60.30.2	Structural Steel Framing Inside Existing Boiler Room							0	168,700		2,972			304,896	473,596
1247		Framing	Labor Unit Rate Tripled for Work Inside Existing Unit	Est.	50	TN		2,650	0	132,500	48	2,760	STST	104.09	287,288	419,788
1248		Grating	1-1/4" Galvanized	Est.	600	SF	0	14	0	8,400	0.14	97	GALL	83.21	8,038	16,438
1249		Handrail		Est.	400	LF	0	33.5	0	13,400	0.10	46	GALL	83.21	3,828	17,228
1250		Stair Treads		Est.	60	EA	0	240	0	14,400	1.00	69	GALL	83.21	5,741	20,141
1251																
1252	60.30.3	Exterior Structural Steel Framing East & South of Unit 1							0	451,025		3,076			313,604	764,629
1253		Framing		Est.	150	TN		2,650	0	397,500	16	2,760	STST	104.09	287,288	684,788
1254		Grating	1-1/4" Galvanized	Est.	1,000	SF	0	14	0	14,000	0.14	161	GALL	83.21	13,397	27,397
1255		Handrail		Est.	750	LF	0	33.5	0	25,125	0.10	86	GALL	83.21	7,177	32,302
1256		Stair Treads		Est.	60	EA	0	240	0	14,400	1.00	69	GALL	83.21	5,741	20,141
1257																
1260	**60.45**	**PAINTING / COATING**							**0**	**105,000**		**6,038**			**407,350**	**512,350**
1261																
1262	60.45.1	Touch-up Painting	Allowance	Est.	105,000	SF		1	0	105,000	0.05	6,038	PNTR	67.47	407,350	512,350
1263																
1274	**60.89**	**SUBTOTAL - DIRECT COSTS, PIPE RACK**							**0**	**3,221,880**		**33,111**		**90.18**	**2,985,999**	**6,207,879**
1275																

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13																
14																
1276	60.90	CONSTRUCTION INDIRECTS, PIPE RACK							0	757,142		2,879			1,085,154	1,842,295
1277		Additional Crane Allowance			1	LS				0					0	0
1278		Mobilization / Demobilization - Included in Wage Rates Above														
1279		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
1280		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						2,879		90.18	260,000	260,000
1281		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					3,599				272,744	272,744
1282		Per Diem	None		0.00	HR						0			0	0
1283		Consumables - % of Subtotal Above			0.5	%				16,109					14,930	31,039
1284		Freight on Material - % of Subtotal Above			5.0	%				161,094						161,094
1285		Freight on Equipment - % of Subtotal Above			5.0	%			0							0
1286		Scaffolding - % of Subtotal Above			3.0	%				96,656					89,580	186,236
1287		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				483,282					447,900	931,182
1289	60.98	TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, PIPE RACK							0	3,979,022		35,990		113.12	4,071,153	8,050,174
1290																
1291	60.99	SUBCONTRACTS							0	0		0			0	0
1294																
1295	60.00	TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, PIPE RACK							0	3,979,022		35,990		113.12	4,071,153	8,050,174
1296																
1297																
1298																
1299	70.00	ELECTRICAL POWER DISTRIBUTION														54,045,313
1300																
1303	70.20	CONCRETE							0	707,133		16,538			1,395,033	2,102,166
1304																
1305	70.20.1	GSU Foundations (2 Total)	Includes Mat, Piers, Firewall, & Containment						0	175,015		5,302			452,961	627,976
1306		Excavation		Est.	700	CY		0	0	0	0.20	161	EXFD	88.87	14,308	14,308
1307		Backfill		Est.	320	CY		0	0	0	0.15	55	EXFD	88.87	4,906	4,906
1308		Concrete		Est.	430	CY		120	0	51,600	1.90	940	COND	68.54	64,397	115,997
1309		Reinforcing		Est.	26	TN		950	0	24,700	22.50	673	REIN	76.92	51,748	76,448
1310		Formwork		Est.	11,500	SF		2.25	0	25,875	0.20	2,645	FORM	98.01	259,236	285,111
1311		Embeds		Est.	6	TN		5,000	0	30,000	120.00	828	CARP	70.49	58,366	88,366
1312		Piles	16" Dia. X 68' Long Augercast Piles	Est.	18	EA		2380	0	42,840	incl w/matl	incl w/matl				42,840
1313																

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13																
14																
1314	70.20.2	Aux Transformer Foundations (2 Total)	Includes Mat, Piers, Firewall, & Containment						0	68,178		2,377			213,882	282,060
1315		Excavation		Est.	300	CY		0	0	0	0.20	69	EXFD	88.87	6,132	6,132
1316		Backfill		Est.	80	CY		0	0	0	0.15	14	EXFD	88.87	1,226	1,226
1317		Concrete		Est.	200	CY		120	0	24,000	1.90	437	COND	68.54	29,952	53,952
1318		Reinforcing		Est.	10	TN		950	0	9,500	22.50	259	REIN	76.92	19,903	29,403
1319		Formwork		Est.	6,950	SF		2.25	0	15,638	0.20	1,599	FORM	98.01	156,669	172,306
1320		Piles	16" Dia. X 68' Long Augercast Piles	Est.	8	EA		2380	0	19,040	incl w/matl	incl w/matl				19,040
1321																
1322	70.20.3	Transformer PDC Foundation	Mat Foundation w/ Conc. Piers for Elevated PDC						0	142,625		2,262			185,997	328,622
1323		Excavation		Est.	350	CY		0	0	0	0.20	81	EXFD	88.87	7,154	7,154
1324		Backfill		Est.	50	CY		0	0	0	0.15	9	EXFD	88.87	767	767
1325		Concrete		Est.	330	CY		120	0	39,600	1.90	721	COND	68.54	49,421	89,021
1326		Reinforcing		Est.	25	TN		950	0	23,750	22.50	647	REIN	76.92	49,758	73,508
1327		Formwork		Est.	3,500	SF		2.25	0	7,875	0.20	805	FORM	98.01	78,898	86,773
1328		Piles	16" Dia. X 68' Long Augercast Piles	Est.	30	EA		2380	0	71,400	incl w/matl	incl w/matl				71,400
1329																
1330	70.20.4	STG PDC Foundation	Mat Foundation w/ Conc. Piers for Elevated PDC						0	94,600		1,876			153,953	248,553
1331		Excavation		Est.	370	CY		0	0	0	0.20	85	EXFD	88.87	7,563	7,563
1332		Backfill		Est.	100	CY		0	0	0	0.15	17	EXFD	88.87	1,533	1,533
1333		Concrete		Est.	280	CY		120	0	33,600	1.90	612	COND	68.54	41,933	75,533
1334		Reinforcing		Est.	20	TN		950	0	19,000	22.50	518	REIN	76.92	39,806	58,806
1335		Formwork		Est.	2,800	SF		2.25	0	6,300	0.20	644	FORM	98.01	63,118	69,418
1336		Piles	16" Dia. X 68' Long Augercast Piles	Est.	15	EA		2380	0	35,700	incl w/matl	incl w/matl				35,700
1337																
1338	70.20.5	HRSG PDC Foundations (2 Total)	Mat Foundation w/ Conc. Piers for Elevated PDC						0	115,340		2,347			193,968	309,308
1339		Excavation		Est.	350	CY		0	0	0	0.20	81	EXFD	88.87	7,154	7,154
1340		Backfill		Est.	80	CY		0	0	0	0.15	14	EXFD	88.87	1,226	1,226
1341		Concrete		Est.	335	CY		120	0	40,200	1.90	732	COND	68.54	50,170	90,370
1342		Reinforcing		Est.	25	TN		950	0	23,750	22.50	647	REIN	76.92	49,758	73,508
1343		Formwork		Est.	3,800	SF		2.25	0	8,550	0.20	874	FORM	98.01	85,661	94,211
1344		Piles	16" Dia. X 68' Long Augercast Piles	Est.	18	EA		2380	0	42,840	incl w/matl	incl w/matl				42,840
1345																
1346	70.20.6	CT Chiller PDC Foundations	Mat Foundation w/ Conc. Piers for Elevated PDC						0	94,600		1,876			153,953	248,553
1347		Excavation		Est.	370	CY		0	0	0	0.20	85	EXFD	88.87	7,563	7,563
1348		Backfill		Est.	100	CY		0	0	0	0.15	17	EXFD	88.87	1,533	1,533
1349		Concrete		Est.	280	CY		120	0	33,600	1.90	612	COND	68.54	41,933	75,533
1350		Reinforcing		Est.	20	TN		950	0	19,000	22.50	518	REIN	76.92	39,806	58,806
1351		Formwork		Est.	2,800	SF		2.25	0	6,300	0.20	644	FORM	98.01	63,118	69,418
1352		Piles	16" Dia. X 68' Long Augercast Piles	Est.	15	EA		2380	0	35,700	incl w/matl	incl w/matl				35,700
1353																

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13																
14																
1354	70.20.7	Iso-Phase Bus / Cable Bus Foundations	Individual Drilled Concrete Piers, 30" Dia. X 10' Long						0	7,900		173			12,491	20,391
1355		Excavation		Est.	50	CY		0	0	0	0.20	12	EXFD	88.87	1,022	1,022
1356		Backfill		Est.	0	CY		0	0	0	0.15	0	EXFD	88.87	0	0
1357		Concrete		Est.	50	CY		120	0	6,000	1.90	109	COND	68.54	7,488	13,488
1358		Reinforcing		Est.	2	TN		950	0	1,900	22.50	52	REIN	76.92	3,981	5,881
1359																
1360	70.20.8	Emergency Diesel Generator Foundation							0	8,875		326			27,828	36,703
1361		Excavation		Est.	50	CY		0	0	0	0.20	12	EXFD	88.87	1,022	1,022
1362		Backfill		Est.	20	CY		0	0	0	0.15	3	EXFD	88.87	307	307
1363		Concrete		Est.	45	CY		120	0	5,400	1.90	98	COND	68.54	6,739	12,139
1364		Reinforcing		Est.	2	TN		950	0	1,900	22.50	52	REIN	76.92	3,981	5,881
1365		Formwork		Est.	700	SF		2.25	0	1,575	0.20	161	FORM	98.01	15,780	17,355
1366																
1367	**70.30**	**STRUCTURAL STEEL**							**0**	**163,195**		**1,332**			**121,640**	**284,835**
1368																
1369	70.30.1	Miscellaneous Steel for GSU Containments (2 Total)							0	45,365		411			36,011	81,376
1370		Framing		Est.	3.5	TN	0	3710	0	12,985	22.000	89	STST	104.09	9,217	22,202
1371		Grating	1-1/2" Galvanized	Est.	2,000	SF	0	16.19	0	32,380	0.14	322	GALL	83.21	26,794	59,174
1372																
1373	70.30.2	Miscellaneous Steel for Aux Transformer Containments (2 Total)							0	23,610		212			18,664	42,274
1374		Framing		Est.	2	TN	0	3710	0	7,420	22.000	51	STST	104.09	5,267	12,687
1375		Grating	1-1/2" Galvanized	Est.	1,000	SF	0	16.19	0	16,190	0.14	161	GALL	83.21	13,397	29,587
1376																
1377	70.30.3	STG PDC Galleries							0	12,930		98			9,190	22,120
1378		Framing		Est.	2	TN	0	3710	0	7,420	22.000	51	STST	104.09	5,267	12,687
1379		Grating	1-1/4" Galvanized	Est.	250	SF	0	14	0	3,500	0.14	40	GALL	83.21	3,349	6,849
1380		Handrail		Est.	60	LF	0	33.5	0	2,010	0.10	7	GALL	83.21	574	2,584
1381																
1382	70.30.4	HRSG PDC Galleries (2 Total)							0	22,150		170			15,747	37,897
1383		Framing		Est.	3	TN	0	3710	0	11,130	22.000	76	STST	104.09	7,900	19,030
1384		Grating	1-1/4" Galvanized	Est.	500	SF	0	14	0	7,000	0.14	81	GALL	83.21	6,698	13,698
1385		Handrail		Est.	120	LF	0	33.5	0	4,020	0.10	14	GALL	83.21	1,148	5,168
1386																
1387	70.30.5	Transformer PDC Galleries							0	22,150		170			15,747	37,897
1388		Framing		Est.	3	TN	0	3710	0	11,130	22.000	76	STST	104.09	7,900	19,030
1389		Grating	1-1/4" Galvanized	Est.	500	SF	0	14	0	7,000	0.14	81	GALL	83.21	6,698	13,698
1390		Handrail		Est.	120	LF	0	33.5	0	4,020	0.10	14	GALL	83.21	1,148	5,168
1391																
1392	70.30.6	HVAC PDC Support Framing & Galleries							0	24,060		174			17,091	41,151
1393		Framing		Est.	5	TN	0	3710	0	18,550	22.000	127	STST	104.09	13,167	31,717
1394		Grating	1-1/4" Galvanized	Est.	250	SF	0	14	0	3,500	0.14	40	GALL	83.21	3,349	6,849
1395		Handrail		Est.	60	LF	0	33.5	0	2,010	0.10	7	GALL	83.21	574	2,584
1396																

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13																
14																
1397	70.30.7	CT Chiller PDC Galleries							0	12,930		98			9,190	22,120
1398		Framing		Est.	2	TN	0	3710	0	7,420	22.000	51	STST	104.09	5,267	12,687
1399		Grating	1-1/4" Galvanized	Est.	250	SF	0	14	0	3,500	0.14	40	GALL	83.21	3,349	6,849
1400		Handrail		Est.	60	LF	0	33.5	0	2,010	0.10	7	GALL	83.21	574	2,584
1401																
1406	**70.50**	**ELECTRICAL**							**21,342,410**	**4,677,509**		**185,777**			**16,479,463**	**42,499,382**
1407																
1408		Electrical Equipment							21,255,210	2,000		40,119			3,171,900	24,429,109
1409																
1410	70.50.1	Generator Circuit Breakers (18KV)	GCB: 1A, 1B	Est.	2	Ea.	500000		1,000,000	0	550	1,265	EHEC	79.78	100,922	1,100,922
1411																
1412	70.50.2	Generator Step Up Transformers							4,080,300	0		5,014			400,017	4,480,317
1413		CT Generator Step Up Transformers (GSU: 1A, 1B) ▼-Y	18kV-141.5kV @ 165/220/275MVA, 2-winding	Est.	2	Ea.	2040150		4,080,300	0	2,180	5,014	EHEC	79.78	400,017	4,480,317
1414		ST Generator Step Up Transformer (GSU: 1S) ▼-Y	Existing													Existing
1415																
1416	70.50.3	Unit Substation Transformers	Equipment Cost Included Below w/ 480V Switchgear						0	0		3,335			266,066	266,066
1417		UST: 21A, 21B, 22A, 22B, 23A, 23B, 24A & 24B	4.16kV-480V @ 2000/2600KVA	Est.	8	Ea.	0		0	0	250	2,300	EHEC	79.78	183,494	183,494
1418		UST: 11A, 11B	4.16kV-600V @ 1000KVA	Est.	2	Ea.	0		0	0	120	276	EHEC	79.78	22,019	22,019
1419		UST: 25A, 25B, 26A, 26B	4.16kV-480V @ 1500/2000KVA	Est.	4	Ea.	0		0	0	165	759	EHEC	79.78	60,553	60,553
1420																
1421	70.50.4	Unit Auxiliary Transformers (UAT: 1A, 1B)	18KV-4.26kV @ 24/32, 12/16, 12/16MVA	Est.	2	Ea.	645000		1,290,000	0	980	2,254	EHEC	79.78	179,824	1,469,824
1422																
1423	70.50.5	4.16kV Switchgear							3,444,200	0		0			0	3,444,200
1424		4.16kV Switchgear, 3000A MAIN & 3000A TI BKR, Double Ended	12A&B, 13A&B. Installed in PDC's	Est.	2	EA	931500		1,863,000	0					0	1,863,000
1425		4.16kV Switchgear, 1600A MAIN & 1600A Reserve.	1A, 1B. Installed in PDC's (ST Bldg - Repowers Existing Loads)	Est.	2	EA	375250		750,500	0					0	750,500
1426		4.16kV Switchgear, 1600A MAIN.	14A, 14B - Installed in PDC's (Chillers)	Est.	2	EA	415350		830,700	0					0	830,700
1427																
1428	70.50.6	480V Switchgear							3,021,600	0		690			53,717	3,075,317
1429		480V Switchgear, 4000A MAIN & 4000A TI BKR	31A, 31B - Installed in PDC's	Est.	1	EA	443800		443,800	0					0	443,800
1430		480V Switchgear, 4000A MAIN & 4000A TI BKR	32A, 32B - Installed in PDC's	Est.	1	EA	453800		453,800	0					0	453,800
1431		480V Switchgear, 4000A MAIN & 4000A TI BKR	33A, 33B (Water Treatment Building)	Est.	1	EA	393500		393,500	0	300	345	EHEA	77.85	26,858	420,358
1432		480V Switchgear, 3000A MAIN & 3000A TI BKR	34A, 34B (Water Pretreatment BLDG)	Est.	1	EA	393500		393,500	0	300	345	EHEA	77.85	26,858	420,358
1433		480V Switchgear, 3000A MAIN & 3000A TI BKR	35A, 35B, 36A, 36B (Chiller BLDG) - Installed in PDC	Est.	2	EA	393500		787,000	0					0	787,000
1434		600V Switchgear, 1600A MAIN & 1600A TI BKR	11A, 11B (ST Bldg - Repowers Existing Loads) - Installed in PDC	Est.	1	EA	550000		550,000	0					0	550,000
1435																

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13																
14																
1436	70.50.7	Isolated Phase Bus Duct	Includes Main & Tap Buses, in Single Phase Feet	Est.	844	LF	1060.426		895,000	0	4.40	4,271	EHEA	77.85	332,469	1,227,469
1437																
1438	70.50.8	480V-800A, Motor Control Centers			23	EA	114,000		1,311,000	0		552			42,973	1,353,973
1439		480V-800A, Motor Control Centers	480V, 3Phase - Installed in PDC's	Est.	15	EA	57000		855,000	0						855,000
1440		480V-800A, Motor Control Centers	Buildings	Est.	8	EA	57000		456,000	0	60.00	552	EHEA	77.85	42,973	498,973
1441																
1442	70.50.9	Non-Seg/Cable Bus	MV and LV	Est.	1	LS	868720		868,720	0	11,150	12,823	EHEA	77.85	998,232	1,866,952
1443																
1444	70.50.10	Emergency Power System	125VDC Batteries	Est.	1	LS	257500		257,500	0	450	518	EHEA	77.85	40,287	297,787
1445		2 Battery Chargers	Included Above													Included Above
1446		UPS	Included Above													Included Above
1447		Alternet Source Transformer (45KVA, 480/120VAC)	Included Above													Included Above
1448		Satellite UPS (Fuel Oil PDC)	Included Above													Included Above
1449																
1450	70.50.11	PDCs		Est.	9545	SF	375		3,579,375	0	0.5	5,488	EHEC	79.78	437,863	4,017,238
1451		Transformer Power Distribution PDC			1	EA										Included Above
1452		STG Power Distribution Center PDC			1	EA										Included Above
1453		HRSG Power Distribution Center PDC			2	EA										Included Above
1454		HRSG PDC- Upper			2	EA										Included Above
1455		CTG HVAC PDC			1	EA										Included Above
1456		Chiller PDC			1	EA										Included Above
1457																
1458	70.50.12	Panelboards							152,000	0		196			15,220	167,220
1459		AC/UPS Panelboards/Switchboards		Est.	1	LS	152000		152,000	0	170	196	EHEA	77.85	15,220	167,220
1460		DC Panelboards/Switchboards	Included Above	Est.	1	LS										Included Above
1461																
1462	70.50.13	Generator/Transformer Relay & Protection Panels							276,000	2,000		679			59,043	337,043
1463		New Panels		Est.	1	LS	276000		276,000	0	340	391	INEL	87.02	34,025	310,025
1464		Modify Existing Protection Relay Panels	Allowance	Est.	1	LS	0	2000	0	2,000	250	288	INEL	87.02	25,018	27,018
1465																
1466	70.50.14	Communication		Est.	1	LS	81835		81,835	0	120	138	EHEA	77.85	10,743	92,578
1467																
1468	70.50.15	Digital Fault Recorder		Est.	1	LS	125680		125,680	0	200	230	EHEA	77.85	17,906	143,586
1469																
1470	70.50.16	Diesel Generator	1,000 kW Capacity	Est.	1	LS	550000		550,000	0	1000	1,150	EHEA	77.85	89,528	639,528
1471																
1472	70.50.17	Security System	Allowance	Est.	1	LS	145000		145,000	0	400	460	WIRE	97.23	44,726	189,726
1473																
1474	70.50.18	Cable Splice Boxes							177,000	0		1,058			82,365	259,365
1475		4.16 kV	Allowance	Est.	7	EA	9000		63,000	0	50	403	EHEA	77.85	31,335	94,335
1476		600V	Allowance	Est.	19	EA	6000		114,000	0	30	656	EHEA	77.85	51,031	165,031
1477																

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13																
14																
1478		Electrical BOP							87,200	4,675,509		145,658			13,307,564	18,070,272
1479																
1480	70.50.19	Cable	Per RPESK-013		470,454	LF			0	2,662,772		76,793			7,466,587	10,129,359
1481		MV Power Cable		Est.	59,986	LF			0	593,447		11,280			1,096,771	1,690,218
1482		1/C #1550 KCMIL 2KV		Est.	1,020	LF		19.15	0	19,533	0.190	223	WIRE	97.23	21,670	41,203
1483		1/C #1000 KCMIL 5KV		Est.	5,925	LF		15.96	0	94,563	0.173	1,179	WIRE	97.23	114,613	209,176
1484		1/C #750 KCMIL 5KV		Est.	15,420	LF		13.87	0	213,875	0.173	3,068	WIRE	97.23	298,283	512,158
1485		1/C #500 KCMIL 5KV		Est.	18,180	LF		9.39	0	170,710	0.170	3,554	WIRE	97.23	345,574	516,284
1486		1/C #250 KCMIL 5KV		Est.	7,080	LF		5.46	0	38,657	0.170	1,384	WIRE	97.23	134,580	173,237
1487		1/C #4/0 KCMIL 5KV		Est.	4,200	LF		4.76	0	19,992	0.120	580	WIRE	97.23	56,355	76,347
1488		1/C #2/0 KCMIL 5KV		Est.	8,160	LF		3.00	0	24,480	0.120	1,126	WIRE	97.23	109,489	133,969
1489		Terminations		Est.	1	LS				11,636		167	WIRE	97.23	16,208	27,845
1490									0							
1491		600V Large Power Cable	Per RPESK-013	Est.	77,043	LF			0	1,378,641		41,643			4,048,917	5,427,558
1492		3/C # 500 KCMIL - 600V & 1000V		Est.	30,180	LF		31.29	0	944,332	0.690	23,948	WIRE	97.23	2,328,448	3,272,780
1493		3/C # 250 KCMIL - 600V		Est.	6,920	LF		16.28	0	112,658	0.690	5,491	WIRE	97.23	533,892	646,549
1494		3/C # 4/0 KCMIL - 600V & 1000V		Est.	8,890	LF		16.04	0	142,596	0.520	5,316	WIRE	97.23	516,896	659,492
1495		1/C # 500 KCMIL - 600V		Est.	120	LF		8.96	0	1,075	0.173	24	WIRE	97.23	2,321	3,396
1496		1/C # 250 KCMIL - 600V		Est.	30,932	LF		4.88	0	150,948	0.170	6,047	WIRE	97.23	587,970	738,918
1497		Terminations		Est.	1	LS				27,032		817	WIRE	97.23	79,391	106,423
1498																
1499		600V Small Power Cable	Per RPESK-OPT1-005	Est.	333,425	LF			0	690,684		23,870			2,320,899	3,011,584
1500		2/C # 10 W/G, 600V		Est.	90,753	LF		1.85	0	167,894	0.027	2,818	WIRE	97.23	273,984	441,878
1501		2/C # 12 W/G, 600V		Est.	37,414	LF		0.66	0	24,693	0.030	1,291	WIRE	97.23	125,503	150,196
1502		3/C # 2 W/G, 600V		Est.	12,793	LF		5.84	0	74,709	0.350	5,149	WIRE	97.23	500,639	575,348
1503		3/C # 6 W/G, 600V		Est.	11,658	LF		3.37	0	39,287	0.090	1,207	WIRE	97.23	117,318	156,605
1504		3/C # 8 W/G, 600V		Est.	8,737	LF		2.65	0	23,152	0.053	532	WIRE	97.23	51,774	74,926
1505		3/C # 10 W/G, 600V		Est.	32,489	LF		2.06	0	66,927	0.053	1,980	WIRE	97.23	192,535	259,463
1506		3/C # 2/0 W/G, 600V		Est.	4,513	LF		9.26	0	41,787	0.520	2,699	WIRE	97.23	262,379	304,165
1507		3/C # 2/0 W/G, W/S, 1KV		Est.	1,089	LF		9.26	0	10,085	0.520	651	WIRE	97.23	63,321	73,406
1508		2/C # 10 W/G, 600V		Est.	3,259	LF		1.85	0	6,029	0.027	101	WIRE	97.23	9,839	15,869
1509		2/C # 12 W/G, 600V		Est.	16,542	LF		0.66	0	10,917	0.030	571	WIRE	97.23	55,488	66,405
1510		2/C # 14, 600V		Est.	10,652	LF		0.56	0	5,965	0.027	331	WIRE	97.23	32,158	38,123
1511		3/C # 2 W/G, 600V		Est.	454	LF		5.84	0	2,653	0.350	183	WIRE	97.23	17,777	20,430
1512		3/C # 6 W/G, 600V		Est.	1,047	LF		3.37	0	3,527	0.090	108	WIRE	97.23	10,531	14,058
1513		3/C # 10 W/G, 600V		Est.	6,803	LF		2.06	0	14,015	0.053	415	WIRE	97.23	40,318	54,333
1514		3/C # 2/0 W/G, 600V		Est.	840	LF		9.26	0	7,774	0.520	502	WIRE	97.23	48,812	56,585
1515		4/C # 10, 600V		Est.	8,723	LF		2.21	0	19,277	0.064	642	WIRE	97.23	62,421	81,698
1516		4/C # 14, 600V		Est.	5,700	LF		0.8	0	4,560	0.032	210	WIRE	97.23	20,395	24,955
1517		7/C # 14, 600V		Est.	10,686	LF		1.24	0	13,251	0.040	492	WIRE	97.23	47,794	61,045
1518		12/C # 14, 600V		Est.	3,058	LF		1.92	0	5,871	0.070	246	WIRE	97.23	23,935	29,806
1519		1/C # 14, W/S, 600V, FP		Est.	2,401	LF		0.14	0	336	0.024	66	WIRE	97.23	6,444	6,780
1520		1/C #14, 600V, JMPR		Est.	21	LF		0.14	0	3	0.024	1	WIRE	97.23	56	58
1521		2/C # 10 W/G, 600V, AEP Cable		Est.	2,328	LF		1.85	0	4,306	0.027	72	WIRE	97.23	7,027	11,333

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1522		3/C # 6 W/G, W/S, 1000V		Est.	368	LF		3.37	0	1,240	0.090	38	WIRE	97.23	3,703	4,943
1523		1 PR # 16, W/S, 600V		Est.	1,172	LF		0.17	0	199	0.027	36	WIRE	97.23	3,538	3,737
1524		FIBER 12MM, 12SM		Est.	307	LF		5.11	0	1,569	0.140	49	WIRE	97.23	4,806	6,375
1525		FO-12 FIBER MULTIMODE		Est.	395	LF		5.11	0	2,018	0.140	64	WIRE	97.23	6,183	8,202
1526		FO-2 FIBER MULTIMODE		Est.	31	LF		5.11	0	158	0.140	5	WIRE	97.23	485	644
1527		FIBER 24MM, 24SM		Est.	43	LF		10.19	0	438	0.280	14	WIRE	97.23	1,346	1,784
1528		FO-12 FIBER MULTIMODE		Est.	245	LF		5.11	0	1,252	0.140	39	WIRE	97.23	3,835	5,087
1529		FIBER 24MM, 24SM		Est.	1,840	LF		10.19	0	18,750	0.280	592	WIRE	97.23	57,607	76,356
1530		1/C # 2/0, 25KV		Est.	115	LF		4.86	0	559	0.117	15	WIRE	97.23	1,504	2,063
1531		2/C # 14, 600V		Est.	55	LF		0.56	0	31	0.027	2	WIRE	97.23	166	197
1532		2/C # 10 W/G, 600V, AEP CABLE		Est.	2,185	LF		1.85	0	4,042	0.027	68	WIRE	97.23	6,596	10,639
1533		4/C # 14, 600V, PDC CABLE		Est.	33	LF		0.8	0	26	0.032	1	WIRE	97.23	118	144
1534		16/C # 14, 600V, AEP CABLE		Est.	2,185	LF		2.33	0	5,091	0.080	201	WIRE	97.23	19,545	24,636
1535		1 PR # 16, W/S, 600V		Est.	15,679	LF		0.17	0	2,665	0.027	487	WIRE	97.23	47,335	50,000
1536		1 PR # 16, W/S, 600V, TYPE K		Est.	8,360	LF		0.92	0	7,691	0.027	260	WIRE	97.23	25,239	32,930
1537		1 PR # 18, W/IOS, 600V, TYPE KXH		Est.	6,431	LF		0.87	0	5,595	0.027	200	WIRE	97.23	19,415	25,010
1538		1 PR # 16, W/IOS, 600V, TYPE SIH		Est.	161	LF		0.82	0	132	0.027	5	WIRE	97.23	486	618
1539		1 PR # 16, W/S, 600V		Est.	3,258	LF		0.17	0	554	0.027	101	WIRE	97.23	9,836	10,390
1540		2 PR # 16, W/IOS, 600V		Est.	7,362	LF		1.44	0	10,601	0.053	449	WIRE	97.23	43,628	54,230
1541		2 PR # 16, W/IOS, 600V, PDC CABLE		Est.	451	LF		1.44	0	649	0.053	27	WIRE	97.23	2,673	3,322
1542		4 PR # 16, W/IOS, 600V		Est.	2,988	LF		1.44	0	4,303	0.053	182	WIRE	97.23	17,707	22,010
1543		4 PR # 16, W/IOS, 600V, TYPE K		Est.	104	LF		6.87	0	714	0.027	3	WIRE	97.23	314	1,028
1544		4 PR # 16, W/IOS, 600V, PDC CABLE		Est.	97	LF		6.87	0	666	0.027	3	WIRE	97.23	293	959
1545		4 PR # 16, W/IOS, 600V		Est.	722	LF		3.94	0	2,845	0.053	44	WIRE	97.23	4,279	7,123
1546		8 PR # 16, W/IOS, 600V		Est.	2,910	LF		8.95	0	26,045	0.053	177	WIRE	97.23	17,245	43,290
1547		8 PR # 16, W/IOS, 600V, AEP CABLE		Est.	2,162	LF		8.95	0	19,350	0.053	132	WIRE	97.23	12,812	32,162
1548		8 PR # 16, W/IOS, 600V, TYPE KX		Est.	823	LF		14.8	0	12,180	0.027	26	WIRE	97.23	2,485	14,665
1549		COAX CABLE TYPE RG6		Est.	340	LF		0.77	0	262	0.027	11	WIRE	97.23	1,026	1,288
1550		SPG CABLE (COAX)		Est.	644	LF		0.77	0	496	0.027	20	WIRE	97.23	1,944	2,440
1551		Termination		Est.	1	LT			0	13,543		353	WIRE	97.23	34,299	47,842
1552																
1553	70.50.20	Heat Tracing	Per RPESK-007						87,200	440,105		12,407			1,206,361	1,733,666
1554		Freeze Protection, Heat Tracing														
1555		Heat Tracing XFMR, 45KVA. 480-208/120V		Est.	6	EA	5000		30,000	0	16.00	110	WIRE	97.23	10,734	40,734
1556		Heat Tracing Distribution Panel-208/120VAC-30CKT BRK		Est.	6	EA	1200		7,200	0	8.00	55	WIRE	97.23	5,367	12,567
1557		Heat Tracing Zone control Panel		Est.	2	EA	25000		50,000	0	24.00	55	WIRE	97.23	5,367	55,367
1558		Heat Tracing MI Cable		Est.	30,938	LF		9.5	0	293,911	0.20	7,116	WIRE	97.23	691,863	985,774
1559		Heat Tracing Self Limiting Cable		Est.	10,313	LF		11.25	0	116,021	0.20	2,372	WIRE	97.23	230,629	346,650
1560		Heat Tracing Junction Boxes + MTG supports		Est.	447	EA		12.5	0	5,588	2.75	1,414	WIRE	97.23	137,448	143,035
1561		Heat Tracing Power Circuits & Thermostats		Est.	1	LS		22350	0	22,350	894	1,028	WIRE	97.23	99,962	122,312
1562		Test & calibrations + label & tag with documentations		Est.	1	LS		2235	0	2,235	224	257	WIRE	97.23	24,991	27,226
1563																

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14																
1564	70.50.21	Conduit-Above Ground	Per RPESK-OPT2-023		33,191	LF			0	257,298		10,731			799,534	1,056,832
1565		3/4" RGS Conduit		Est.	14,188	LF		3.48	0	49,374	0.194	3,165	ECND	74.51	235,850	285,224
1566		1" RGS Conduit		Est.	2,949	LF		4.92	0	14,509	0.239	811	ECND	74.51	60,393	74,902
1567		1-1/2" RGS Conduit		Est.	11,312	LF		8.5	0	96,152	0.284	3,694	ECND	74.51	275,277	371,429
1568		2" RGS Conduit		Est.	2,229	LF		10.95	0	24,408	0.352	902	ECND	74.51	67,230	91,638
1569		3" RGS Conduit		Est.	1,499	LF		22.85	0	34,252	0.645	1,112	ECND	74.51	82,846	117,099
1570		4" RGS Conduit		Est.	908	LF		32.30	0	29,328	0.807	843	ECND	74.51	62,787	92,116
1571		6" RGS Conduit		Est.	106	LF		87.5	0	9,275	1.668	203	ECND	74.51	15,150	24,425
1572																
1573	70.50.22	Embedded Conduits	Per RPESK-OPT2-012						0	22,980		778			57,985	80,966
1574		1" RGS Conduit		Est.	45	LF		4.92	0	221	0.239	12	ECND	74.51	922	1,143
1575		2" RGS Conduit		Est.	801	LF		10.95	0	8,771	0.352	324	ECND	74.51	24,159	32,930
1576		3" RGS Conduit		Est.	588	LF		22.85	0	13,436	0.645	436	ECND	74.51	32,497	45,933
1577		4" PVC Conduit		Est.	47	LF		11.75	0	552	0.101	5	ECND	74.51	407	959
1578																
1579	70.50.23	Cable Tray							0	389,598		25,753			1,928,649	2,318,247
1580		CT/STG Area	Per RPESK-014						0	289,066		19,086			1,422,077	1,711,143
1581		Sizes 6" & 9"		Est.	1,692	LF		16.005	0	27,080	0.888	1,728	ECND	74.51	128,744	155,824
1582		Sizes 12"		Est.	5,298	LF		21.34	0	113,059	1.110	6,763	ECND	74.51	503,903	616,963
1583		Sizes 18"		Est.	1,620	LF		24.38	0	39,496	1.450	2,701	ECND	74.51	201,278	240,773
1584		Sizes 24"		Est.	1,869	LF		27.79	0	51,940	1.750	3,761	ECND	74.51	280,259	332,199
1585		Sizes 30"		Est.	923	LF		30.69	0	28,327	1.950	2,070	ECND	74.51	154,223	182,550
1586		Sizes 36"		Est.	854	LF		34.15	0	29,164	2.100	2,062	ECND	74.51	153,670	182,834
1587		Water Treating Area	Per RPESK-015						0	55,076		3,725			277,540	332,616
1588		Size 12"		Est.	712	LF		21.34	0	15,194	1.110	909	ECND	74.51	67,720	82,914
1589		Size 18"		Est.	632	LF		24.38	0	15,408	1.450	1,054	ECND	74.51	78,523	93,931
1590		Size 24"		Est.	569	LF		27.79	0	15,813	1.750	1,145	ECND	74.51	85,322	101,135
1591		Size 30"		Est.	63	LF		30.69	0	1,933	1.950	141	ECND	74.51	10,527	12,460
1592		Size 36"		Est.	197	LF		34.15	0	6,728	2.100	476	ECND	74.51	35,449	42,176
1593		Water Pre-Treatment Area	Per RPESK-016						0	45,457		2,942			229,032	274,489
1594		Size 6"		Est.	324	LF		16.01	0	5,186	0.89	331	EHEA	77.85	25,758	30,944
1595		Size 12"		Est.	1,052	LF		21.34	0	22,450	1.11	1,343	EHEA	77.85	104,543	126,993
1596		Size 18"		Est.	202	LF		24.38	0	4,925	1.45	337	EHEA	77.85	26,223	31,147
1597		Size 24"		Est.	410	LF		27.79	0	11,394	1.75	825	EHEA	77.85	64,236	75,630
1598		Size 36"		Est.	44	LF		34.15	0	1,503	2.10	106	EHEA	77.85	8,272	9,775
1599		Cooling Tower Area	Existing													Existing
1600																
1601	70.50.24	Lighting and Distribution							0	757,000		14,950			1,453,589	2,210,589
1602		New Lighting	Per RPESK-011	Est.	1	LS		747000	0	747,000	12,600	14,490	WIRE	97.23	1,408,863	2,155,863
1603		Upgrade Existing Control Room Lighting	Allowance	Est.	1	LS		10000	0	10,000	400	460	WIRE	97.23	44,726	54,726
1604																
1605	70.50.25	Laydown Area Lighting	Costs Covered in Site Overheads (In Crew Wage Rates)						0	0		0			0	0
1606																

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14																
1607	70.50.26	Miscellaneous Electrical Devices	Welding Receptacles, Junction Boxes, etc.	Est.	1	LS		100000	0	100,000	2,000	2,300	WIRE	97.23	223,629	323,629
1608																
1609	70.50.27	Lightning Protection	Per RPESK-006						0	15,674		871			84,720	100,394
1610		#2/0 Bare copper wire	CTG Building	Est.	874	LF		2.57	0	2,246	0.12	121	WIRE	97.23	11,727	13,973
1611		#2/0 Bare copper wire	Water treatment Building	Est.	580	LF		2.57	0	1,491	0.12	80	WIRE	97.23	7,782	9,273
1612		#2/0 Bare copper wire	Transformer PDC	Est.	260	LF		2.57	0	668	0.12	36	WIRE	97.23	3,489	4,157
1613		#2/0 Bare copper wire	Pre Treatment Building	Est.	520	LF		2.57	0	1,336	0.120	72	WIRE	97.23	6,977	8,314
1614		#2/0 Bare copper wire	Filter Building	Est.	290	LF		2.57	0	745	0.120	40	WIRE	97.23	3,891	4,636
1615		#2/0 Bare copper wire	Fire Protection Building	Est.	290	LF		2.57	0	745	0.120	40	WIRE	97.23	3,891	4,636
1616		#2/0 Bare copper wire	Chiller PDC	Est.	250	LF		2.57	0	643	0.120	35	WIRE	97.23	3,354	3,997
1617		5/8' X 2' Air Terminal		Est.	130	EA		50	0	6,500	2.00	299	WIRE	97.23	29,072	35,572
1618		#2/0 Splicing & terminations + Tag	Including test and documentations	Est.	260	EA		5	0	1,300	0.50	150	WIRE	97.23	14,536	15,836
1619																
1620	70.50.28	Above Ground Grounding	Per RPESK-022						0	22,581		932			72,533	95,114
1621		Cable Tray Grounding														
1622		Cable Tray #4/0 KCMIL Bare Copper Wire		Est.	5,660	LF		3.08	0	17,447	0.06	391	EHEA	77.85	30,404	47,850
1623		Equipment Grounding														
1624		#6 AWG Bare Copper Wire		Est.	8,556	LF		0.6	0	5,134	0.055	541	EHEA	77.85	42,130	47,263
1625																
1626	70.50.29	Electrical Allowance for Relocated Bulk Gas Storage Facility	Includes Lighting	Est.	1	LS		7500	0	7,500	125	144	WIRE	97.23	13,977	21,477
1627																
1636	**70.89**	**SUBTOTAL - DIRECT COSTS, ELECTRICAL POWER DISTRIBUTION**							**21,342,410**	**5,547,836**		**203,647**		**88.37**	**17,996,137**	**44,886,383**
1637																
1638	**70.90**	**CONSTRUCTION INDIRECTS, ELECTRICAL POWER DISTRIBUTION**							**1,067,120**	**1,303,742**		**17,708**			**6,538,068**	**8,908,930**
1639		Additional Crane Allowance			1	LS				0					0	0
1640		Mobilization / Demobilization - Included in Wage Rates Above														
1641		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
1642		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						17,708		88.37	1,565,000	1,565,000
1643		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					22,136				1,643,783	1,643,783
1644		Per Diem	None		0.00	HR						0			0	0
1645		Consumables - % of Subtotal Above			0.5	%				27,739					89,981	117,720
1646		Freight on Material - % of Subtotal Above			5.0	%				277,392						277,392
1647		Freight on Equipment - % of Subtotal Above			5.0	%			1,067,120							1,067,120
1648		Scaffolding - % of Subtotal Above			3.0	%				166,435					539,884	706,319
1649		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				832,175					2,699,421	3,531,596

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1651	70.98	TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, ELECTRICAL POWER DISTRIBUTION							22,409,530	6,851,578		221,355		110.84	24,534,205	53,795,313
1652																
1653	70.99	SUBCONTRACTS	GSU Heavy Haul						0	0		0			250,000	250,000
1654																
1655		Heavy Haul Subcontract for GSU Offloading & Staging	Allowance		1	LS									250,000	250,000
1656																
1657	70.00	TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, ELECTRICAL POWER DISTRIBUTION							22,409,530	6,851,578		221,355		111.97	24,784,205	54,045,313
1658																
1659																
1660																
1661	75.00	DCS														13,159,938
1662																
1665	75.20	CONCRETE							0	7,420		223			18,125	25,545
1666																
1667	75.20.1	CEMS Foundation (2 Total)							0	7,420		223			18,125	25,545
1668		Excavation		Est.	40	CY		0	0	0	0.20	9	EXFD	88.87	818	818
1669		Backfill		Est.	8	CY		0	0	0	0.15	1	EXFD	88.87	123	123
1670		Concrete		Est.	40	CY		120	0	4,800	1.90	87	COND	68.54	5,990	10,790
1671		Reinforcing		Est.	2	TN		950	0	1,900	22.50	52	REIN	76.92	3,981	5,881
1672		Formwork		Est.	320	SF		2.25	0	720	0.20	74	FORM	98.01	7,214	7,934
1673																
1680	75.50	ELECTRICAL							0	684,986		23,563			2,073,535	2,758,521
1681																
1682	75.50.1	600V Small Power Cable	Per RPESK-OPT1-005		323,845	LF			0	448,175		13,990			1,360,251	1,808,426
1683		2/C # 14, 600V		Est.	42,606	LF		0.56	0	23,859	0.027	1,323	WIRE	97.23	128,627	152,487
1684		4/C # 14, 600V		Est.	22,798	LF		0.80	0	18,238	0.032	839	WIRE	97.23	81,573	99,811
1685		7/C # 14, 600V		Est.	42,743	LF		1.24	0	53,001	0.040	1,966	WIRE	97.23	191,171	244,173
1686		12/C # 14, 600V		Est.	12,233	LF		1.92	0	23,487	0.070	985	WIRE	97.23	95,748	119,235
1687		1 PR # 16, W/S, 600V		Est.	1,646	LF		0.17	0	280	0.027	51	WIRE	97.23	4,969	5,249
1688		FIBER 12MM, 12SM		Est.	1,227	LF		5.11	0	6,270	0.140	198	WIRE	97.23	19,207	25,477
1689		FO-12 FIBER MULTIMODE		Est.	1,580	LF		5.11	0	8,074	0.140	254	WIRE	97.23	24,733	32,807
1690		FO-2 FIBER MULTIMODE		Est.	124	LF		5.11	0	634	0.140	20	WIRE	97.23	1,941	2,575
1691		FIBER 24MM, 24SM		Est.	172	LF		10.19	0	1,753	0.280	55	WIRE	97.23	5,385	7,138
1692		FO-12 FIBER MULTIMODE		Est.	980	LF		5.11	0	5,008	0.140	158	WIRE	97.23	15,341	20,349
1693		2/C # 14, 600V		Est.	220	LF		0.56	0	123	0.027	7	WIRE	97.23	664	787
1694		4/C # 14, 600V, PDC CABLE		Est.	132	LF		0.8	0	106	0.032	5	WIRE	97.23	472	578
1695		1 PR # 16, W/S, 600V		Est.	62,716	LF		0.17	0	10,662	0.027	1,947	WIRE	97.23	189,339	200,001
1696		1 PR # 16, W/S, 600V, TYPE K		Est.	33,440	LF		0.92	0	30,765	0.027	1,038	WIRE	97.23	100,955	131,720
1697		1 PR # 18, W/IOS, 600V, TYPE KXH		Est.	25,724	LF		0.87	0	22,380	0.027	799	WIRE	97.23	77,661	100,040
1698		1 PR # 16, W/IOS, 600V, TYPE SIH		Est.	645	LF		0.82	0	529	0.027	20	WIRE	97.23	1,947	2,476
1699		1 PR # 16, W/S, 600V		Est.	13,031	LF		0.17	0	2,215	0.027	405	WIRE	97.23	39,340	41,556

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13																
14																
1700		2 PR # 16, W/IOS, 600V		Est.	29,448	LF		1.44	0	42,405	0.053	1,795	WIRE	97.23	174,514	216,919
1701		2 PR # 16, W/IOS, 600V, PDC CABLE		Est.	1,804	LF		1.44	0	2,598	0.053	110	WIRE	97.23	10,691	13,289
1702		4 PR # 16, W/IOS, 600V		Est.	11,952	LF		1.44	0	17,211	0.053	728	WIRE	97.23	70,830	88,040
1703		4 PR # 16, W/IOS, 600V, TYPE K		Est.	416	LF		6.87	0	2,858	0.027	13	WIRE	97.23	1,256	4,114
1704		4 PR # 16, W/IOS, 600V, PDC CABLE		Est.	386	LF		6.87	0	2,652	0.027	12	WIRE	97.23	1,165	3,817
1705		4 PR # 16, W/IOS, 600V		Est.	2,890	LF		3.94	0	11,387	0.053	176	WIRE	97.23	17,127	28,513
1706		8 PR # 16, W/IOS, 600V		Est.	11,641	LF		8.95	0	104,187	0.053	710	WIRE	97.23	68,987	173,173
1707		8 PR # 16, W/IOS, 600V, TYPE KX		Est.	3,291	LF		14.80	0	48,707	0.027	102	WIRE	97.23	9,936	58,642
1708		Termination		Est.	1	LT				8,788		274	WIRE	97.23	26,672	35,459
1709																
1710	75.50.2	Conduit-Above Ground	Per RPESK-OPT2-023		21,765	LF			0	159,542		6,936			516,801	676,343
1711		3/4" RGS Conduit		Est.	7,042	LF		3.48	0	24,506	0.194	1,571	ECND	74.51	117,060	141,567
1712		1" RGS Conduit		Est.	5,098	LF		4.92	0	25,082	0.239	1,401	ECND	74.51	104,402	129,484
1713		1-1/2" RGS Conduit		Est.	5,328	LF		8.5	0	45,288	0.284	1,740	ECND	74.51	129,657	174,945
1714		2" RGS Conduit		Est.	2,959	LF		10.95	0	32,401	0.352	1,198	ECND	74.51	89,248	121,649
1715		3" RGS Conduit		Est.	1,159	LF		22.85	0	26,483	0.645	860	ECND	74.51	64,055	90,539
1716		4" RGS Conduit		Est.	179	LF		32.3	0	5,782	0.807	166	ECND	74.51	12,378	18,159
1717		6" RGS Conduit		Est.	0	LF		87.5	0	0	1.668	0	ECND	74.51	0	0
1718																
1719	75.50.3	Embedded Conduits	Per RPESK-OPT2-012						0	77,269		2,637			196,484	273,752
1720		1" RGS Conduit		Est.	3	LF		4.92	0	15	0.239	1	ECND	74.51	61	76
1721		2" RGS Conduit		Est.	2,602	LF		10.95	0	28,492	0.352	1,053	ECND	74.51	78,481	106,973
1722		3" RGS Conduit		Est.	2,134	LF		22.85	0	48,762	0.645	1,583	ECND	74.51	117,941	166,703
1723																
1724	**75.55**	**INSTRUMENTATION**							**5,606,400**	**813,026**		**23,595**			**1,879,857**	**8,299,283**
1725																
1726	75.55.1	DCS							2,900,000	0		3,853			335,245	3,235,245
1727		New DCS	Based on 3,710 IO Points	Est.	1	LS	2600000		2,600,000	0	2,900	3,335	INEL	87.02	290,212	2,890,212
1728		Turbine Control System Upgrade	Based on770 IO Points (Most Existing)	Est.	1	LS	300000		300,000	0	450	518	INEL	87.02	45,033	345,033
1729																
1730	75.55.2	High Fidelity Simulator		Est.	1	LS	1346000		1,346,000	0	1,500	1,725	INEL	87.02	150,110	1,496,110
1731																
1732	75.55.3	CEMS	(2) Shelters, (2) Sets of Stack Monitoring Equipment	Est.	2	LS	330000		660,000	0	600	1,380	INEL	87.02	120,088	780,088
1733		CEMS on Auxiliary Boiler Stack	Not Included													Not Included
1734																
1735	75.55.4	BOP Field Mounted Instruments							700,400	545,310		11,117			851,566	2,097,276
1736		Analyzers		Est.	8	EA	3000		24,000	0	7	64	INPE	76.60	4,933	28,933
1737		Tubing w/Fittings, Adapters, Supports, & Insulation		Est.	240	LF		6.5	0	1,560	0.35	97	INPE	76.60	7,400	8,960
1738		Flow Elements		Est.	57	EA	3000		171,000	0	6	393	INPE	76.60	30,127	201,127
1739		Level Switches		Est.	41	EA	300		12,300	0	7	330	INPE	76.60	25,282	37,582
1740		Valves		Est.	82	EA		200	0	16,400	1	94	INPE	76.60	7,223	23,623

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13																
14																
1741		Transmitters		Est.	265	EA	1700		450,500	0	7	2,133	INPE	76.60	163,407	613,907
1742		Tubing w/Fittings, Adapters, Supports, & Insulation		Est.	15,900	LF		6.5	0	103,350	0.35	6,400	INPE	76.60	490,221	593,571
1743		Valves		Est.	795	EA		200	0	159,000	1	914	INPE	76.60	70,032	229,032
1744		Temperature Elements		Est.	142	EA	300		42,600	0	0.50	82	INPE	76.60	6,254	48,854
1745		Instrument Stands / Racks / Heated Enclosures		Est.	1	LS		265000	0	265,000	530	610	INPE	76.60	46,688	311,688
1746																
1747	75.55.5	Vendor Furnished Field Mounted Instruments							0	267,716		5,520			422,850	690,566
1748		CTG Related Instruments	Installation Incl w/ Equipment	Est.	390	EA	0		0	0						0
1749		Tubing w/Fittings, Adapters, Supports, & Insulation		Est.	4,680	LF		6.5	0	30,420	0.35	1,884	INPE	76.60	144,291	174,711
1750		Valves		Est.	351	EA		200	0	70,200	1	404	INPE	76.60	30,920	101,120
1751		HRSG Related Instruments	Installation Incl w/ Equipment	Est.	462	EA	0		0	0						0
1752		Tubing w/Fittings, Adapters, Supports, & Insulation		Est.	5,544	LF		6.5	0	36,036	0.35	2,231	INPE	76.60	170,930	206,966
1753		Valves		Est.	416	EA		200	0	83,160	1	478	INPE	76.60	36,628	119,788
1754		Enclosures		Est.	50	EA		700	0	35,000	4	230	INPE	76.60	17,618	52,618
1755		BOP Vendor Related Instruments	Installation Incl w/ Equipment	Est.	50	EA	0		0	0						0
1756		Tubing w/Fittings, Adapters, Supports, & Insulation		Est.	600	LF		6.5	0	3,900	0.35	242	INPE	76.60	18,499	22,399
1757		Valves		Est.	45	EA		200	0	9,000	1	52	INPE	76.60	3,964	12,964
1758																
1765	**75.89**	**SUBTOTAL - DIRECT COSTS, DCS**							**5,606,400**	**1,505,432**		**47,381**		**83.82**	**3,971,517**	**11,083,349**
1766																
1767	**75.90**	**CONSTRUCTION INDIRECTS, DCS**							**280,320**	**353,776**		**4,120**			**1,442,493**	**2,076,589**
1768		Additional Crane Allowance			1	LS				0					0	0
1769		Mobilization / Demobilization - Included in Wage Rates Above														
1770		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
1771		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						4,120		83.82	345,000	345,000
1772		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					5,150				362,762	362,762
1773		Per Diem	None		0.00	HR						0			0	0
1774		Consumables - % of Subtotal Above			0.5	%				7,527					19,858	27,385
1775		Freight on Material - % of Subtotal Above			5.0	%				75,272						75,272
1776		Freight on Equipment - % of Subtotal Above			5.0	%			280,320							280,320
1777		Scaffolding - % of Subtotal Above			3.0	%				45,163					119,146	164,308
1778		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				225,815					595,728	821,542
1780	**75.98**	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, DCS**							**5,886,720**	**1,859,208**		**51,501**		**105.12**	**5,414,010**	**13,159,938**
1781																
1782	**75.99**	**SUBCONTRACTS**							**0**	**0**		**0**			**0**	**0**
1786																
1787	**75.00**	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, DCS**							**5,886,720**	**1,859,208**		**51,501**		**105.12**	**5,414,010**	**13,159,938**
1788																

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13																
14																
1789																
1790																
1791	**80.00**	**BOP**														**82,406,646**
1792																
1795	**80.20**	**CONCRETE**							**0**	**286,062**		**6,881**			**563,341**	**849,402**
1796																
1797	80.20.1	CTG Inlet Air Chiller Foundations	Individual Drilled Concrete Piers, 36" Dia. X 10' Long						0	16,750		325			23,819	40,569
1798		Excavation		Est.	100	CY		0	0	0	0.2	23	EXFD	88.87	2,044	2,044
1799		Backfill		Est.	0	CY		0	0	0	0.15	0	EXFD	88.87	0	0
1800		Concrete		Est.	100	CY		120	0	12,000	1.5	173	COND	68.54	11,823	23,823
1801		Reinforcing		Est.	5	TN		950	0	4,750	22.5	129	REIN	76.92	9,952	14,702
1802																
1803	80.20.2	Ammonia Storage Tank Foundation	Includes Mat, Piers, Pump Pads, and Curbs						0	58,038		1,278			111,948	169,986
1804		Excavation		Est.	200	CY		0	0	0	0.2	46	EXFD	88.87	4,088	4,088
1805		Backfill		Est.	40	CY		0	0	0	0.15	7	EXFD	88.87	613	613
1806		Concrete		Est.	155	CY		120	0	18,600	1.5	267	COND	68.54	18,326	36,926
1807		Reinforcing		Est.	9	TN		950	0	8,550	22.5	233	REIN	76.92	17,913	26,463
1808		Formwork		Est.	3150	SF		2.25	0	7,088	0.2	725	FORM	98.01	71,008	78,096
1809		Piles	16" Dia. X 68' Long Augercast Piles	Est.	10	EA		2380	0	23,800	incl w/matl	incl w/matl				23,800
1810																
1811	80.20.3	HRSG Blowdown Sump							0	46,465		2,223			196,424	242,889
1812		Excavation		Est.	1100	CY		0	0	0	0.2	253	EXFD	88.87	22,484	22,484
1813		Backfill		Est.	700	CY		0	0	0	0.15	121	EXFD	88.87	10,731	10,731
1814		Concrete		Est.	140	CY		120	0	16,800	1.5	242	COND	68.54	16,552	33,352
1815		Reinforcing		Est.	20	TN		950	0	19,000	22.5	518	REIN	76.92	39,806	58,806
1816		Formwork		Est.	4500	SF		2.25	0	10,125	0.2	1,035	FORM	98.01	101,440	111,565
1817		Formwork Shoring	Allowance	Est.	120	SF		4.5	0	540	0.40	55	FORM	98.01	5,410	5,950
1818																
1819	80.20.4	Aux Boiler Foundation	Mat Foundation, 65' x 30'						0	83,125		882			70,174	153,299
1820		Excavation		Est.	250	CY		0	0	0	0.2	58	EXFD	88.87	5,110	5,110
1821		Backfill		Est.	80	CY		0	0	0	0.15	14	EXFD	88.87	1,226	1,226
1822		Concrete		Est.	200	CY		120	0	24,000	1.5	345	COND	68.54	23,646	47,646
1823		Reinforcing		Est.	10	TN		950	0	9,500	22.5	259	REIN	76.92	19,903	29,403
1824		Formwork		Est.	900	SF		2.25	0	2,025	0.2	207	FORM	98.01	20,288	22,313
1825		Piles	16" Dia. X 68' Long Augercast Piles	Est.	20	EA		2380	0	47,600	incl w/matl	incl w/matl				47,600
1826																
1827	80.20.5	Bulk Gas Storage Pad							0	30,275		748			59,896	90,171
1828		Excavation		Est.	200	CY		0	0	0	0.2	46	EXFD	88.87	4,088	4,088
1829		Backfill		Est.	20	CY		0	0	0	0.15	3	EXFD	88.87	307	307
1830		Concrete		Est.	180	CY		120	0	21,600	1.5	311	COND	68.54	21,282	42,882
1831		Reinforcing		Est.	7	TN		950	0	6,650	22.5	181	REIN	76.92	13,932	20,582
1832		Formwork		Est.	900	SF		2.25	0	2,025	0.2	207	FORM	98.01	20,288	22,313
1833																

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13																
14																
1834	80.20.6	CO2 Storage Tank (Relocated)	6' x 15' x 2' Thick						0	1,409		45			3,803	5,212
1835		Excavation		Est.	11	CY		0	0	0	0.2	3	EXFD	88.87	225	225
1836		Backfill		Est.	4	CY		0	0	0	0.15	1	EXFD	88.87	61	61
1837		Concrete		Est.	7	CY		120	0	840	1.5	12	COND	68.54	828	1,668
1838		Reinforcing		Est.	0.4	TN		950	0	380	22.5	10	REIN	76.92	796	1,176
1839		Formwork		Est.	84	SF		2.25	0	189	0.2	19	FORM	98.01	1,894	2,083
1840																
1841	80.20.7	BOP Foundation Embedments							0	50,000		1,380			97,276	147,276
1842		Embeds		Est.	10	TN		5,000	0	50,000	120.00	1,380	CARP	70.49	97,276	147,276
1843																
1844	**80.30**	**STRUCTURAL STEEL**							**0**	**3,350**		**12**			**957**	**4,307**
1845																
1846	80.30.1	HRSG Blowdown Sump Handrails							0	3,350		12			957	4,307
1847		Handrail		Est.	100	SF	0	33.5	0	3,350	0.10	12	GALL	83.21	957	4,307
1848																
1849	**80.40**	**ARCHITECTURAL**							**0**	**123,750**		**0**			**0**	**123,750**
1850																
1851	80.40.1	Bulk Gas Storage Enclosure							0	123,750		0			0	123,750
1852		Pre Engineered Building, 55' x 30' x 20' High (Siding on 3 Sides, Open 4th Side)	Subcontract Price, Includes Installation Labor	Est.	1,650	SF		75	0	123,750	incl w/matl	incl w/matl				123,750
1853																
1854	**80.45**	**PAINTING / COATING**							**0**	**150,000**		**8,625**			**581,929**	**731,929**
1855																
1856	80.45.1	Touch-up & Finish Painting		Est.	150,000	SF		1	0	150,000	0.05	8,625	PNTR	67.47	581,929	731,929
1857																
1862	**80.60**	**MECHANICAL**							**12,121,000**	**0**		**17,906**			**1,709,248**	**13,830,248**
1863																
1864	80.60.1	CTG Inlet Air Chiller Equipment Package		Est.	2	LS	4250000		8,500,000	0	3,000	6,900	MECH	87.74	605,406	9,105,406
1865																
1866	80.60.2	Auxiliary Boiler	80,000 lb/hr	Est.	1	LS	1751000		1,751,000	0	6,000	6,900	SGEN	107.70	743,130	2,494,130
1867																
1868	80.60.3	Heat Exchangers							480,000	0		690			60,541	540,541
1869		CCW Heat Exchanger	Shell & Tube Design, 100% Each.	Est.	2	Ea.	240000		480,000	0	300	690	MECH	87.74	60,541	540,541
1870																
1871	80.60.4	Miscellaneous Pumps							180,000	0		736			63,428	243,428
1872		Auxiliary Cooling Water	Not Required													Not Required
1873		Closed Cooling Water		Est	2	Ea.	55000		110,000	0	200	460	PUMP	86.18	39,643	149,643
1874		Hydrogen Cooler Pumps		Est	2	Ea.	35000		70,000	0	120	276	PUMP	86.18	23,786	93,786
1875																
1876	80.60.5	Shop Fabricated Tanks							40,000	0		81			7,070	47,070
1877		CCW Head Tank	100%	Est	1	Ea.	15000		15,000	0	20	23	TANK	87.82	2,020	17,020
1878		Steam Turbine Drains Tank	10,500 Gal. Capacity	Est	1	Ea.	25000		25,000	0	50	58	TANK	87.82	5,050	30,050
1879																

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13																
14																
1880	80.60.6	Bulk Gas Storage Provisions							80,000	0		460			40,360	120,360
1881		Nitrogen Storage	Storage Tank w/ manifolds & Regulators	Est.	1	LS	30000		30,000	0	150	173	MECH	87.74	15,135	45,135
1882		Hydrogen Storage	Storage Tubes w/ manifolds & Regulators	Est.	1	LS	20000		20,000	0	100	115	MECH	87.74	10,090	30,090
1883		CO2 Storage	Storage Tank w/ manifolds & Regulators	Est.	1	LS	30000		30,000	0	150	173	MECH	87.74	15,135	45,135
1884																
1885	80.60.7	Ammonia Storage & Forwarding Equipment							400,000	0		943			82,739	482,739
1886		Aqueous Ammonia Storage & Forwarding Skid	Includes 15,000 gal. CS Tank for 10 Day Storage	Est.	1	LS	400000		400,000	0	820	943	MECH	87.74	82,739	482,739
1887																
1888	80.60.8	Air Compressors & Accessories							15,000	0		81			7,070	22,070
1889		Air Compressors	Existing													Existing
1890		Air Receiver	CS w/ Epoxy Coating	Est.	1	Ea.	15000		15,000	0	70	81	TANK	87.82	7,070	22,070
1891		Air Dryers	Existing													Existing
1892																
1893	80.60.9	Chemical Feed & Sample Systems							675,000	0		828			74,280	749,280
1894		Chemical Feed System	Chemical Feed system for FW system only	Est.	1	LS	375000		375,000	0	270	311	WTRT	89.71	27,855	402,855
1895		Steam & Water Analysis System	Complete System as Required	Est.	1	Ea.	300000		300,000	0	450	518	WTRT	89.71	46,425	346,425
1896																
1897	80.60.10	Relocate Existing CO2 Storage Tank		Est.	1	LS	0		0	0	250	288	MECH	87.74	25,225	25,225
1898																
1899	**80.70**	**PIPING**							**9,072,000**	**16,962,959**		**200,827**			**18,682,955**	**44,717,914**
1900																
1901	80.70.1	Alloy Piping							0	10,156,055		54,775			5,095,672	15,251,727
1902		Large Bore Alloy Pipe (Above Ground)			5,830	LF				10,029,180		48,329			4,496,024	14,525,204
1903		Main Steam System	P91, 24" dia., Sch. 160	Est.	500	LF		4100	0	2,050,000	12.45	7,159	SPNG	93.03	665,979	2,715,979
1904		Main Steam System	P91, 18" dia., Sch. 160	Est.	470	LF		2330	0	1,095,100	8.90	4,810	SPNG	93.03	447,516	1,542,616
1905		Main Steam System	P91, 14" dia., Sch. 160	Est.	100	LF		1590	0	159,000	7.00	805	SPNG	93.03	74,889	233,889
1906		Main Steam System	P91, 12" dia., Sch. 160	Est.	100	LF		1210	0	121,000	6.00	690	SPNG	93.03	64,191	185,191
1907		Main Steam System	P91, 6" dia., Sch. XXS	Est.	290	LF		334	0	96,860	3.10	1,034	SPNG	93.03	96,179	193,039
1908		Hot Reheat System	P91, 32" dia., 0.9" Wall	Est.	500	LF		2690	0	1,345,000	8.80	5,060	SPNG	93.03	470,732	1,815,732
1909		Hot Reheat System	P91, 24" dia., Sch. 60	Est.	450	LF		1850	0	832,500	8.00	4,140	SPNG	93.03	385,144	1,217,644
1910		Hot Reheat System	P91, 16" dia., Sch. 60	Est.	100	LF		850	0	85,000	4.40	506	SPNG	93.03	47,073	132,073
1911		Hot Reheat System	P91, 12" dia., Sch. 80	Est.	100	LF		690	0	69,000	4.20	483	SPNG	93.03	44,933	113,933
1912		Cold Reheat System	P11, 32" dia., 0.9" Wall	Est.	540	LF		1650	0	891,000	8.20	5,092	SPNG	93.03	473,727	1,364,727
1913		Cold Reheat System	P11, 20" dia., Sch. 40	Est.	530	LF		810	0	429,300	5.20	3,169	SPNG	93.03	294,849	724,149
1914		Cold Reheat System	P11, 12" dia., Sch. 40	Est.	100	LF		300	0	30,000	3.10	357	SPNG	93.03	33,165	63,165
1915		HR Bypass System	P91, 26" dia., Sch. XS	Est.	80	LF		1500	0	120,000	6.50	598	SPNG	93.03	55,632	175,632
1916		HR Bypass System	P22, 26" dia., Sch. Std	Est.	40	LF		630	0	25,200	4.10	189	SPNG	93.03	17,545	42,745
1917		HR Bypass System	P91, 24" dia., Sch. 60	Est.	1,240	LF		1850	0	2,294,000	8.00	11,408	SPNG	93.03	1,061,286	3,355,286
1918		MS Bypass System	P91, 20" dia., Sch. 60	Est.	60	LF		1260	0	75,600	6.10	421	SPNG	93.03	39,156	114,756

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1919		MS Bypass System	P91, 20" dia., Sch. 40	Est.	60	LF		930	0	55,800	5.10	352	SPNG	93.03	32,737	88,537
1920		MS Bypass System	P91, 16" dia., Sch. 160	Est.	60	LF		1850	0	111,000	7.70	531	SPNG	93.03	49,427	160,427
1921		Equipment Drains System	P91, 10" dia., Sch 40	Est.	255	LF		306	0	78,030	2.60	762	SPNG	93.03	70,931	148,961
1922		Equipment Drains System	P22, 10" dia., Sch. 40	Est.	255	LF		258	0	65,790	2.60	762	SPNG	93.03	70,931	136,721
1923		Small Bore Alloy Pipe (Above Ground)			4,200	LF				126,875		6,446			599,648	726,523
1924		Hot Reheat System	P91, 2" dia., Sch 80	Est.	1,450	LF		40	0	58,000	1.40	2,335	SPNG	93.03	217,179	275,179
1925		Main Steam System	P91, 1-1/2" dia., Sch 80	Est.	1,300	LF		29	0	37,700	1.30	1,944	SPNG	93.03	180,804	218,504
1926		Cold Reheat System	P11, 2" dia., Sch 80	Est.	1,450	LF		21.5	0	31,175	1.30	2,168	SPNG	93.03	201,666	232,841
1927																
1928	80.70.2	BOP Piping							0	3,676,904		117,694			10,949,045	14,625,949
1929																
1930		Large Bore BOP Pipe 2-1/2"& Larger - Above Ground			28,745	LF			0	2,714,389		69,500			6,465,539	9,179,928
1931		Ammonia System	SS, 3" dia., Sch 40S	Est.	170	LF		49	0	8,330	1.63	319	SPNG	93.03	29,645	37,975
1932		Auxiliary Cooling Water System	CS, 16" dia., Sch. Std.	Est.	150	LF		245	0	36,750	3.45	595	SPNG	93.03	55,364	92,114
1933		Auxiliary Steam System	CS, 10" dia., Sch. 40	Est.	900	LF		110	0	99,000	2.40	2,484	SPNG	93.03	231,087	330,087
1934		Auxiliary Steam System	CS, 3" dia., Sch. 40	Est.	1,300	LF		20	0	26,000	1.34	2,003	SPNG	93.03	186,367	212,367
1935		Boiler Drains System	CS, 10" dia., Sch. 40	Est.	60	LF		110	0	6,600	2.40	166	SPNG	93.03	15,406	22,006
1936		Bottle Gas System	SS, 3" dia., Sch 40S	Est.	600	LF		49	0	29,400	1.63	1,125	SPNG	93.03	104,631	134,031
1937		Chilled Water System	CS, 24" dia., Sch. Std.	Est.	200	LF		456	0	91,200	5.34	1,228	SPNG	93.03	114,259	205,459
1938		Chilled Water System	CS, 12" dia., Sch. Std.	Est.	300	LF		189	0	56,700	2.80	966	SPNG	93.03	89,867	146,567
1939		Chilled Water System	CS, 4" dia., Sch. 40	Est.	120	LF		23	0	2,760	1.48	204	SPNG	93.03	19,000	21,760
1940		Circulating Water Makeup System	SS, 16" dia., Sch STD	Est.	250	LF		366	0	91,500	4.25	1,222	SPNG	93.03	113,671	205,171
1941		Circulating Water Blowdown and Makeup System	CS, 8" dia., Sch. 40	Est.	100	LF		61.5	0	6,150	1.92	221	SPNG	93.03	20,541	26,691
1942		Circulating Water Blowdown and Makeup System	CS, 4" dia., Sch. 40	Est.	200	LF		23	0	4,600	1.48	340	SPNG	93.03	31,667	36,267
1943		Closed Cooling Water System	CS, 16" dia., Sch. Std.	Est.	1,300	LF		245	0	318,500	3.45	5,158	SPNG	93.03	479,825	798,325
1944		Closed Cooling Water System	CS, 10" dia., Sch. 40	Est.	2,200	LF		110	0	242,000	2.40	6,072	SPNG	93.03	564,878	806,878
1945		Closed Cooling Water System	CS, 4" dia., Sch. 40	Est.	1,200	LF		23	0	27,600	1.48	2,042	SPNG	93.03	190,004	217,604
1946		Condensate System	A106C CS, 20" dia., Sch. Std.	Est.	80	LF		528	0	42,240	5.86	539	SPNG	93.03	50,154	92,394
1947		Condensate System	A106C CS, 12" dia., Sch. Std.	Est.	940	LF		207.9	0	195,426	2.80	3,027	SPNG	93.03	281,583	477,009
1948		Condensate System	A106C CS, 10" dia., Sch. 40	Est.	350	LF		121	0	42,350	2.40	966	SPNG	93.03	89,867	132,217
1949		Condensate System	A106C CS, 8" dia., Sch. 40	Est.	220	LF		67.65	0	14,883	1.92	486	SPNG	93.03	45,190	60,073
1950		Condensate System	A106C CS, 6" dia., Sch. 40	Est.	180	LF		45.87	0	8,257	1.61	333	SPNG	93.03	31,004	39,261
1951		Condensate System	A106C CS, 4" dia., Sch. 40	Est.	520	LF		25.3	0	13,156	1.48	885	SPNG	93.03	82,335	95,491
1952		Condensate System	A106C CS, 3" dia., Sch. 40	Est.	160	LF		22	0	3,520	1.34	247	SPNG	93.03	22,937	26,457
1953		Condenser Vacuum System	Existing													
1954		Demineralized Water System	SS, 6" dia., Sch 40S	Est.	600	LF		111	0	66,600	2.02	1,394	SPNG	93.03	129,665	196,265
1955		Demineralized Water System	SS, 3" dia., Sch 40S	Est.	770	LF		49	0	37,730	1.63	1,443	SPNG	93.03	134,276	172,006
1956		Equipment Drains System	CS, 10" dia., Sch. 40	Est.	255	LF		110	0	28,050	2.40	704	SPNG	93.03	65,475	93,525
1957		Equipment Drains System	CS, 4" dia., Sch. 40	Est.	1,200	LF		23	0	27,600	1.48	2,042	SPNG	93.03	190,004	217,604
1958		Feed Water System	A106C CS, 12" dia., Sch. Std.	Est.	200	LF		207.9	0	41,580	2.80	644	SPNG	93.03	59,911	101,491
1959		Feed Water System	A106C CS, 10" dia., Sch. 160	Est.	160	LF		392.7	0	62,832	6.00	1,104	SPNG	93.03	102,705	165,537
1960		Feed Water System	A106C CS, 10" dia., Sch. 40	Est.	80	LF		121	0	9,680	2.40	221	SPNG	93.03	20,541	30,221
1961		Feed Water System	A106C CS, 4" dia., Sch. 40	Est.	480	LF		25.3	0	12,144	1.48	817	SPNG	93.03	76,002	88,146
1962		Feed Water System	A106C CS, 3" dia., Sch. 40	Est.	200	LF		22	0	4,400	1.34	308	SPNG	93.03	28,672	33,072

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1963		Fire Protection System	CS, 8" dia., Sch. 40	Est.	100	LF		61.5	0	6,150	1.92	221	SPNG	93.03	20,541	26,691
1964		Fuel Gas System	CS, 16" dia., Sch. 60	Est.	40	LF		372	0	14,880	5.23	241	SPNG	93.03	22,381	37,261
1965		Fuel Gas System	SS, 8" dia., Sch. 80S	Est.	250	LF		270	0	67,500	3.70	1,064	SPNG	93.03	98,961	166,461
1966		Fuel Gas System	CS, 8" dia., Sch. 60	Est.	280	LF		76.7	0	21,476	2.18	702	SPNG	93.03	65,303	86,779
1967		Fuel Gas System	CS, 6" dia., Sch. 60	Est.	280	LF		51.2	0	14,336	1.80	580	SPNG	93.03	53,920	68,256
1968		Fuel Gas System	CS, 4" dia., Sch. 60	Est.	200	LF		30.8	0	6,160	1.62	373	SPNG	93.03	34,663	40,823
1969		HR Steam Bypass System	CS, 26" dia., Sch. Std.	Est.	200	LF		540	0	108,000	8.40	1,932	SPNG	93.03	179,734	287,734
1970		Instrument Air System	SS, 6" dia., Sch 40S	Est.	435	LF		111	0	48,285	2.02	1,011	SPNG	93.03	94,007	142,292
1971		Instrument Air System	SS, 4" dia., Sch 40S	Est.	850	LF		68.3	0	58,055	1.82	1,779	SPNG	93.03	165,505	223,560
1972		Instrument Air System	SS, 3" dia., Sch 40S	Est.	1,100	LF		49	0	53,900	1.63	2,062	SPNG	93.03	191,823	245,723
1973		LP Steam System	CS, 18" dia., Sch. Std.	Est.	620	LF		310	0	192,200	4.10	2,923	SPNG	93.03	271,955	464,155
1974		LP Steam System	CS, 12" dia., Sch. Std.	Est.	510	LF		189	0	96,390	2.80	1,642	SPNG	93.03	152,774	249,164
1975		LP Steam Bypass System	CS, 10" dia., Sch. 40	Est.	220	LF		110	0	24,200	2.40	607	SPNG	93.03	56,488	80,688
1976		LP Steam Bypass System	CS, 8" dia., Sch. 40	Est.	670	LF		61.5	0	41,205	1.92	1,479	SPNG	93.03	137,625	178,830
1977		Oily Water System	CS, 6" dia., Sch. 40	Est.	600	LF		41.7	0	25,020	1.61	1,111	SPNG	93.03	103,347	128,367
1978		Potable Water System (Tepid Recirc)	SS, 3" dia., Sch 40S	Est.	450	LF		49	0	22,050	1.63	844	SPNG	93.03	78,473	100,523
1979		Service Air System	CS, 6" dia., Sch. 40	Est.	435	LF		41.7	0	18,140	1.61	805	SPNG	93.03	74,927	93,066
1980		Service Air System	CS, 4" dia., Sch. 40	Est.	1,050	LF		23	0	24,150	1.48	1,787	SPNG	93.03	166,254	190,404
1981		Service Air System	CS, 3" dia., Sch. 40	Est.	1,800	LF		20	0	36,000	1.34	2,774	SPNG	93.03	258,047	294,047
1982		Service Water System	SS, 6" dia., Sch 40S	Est.	120	LF		111	0	13,320	2.02	279	SPNG	93.03	25,933	39,253
1983		Service Water System	SS, 4" dia., Sch 40S	Est.	1,050	LF		68.3	0	71,715	1.82	2,198	SPNG	93.03	204,447	276,162
1984		Service Water System	SS, 3" dia., Sch 40S	Est.	1,800	LF		49	0	88,200	1.63	3,374	SPNG	93.03	313,893	402,093
1985		Waste Water System	CS, 4" dia., Sch. 40	Est.	240	LF		23	0	5,520	1.48	408	SPNG	93.03	38,001	43,521
1986		Small Bore BOP Pipe 2" & Smaller - Above Ground			32,700	LF			0	962,515		48,194			4,483,506	5,446,021
1987		Auxiliary Steam System	CS, 2" dia., Sch. 80	Est.	950	LF		22.2	0	21,090	1.26	1,377	SPNG	93.03	128,060	149,150
1988		Chemical Feed System	SS, 2" dia., Sch. 80S	Est.	1,200	LF		67.3	0	80,760	2.00	2,760	SPNG	93.03	256,763	337,523
1989		Chemical Feed System	A20, 2" dia., Sch. 80S	Est.	350	LF		87	0	30,450	2.20	886	SPNG	93.03	82,378	112,828
1990		Chemical Feed System	CPVC, 2" dia., Sch. 80	Est.	350	LF		2	0	700	0.50	201	SPNG	93.03	18,722	19,422
1991		Chilled Water System	CS, 2" dia., Sch. 80	Est.	50	LF		22.2	0	1,110	1.26	72	SPNG	93.03	6,740	7,850
1992		Closed Cooling Water System	CS, 2" dia., Sch. 80	Est.	2,800	LF		22.2	0	62,160	1.26	4,057	SPNG	93.03	377,441	439,601
1993		Cold Reheat System	CS, 2" dia., Sch. 80	Est.	1,950	LF		22.2	0	43,290	1.26	2,826	SPNG	93.03	262,861	306,151
1994		Condensate System	CS, 1-1/2" dia., Sch. 80	Est.	200	LF		19.3	0	3,860	1.16	267	SPNG	93.03	24,820	28,680
1995		Demineralized Water System	SS, 1-1/2" dia., Sch. 40S	Est.	1,600	LF		33.7	0	53,920	1.32	2,429	SPNG	93.03	225,951	279,871
1996		Feedwater System	CS, 2" dia., Sch. 80	Est.	2,050	LF		22.2	0	45,510	1.26	2,970	SPNG	93.03	276,341	321,851
1997		Fuel Gas System	SS, 2" dia., Sch. 80S	Est.	500	LF		67.3	0	33,650	2.00	1,150	SPNG	93.03	106,985	140,635
1998		Fuel Gas System	CS, 2" dia., Sch. 80	Est.	850	LF		22.2	0	18,870	1.26	1,232	SPNG	93.03	114,580	133,450
1999		Fuel Oil System	CS, 2" dia., Sch. 80	Est.	850	LF		22.2	0	18,870	1.26	1,232	SPNG	93.03	114,580	133,450
2000		HRSG Vents & Drains System	CS, 1-1/2" dia., Sch. 80	Est.	500	LF		19.3	0	9,650	1.16	667	SPNG	93.03	62,051	71,701
2001		Bulk Gas System	SS, 2" dia., Sch. 80S	Est.	2,400	LF		67.3	0	161,520	2.00	5,520	SPNG	93.03	513,526	675,046
2002		Instrument Air System	SS, 1-1/2" dia., Sch. 40S	Est.	6,200	LF		33.7	0	208,940	1.32	9,412	SPNG	93.03	875,561	1,084,501
2003		LP Steam System	CS, 2" dia., Sch. 80	Est.	2,000	LF		22.2	0	44,400	1.26	2,898	SPNG	93.03	269,601	314,001
2004		Potable Water System	SS, 2" dia., Sch. 40S	Est.	100	LF		48.8	0	4,880	1.44	166	SPNG	93.03	15,406	20,286
2005		Process Sampling System	CS, 1/2" avg. dia. (Sample Tubing)	Est.	4,450	LF		6.5	0	28,925	0.60	3,071	SPNG	93.03	285,649	314,574
2006		Raw Water System	CS, 2" dia., Sch. 80	Est.	150	LF		22.2	0	3,330	1.26	217	SPNG	93.03	20,220	23,550

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2007		Service Air System	CS, 1-1/2" dia., Sch. 80	Est.	2,400	LF		19.3	0	46,320	1.16	3,202	SPNG	93.03	297,845	344,165
2008		Service Water System	SS, 2" dia., Sch. 80S	Est.	500	LF		67.3	0	33,650	2.00	1,150	SPNG	93.03	106,985	140,635
2009		Waste Water System	CS, 2" dia., Sch. 80	Est.	300	LF		22.2	0	6,660	1.26	435	SPNG	93.03	40,440	47,100
2010																
2011	80.70.3	Pipe Supports, HP (Engineered Supports)		Est.	1	Lot		2100000	0	2,100,000	3,040	3,496	SPNG	93.03	325,233	2,425,233
2012																
2013	80.70.4	Pipe Supports, LP		Est.	1	Lot		750000	0	750,000	4,700	5,405	SPNG	93.03	502,827	1,252,827
2014																
2015	80.70.5	C/T Interconnecting Piping		Est.	2	LS		140000	0	280,000	2,000	4,600	SPNG	93.03	427,938	707,938
2016																
2017	80.70.6	Valves & Specialties							9,072,000	0		14,858			1,382,240	10,454,240
2018		Turbine Bypass Valves		Est.	1	LS	800000		800,000	0	1,070	1,231	SPNG	93.03	114,473	914,473
2019		Turbine Bypass Attemperator Valves	Included Above													Included Above
2020		CR Check Valves		Est.	1	Ea.	80000		80,000	0	80	92	SPNG	93.03	8,559	88,559
2021		Reheater Relief Valves		B	4	Ea.	15500		62,000	0	16	74	SPNG	93.03	6,847	68,847
2022		Large OD CW Butterfly Valves, W/ Operators	Existing													Existing
2023		Large Bore HP Valves 2-1/2" & Larger		Est.	120	Ea.	30000		3,600,000	0	16	2,208	SPNG	93.03	205,410	3,805,410
2024		Small Bore HP Valves <2-1/2"		Est.	450	Ea.	2500		1,125,000	0	6	3,105	SPNG	93.03	288,858	1,413,858
2025		Control Valves		Est.	73	Ea.	15068.49		1,100,000	0	12	1,007	SPNG	93.03	93,718	1,193,718
2026		Large Bore BOP Valves 2-1/2" & Larger		Est.	375	Ea.	3500		1,312,500	0	6	2,588	SPNG	93.03	240,715	1,553,215
2027		Small Bore BOP Valves <2-1/2"		Est.	900	Ea.	325		292,500	0	3	3,105	SPNG	93.03	288,858	581,358
2028		Circulating Water Expansion Joints	Existing													Existing
2029		Specialties		Est.	60	Ea.	4000		240,000	0	14	966	SPNG	93.03	89,867	329,867
2030		Boiler Feed Pump Suction Duplex Strainers		Est.	4	Ea.	80000		320,000	0	60	276	SPNG	93.03	25,676	345,676
2031		Condensate Pump Suction Duplex Strainers		Est.	2	Ea.	40000		80,000	0	60	138	SPNG	93.03	12,838	92,838
2032		CCW Duplex Strainers		Est.	2	Ea.	30000		60,000	0	30	69	SPNG	93.03	6,419	66,419
2033																
2034	**80.80**	**INSULATION**							**0**	**1,505,000**		**71,392**			**5,345,111**	**6,850,111**
2035																
2036	80.80.1	Thermal Insulation/Lagging	Allowance	Est.	50,000	SF		19	0	950,000	1.03	59,225	INSL	74.51	4,412,855	5,362,855
2037																
2038	80.80.2	HRSG Piping & Drum Insulation and Lagging	Allowance	Est.	2	LS		180000	0	360,000	3,600	8,280	INSL	74.51	616,943	976,943
2039																
2040	80.80.3	HRSG Stack Insulation to Damper Elevation	Allowance	Est.	13,000	SF		15	0	195,000	0	3,887	DINS	81.12	315,313	510,313
2041																
2042	**80.89**	**SUBTOTAL - DIRECT COSTS, BOP**							**21,193,000**	**19,031,121**		**305,642**		**87.96**	**26,883,541**	**67,107,661**
2043																

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13																
14																
2044	80.90	CONSTRUCTION INDIRECTS, BOP							1,059,650	4,472,313		26,578			9,767,021	15,298,985
2045		Additional Crane Allowance			1	LS				0					0	0
2046		Mobilization / Demobilization - Included in Wage Rates Above														
2047		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
2048		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						26,578		87.96	2,338,000	2,338,000
2049		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					33,222				2,455,566	2,455,566
2050		Per Diem	None		0.00	HR						0			0	0
2051		Consumables - % of Subtotal Above			0.5	%				95,156					134,418	229,573
2052		Freight on Material - % of Subtotal Above			5.0	%				951,556						951,556
2053		Freight on Equipment - % of Subtotal Above			5.0	%			1,059,650							1,059,650
2054		Scaffolding - % of Subtotal Above			3.0	%				570,934					806,506	1,377,440
2055		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				2,854,668					4,032,531	6,887,199
2057	80.98	TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, BOP							22,252,650	23,503,434		332,219		110.32	36,650,562	82,406,646
2058																
2059	80.99	SUBCONTRACTS							0	0		0			0	0
2063																
2064	80.00	TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, BOP							22,252,650	23,503,434		332,219		110.32	36,650,562	82,406,646
2065																
2066																
2067																
2068	90.00	COMMON														26,908,001
2069																
2072	90.20	CONCRETE							0	1,751,594		24,700			1,846,933	3,598,527
2073																
2074	90.20.1	Combustion Turbine Building Foundation	Mat Foundation						0	1,512,788		21,839			1,612,720	3,125,507
2075		Excavation		Est.	2,900	CY		0	0	0	0.2	667	EXFD	88.87	59,276	59,276
2076		Backfill		Est.	400	CY		0	0	0	0.15	69	EXFD	88.87	6,132	6,132
2077		Concrete		Est.	4275	CY		120	0	513,000	1.9	9,341	COND	68.54	640,224	1,153,224
2078		Reinforcing		Est.	311	TN		950	0	295,450	22.5	8,047	REIN	76.92	618,985	914,435
2079		Embeds		Est.	20	TN		5,000	0	100,000	120.00	2,760	CARP	70.49	194,552	294,552
2080		Formwork		Est.	4150	SF		2.25	0	9,338	0.2	955	FORM	98.01	93,551	102,888
2081		Piles	16" Dia. X 68' Long Augercast Piles	Est.	250	EA		2380	0	595,000	incl w/matl	incl w/matl				595,000
2082																

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13																
14																
2083	90.20.2	Steam Turbine Building Foundation	Additions in Existing Building						0	3,723		146			12,021	15,744
2084		CCW Heat Exchanger Foundations	(2) @ 4' x 15' x 2' High													
2085		Hilti Epoxy Grout Dowels	#4 x 8" Long	Est.	36	EA		10	0	360	0.60	25	REIN	76.92	1,911	2,271
2086		Concrete		Est.	9	CY		120	0	1,080	1.9	20	COND	68.54	1,348	2,428
2087		Reinforcing		Est.	0.4	TN		950	0	380	22.5	10	REIN	76.92	796	1,176
2088		Formwork		Est.	150	SF		2.25	0	338	0.2	35	FORM	98.01	3,381	3,719
2089		Drain Tank Foundation	@ 10' x 10' x 2' High													
2090		Hilti Epoxy Grout Dowels	#4 x 8" Long	Est.	20	EA		10	0	200	0.60	14	REIN	76.92	1,061	1,261
2091		Concrete		Est.	7.5	CY		120	0	900	1.9	16	COND	68.54	1,123	2,023
2092		Reinforcing		Est.	0.3	TN		950	0	285	22.5	8	REIN	76.92	597	882
2093		Formwork		Est.	80	SF		2.25	0	180	0.2	18	FORM	98.01	1,803	1,983
2094																
2095	90.20.3	Steam Turbine Building Elevated Slabs	Modify Existing						0	0		10			1,206	1,206
2096		New Penetration for CCW Piping														
2097		4' x 8' Floor Penetration	Saw Cut, 4" Slab	Est.	24	LF		0	0	0	0.30	8	WRKG	119.15	987	987
2098		Remove & Dispose of Concrete		Est.	0.4	CY		0	0	0	4.00	2	WRKG	119.15	219	219
2099																
2100	90.20.4	Boiler Building Concrete Work	Additions in Existing Building						0	2,390		52			3,787	6,177
2101		Control Room Extension														
2102		Concrete		Est.	12	CY		120	0	1,440	1.9	26	COND	68.54	1,797	3,237
2103		Reinforcing		Est.	1	TN		950	0	950	22.5	26	REIN	76.92	1,990	2,940
2104																
2105	90.20.5	Admin / Warehouse / Storage Building Foundation	Not Included													Not Included
2106																
2107	90.20.6	Fire Water Pumphouse Foundation	Existing													Existing
2108																
2109	90.20.7	Service Water Pump Foundation	Existing													Existing
2110																
2111	90.20.8	Tower Crane Foundation	Allowance	Est.	1	LS		200,000	0	200,000	1050	1,208	CONP	77.97	94,149	294,149
2112																
2113	90.20.9	New Foundation for Fire House (Truck Parking)	20' x 30'						0	4,581		129			10,253	14,835
2114		Excavation & Backfill		Est.	30	CY		0	0	0	0.15	5	EXFD	88.87	460	460
2115		Concrete		Est.	20	CY		120	0	2,400	1.9	44	COND	68.54	2,995	5,395
2116		Reinforcing		Est.	2	TN		950	0	1,900	22.5	52	REIN	76.92	3,981	5,881
2117		Formwork		Est.	125	SF		2.25	0	281	0.2	29	FORM	98.01	2,818	3,099
2118																
2119	90.20.10	Overflow Sump	30' x 15' x 10' Deep						0	28,113		1,317			112,797	140,909
2120		Excavation		Est.	800	CY		0	0	0	0.2	184	EXFD	88.87	16,352	16,352
2121		Backfill		Est.	620	CY		0	0	0	0.15	107	EXFD	88.87	9,505	9,505
2122		Concrete		Est.	80	CY		120	0	9,600	1.9	175	COND	68.54	11,981	21,581
2123		Reinforcing		Est.	12	TN		950	0	11,400	22.5	311	REIN	76.92	23,884	35,284
2124		Embeds		Est.	0.5	TN		5,000	0	2,500	120.00	69	CARP	70.49	4,864	7,364
2125		Formwork		Est.	2050	SF		2.25	0	4,613	0.2	472	FORM	98.01	46,212	50,824
2126																

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13																
14																
2127	**90.30**	**STRUCTURAL STEEL**							**0**	**3,902,118**		**30,877**			**3,190,630**	**7,092,748**
2128																
2129	90.30.1	Combustion Turbine Building Steel	75' x 300' x 80' H plus 55' x 300' x 40' H						0	3,730,800		27,710			2,862,861	6,593,661
2130		Steel Framing		Est.	1,450	TN	0	2460	0	3,567,000	16.00	26,680	STST	104.09	2,777,121	6,344,121
2131		Grating	1-1/4" Galvanized	Est.	3,000	SF	0	14	0	42,000	0.14	483	GALL	83.21	40,190	82,190
2132		Handrail		Est.	1,800	LF	0	33.5	0	60,300	0.10	207	GALL	83.21	17,224	77,524
2133		Stair Treads, 3' Wide		Est.	200	EA	0	240	0	48,000	1.00	230	GALL	83.21	19,138	67,138
2134		Ladder, w/ Cage		Est.	150	LF	0	90	0	13,500	0.64	110	GALL	83.21	9,186	22,686
2135																
2136	90.30.2	Steam Turbine Building Steel	Modifications to Existing						0	53,342		1,092			112,796	166,138
2137		Provisions for New CCW Head Tank														
2138		Steel Framing	Labor Unit Rate Tripled for Work Inside Existing Unit	Est.	6	TN	0	2650	0	15,900	48.00	331	STST	104.09	34,475	50,375
2139		Grating	1-1/4" Galvanized	Est.	200	SF	0	14	0	2,800	0.14	32	GALL	83.21	2,679	5,479
2140		Handrail		Est.	75	LF	0	33.5	0	2,513	0.10	9	GALL	83.21	718	3,230
2141		Reinforce Existing Steel		Est.	2	TN	0	5000	0	10,000	100.00	230	STST	104.09	23,941	33,941
2142		New Penetration for CCW Piping														
2143		Steel Framing - (2) New Posts from El. 551' to 567'	Labor Unit Rate Tripled for Work Inside Existing Unit	Est.	0.5	TN	0	2650	0	1,325	48.00	28	STST	104.09	2,873	4,198
2144		Handrail		Est.	24	LF	0	33.5	0	804	0.10	3	GALL	83.21	230	1,034
2145		Turbine Floor Framing Reinforcing	For Bypass Piping Loads	Est.	4	TN	0	5000	0	20,000	100.00	460	STST	104.09	47,881	67,881
2146																
2147	90.30.3	Boiler Building Steel	Modifications to Existing						0	117,976		2,075			214,973	332,949
2148		New Girt Framing at Former Combustion Air Coil Room		Est.	8	TN	0	3710	0	29,680	22.00	202	STST	104.09	21,068	50,748
2149		Heater Bay El. 595 Floor Framing Reinforcing	For Piping & Cable Tray Loads	Est.	8	TN	0	5000	0	40,000	100.00	920	STST	104.09	95,763	135,763
2150		Heater Bay Floor Framing Reinforcing	For CR Piping Loads	Est.	2	TN	0	5000	0	10,000	100.00	230	STST	104.09	23,941	33,941
2151		Heater Bay El. 595' & 587' Floor Framing Reinforcing	For PDC Cable Tray Loads	Est.	2	TN	0	5000	0	10,000	100.00	230	STST	104.09	23,941	33,941
2152																
2153		Control Room Extension														
2154		Reinforce Existing Framing		Est.	2	TN	0	5000	0	10,000	100.00	230	STST	104.09	23,941	33,941
2155		New Steel Framing	Labor Unit Rate Tripled for Work Inside Existing Unit	Est.	4	TN	0	2650	0	10,600	48.00	221	STST	104.09	22,983	33,583
2156		Metal Floor Decking		Est.	860	SF	0	2.8	0	2,408	0.014	14	DCKG	79.06	1,095	3,503
2157		Metal Roof Decking		Est.	860	SF	0	2.8	0	2,408	0.014	14	DCKG	79.06	1,095	3,503
2158		Stair Treads, 3' Wide		Est.	12	EA	0	240	0	2,880	1.00	14	GALL	83.21	1,148	4,028
2159																
2160	**90.40**	**ARCHITECTURAL**							**0**	**1,549,956**		**12,832**			**1,158,903**	**2,708,859**
2161																
2162	90.40.1	Combustion Turbine Building							0	1,301,792		10,991			1,008,287	2,310,079
2163		Insulated Metal Siding		Est.	56,200	SF	0	12.2	0	685,640	0.09	5,817	SDNG	92.14	535,951	1,221,591
2164		Insulated Metal Standing Seam Roof		Est.	39,300	SF	0	14.64	0	575,352	0.11	4,971	SDNG	92.14	458,069	1,033,421
2165		Double Door		Est.	2	EA	0	2900	0	5,800	12	28	CARP	70.49	1,946	7,746
2166		Man Door		Est.	10	EA	0	1500	0	15,000	8	92	CARP	70.49	6,485	21,485
2167		Rolling Steel Door		Est.	2	EA	0	10000	0	20,000	36	83	CARP	70.49	5,837	25,837

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13																
14																
2168																
2169	90.40.2	Steam Turbine Building	Existing. No Mods Required						0	0		0			0	0
2177																
2178	90.40.3	Boiler Building	Modifications to Existing Building						0	148,164		1,842			150,616	298,780
2179		New Insulated Siding at Former Combustion Air Coil Room		Est.	2,200	SF	0	12.2	0	26,840	0.09	228	SDNG	92.14	20,980	47,820
2180		Remove & Dispose of Siding (Transite), El. 569' to 600', East Wall, for Piping Penetrations	Covered in Demolition & Removal at End of This Estimate													
2181		Remove & Dispose of Siding (Transite), El. 569' to 594', South Wall, for Piping Penetrations	Covered in Demolition & Removal at End of This Estimate													
2182		New Insulated Siding at East and South Walls		Est.	7,000	SF	0	12.2	0	85,400	0.09	725	SDNG	92.14	66,755	152,155
2183																
2184		New Control Room Extension	42' x 20-'6" x 12' High													
2185		Cut Door Openings in Existing Block Wall		Est.	2	EA	0	500	0	1,000	60	138	MSRY	71.99	9,935	10,935
2186		Metal Stud/Runner		Est.	1,650	LF	0	0.76	0	1,254	0.024	46	CARP	70.49	3,210	4,464
2187		Gypsum Board		Est.	3,200	SF	0	0.65	0	2,080	0.03	110	CARP	70.49	7,782	9,862
2188		Suspended Acoustical Tile Ceiling		Est.	860	SF	0	4	0	3,440	0.05	49	SSCL	69.73	3,448	6,888
2189		Vinyl Floor Tile		Est.	860	SF	0	2.5	0	2,150	0.05	49	CARP	70.49	3,486	5,636
2190		Man Door		Est.	4	EA	0	1500	0	6,000	8	37	CARP	70.49	2,594	8,594
2191																
2192		Install New Control Room Bathroom Walls & Fixtures	Allowance	Est.	1	LS		10000	0	10,000	200.00	230	CARP	70.49	16,213	26,213
2193																
2194		Replace Existing Control Room Flooring	Allowance	Est.	1	LS		10000	0	10,000	200.00	230	CARP	70.49	16,213	26,213
2195																
2196	90.40.4	Admin / Warehouse / Storage Building	Not Included													Not Included
2197																
2198	90.40.5	Relocate Existing Warehouse Building	Not Required													Not Required
2199																
2200	90.40.6	New Metal Cleaning Waste Pumphouse							0	40,000		0			0	40,000
2201		Pre Engineered Building, Incl. Ventilation, Lighting, & Power, 20' x 20' x 12' High	Subcontract Price, Includes Installation Labor	Est.	400	SF		100	0	40,000	incl w/matl	incl w/matl				40,000
2202																
2203	90.40.7	New Fire House (Truck Parking)							0	60,000		0			0	60,000
2204		Pre Engineered Building, Incl. HVAC, 20' x 30' x 12' High	Subcontract Price, Includes Installation Labor	Est.	600	SF		100	0	60,000	incl w/matl	incl w/matl				60,000
2205																
2206	**90.45**	**PAINTING / COATING**							**0**	**100,000**		**5,750**			**387,953**	**487,953**
2207																
2208	90.45.1	Touch-up & Finish Painting	Allowance	Est.	100,000	SF		1	0	100,000	0.05	5,750	PNTR	67.47	387,953	487,953
2209																
2214	**90.60**	**MECHANICAL**							**1,980,000**	**67,350**		**8,697**			**766,904**	**2,814,254**
2215																
2216	90.60.1	Diesel Driven Fire Pump Package	3,500 gpm	Est.	1	EA	160000	0	160,000	0	200	230	PUMP	86.18	19,821	179,821
2217																

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13																
14																
2218	90.60.2	Miscellaneous Pumps							0	0					3,964	3,964
2219		Service Water	Existing													Existing
2220		Relocate Existing Matal Cleaning Wastewater Pumps to New Pumphouse		Est.	1	LS			0	0	40.00	46	PUMP	86.18	3,964	3,964
2221																
2222	90.60.3	Cranes & Hoists							770,000	0		2,990			261,446	1,031,446
2223		C/T	70/20 TN Capacity Bridge Crane	Est.	1	LS	520000		520,000	0	2,100	2,415	MECH	87.74	211,892	731,892
2224		Steam Turbine	Existing													Existing
2225		Miscellaneous Hoists and Trolleys	Allowance	Est.	1	LS	250000		250,000	0	500	575	PUMP	86.18	49,554	299,554
2226																
2227	90.60.4	Fuel Gas Check Metering Station		Est.	1	LS	800000		800,000	0	1,500	1,725	MECH	87.74	151,352	951,352
2228																
2229	90.60.5	Potable Water Tepid Recirculation System		Est.	1	LS	250000		250,000	0	600	690	MECH	87.74	60,541	310,541
2230																
2231	90.60.6	HVAC for New Control Room Extension	Allowance	Est.	1	LS		25,000	0	25,000	800	920	HVAC	80.08	73,674	98,674
2232																
2233	90.60.7	Plumbing & Fixtures		Est.	1	LS		30,000	0	30,000	1,200	1,380	SPNG	93.03	128,381	158,381
2234																
2235	90.60.8	Install Blanking Plate at Existing Chimney							0	12,350		716			67,726	80,076
2236		Remove & Dispose of Existing Insulation		Est.	250	SF	0		0	0	0.15	43	DINS	81.12	3,498	3,498
2237		Remove & Dispose of Existing 10' x 18' Damper		Est.	180	SF	0		0	0	1.50	311	MECH	87.74	27,243	27,243
2238		Demo Portion of Existing Ductwork		Est.	3	TN	0		0	0	30.00	104	FLDU	108.65	11,245	11,245
2239		Install New Duct Blanking Plate		Est.	3	TN	0	3500	0	8,750	60.00	173	FLDU	108.65	18,742	27,492
2240		Install New Insulation		Est.	300	SF	0	12	0	3,600	0.25	86	DINS	81.12	6,997	10,597
2241																
2246	**90.89**	**SUBTOTAL - DIRECT COSTS, COMMON**							**1,980,000**	**7,371,017**		**82,857**		**88.72**	**7,351,323**	**16,702,340**
2247																
2248	**90.90**	**CONSTRUCTION INDIRECTS, COMMON**							**99,000**	**1,732,189**		**7,205**			**4,370,471**	**6,201,660**
2249		Additional Crane Allowance	Tower Crane, 18 Months, Including Operator		1	LS				0					1,700,000	1,700,000
2250		Mobilization / Demobilization - Included in Wage Rates Above														
2251		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
2252		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						7,205		88.72	639,000	639,000
2253		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					9,006				671,476	671,476
2254		Per Diem	None		0.00	HR						0			0	0
2255		Consumables - % of Subtotal Above			0.5	%				36,855					36,757	73,612
2256		Freight on Material - % of Subtotal Above			5.0	%				368,551						368,551
2257		Freight on Equipment - % of Subtotal Above			5.0	%			99,000							99,000
2258		Scaffolding - % of Subtotal Above			3.0	%				221,131					220,540	441,670
2259		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				1,105,653					1,102,698	2,208,351

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13																
14																
2261	90.98	TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, COMMON							2,079,000	9,103,206		90,062		130.15	11,721,794	22,904,001
2262																
2263	90.99	SUBCONTRACTS	Metal Cleaning Waste Tank, Fire Protection Systems, & Site Bussing Services						4,004,000	0		0			0	4,004,000
2264																
2265		Field Erected Tanks														
2266		Metal Cleaning Waste Tank	Approx. 1,000,000 Gal. Vertical, API 650, cone roof, incl stairs, ladders, manways, & cathodic protection. CS w/ Epoxy Coating & Exterior Finish Paint..	Est.	1	Ea.	1000000		1,000,000	0	incl w/equip.	incl w/equip.				1,000,000
2267																
2268		Fire Protection														
2269		Fire Protection & Detection	Based on a Single Site Subcontract, Including Building Systems, Transformer Deluge, Detection, and Portable Extinguishers.	Est.	1	LS	1750000		1,750,000	0	incl w/equip.	incl w/equip.				1,750,000
2270																
2271		Bussing Services Between Remote Parking Areas and Plant Construction Area	Allowance for 33 Month Construction Period Based on 2 Busses Operating Continuously for 5x10 Work Week. Includes Equipment, Supplies, and Labor (Drivers, Fuel, & Maintenance).	Est.	33	MO	38000		1,254,000	0	incl w/equip.	incl w/equip.				1,254,000
2272																
2273	90.00	TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, COMMON							6,083,000	9,103,206		90,062		130.15	11,721,794	26,908,001
2274																
2275																
2276																
2277		OVERALL PROJECT SUBTOTALS														497,639,767
2278																
2279	OP.89	SUBTOTAL - DIRECT COSTS, OVERALL PROJECT SUBTOTALS							225,598,909	55,326,367		1,243,746		90.01	111,944,254	392,869,531
2280																

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13																
14																
2281	OP.90	**CONSTRUCTION INDIRECTS, OVERALL PROJECT SUBTOTALS**							**5,435,765**	**13,001,696**		**108,152**			**42,368,774**	**60,806,236**
2282		Additional Crane Allowance			1	LS				0					1,700,000	1,700,000
2283		Mobilization / Demobilization - Included in Wage Rates Above														
2284		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
2285		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						108,152		90.01	9,734,000	9,734,000
2286		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					135,190				10,225,087	10,225,087
2287		Per Diem	None		0.00	HR						0			0	0
2288		Consumables - % of Subtotal Above			0.5	%				276,632					559,721	836,353
2289		Freight on Material - % of Subtotal Above			5.0	%				2,766,318						2,766,318
2290		Freight on Equipment - % of Subtotal Above			5.0	%			5,435,765							5,435,765
2291		Scaffolding - % of Subtotal Above			3.0	%				1,659,791					3,358,328	5,018,119
2292		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				8,298,955					16,791,638	25,090,593
2294	OP.98	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, OVERALL PROJECT SUBTOTALS**							**231,034,675**	**68,328,064**		**1,351,898**		**114.15**	**154,313,028**	**453,675,767**
2295																
2296	OP.99	**TOTAL SUBCONTRACTS OVERALL PROJECT SUBTOTALS**							**39,754,000**	**150,000**		**0**			**4,060,000**	**43,964,000**
2297																
2298	OP.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, OVERALL PROJECT SUBTOTALS**							**270,788,675**	**68,478,064**		**1,351,898**		**117.15**	**158,373,028**	**497,639,767**
2299																
2300																
2301																
2302	**PI.00**	**OVERALL PROJECT INDIRECT COSTS**														**38,192,900**
2303																
2304	PI.01	Engineering, Design, and Procurement Services			1	LS										29,000,000
2305	PI.02	Field Engineering Support for Construction Management			1	LS										2,000,000
2306	PI.03	Field Engineering Support for S-U/Commissioning			1	LS										1,750,000
2307	PI.04	Craft Start-Up Support	Cost Included on Owner's Costs													Not Included
2308		Initial Fills			0.3	%										1,492,900
2309		Operator Training & Manuals			1	LS										450,000
2310		Subcontracts			1	LS										500,000
2311		Site Survey	Included Above													Included Above
2312		Geotechnical Investigation	Included Above													Included Above
2313		Underground Utility Investigation	Included Above													Included Above
2314		Noise Abatement Consultant	Included Above													Included Above

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13																
14																
2315		Noise Abatement for 85 DBA Requirements			1	LS										3,000,000
2316		Interest On Retention	Not Included													Not Included
2317		TFA	Included with Equipment Costs		1	LS										Included with Equipment Costs
2318																
2319		**TOTAL OVERALL PROJECT INDIRECT COSTS**														**38,192,900**
2320																
2321																
2322																
2323		**TOTAL OVERALL PROJECT DIRECT AND INDIRECT COSTS**														**535,832,667**
2324																
2325		**Spare Parts**							**4,061,800**							**4,061,800**
2326		Operating Spare Parts - Capitalized			0.90	%			2,437,100							2,437,100
2327		Operating Spare Parts - First Year of Operation			0.60	%			1,624,700							1,624,700
2328																
2329		**Contingency**														**71,834,100**
2330		Project Contingency @ 13.305%	Contingency applied to Direct and Indirect Costs, Based on 95% Confidence Factor from Range Analysis		13.305	%										71,834,100
2331																
2332		**Escalation**														**51,986,300**
2333		Equipment	Based on 4.4% Annual Rate		1	LS			24,353,650							24,353,650
2334		Material	Based on 6.2% Annual Rate		1	LS				13,089,254						13,089,254
2335		Labor	Based on 2.4% Annual Rate		1	LS									11,171,318	11,171,318
2336		Indirects	Based on 2.7% Annual Rate		1	LS										3,372,078
2337																
2338		**Subtotal Project Cost**														**663,714,867**
2339																
2340		**Owner's Costs**	**Not Included**													**0**
2341																
2342		**AFUDC (Interest During Construction)**	**Not Included**													**0**
2343																
2344		**Total Project Cost**														**663,714,867**
2345																
2346																

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13																
14																
2347																
2348		**ADDITIONAL REFERENCE COSTS:**														
2349																
2350																
2351	A	**Demolition & Removal**														
2352																
2353	A.1	Existing Metal Cleaning Waste Tank Area Restoration	Pump Relocation Detailed Above						0	2,850		690			55,548	58,398
2354		Remove Contaminated Sludge from Tank Interior	See Subcontracts Below													
2355		Demo Existing Tank	Demo Cost Expected to be Offset by Scrap Value of Tank.	Est.	1	EA			0	0					0	0
2356		Demo Pumphouse		Est.	1	LS	0	0	0	0	30.00	35	WRKG	119.15	4,111	4,111
2357		Soil Remediation in Tank Area	See Subcontracts Below													
2358		Remove & Dispose of Existing Geomenbrane Liner		Est.	3,800	SY	0	0.75	0	2,850	0.15	656	MSTR	78.47	51,437	54,287
2359																
2360	A.2	Demolish Existing Fire House (Truck Parking)	25' x 16' x 12' High						0	0		50			5,919	5,919
2361		Demo Single Story Structure, 25' x 16' x 12' Tall		Est.	4,800	CF	0	0	0	0	0.004	22	WRKG	119.15	2,631	2,631
2362		Demo Slab Foundation, 40' x 40'		Est.	30	CY	0	0	0	0	0.80	28	WRKG	119.15	3,289	3,289
2363																
2364	A.3	Demolish Existing Coal Handling Structures							0	0		2,800			333,672	333,672
2365		Coal Conveyor System														
2366		Transite Panel Removal & Disposal, Conveyor Belt Enclosures	See Subcontracts Below													
2367		Conveyor & Truss	36" Belt Conveyor	Est.	850	LF	0	0	0	0	0.1	98	WRKG	119.15	11,647	11,647
2368		Take Up Tower	Approx. 70' Tall	Est.	28	TN	0	0	0	0	1.1	35	WRKG	119.15	4,220	4,220
2369		Conveyor Support Bents	(3) @ Avg. Height 60'	Est.	78	TN	0	0	0	0	1.1	99	WRKG	119.15	11,757	11,757
2370		Transfer House	Approx. 30' x 30' x 60' High, Transite Siding													
2371		Transite Siding Removal & Disposal	See Subcontracts Below													
2372		Remove Remaining Equipment & Motors	Allowance	Est.	1	LS	0	0	0	0	160	184	WRKG	119.15	21,924	21,924
2373		Demolish Main Structure		Est.	54,000	CF	0	0	0	0	0.004	248	WRKG	119.15	29,597	29,597
2374		Demolish Deluge Valve House		Est.	1	LS	0	0	0	0	20	23	WRKG	119.15	2,740	2,740
2375		Demolish Foundations		Est.	160	CY	0	0	0	0	1.1	202	WRKG	119.15	24,116	24,116
2376																
2377		Coal Car Thawing Building	60' x 18' x 18' High	Est.	19,440	CF	0	0	0	0	0.004	89	WRKG	119.15	10,655	10,655
2378		Demolish Foundation		Est.	50	CY	0	0	0	0	1.1	63	WRKG	119.15	7,536	7,536
2379																
2380		Locomotive House	50' x 44' x 27' High, Concrete Block	Est.	59,400	CF	0	0	0	0	0.006	410	WRKG	119.15	48,835	48,835
2381																
2382		Tractor Shed	50' x 26' x 12' High, Asbestos Siding, Roofing, & Louvers. Open One Side.													
2383		Asbestos Siding & Roofing Removal & Disposal	See Subcontracts Below													
2384		Demolish Building Structure		Est.	15,600	CF	0	0	0	0	0.004	72	WRKG	119.15	8,550	8,550
2385		Demolish Foundations		Est.	100	CY	0	0	0	0	1.1	127	WRKG	119.15	15,072	15,072

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13																
14																
2386		Demo Yard Lighting, Paving, & Remaining Electrical Facilities in Coal Handling Area	Allowance	Est.	1	LS	0	0	0	0	1000.000	1,150	WRKG	119.15	137,023	137,023
2387																
2388	A.4	Demolish Existing Railroad Tracks							0	0		476			41,249	41,249
2389		Remove and Dispose of Existing Rail & Ties		Est.	1,500	LF	0	0	0	0	0.17	293	RRTK	86.64	25,407	25,407
2390		Remove and Dispose of Existing Ballast		Est.	1,500	LF	0	0	0	0	0.106	183	RRTK	86.64	15,842	15,842
2391																
2392	A.5	Demolish Existing Helipad	Included w/ Coal Handling Removals in A.3						0	0		0			0	0
2393																
2394	A.6	Demolish Existing Sun Shelter							0	0		110			13,154	13,154
2395		Demo Single Story Structure, 60' x 25' x 12' Tall	Open All Sides	Est.	18,000	CF	0	0	0	0	0.004	83	WRKG	119.15	9,866	9,866
2396		Demo Foundation		Est.	30	CY	0	0	0	0	0.8	28	WRKG	119.15	3,289	3,289
2397																
2398	A.7	Demolish Unit 1 Boiler Building Combustion Air Coil Room							0	0		574			68,388	68,388
2399		Transite Siding Removal & Disposal	See Subcontracts Below													
2400		Demo Coil Piping	Allowance	Est.	1	LS	0	0	0	0	100	115	WRKG	119.15	13,702	13,702
2401		Demo Coils		Est.	1	LS	0	0	0	0	300	345	WRKG	119.15	41,107	41,107
2402		Demo Fans		Est.	1	LS	0	0	0	0	30	35	WRKG	119.15	4,111	4,111
2403		Demo Concrete Roofs & Floors		Est.	18	CY	0	0	0	0	0.6	12	WRKG	119.15	1,480	1,480
2404		Demo 4" Masonry Walls		Est.	1,000	SF	0	0	0	0	0.044	51	WRKG	119.15	6,029	6,029
2405		Demo Building Steel		Est.	13	TN	0	0	0	0	1.1	16	WRKG	119.15	1,959	1,959
2406		New Girt Framing & Siding	Detailed Above in Common, Steel and Architectural													
2407																
2408	A.8	Demolish Unit 1 Boiler Building Platform at El. 586'-9" (Row 8 to 12)							0	0		89			10,606	10,606
2409		Demo Grating		Est.	270	SF	0	0	0	0	0.1	31	WRKG	119.15	3,700	3,700
2410		Demo 4" Concrete Slab		Est.	480	SF	0	0	0	0	0.03	17	WRKG	119.15	1,973	1,973
2411		Demo Steel Framing		Est.	6	TN	0	0	0	0	6	41	WRKG	119.15	4,933	4,933
2412																
2413	A.9	Secure Existing Track Hopper for Abandonment							0	54,930		934			97,942	152,872
2414		Demo Car Shake Out Structure	Allowance	Est.	1	LS	0	0	0	0	120	138	WRKG	119.15	16,443	16,443
2415		New Steel Framing at Existing Grizzly		Est.	15	TN	0	2650	0	39,750	16	276	STST	104.09	28,729	68,479
2416		Reinforce Existing Steel		Est.	2	TN	0	5000	0	10,000	100	230	STST	104.09	23,941	33,941
2417		Metal Floor Decking		Est.	600	SF	0	2.8	0	1,680	0.014	10	DCKG	79.06	764	2,444
2418		Concrete Reinforcing		Est.	1	TN		950	0	950	22.5	26	REIN	76.92	1,990	2,940
2419		Concrete		Est.	15	CY		120	0	1,800	1.9	33	COND	68.54	2,246	4,046
2420		Excavation at Tunnel	Allowance	Est.	100	CY		0	0	0	0.2	23	EXFD	88.87	2,044	2,044
2421		Demo Tunnel Concrete to 4' Below Grade		Est.	115	CY	0	0	0	0	1.1	145	WRKG	119.15	17,333	17,333
2422		Install 9.5' x 8.5' Concrete Bulkhead, 1' Thick	On Existing Tunnel	Est.	3	CY		250	0	750	8	28	CONP	77.97	2,152	2,902
2423		Backfill	Allowance	Est.	150	CY		0	0	0	0.15	26	EXFD	88.87	2,300	2,300
2424																

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8											Labor Productivity =			1.15	Reviewer:	BJD
9																
10																
11																
12	Account No.	Item Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equipment Cost	Unit Material Cost	Total Equipment Cost	Total Material Cost	Unit Man-hours (Base)	Total Man-hours, w/ Productivity	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Total Projected Cost
13																
14																
2425	A.10	Demolish Gas Cylinder Storage Shed							0	0		77			9,208	9,208
2426		Demo Single Story Structure, 30' x 30' x 12' Tall	Oper All Sides	Est.	10,800	CF	0	0	0	0	0.004	50	WRKG	119.15	5,919	5,919
2427		Demo Foundation		Est.	30	CY	0	0	0	0	0.80	28	WRKG	119.15	3,289	3,289
2428																
2429	A.11	Demolish CO2 Storage Tank Foundation		Est.	30	CY	0	0	0	0	0.80	28	WRKG	119.15	3,289	3,289
2430																
2431	A.12	Remove & Dispose of Existing Relays serving ST GSU, UAT, RAT, and Generator Protection	Allowance	Est.	1	LS	0	0	0	0	100	115	WRKG	119.15	13,702	13,702
2432																
2433	A.13	Remove & Dispose of Existing 4.16 kV Switchgear Sections in Existing STG Building		Est.	7	EA	0	0	0	0	180	1,449	WRKG	119.15	172,648	172,648
2434																
2435	A.14	Remove & Dispose of Existing 600V Switchgear Sections in Existing STG Building		Est.	19	EA	0	0	0	0	120	2,622	WRKG	119.15	312,411	312,411
2436																
2437	A.15	Remove & Dispose of Existing Oil Filled 4.16kV/600V 1.5 MVA Transformers in Existing STG Building		Est.	2	EA	0	0	0	0	200	460	WRKG	119.15	54,809	54,809
2438																
2439	A.16	Control Room Demolition & Removals							0	0		1,035			123,320	123,320
2440		Demo Freestanding Control and Ovation Panels		Est.	2	LS	0	0	0	0	120	276	WRKG	119.15	32,885	32,885
2441		Demo Existing Boiler Instrumentation & Electrical Devices On and Behind Main Control boards	Allowance	Est.	1	LS	0	0	0	0	500	575	WRKG	119.15	68,511	68,511
2442		Demo Walls, Fixtures, and Plumbing at Existing Control Room Bathroom	Allowance	Est.	1	LS	0	0	0	0	160	184	WRKG	119.15	21,924	21,924
2443																
2444	A.17	Remove Existing Pumps							0	0		1,311			112,982	112,982
2445		Remove & Dispose of Existing Hotwell Pumps		Est.	2	EA	0	0	0	0	200	460	PUMP	86.18	39,643	39,643
2446		Remove & Dispose of Existing Condensate Booster Pumps		Est.	2	EA	0	0	0	0	250	575	PUMP	86.18	49,554	49,554
2447		Remove & Dispose of Existing LP Heater No. 1 Drain Pumps		Est.	2	EA	0	0	0	0	60	138	PUMP	86.18	11,893	11,893
2448		Remove & Dispose of Existing Diesel Driven Fire Pump Package	1,500 gpm	Est.	1	LS	0	0	0	0	120	138	PUMP	86.18	11,893	11,893
2449																
2450	A.18	Remove & Dispose of Existing Gland Steam Condenser		Est.	1	EA	0	0	0	0	200	230	PUMP	86.18	19,821	19,821
2451																
2452	A.19	Remove & Dispose of Existing ST Turning Gear Assembly		Est.	1	LS	0	0	0	0	200	230	MECH	87.74	20,180	20,180
2453																
2454	A.20	Remove & Dispose of Existing Raw Water Intake Screens	Johnson Screens	Est.	1	LS	0		0	0	400	460	MECH	87.74	40,360	40,360
2455																

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13																
14																
2456	A.21	Remove & Dispose of Existing Insulation & Lagging on Ductwork Above Boiler Room Roof	Allowance - Not Asbestos Insulation.	Est.	17,000	SF	0		0	0	0.1	1,955	DINS	81.12	158,590	158,590
2457																
2458	A.22	Remove & Dispose of Existing Piping & Mechanical Items In Existing Powerhouse As Required	Allowance	Est.	1	LS	0		0	0	2,500	2,875	SPNG	93.03	267,461	267,461
2459																
2460	A.23	Remove & Dispose of Existing Conduits & Electrical Items In Existing Powerhouse As Required	Allowance	Est.	1	LS	0		0	0	2,500	2,875	EHEA	77.85	223,819	223,819
2461																
2462	**A.89**	**SUBTOTAL - DIRECT COSTS, Demolition & Removal**							**0**	**57,780**		**21,446**		**6,445**	**2,159,078**	**2,216,858**
2463																
2464	**A.90**	**CONSTRUCTION INDIRECTS, Demolition & Removal**							**0**	**13,578**		**1,865**			**784,642**	**798,220**
2465		Additional Crane Allowance	None		1	LS				0					0	0
2466		Mobilization / Demobilization - Included in Wage Rates Above														
2467		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
2468		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						1,865		100.68	188,000	188,000
2469		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					2,331				197,212	197,212
2470		Per Diem	None		0.00	HR						0			0	0
2471		Consumables - % of Subtotal Above			0.5	%				289					10,795	11,084
2472		Freight on Material - % of Subtotal Above			5.0	%				2,889						2,889
2473		Freight on Equipment - % of Subtotal Above			5.0	%			0							0
2474		Scaffolding - % of Subtotal Above			3.0	%				1,733					64,772	66,506
2475		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				8,667					323,862	332,529
2477	**A.98**	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, Demolition & Removal**							**0**	**71,358**		**23,311**		**126.28**	**2,943,720**	**3,015,078**
2478																

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13																
14																
2479	**A.99**	**SUBCONTRACTS**	Sludge Disposal, Soil Remediation & Asbestos Removal						**1,504,100**	**0**		**0**			**0**	**1,504,100**
2480																
2481		Remove & Dispose of Contaminated Sludge in Existing Metal Cleaning Waste Tank	Allowance. Assume 6" Accumulation	Est.	72	CY	250	0	18,000	0						18,000
2482		Soil Remediation in Metal Cleaning Waste Tank Area - Assumes Removing 1' of Material from the Bottom of the Existing Containment, Above the Liner.	Allowance for soil remediation and disposal in an EPA approved landfill. Subcontract cost includes labor. Used lower end of the range $118-355/CY. Cost could be lower ($59-118/CY) if sold to a bituminous concrete batch plant.	Est.	1,000	CY	150	0	150,000	0						150,000
2483		Soil Remediation in Former Diesel Oil & Gasoline Tanks and Pump Area - 100' x 100' x 5' Deep	Allowance for soil remediation and disposal in an EPA approved landfill. Subcontract cost includes labor. Used lower end of the range $118-355/CY. Cost could be lower ($59-118/CY) if sold to a bituminous concrete batch plant.	Est.	1,850	CY	150	0	277,500	0						277,500
2484		Transite Panel Removal & Disposal, Conveyor Belt Enclosures	Subcontract Price	Est.	11,900	SF	10	0	119,000	0						119,000
2485		Transite Siding Removal & Disposal, Transfer House Siding	Subcontract Price	Est.	7,200	SF	10	0	72,000	0						72,000
2486		Asbestos Siding & Roofing Removal & Disposal, Tractor Shed	Subcontract Price	Est.	2,210	SF	10	0	22,100	0						22,100
2487		Transite Siding Removal & Disposal, Boiler Building Combustion Air Coil Room	Subcontract Price	Est.	2,600	SF	10	0	26,000	0						26,000
2488		Transite Siding Removal & Disposal, Boiler Building East Wall for Piping Penetrations	Subcontract Price	Est.	5,700	SF	10	0	57,000	0						57,000
2489		Transite Siding Removal & Disposal, Boiler Building South Wall for Piping Penetrations	Subcontract Price	Est.	1,250	SF	10	0	12,500	0						12,500
2490		Arsenic, Asbestos, & Lead Abatement In Existing Power Block	Allowance	Est.	1	LS	750000	0	750,000	0						750,000
2491																
2492	**A.00**	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, Demolition & Removal**							**1,504,100**	**71,358**		**23,311**		**126.28**	**2,943,720**	**4,519,178**
2493																

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13																
14																
2494	PI.00	**Indirect Costs**	Included Above w/ Overall Project Indirect Costs													Included Elsewhere
2495																
2496		**Contingency**														**1,265,700**
2497		Project Contingency @ 28.007%	Contingency applied to Direct and Indirect Costs, Based on 95% Confidence Factor from Range Analysis		28.007	%										1,265,700
2498																
2499		**Escalation**	Pro-Rated from Option 1 Estimate													**356,557**
2500		Equipment	Based on 4.4% Annual Rate		1	LS			135,273							135,273
2501		Material	Based on 6.2% Annual Rate		1	LS				13,640						13,640
2502		Labor	Based on 2.4% Annual Rate		1	LS									207,644	207,644
2503		Indirects	Based on 2.7% Annual Rate		1	LS										0
2504																
2505		**Total Demolition & Removal Cost**														**6,141,435**
2506																

ATTACHMENT 1-12
Option 1 Summary Capital Cost Estimate No. 31238B

Sargent & Lundy, LLC

AEP
Big Sandy Plant Unit 1 Repowering Cost Estimate Study
Option 1 - 2x2 MHI 501GAC Combustion Turbines
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Cost Estimate Summary

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Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
10.00	**GENERAL SITE WORK**					
10.10	CIVIL					
10.10.1	Relocate Existing Metal Cleaning Waste Tank and Pumphouse		$ -	$ 224,134	$ 355,291	$ 579,425
10.10.2	Relocate Existing RSO Trailers		$ -	$ -	$ 30,270	$ 30,270
10.10.3	Construction Parking & Laydown Areas Preparation		$ -	$ 1,923,056	$ 2,411,610	$ 4,334,666
10.10.4	Erosion & Sediment Control - New Power Block Area		$ -	$ 66,000	$ 38,538	$ 104,538
10.10.5	Site Clearing & Stripping		$ -	$ -	$ 518,395	$ 518,395
10.10.6	Roads & Surfacing		$ -	$ 1,063,300	$ 692,190	$ 1,755,490
10.10.7	Fencing		$ -	$ 112,000	$ 56,096	$ 168,096
10.10.8	Stormwater Drainage Trench		$ -	$ 930,000	$ 1,217,784	$ 2,147,784
10.10.9	Stormwater Runoff Pond		$ -	$ 35,475	$ 38,966	$ 74,441
10.10.10	Stormwater Pond Outlet Structure		$ -	$ 145,000	$ 459,902	$ 604,902
10.10.11	Temporary Construction Guard House		$ -	$ 20,000	$ 40,532	$ 60,532
10.10.12	Concrete Filled Pipe Bollards	Includes Installation Labor	$ -	$ 25,000	$ -	$ 25,000
10.10.13	Spur Track Upgrade		$ -	$ 548,425	$ 561,748	$ 1,110,173
10.10.14	Install New Stops at Track Sections Being Demolished		$ -	$ 5,000	$ 1,993	$ 6,993
10.89	SUBTOTAL - DIRECT COSTS, GENERAL SITE WORK		$ -	$ 5,097,390	$ 6,423,314	$ 11,520,704
10.90	CONSTRUCTION INDIRECTS, GENERAL SITE WORK		$ -	$ 1,197,887	$ 2,334,024	$ 3,531,911
10.99	SUBCONTRACTS		$ -	$ -	$ -	$ -
10.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, GENERAL SITE WORK**		$ -	$ 6,295,277	$ 8,757,338	$ 15,052,615

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11.00	**UNDERGROUND**					
11.10	CIVIL					
11.10.1	Oily Water Sewer System		$ 6,000	$ 272,075	$ 757,636	$ 1,035,711
11.10.2	Modifications to Existing Storm Sewers		$ -	$ 128,300	$ 553,979	$ 682,279
11.10.3	Stormwater Drainage System		$ 1,500	$ 57,000	$ 231,703	$ 290,203
11.10.4	Sanitary Sewer System	Use Existing	$ -	$ -	$ -	$ -
11.10.5	Mechanical Excavation (for process pipe trenches)		$ -	$ -	$ 1,076,938	$ 1,076,938
11.10.6	Hydro Excavation for Mechanical and Electrical Services		$ -	$ 19,550	$ 176,296	$ 195,846
11.10.7	Relocation of Miscellaneous Underground Utilities		$ -	$ 125,000	$ 128,530	$ 253,530
11.20	CONCRETE					
11.20.1	Concrete Thrust Blocks for Piping Systems		$ -	$ 9,000	$ 23,646	$ 32,646
11.50	ELECTRICAL					
11.50.1	Electrical Ductbanks & Trenches		$ -	$ 555,725	$ 3,128,297	$ 3,684,022
11.50.2	Conduits		$ -	$ 807,573	$ 830,994	$ 1,638,567
11.50.3	Grounding		$ -	$ 187,584	$ 414,668	$ 602,252
11.50.4	Cathodic Protection		$ -	$ 76,519	$ 123,275	$ 199,794
11.60	MECHANICAL					
11.60.1	Oil/Water Separator Including Lift Stations	(2) Included	$ 100,000	$ -	$ 114,426	$ 214,426
11.60.2	Sanitary Sewage Treatment Plant	Use Existing Plant System	$ -	$ -	$ -	Existing
11.70	PIPING					
11.70.1	Large Bore BOP Pipe 2-1/2" & Larger - Below Ground		$ -	$ 3,016,428	$ 5,223,237	$ 8,239,664
11.89	SUBTOTAL - DIRECT COSTS, UNDERGROUND		$ 107,500	$ 5,254,753	$ 12,783,626	$ 18,145,879
11.90	CONSTRUCTION INDIRECTS, UNDERGROUND		$ 5,375	$ 1,234,867	$ 4,644,638	$ 5,884,880
11.99	SUBCONTRACTS	Jack & Bore Under RR Tracks	$ -	$ 150,000	$ 350,000	$ 500,000
11.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, UNDERGROUND**		$ 112,875	$ 6,639,620	$ 17,778,264	$ 24,530,759

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21.00	**CTG A**					
21.20	CONCRETE					
21.20.1	Combustion Turbine A Foundation	Isolated Mat Foundation, 110' x 35'	$ -	$ 278,550	$ 332,214	$ 610,764
21.20.2	Combustion Turbine A Piers / Pedestal		$ -	$ 161,550	$ 471,466	$ 633,016
21.20.3	Combustion Turbine A Excitation & Isolation Transformer Foundations	Includes Mat, Piers, Firewalls, and Containment	$ -	$ 20,050	$ 71,172	$ 91,222
21.20.4	Combustion Turbine A Miscellaneous Equipment Pads		$ -	$ 6,175	$ 15,236	$ 21,411
21.30	STRUCTURAL STEEL					
21.30.1	Miscellaneous Steel for Transformer Containments		$ -	$ 6,712	$ 5,336	$ 12,048
21.45	PAINTING / COATING					
21.45.1	Touch Up Painting, CTG A		$ -	$ -	$ 81,470	$ 81,470
21.60	MECHANICAL					
21.60.1	Combustion Turbine & Accessories	MHI M501GAC C/T. - Nominal 268 mW, Firing Natural Gas or Fuel Oil, w/Dry Low Nox Burners, Inlet Air Filters, Standard Accessories.	$ 70,880,000	$ -	$ 3,070,417	$ 73,950,417
21.60.2	Fuel Gas Conditioning	Skid Mounted, Includes Separators, Coalescing Filters, & Dewpoint Heater. Serves (1) C/T's	$ 1,150,000	$ -	$ 70,631	$ 1,220,631
21.60.3	Heat Exchangers	Performance Heaters	$ -	$ -	$ 45,405	$ 45,405
21.60.4	Shop Fabricated Tanks	Water Wash Drain Tank	$ 15,000	$ -	$ 6,060	$ 21,060
21.89	SUBTOTAL - DIRECT COSTS, CTG A		$ 72,045,000	$ 473,037	$ 4,169,407	$ 76,687,444
21.90	CONSTRUCTION INDIRECTS, CTG A		$ 158,250	$ 111,164	$ 1,515,178	$ 1,784,591
21.99	SUBCONTRACTS	Heavy Haul	$ -	$ -	$ 1,000,000	$ 1,000,000
21.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, CTG A**		$ 72,203,250	$ 584,201	$ 6,684,584	$ 79,472,035

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22.00	**CTG B**					
22.20	CONCRETE					
22.20.1	Combustion Turbine B Foundation	Isolated Mat Foundation, 110' x 35'	$ -	$ 278,550	$ 332,214	$ 610,764
22.20.2	Combustion Turbine B Piers / Pedestal		$ -	$ 161,550	$ 471,466	$ 633,016
22.20.3	Combustion Turbine B Excitation & Isolation Transformer Foundations	Includes Mat, Piers, Firewalls, and Containment	$ -	$ 20,050	$ 71,172	$ 91,222
22.20.4	Combustion Turbine B Miscellaneous Equipment Pads		$ -	$ 6,175	$ 15,236	$ 21,411
22.30	STRUCTURAL STEEL					
22.30.1	Miscellaneous Steel for Transformer Containments		$ -	$ 6,712	$ 5,336	$ 12,048
22.45	PAINTING / COATING					
22.45.1	Touch Up Painting, CTG B		$ -	$ -	$ 81,470	$ 81,470
22.60	MECHANICAL					
22.60.1	Combustion Turbine & Accessories	MHI M501GAC C/T. - Nominal 268 mW, Firing Natural Gas or Fuel Oil, w/Dry Low Nox Burners, Inlet Air Filters, Standard Accessories.	$ 70,880,000	$ -	$ 3,067,390	$ 73,947,390
22.60.2	Fuel Gas Conditioning	Skid Mounted, Includes Separators, Coalescing Filters, &	$ 1,150,000	$ -	$ 70,631	$ 1,220,631
22.60.3	Heat Exchangers	Performance Heaters	$ -	$ -	$ 45,405	$ 45,405
22.60.4	Shop Fabricated Tanks	Water Wash Drain Tank	$ 15,000	$ -	$ 6,060	$ 21,060
22.89	SUBTOTAL - DIRECT COSTS, CTG B		$ 72,045,000	$ 473,037	$ 4,166,380	$ 76,684,417
22.90	CONSTRUCTION INDIRECTS, CTG B		$ 158,250	$ 111,164	$ 1,513,341	$ 1,782,755
22.99	SUBCONTRACTS	Heavy Haul	$ -	$ -	$ 1,000,000	$ 1,000,000
22.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, CTG B**		$ 72,203,250	$ 584,201	$ 6,679,721	$ 79,467,172

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31.00	**HRSG A**					
31.20	CONCRETE					
31.20.1	HRSG A Foundation (Incl. Stack)	Mat Foundation, 180' x 45'	$ -	$ 563,200	$ 572,842	$ 1,136,042
31.20.2	Boiler Feed Pump Enclosure Foundation	Foundation 65'x28'	$ -	$ 76,510	$ 86,044	$ 162,554
31.20.3	Misc HRSG Equipment Pads / Foundations		$ -	$ 25,295	$ 91,966	$ 117,261
31.30	STRUCTURAL STEEL					
31.30.1	Blowdown Tant Pit / Trenches		$ -	$ 48,153	$ 32,646	$ 80,799
31.40	ARCHITECTURAL					
31.40.1	Boiler Feed Pump Enclosure		$ -	$ 147,560	$ -	$ 147,560
31.45	PAINTING / COATING					
31.45.1	Touch Up Painting, HRSG A		$ -	$ -	$ 218,611	$ 218,611
31.60	MECHANICAL					
31.60.1	HRSG & Accessories	3-Press HRSG w\Reheat. Supplemental Duct Burners Incl. Integral Deaerator Incl. SCR and CO Catalyst Incl. 200 Foot Steel Stack Incl.	$ 25,764,000	$ -	$ 9,970,328	$ 35,734,328
31.60.2	Boiler Feed Pumps & Accessories	Incl. VFD's	$ 1,900,000	$ -	$ 218,035	$ 2,118,035
31.60.3	Shop Fabricated Tanks	HRSG Blowdown Tank	$ 50,000	$ -	$ 7,070	$ 57,070
31.60.4	Miscellaneous Pumps	Blowdown Sump Pumps	$ 110,000	$ -	$ 14,866	$ 124,866
31.89	SUBTOTAL - DIRECT COSTS, HRSG A		$ 27,874,000	$ 860,718	$ 11,212,407	$ 39,947,125
31.90	CONSTRUCTION INDIRECTS, HRSG A		$ 1,114,960	$ 202,269	$ 4,073,447	$ 5,390,675
31.99	SUBCONTRACTS	Heavy Haul	$ -	$ -	$ 850,000	$ 850,000
31.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, HRSG A**		$ 28,988,960	$ 1,062,987	$ 16,135,854	$ 46,187,800

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32.00	**HRSG B**					
32.20	CONCRETE					
32.20.1	HRSG B Foundation (Incl. Stack)	Mat Foundation, 180' x 45'	$ -	$ 563,200	$ 572,842	$ 1,136,042
32.20.2	Boiler Feed Pump Enclosure Foundation	Foundation 65'x28'	$ -	$ 76,510	$ 86,044	$ 162,554
32.20.3	Misc HRSG Equipment Pads / Foundations		$ -	$ 25,295	$ 91,966	$ 117,261
32.30	STRUCTURAL STEEL					
32.30.1	Blowdown Tank Pit / Trenches		$ -	$ 48,153	$ 32,646	$ 80,799
32.40	ARCHITECTURAL					
32.40.1	Boiler Feed Pump Enclosure		$ -	$ 147,560	$ -	$ 147,560
32.45	PAINTING / COATING					
32.45.1	Touch Up Painting, HRSG B		$ -	$ -	$ 218,611	$ 218,611
32.60	MECHANICAL					
32.60.1	HRSG & Accessories	3-Press HRSG w\Reheat. Supplemental Duct Burners Incl. Integral Deaerator Incl. SCR and CO Catalyst Incl. 200 Foot Steel Stack Incl.	$ 25,764,000	$ -	$ 9,970,328	$ 35,734,328
32.60.2	Boiler Feed Pumps & Accessories	Incl. VFD's	$ 1,900,000	$ -	$ 218,035	$ 2,118,035
32.60.3	Shop Fabricated Tanks	HRSG Blowdown Tank	$ 50,000	$ -	$ 7,070	$ 57,070
32.60.4	Miscellaneous Pumps	Blowdown Sump Pumps	$ -	$ -	$ -	$ -
32.89	SUBTOTAL - DIRECT COSTS, HRSG B		$ 27,764,000	$ 860,718	$ 11,197,541	$ 39,822,259
32.90	CONSTRUCTION INDIRECTS, HRSG B		$ 1,110,560	$ 202,269	$ 4,068,338	$ 5,381,167
32.99	SUBCONTRACTS	Heavy Haul	$ -	$ -	$ 850,000	$ 850,000
32.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, HRSG B**		$ 28,874,560	$ 1,062,987	$ 16,115,880	$ 46,053,426

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41.00	**STEAM TURBINE**					
41.20	CONCRETE					
41.20.1	STG Pedestal Foundation	Existing	$ -	$ -	$ -	Existing
41.20.2	STG Pedestal	Existing	$ -	$ -	$ -	Existing
41.20.3	STG Excitation Transformer Foundation	Existing	$ -	$ -	$ -	Existing
41.20.4	STG Equipment Pads	Existing	$ -	$ -	$ -	Existing
41.60	MECHANICAL					
41.60.1	Steam Turbine Modifications	New Turning Gear - See Subcontracts for Additional Work	$ 150,000	$ -	$ 30,270	$ 180,270
41.60.2	Condenser Modifications	Bypass Spargers - See Subcontracts for Additional Work	$ -	$ 150,000	$ 107,985	$ 257,985
41.60.3	Pumps		$ 840,000	$ -	$ 148,661	$ 988,661
41.60.4	Condensate Polishing Equipment		$ 2,500,000	$ -	$ 151,352	$ 2,651,352
41.60.5	Gland Steam Condenser		$ 80,000	$ -	$ 15,135	$ 95,135
41.89	SUBTOTAL - DIRECT COSTS, STEAM TURBINE		$ 3,570,000	$ 150,000	$ 453,402	$ 4,173,402
41.90	CONSTRUCTION INDIRECTS, STEAM TURBINE		$ 178,500	$ 35,250	$ 164,294	$ 378,044
41.99	SUBCONTRACTS	ST Blade Mods, ST Generator Rewind, and Condenser Cleaning	$ 23,200,000	$ -	$ -	$ 23,200,000
41.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, STEAM TURBINE**		$ 26,948,500	$ 185,250	$ 617,696	$ 27,751,446

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50.00	**COOLING TOWER**					
50.20	CONCRETE					
50.20.1	Cooling Tower Pump Structure	Existing	$ -	$ -	$ -	Existing
50.20.2	Natural Draft Cooling Tower Basin	Existing	$ -	$ -	$ -	Existing
50.30	STRUCTURAL STEEL					
50.30.1	Miscellaneous Steel for Cooling Tower Pump Intake		$ -	$ -	$ -	Existing
50.60	MECHANICAL					
50.60.1	Cooling Tower Fire Protection System	Not Included	$ -	$ -	$ -	Not Included
50.60.2	Trash Screens	Not Included	$ -	$ -	$ -	Not Included
50.60.3	Circulating Water Chemical Feed System	Tanks Only	$ -	$ -	$ -	Existing
50.60.4	Pumps	New Cooling Tower Makeup Pumps & Remove / Reinstall Circ Water Pumps	$ 80,000	$ -	$ 223,982	$ 303,982
50.89	SUBTOTAL - DIRECT COSTS, COOLING TOWER		$ 80,000	$ -	$ 223,982	$ 303,982
50.90	CONSTRUCTION INDIRECTS, COOLING TOWER		$ 4,000	$ -	$ 80,895	$ 84,895
50.99	SUBCONTRACTS	Cooling Tower Fill Replacement & Circ Water Pump Refurbishment	$ 11,850,000	$ -	$ -	$ 11,850,000
50.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, COOLING TOWER**		$ 11,934,000	$ -	$ 304,877	$ 12,238,877

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55.00	**WATER TREATMENT**					
55.20	CONCRETE					
55.20.1	Water Treatment Building Foundation	Mat Foundation, 152' x 89'	$ -	$ 526,225	$ 622,474	$ 1,148,699
55.20.2	Misc. Equipment Pads in Building		$ -	$ 13,008	$ 28,542	$ 41,550
55.20.3	Chemical Storage Foundation		$ -	$ 17,830	$ 35,022	$ 52,852
55.20.4	Water Treatment Laboratory Foundation		$ -	$ 24,233	$ 22,845	$ 47,077
55.20.5	Demin Water Storage Tank Foundation		$ -	$ 17,830	$ 35,022	$ 52,852
55.40	ARCHITECTURAL					
55.40.1	Water Treatment Building		$ 75,000	$ 1,515,056	$ 86,208	$ 1,676,264
55.40.2	Water Treatment Laboratory Building		$ -	$ 75,600	$ -	$ 75,600
55.45	PAINTING / COATING					
55.45.1	Special Coatings		$ -	$ 30,000	$ 186,217	$ 216,217
55.60	MECHANICAL					
55.60.1	Water Treatment Equipment	150 gpm Ultrafilter & RO System, w/ Cartridge Filters, Feed Pumps, Chemical Injection, Break Tank, and CIP Skids	$ 3,005,600	$ -	$ 928,499	$ 3,934,099
55.60.2	Miscellaneous Pumps		$ 72,000	$ -	$ 52,527	$ 124,527
55.60.3	Shop Fabricated Tanks		$ 25,000	$ -	$ 10,099	$ 35,099
55.89	SUBTOTAL - DIRECT COSTS, WATER TREATMENT		$ 3,177,600	$ 2,219,781	$ 2,007,455	$ 7,404,836
55.90	CONSTRUCTION INDIRECTS, WATER TREATMENT		$ 158,880	$ 521,649	$ 729,742	$ 1,410,270
55.99	SUBCONTRACTS		$ -	$ -	$ -	$ -
55.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, WATER TREATMENT**		$ 3,336,480	$ 2,741,429	$ 2,737,197	$ 8,815,107

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56.00	**PRE-TREATMENT**					
56.20	CONCRETE					
56.20.1	Clarifier Foundations (2 Total)	85' Dia. Steel Clarifier on Mat Fdn.	$ -	$ 536,743	$ 490,847	$ 1,027,590
56.20.2	Sludge Holding Tank Foundations (2 Total)		$ -	$ 150,600	$ 169,189	$ 319,789
56.20.3	Raw Water Storage Tank Foundation		$ -	$ 114,638	$ 93,580	$ 208,217
56.20.4	Clearwell Tank Foundations (2 Total)		$ -	$ 150,600	$ 169,189	$ 319,789
56.20.5	Filter Press Building Foundation		$ -	$ 192,363	$ 200,543	$ 392,906
56.20.6	Filter Press Building Equipment Pads		$ -	$ 4,138	$ 12,875	$ 17,013
56.20.7	Pre-Treatment Building Foundation		$ -	$ 499,638	$ 575,287	$ 1,074,924
56.20.8	Pre-Treatment Building Equipment Pads		$ -	$ 24,450	$ 62,970	$ 87,420
56.30	STRUCTURAL STEEL					
56.30.1	Filter Press Building Steel	Framing, Upper Floor	$ -	$ 127,305	$ 90,291	$ 217,596
56.40	ARCHITECTURAL					
56.40.1	Pre-Treatment Building		$ 75,000	$ 1,104,675	$ 32,232	$ 1,211,907
56.40.2	Filter Press Building		$ 20,000	$ 430,000	$ 27,628	$ 477,628
56.40.3	Interior Finishes		$ -	$ 208,180	$ 128,056	$ 336,236
56.40.4	River Water Intake Structure Building		$ -	$ -	$ -	Existing
56.45	PAINTING / COATING					
56.45.1	Special Coatings		$ -	$ 20,000	$ 124,145	$ 144,145
56.60	MECHANICAL					
56.60.1	Water Pre-Treatment Equipment	4,500 GPM, w/ Chemical Dosing and Filter Presses	$ 3,014,000	$ -	$ 1,444,331	$ 4,458,331
56.60.2	Miscellaneous Pumps		$ 55,000	$ -	$ 14,866	$ 69,866
56.60.3	River Water Intake Screens		$ 140,000	$ -	$ 60,541	$ 200,541
56.89	SUBTOTAL - DIRECT COSTS, PRE-TREATMENT		$ 3,304,000	$ 3,563,328	$ 3,696,569	$ 10,563,897
56.90	CONSTRUCTION INDIRECTS, PRE-TREATMENT		$ 165,200	$ 837,382	$ 1,342,513	$ 2,345,095
56.99	SUBCONTRACTS	Raw Water Tank	$ 700,000	$ -	$ -	$ 700,000
56.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, PRE-TREATMENT**		$ 4,169,200	$ 4,400,709	$ 5,039,082	$ 13,608,992

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60.00	**PIPE RACK**					
60.20	CONCRETE					
60.20.1	Piperack Foundations @ New Powerblock	Individual Footings. Half of Pipe Rack Columns on Other	$ -	$ 381,400	$ 379,241	$ 760,641
60.20.2	Piperack Foundations @ Exterior Rack East & South of Unit 1		$ -	$ 140,650	$ 194,117	$ 334,767
60.30	STRUCTURAL STEEL					
60.30.1	Structural Steel, Pipe Rack @ New Power Block	330' L x 12' W x 25' H, 1 Level and 660' L x 24' W x 40' H, 2 Levels.	$ -	$ 2,107,605	$ 1,482,554	$ 3,590,159
60.30.2	Structural Steel Framing Inside Existing Boiler Room		$ -	$ 168,700	$ 304,896	$ 473,596
60.30.3	Exterior Structural Steel Framing East & South of Unit 1		$ -	$ 451,025	$ 313,604	$ 764,629
60.45	PAINTING / COATING					
60.45.1	Touch-up Painting		$ -	$ 105,000	$ 407,350	$ 512,350
60.89	SUBTOTAL - DIRECT COSTS, PIPE RACK		$ -	$ 3,354,380	$ 3,081,762	$ 6,436,142
60.90	CONSTRUCTION INDIRECTS, PIPE RACK		$ -	$ 788,279	$ 1,119,617	$ 1,907,896
60.99	SUBCONTRACTS		$ -	$ -	$ -	$ -
60.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, PIPE RACK**		$ -	$ 4,142,659	$ 4,201,379	$ 8,344,038

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70.00	**ELECTRICAL POWER DISTRIBUTION**					
70.20	CONCRETE					
70.20.1	GSU Foundations (2 Total)	Includes Mat, Piers, Firewall, & Containment	$ -	$ 200,800	$ 522,112	$ 722,912
70.20.2	Aux Transformer Foundations (2 Total)	Includes Mat, Piers, Firewall, & Containment	$ -	$ 68,178	$ 213,882	$ 282,060
70.20.3	Transformer PDC Foundation		$ -	$ 142,625	$ 185,997	$ 328,622
70.20.4	STG PDC Foundation		$ -	$ 94,600	$ 153,953	$ 248,553
70.20.5	HRSG PDC Foundations (2 Total)		$ -	$ 115,340	$ 193,968	$ 309,308
70.20.6	CT Chiller PDC Foundations		$ -	$ 94,600	$ 153,953	$ 248,553
70.20.7	Iso-Phase Bus / Cable Bus Foundations		$ -	$ 7,900	$ 12,491	$ 20,391
70.20.8	Emergency Diesel Generator Foundation		$ -	$ 8,875	$ 27,828	$ 36,703
70.30	STRUCTURAL STEEL					
70.30.1	Miscellaneous Steel for GSU Containments (2 Total)		$ -	$ 45,365	$ 36,011	$ 81,376
70.30.2	Miscellaneous Steel for Aux Transformer Containments (2 Total)		$ -	$ 23,610	$ 18,664	$ 42,274
70.30.3	STG PDC Galleries		$ -	$ 12,930	$ 9,190	$ 22,120
70.30.4	HRSG PDC Galleries (2 Total)		$ -	$ 22,150	$ 15,747	$ 37,897
70.30.5	Transformer PDC Galleries		$ -	$ 22,150	$ 15,747	$ 37,897
70.30.6	HVAC PDC Support Framing & Galleries		$ -	$ 24,060	$ 17,091	$ 41,151
70.30.7	CT Chiller PDC Galleries		$ -	$ 12,930	$ 9,190	$ 22,120
70.50	ELECTRICAL					
70.50.1	Generator Circuit Breakers (18KV)		$ 1,100,000	$ -	$ 100,922	$ 1,200,922
70.50.2	Generator Step Up Transformers		$ 5,286,500	$ -	$ 462,405	$ 5,748,905
70.50.3	Unit Substation Transformers		$ -	$ -	$ 266,066	$ 266,066
70.50.4	Unit Auxiliary Transformers (UAT: 1A, 1B)		$ 1,300,000	$ -	$ 179,824	$ 1,479,824
70.50.5	4.16kV Switchgear		$ 3,444,200	$ -	$ -	$ 3,444,200
70.50.6	480V Switchgear		$ 3,021,600	$ -	$ 53,717	$ 3,075,317
70.50.7	Isolated Phase Bus Duct		$ 895,000	$ -	$ 332,469	$ 1,227,469
70.50.8	480V-800A, Motor Control Centers		$ 1,311,000	$ -	$ 42,973	$ 1,353,973
70.50.9	Non-Seg/Cable Bus		$ 868,720	$ -	$ 998,232	$ 1,866,952

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70.50.10	Emergency Power System		$ 257,500	$ -	$ 40,287	$ 297,787
70.50.11	PDCs		$ 3,579,375	$ -	$ 437,863	$ 4,017,238
70.50.12	Panelboards		$ 152,000	$ -	$ 15,220	$ 167,220
70.50.13	Generator/Transformer Relay & Protection Panels		$ 276,000	$ 2,000	$ 59,043	$ 337,043
70.50.14	Communication		$ 81,835	$ -	$ 10,743	$ 92,578
70.50.15	Digital Fault Recorder		$ 125,680	$ -	$ 17,906	$ 143,586
70.50.16	Diesel Generator		$ 550,000	$ -	$ 89,528	$ 639,528
70.50.17	Security System		$ 145,000	$ -	$ 44,726	$ 189,726
70.50.18	Cable Splice Boxes		$ -	$ -	$ 82,365	$ 259,365
70.50.19	Cable		$ -	$ 2,673,346	$ 7,503,834	$ 10,177,180
70.50.20	Heat Tracing		$ 87,200	$ 440,105	$ 1,206,361	$ 1,733,666
70.50.21	Conduit-Above Ground		$ -	$ 268,977	$ 835,812	$ 1,104,789
70.50.22	Embedded Conduits		$ -	$ 24,048	$ 60,677	$ 84,725
70.50.23	Cable Tray		$ -	$ 389,598	$ 1,928,649	$ 2,318,247
70.50.24	Lighting and Distribution		$ -	$ 757,000	$ 1,453,589	$ 2,210,589
70.50.25	Laydown Area Lighting	Costs Covered in Site Overheads (In Crew Wage Rates)	$ -	$ -	$ -	$ -
70.50.26	Miscellaneous Electrical Devices		$ -	$ 100,000	$ 223,629	$ 323,629
70.50.27	Lightning Protection		$ -	$ 15,674	$ 84,720	$ 100,394
70.50.28	Above Ground Grounding		$ -	$ 22,581	$ 72,533	$ 95,114
70.50.29	Electrical Allowance for Relocated Bulk Gas Storage Facility		$ -	$ 7,500	$ 13,977	$ 21,477
70.89	SUBTOTAL - DIRECT COSTS, ELECTRICAL POWER DISTRIBUTION		$ 22,658,610	$ 5,596,941	$ 18,203,893	$ 46,459,443
70.90	CONSTRUCTION INDIRECTS, ELECTRICAL POWER DISTRIBUTION		$ 1,132,930	$ 1,315,281	$ 6,613,480	$ 9,061,691
70.99	SUBCONTRACTS	GSU Heavy Haul	$ -	$ -	$ 250,000	$ 250,000
70.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, ELECTRICAL POWER DISTRIBUTION**		$ 23,791,540	$ 6,912,222	$ 25,067,372	$ 55,771,135

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Option 1 - 2x2 MHI 501GAC Combustion Turbines
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Cost Estimate Summary

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Project No.: 12756-002
First Issue Date: 7/29/11
Revision No.: B
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Reviewer: BJD

Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
75.00	**DCS**					
75.20	CONCRETE					
75.20.1	CEMS Foundation (2 Total)		$ -	$ 7,420	$ 18,125	$ 25,545
75.50	ELECTRICAL					
75.50.1	600V Small Power Cable		$ -	$ 468,546	$ 1,422,055	$ 1,890,601
75.50.2	Conduit-Above Ground		$ -	$ 166,802	$ 540,315	$ 707,117
75.50.3	Embedded Conduits		$ -	$ 80,765	$ 205,378	$ 286,144
75.55	INSTRUMENTATION					
75.55.1	DCS		$ 2,900,000	$ -	$ 335,245	$ 3,235,245
75.55.2	High Fidelity Simulator		$ 1,346,000	$ -	$ 150,110	$ 1,496,110
75.55.3	CEMS		$ 660,000	$ -	$ 120,088	$ 780,088
75.55.4	BOP Field Mounted Instruments		$ 700,400	$ 545,310	$ 851,566	$ 2,097,276
75.55.5	Vendor Furnished Field Mounted Instruments		$ -	$ 267,716	$ 422,850	$ 690,566
75.89	SUBTOTAL - DIRECT COSTS, DCS		$ 5,606,400	$ 1,536,560	$ 4,065,730	$ 11,208,690
75.90	CONSTRUCTION INDIRECTS, DCS		$ 280,320	$ 361,091	$ 1,477,527	$ 2,118,939
75.99	SUBCONTRACTS		$ -	$ -	$ -	$ -
75.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, DCS**		$ 5,886,720	$ 1,897,651	$ 5,543,258	$ 13,327,629

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80.00	**BOP**					
80.20	CONCRETE					
80.20.1	CTG Inlet Air Chiller Foundations		$ -	$ 16,750	$ 23,819	$ 40,569
80.20.2	Ammonia Storage Tank Foundation		$ -	$ 58,038	$ 111,948	$ 169,986
80.20.3	HRSG Blowdown Sump		$ -	$ 46,465	$ 196,424	$ 242,889
80.20.4	Aux Boiler Foundation	Mat Foundation, 65' x 30'	$ -	$ 83,125	$ 70,174	$ 153,299
80.20.5	Bulk Gas Storage Pad		$ -	$ 30,275	$ 59,896	$ 90,171
80.20.6	CO2 Storage Tank (Relocated)		$ -	$ 1,409	$ 3,803	$ 5,212
80.20.7	BOP Foundation Embedments		$ -	$ 50,000	$ 97,276	$ 147,276
80.30	STRUCTURAL STEEL					
80.30.1	HRSG Blowdown Sump Handrails		$ -	$ 3,350	$ 957	$ 4,307
80.40	ARCHITECTURAL					
80.40.1	Bulk Gas Storage Enclosure		$ -	$ 123,750	$ -	$ 123,750
80.45	PAINTING / COATING					
80.45.1	Touch-up & Finish Painting		$ -	$ 150,000	$ 581,929	$ 731,929
80.60	MECHANICAL					
80.60.1	CTG Inlet Air Chiller Equipment Package		$ 9,000,000	$ -	$ 706,307	$ 9,706,307
80.60.2	Auxiliary Boiler	80,000 lb/hr	$ 1,751,000	$ -	$ 743,130	$ 2,494,130
80.60.3	Heat Exchangers		$ 520,000	$ -	$ 60,541	$ 580,541
80.60.4	Miscellaneous Pumps		$ 220,000	$ -	$ 63,428	$ 283,428
80.60.5	Shop Fabricated Tanks		$ 40,000	$ -	$ 7,070	$ 47,070
80.60.6	Bulk Gas Storage Provisions	Storage Tank w/ manifolds & Regulators	$ 80,000	$ -	$ 40,360	$ 120,360
80.60.7	Ammonia Storage & Forwarding Equipment	Includes 20,000 gal. CS Tank for 10 Day Storage	$ 450,000	$ -	$ 85,766	$ 535,766

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80.60.8	Air Compressors & Accessories		$ 15,000	$ -	$ 7,070	$ 22,070
80.60.9	Chemical Feed & Sample Systems		$ 725,000	$ -	$ 77,375	$ 802,375
80.60.10	Relocate Existing CO2 Storage Tank		$ -	$ -	$ 25,225	$ 25,225
80.70	PIPING					
80.70.1	Alloy Piping		$ -	$ 10,129,055	$ 5,084,117	$ 15,213,172
80.70.2	BOP Piping		$ -	$ 4,874,341	$ 12,756,013	$ 17,630,354
80.70.3	Pipe Supports, HP (Engineered Supports)		$ -	$ 2,100,000	$ 325,233	$ 2,425,233
80.70.4	Pipe Supports, LP		$ -	$ 850,000	$ 567,018	$ 1,417,018
80.70.5	C/T Interconnecting Piping		$ -	$ -	$ 427,938	$ 427,938
80.70.6	Valves & Specialties		$ 9,092,000	$ -	$ 1,382,240	$ 10,474,240
80.80	INSULATION					
80.80.1	Thermal Insulation/Lagging		$ -	$ 950,000	$ 4,412,855	$ 5,362,855
80.80.2	HRSG Piping & Drum Insulation and Lagging		$ -	$ 400,000	$ 685,492	$ 1,085,492
80.80.3	HRSG Stack Insulation to Damper Elevation		$ -	$ 195,000	$ 315,313	$ 510,313
80.89	SUBTOTAL - DIRECT COSTS, BOP		$ 21,893,000	$ 20,061,558	$ 28,918,718	$ 70,873,275
80.90	CONSTRUCTION INDIRECTS, BOP		$ 1,094,650	$ 4,714,466	$ 10,506,424	$ 16,315,540
80.99	SUBCONTRACTS		$ -	$ -	$ -	$ -
80.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, BOP**		$ 22,987,650	$ 24,776,024	$ 39,425,141	$ 87,188,815

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90.00	**COMMON**					
90.20	CONCRETE					
90.20.1	Combustion Turbine Building Foundation		$ -	$ 1,512,788	$ 1,612,720	$ 3,125,507
90.20.2	Steam Turbine Building Foundation		$ -	$ 3,723	$ 12,021	$ 15,744
90.20.3	Steam Turbine Building Elevated Slabs		$ -	$ -	$ 1,206	$ 1,206
90.20.4	Boiler Building Concrete Work	Additions in Existing Building	$ -	$ 2,390	$ 3,787	$ 6,177
90.20.5	Admin / Warehouse / Storage Building Foundation		$ -	$ -	$ -	Not Included
90.20.6	Fire Water Pumphouse Foundation		$ -	$ -	$ -	Existing
90.20.7	Service Water Pump Foundation		$ -	$ -	$ -	Existing
90.20.8	Tower Crane Foundation		$ -	$ 200,000	$ 94,149	$ 294,149
90.20.9	New Foundation for Fire House (Truck Parking)		$ -	$ 4,581	$ 10,253	$ 14,835
90.20.10	Overflow Sump		$ -	$ 28,113	$ 112,797	$ 140,909
90.30	STRUCTURAL STEEL					
90.30.1	Combustion Turbine Building Steel	75' x 300' x 80' H plus 55' x 300' x 40' H	$ -	$ 3,730,800	$ 2,862,861	$ 6,593,661
90.30.2	Steam Turbine Building Steel	Modifications to Existing	$ -	$ 53,342	$ 112,796	$ 166,138
90.30.3	Boiler Building Steel	Modifications to Existing	$ -	$ 117,976	$ 214,973	$ 332,949
90.40	ARCHITECTURAL					
90.40.1	Combustion Turbine Building		$ -	$ 1,301,792	$ 1,008,287	$ 2,310,079
90.40.2	Steam Turbine Building	Existing. No Mods Required	$ -	$ -	$ -	$ -
90.40.3	Boiler Building	Modifications to Existing Building	$ -	$ 148,164	$ 150,616	$ 298,780
90.40.4	Admin / Warehouse / Storage Building	Not Included	$ -	$ -	$ -	Not Included
90.40.5	Relocate Existing Warehouse Building	Not Required	$ -	$ -	$ -	Not Required
90.40.6	New Metal Cleaning Waste Pumphouse		$ -	$ 40,000	$ -	$ 40,000
90.40.7	New Fire House (Truck Parking)		$ -	$ 60,000	$ -	$ 60,000

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90.45	PAINTING / COATING					
90.45.1	Touch-up & Finish Painting		$ -	$ 100,000	$ 387,953	$ 487,953
90.60	MECHANICAL					
90.60.1	Diesel Driven Fire Pump Package		$ 160,000	$ -	$ 19,821	$ 179,821
90.60.2	Miscellaneous Pumps		$ -	$ -	$ 3,964	$ 3,964
90.60.3	Cranes & Hoists		$ 770,000	$ -	$ 261,446	$ 1,031,446
90.60.4	Fuel Gas Check Metering Station		$ 800,000	$ -	$ 151,352	$ 951,352
90.60.5	Potable Water Tepid Recirculation System		$ 250,000	$ -	$ 60,541	$ 310,541
90.60.6	HVAC for New Control Room Extension		$ -	$ 25,000	$ 73,674	$ 98,674
90.60.7	Plumbing & Fixtures		$ -	$ 30,000	$ 128,381	$ 158,381
90.60.8	Install Blanking Plate at Existing Chimney		$ -	$ 12,350	$ 67,726	$ 80,076
90.89	SUBTOTAL - DIRECT COSTS, COMMON		$ 1,980,000	$ 7,371,017	$ 7,351,323	$ 16,702,340
90.90	CONSTRUCTION INDIRECTS, COMMON		$ 99,000	$ 1,732,189	$ 4,370,471	$ 6,201,660
90.99	SUBCONTRACTS	Metal Cleaning Waste Tank, Fire Protection Systems, & Site Bussing Services	$ 4,004,000	$ -	$ -	$ 4,004,000
90.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, COMMON**		$ 6,083,000	$ 9,103,206	$ 11,721,794	$ 26,908,001

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Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
	OVERALL PROJECT SUBTOTALS					
OP.89	**DIRECT COSTS**		$ 262,105,109	$ 56,873,217	$ 117,955,509	$ 436,933,835
OP.90	**CONSTRUCTION INDIRECTS**		$ 5,660,875	$ 13,365,206	$ 44,553,930	$ 63,580,011
OP.99	**SUBCONTRACTS**		$ 39,754,000	$ 150,000	$ 4,300,000	$ 44,204,000
OP.00	**SUBTOTAL PROJECT COSTS**		$ 307,519,985	$ 70,388,423	$ 166,809,438	$ 544,717,846
PI.00	**OVERALL PROJECT INDIRECT COSTS**					$ 38,334,200
	Spare Parts					$ 4,612,800
	Contingency					$ 76,810,500
	Escalation					$ 56,305,259
	Subtotal Project Cost					$ 720,780,605
	Owner's Costs	Not Included				$ -
	AFUDC (Interest During Construction)	Not Included				$ -
	Total Project Cost					$ 720,780,605

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Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
	ADDITIONAL REFERENCE COSTS:					
A	**Demolition & Removal**					
A.1	Existing Metal Cleaning Waste Tank Area Restoration		$ -	$ 2,850	$ 55,548	$ 58,398
A.2	Demolish Existing Fire House (Truck Parking)		$ -	$ -	$ 5,919	$ 5,919
A.3	Demolish Existing Coal Handling Structures		$ -	$ -	$ 333,672	$ 333,672
A.4	Demolish Existing Railroad Tracks		$ -	$ -	$ 41,249	$ 41,249
A.5	Demolish Existing Helipad	Included w/ Coal Handling Removals in A.3	$ -	$ -	$ -	$ -
A.6	Demolish Existing Sun Shelter		$ -	$ -	$ 13,154	$ 13,154
A.7	Demolish Unit 1 Boiler Building Combustion Air Coil Room		$ -	$ -	$ 68,388	$ 68,388
A.8	Demolish Unit 1 Boiler Building Platform at El. 586'-9" (Row 8 to 12)		$ -	$ -	$ 10,606	$ 10,606
A.9	Secure Existing Track Hopper for Abandonment		$ -	$ 54,930	$ 97,942	$ 152,872
A.10	Demolish Gas Cylinder Storage Shed		$ -	$ -	$ 9,208	$ 9,208
A.11	Demolish CO2 Storage Tank Foundation		$ -	$ -	$ 3,289	$ 3,289
A.12	Remove & Dispose of Existing Relays serving ST GSU, UAT, RAT, and Generator Protection		$ -	$ -	$ 13,702	$ 13,702
A.13	Remove & Dispose of Existing 4.16 kV Switchgear Sections in Existing STG Building		$ -	$ -	$ 172,648	$ 172,648
A.14	Remove & Dispose of Existing 600V Switchgear Sections in Existing STG Building		$ -	$ -	$ 312,411	$ 312,411

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A.15	Remove & Dispose of Existing Oil Filled 4.16kV/600V 1.5 MVA Transformers in Existing STG Building		$ -	$ -	$ 54,809	$ 54,809
A.16	Control Room Demolition & Removals		$ -	$ -	$ 123,320	$ 123,320
A.17	Remove Existing Pumps		$ -	$ -	$ 112,982	$ 112,982
A.18	Remove & Dispose of Existing Gland Steam Condenser		$ -	$ -	$ 19,821	$ 19,821
A.19	Remove & Dispose of Existing ST Turning Gear Assembly		$ -	$ -	$ 20,180	$ 20,180
A.20	Remove & Dispose of Existing Raw Water Intake Screens		$ -	$ -	$ 40,360	$ 40,360
A.21	Remove & Dispose of Existing Insulation & Lagging on Ductwork Above Boiler Room Roof		$ -	$ -	$ 158,590	$ 158,590
A.22	Remove & Dispose of Existing Piping & Mechanical Items In Existing Powerhouse As Required	Allowance	$ -	$ -	$ 267,461	$ 267,461
A.23	Remove & Dispose of Existing Conduits & Electrical Items In Existing Powerhouse As Required	Allowance	$ -	$ -	$ 223,819	$ 223,819
A.89	SUBTOTAL - DIRECT COSTS, Demolition & Removal		$ -	$ 57,780	$ 2,159,078	$ 2,216,858
A.90	CONSTRUCTION INDIRECTS, Demolition & Removal		$ -	$ 13,578	$ 784,642	$ 798,220
A.99	SUBCONTRACTS	Sludge Disposal, Soil Remediation & Asbestos Removal	$ 1,504,100	$ -	$ -	$ 1,504,100
A.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, Demolition & Removal**		$ 1,504,100	$ 71,358	$ 2,943,720	$ 4,519,178
PI.00	**Indirect Costs**	Included Above w/ Overall Project Indirect Costs				
	Contingency					$ 1,265,700
	Escalation					$ 356,557
	Total Demolition & Removal Cost					$ 6,141,435

ATTACHMENT 1-13
Option 2 Summary Capital
Cost Estimate No. 31239B

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10.00	**GENERAL SITE WORK**					
10.10	CIVIL					
10.10.1	Relocate Existing Metal Cleaning Waste Tank and Pumphouse		$ -	$ 224,134	$ 355,291	$ 579,425
10.10.2	Relocate Existing RSO Trailers		$ -	$ -	$ 30,270	$ 30,270
10.10.3	Construction Parking & Laydown Areas Preparation		$ -	$ 1,923,056	$ 2,411,610	$ 4,334,666
10.10.4	Erosion & Sediment Control - New Power Block Area		$ -	$ 66,000	$ 38,538	$ 104,538
10.10.5	Site Clearing & Stripping		$ -	$ -	$ 518,395	$ 518,395
10.10.6	Roads & Surfacing		$ -	$ 1,063,300	$ 692,190	$ 1,755,490
10.10.7	Fencing		$ -	$ 112,000	$ 56,096	$ 168,096
10.10.8	Stormwater Drainage Trench		$ -	$ 930,000	$ 1,217,784	$ 2,147,784
10.10.9	Stormwater Runoff Pond		$ -	$ 35,475	$ 38,966	$ 74,441
10.10.10	Stormwater Pond Outlet Structure		$ -	$ 145,000	$ 459,902	$ 604,902
10.10.11	Temporary Construction Guard House		$ -	$ 20,000	$ 40,532	$ 60,532
10.10.12	Concrete Filled Pipe Bollards	Includes Installation Labor	$ -	$ 25,000	$ -	$ 25,000
10.10.13	Spur Track Upgrade		$ -	$ 548,425	$ 561,748	$ 1,110,173
10.10.14	Install New Stops at Track Sections Being Demolished		$ -	$ 5,000	$ 1,993	$ 6,993
10.89	SUBTOTAL - DIRECT COSTS, GENERAL SITE WORK		$ -	$ 5,097,390	$ 6,423,314	$ 11,520,704
10.90	CONSTRUCTION INDIRECTS, GENERAL SITE WORK		$ -	$ 1,197,887	$ 2,334,024	$ 3,531,911
10.99	SUBCONTRACTS		$ -	$ -	$ -	$ -
10.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, GENERAL SITE WORK**		$ -	$ 6,295,277	$ 8,757,338	$ 15,052,615

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11.00	**UNDERGROUND**					
11.10	CIVIL					
11.10.1	Oily Water Sewer System		$ 6,000	$ 272,075	$ 757,636	$ 1,035,711
11.10.2	Modifications to Existing Storm Sewers		$ -	$ 128,300	$ 553,979	$ 682,279
11.10.3	Stormwater Drainage System		$ 1,500	$ 57,000	$ 231,703	$ 290,203
11.10.4	Sanitary Sewer System		$ -	$ -	$ -	$ -
11.10.5	Mechanical Excavation (for process pipe trenches)		$ -	$ -	$ 1,076,938	$ 1,076,938
11.10.6	Hydro Excavation for Mechanical and Electrical Services		$ -	$ 19,550	$ 176,296	$ 195,846
11.10.7	Relocation of Miscellaneous Underground Utilities		$ -	$ 125,000	$ 128,530	$ 253,530
11.20	CONCRETE					
11.20.1	Concrete Thrust Blocks for Piping Systems		$ -	$ 9,000	$ 23,646	$ 32,646
11.50	ELECTRICAL					
11.50.1	Electrical Ductbanks & Trenches		$ -	$ 555,725	$ 3,128,297	$ 3,684,022
11.50.2	Conduits		$ -	$ 807,573	$ 830,994	$ 1,638,567
11.50.3	Grounding		$ -	$ 187,584	$ 414,668	$ 602,252
11.50.4	Cathodic Protection		$ -	$ 76,519	$ 123,275	$ 199,794
11.60	MECHANICAL					
11.60.1	Oil/Water Separator Including Lift Stations	(2) Included	$ 100,000	$ -	$ 114,426	$ 214,426
11.60.2	Sanitary Sewage Treatment Plant		$ -	$ -	$ -	Existing
11.70	PIPING					
11.70.1	Large Bore BOP Pipe 2-1/2" & Larger - Below Ground		$ -	$ 3,009,060	$ 5,212,203	$ 8,221,262
11.89	SUBTOTAL - DIRECT COSTS, UNDERGROUND		$ 107,500	$ 5,247,385	$ 12,772,592	$ 18,127,477
11.90	CONSTRUCTION INDIRECTS, UNDERGROUND		$ 5,375	$ 1,233,135	$ 4,640,589	$ 5,879,100
11.99	SUBCONTRACTS	Jack & Bore Under RR Tracks	$ -	$ 150,000	$ 350,000	$ 500,000
11.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, UNDERGROUND**		$ 112,875	$ 6,630,521	$ 17,763,181	$ 24,506,577

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21.00	**CTG A**					
21.20	CONCRETE					
21.20.1	Combustion Turbine A Foundation	Isolated Mat Foundation, 110' x 35'	$ -	$ 243,880	$ 264,975	$ 508,855
21.20.2	Combustion Turbine A Piers / Pedestal		$ -	$ 107,702	$ 314,326	$ 422,027
21.20.3	Combustion Turbine A Excitation & Isolation Transformer Foundations	Includes Mat, Piers, Firewalls, and Containment	$ -	$ 20,050	$ 71,172	$ 91,222
21.20.4	Combustion Turbine A Miscellaneous Equipment Pads		$ -	$ 6,175	$ 15,236	$ 21,411
21.30	STRUCTURAL STEEL					
21.30.1	Miscellaneous Steel for Transformer Containments		$ -	$ 6,712	$ 5,336	$ 12,048
21.45	PAINTING / COATING					
21.45.1	Touch Up Painting, CTG A		$ -	$ -	$ 76,582	$ 76,582
21.60	MECHANICAL					
21.60.1	Combustion Turbine & Accessories	GE 7FA.05 C/T. - Nominal 210 mW, Firing Natural Gas or Fuel Oil, w/Dry Low Nox Burners, Inlet Air Filters, Standard Accessories.	$ 54,600,000	$ -	$ 2,883,751	$ 57,483,751
21.60.2	Fuel Gas Conditioning	Skid Mounted, Includes Separators, Coalescing Filters, & Dewpoint Heater. Serves (1) C/T's	$ 1,150,000	$ -	$ 70,631	$ 1,220,631
21.60.3	Heat Exchangers	Performance Heaters	$ 150,000	$ -	$ 45,405	$ 195,405
21.60.4	Shop Fabricated Tanks	Water Wash Drain Tank	$ 15,000	$ -	$ 6,060	$ 21,060
21.89	SUBTOTAL - DIRECT COSTS, CTG A		$ 55,915,000	$ 384,519	$ 3,753,473	$ 60,052,991
21.90	CONSTRUCTION INDIRECTS, CTG A		$ 140,750	$ 90,362	$ 1,363,238	$ 1,594,350
21.99	SUBCONTRACTS	Heavy Haul	$ -	$ -	$ 1,000,000	$ 1,000,000
21.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, CTG A**		$ 56,055,750	$ 474,880	$ 6,116,710	$ 62,647,341

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Reviewer: BJD

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22.00	**CTG B**					
22.20	CONCRETE					
22.20.1	Combustion Turbine B Foundation	Isolated Mat Foundation, 110' x 35'	$ -	$ 243,880	$ 264,975	$ 508,855
22.20.2	Combustion Turbine B Piers / Pedestal		$ -	$ 107,702	$ 314,326	$ 422,027
22.20.3	Combustion Turbine B Excitation & Isolation Transformer Foundations	Includes Mat, Piers, Firewalls, and Containment	$ -	$ 20,050	$ 71,172	$ 91,222
22.20.4	Combustion Turbine B Miscellaneous Equipment Pads		$ -	$ 6,175	$ 15,236	$ 21,411
22.30	STRUCTURAL STEEL					
22.30.1	Miscellaneous Steel for Transformer Containments		$ -	$ 6,712	$ 5,336	$ 12,048
22.45	PAINTING / COATING					
22.45.1	Touch Up Painting, CTG B		$ -	$ -	$ 76,582	$ 76,582
22.60	MECHANICAL					
22.60.1	Combustion Turbine & Accessories	GE 7FA.05 C/T. - Nominal 210 mW, Firing Natural Gas or Fuel Oil, w/Dry Low Nox Burners, Inlet Air Filters, Standard Accessories.	$ 54,600,000	$ -	$ 2,880,724	$ 57,480,724
22.60.2	Fuel Gas Conditioning	Skid Mounted, Includes Separators, Coalescing Filters, &	$ 1,150,000	$ -	$ 70,631	$ 1,220,631
22.60.3	Heat Exchangers	Performance Heaters	$ 150,000	$ -	$ 45,405	$ 195,405
22.60.4	Shop Fabricated Tanks	Water Wash Drain Tank	$ 15,000	$ -	$ 6,060	$ 21,060
22.89	SUBTOTAL - DIRECT COSTS, CTG B		$ 55,915,000	$ 384,519	$ 3,750,446	$ 60,049,964
22.90	CONSTRUCTION INDIRECTS, CTG B		$ 140,750	$ 90,362	$ 1,362,401	$ 1,593,513
22.99	SUBCONTRACTS	Heavy Haul	$ -	$ -	$ 1,000,000	$ 1,000,000
22.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, CTG B**		$ 56,055,750	$ 474,880	$ 6,112,847	$ 62,643,477

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31.00	**HRSG A**					
31.20	CONCRETE					
31.20.1	HRSG A Foundation (Incl. Stack)	Mat Foundation, 160' x 45'	$ -	$ 503,563	$ 509,808	$ 1,013,370
31.20.2	Boiler Feed Pump Enclosure Foundation	Foundation 65'x28'	$ -	$ 76,510	$ 86,044	$ 162,554
31.20.3	Misc HRSG Equipment Pads / Foundations		$ -	$ 25,295	$ 91,966	$ 117,261
31.30	STRUCTURAL STEEL					
31.30.1	Blowdown Tant Pit / Trenches		$ -	$ 48,153	$ 32,646	$ 80,799
31.40	ARCHITECTURAL					
31.40.1	Boiler Feed Pump Enclosure		$ -	$ 147,560	$ -	$ 147,560
31.45	PAINTING / COATING					
31.45.1	Touch Up Painting, HRSG A		$ -	$ -	$ 190,640	$ 190,640
31.60	MECHANICAL		$ -	$ -	$ -	$ -
31.60.1	HRSG & Accessories	3-Press HRSG w\Reheat. Supplemental Duct Burners Incl. Integral Deaerator Incl. SCR and CO Catalyst Incl. 200 Foot Steel Stack Incl.	$ 24,664,000	$ -	$ 8,694,621	$ 33,358,621
31.60.2	Boiler Feed Pumps & Accessories	Incl. VFD's	$ 1,900,000	$ -	$ 218,035	$ 2,118,035
31.60.3	Shop Fabricated Tanks	HRSG Blowdown Tank	$ 40,000	$ -	$ 6,060	$ 46,060
31.60.4	Miscellaneous Pumps	Blowdown Sump Pumps	$ 110,000	$ -	$ 14,866	$ 124,866
31.89	SUBTOTAL - DIRECT COSTS, HRSG A		$ 26,764,000	$ 801,081	$ 9,844,685	$ 37,409,766
31.90	CONSTRUCTION INDIRECTS, HRSG A		$ 1,070,560	$ 188,254	$ 3,576,489	$ 4,835,303
31.99	SUBCONTRACTS	Heavy Haul	$ -	$ -	$ 730,000	$ 730,000
31.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, HRSG A**		$ 27,834,560	$ 989,334	$ 14,151,174	$ 42,975,069

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32.00	**HRSG B**					
32.20	CONCRETE					
32.20.1	HRSG B Foundation (Incl. Stack)	Mat Foundation, 160' x 45'	$ -	$ 503,563	$ 509,808	$ 1,013,370
32.20.2	Boiler Feed Pump Enclosure Foundation	Foundation 65'x28'	$ -	$ 76,510	$ 86,044	$ 162,554
32.20.3	Misc HRSG Equipment Pads / Foundations		$ -	$ 25,295	$ 91,966	$ 117,261
32.30	STRUCTURAL STEEL					
32.30.1	Blowdown Tank Pit / Trenches		$ -	$ 48,153	$ 32,646	$ 80,799
32.40	ARCHITECTURAL					
32.40.1	Boiler Feed Pump Enclosure		$ -	$ 147,560	$ -	$ 147,560
32.45	PAINTING / COATING					
32.45.1	Touch Up Painting, HRSG B		$ -	$ -	$ 190,640	$ 190,640
32.60	MECHANICAL					
32.60.1	HRSG & Accessories	3-Press HRSG w\Reheat. Supplemental Duct Burners Incl. Integral Deaerator Incl. SCR and CO Catalyst Incl. 200 Foot Steel Stack Incl.	$ 24,664,000	$ -	$ 8,694,621	$ 33,358,621
32.60.2	Boiler Feed Pumps & Accessories	Incl. VFD's	$ 1,900,000	$ -	$ 218,035	$ 2,118,035
32.60.3	Shop Fabricated Tanks	HRSG Blowdown Tank	$ 40,000	$ -	$ 6,060	$ 46,060
32.60.4	Miscellaneous Pumps	Blowdown Sump Pumps	$ -	$ -	$ -	$ -
32.89	SUBTOTAL - DIRECT COSTS, HRSG B		$ 26,654,000	$ 801,081	$ 9,829,819	$ 37,284,900
32.90	CONSTRUCTION INDIRECTS, HRSG B		$ 1,066,160	$ 188,254	$ 3,571,381	$ 4,825,795
32.99	SUBCONTRACTS	Heavy Haul	$ -	$ -	$ 730,000	$ 730,000
32.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, HRSG B**		$ 27,720,160	$ 989,334	$ 14,131,200	$ 42,840,694

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41.00	**STEAM TURBINE**					
41.20	CONCRETE					
41.20.1	STG Pedestal Foundation	Existing	$ -	$ -	$ -	Existing
41.20.2	STG Pedestal	Existing	$ -	$ -	$ -	Existing
41.20.3	STG Excitation Transformer Foundation	Existing	$ -	$ -	$ -	Existing
41.20.4	STG Equipment Pads	Existing	$ -	$ -	$ -	Existing
41.60	MECHANICAL					
41.60.1	Steam Turbine Modifications	New Turning Gear - See Subcontracts for Additional Work	$ 150,000	$ -	$ 30,270	$ 180,270
41.60.2	Condenser Modifications	Bypass Spargers - See Subcontracts for Additional Work	$ -	$ 150,000	$ 107,985	$ 257,985
41.60.3	Pumps		$ 830,000	$ -	$ 148,661	$ 978,661
41.60.4	Condensate Polishing Equipment		$ 2,500,000	$ -	$ 151,352	$ 2,651,352
41.60.5	Gland Steam Condenser		$ 80,000	$ -	$ 15,135	$ 95,135
41.89	SUBTOTAL - DIRECT COSTS, STEAM TURBINE		$ 3,560,000	$ 150,000	$ 453,402	$ 4,163,402
41.90	CONSTRUCTION INDIRECTS, STEAM TURBINE		$ 178,000	$ 35,250	$ 164,294	$ 377,544
41.99	SUBCONTRACTS	ST Blade Mods, ST Generator Rewind, and Condenser Cleaning	$ 23,200,000	$ -	$ -	$ 23,200,000
41.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, STEAM TURBINE**		$ 26,938,000	$ 185,250	$ 617,696	$ 27,740,946

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50.00	**COOLING TOWER**					
50.20	CONCRETE					
50.20.1	Cooling Tower Pump Structure	Existing	$ -	$ -	$ -	Existing
50.20.2	Natural Draft Cooling Tower Basin	Existing	$ -	$ -	$ -	Existing
50.30	STRUCTURAL STEEL					
50.30.1	Miscellaneous Steel for Cooling Tower Pump Intake	Not Required	$ -	$ -	$ -	Not Required
50.60	MECHANICAL					
50.60.1	Cooling Tower Fire Protection System	Not Included	$ -	$ -	$ -	Not Included
50.60.2	Trash Screens	Not Included	$ -	$ -	$ -	Not Included
50.60.3	Circulating Water Chemical Feed System	Existing	$ -	$ -	$ -	Existing
50.60.4	Pumps	New Cooling Tower Makeup Pumps & Remove / Reinstall Circ Water Pumps	$ 80,000	$ -	$ 223,982	$ 303,982
50.89	SUBTOTAL - DIRECT COSTS, COOLING TOWER		$ 80,000	$ -	$ 223,982	$ 303,982
50.90	CONSTRUCTION INDIRECTS, COOLING TOWER		$ 4,000	$ -	$ 80,895	$ 84,895
50.99	SUBCONTRACTS	Cooling Tower Fill Replacement & Circ Water Pump Refurbishment	$ 11,850,000	$ -	$ -	$ 11,850,000
50.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, COOLING TOWER**		$ 11,934,000	$ -	$ 304,877	$ 12,238,877

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55.00	**WATER TREATMENT**					
55.20	CONCRETE					
55.20.1	Water Treatment Building Foundation	Mat Foundation, 152' x 89'	$ -	$ 526,225	$ 622,474	$ 1,148,699
55.20.2	Misc. Equipment Pads in Building		$ -	$ 13,008	$ 28,542	$ 41,550
55.20.3	Chemical Storage Foundation		$ -	$ 17,830	$ 35,022	$ 52,852
55.20.4	Water Treatment Laboratory Foundation		$ -	$ 24,233	$ 22,845	$ 47,077
55.20.5	Demin Water Storage Tank Foundation		$ -	$ 17,830	$ 35,022	$ 52,852
55.40	ARCHITECTURAL					
55.40.1	Water Treatment Building		$ 75,000	$ 1,515,056	$ 86,208	$ 1,676,264
55.40.2	Water Treatment Laboratory Building		$ -	$ 75,600	$ -	$ 75,600
55.45	PAINTING / COATING					
55.45.1	Special Coatings		$ -	$ 30,000	$ 186,217	$ 216,217
55.60	MECHANICAL					
55.60.1	Water Treatment Equipment	150 gpm Ultrafilter & RO System, w/ Cartridge Filters, Feed Pumps, Chemical Injection, Break Tank, and CIP Skids	$ 3,005,600	$ -	$ 928,499	$ 3,934,099
55.60.2	Miscellaneous Pumps		$ 72,000	$ -	$ 52,527	$ 124,527
55.60.3	Shop Fabricated Tanks		$ 25,000	$ -	$ 10,099	$ 35,099
55.89	SUBTOTAL - DIRECT COSTS, WATER TREATMENT		$ 3,177,600	$ 2,219,781	$ 2,007,455	$ 7,404,836
55.90	CONSTRUCTION INDIRECTS, WATER TREATMENT		$ 158,880	$ 521,649	$ 729,742	$ 1,410,270
55.99	SUBCONTRACTS		$ -	$ -	$ -	$ -
55.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, WATER TREATMENT**		$ 3,336,480	$ 2,741,429	$ 2,737,197	$ 8,815,107

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56.00	**PRE-TREATMENT**					
56.20	CONCRETE					
56.20.1	Clarifier Foundations (2 Total)	85' Dia. Steel Clarifier on Mat Fdn.	$ -	$ 536,743	$ 490,847	$ 1,027,590
56.20.2	Sludge Holding Tank Foundations (2 Total)		$ -	$ 150,600	$ 169,189	$ 319,789
56.20.3	Raw Water Storage Tank Foundation		$ -	$ 114,638	$ 93,580	$ 208,217
56.20.4	Clearwell Tank Foundations (2 Total)		$ -	$ 150,600	$ 169,189	$ 319,789
56.20.5	Filter Press Building Foundation		$ -	$ 192,363	$ 200,543	$ 392,906
56.20.6	Filter Press Building Equipment Pads		$ -	$ 4,138	$ 12,875	$ 17,013
56.20.7	Pre-Treatment Building Foundation		$ -	$ 499,638	$ 575,287	$ 1,074,924
56.20.8	Pre-Treatment Building Equipment Pads		$ -	$ 24,450	$ 62,970	$ 87,420
56.30	STRUCTURAL STEEL					
56.30.1	Filter Press Building Steel	Framing, Upper Floor	$ -	$ 127,305	$ 90,291	$ 217,596
56.40	ARCHITECTURAL					
56.40.1	Pre-Treatment Building		$ 75,000	$ 1,104,675	$ 32,232	$ 1,211,907
56.40.2	Filter Press Building		$ 20,000	$ 430,000	$ 27,628	$ 477,628
56.40.3	Interior Finishes		$ -	$ 208,180	$ 128,056	$ 336,236
56.40.4	River Water Intake Structure Building		$ -	$ -	$ -	Existing
56.45	PAINTING / COATING					
56.45.1	Special Coatings		$ -	$ 20,000	$ 124,145	$ 144,145
56.60	MECHANICAL					
56.60.1	Water Pre-Treatment Equipment	4,500 GPM, w/ Chemical Dosing and Filter Presses	$ 3,014,000	$ -	$ 1,444,331	$ 4,458,331
56.60.2	Miscellaneous Pumps		$ 55,000	$ -	$ 14,866	$ 69,866
56.60.3	River Water Intake Screens		$ 140,000	$ -	$ 60,541	$ 200,541
56.89	SUBTOTAL - DIRECT COSTS, PRE-TREATMENT		$ 3,304,000	$ 3,563,328	$ 3,696,569	$ 10,563,897
56.90	CONSTRUCTION INDIRECTS, PRE-TREATMENT		$ 165,200	$ 837,382	$ 1,342,513	$ 2,345,095
56.99	SUBCONTRACTS	Raw Water Tank	$ 700,000	$ -	$ -	$ 700,000
56.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, PRE-TREATMENT**		$ 4,169,200	$ 4,400,709	$ 5,039,082	$ 13,608,992

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60.00	**PIPE RACK**					
60.20	CONCRETE					
60.20.1	Piperack Foundations @ New Powerblock	Individual Footings. Half of Pipe Rack Columns on Other	$ -	$ 381,400	$ 379,241	$ 760,641
60.20.2	Piperack Foundations @ Exterior Rack East & South of Unit 1		$ -	$ 140,650	$ 194,117	$ 334,767
60.30	STRUCTURAL STEEL					
60.30.1	Structural Steel, Pipe Rack @ New Power Block	330' L x 12' W x 25' H, 1 Level and 660' L x 24' W x 40' H, 2 Levels.	$ -	$ 1,975,105	$ 1,386,791	$ 3,361,896
60.30.2	Structural Steel Framing Inside Existing Boiler Room		$ -	$ 168,700	$ 304,896	$ 473,596
60.30.3	Exterior Structural Steel Framing East & South of Unit 1		$ -	$ 451,025	$ 313,604	$ 764,629
60.45	PAINTING / COATING					
60.45.1	Touch-up Painting		$ -	$ 105,000	$ 407,350	$ 512,350
60.89	SUBTOTAL - DIRECT COSTS, PIPE RACK		$ -	$ 3,221,880	$ 2,985,999	$ 6,207,879
60.90	CONSTRUCTION INDIRECTS, PIPE RACK		$ -	$ 757,142	$ 1,085,154	$ 1,842,295
60.99	SUBCONTRACTS		$ -	$ -	$ -	$ -
60.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, PIPE RACK**		$ -	$ 3,979,022	$ 4,071,153	$ 8,050,174

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70.00	**ELECTRICAL POWER DISTRIBUTION**					
70.20	CONCRETE					
70.20.1	GSU Foundations (2 Total)	Includes Mat, Piers, Firewall, & Containment	$ -	$ 175,015	$ 452,961	$ 627,976
70.20.2	Aux Transformer Foundations (2 Total)	Includes Mat, Piers, Firewall, & Containment	$ -	$ 68,178	$ 213,882	$ 282,060
70.20.3	Transformer PDC Foundation		$ -	$ 142,625	$ 185,997	$ 328,622
70.20.4	STG PDC Foundation		$ -	$ 94,600	$ 153,953	$ 248,553
70.20.5	HRSG PDC Foundations (2 Total)		$ -	$ 115,340	$ 193,968	$ 309,308
70.20.6	CT Chiller PDC Foundations		$ -	$ 94,600	$ 153,953	$ 248,553
70.20.7	Iso-Phase Bus / Cable Bus Foundations		$ -	$ 7,900	$ 12,491	$ 20,391
70.20.8	Emergency Diesel Generator Foundation		$ -	$ 8,875	$ 27,828	$ 36,703
70.30	STRUCTURAL STEEL					
70.30.1	Miscellaneous Steel for GSU Containments (2 Total)		$ -	$ 45,365	$ 36,011	$ 81,376
70.30.2	Miscellaneous Steel for Aux Transformer Containments (2 Total)		$ -	$ 23,610	$ 18,664	$ 42,274
70.30.3	STG PDC Galleries		$ -	$ 12,930	$ 9,190	$ 22,120
70.30.4	HRSG PDC Galleries (2 Total)		$ -	$ 22,150	$ 15,747	$ 37,897
70.30.5	Transformer PDC Galleries		$ -	$ 22,150	$ 15,747	$ 37,897
70.30.6	HVAC PDC Support Framing & Galleries		$ -	$ 24,060	$ 17,091	$ 41,151
70.30.7	CT Chiller PDC Galleries		$ -	$ 12,930	$ 9,190	$ 22,120
70.50	ELECTRICAL					
70.50.1	Generator Circuit Breakers (18KV)		$ 1,000,000	$ -	$ 100,922	$ 1,100,922
70.50.2	Generator Step Up Transformers		$ 4,080,300	$ -	$ 400,017	$ 4,480,317
70.50.3	Unit Substation Transformers		$ -	$ -	$ 266,066	$ 266,066
70.50.4	Unit Auxiliary Transformers (UAT: 1A, 1B)		$ 1,290,000	$ -	$ 179,824	$ 1,469,824
70.50.5	4.16kV Switchgear		$ 3,444,200	$ -	$ -	$ 3,444,200
70.50.6	480V Switchgear		$ 3,021,600	$ -	$ 53,717	$ 3,075,317
70.50.7	Isolated Phase Bus Duct		$ 895,000	$ -	$ 332,469	$ 1,227,469
70.50.8	480V-800A, Motor Control Centers		$ 1,311,000	$ -	$ 42,973	$ 1,353,973
70.50.9	Non-Seg/Cable Bus		$ 868,720	$ -	$ 998,232	$ 1,866,952

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70.50.10	Emergency Power System		$ 257,500	$ -	$ 40,287	$ 297,787
70.50.11	PDCs		$ 3,579,375	$ -	$ 437,863	$ 4,017,238
70.50.12	Panelboards		$ 152,000	$ -	$ 15,220	$ 167,220
70.50.13	Generator/Transformer Relay & Protection Panels		$ 276,000	$ 2,000	$ 59,043	$ 337,043
70.50.14	Communication		$ 81,835	$ -	$ 10,743	$ 92,578
70.50.15	Digital Fault Recorder		$ 125,680	$ -	$ 17,906	$ 143,586
70.50.16	Diesel Generator		$ 550,000	$ -	$ 89,528	$ 639,528
70.50.17	Security System		$ 145,000	$ -	$ 44,726	$ 189,726
70.50.18	Cable Splice Boxes		$ -	$ -	$ 82,365	$ 259,365
70.50.19	Cable		$ -	$ 2,662,772	$ 7,466,587	$ 10,129,359
70.50.20	Heat Tracing		$ 87,200	$ 440,105	$ 1,206,361	$ 1,733,666
70.50.21	Conduit-Above Ground		$ -	$ 257,298	$ 799,534	$ 1,056,832
70.50.22	Embedded Conduits		$ -	$ 22,980	$ 57,985	$ 80,966
70.50.23	Cable Tray		$ -	$ 389,598	$ 1,928,649	$ 2,318,247
70.50.24	Lighting and Distribution		$ -	$ 757,000	$ 1,453,589	$ 2,210,589
70.50.25	Laydown Area Lighting	Costs Covered in Site Overheads (In Crew Wage Rates)	$ -	$ -	$ -	$ -
70.50.26	Miscellaneous Electrical Devices		$ -	$ 100,000	$ 223,629	$ 323,629
70.50.27	Lightning Protection		$ -	$ 15,674	$ 84,720	$ 100,394
70.50.28	Above Ground Grounding		$ -	$ 22,581	$ 72,533	$ 95,114
70.50.29	Electrical Allowance for Relocated Bulk Gas Storage Facility		$ -	$ 7,500	$ 13,977	$ 21,477
70.89	SUBTOTAL - DIRECT COSTS, ELECTRICAL POWER DISTRIBUTION		$ 21,342,410	$ 5,547,836	$ 17,996,137	$ 44,886,383
70.90	CONSTRUCTION INDIRECTS, ELECTRICAL POWER DISTRIBUTION		$ 1,067,120	$ 1,303,742	$ 6,538,068	$ 8,908,930
70.99	SUBCONTRACTS	GSU Heavy Haul	$ -	$ -	$ 250,000	$ 250,000
70.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, ELECTRICAL POWER DISTRIBUTION**		$ 22,409,530	$ 6,851,578	$ 24,784,205	$ 54,045,313

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Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
75.00	**DCS**					
75.20	CONCRETE					
75.20.1	CEMS Foundation (2 Total)		$ -	$ 7,420	$ 18,125	$ 25,545
75.50	ELECTRICAL					
75.50.1	600V Small Power Cable		$ -	$ 448,175	$ 1,360,251	$ 1,808,426
75.50.2	Conduit-Above Ground		$ -	$ 159,542	$ 516,801	$ 676,343
75.50.3	Embedded Conduits		$ -	$ 77,269	$ 196,484	$ 273,752
75.55	INSTRUMENTATION					
75.55.1	DCS		$ 2,900,000	$ -	$ 335,245	$ 3,235,245
75.55.2	High Fidelity Simulator		$ 1,346,000	$ -	$ 150,110	$ 1,496,110
75.55.3	CEMS		$ 660,000	$ -	$ 120,088	$ 780,088
75.55.4	BOP Field Mounted Instruments		$ 700,400	$ 545,310	$ 851,566	$ 2,097,276
75.55.5	Vendor Furnished Field Mounted Instruments		$ -	$ 267,716	$ 422,850	$ 690,566
75.89	SUBTOTAL - DIRECT COSTS, DCS		$ 5,606,400	$ 1,505,432	$ 3,971,517	$ 11,083,349
75.90	CONSTRUCTION INDIRECTS, DCS		$ 280,320	$ 353,776	$ 1,442,493	$ 2,076,589
75.99	SUBCONTRACTS		$ -	$ -	$ -	$ -
75.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, DCS**		$ 5,886,720	$ 1,859,208	$ 5,414,010	$ 13,159,938

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Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
80.00	**BOP**					
80.20	CONCRETE					
80.20.1	CTG Inlet Air Chiller Foundations		$ -	$ 16,750	$ 23,819	$ 40,569
80.20.2	Ammonia Storage Tank Foundation		$ -	$ 58,038	$ 111,948	$ 169,986
80.20.3	HRSG Blowdown Sump		$ -	$ 46,465	$ 196,424	$ 242,889
80.20.4	Aux Boiler Foundation	Mat Foundation, 65' x 30'	$ -	$ 83,125	$ 70,174	$ 153,299
80.20.5	Bulk Gas Storage Pad		$ -	$ 30,275	$ 59,896	$ 90,171
80.20.6	CO2 Storage Tank (Relocated)		$ -	$ 1,409	$ -	$ 5,212
80.20.7	BOP Foundation Embedments		$ -	$ 50,000	$ 97,276	$ 147,276
80.30	STRUCTURAL STEEL					
80.30.1	HRSG Blowdown Sump Handrails		$ -	$ 3,350	$ 957	$ 4,307
80.40	ARCHITECTURAL					
80.40.1	Bulk Gas Storage Enclosure		$ -	$ 123,750	$ -	$ 123,750
80.45	PAINTING / COATING					
80.45.1	Touch-up & Finish Painting		$ -	$ 150,000	$ 581,929	$ 731,929
80.60	MECHANICAL					
80.60.1	CTG Inlet Air Chiller Equipment Package		$ 8,500,000	$ -	$ 605,406	$ 9,105,406
80.60.2	Auxiliary Boiler	80,000 lb/hr	$ 1,751,000	$ -	$ 743,130	$ 2,494,130
80.60.3	Heat Exchangers		$ 480,000	$ -	$ 60,541	$ 540,541
80.60.4	Miscellaneous Pumps		$ 180,000	$ -	$ 63,428	$ 243,428
80.60.5	Shop Fabricated Tanks		$ 40,000	$ -	$ 7,070	$ 47,070
80.60.6	Bulk Gas Storage Provisions	Storage Tank w/ manifolds & Regulators	$ 80,000	$ -	$ 40,360	$ 120,360
80.60.7	Ammonia Storage & Forwarding Equipment	Includes 15,000 gal. CS Tank for 10 Day Storage	$ 400,000	$ -	$ 82,739	$ 482,739

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80.60.8	Air Compressors & Accessories		$ 15,000	$ -	$ 7,070	$ 22,070
80.60.9	Chemical Feed & Sample Systems		$ 675,000	$ -	$ 74,280	$ 749,280
80.60.10	Relocate Existing CO2 Storage Tank		$ -	$ -	$ 25,225	$ 25,225
80.70	PIPING					
80.70.1	Alloy Piping		$ -	$ 10,156,055	$ 5,095,672	$ 15,251,727
80.70.2	BOP Piping		$ -	$ 3,676,904	$ 10,949,045	$ 14,625,949
80.70.3	Pipe Supports, HP (Engineered Supports)		$ -	$ 2,100,000	$ 325,233	$ 2,425,233
80.70.4	Pipe Supports, LP		$ -	$ 750,000	$ 502,827	$ 1,252,827
80.70.5	C/T Interconnecting Piping		$ -	$ 280,000	$ 427,938	$ 707,938
80.70.6	Valves & Specialties		$ 9,072,000	$ -	$ 1,382,240	$ 10,454,240
80.80	INSULATION					
80.80.1	Thermal Insulation/Lagging		$ -	$ 950,000	$ 4,412,855	$ 5,362,855
80.80.2	HRSG Piping & Drum Insulation and Lagging		$ -	$ 360,000	$ 616,943	$ 976,943
80.80.3	HRSG Stack Insulation to Damper Elevation		$ -	$ 195,000	$ 315,313	$ 510,313
80.89	SUBTOTAL - DIRECT COSTS, BOP		$ 21,193,000	$ 19,031,121	$ 26,883,541	$ 67,107,661
80.90	CONSTRUCTION INDIRECTS, BOP		$ 1,059,650	$ 4,472,313	$ 9,767,021	$ 15,298,985
80.99	SUBCONTRACTS		$ -	$ -	$ -	$ -
80.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, BOP**		$ 22,252,650	$ 23,503,434	$ 36,650,562	$ 82,406,646

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90.00	**COMMON**					
90.20	CONCRETE					
90.20.1	Combustion Turbine Building Foundation		$ -	$ 1,512,788	$ 1,612,720	$ 3,125,507
90.20.2	Steam Turbine Building Foundation		$ -	$ 3,723	$ 12,021	$ 15,744
90.20.3	Steam Turbine Building Elevated Slabs		$ -	$ -	$ 1,206	$ 1,206
90.20.4	Boiler Building Concrete Work	Additions in Existing Building	$ -	$ 2,390	$ 3,787	$ 6,177
90.20.5	Admin / Warehouse / Storage Building Foundation		$ -	$ -	$ -	Not Included
90.20.6	Fire Water Pumphouse Foundation		$ -	$ -	$ -	Existing
90.20.7	Service Water Pump Foundation		$ -	$ -	$ -	Existing
90.20.8	Tower Crane Foundation		$ -	$ 200,000	$ 94,149	$ 294,149
90.20.9	New Foundation for Fire House (Truck Parking)		$ -	$ 4,581	$ 10,253	$ 14,835
90.20.10	Overflow Sump		$ -	$ 28,113	$ 112,797	$ 140,909
90.30	STRUCTURAL STEEL					
90.30.1	Combustion Turbine Building Steel	75' x 300' x 80' H plus 55' x 300' x 40' H	$ -	$ 3,730,800	$ 2,862,861	$ 6,593,661
90.30.2	Steam Turbine Building Steel	Modifications to Existing	$ -	$ 53,342	$ 112,796	$ 166,138
90.30.3	Boiler Building Steel	Modifications to Existing	$ -	$ 117,976	$ 214,973	$ 332,949
90.40	ARCHITECTURAL					
90.40.1	Combustion Turbine Building		$ -	$ 1,301,792	$ 1,008,287	$ 2,310,079
90.40.2	Steam Turbine Building	Existing. No Mods Required	$ -	$ -	$ -	$ -
90.40.3	Boiler Building	Modifications to Existing Building	$ -	$ 148,164	$ 150,616	$ 298,780
90.40.4	Admin / Warehouse / Storage Building		$ -	$ -	$ -	Not Included
90.40.5	Relocate Existing Warehouse Building	Not Required	$ -	$ -	$ -	Not Required
90.40.6	New Metal Cleaning Waste Pumphouse		$ -	$ 40,000	$ -	$ 40,000

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90.40.7	New Fire House (Truck Parking)		$ -	$ 60,000	$ -	$ 60,000
90.45	PAINTING / COATING					
90.45.1	Touch-up & Finish Painting		$ -	$ 100,000	$ 387,953	$ 487,953
90.60	MECHANICAL					
90.60.1	Diesel Driven Fire Pump Package		$ 160,000	$ -	$ 19,821	$ 179,821
90.60.2	Miscellaneous Pumps		$ -	$ -	$ 3,964	$ 3,964
90.60.3	Cranes & Hoists		$ 770,000	$ -	$ 261,446	$ 1,031,446
90.60.4	Fuel Gas Check Metering Station		$ 800,000	$ -	$ 151,352	$ 951,352
90.60.5	Potable Water Tepid Recirculation System		$ 250,000	$ -	$ 60,541	$ 310,541
90.60.6	HVAC for New Control Room Extension		$ -	$ 25,000	$ 73,674	$ 98,674
90.60.7	Plumbing & Fixtures		$ -	$ 30,000	$ 128,381	$ 158,381
90.60.8	Install Blanking Plate at Existing Chimney		$ -	$ 12,350	$ 67,726	$ 80,076
90.89	SUBTOTAL - DIRECT COSTS, COMMON		$ 1,980,000	$ 7,371,017	$ 7,351,323	$ 16,702,340
90.90	CONSTRUCTION INDIRECTS, COMMON		$ 99,000	$ 1,732,189	$ 4,370,471	$ 6,201,660
90.99	SUBCONTRACTS	Metal Cleaning Waste Tank, Fire Protection Systems, & Site Bussing Services	$ 4,004,000	$ -	$ -	$ 4,004,000
90.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, COMMON**		$ 6,083,000	$ 9,103,206	$ 11,721,794	$ 26,908,001

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Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
	OVERALL PROJECT SUBTOTALS					
OP.89	**DIRECT COSTS**		$ 225,598,909	$ 55,326,367	$ 111,944,254	$ 392,869,531
OP.90	**CONSTRUCTION INDIRECTS**		$ 5,435,765	$ 13,001,696	$ 42,368,774	$ 60,806,236
OP.99	**SUBCONTRACTS**		$ 39,754,000	$ 150,000	$ 4,060,000	$ 43,964,000
OP.00	**SUBTOTAL PROJECT COSTS**		$ 270,788,675	$ 68,478,064	$ 158,373,028	$ 497,639,767
PI.00	**OVERALL PROJECT INDIRECT COSTS**					$ 38,192,900
	Spare Parts					$ 4,061,800
	Contingency					$ 71,834,100
	Escalation					$ 51,986,300
	Subtotal Project Cost					$ 663,714,867
	Owner's Costs	Not Included				$ -
	AFUDC (Interest During Construction)	Not Included				$ -
	Total Project Cost					$ 663,714,867

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Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
	ADDITIONAL REFERENCE COSTS:					
A	**Demolition & Removal**					
A.1	Existing Metal Cleaning Waste Tank Area Restoration		$ -	$ 2,850	$ 55,548	$ 58,398
A.2	Demolish Existing Fire House (Truck Parking)		$ -	$ -	$ 5,919	$ 5,919
A.3	Demolish Existing Coal Handling Structures		$ -	$ -	$ 333,672	$ 333,672
A.4	Demolish Existing Railroad Tracks		$ -	$ -	$ 41,249	$ 41,249
A.5	Demolish Existing Helipad	Included w/ Coal Handling Removals in A.3	$ -	$ -	$ -	$ -
A.6	Demolish Existing Sun Shelter		$ -	$ -	$ 13,154	$ 13,154
A.7	Demolish Unit 1 Boiler Building Combustion Air Coil Room		$ -	$ -	$ 68,388	$ 68,388
A.8	Demolish Unit 1 Boiler Building Platform at El. 586'-9" (Row 8 to 12)		$ -	$ -	$ 10,606	$ 10,606
A.9	Secure Existing Track Hopper for Abandonment		$ -	$ 54,930	$ 97,942	$ 152,872
A.10	Demolish Gas Cylinder Storage Shed		$ -	$ -	$ 9,208	$ 9,208
A.11	Demolish CO2 Storage Tank Foundation		$ -	$ -	$ 3,289	$ 3,289
A.12	Remove & Dispose of Existing Relays serving ST GSU, UAT, RAT, and Generator Protection		$ -	$ -	$ 13,702	$ 13,702
A.13	Remove & Dispose of Existing 4.16 kV Switchgear Sections in Existing STG Building		$ -	$ -	$ 172,648	$ 172,648
A.14	Remove & Dispose of Existing 600V Switchgear Sections in Existing STG Building		$ -	$ -	$ 312,411	$ 312,411

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A.15	Remove & Dispose of Existing Oil Filled 4.16kV/600V 1.5 MVA Transformers in Existing STG Building		$ -	$ -	$ 54,809	$ 54,809
A.16	Control Room Demolition & Removals		$ -	$ -	$ 123,320	$ 123,320
A.17	Remove Existing Pumps		$ -	$ -	$ 112,982	$ 112,982
A.18	Remove & Dispose of Existing Gland Steam Condenser		$ -	$ -	$ 19,821	$ 19,821
A.19	Remove & Dispose of Existing ST Turning Gear Assembly		$ -	$ -	$ 20,180	$ 20,180
A.20	Remove & Dispose of Existing Raw Water Intake Screens		$ -	$ -	$ 40,360	$ 40,360
A.21	Remove & Dispose of Existing Insulation & Lagging on Ductwork Above Boiler Room Roof		$ -	$ -	$ 158,590	$ 158,590
A.22	Remove & Dispose of Existing Piping & Mechanical Items In Existing Powerhouse As Required	Allowance	$ -	$ -	$ 267,461	$ 267,461
A.23	Remove & Dispose of Existing Conduits & Electrical Items In Existing Powerhouse As Required	Allowance	$ -	$ -	$ 223,819	$ 223,819
A.89	SUBTOTAL - DIRECT COSTS, Demolition & Removal		$ -	$ 57,780	$ 2,159,078	$ 2,216,858
A.90	CONSTRUCTION INDIRECTS, Demolition & Removal		$ -	$ 13,578	$ 784,642	$ 798,220
A.99	SUBCONTRACTS	Sludge Disposal, Soil Remediation & Asbestos Removal	$ 1,504,100	$ -	$ -	$ 1,504,100
A.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, Demolition & Removal**		$ 1,504,100	$ 71,358	$ 2,943,720	$ 4,519,178
PI.00	**Indirect Costs**	Included Above w/ Overall Project Indirect Costs				
	Contingency					$ 1,265,700
	Escalation					$ 356,557
	Total Demolition & Removal Cost					$ 6,141,435

ATTACHMENT 1-14
Cost Estimate Options and Takeout Pricing

Sargent & Lundy, LLC

AEP
Big Sandy Plant Unit 1 Repowering Cost Estimate Study
Fuel Oil Option (Based on Option 1 Estimate)
Conceptual Project Cost Estimate
Cost Estimate Summary

Estimate No.: 31240A
Project No.: 12756-002
First Issue Date: 7/29/11
Revision No.: A
Revision Date: 7/29/11
Run Date: 7/29/11
Preparer: TJM
Reviewer: BJD

Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
10.00	**GENERAL SITE WORK**					
10.10	CIVIL					
10.10.1	Erosion & Sediment Control - Fuel Oil Tank Area		$ -	$ 4,300	$ 6,748	$ 11,048
10.10.2	Site Grading - Fuel Oil Tank Area		$ -	$ 16,500	$ 32,274	$ 48,774
10.10.3	Fuel Oil Truck Unloading Slab	12" Reinforced Concrete (10' x 150')	$ -	$ 28,750	$ 82,492	$ 111,242
10.89	SUBTOTAL - DIRECT COSTS, GENERAL SITE WORK		$ -	$ 49,550	$ 121,514	$ 171,064
10.90	CONSTRUCTION INDIRECTS, GENERAL SITE WORK		$ -	$ 11,644	$ 44,673	$ 56,318
10.99	SUBCONTRACTS		$ -	$ -	$ -	$ -
10.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, GENERAL SITE WORK**		$ -	$ 61,194	$ 166,188	$ 227,382
11.00	**UNDERGROUND**					
11.10	CIVIL					
11.10.1	Fuel Oil Containment and Unloading Drainage		$ 2,265	$ 71,650	$ 216,254	$ 290,169
11.89	SUBTOTAL - DIRECT COSTS, UNDERGROUND		$ 2,265	$ 71,650	$ 216,254	$ 290,169
11.90	CONSTRUCTION INDIRECTS, UNDERGROUND		$ 113	$ 16,838	$ 78,927	$ 95,878
11.99	SUBCONTRACTS		$ -	$ -	$ -	$ -
11.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, UNDERGROUND**		$ 2,378	$ 88,488	$ 295,181	$ 386,047

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Fuel Oil Option (Based on Option 1 Estimate)
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Revision No.: A
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Reviewer: BJD

Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
55.00	**WATER TREATMENT**					
55.20	CONCRETE					
55.20.1	Demin. Water Storage Tank (CT Water Injection) Foundation		$ -	$ 270,050	$ 144,878	$ 414,928
55.20.2	Demin. Pump Foundation		$ -	$ 3,643	$ 7,638	$ 11,281
55.60	MECHANICAL					
55.60.1	Fuel Oil Demin Water Injection Pumps	2x 100%	$ 60,000	$ -	$ 15,857	$ 75,857
55.60.2	Fuel Oil Truck Unloading Skid		$ 125,000	$ -	$ 15,135	$ 140,135
55.89	SUBTOTAL - DIRECT COSTS, WATER TREATMENT		$ 185,000	$ 273,693	$ 183,509	$ 642,201
55.90	CONSTRUCTION INDIRECTS, WATER TREATMENT		$ 9,250	$ 64,318	$ 66,853	$ 140,421
55.99	SUBCONTRACTS	Demin Storage Tank, 1,350,000 gal. Capacity.	$ 1,320,000	$ -	$ -	$ 1,320,000
55.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, WATER TREATMENT**		$ 1,514,250	$ 338,010	$ 250,362	$ 2,102,622

Sargent & Lundy, LLC

AEP
Big Sandy Plant Unit 1 Repowering Cost Estimate Study
Fuel Oil Option (Based on Option 1 Estimate)
Conceptual Project Cost Estimate
Cost Estimate Summary

Estimate No.: 31240A
Project No.: 12756-002
First Issue Date: 7/29/11
Revision No.: A
Revision Date: 7/29/11
Run Date: 7/29/11
Preparer: TJM
Reviewer: BJD

Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
70.00	**ELECTRICAL POWER DISTRIBUTION**					
70.20	CONCRETE					
70.20.1	Fuel Oil PDC Foundation		$ -	$ 37,555	$ 60,182	$ 97,737
70.30	STRUCTURAL STEEL					
70.30.1	Fuel Oil PDC Galleries		$ -	$ 7,598	$ 5,342	$ 12,939
70.50	ELECTRICAL					
70.50.1	Unit Substation Transformers		$ -	$ -	$ 213,771	$ 213,771
70.50.2	480V Switchgear		$ 356,000	$ -	$ -	$ 356,000
70.50.3	480V-800A, Motor Control Centers		$ 171,500	$ -	$ 5,352	$ 176,852
70.50.4	Non-Seg/Cable Bus		$ 40,000	$ -	$ 4,476	$ 44,476
70.50.5	PDCs		$ 225,000	$ -	$ 27,524	$ 252,524
70.50.6	Cable		$ -	$ 65,872	$ 281,459	$ 347,331
70.50.7	Conduit-Above Ground		$ -	$ 7,215	$ 23,392	$ 30,607
70.50.8	Lightning Protection		$ -	$ 5,093	$ 27,547	$ 32,640
70.89	SUBTOTAL - DIRECT COSTS, ELECTRICAL POWER DISTRIBUTION		$ 792,500	$ 123,333	$ 649,045	$ 1,564,878
70.90	CONSTRUCTION INDIRECTS, ELECTRICAL POWER DISTRIBUTION		$ 39,625	$ 28,983	$ 235,860	$ 304,468
70.99	SUBCONTRACTS		$ -	$ -	$ -	$ -
70.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, ELECTRICAL POWER DISTRIBUTION**		$ 832,125	$ 152,316	$ 884,905	$ 1,869,346

Sargent & Lundy, LLC

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Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
75.00	**DCS**					
75.55	INSTRUMENTATION					
75.55.1	DCS	Based on 50 IO Points	$ 25,000	$ -	$ 3,002	$ 28,002
75.55.2	CEMS	Incremental Increase	$ 270,000	$ -	$ 50,037	$ 320,037
75.55.3	Fuel Oil BOP Field Mounted Instruments	Allowance	$ 4,000	$ 1,000	$ 13,214	$ 18,214
75.89	SUBTOTAL - DIRECT COSTS, DCS		$ 299,000	$ 1,000	$ 66,252	$ 366,252
75.90	CONSTRUCTION INDIRECTS, DCS		$ 14,950	$ 235	$ 24,359	$ 39,544
75.99	SUBCONTRACTS		$ -	$ -	$ -	$ -
75.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, DCS**		$ 313,950	$ 1,235	$ 90,612	$ 405,797

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Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
80.00	**BOP**					
80.20	CONCRETE					
80.20.1	Fuel Oil Tank Foundations (2 Total)		$ -	$ 523,450	$ 302,073	$ 825,523
80.20.2	Fuel Oil Tank Containment Slab	8" Slab, 280' x 360'	$ -	$ 401,413	$ 598,889	$ 1,000,302
80.20.3	Fuel Oil Tank Containment Walls	10' High Wall on Footing x 1,280' Long	$ -	$ 217,100	$ 924,737	$ 1,141,837
80.20.4	Fuel Oil Unloading Foundation		$ -	$ 10,568	$ 19,220	$ 29,788
80.45	PAINTING / COATING					
80.45.1	Touch-up & Finish Painting		$ -	$ 20,000	$ 77,591	$ 97,591
80.60	MECHANICAL					
80.60.1	Fuel Oil Forwarding Pumps	2x 100%	$ 295,000	$ -	$ 39,643	$ 334,643
80.70	PIPING					
80.70.1	BOP Piping		$ -	$ 92,724	$ 312,652	$ 405,376
80.70.2	Pipe Supports, LP		$ -	$ 20,000	$ 13,373	$ 33,373
80.70.3	Valves & Specialties		$ 32,900	$ -	$ 10,698	$ 43,598
80.80	INSULATION					
80.80.1	Thermal Insulation/Lagging	Allowance	$ -	$ 19,000	$ 88,257	$ 107,257
80.89	SUBTOTAL - DIRECT COSTS, BOP		$ 327,900	$ 1,284,254	$ 2,373,761	$ 3,985,915
80.90	CONSTRUCTION INDIRECTS, BOP		$ 16,395	$ 301,800	$ 863,805	$ 1,181,999
80.99	SUBCONTRACTS	2x 1,250,000 gal. Capacity Fuel Oil Tanks and Foam Fire Protection System	$ 3,040,000	$ -	$ -	$ 3,040,000
80.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, BOP**		$ 3,384,295	$ 1,586,054	$ 3,237,565	$ 8,207,914

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Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
	OVERALL PROJECT SUBTOTALS					
OP.89	**DIRECT COSTS**		$ 1,606,665	$ 1,803,479	$ 3,610,335	$ 7,020,479
OP.90	**CONSTRUCTION INDIRECTS**		$ 80,333	$ 423,818	$ 1,314,478	$ 1,818,629
OP.99	**SUBCONTRACTS**		$ 4,360,000	$ -	$ -	$ 4,360,000
OP.00	**SUBTOTAL PROJECT COSTS**		$ 6,046,998	$ 2,227,297	$ 4,924,813	$ 13,199,108
PI.00	**OVERALL PROJECT INDIRECT COSTS**					$ -
	Spare Parts					$ 90,700
	Contingency					$ 2,360,100
	Escalation					$ 1,324,205
	Subtotal Project Cost					$ 16,974,113
	Owner's Costs	Not Included				$ -
	AFUDC (Interest During Construction)	Not Included				$ -
	Total Project Cost					$ 16,974,113

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5		OPB=Other Project Bid		Conceptual Project Cost Estimate											Revision Date:	07/29/11
6		DOR:		-CONFIDENTIAL-											Run Date:	07/29/11
7											Wage Rates Based on:			11BS_90NMA	Preparer:	TJM
8											Labor Productivity =			1.15	Reviewer:	BJD
9																
10																
11																
12	Account No.	Item Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equipment Cost	Unit Material Cost	Total Equipment Cost	Total Material Cost	Unit Man-hours (Base)	Total Man-hours, w/ Productivity	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Total Projected Cost
13																
14																
15	**10.00**	**GENERAL SITE WORK**														**227,382**
16																
17	**10.10**	**CIVIL**							**0**	**49,550**		**1,355**			**121,514**	**171,064**
18																
19	10.10.1	Erosion & Sediment Control - Fuel Oil Tank Area							0	4,300		113			6,748	11,048
20		Silt Fence		Est.	1,300	LF		1	0	1,300	0.02	30	LAND	59.88	1,790	3,090
21		Rock Check Dams		Est.	6	EA		500	0	3,000	12	83	LAND	59.88	4,958	7,958
22																
23	10.10.2	Site Grading - Fuel Oil Tank Area							0	16,500		184			32,274	48,774
24		Topsoil & Organic Stripping	Area Already Developed as Laydown Area	Est.	0	CY		0	0	0	0.05	0	ETWK	175.40	0	0
25		Cut	Minor Earthwork Allowance	Est.	1,000	CY		0	0	0	0.080	92	ETWK	175.40	16,137	16,137
26		Fill	Minor Earthwork Allowance	Est.	1,000	CY		16.5	0	16,500	0.080	92	ETWK	175.40	16,137	32,637
27																
28	10.10.3	Fuel Oil Truck Unloading Slab	12" Reinforced Concrete (10' x 150')	Est.	115	CY		250	0	28,750	8.000	1,058	CONP	77.97	82,492	111,242
29																
48	**10.89**	**SUBTOTAL - DIRECT COSTS, GENERAL SITE WORK**							**0**	**49,550**		**1,355**		**89.70**	**121,514**	**171,064**
49																
50	**10.90**	**CONSTRUCTION INDIRECTS, GENERAL SITE WORK**							**0**	**11,644**		**118**			**44,673**	**56,318**
51		Additional Crane Allowance			1	LS				0					0	0
52		Mobilization / Demobilization - Included in Wage Rates Above														
53		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
54		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						118		89.70	11,000	11,000
55		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					147				11,193	11,193
56		Per Diem	None		0.00	HR						0			0	0
57		Consumables - % of Subtotal Above			0.5	%				248					608	855
58		Freight on Material - % of Subtotal Above			5.0	%				2,478						2,478
59		Freight on Equipment - % of Subtotal Above			5.0	%			0							0
60		Scaffolding - % of Subtotal Above			3.0	%				1,487					3,645	5,132
61		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				7,433					18,227	25,660
63	**10.98**	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, GENERAL SITE WORK**							**0**	**61,194**		**1,473**		**112.86**	**166,188**	**227,382**
64																
65	**10.99**	**SUBCONTRACTS**							**0**	**0**		**0**			**0**	**0**
68																
69	**10.00**	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, GENERAL SITE WORK**							**0**	**61,194**		**1,473**		**112.86**	**166,188**	**227,382**
70																
71																

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12	Account No.	Item Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equipment Cost	Unit Material Cost	Total Equipment Cost	Total Material Cost	Unit Man-hours (Base)	Total Man-hours, w/ Productivity	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Total Projected Cost
13																
14																
72																
73	**11.00**	**UNDERGROUND**														**386,047**
74																
75	**11.10**	**CIVIL**							**2,265**	**71,650**		**2,434**			**216,254**	**290,169**
76																
77		Site Drainage System														
78	11.10.1	Fuel Oil Containment and Unloading Drainage							2,265	71,650		2,434			216,254	290,169
79		Piping	6" CS	Est.	400	LF		52	0	20,800	1.190	547	YDPP	88.84	48,631	69,431
80		Piping	8" CS	Est.	600	LF		69	0	41,400	1.260	869	YDPP	88.84	77,237	118,637
81		Catchbasins	3' x 3' Internal	Est.	2	EA		1575	0	3,150	20.000	46	YDPP	88.84	4,087	7,237
82		Manholes	4' Internal Diameter	Est.	4	EA		1575	0	6,300	20.000	92	YDPP	88.84	8,173	14,473
83		Post Indicator Valve		Est.	3	EA	750	0	2,250	0	6.000	21	YDPP	88.84	1,839	4,089
84		Excavation / Backfill		Est.	2238	CY		0	0	0	0.30	772	EXFD	88.87	68,617	68,617
85		Bedding Material		Est.	112	CY		0	15	0	0.67	86	EXFD	88.87	7,669	7,684
86																
105	**11.89**	**SUBTOTAL - DIRECT COSTS, UNDERGROUND**							**2,265**	**71,650**		**2,434**		**88.85**	**216,254**	**290,169**
106																
107	**11.90**	**CONSTRUCTION INDIRECTS, UNDERGROUND**							**113**	**16,838**		**212**			**78,927**	**95,878**
108		Additional Crane Allowance			1	LS				0					0	0
109		Mobilization / Demobilization - Included in Wage Rates Above														
110		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
111		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						212		88.85	19,000	19,000
112		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					265				19,920	19,920
113		Per Diem	None		0.00	HR						0			0	0
114		Consumables - % of Subtotal Above			0.5	%				358					1,081	1,440
115		Freight on Material - % of Subtotal Above			5.0	%				3,583						3,583
116		Freight on Equipment - % of Subtotal Above			5.0	%			113							113
117		Scaffolding - % of Subtotal Above			3.0	%				2,150					6,488	8,637
118		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				10,748					32,438	43,186
120	**11.98**	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, UNDERGROUND**							**2,378**	**88,488**		**2,646**		**111.58**	**295,181**	**386,047**
121																
122	**11.99**	**SUBCONTRACTS**							**0**	**0**		**0**			**0**	**0**
126																
127	**11.00**	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, UNDERGROUND**							**2,378**	**88,488**		**2,646**		**111.58**	**295,181**	**386,047**
128																
129																

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12	Account No.	Item Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equipment Cost	Unit Material Cost	Total Equipment Cost	Total Material Cost	Unit Man-hours (Base)	Total Man-hours, w/ Productivity	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Total Projected Cost
13																
14																
416	**55.00**	**WATER TREATMENT**														**2,102,622**
417																
420	**55.20**	**CONCRETE**							**0**	**273,693**		**2,010**			**152,516**	**426,209**
421																
422	55.20.1	Demin. Water Storage Tank (CT Water Injection) Foundation	70' Dia. Tank on Mat						0	270,050		1,915			144,878	414,928
423		Excavation		Est.	500	CY		0	0	0	0.2	115	EXFD	88.87	10,220	10,220
424		Backfill		Est.	120	CY		0	0	0	0.15	21	EXFD	88.87	1,840	1,840
425		Concrete		Est.	550	CY		120	0	66,000	1.5	949	COND	68.54	65,027	131,027
426		Reinforcing		Est.	25	TN		950	0	23,750	22.5	647	REIN	76.92	49,758	73,508
427		Formwork		Est.	800	SF		2.25	0	1,800	0.2	184	FORM	98.01	18,034	19,834
428		Piles	16" Dia. X 68' Long Augercast Piles	Est.	75	EA		2380	0	178,500	incl w/matl	incl w/matl				178,500
429																
430	55.20.2	Demin. Pump Foundation							0	3,643		94			7,638	11,281
431		Excavation		Est.	15	CY		0	0	0	0.2	3	EXFD	88.87	307	307
432		Backfill		Est.	3	CY		0	0	0	0.15	1	EXFD	88.87	46	46
433		Concrete		Est.	20	CY		120	0	2,400	1.5	35	COND	68.54	2,365	4,765
434		Reinforcing		Est.	1	TN		950	0	950	22.5	26	REIN	76.92	1,990	2,940
435		Formwork		Est.	130	SF		2.25	0	293	0.2	30	FORM	98.01	2,930	3,223
436																
447	**55.60**	**MECHANICAL**							**185,000**	**0**		**357**			**30,992**	**215,992**
448																
449	55.60.1	Fuel Oil Demin Water Injection Pumps	2x 100%	Est.	2	Ea	30000		60,000	0	80	184	PUMP	86.18	15,857	75,857
450																
451	55.60.2	Fuel Oil Truck Unloading Skid		Est.	1	Ea	125000		125,000	0	150	173	MECH	87.74	15,135	140,135
452																
457	**55.89**	**SUBTOTAL - DIRECT COSTS, WATER TREATMENT**							**185,000**	**273,693**		**2,366**		**77.56**	**183,509**	**642,201**
458																
459	**55.90**	**CONSTRUCTION INDIRECTS, WATER TREATMENT**							**9,250**	**64,318**		**206**			**66,853**	**140,421**
460		Additional Crane Allowance			1	LS				0					0	0
461		Mobilization / Demobilization - Included in Wage Rates Above														
462		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
463		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						206		77.56	16,000	16,000
464		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					257				16,904	16,904
465		Per Diem	None		0.00	HR						0			0	0
466		Consumables - % of Subtotal Above			0.5	%				1,368					918	2,286
467		Freight on Material - % of Subtotal Above			5.0	%				13,685						13,685
468		Freight on Equipment - % of Subtotal Above			5.0	%			9,250							9,250
469		Scaffolding - % of Subtotal Above			3.0	%				8,211					5,505	13,716
470		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				41,054					27,526	68,580

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12	Account No.	Item Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equipment Cost	Unit Material Cost	Total Equipment Cost	Total Material Cost	Unit Man-hours (Base)	Total Man-hours, w/ Productivity	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Total Projected Cost
13																
14																
472	55.98	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, WATER TREATMENT**							**194,250**	**338,010**		**2,572**		**97.35**	**250,362**	**782,622**
473																
474	55.99	**SUBCONTRACTS**	Demin Storage Tank						**1,320,000**	**0**		**0**			**0**	**1,320,000**
475																
476		Field Erected Tanks														
477		Demineralized Water Storage Tank	Approx. 1,350,000 Gal. Vertical, API 650, cone roof, incl stairs, ladders, manways, & cathodic protection. CS w/ Epoxy Coating, Heaters, & Exterior Finish Paint.	Est.	1	Ea.	1320000		1,320,000	0	incl w/equip.	incl w/equip.				1,320,000
478																
479	55.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, WATER TREATMENT**							**1,514,250**	**338,010**		**2,572**		**97.35**	**250,362**	**2,102,622**
480																
481																
577																
578	**70.00**	**ELECTRICAL POWER DISTRIBUTION**														**1,869,346**
581																
582	**70.20**	**CONCRETE**							**0**	**37,555**		**734**			**60,182**	**97,737**
583																
584	70.20.1	Fuel Oil PDC Foundation	Mat Foundation w/ Conc. Piers for Elevated PDC						0	37,555		734			60,182	97,737
585		Excavation		Est.	120	CY		0	0	0	0.20	28	EXFD	88.87	2,453	2,453
586		Backfill		Est.	35	CY		0	0	0	0.15	6	EXFD	88.87	537	537
587		Concrete		Est.	110	CY		120	0	13,200	1.90	240	COND	68.54	16,474	29,674
588		Reinforcing		Est.	8	TN		950	0	7,600	22.50	207	REIN	76.92	15,922	23,522
589		Formwork		Est.	1,100	SF		2.25	0	2,475	0.20	253	FORM	98.01	24,797	27,272
590		Piles	16" Dia. X 68' Long Augercast Piles	Est.	6	EA		2380	0	14,280	incl w/matl	incl w/matl				14,280
591																
592	**70.30**	**STRUCTURAL STEEL**							**0**	**7,598**		**58**			**5,342**	**12,939**
593																
594	70.30.1	Fuel Oil PDC Galleries							0	7,598		58			5,342	12,939
595		Framing		Est.	1	TN	0	3710	0	3,710	22.000	25	STST	104.09	2,633	6,343
596		Grating	1-1/4" Galvanized	Est.	170	SF	0	14	0	2,380	0.14	27	GALL	83.21	2,277	4,657
597		Handrail		Est.	45	LF	0	33.5	0	1,508	0.10	5	GALL	83.21	431	1,938
598																
603	**70.50**	**ELECTRICAL**							**792,500**	**78,180**		**6,643**			**583,522**	**1,454,202**
604																
605		Electrical Equipment							0	0		0			0	0
606																
607	70.50.1	Unit Substation Transformers	Equipment Cost Included Below w/ 480V Switchgear						0	0		2,680			213,771	213,771
608		UST: 21A, 21B, 22A, 22B, 23A, 23B, 24A & 24B	4.16kV-480V @ 2000/2600KVA	Est.	8	Ea.	0		0	0	250	2,300	EHEC	79.78	183,494	183,494
609		UST: 27A, 27B	4.16kV-480V @ 1500/2000KVA	Est.	2	Ea.	0		0	0	165	380	EHEC	79.78	30,277	30,277
610																

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13																
14																
611																
612	70.50.2	480V Switchgear							356,000	0		0			0	356,000
613		480V Switchgear, 3000A MAIN & 3000A TI BKR	37A, 37B - Installed in PDC	Est.	1	EA	356000		356,000	0					0	356,000
614																
615	70.50.3	480V-800A, Motor Control Centers							171,500	0		69			5,352	176,852
616		480V-800A, Motor Control Centers		Est.	1	EA	57500		57,500	0	60.000	69	EHEB	77.57	5,352	62,852
617		480V-800A, Motor Control Centers	480V, 3Phase - Installed in PDC's	Est.	2	EA	57000		114,000	0						114,000
618																
619	70.50.4	Non-Seg/Cable Bus	MV and LV	Est.	1	LS	40000		40,000	0	50	58	EHEA	77.85	4,476	44,476
620																
621	70.50.5	PDCs		Est.	600	SF	375		225,000	0	0.5	345	EHEC	79.78	27,524	252,524
622		Fuel Oil PDC			1	EA										Included Above
623																
624																
625		Electrical BOP							0	73,087		3,209			304,852	377,938
626																
627	70.50.6	Cable							0	65,872		2,895			281,459	347,331
628																
629		MV Power Cable		Est.	18,001	LF			0	55,080		2,521			245,142	300,222
630		1/C #2/0 KCMIL 5KV		Est.	18,000	LF		3.00	0	54,000	0.120	2,484	WIRE	97.23	241,519	295,519
631		Terminations		Est.	1	LS				1,080		37	WIRE	97.23	3,623	4,703
632																
633		600V Small Power Cable		Est.	4,000	LF			0	10,792		374			36,317	47,109
634		3/C # 6 W/G, 600V		Est.	2,000	LF		3.37	0	6,740	0.090	207	WIRE	97.23	20,127	26,867
635		12/C # 14, 600V		Est.	2,000	LF		1.92	0	3,840	0.070	161	WIRE	97.23	15,654	19,494
636		Termination		Est.	1	LT			0	212		6	WIRE	97.23	537	748
637																
638	70.50.7	Conduit-Above Ground							0	7,215		314			23,392	30,607
639		3/4" RGS Conduit		Est.	500	LF		3.48	0	1,740	0.194	112	ECND	74.51	8,312	10,052
640		2" RGS Conduit		Est.	500	LF		10.95	0	5,475	0.352	202	ECND	74.51	15,081	20,556
641																
642	70.50.8	Lightning Protection	Per RPESK-006						0	5,093		283			27,547	32,640
643		#2/0 Bare copper wire	Fuel Oil Storage Tanks	Est.	828	LF		2.57	0	2,128	0.12	114	WIRE	97.23	11,110	13,238
644		#2/0 Bare copper wire	Fuel Oil PDC	Est.	150	LF		2.57	0	386	0.120	21	WIRE	97.23	2,013	2,398
645		5/8' X 2' Air Terminal		Est.	43	EA		50	0	2,150	2.00	99	WIRE	97.23	9,616	11,766
646		#2/0 Splicing & terminations + Tag	Including test and documentations	Est.	86	EA		5	0	430	0.50	49	WIRE	97.23	4,808	5,238
647																
648																
649																
658	**70.89**	**SUBTOTAL - DIRECT COSTS, ELECTRICAL POWER DISTRIBUTION**							**792,500**	**123,333**		**7,435**		**87.30**	**649,045**	**1,564,878**
659																

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13																
14																
660	**70.90**	**CONSTRUCTION INDIRECTS, ELECTRICAL POWER DISTRIBUTION**							**39,625**	**28,983**		**647**			**235,860**	**304,468**
661		Additional Crane Allowance			1	LS				0					0	0
662		Mobilization / Demobilization - Included in Wage Rates Above														
663		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
664		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						647		87.30	56,000	56,000
665		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					808				59,787	59,787
666		Per Diem	None		0.00	HR						0			0	0
667		Consumables - % of Subtotal Above			0.5	%				617					3,245	3,862
668		Freight on Material - % of Subtotal Above			5.0	%				6,167						6,167
669		Freight on Equipment - % of Subtotal Above			5.0	%			39,625							39,625
670		Scaffolding - % of Subtotal Above			3.0	%				3,700					19,471	23,171
671		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				18,500					97,357	115,857
673	**70.98**	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, ELECTRICAL POWER DISTRIBUTION**							**832,125**	**152,316**		**8,081**		**109.50**	**884,905**	**1,869,346**
674																
675	**70.99**	**SUBCONTRACTS**							**0**	**0**		**0**			**0**	**0**
678																
679	**70.00**	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, ELECTRICAL POWER DISTRIBUTION**							**832,125**	**152,316**		**8,081**		**109.50**	**884,905**	**1,869,346**
680																
681																
682																
683	**75.00**	**DCS**														**405,797**
684																
697	**75.55**	**INSTRUMENTATION**							**299,000**	**1,000**		**782**			**66,252**	**366,252**
698																
699	75.55.1	DCS	Based on 50 IO Points	Est.	1	LS	25000		25,000	0	30	35	INEL	87.02	3,002	28,002
700																
701	75.55.2	CEMS	Incremental Increase	Est.	2	LS	135000		270,000	0	250.00	575	INEL	87.02	50,037	320,037
702																
703	75.55.3	Fuel Oil BOP Field Mounted Instruments	Allowance	Est.	1	LS	4000	1000	4,000	1,000	150.00	173	INPE	76.60	13,214	18,214
704																
711	**75.89**	**SUBTOTAL - DIRECT COSTS, DCS**							**299,000**	**1,000**		**782**		**84.72**	**66,252**	**366,252**
712																

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13																
14																
713	**75.90**	**CONSTRUCTION INDIRECTS, DCS**							**14,950**	**235**		**68**			**24,359**	**39,544**
714		Additional Crane Allowance			1	LS				0					0	0
715		Mobilization / Demobilization - Included in Wage Rates Above														
716		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
717		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						68		84.72	6,000	6,000
718		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					85				6,103	6,103
719		Per Diem	None		0.00	HR						0			0	0
720		Consumables - % of Subtotal Above			0.5	%				5					331	336
721		Freight on Material - % of Subtotal Above			5.0	%				50						50
722		Freight on Equipment - % of Subtotal Above			5.0	%			14,950							14,950
723		Scaffolding - % of Subtotal Above			3.0	%				30					1,988	2,018
724		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				150					9,938	10,088
726	**75.98**	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, DCS**							**313,950**	**1,235**		**850**		**106.60**	**90,612**	**405,797**
727																
728	**75.99**	**SUBCONTRACTS**							**0**	**0**		**0**			**0**	**0**
732																
733	**75.00**	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, DCS**							**313,950**	**1,235**		**850**		**106.60**	**90,612**	**405,797**
734																
735																
736																
737	**80.00**	**BOP**														**8,207,914**
738																
741	**80.20**	**CONCRETE**							**0**	**1,152,530**		**22,568**			**1,844,920**	**2,997,450**
742																
743	80.20.1	Fuel Oil Tank Foundations (2 Total)	70' Dia. Tank on Mat						0	523,450		3,995			302,073	825,523
744		Excavation		Est.	1000	CY		0	0	0	0.2	230	EXFD	88.87	20,440	20,440
745		Backfill		Est.	240	CY		0	0	0	0.15	41	EXFD	88.87	3,679	3,679
746		Concrete		Est.	1120	CY		120	0	134,400	1.5	1,932	COND	68.54	132,419	266,819
747		Reinforcing		Est.	55	TN		950	0	52,250	22.5	1,423	REIN	76.92	109,467	161,717
748		Formwork		Est.	1600	SF		2.25	0	3,600	0.2	368	FORM	98.01	36,068	39,668
749		Piles	16" Dia. X 68' Long Augercast Piles	Est.	140	EA		2380	0	333,200	incl w/matl	incl w/matl				333,200
750																
751	80.20.2	Fuel Oil Tank Containment Slab	8" Slab, 280' x 360'						0	401,413		8,079			598,889	1,000,302
752		Excavation		Est.	2400	CY		0	0	0	0.2	552	EXFD	88.87	49,056	49,056
753		Backfill		Est.	0	CY		0	0	0	0.15	0	EXFD	88.87	0	0
754		Concrete		Est.	2300	CY		120	0	276,000	1.5	3,968	COND	68.54	271,932	547,932
755		Reinforcing		Est.	130	TN		950	0	123,500	22.5	3,364	REIN	76.92	258,740	382,240
756		Formwork		Est.	850	SF		2.25	0	1,913	0.2	196	FORM	98.01	19,161	21,073
757																

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13																
14																
758	80.20.3	Fuel Oil Tank Containment Walls	10' High Wall on Footing x 1,280' Long						0	217,100		10,250			924,737	1,141,837
759		Excavation		Est.	1665	CY		0	0	0	0.2	383	EXFD	88.87	34,033	34,033
760		Backfill		Est.	1150	CY		0	0	0	0.15	198	EXFD	88.87	17,630	17,630
761		Concrete		Est.	715	CY		120	0	85,800	1.5	1,233	COND	68.54	84,536	170,336
762		Reinforcing		Est.	70	TN		950	0	66,500	22.5	1,811	REIN	76.92	139,321	205,821
763		Formwork		Est.	28800	SF		2.25	0	64,800	0.2	6,624	FORM	98.01	649,218	714,018
764																
765	80.20.4	Fuel Oil Unloading Foundation							0	10,568		245			19,220	29,788
766		Excavation		Est.	40	CY		0	0	0	0.2	9	EXFD	88.87	818	818
767		Backfill		Est.	10	CY		0	0	0	0.15	2	EXFD	88.87	153	153
768		Concrete		Est.	60	CY		120	0	7,200	1.5	104	COND	68.54	7,094	14,294
769		Reinforcing		Est.	3	TN		950	0	2,850	22.5	78	REIN	76.92	5,971	8,821
770		Formwork		Est.	230	SF		2.25	0	518	0.2	53	FORM	98.01	5,185	5,702
771																
776	**80.45**	**PAINTING / COATING**							**0**	**20,000**		**1,150**			**77,591**	**97,591**
777																
778	80.45.1	Touch-up & Finish Painting		Est.	20,000	SF		1	0	20,000	0.05	1,150	PNTR	67.47	77,591	97,591
779																
784	**80.60**	**MECHANICAL**							**295,000**	**0**		**460**			**39,643**	**334,643**
785																
786	80.60.1	Fuel Oil Forwarding Pumps	2x 100%	Est.	2	Ea.	147500		295,000	0	200	460	PUMP	86.18	39,643	334,643
787																
788	**80.70**	**PIPING**							**32,900**	**92,724**		**3,476**			**323,350**	**448,974**
789																
790	80.70.1	BOP Piping							0	92,724		3,361			312,652	405,376
791																
792		Large Bore BOP Pipe 2-1/2"& Larger - Above Ground			980	LF				53,854		1,985			184,698	238,552
793		Demineralized Water System (Injection for Oil Firing)	SS, 4" dia., Sch 40S		220	LF		68.3	0	15,026	1.82	460	SPNG	93.03	42,837	57,863
794		Fuel Oil System	CS, 10" dia., Sch. 40		80	LF		110	0	8,800	2.40	221	SPNG	93.03	20,541	29,341
795		Fuel Oil System	CS, 8" dia., Sch. 40		160	LF		61.5	0	9,840	1.92	353	SPNG	93.03	32,866	42,706
796		Fuel Oil System	CS, 6" dia., Sch. 40		440	LF		41.7	0	18,348	1.61	815	SPNG	93.03	75,788	94,136
797		Fuel Oil System	CS, 4" dia., Sch. 40		80	LF		23	0	1,840	1.48	136	SPNG	93.03	12,667	14,507
798																
799		Small Bore BOP Pipe 2" & Smaller - Above Ground			850	LF				18,870		1,232			114,580	133,450
800		Fuel Oil System	CS, 2" dia., Sch. 80		850	LF		22.2	0	18,870	1.26	1,232	SPNG	93.03	114,580	133,450
801																
802	80.70.2	Pipe Supports, LP		Est.	1	Lot		20000	0	20,000	125	144	SPNG	93.03	13,373	33,373
803																
804	80.70.3	Valves & Specialties							32,900	0		115			10,698	43,598
805		Large Bore BOP Valves 2-1/2">		Est.	6	Ea.	3500		21,000	0	6	41	SPNG	93.03	3,851	24,851
806		Small Bore BOP Valves <2-1/2"		Est.	12	Ea.	325		3,900	0	3	41	SPNG	93.03	3,851	7,751
807		Specialties		Est.	2	Ea.	4000		8,000	0	14	32	SPNG	93.03	2,996	10,996
808																

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13																
14																
809	**80.80**	**INSULATION**							**0**	**19,000**		**1,185**			**88,257**	**107,257**
810																
811	80.80.1	Thermal Insulation/Lagging	Allowance	Est.	1,000	SF		19	0	19,000	1.03	1,185	INSL	74.51	88,257	107,257
812																
813	**80.89**	**SUBTOTAL - DIRECT COSTS, BOP**							**327,900**	**1,284,254**		**28,838**		**82.31**	**2,373,761**	**3,985,915**
814																
815	**80.90**	**CONSTRUCTION INDIRECTS, BOP**							**16,395**	**301,800**		**2,508**			**863,805**	**1,181,999**
816		Additional Crane Allowance			1	LS				0					0	0
817		Mobilization / Demobilization - Included in Wage Rates Above														
818		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
819		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						2,508		82.31	206,000	206,000
820		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					3,135				218,659	218,659
821		Per Diem	None		0.00	HR						0			0	0
822		Consumables - % of Subtotal Above			0.5	%				6,421					11,869	18,290
823		Freight on Material - % of Subtotal Above			5.0	%				64,213						64,213
824		Freight on Equipment - % of Subtotal Above			5.0	%			16,395							16,395
825		Scaffolding - % of Subtotal Above			3.0	%				38,528					71,213	109,740
826		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				192,638					356,064	548,702
828	**80.98**	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, BOP**							**344,295**	**1,586,054**		**31,346**		**103.28**	**3,237,565**	**5,167,914**
829																
830	**80.99**	**SUBCONTRACTS**	Fuel Oil Tank and Fire Protection (Foam)						**3,040,000**	**0**		**0**			**0**	**3,040,000**
831																
832		Field Erected Tanks														
833		Fuel Oil Storage Tank	Approx. 1,250,000 Gal. Vertical, API 650, cone roof, 70' dia x 44' high, incl stairs, ladders, manways, & cathodic protection. CS w/ Epoxy Coating, Heaters, & Exterior Finish Paint.	Est.	2	Ea.	1320000		2,640,000	0	incl w/equip.	incl w/equip.				2,640,000
834		Fuel Oil Fire Protection	Foam (Fluoroprotein Foam) Skid and Accessories	Est.	1	LS	400000		400,000	0	incl w/equip.	incl w/equip.				400,000
835																
836	**80.00**	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, BOP**							**3,384,295**	**1,586,054**		**31,346**		**103.28**	**3,237,565**	**8,207,914**
837																
838																

	A	B	C	D	E	F	H	I	L	M	O	Q	R	S	T	U
1															Estimate No.:	31240A
2								AEP							Project No.:	12756-002
3								Big Sandy Plant Unit 1 Repowering Cost Estimate Study							First Issue Date:	07/29/11
4		Cost Type: Est=Estimated, B=Bid and						Fuel Oil Option (Based on Option 1 Estimate)							Revision No.:	A
5		OPB=Other Project Bid						Conceptual Project Cost Estimate							Revision Date:	07/29/11
6		DOR:						-CONFIDENTIAL-							Run Date:	07/29/11
7											Wage Rates Based on:			11BS_90NMA	Preparer:	TJM
8											Labor Productivity =			1.15	Reviewer:	BJD
9																
10																
11																
12	Account No.	Item Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equipment Cost	Unit Material Cost	Total Equipment Cost	Total Material Cost	Unit Man-hours (Base)	Total Man-hours, w/ Productivity	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Total Projected Cost
13																
14																
887																
888		**OVERALL PROJECT SUBTOTALS**														**13,199,108**
889																
890	OP.89	**SUBTOTAL - DIRECT COSTS, OVERALL PROJECT SUBTOTALS**							**1,606,665**	**1,803,479**		**43,210**		**83.55**	**3,610,335**	**7,020,479**
891																
892	OP.90	**CONSTRUCTION INDIRECTS, OVERALL PROJECT SUBTOTALS**							**80,333**	**423,818**		**3,757**			**1,314,478**	**1,818,629**
893		Additional Crane Allowance			1	LS				0					0	0
894		Mobilization / Demobilization - Included in Wage Rates Above														
895		Cost Due to Overtime Working 5x10 Hour Days			1	LS										
896		Cost Due to Overtime Inefficiency - Specify % Inefficiency			8.00	%						3,757		83.55	314,000	314,000
897		Cost Due to Overtime Pay @ 1.5 Times Overtime Pay Rate - Specify % Additional Hours Paid on Actual Hours Worked			10.00	%					4,697				332,566	332,566
898		Per Diem	None		0.00	HR						0			0	0
899		Consumables - % of Subtotal Above			0.5	%				9,017					18,052	27,069
900		Freight on Material - % of Subtotal Above			5.0	%				90,174						90,174
901		Freight on Equipment - % of Subtotal Above			5.0	%			80,333							80,333
902		Scaffolding - % of Subtotal Above			3.0	%				54,104					108,310	162,414
903		Contractor's General and Administrative Expense & Profit - % of Above Subtotal			15	%				270,522					541,550	812,072
905	OP.98	**TOTAL DIRECT & CONSTRUCTION INDIRECT COSTS, OVERALL PROJECT SUBTOTALS**							**1,686,998**	**2,227,297**		**46,967**		**104.86**	**4,924,813**	**8,839,108**
906																
907	OP.99	**TOTAL SUBCONTRACTS OVERALL PROJECT SUBTOTALS**							**4,360,000**	**0**		**0**			**0**	**4,360,000**
908																
909	OP.00	**TOTAL DIRECT, CONSTRUCTION INDIRECT, AND SUBCONTRACT COSTS, OVERALL PROJECT SUBTOTALS**							**6,046,998**	**2,227,297**		**46,967**		**104.86**	**4,924,813**	**13,199,108**
910																
911																

	A	B	C	D	E	F	H	I	L	M	O	Q	R	S	T	U
1															**Estimate No.:**	**31240A**
2								**AEP**							**Project No.:**	**12756-002**
3								**Big Sandy Plant Unit 1 Repowering Cost Estimate Study**							**First Issue Date:**	**07/29/11**
4		**Cost Type: Est=Estimated, B=Bid and**						**Fuel Oil Option (Based on Option 1 Estimate)**							**Revision No.:**	**A**
5		**OPB=Other Project Bid**						**Conceptual Project Cost Estimate**							**Revision Date:**	**07/29/11**
6		**DOR:**						**-CONFIDENTIAL-**							**Run Date:**	**07/29/11**
7											**Wage Rates Based on:**			**11BS_90NMA**	**Preparer:**	**TJM**
8											**Labor Productivity =**			**1.15**	**Reviewer:**	**BJD**
9																
10																
11																
12	**Account No.**	**Item Description**	**Scope Definition**	**Cost Type**	**Quantity**	**Unit of Measure**	**Unit Equipment Cost**	**Unit Material Cost**	**Total Equipment Cost**	**Total Material Cost**	**Unit Man-hours (Base)**	**Total Man-hours, w/ Productivity**	**Crew Code**	**Crew Wage Rate**	**Total Construction & Erection Cost**	**Total Projected Cost**
13																
14																
912																
913	**PI.00**	**OVERALL PROJECT INDIRECT COSTS**														**0**
914																
915	PI.01	Engineering, Design, and Procurement Services	Cost Included in Main Project Estimate													Included in Main Estimate
916	PI.02	Field Engineering Support for Construction Management	Cost Included in Main Project Estimate													Included in Main Estimate
917	PI.03	Field Engineering Support for S-U/Commissioning	Cost Included in Main Project Estimate													Included in Main Estimate
918	PI.04	Craft Start-Up Support	Cost Included on Owner's Costs													Not Included
919		Initial Fills	Cost Included in Main Project Estimate													Included in Main Estimate
920		Operator Training & Manuals	Cost Included in Main Project Estimate													Included in Main Estimate
921		Subcontracts	Cost Included in Main Project Estimate													Included in Main Estimate
922		Site Survey	Included Above													Included Above
923		Geotechnical Investigation	Included Above													Included Above
924		Underground Utility Investigation	Included Above													Included Above
925		Noise Abatement Consultant	Included Above													Included Above
926		Noise Abatement for 85 DBA Requirements	Cost Included in Main Project Estimate													Included in Main Estimate
927		Interest On Retention	Not Included													Not Included
928		TFA	Included with Equipment Costs		1	LS										Included with Equipment Costs
929																
930		**TOTAL OVERALL PROJECT INDIRECT COSTS**														**0**
931																
932																
933																
934		**TOTAL OVERALL PROJECT DIRECT AND INDIRECT COSTS**														**13,199,108**
935																
936		**Spare Parts**							**90,700**							**90,700**
937		Operating Spare Parts - Capitalized			0.90	%			54,400							54,400
938		Operating Spare Parts - First Year of Operation			0.60	%			36,300							36,300
939																
940		**Contingency**														**2,360,100**
941		Project Contingency @ 17.76%	Contingency applied to Direct and Indirect Costs, Based on Range Analysis		17.76	%										2,360,100
942																

	A	B	C	D	E	F	H	I	L	M	O	Q	R	S	T	U
1															Estimate No.:	31240A
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3				Big Sandy Plant Unit 1 Repowering Cost Estimate Study											First Issue Date:	07/29/11
4		Cost Type: Est=Estimated, B=Bid and		Fuel Oil Option (Based on Option 1 Estimate)											Revision No.:	A
5		OPB=Other Project Bid		Conceptual Project Cost Estimate											Revision Date:	07/29/11
6		DOR:		-CONFIDENTIAL-											Run Date:	07/29/11
7											Wage Rates Based on:			11BS_90NMA	Preparer:	TJM
8											Labor Productivity =			1.15	Reviewer:	BJD
9																
10																
11																
12	Account No.	Item Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equipment Cost	Unit Material Cost	Total Equipment Cost	Total Material Cost	Unit Man-hours (Base)	Total Man-hours, w/ Productivity	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Total Projected Cost
13																
14																
943		**Escalation**														**1,324,205**
944		Equipment	Based on 4.4% Annual Rate		1	LS			543,843							543,843
945		Material	Based on 6.2% Annual Rate		1	LS				425,737						425,737
946		Labor	Based on 2.4% Annual Rate		1	LS									347,387	347,387
947		Indirects	Based on 2.7% Annual Rate		1	LS										7,238
948																
949		**Subtotal Project Cost**														**16,974,113**
950																
951		**Owner's Costs**	**Not Included**													**0**
952																
953		**AFUDC (Interest During Construction)**	**Not Included**													**0**
954																
955		**Total Project Cost**														**16,974,113**
956																

American Electric Power
Big Sandy Plant Unit 1
Repowering Cost Estimate Study

CT INLET AIR CHILLER TAKEOUT PRICING

31241B
08/26/11
12756-002

ITEM DESCRIPTION	QUANTITY / SCOPE	EQUIPMENT COST	MATERIAL COST	LABOR COST	REMARKS
ELECTRICAL					
Medium Voltage Switchgear (4.16kV) /MCCs	2 - single ended type + 2 Feeders from 12A/13B	$872,235		Included in PDC	
Low Voltage Transformers	4 - Outdoor Cast Coil Type	Included Below		$82,352	
Low Voltage Switchgear	2 - Double Ended Type	$826,350		Included in PDC	
Low Voltage Cable Bus Duct		$100,529		Included in PDC	
480 Volt Motor Control Centers	8 - MCC Lineups	$478,800		Included in PDC	
UPS Panelboard	1	$5,250		Included in PDC	
DC Panels	1	$5,250		Included in PDC	
Alternate Source Panels	1	$5,250		Included in PDC	
Chiller Power Distribution Center (PDC)	1	$826,875		$140,013	
Mimic Panels	1	$14,700		Included in PDC	
Electrical Cable					
1/C 750 KCMIL- 5KV	10,500 LF		$179,859	$276,231	
1/C 250 KCMIL - 5KV	3,420 LF		$23,061	$88,412	
3/C 500 KCMIL - 600V	1,440 LF		$55,647	$151,095	
3/C 250 KCMIL - 600V	2,700 LF		$54,286	$283,302	
3/C #4/0 - 600V	5,400 LF		$106,971	$427,006	
LV CABLE	3% of Project Cable Balance		$25,982	$96,212	
DCS CABLE	5% of Project Cable Balance		$28,932	$96,699	
Race way					
Undergound Duct Bank	3% of Project Ductbank Balance		$19,408	$127,097	
Cable Tray	30" - 700' ; 24" - 350'		$38,544	$230,445	
Above Ground Conduit	3% of Project Conduit Balance		$9,965	$34,101	
DCS					
Remote IO Cabinet	1 LS	$113,190			Required for Switchgear Control and Interface to Chiller PLC
Controls	Allowance - Local Control to DCS Interface	$26,250		$6,800	
Miscellaneous					
Grounding	1 LS - Ground Conductor (500'), welds, rods		$3,341	$11,886	
Security	1 LS - Card Readers	$2,000		$500	
Communications	1 LS - FDC, Lan, Telephone	$10,000		$15,000	

American Electric Power
Big Sandy Plant Unit 1
Repowering Cost Estimate Study

CT INLET AIR CHILLER TAKEOUT PRICING

31241B
08/26/11
12756-002

ITEM DESCRIPTION	QUANTITY / SCOPE	EQUIPMENT COST	MATERIAL COST	LABOR COST	REMARKS
MECHANICAL					
Chillers		$9,450,000		$960,578	
Inlet Chilling Coils		$4,200,000		$109,779	
Underground Piping			$188,288	$352,644	
Abovegrade Piping			$192,364	$306,507	
Supports & Valves			$30,000	$15,000	
STRUCTURAL / CIVIL					
Structural Steel			$15,969	$12,498	
Foundations			$137,517	$241,770	
Incremental Equipment Cost					
Unit Auxiliary Transformers	Increased MVA rating	$400,000		N/A	$16,500 / MW x 12 MW
Subtotals		**$17,336,679**	**$1,110,133**	**$4,065,927**	
Total Direct & Construction Indirect Cost				**$22,512,740**	
Overall Project Indirects	Assume No Change			$0	
Spare Parts	At 1.5% of Equipment Cost			$260,050	
Contingency	At 13.07% (from Option 1)			$2,976,404	
Escalation	At 10.34% of Direct Costs (from Option 1)			$2,327,817	Pro-rated value
Total Cost Impact				**$28,077,011**	

Note 1: Pricing includes estimate markups for construction indirect costs.

Note 2: Values above reflect Takeout Pricing - Values are currently included in main project cost estimates.

American Electric Power
Big Sandy Plant Unit 1
Repowering Cost Estimate Study

CONDENSATE POLISHER TAKEOUT PRICING

31242B
08/26/11
12756-002

ITEM DESCRIPTION	QUANTITY / SCOPE	EQUIPMENT COST	MATERIAL COST	LABOR COST	REMARKS
ELECTRICAL					
Motor Control Center	1 - Allowance	$59,850		$7,840	
Cable Tray & Conduits	Allowance		$49,400	$163,200	
Cables	Allowance		$12,350	$47,600	
Controls	Allowance - Local Control to DCS Interface	$26,250		$6,800	
MECHANICAL					
Condensate Polishing Equipment		$2,625,000		$205,839	
Condensate Booster Pump Head Increase	15% Incremental Equipment Cost	$66,938		$0	
Piping & Isolation Valves	Allowance		$123,500	$217,600	
STRUCTURAL / CIVIL					
Water Treatment Building	Eliminate 89' x 10' x 30' Section of Water Treatment Building				
Building Structure	890 SF of Building Structure		$115,411	Incl. w/ Mat'l.	
Building Foundation	6.5% of Building Foundation (by area)		$42,243	$55,027	
Subtotals		**$2,778,038**	**$342,903**	**$703,906**	
Total Direct & Construction Indirect Cost				**$3,824,847**	
Overall Project Indirects	Assume No Change			$0	
Spare Parts	At 1.5% of Equipment Cost			$41,671	
Contingency	At 13.07% (from Option 1)			$505,354	
Escalation	At 10.34% of Direct Costs (from Option 1)			$395,489	Pro-rated value
Total Cost Impact				**$4,767,360**	

Note 1: Pricing includes estimate markups for construction indirect costs.

Note 2: Values above reflect Takeout Pricing - Values are currently included in main project cost estimates.

American Electric Power
Big Sandy Plant Unit 1
Repowering Cost Estimate Study

AUXILIARY BOILER TAKEOUT PRICING

31243B
08/26/11
12756-002

ITEM DESCRIPTION	QUANTITY / SCOPE	EQUIPMENT COST	MATERIAL COST	LABOR COST	REMARKS
ELECTRICAL					
Motor Control Center	1 - Allowance	$59,850		$7,840	
Conduits & Ductbanks	Allowance		$61,750	$217,600	
Cables	Allowance		$18,525	$68,000	
Controls	Allowance - Local Control to DCS Interface	$26,250		$6,800	
MECHANICAL					
Auxiliary Boiler Equipment		$1,838,550		$1,010,657	
Auxiliary Steam Piping	Large and Small Bore		$180,421	$741,899	
Demineralized Water Piping	100' - SS, 3" dia., Sch 40S		$6,052	$23,716	
Valves & BOP Systems	Allowance		$61,750	$34,000	
STRUCTURAL / CIVIL					
Auxiliary Boiler Foundation			$102,659	$95,437	
Subtotals		**$1,924,650**	**$431,157**	**$2,205,949**	
Total Direct & Construction Indirect Cost				**$4,561,756**	
Overall Project Indirects	Assume No Change			$0	
Spare Parts	At 1.5% of Equipment Cost			$28,870	
Contingency	At 13.07% (from Option 1)			$599,995	
Escalation	At 10.34% of Direct Costs (from Option 1)			$471,686	Pro-rated value
Total Cost Impact				**$5,662,306**	

Note 1: Pricing includes estimate markups for construction indirect costs.

Note 2: Values above reflect Takeout Pricing - Values are currently included in main project cost estimates.

American Electric Power
Big Sandy Plant Unit 1
Repowering Cost Estimate Study

DCS HIGH FIDELITY SIMULATOR TAKEOUT PRICING

31244B
08/26/11
12756-002

ITEM DESCRIPTION	QUANTITY / SCOPE	EQUIPMENT COST	MATERIAL COST	LABOR COST	REMARKS
ELECTRICAL					
High Fidelity Simulator		$1,413,300		$204,150	
MECHANICAL					
STRUCTURAL / CIVIL					
Subtotals		**$1,413,300**	**$0**	**$204,150**	
Total Direct & Construction Indirect Cost				**$1,617,450**	
Overall Project Indirects	Assume No Change			$0	
Spare Parts	At 1.5% of Equipment Cost			$21,200	
Contingency	At 13.07% (from Option 1)			$214,171	
Escalation	At 10.34% of Direct Costs (from Option 1)			$167,244	Pro-rated value
Total Cost Impact				**$2,020,065**	

Note 1: Pricing includes estimate markups for construction indirect costs.

Note 2: Values above reflect Takeout Pricing - Values are currently included in main project cost estimates.

American Electric Power
Big Sandy Plant Unit 1
Repowering Cost Estimate Study

SS SERVICE WATER PIPING TAKEOUT PRICING

31245B
08/26/11
12756-002

ITEM DESCRIPTION	QUANTITY / SCOPE	EQUIPMENT COST	MATERIAL COST	LABOR COST	REMARKS
ELECTRICAL					
MECHANICAL					
SS Piping:					
SS, 16" dia., Sch Std	250 LF		$113,003	$154,593	
SS, 6" dia., Sch 40S	120 LF		$16,450	$35,269	
SS, 4" dia., Sch 40S	1,050 LF		$88,568	$278,048	
SS, 3" dia., Sch 40S	1,800 LF		$108,927	$426,894	
SS, 2" dia., Sch. 80S	500 LF		$41,558	$145,500	
Less Same Lines in Carbon Steel:					
CS, 16" dia., Sch Std	-250 LF		-$75,644	-$125,493	
CS, 6" dia., Sch 40	-120 LF		-$6,180	-$28,110	
CS, 4" dia., Sch 40	-1,050 LF		-$29,825	-$226,105	
CS, 3" dia., Sch 40	-1,800 LF		-$44,460	-$350,944	
CS, 2" dia., Sch. 80	-500 LF		-$13,709	-$91,664	
STRUCTURAL / CIVIL					
Subtotals		**$0**	**$198,688**	**$217,988**	
Total Direct & Construction Indirect Cost				**$416,676**	
Overall Project Indirects	Assume No Change			$0	
Spare Parts	At 1.5% of Equipment Cost			$0	
Contingency	At 13.07% (from Option 1)			$54,460	
Escalation	At 10.34% of Direct Costs (from Option 1)			$43,084	Pro-rated value
Total Cost Impact				**$514,219**	

Note 1: Pricing includes estimate markups for construction indirect costs.

Note 2: Values above reflect Takeout Pricing - Values are currently included in main project cost estimates.

American Electric Power
Big Sandy Plant Unit 1
Repowering Cost Estimate Study

SECONDARY FUEL OIL TAKEOUT PRICING

31246B
08/26/11
12756-002

ITEM DESCRIPTION	QUANTITY / SCOPE	EQUIPMENT COST	MATERIAL COST	LABOR COST	REMARKS
ELECTRICAL					
Power & Control Wiring to Auxiliary Fuel Oil Skids	Allowance		$24,700	$54,400	
MECHANICAL					
Combustion Turbines	Dual Fuel Capability, (2) CT's	$8,800,000		$82,334	Assume 300 hours per CT for auxiliary skid installation.
Fuel Oil Piping, Underground	3,000' - Encased CS, 8" dia. Sch 40		$815,100	$666,940	
Fuel Oil Piping, Underground	600' - Encased CS, 6" dia. Sch 40		$88,920	$116,714	
Fuel Oil Demin Water Piping, Underground	3,600' - HDPE, SDR11, 4" dia.		$12,449	$200,082	
STRUCTURAL / CIVIL					
CT Misc. Equipment Pads	20 CY		$5,083	$13,814	Fdns for auxiliary skids.
Subtotals		**$8,800,000**	**$946,252**	**$1,134,284**	
Total Direct & Construction Indirect Cost				**$10,880,536**	
Overall Project Indirects	Assume No Change			$0	
Spare Parts	At 1.5% of Equipment Cost			$132,000	
Contingency	At 13.07% (from Option 1)			$1,439,338	
Escalation	At 10.34% of Direct Costs (from Option 1)			$1,125,047	Pro-rated value
Total Cost Impact				**$13,576,921**	

Note 1: Pricing includes estimate markups for construction indirect costs.

Note 2: Values above reflect Takeout Pricing - Values are currently included in main project cost estimates.

American Electric Power
Big Sandy Plant Unit 1
Repowering Cost Estimate Study

WATER TREATING TAKEOUT PRICING

31247B
08/26/11
12756-002

ITEM DESCRIPTION	QUANTITY / SCOPE	EQUIPMENT COST	MATERIAL COST	LABOR COST	REMARKS
ELECTRICAL					
UST 23A & 23B	Equipment Cost Incl. w/ 480V Switchgear			$62,389	
480V Switchgear 33A & 33B		$413,175		$36,527	
Motor Control Center	4 - Allowance	$239,400		$29,221	
Mimic Panels	Allowance	$14,700		$1,911	
Distribution Panels	Allowance	$15,750		$2,515	
Communications	Allowance	$10,500		$1,786	
Security System	Allowance	$5,250		$2,097	
Cable Tray	Allowance		$68,019	$377,454	
Lightning Protection	Allowance		$1,841	$10,584	
Conduits	Allowance		$86,450	$285,600	
Cables	Allowance		$21,613	$84,320	
Controls - DCS	Based on 450 I/O Points.	$331,132		$47,872	
MECHANICAL					
Demineralizer Equipment		$3,155,880		$1,262,759	
Pretreatment System		$0	$0	$0	Remains in Scope
Pumps	Demin Transfer & WTB Sump	$75,600		$71,437	
Shop Fab Tanks	Demin Storage, 12,000 gal.	$26,250		$13,735	
Piping & Isolation Valves	Allowance		$61,750	$108,800	
Painting & Coatings	Allowance		$37,050	$253,255	
STRUCTURAL / CIVIL					
Water Treatment Foundations			$687,972	$933,013	
Water Treatment Buildings		$78,750	$1,871,094	$117,243	
Subtotals		**$4,366,387**	**$2,835,788**	**$3,702,516**	
Total Direct & Construction Indirect Cost				**$10,904,691**	
Overall Project Indirects	Assume No Change			$0	
Spare Parts	At 1.5% of Equipment Cost			$65,496	
Contingency	At 13.07% (from Option 1)			$1,433,803	
Escalation	At 10.34% of Direct Costs (from Option 1)			$1,127,545	Pro-rated value
Total Cost Impact				**$13,531,536**	

Note 1: Pricing includes estimate markups for construction indirect costs.

Note 2: Values above reflect Takeout Pricing - Values are currently included in main project cost estimates.

ATTACHMENT 1-15
Non-Fuel O&M Costs
Fixed and Variable

2x2x1 MHI M501GAC, 744.8 MW

General Input Data

All costs expressed in 2011 $ unless otherwise specified.

		Value	Source/Basis/Comment
Economic Inputs			
General inflation rate, %/year		2.50%	AEP e-mail 29 April 2011, Malone.
Escalation rate for LTSA expenses		2.50%	AEP e-mail 29 April 2011, Malone.
Base year for all escalation		2011	Escalates from beginning of this year. Model uses end-of-year payment convention.
Number of years in analysis		30	S&L assumption
Discount rate used for levelized costs		8.0%	S&L assumption
Schedule			
Date of commercial service (beginning of this month/year)		Jan-16	Project scope document.
Operations Inputs			
Capacity factor	Year	CF	
	2016	50.00%	AEP e-mail 29 April 2011, Malone.
	2017	53.75%	AEP e-mail 29 April 2011, Malone.
	2018	57.50%	AEP e-mail 29 April 2011, Malone.
	2019	61.25%	AEP e-mail 29 April 2011, Malone.
	2020	65.00%	AEP e-mail 29 April 2011, Malone.
Net MW rating		744.8	Project scope document.
Number of CTs		2	Project scope document.
Operating Costs			
Program initiation fee with CT OEM (one-time charge, at contract signing)		$250,000	AEP e-mail 29 April 2011, Malone. Cost is assumed to be in year before startup.
Program parts payment (one-time charge, 25% at contract signing, 75% at COD)		$8,772,000	AEP e-mail 29 April 2011, Malone. Cost is assumed to be in year before startup.
Cost per operating hour, per CT		$790	AEP e-mail 29 April 2011, Malone.
Fixed monthly fee for LTSA, per month (covers whole plant)		$42,500	AEP e-mail 29 April 2011, Malone.
SCR catalyst replacement (each time), treated as fixed O&M		$2,420,000	AEP e-mail 29 April 2011, Malone, escalated from 2008.
SCR catalyst replacement interval, years		4	AEP e-mail 29 April 2011, Malone.
CO catalyst replacement (each time), treated as fixed O&M		$2,750,000	AEP e-mail 29 April 2011, Malone, escalated from 2008.
CO catalyst replacement interval, years		4	AEP e-mail 29 April 2011, Malone.
Cost of 19% ammonia per dry ton delivered, including transportation		$826	per ton of ammonia in 19% solution (Malone e-mail 29 April).
Ammonia cost, $/ton (19.5% NH3 solution)		$157	is cost per ton of 19% solution.
Ammonia consumption lb of solution per operating hour		500	S&L estimate. This covers the whole plant.
Sludge disposal cost, $/ton		$42	Franczak note, 21 July 2011.
Sludge generation, tons per day at 100% load		24	Franczak note, 21 July 2011.
Water pre-treatment and water treatment, $1000s/full power year		$1,000	For MHI is input from Mike Rosen 28 April 2011, $1000s per full pwr yr. GE is scaled.
Cost of city water for potable uses		$4.62	AEP e-mail 29 April 2011, Malone.
River water			Assumes zero cost for raw water drawn from the river.
Potable water consumption, gpm		2	From water balance
CT gases and chemicals, $1000s per year		$120	S&L estimate from other projects at 100% capacity factor.
ST major maintenance, $1000s, considered a fixed O&M cost		$7,000	S&L assumption.
Frequency of ST overhaul, years		7	S&L assumption.
HRSG and other BOP fixed maintenance cost, $1000/yr		$500	Input on a per CT basis.
Maint. materials/supplies/consumables as % of maintenance labor		50%	S&L assumption.
Contingency fund (emergency maintenance, etc.), % of fixed O&M		15%	S&L assumption.

2x2x1 MHI M501GAC, 744.8 MW
Staffing Input Data

O&M Staffing for Conventional 2x2x1 CC Utility Plant

	Wages & Benefits, 2011$/hr	Staffing	Operating Phase, US$/yr
Operating Labor			
Plant Management			
plant manager	$73.75	1	$153,000
procurement specialist	$73.75	1	$153,000
administrative assistants	$73.75	2	$307,000
Subtotal		**4**	**$613,000**
Operations			
production supervisor	$73.75	1	$153,000
lead operating technicians	$73.75	3	$460,000
operating technicians	$73.75	10	$1,534,000
engineering/tech. support	$73.75	1	$153,000
chemist	$73.75	1	$153,000
Subtotal		**16**	**$2,453,000**
Maintenance Labor			
production supervisor	$73.75	1	$153,000
lead operating technicians	$73.75	1	$153,000
operating technicians	$73.75	4	$614,000
EH&S coordinator	$73.75	1	$153,000
I&C technicians	$73.75	1	$153,000
Subtotal		**8**	**$1,226,000**
Total Operating and Maintenance Labor		**28**	**$4,292,000**

We received only one labor cost from AEP, so breakdown of mgmt/ops/maint is not perfect here. Staffing is assumed same for either MHI or GE option.

OPTION 1
NON-FUEL O&M COSTS
FIXED AND VARIABLE

2x2x1 MHI M501GAC, 744.8 MW
Fixed and Variable O&M Costs

Year end date		31-Dec-15	31-Dec-16	31-Dec-17	31-Dec-18	31-Dec-19	31-Dec-20	31-Dec-21	31-Dec-22	31-Dec-23	31-Dec-24	31-Dec-25	31-Dec-26	31-Dec-27
Operating year			1	2	3	4	5	6	7	8	9	10	11	12
General inflation factors (to year-end payments)		1.131	1.160	1.189	1.218	1.249	1.280	1.312	1.345	1.379	1.413	1.448	1.485	1.522
Inflation factors for LTSA expenses		1.131	1.160	1.189	1.218	1.249	1.280	1.312	1.345	1.379	1.413	1.448	1.485	1.522
Discount factors (for levelized cost results)			0.926	0.857	0.794	0.735	0.681	0.630	0.583	0.540	0.500	0.463	0.429	0.397
Mask to limit term of analysis			1	1	1	1	1	1	1	1	1	1	1	1
Fraction of year operating			1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Operations & Performance														
Capacity factor			50.00%	53.75%	57.50%	61.25%	65.00%	65.00%	65.00%	65.00%	65.00%	65.00%	65.00%	65.00%
Fired hours per year per machine (running hours)			4,380	4,709	5,037	5,366	5,694	5,694	5,694	5,694	5,694	5,694	5,694	5,694
$ / factored hr (LTSA variable MM charge) per CT			$916	$939	$963	$987	$1,011	$1,037	$1,062	$1,089	$1,116	$1,144	$1,173	$1,202
GWh generated (with NPV of energy)		45,640	3,262	3,507	3,752	3,996	4,241	4,241	4,241	4,241	4,241	4,241	4,241	4,241
Variable O&M Cost, $1000s														
Water treatment expense			$580	$639	$701	$765	$832	$853	$874	$896	$918	$941	$965	$989
CT gases/chemicals			$70	$77	$84	$92	$100	$102	$105	$108	$110	$113	$116	$119
Ammonia			$199	$220	$241	$263	$286	$293	$300	$308	$316	$324	$332	$340
Sludge disposal			$213	$235	$258	$281	$306	$314	$322	$330	$338	$346	$355	$364
LTSA variable monthly maintenance fee	level $/MWh		$8,026	$8,843	$9,697	$10,587	$11,516	$11,804	$12,099	$12,402	$12,712	$13,030	$13,355	$13,689
Total Variable O&M Cost	$3.59		$9,088	$10,013	$10,980	$11,988	$13,040	$13,366	$13,700	$14,043	$14,394	$14,754	$15,123	$15,501
Fixed O&M Cost, $1000s														
Site labor (based on loaded rates)			$4,977	$5,102	$5,229	$5,360	$5,494	$5,631	$5,772	$5,917	$6,064	$6,216	$6,371	$6,531
LTSA program initation fee	$283		$25	$25	$25	$25	$25	$25	$25	$25	$25	$25	$25	$25
LTSA program parts cost	$9,925		$882	$882	$882	$882	$882	$882	$882	$882	$882	$882	$882	$882
Steam turbine overhaul maintenance allocation			$0	$0	$0	$0	$0	$0	$9,414	$0	$0	$0	$0	$0
SCR NOX catalyst replacement			$0	$0	$0	$3,022	$0	$0	$0	$3,336	$0	$0	$0	$3,682
CO catalyst replacement			$0	$0	$0	$3,434	$0	$0	$0	$3,791	$0	$0	$0	$4,184
Potable water			$6	$6	$6	$6	$6	$6	$7	$7	$7	$7	$7	$7
Services and materials			$711	$729	$747	$766	$785	$804	$824	$845	$866	$888	$910	$933
LTSA monthly fixed fee			$591	$606	$621	$637	$653	$669	$686	$703	$721	$739	$757	$776
HRSG and other BOP maintenance expense			$1,160	$1,189	$1,218	$1,249	$1,280	$1,312	$1,345	$1,379	$1,413	$1,448	$1,485	$1,522
Contingency fund (emergency maintenance, etc.)	level $/MWh		$1,253	$1,281	$1,309	$2,307	$1,369	$1,400	$2,843	$2,533	$1,497	$1,531	$1,566	$2,781
Subtotal: Fixed O&M cost	$3.79		$9,605	$9,819	$10,038	$17,688	$10,493	$10,730	$21,798	$19,416	$11,474	$11,735	$12,003	$21,323
	Level													
Total Non-Fuel O&M Cost, $1000s			$18,692	$19,832	$21,018	$29,676	$23,534	$24,096	$35,499	$33,459	$25,869	$26,489	$27,125	$36,824
Fixed O&M Cost, $/kW/yr (for 744.8 net MW)	$20.64		$12.90	$13.18	$13.48	$23.75	$14.09	$14.41	$29.27	$26.07	$15.41	$15.76	$16.11	$28.63
Variable O&M Cost, $/MWh	$3.59		$2.79	$2.86	$2.93	$3.00	$3.07	$3.15	$3.23	$3.31	$3.39	$3.48	$3.57	$3.66
Total Fixed + Variable Cost, $/MWh	$7.39		$5.73	$5.66	$5.60	$7.43	$5.55	$5.68	$8.37	$7.89	$6.10	$6.25	$6.40	$8.68

OPTION 1
NON-FUEL O&M COSTS
FIXED AND VARIABLE

2x2x1 MHI M501GAC, 744.8 MW
Fixed and Variable O&M Costs

Year end date		31-Dec-15	31-Dec-28	31-Dec-29	31-Dec-30	31-Dec-31	31-Dec-32	31-Dec-33	31-Dec-34	31-Dec-35	31-Dec-36	31-Dec-37	31-Dec-38	31-Dec-39
Operating year			13	14	15	16	17	18	19	20	21	22	23	24
General inflation factors (to year-end payments)		1.131	1.560	1.599	1.639	1.680	1.722	1.765	1.809	1.854	1.900	1.948	1.996	2.046
Inflation factors for LTSA expenses		1.131	1.560	1.599	1.639	1.680	1.722	1.765	1.809	1.854	1.900	1.948	1.996	2.046
Discount factors (for levelized cost results)			0.368	0.340	0.315	0.292	0.270	0.250	0.232	0.215	0.199	0.184	0.170	0.158
Mask to limit term of analysis			1	1	1	1	1	1	1	1	1	1	1	1
Fraction of year operating			1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Operations & Performance														
Capacity factor			65.00%	65.00%	65.00%	65.00%	65.00%	65.00%	65.00%	65.00%	65.00%	65.00%	65.00%	65.00%
Fired hours per year per machine (running hours)			5,694	5,694	5,694	5,694	5,694	5,694	5,694	5,694	5,694	5,694	5,694	5,694
$ / factored hr (LTSA variable MM charge) per CT			$1,232	$1,263	$1,295	$1,327	$1,360	$1,394	$1,429	$1,465	$1,501	$1,539	$1,577	$1,617
GWh generated (with NPV of energy)		45,640	4,241	4,241	4,241	4,241	4,241	4,241	4,241	4,241	4,241	4,241	4,241	4,241
Variable O&M Cost, $1000s														
Water treatment expense			$1,014	$1,039	$1,065	$1,092	$1,119	$1,147	$1,176	$1,205	$1,235	$1,266	$1,298	$1,330
CT gases/chemicals			$122	$125	$128	$131	$134	$138	$141	$145	$148	$152	$156	$160
Ammonia			$348	$357	$366	$375	$385	$394	$404	$414	$425	$435	$446	$457
Sludge disposal			$373	$382	$392	$402	$412	$422	$433	$443	$454	$466	$477	$489
LTSA variable monthly maintenance fee	level $/MWh		$14,032	$14,382	$14,742	$15,110	$15,488	$15,875	$16,272	$16,679	$17,096	$17,523	$17,962	$18,411
Total Variable O&M Cost	$3.59		$15,888	$16,286	$16,693	$17,110	$17,538	$17,976	$18,426	$18,886	$19,358	$19,842	$20,338	$20,847
Fixed O&M Cost, $1000s														
Site labor (based on loaded rates)			$6,694	$6,861	$7,033	$7,209	$7,389	$7,574	$7,763	$7,957	$8,156	$8,360	$8,569	$8,783
LTSA program initation fee		$283	$25	$25	$25	$25	$25	$25	$25	$25	$25	$25	$25	$25
LTSA program parts cost		$9,925	$882	$882	$882	$882	$882	$882	$882	$882	$882	$882	$882	$882
Steam turbine overhaul maintenance allocation			$0	$11,191	$0	$0	$0	$0	$0	$0	$13,302	$0	$0	$0
SCR NOX catalyst replacement			$0	$0	$0	$4,065	$0	$0	$0	$4,487	$0	$0	$0	$4,952
CO catalyst replacement			$0	$0	$0	$4,619	$0	$0	$0	$5,098	$0	$0	$0	$5,628
Potable water			$8	$8	$8	$8	$8	$9	$9	$9	$9	$9	$10	$10
Services and materials			$956	$980	$1,004	$1,030	$1,055	$1,082	$1,109	$1,136	$1,165	$1,194	$1,224	$1,254
LTSA monthly fixed fee			$795	$815	$836	$857	$878	$900	$922	$946	$969	$993	$1,018	$1,044
HRSG and other BOP maintenance expense			$1,560	$1,599	$1,639	$1,680	$1,722	$1,765	$1,809	$1,854	$1,900	$1,948	$1,996	$2,046
Contingency fund (emergency maintenance, etc.)	level $/MWh		$1,638	$3,354	$1,714	$3,056	$1,794	$1,835	$1,878	$3,359	$3,961	$2,012	$2,059	$3,694
Subtotal: Fixed O&M cost	$3.79		$12,557	$25,714	$13,140	$23,429	$13,753	$14,071	$14,396	$25,753	$30,370	$15,423	$15,783	$28,318
	Level													
Total Non-Fuel O&M Cost, $1000s			$28,446	$42,000	$29,833	$40,539	$31,291	$32,047	$32,822	$44,639	$49,728	$35,265	$36,121	$49,165
Fixed O&M Cost, $/kW/yr (for 744.8 net MW)	$20.64		$16.86	$34.52	$17.64	$31.46	$18.46	$18.89	$19.33	$34.58	$40.78	$20.71	$21.19	$38.02
Variable O&M Cost, $/MWh	$3.59		$3.75	$3.84	$3.94	$4.03	$4.14	$4.24	$4.34	$4.45	$4.56	$4.68	$4.80	$4.92
Total Fixed + Variable Cost, $/MWh	$7.39		$6.71	$9.90	$7.03	$9.56	$7.38	$7.56	$7.74	$10.53	$11.73	$8.32	$8.52	$11.59

OPTION 1
NON-FUEL O&M COSTS
FIXED AND VARIABLE

2x2x1 MHI M501GAC, 744.8 MW
Fixed and Variable O&M Costs

Year end date		31-Dec-15	31-Dec-40	31-Dec-41	31-Dec-42	31-Dec-43	31-Dec-44	31-Dec-45
Operating year			25	26	27	28	29	30
General inflation factors (to year-end payments)		1.131	2.098	2.150	2.204	2.259	2.315	2.373
Inflation factors for LTSA expenses		1.131	2.098	2.150	2.204	2.259	2.315	2.373
Discount factors (for levelized cost results)			0.146	0.135	0.125	0.116	0.107	0.099
Mask to limit term of analysis			1	1	1	1	1	1
Fraction of year operating			1.000	1.000	1.000	1.000	1.000	1.000
Operations & Performance								
Capacity factor			65.00%	65.00%	65.00%	65.00%	65.00%	65.00%
Fired hours per year per machine (running hours)			5,694	5,694	5,694	5,694	5,694	5,694
$ / factored hr (LTSA variable MM charge) per CT			$1,657	$1,699	$1,741	$1,784	$1,829	$1,875
GWh generated (with NPV of energy)		45,640	4,241	4,241	4,241	4,241	4,241	4,241
Variable O&M Cost, $1000s								
Water treatment expense			$1,363	$1,398	$1,432	$1,468	$1,505	$1,543
CT gases/chemicals			$164	$168	$172	$176	$181	$185
Ammonia			$469	$480	$492	$505	$517	$530
Sludge disposal			$502	$514	$527	$540	$554	$568
LTSA variable monthly maintenance fee	level $/MWh		$18,871	$19,343	$19,826	$20,322	$20,830	$21,351
Total Variable O&M Cost		$3.59	$21,368	$21,902	$22,450	$23,011	$23,586	$24,176
Fixed O&M Cost, $1000s								
Site labor (based on loaded rates)			$9,003	$9,228	$9,459	$9,695	$9,937	$10,186
LTSA program initation fee		$283	$25	$25	$25	$25	$25	$25
LTSA program parts cost		$9,925	$882	$882	$882	$882	$882	$882
Steam turbine overhaul maintenance allocation			$0	$0	$0	$15,812	$0	$0
SCR NOX catalyst replacement			$0	$0	$0	$5,466	$0	$0
CO catalyst replacement			$0	$0	$0	$6,212	$0	$0
Potable water			$10	$10	$11	$11	$11	$12
Services and materials			$1,286	$1,318	$1,351	$1,385	$1,419	$1,455
LTSA monthly fixed fee			$1,070	$1,097	$1,124	$1,152	$1,181	$1,210
HRSG and other BOP maintenance expense			$2,098	$2,150	$2,204	$2,259	$2,315	$2,373
Contingency fund (emergency maintenance, etc.)	level $/MWh		$2,156	$2,206	$2,258	$6,435	$2,366	$2,421
Subtotal: Fixed O&M cost		$3.79	$16,529	$16,916	$17,313	$49,333	$18,136	$18,564
	Level							
Total Non-Fuel O&M Cost, $1000s			$37,897	$38,818	$39,763	$72,344	$41,723	$42,740
Fixed O&M Cost, $/kW/yr (for 744.8 net MW)		$20.64	$22.19	$22.71	$23.24	$66.24	$24.35	$24.92
Variable O&M Cost, $/MWh		$3.59	$5.04	$5.16	$5.29	$5.43	$5.56	$5.70
Total Fixed + Variable Cost, $/MWh		$7.39	$8.94	$9.15	$9.38	$17.06	$9.84	$10.08

2x2x1 GE 7FA.05, 601.8 MW, scaled

General Input Data

All costs expressed in 2011 $ unless otherwise specified.

Economic Inputs	Value	Source/Basis/Comment
General inflation rate, %/year	2.50%	AEP e-mail 29 April 2011, Malone.
Escalation rate for LTSA expenses	2.50%	AEP e-mail 29 April 2011, Malone.
Base year for all escalation	2011	Escalates from beginning of this year. Model uses end-of-year payment convention.
Number of years in analysis	30	S&L assumption
Discount rate used for levelized costs	8.0%	S&L assumption
Schedule		
Date of commercial service (beginning of this month/year)	Jan-16	Project scope document.
Operations Inputs		

Capacity factor

Year	CF	
2016	50.00%	AEP e-mail 29 April 2011, Malone.
2017	53.75%	AEP e-mail 29 April 2011, Malone.
2018	57.50%	AEP e-mail 29 April 2011, Malone.
2019	61.25%	AEP e-mail 29 April 2011, Malone.
2020	65.00%	AEP e-mail 29 April 2011, Malone.

Net MW rating	601.8	Project scope document.
Number of CTs	2	Project scope document.
Operating Costs		
Program initiation fee with CT OEM (one-time charge, at contract signing)	$250,000	AEP e-mail 29 April 2011, Malone. Cost is assumed to be in year before startup.
Program parts payment (one-time charge, 25% at contract signing, 75% at COD)	$7,569,342	AEP e-mail 29 April 2011, Malone. Cost is assumed to be in year before startup.
Cost per operating hour, per CT	$682	AEP e-mail 29 April 2011, Malone.
Fixed monthly fee for LTSA, per month (covers whole plant)	$42,500	AEP e-mail 29 April 2011, Malone.
SCR catalyst replacement (each time), treated as fixed O&M	$1,928,819	AEP e-mail 29 April 2011, Malone, escalated from 2008.
SCR catalyst replacement interval, years	4	AEP e-mail 29 April 2011, Malone.
CO catalyst replacement (each time), treated as fixed O&M	$2,191,840	AEP e-mail 29 April 2011, Malone, escalated from 2008.
CO catalyst replacement interval, years	4	AEP e-mail 29 April 2011, Malone.
Cost of 19% ammonia per dry ton delivered, including transportation	$826	per ton of ammonia in 19% solution (Malone e-mail 29 April).
Ammonia cost, $/ton (19.5% NH3 solution)	$157	is cost per ton of 19% solution.
Ammonia consumption lb of solution per operating hour	399	S&L estimate. This covers the whole plant.
Sludge disposal cost, $/ton	$42	Franczak note, 21 July 2011.
Sludge generation, tons per day at 100% load	24	Franczak note, 21 July 2011.
Water pre-treatment and water treatment, $1000s/full power year	$797	For MHI is input from Mike Rosen 28 April 2011, $1000s per full pwr yr. GE is scaled.
Cost of city water for potable uses	$4.62	AEP e-mail 29 April 2011, Malone.
River water		Assumes zero cost for raw water drawn from the river.
Potable water consumption, gpm	2	From water balance
CT gases and chemicals, $1000s per year	$96	S&L estimate from other projects at 100% capacity factor.
ST major maintenance, $1000s, considered a fixed O&M cost	$7,000	S&L assumption.
Frequency of ST overhaul, years	7	S&L assumption.
HRSG and other BOP fixed maintenance cost, $1000/yr	$431	Input on a per CT basis.
Maint. materials/supplies/consumables as % of maintenance labor	50%	S&L assumption.
Contingency fund (emergency maintenance, etc.), % of fixed O&M	15%	S&L assumption.

2x2x1 GE 7FA.05, 601.8 MW, scaled
Staffing Input Data

O&M Staffing for Conventional 2x2x1 CC Utility Plant

	Wages & Benefits, 2011$/hr	Staffing	Operating Phase, US$/yr
Operating Labor			
Plant Management			
plant manager	$73.75	1	$153,000
procurement specialist	$73.75	1	$153,000
administrative assistants	$73.75	2	$307,000
Subtotal		**4**	**$613,000**
Operations			
production supervisor	$73.75	1	$153,000
lead operating technicians	$73.75	3	$460,000
operating technicians	$73.75	10	$1,534,000
engineering/tech. support	$73.75	1	$153,000
chemist	$73.75	1	$153,000
Subtotal		**16**	**$2,453,000**
Maintenance Labor			
production supervisor	$73.75	1	$153,000
lead operating technicians	$73.75	1	$153,000
operating technicians	$73.75	4	$614,000
EH&S coordinator	$73.75	1	$153,000
I&C technicians	$73.75	1	$153,000
Subtotal		**8**	**$1,226,000**
Total Operating and Maintenance Labor		**28**	**$4,292,000**

We received only one labor cost from AEP, so breakdown of mgmt/ops/maint is not perfect here. Staffing is assumed same for either MHI or GE option.

OPTION 2
NON-FUEL O&M COSTS
FIXED AND VARIABLE

2x2x1 GE 7FA.05, 601.8 MW, scaled
Fixed and Variable O&M Costs

Year end date		31-Dec-15	31-Dec-16	31-Dec-17	31-Dec-18	31-Dec-19	31-Dec-20	31-Dec-21	31-Dec-22	31-Dec-23	31-Dec-24	31-Dec-25	31-Dec-26	31-Dec-27
Operating year			1	2	3	4	5	6	7	8	9	10	11	12
General inflation factors (to year-end payments)		1.131	1.160	1.189	1.218	1.249	1.280	1.312	1.345	1.379	1.413	1.448	1.485	1.522
Inflation factors for LTSA expenses		1.131	1.160	1.189	1.218	1.249	1.280	1.312	1.345	1.379	1.413	1.448	1.485	1.522
Discount factors (for levelized cost results)			0.926	0.857	0.794	0.735	0.681	0.630	0.583	0.540	0.500	0.463	0.429	0.397
Mask to limit term of analysis			1	1	1	1	1	1	1	1	1	1	1	1
Fraction of year operating			1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Operations & Performance														
Capacity factor			50.00%	53.75%	57.50%	61.25%	65.00%	65.00%	65.00%	65.00%	65.00%	65.00%	65.00%	65.00%
Fired hours per year per machine (running hours)			4,380	4,709	5,037	5,366	5,694	5,694	5,694	5,694	5,694	5,694	5,694	5,694
$ / factored hr (LTSA variable MM charge) per CT			$791	$810	$831	$851	$873	$894	$917	$940	$963	$987	$1,012	$1,037
GWh generated (with NPV of energy)		36,875	2,636	2,833	3,031	3,229	3,427	3,427	3,427	3,427	3,427	3,427	3,427	3,427
Variable O&M Cost, $1000s														
Water treatment expense			$462	$509	$558	$610	$663	$680	$697	$714	$732	$750	$769	$788
CT gases/chemicals			$55	$61	$67	$73	$80	$82	$84	$86	$88	$90	$92	$95
Ammonia			$159	$175	$192	$210	$228	$234	$239	$245	$252	$258	$264	$271
Sludge disposal			$213	$235	$258	$281	$306	$314	$322	$330	$338	$346	$355	$364
LTSA variable monthly maintenance fee	level $/MWh		$6,925	$7,631	$8,367	$9,136	$9,937	$10,186	$10,440	$10,701	$10,969	$11,243	$11,524	$11,812
Total Variable O&M Cost	$3.83		$7,815	$8,611	$9,442	$10,310	$11,214	$11,495	$11,782	$12,076	$12,378	$12,688	$13,005	$13,330
Fixed O&M Cost, $1000s														
Site labor (based on loaded rates)			$4,977	$5,102	$5,229	$5,360	$5,494	$5,631	$5,772	$5,917	$6,064	$6,216	$6,371	$6,531
LTSA program initation fee		$283	$25	$25	$25	$25	$25	$25	$25	$25	$25	$25	$25	$25
LTSA program parts cost		$8,564	$761	$761	$761	$761	$761	$761	$761	$761	$761	$761	$761	$761
Steam turbine overhaul maintenance allocation			$0	$0	$0	$0	$0	$0	$9,414	$0	$0	$0	$0	$0
SCR NOX catalyst replacement			$0	$0	$0	$2,409	$0	$0	$0	$2,659	$0	$0	$0	$2,935
CO catalyst replacement			$0	$0	$0	$2,737	$0	$0	$0	$3,021	$0	$0	$0	$3,335
Potable water			$6	$6	$6	$6	$6	$6	$7	$7	$7	$7	$7	$7
Services and materials			$711	$729	$747	$766	$785	$804	$824	$845	$866	$888	$910	$933
LTSA monthly fixed fee			$591	$606	$621	$637	$653	$669	$686	$703	$721	$739	$757	$776
HRSG and other BOP maintenance expense			$1,001	$1,026	$1,051	$1,078	$1,105	$1,132	$1,161	$1,190	$1,219	$1,250	$1,281	$1,313
Contingency fund (emergency maintenance, etc.)	level $/MWh		$1,211	$1,238	$1,266	$2,067	$1,324	$1,354	$2,797	$2,269	$1,449	$1,483	$1,517	$2,492
Subtotal: Fixed O&M cost	$4.46		$9,283	$9,492	$9,707	$15,845	$10,153	$10,384	$21,447	$17,396	$11,113	$11,368	$11,630	$19,108
	Level													
Total Non-Fuel O&M Cost, $1000s			$17,098	$18,103	$19,149	$26,155	$21,367	$21,878	$33,229	$29,473	$23,491	$24,056	$24,635	$32,438
Fixed O&M Cost, $/kW/yr (for 601.8 net MW)	$24.26		$15.43	$15.77	$16.13	$26.33	$16.87	$17.26	$35.64	$28.91	$18.47	$18.89	$19.33	$31.75
Variable O&M Cost, $/MWh	$3.83		$2.96	$3.04	$3.12	$3.19	$3.27	$3.35	$3.44	$3.52	$3.61	$3.70	$3.80	$3.89
Total Fixed + Variable Cost, $/MWh	$8.28		$6.49	$6.39	$6.32	$8.10	$6.24	$6.39	$9.70	$8.60	$6.86	$7.02	$7.19	$9.47

2x2x1 GE 7FA.05, 601.8 MW, scaled

Fixed and Variable O&M Costs

Year end date	31-Dec-15	31-Dec-28	31-Dec-29	31-Dec-30	31-Dec-31	31-Dec-32	31-Dec-33	31-Dec-34	31-Dec-35	31-Dec-36	31-Dec-37	31-Dec-38	31-Dec-39
Operating year		13	14	15	16	17	18	19	20	21	22	23	24
General inflation factors (to year-end payments)	1.131	1.560	1.599	1.639	1.680	1.722	1.765	1.809	1.854	1.900	1.948	1.996	2.046
Inflation factors for LTSA expenses	1.131	1.560	1.599	1.639	1.680	1.722	1.765	1.809	1.854	1.900	1.948	1.996	2.046
Discount factors (for levelized cost results)		0.368	0.340	0.315	0.292	0.270	0.250	0.232	0.215	0.199	0.184	0.170	0.158
Mask to limit term of analysis		1	1	1	1	1	1	1	1	1	1	1	1
Fraction of year operating		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Operations & Performance													
Capacity factor		65.00%	65.00%	65.00%	65.00%	65.00%	65.00%	65.00%	65.00%	65.00%	65.00%	65.00%	65.00%
Fired hours per year per machine (running hours)		5,694	5,694	5,694	5,694	5,694	5,694	5,694	5,694	5,694	5,694	5,694	5,694
$ / factored hr (LTSA variable MM charge) per CT		$1,063	$1,090	$1,117	$1,145	$1,174	$1,203	$1,233	$1,264	$1,295	$1,328	$1,361	$1,395
GWh generated (with NPV of energy)	36,875	3,427	3,427	3,427	3,427	3,427	3,427	3,427	3,427	3,427	3,427	3,427	3,427
Variable O&M Cost, $1000s													
Water treatment expense		$808	$828	$849	$870	$892	$914	$937	$960	$984	$1,009	$1,034	$1,060
CT gases/chemicals		$97	$99	$102	$104	$107	$110	$112	$115	$118	$121	$124	$127
Ammonia		$278	$285	$292	$299	$307	$314	$322	$330	$338	$347	$355	$364
Sludge disposal		$373	$382	$392	$402	$412	$422	$433	$443	$454	$466	$477	$489
LTSA variable monthly maintenance fee	level $/MWh	$12,108	$12,410	$12,721	$13,039	$13,365	$13,699	$14,041	$14,392	$14,752	$15,121	$15,499	$15,886
Total Variable O&M Cost	$3.83	$13,663	$14,005	$14,355	$14,714	$15,082	$15,459	$15,845	$16,242	$16,648	$17,064	$17,490	$17,928
Fixed O&M Cost, $1000s													
Site labor (based on loaded rates)		$6,694	$6,861	$7,033	$7,209	$7,389	$7,574	$7,763	$7,957	$8,156	$8,360	$8,569	$8,783
LTSA program initation fee	$283	$25	$25	$25	$25	$25	$25	$25	$25	$25	$25	$25	$25
LTSA program parts cost	$8,564	$761	$761	$761	$761	$761	$761	$761	$761	$761	$761	$761	$761
Steam turbine overhaul maintenance allocation		$0	$11,191	$0	$0	$0	$0	$0	$0	$13,302	$0	$0	$0
SCR NOX catalyst replacement		$0	$0	$0	$3,240	$0	$0	$0	$3,576	$0	$0	$0	$3,947
CO catalyst replacement		$0	$0	$0	$3,681	$0	$0	$0	$4,064	$0	$0	$0	$4,485
Potable water		$8	$8	$8	$8	$8	$9	$9	$9	$9	$9	$10	$10
Services and materials		$956	$980	$1,004	$1,030	$1,055	$1,082	$1,109	$1,136	$1,165	$1,194	$1,224	$1,254
LTSA monthly fixed fee		$795	$815	$836	$857	$878	$900	$922	$946	$969	$993	$1,018	$1,044
HRSG and other BOP maintenance expense		$1,346	$1,379	$1,414	$1,449	$1,486	$1,523	$1,561	$1,600	$1,640	$1,681	$1,723	$1,766
Contingency fund (emergency maintenance, etc.)	level $/MWh	$1,588	$3,303	$1,662	$2,739	$1,740	$1,781	$1,822	$3,011	$3,904	$1,954	$1,999	$3,311
Subtotal: Fixed O&M cost	$4.46	$12,173	$25,323	$12,743	$20,998	$13,342	$13,653	$13,972	$23,084	$29,931	$14,977	$15,329	$25,387
	Level												
Total Non-Fuel O&M Cost, $1000s		$25,836	$39,328	$27,098	$35,712	$28,424	$29,112	$29,817	$39,326	$46,579	$32,041	$32,819	$43,314
Fixed O&M Cost, $/kW/yr (for 601.8 net MW)	$24.26	$20.23	$42.08	$21.18	$34.89	$22.17	$22.69	$23.22	$38.36	$49.74	$24.89	$25.47	$42.19
Variable O&M Cost, $/MWh	$3.83	$3.99	$4.09	$4.19	$4.29	$4.40	$4.51	$4.62	$4.74	$4.86	$4.98	$5.10	$5.23
Total Fixed + Variable Cost, $/MWh	$8.28	$7.54	$11.48	$7.91	$10.42	$8.30	$8.50	$8.70	$11.48	$13.59	$9.35	$9.58	$12.64

OPTION 2
NON-FUEL O&M COSTS
FIXED AND VARIABLE

2x2x1 GE 7FA.05, 601.8 MW, scaled
Fixed and Variable O&M Costs

Year end date		31-Dec-15	31-Dec-40	31-Dec-41	31-Dec-42	31-Dec-43	31-Dec-44	31-Dec-45
Operating year			25	26	27	28	29	30
General inflation factors (to year-end payments)		1.131	2.098	2.150	2.204	2.259	2.315	2.373
Inflation factors for LTSA expenses		1.131	2.098	2.150	2.204	2.259	2.315	2.373
Discount factors (for levelized cost results)			0.146	0.135	0.125	0.116	0.107	0.099
Mask to limit term of analysis			1	1	1	1	1	1
Fraction of year operating			1.000	1.000	1.000	1.000	1.000	1.000
Operations & Performance								
Capacity factor			65.00%	65.00%	65.00%	65.00%	65.00%	65.00%
Fired hours per year per machine (running hours)			5,694	5,694	5,694	5,694	5,694	5,694
$ / factored hr (LTSA variable MM charge) per CT			$1,430	$1,466	$1,502	$1,540	$1,578	$1,618
GWh generated (with NPV of energy)		36,875	3,427	3,427	3,427	3,427	3,427	3,427
Variable O&M Cost, $1000s								
Water treatment expense			$1,087	$1,114	$1,142	$1,170	$1,200	$1,229
CT gases/chemicals			$130	$134	$137	$140	$144	$148
Ammonia			$373	$383	$392	$402	$412	$423
Sludge disposal			$502	$514	$527	$540	$554	$568
LTSA variable monthly maintenance fee	level $/MWh		$16,284	$16,691	$17,108	$17,536	$17,974	$18,423
Total Variable O&M Cost		$3.83	$18,376	$18,835	$19,306	$19,789	$20,283	$20,791
Fixed O&M Cost, $1000s								
Site labor (based on loaded rates)			$9,003	$9,228	$9,459	$9,695	$9,937	$10,186
LTSA program initation fee		$283	$25	$25	$25	$25	$25	$25
LTSA program parts cost		$8,564	$761	$761	$761	$761	$761	$761
Steam turbine overhaul maintenance allocation			$0	$0	$0	$15,812	$0	$0
SCR NOX catalyst replacement			$0	$0	$0	$4,357	$0	$0
CO catalyst replacement			$0	$0	$0	$4,951	$0	$0
Potable water			$10	$10	$11	$11	$11	$12
Services and materials			$1,286	$1,318	$1,351	$1,385	$1,419	$1,455
LTSA monthly fixed fee			$1,070	$1,097	$1,124	$1,152	$1,181	$1,210
HRSG and other BOP maintenance expense			$1,810	$1,855	$1,902	$1,949	$1,998	$2,048
Contingency fund (emergency maintenance, etc.)	level $/MWh		$2,095	$2,144	$2,195	$6,015	$2,300	$2,354
Subtotal: Fixed O&M cost		$4.46	$16,059	$16,438	$16,826	$46,112	$17,632	$18,051
	Level							
Total Non-Fuel O&M Cost, $1000s			$34,435	$35,273	$36,132	$65,901	$37,916	$38,841
Fixed O&M Cost, $/kW/yr (for 601.8 net MW)		$24.26	$26.69	$27.32	$27.96	$76.63	$29.30	$30.00
Variable O&M Cost, $/MWh		$3.83	$5.36	$5.50	$5.63	$5.78	$5.92	$6.07
Total Fixed + Variable Cost, $/MWh		$8.28	$10.05	$10.29	$10.54	$19.23	$11.07	$11.34

ATTACHMENT 1-16
Contracting Plan

1.0 INTRODUCTION

To support the American Electric Power (AEP) Multi-Prime Contracting Strategy a number of procurement and contracting/service agreement packages must be prepared. These packages include, in most cases, the technical specifications, design drawings and documents and the commercial terms and conditions. The Repowered Combined Cycle Plant project schedule is based on the AE preparing these packages (except for those listed as AEP responsibility) for bidding, reviewing the proposals and preparing a recommendation of award to AEP. The Technical Specifications to be prepared for the procurement and contracting packages is tabulated in the Specification List. The Contractors performing work at the project site, their scope of work and the expected bid basis is tabulated in the Construction Contracting Plan Summary. The Specification List and Construction Contracting Plan Summary are attached.

2.0 SPECIFICATION LIST

The specification list itemizes Technical Specifications to be prepared for (1) procurement of engineered systems and equipment, (2) fabrication of materials, (3) specialty services to be performed at site, (4) construction, demolition and relocation services to be performed at site, and (5) turnkey design, furnish and erect packages. Multi-Prime Contracting Strategies vary as to how the procurement and contracting packages are assembled. Following are notes on specific packages provided to explain the rational for development of these procurement and contracting packages listed in the Specification List.

- BSCC-49 Initial Site Demolition/Relocation Contract: This specification includes the demolition of structures in the CT/HRSG Area and the relocation of structures to remain. This contractor needs to mobilize prior to the Substructure Work Contractor (BSCC-58) to clear the work area.
- BSCC-50 Structural Steel Fabrication: This specification includes steel for the pipe rack which will be erected at the site by the Structural/Mechanical GWC. This specification also includes major steel for the CT Building and for modification work in the existing Boiler and ST Buildings, which will be erected by the Structural/Mechanical GWC. All other miscellaneous steel will be furnished and installed by the Structural/Mechanical GWC.

- BSCC-51 Piling Contract: This package may be included in the scope of the Substructure Work Contractor (BSCC-58) and will be evaluated during preparation of the Level 3 project schedule.
- BSCC-54 Combustion Turbine Building Bridge Crane, BSCC-55 Miscellaneous Hoists and BSCC-56 Pre-Engineered Buildings Contract: These packages need to be prepared early so the vendor can provide design drawings and information to support the structural design process (foundations and building steel design). The schedule cannot wait for the Structural/Mechanical GWC to provide the design information if this scope was included in its package.
- BSCC-22 Field Fabricated Tanks Contract: This package needs to be prepared early so the fabricator can provide design drawings and information to support the structural design process (foundations). The schedule cannot wait for the Structural/Mechanical GWC to provide the design information if this scope was included in its package.
- BSCC-44 Fire Protection and Detection System Contract: This package needs to be prepared early so the necessary design reviews can be performed to insure AEP requirements are incorporated into the design. The AE also requires the fire protection vendor design drawings and documents to support the design process (specifically the wiring diagrams which are used for construction). The schedule cannot wait for the Structural/Mechanical GWC to provide the design information if this scope was included in its package.

3.0 CONSTRUCTION CONTRACTING PLAN SUMMARY

The Construction Contracting Plan Summary tabulates packages for performing site services, fabrication of materials/components, demolition work, relocation work and construction work performed at the site. This summary provides additional information on the scope of the contracting/service agreement packages and the bid basis. The major contract packages are:

- Initial Site Demolition/Relocation Contract
- Piling Contract
- Substructure Work Contract
- Steam Turbine Modification Contract
- Cooling Tower Upgrade Contract

- Steam Condenser Upgrade Contract
- Structural/Mechanical General Works Contract
- Electrical/Controls General Works Contract
- Final Grading & Paving Contract

The engineering and design schedule is based on supporting the bid process for these packages by developing approximately 80 to 90% complete bid packages consisting of drawings and documents prepared by the OEMs, Vendors and the AE. Firm Lump Sum pricing will be requested based on package quantities developed by the AE with at least 80% engineering and design complete. Unit Rates will be used to support a true-up process of contractor scope and pricing (bid vs actual) after construction is complete.

SPEC #	TITLE	NOTES
CIVIL / STRUCTURAL		
BSCC-46	Topographic Site Survey	2
BSCC-47	Geotechnical Investigation	2
BSCC-48	Underground Utility Investigation	2
BSCC-49	Initial Site Demolition/Relocation Contract	2
BSCC-50	Structural Steel Fabrication	2,3
BSCC-51	Piling Contract	2, 7
BSCC-52	Oil Water Separator	3
BSCC-54	Combustion Turbine Building Bridge Crane	3
BSCC-55	Miscellaneous Hoists	3
BSCC-56	Pre-Engineered Buildings Contract	2,3
BSCC-58	Substructure Work Contract	2, 7
BSCC-59	Final Grading & Paving Contract	2
MECHANICAL		
BSCC-1	Combustion Turbines	3
BSCC-2	Heat Recovery Steam Generators	3
BSCC-3	Steam Turbine Modification Contract	2, 9

SPEC #	TITLE	NOTES
BSCC-4	Cooling Tower Upgrade Contract	2, 9
BSCC-5	Steam Condenser Upgrade Contract	2, 9
BSCC-7	River Water Pre-Treatment System	3
BSCC-8	Water Treatment System	3
BSCC-10	Auxiliary Boiler	3
BSCC-12	Noise Investigation Consultant	2
BSCC-13	CT Air Inlet Chillers	3
BSCC-14	Boiler Feedwater Pumps	3
BSCC-16	Closed Cooling Water Heat Exchangers & Filters	3
BSCC-18	Horizontal Pumps	3
BSCC-19	Vertical Pumps	3
BSCC-78	Condensate Polisher System	3
BSCC-20	Sump Pumps	3
BSCC-21	Duplex Strainers	3
BSCC-22	Field Fabricated Tanks Contract	2
BSCC-23	Shop Fabricated Tanks	3

SPEC #	TITLE	NOTES
BSCC-25	Water & Steam Sampling System	3
BSCC-26	Chemical Feed System	3
BSCC-27	Ammonia Storage and Transfer Equipment	3
BSCC-28	High Pressure Valves	3
BSCC-29	High Pressure Valves (2" and smaller)	3
BSCC-30	Control Valves	3
BSCC-32	Safety & Relief Valves	3
BSCC-34	Miscellaneous Butterfly Valves	3
BSCC-35	Non-Return Valves	3
BSCC-36	Mechanical Specialities	3
BSCC-37	Engineered Pipe Supports	3
BSCC-38	Fuel Gas Conditioning System	3
BSCC-39	Fuel Gas Check Metering Station	3
BSCC-40	Fuel Oil Unloading & Forwarding System (Option)	3
BSCC-41	Bulk Gas (H2, N2 & CO2) Storage & Regulating System	3
BSCC-42	Alloy Pipe Supply & Fabrication	3

SPEC #	TITLE	NOTES
BSCC-44	Fire Protection and Detection System Contract	2
BSCC-45	Structural/Mechanical General Works Contract	2
ELECTRICAL		
BSCC-6	Main Power & Unit Auxiliary Transformers	5
BSCC-60	Generator Circuit Breakers	5
BSCC-61	Isolated Phase Bus Duct	5
BSCC-62	Cable Bus Duct	5
BSCC-63	Medium Voltage Switchgear and MCCs	5
BSCC-64	Low Voltage Switchgear and Transformers	5
BSCC-65	480 V Motor Control Centers	5
BSCC-66	125 VDC Battery, Chargers & UPS	5
BSCC-67	Power Distribution Centers (PDC's)	5
BSCC-68	Panels and Switchboards	5
BSCC-69	Cathodic Protection	5
BSCC-70	Plant Security System	5
BSCC-71	Communication System	5

SPEC #	TITLE	NOTES
BSCC-72	Emergency Diesel Generator	3
BSCC-74	Electrical/Controls General Works Contract	2
I&C		
BSCC-11	Distributed Control System	5
BSCC-75	Continuous Emission Monitors (CEM)	5
BSCC-76	BOP Instrumentation & Enclosures	3
AEP	Contracts and Service Agreements	6
AEP-1	Site Services	2,8
AEP-2	Nursing and First Aid Services	2
AEP-3	Sanitary Services	2
AEP-4	Landscaping Services	2
AEP-5	Surveying Services	2
Notes		
1	All specifications will use CSI format.	
2	Refer to Construction Contracting Plan for further information.	
3	Erected/Installed by Structural/Mechanical GWC.	
4	Note Deleted	
5	Erected/Installed by Electrical/Controls GWC.	
6	AEP Responsibility.	
7	Piling Contractor may be a Subcontractor to the Subsubstructure	
	Work Contractor.	
8	Construction Temporary Power System furnished and installed by	
	Site Services Contractor.	
9	If a Specialty Contract is not required to perform this work (to be	
	determined during detailed design) then this work may be performed	
	by supervised craft labor under the direction of a TFA and be	
	included in the scope of the Structural/Mechanical GWC.	

CONSTRUCTION CONTRACTING PLAN
SUMMARY

Specification Number	Title	Scope Description (Summary)	Contract Type Bid Basis
Civil/Structural Specifications			
BSCC-46	Topographic Site Survey	Perform a ground survey to determine the topography of the plant area, locate utilities and structures.	Services Firm Lump Sum
BSCC-47	Geotechnical Investigation	Perform soil borings and resistivity tests of site soil conditions. Perform laboratory testing and provide a report of the investigation indicating findings, test data, boring logs and recommendations for foundation types for various support structures. Report shall also indicate the soil design parameters for foundation design.	Services Firm Lump Sum with Firm Unit Prices
BSCC-48	Underground Utility Investigation	Perform a Geophysical survey of the site to confirm the locations of underground utilities or structures that may be within the project work area. Preparation of a final report that includes descriptions and results of the survey.	Services Firm Lump Sum
BSCC-49	Initial Site Demolition/Relocation Contract	Provide labor, material and equipment to demolish and haul off-site all above-surface structures from the CT/HRSG Area denoted for demolition. Provide relocation services to move existing structures to their new location.	Demolish/Relocate Firm Lump Sum with Firm Unit Prices
BSCC-50	Structural Steel Fabrication	Prepare shop detail and erection drawings, fabricate, shop finish paint and deliver structural steel for the CT building, existing boiler and ST building modifications, pipe rack and miscellaneous galleries. Steel will be erected on-site by the Structural/Mechanical GWC.	Furnish/Fabricate/Deliver Firm Lump Sum with Firm Unit Prices
BSCC-51	Piling Contract	Furnish and install piles per engineered drawings and specifications. Provide quality testing and inspection services to insure the specifications have been satisfied.	Furnish/Install Firm Lump Sum with Firm Unit Prices
BSCC-56	Pre-Engineered Buildings Contract	Design and furnish the following pre-engineered buildings: Water Treatment Building & Pre-Treatment Building, Filter Press Building and Bulk Gas Storage Enclosure. Buildings will be erected on-site by the Structural/Mechanical GWC.	Design/Furnish Firm Lump Sum
BSCC-58	Substructure Work Contract	Provide labor, material and equipment to excavate, backfill and grade the site per engineered drawings and specifications to the intial elevations required. Provide quality testing and inspection services to insure the specifications have been satisfied. Relocate existing utilities and install temporary and/or permanent storm drainage, construction parking and laydown areas and stormwater pond per the design drawings. Provide detailed placing and shop drawings for reinforcing steel for foundations. Excavate, dewater, place embedded items (pipe, conduit, grounding cable, anchorage, steel plates, etc.) and reinforcing steel, pour the concrete foundation structures, and backfill per design drawings and specifications. Provide quality testing and inspection services to insure the specifications have been satisfied. Install underground piping and electrical ductbanks.	Furnish/Construct Firm Lump Sum with Firm Unit Prices
BSCC-59	Final Grading & Paving Contract	Provide labor, material and equipment to finish grade and provide paving for the site per design drawings and specifications to the final elevations required. Provide quality testing and inspection services to insure the specifications have been satisfied. The work includes any final tie-ins to sewer systems and underground utilities, and the final installation of asphalt and crushed stone roads, parking lots, and permanent ground covering as per the design drawings.	Furnish/Construct Firm Lump Sum with Firm Unit Prices

CONSTRUCTION CONTRACTING PLAN SUMMARY

Specification Number	Title	Scope Description (Summary)	Contract Type Bid Basis
Mechanical Specifications			
BSCC-3	Steam Turbine Modification Contract	Design, furnish and erect the required steam turbine modifications per initial study and detail design and erection drawings furnished by contractor (Mitsubishi). If a specialty contract is not required to perform this work (determined during detailed design) then this work may be performed by supervised craft labor under the direction of a TFA and be included in the scope of the Structural/Mechanical GWC.	Design/Furnish/Erect Firm Lump Sum
BSCC-4	Cooling Tower Upgrade Contract	Design, furnish and erect the required cooling tower upgrades/modifications per initial study and detail design and erection drawings furnished by contractor. If a specialty contract is not required to perform this work (determined during detailed design) then this work may be performed by supervised craft labor under the direction of a TFA and be included in the scope of the Structural/Mechanical GWC.	Design/Furnish/Erect Firm Lump Sum
BSCC-5	Steam Condenser Upgrade Contract	Design, furnish and erect the required condenser upgrades/modifications per initial study and detail design and erection drawings furnished by contractor. If a specialty contract is not required to perform this work (determined during detailed design) then this work may be performed by supervised craft labor under the direction of a TFA and be included in the scope of the Structural/Mechanical GWC.	Design/Furnish/Erect Firm Lump Sum
BSCC-12	Noise Investigation Consultant	Perform a background noise study prior to initial site mobilization and provide a report of the results. Assist AE in specification and design of noise attentuation attributes into the plant design. Review OEM and Vendor drawings for noise attenuation design. Perform final project noise survey to verify performance guarantees.	Services Firm Lump Sum with Firm Unit Prices
BSCC-22	Field Fabricated Tanks Contract	Provide detail and erection drawings for the following field erected tanks: Raw Water Storage Tank and optional Fuel Oil Tanks and FO Demineralized Water Storage Tank. Fabricate and deliver tank sections to the jobsite per the detail drawings.	Design/Furnish/Erect Firm Lump Sum with Firm Unit Prices
BSCC-44	Fire Protection and Detection System Contract	Design, furnish and install the fire protection and detection system per detail design and installation drawings furnished by contractor.	Design/Furnish/Install Firm Lump Sum with Firm Unit Prices
BSCC-45	Structural/Mechanical General Works Contract	Provide labor, material, commodity items and erection equipment/tools to erect all structural components and mechanical equipment. Perform demolition work as detailed on the drawings. Work will be performed as detailed on the OEM, Vendor and AE drawings and documents.	Design/Furnish/Erect Firm Lump Sum with Firm Unit Prices
Electrical Specifications			
BSCC-74	Electrical/Controls General Works Contract	Provide labor, material, commodity items and erection equipment/tools to erect all electrical equipment. Perform demolition work as detailed on the drawings. Work will be performed as detailed on the OEM, Vendor and AE drawings and documents.	Design/Furnish/Erect Firm Lump Sum with Firm Unit Prices

CONSTRUCTION CONTRACTING PLAN SUMMARY

Specification Number	Title	Scope Description (Summary)	Contract Type Bid Basis
AEP Contractors			
AEP-1	Site Services	Provide labor and materials to maintain the site during the construction and start-up/commissioning of the Repowered Plant.	Contract or Service Agreement Firm Lump Sum and/or Firm Unit Pricing
AEP-2	Nursing and First Aid Services	Provide nursing and first aid services for the entire construction site.	Contract or Service Agreement Firm Lump Sum and/or Firm Unit Pricing
AEP-3	Sanitary Services	Provide sanitary services for the entire construction site.	Contract or Service Agreement Firm Lump Sum and/or Firm Unit Pricing
AEP-4	Landscaping Services	Provide landscaping services for the entire construction site.	Contract or Service Agreement Firm Lump Sum and/or Firm Unit Pricing
AEP-5	Surveying Services	Provide independent surveying services.	Contract or Service Agreement Firm Lump Sum and/or Firm Unit Pricing

ATTACHMENT 1-17
Project Schedule

Big Sandy - Level 1 Schedule Layout

Rev D July 29, 2011

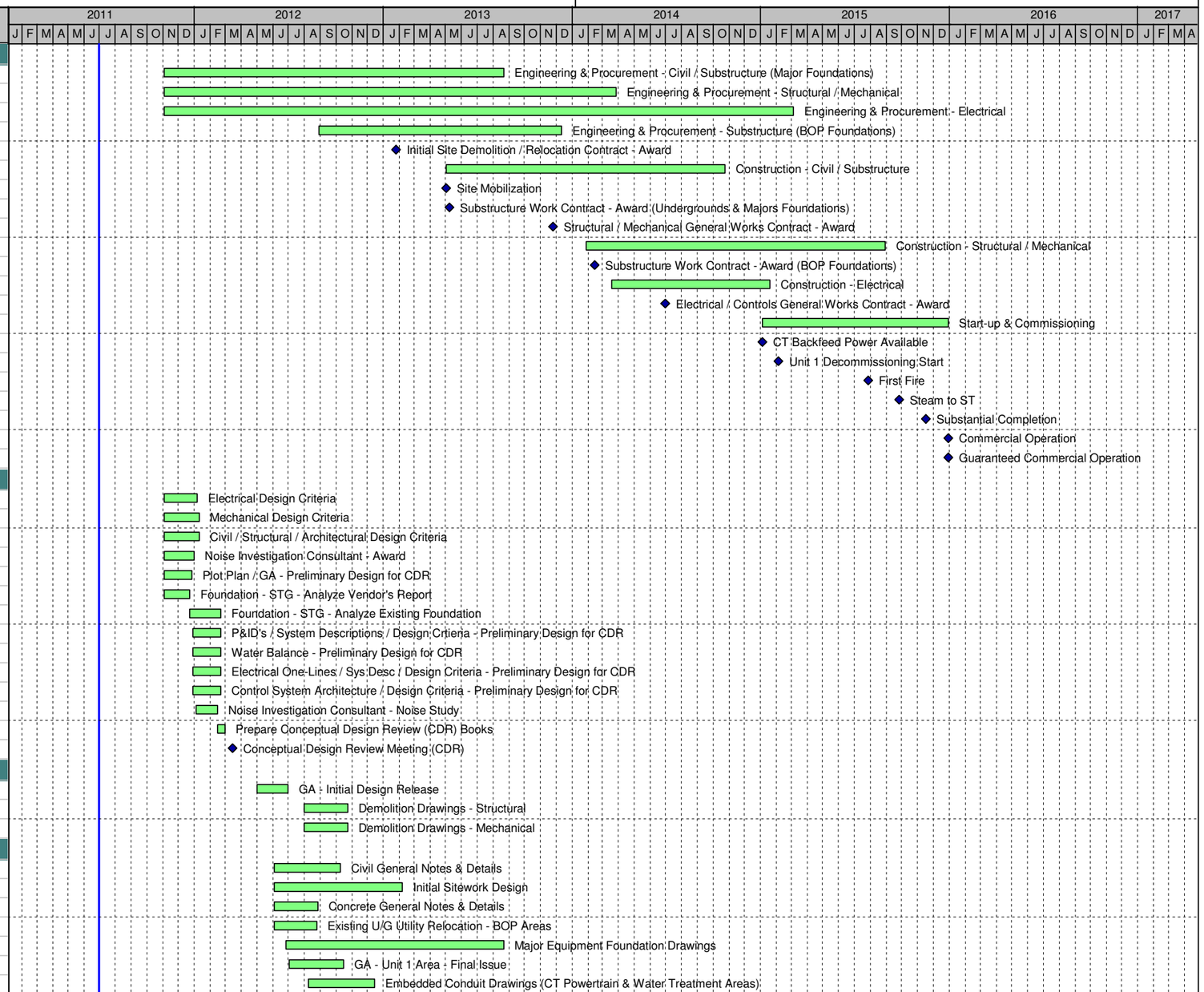
Big Sandy Unit 1 Repowering

Cost Estimate Study

Option 1 - Mitsubishi 501GAC

Data Date: 01-Jul-11 12:00 AM

Activity Name	Dur	Start	Finish
Summary of Work	1087	02-Nov-11	31-Dec-15
Engineering & Procurement - Civil / Substructure (Major Foundations)	471	02-Nov-11	21-Aug-13
Engineering & Procurement - Structural / Mechanical	627	02-Nov-11	27-Mar-14
Engineering & Procurement - Electrical	872	02-Nov-11	05-Mar-15
Engineering & Procurement - Substructure (BOP Foundations)	337	28-Aug-12	11-Dec-13
Initial Site Demolition / Relocation Contract - Award	0		25-Jan-13
Construction - Civil / Substructure	387	02-May-13	24-Oct-14
Site Mobilization	0	02-May-13	
Substructure Work Contract - Award (Undergrounds & Majors Foundations)	0		07-May-13
Structural / Mechanical General Works Contract - Award	0		25-Nov-13
Construction - Structural / Mechanical	415	28-Jan-14	31-Aug-15
Substructure Work Contract - Award (BOP Foundations)	0		14-Feb-14
Construction - Electrical	220	18-Mar-14	19-Jan-15
Electrical / Controls General Works Contract - Award	0		30-Jun-14
Start-up & Commissioning	258	05-Jan-15	31-Dec-15
CT Backfeed Power Available	0		05-Jan-15
Unit 1 Decommissioning Start	0	05-Feb-15	
First Fire	0		27-Jul-15
Steam to ST	0		25-Sep-15
Substantial Completion	0		16-Nov-15
Commercial Operation	0		31-Dec-15
Guaranteed Commercial Operation	0		31-Dec-15*
Concepual Design Review Phase	95	02-Nov-11	13-Mar-12
Electrical Design Criteria	44	02-Nov-11	06-Jan-12
Mechanical Design Criteria	45	02-Nov-11	09-Jan-12
Civil / Structural / Architectural Design Criteria	45	02-Nov-11	09-Jan-12
Noise Investigation Consultant - Award	40	02-Nov-11	30-Dec-11
Plot Plan / GA - Preliminary Design for CDR	40	02-Nov-11	27-Dec-11
Foundation - STG - Analyze Vendor's Report	35	02-Nov-11*	22-Dec-11
Foundation - STG - Analyze Existing Foundation	40	23-Dec-11	20-Feb-12
P&ID's / System Descriptions / Design Crtieria - Preliminary Design for CDR	40	28-Dec-11	21-Feb-12
Water Balance - Preliminary Design for CDR	40	28-Dec-11	21-Feb-12
Electrical One-Lines / Sys Desc / Design Criteria - Preliminary Design for CDR	40	28-Dec-11	21-Feb-12
Control System Architecture / Design Criteria - Preliminary Design for CDR	40	28-Dec-11	21-Feb-12
Noise Investigation Consultant - Noise Study	30	03-Jan-12	13-Feb-12
Prepare Conceptual Design Review (CDR) Books	10	15-Feb-12	28-Feb-12
Conceptual Design Review Meeting (CDR)	0		13-Mar-12
Initial Site Demolition / Relocation Contract	124	30-Apr-12	23-Oct-12
GA - Initial Design Release	44	30-Apr-12	29-Jun-12
Demolition Drawings - Structural	60	31-Jul-12	23-Oct-12
Demolition Drawings - Mechanical	60	31-Jul-12	23-Oct-12
Substructure Work Contract (Undergrounds & Major Foundations)	318	04-Jun-12	21-Aug-13
Civil General Notes & Details	89	04-Jun-12	08-Oct-12
Initial Sitework Design	170	04-Jun-12	05-Feb-13
Concrete General Notes & Details	60	04-Jun-12	27-Aug-12
Existing U/G Utility Relocation - BOP Areas	59	04-Jun-12	24-Aug-12
Major Equipment Foundation Drawings	302	26-Jun-12	21-Aug-13
GA - Unit 1 Area - Final Issue	75	02-Jul-12	16-Oct-12
Embedded Conduit Drawings (CT Powertrain & Water Treatment Areas)	93	08-Aug-12	14-Dec-12

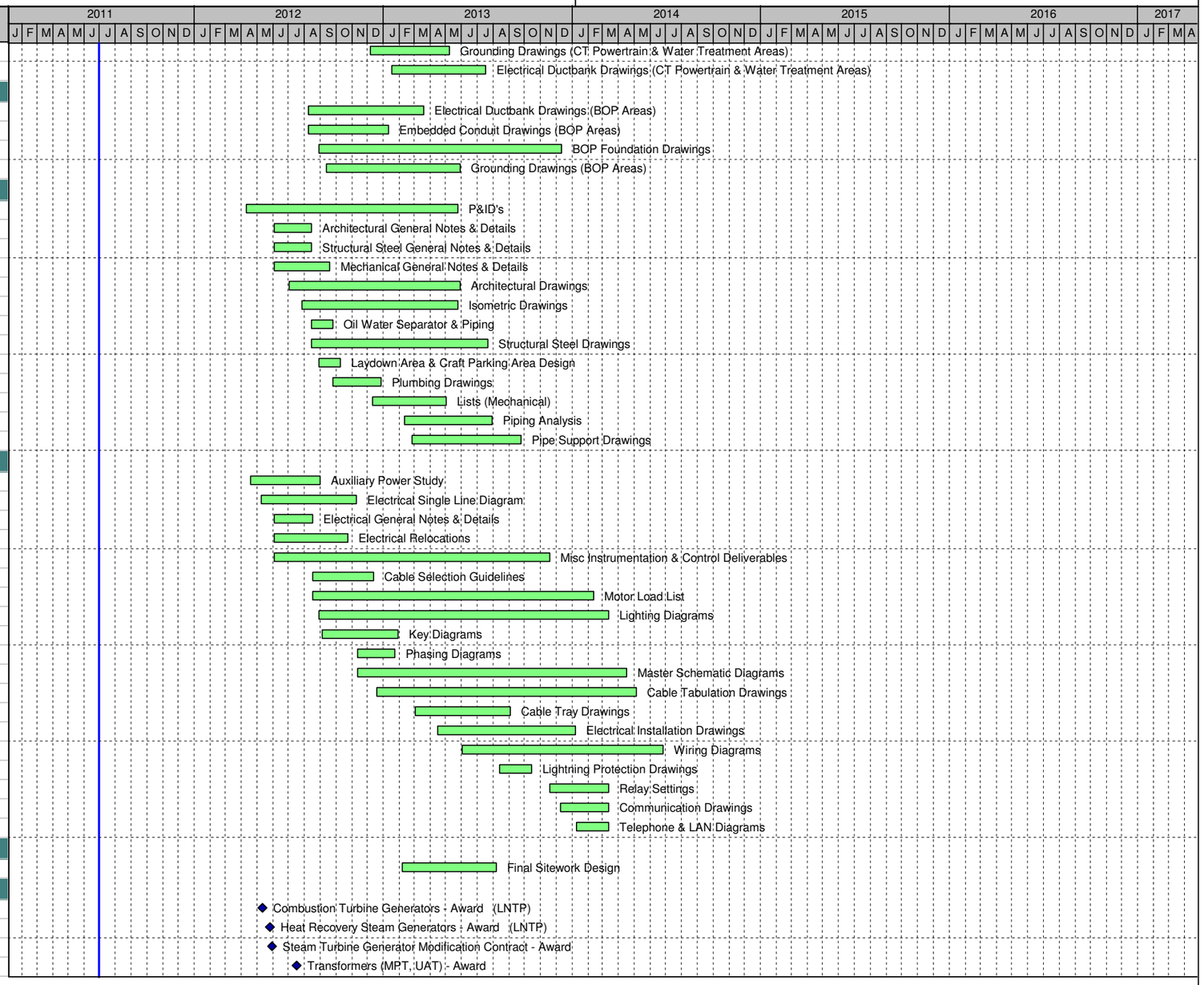


Remaining Level of Effort | Actual Level of Effort | Remaining Work | Milestone

WBS Summary | Actual Work | Critical Remaining Work

TASK filter: Big Sandy - Level 1.

Activity Name	Dur	Start	Finish
Grounding Drawings (CT Powertrain & Water Treatment Areas)	108	07-Dec-12	07-May-13
Electrical Ductbank Drawings (CT Powertrain & Water Treatment Areas)	131	16-Jan-13	17-Jul-13
Substructure Work Contract (BOP Foundations)	351	08-Aug-12	11-Dec-13
Electrical Ductbank Drawings (BOP Areas)	161	08-Aug-12	20-Mar-13
Embedded Conduit Drawings (BOP Areas)	111	08-Aug-12	09-Jan-13
BOP Foundation Drawings	337	28-Aug-12	11-Dec-13
Grounding Drawings (BOP Areas)	184	13-Sep-12	28-May-13
Structural / Mechanical General Works Contract	379	11-Apr-12	23-Sep-13
P&ID's	293	11-Apr-12	24-May-13
Architectural General Notes & Details	50	04-Jun-12	13-Aug-12
Structural Steel General Notes & Details	50	04-Jun-12	13-Aug-12
Mechanical General Notes & Details	75	04-Jun-12	18-Sep-12
Architectural Drawings	237	02-Jul-12	28-May-13
Isometric Drawings	216	27-Jul-12	24-May-13
Oil Water Separator & Piping	30	14-Aug-12	25-Sep-12
Structural Steel Drawings	245	14-Aug-12	22-Jul-13
Laydown Area & Craft Parking Area Design	30	28-Aug-12	09-Oct-12
Plumbing Drawings	65	24-Sep-12	27-Dec-12
Lists (Mechanical)	103	10-Dec-12	01-May-13
Piping Analysis	121	11-Feb-13	29-Jul-13
Pipe Support Drawings	151	25-Feb-13	23-Sep-13
Electrical / Controls General Works Contract	571	19-Apr-12	26-Jun-14
Auxiliary Power Study	95	19-Apr-12	31-Aug-12
Electrical Single Line Diagram	130	09-May-12	09-Nov-12
Electrical General Notes & Details	53	04-Jun-12	16-Aug-12
Electrical Relocations	100	04-Jun-12	23-Oct-12
Misc Instrumentation & Control Deliverables	381	04-Jun-12	18-Nov-13
Cable Selection Guidelines	82	17-Aug-12	13-Dec-12
Motor Load List	380	17-Aug-12	12-Feb-14
Lighting Diagrams	402	28-Aug-12	12-Mar-14
Key Diagrams	100	04-Sep-12	28-Jan-13
Phasing Diagrams	48	12-Nov-12	23-Jan-13
Master Schematic Diagrams	374	12-Nov-12	17-Apr-14
Cable Tabulation Drawings	359	19-Dec-12	05-May-14
Cable Tray Drawings	131	04-Mar-13	02-Sep-13
Electrical Installation Drawings	193	15-Apr-13	08-Jan-14
Wiring Diagrams	279	03-Jun-13	26-Jun-14
Lightning Protection Drawings	45	13-Aug-13	14-Oct-13
Relay Settings	81	18-Nov-13	12-Mar-14
Communication Drawings	65	10-Dec-13	12-Mar-14
Telephone & LAN Diagrams	45	09-Jan-14	12-Mar-14
Final Grading & Paving Contract	130	06-Feb-13	07-Aug-13
Final Sitework Design	130	06-Feb-13	07-Aug-13
Procurement	499	11-May-12	25-Apr-14
Combustion Turbine Generators - Award (LNTP)	0		11-May-12
Heat Recovery Steam Generators - Award (LNTP)	0		25-May-12
Steam Turbine Generator Modification Contract - Award	0		30-May-12
Transformers (MPT, UAT) - Award	0		17-Jul-12



Remaining Level of Effort | Actual Level of Effort | Remaining Work | Milestone

WBS Summary | Actual Work | Critical Remaining Work

TASK filter: Big Sandy - Level 1.

Big Sandy - Level 1 Schedule Layout

Rev D July 29, 2011

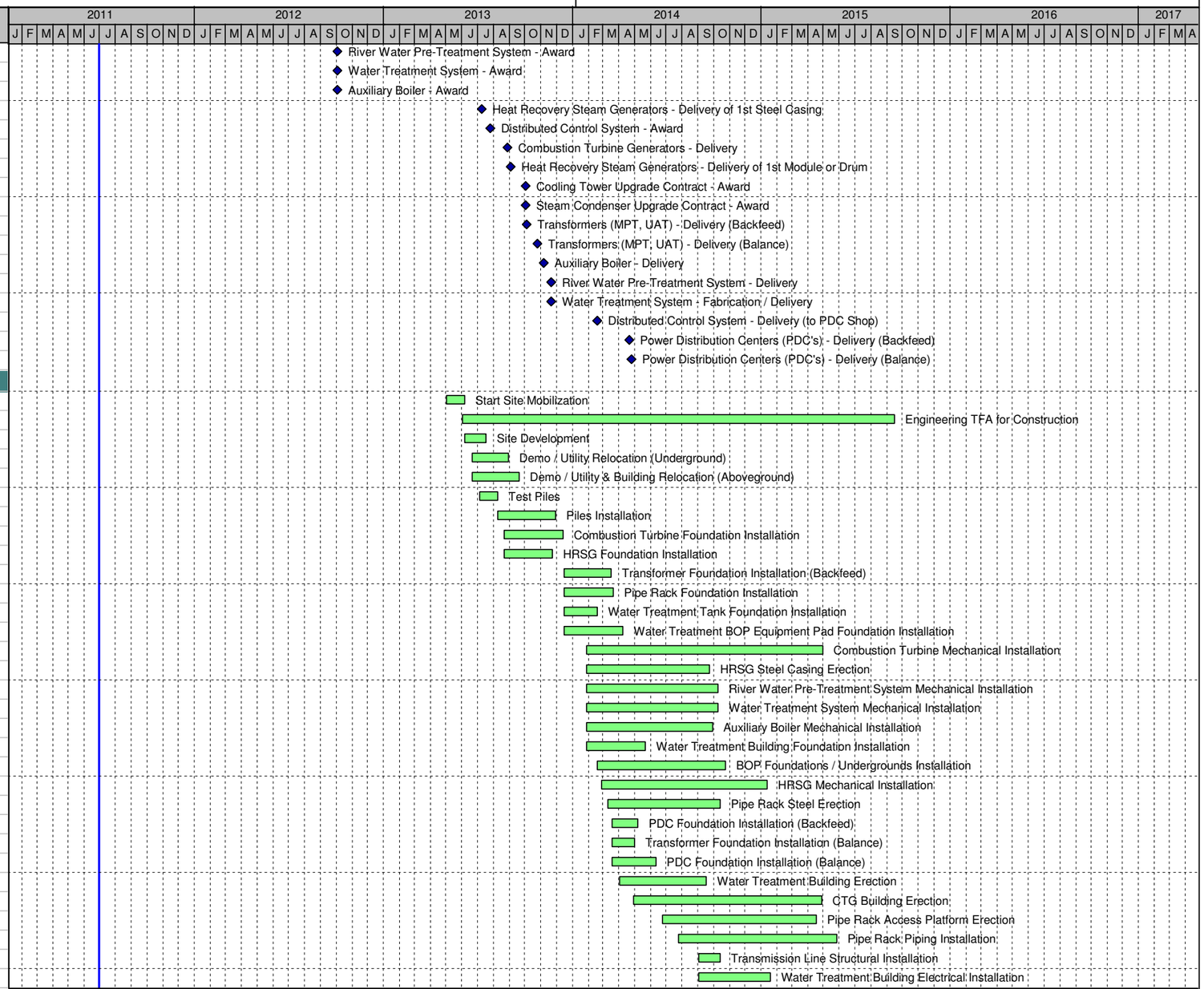
Big Sandy Unit 1 Repowering

Cost Estimate Study

Option 1 - Mitsubishi 501GAC

Data Date: 01-Jul-11 12:00 AM

Activity Name	Dur	Start	Finish
River Water Pre-Treatment System - Award	0		02-Oct-12
Water Treatment System - Award	0		02-Oct-12
Auxiliary Boiler - Award	0		02-Oct-12
Heat Recovery Steam Generators - Delivery of 1st Steel Casing	0		09-Jul-13
Distributed Control System - Award	0		25-Jul-13
Combustion Turbine Generators - Delivery	0		28-Aug-13
Heat Recovery Steam Generators - Delivery of 1st Module or Drum	0		03-Sep-13
Cooling Tower Upgrade Contract - Award	0		01-Oct-13
Steam Condenser Upgrade Contract - Award	0		01-Oct-13*
Transformers (MPT, UAT) - Delivery (Backfeed)	0		04-Oct-13
Transformers (MPT, UAT) - Delivery (Balance)	0		25-Oct-13
Auxiliary Boiler - Delivery	0		06-Nov-13
River Water Pre-Treatment System - Delivery	0		20-Nov-13
Water Treatment System - Fabrication / Delivery	0		20-Nov-13
Distributed Control System - Delivery (to PDC Shop)	0		17-Feb-14
Power Distribution Centers (PDC's) - Delivery (Backfeed)	0		21-Apr-14
Power Distribution Centers (PDC's) - Delivery (Balance)	0		25-Apr-14
New Plant Construction	620	02-May-13	16-Sep-15
Start Site Mobilization	25	02-May-13*	05-Jun-13
Engineering TFA for Construction	591	03-Jun-13	16-Sep-15
Site Development	30	07-Jun-13	18-Jul-13
Demo / Utility Relocation (Underground)	50	21-Jun-13	29-Aug-13
Demo / Utility & Building Relocation (Aboveground)	65	21-Jun-13	19-Sep-13
Test Piles	25	05-Jul-13	08-Aug-13
Piles Installation	80	09-Aug-13	28-Nov-13
Combustion Turbine Foundation Installation	82	22-Aug-13	13-Dec-13
HRSG Foundation Installation	67	22-Aug-13	22-Nov-13
Transformer Foundation Installation (Backfeed)	66	16-Dec-13	17-Mar-14
Pipe Rack Foundation Installation	69	16-Dec-13	20-Mar-14
Water Treatment Tank Foundation Installation	46	16-Dec-13	17-Feb-14
Water Treatment BOP Equipment Pad Foundation Installation	83	16-Dec-13	09-Apr-14
Combustion Turbine Mechanical Installation	328	28-Jan-14	30-Apr-15
HRSG Steel Casing Erection	170	28-Jan-14	22-Sep-14
River Water Pre-Treatment System Mechanical Installation	184	28-Jan-14	10-Oct-14
Water Treatment System Mechanical Installation	184	28-Jan-14	10-Oct-14
Auxiliary Boiler Mechanical Installation	175	28-Jan-14	29-Sep-14
Water Treatment Building Foundation Installation	82	29-Jan-14	22-May-14
BOP Foundations / Undergrounds Installation	180	17-Feb-14	24-Oct-14
HRSG Mechanical Installation	230	26-Feb-14	13-Jan-15
Pipe Rack Steel Erection	157	10-Mar-14	14-Oct-14
PDC Foundation Installation (Backfeed)	37	18-Mar-14	07-May-14
Transformer Foundation Installation (Balance)	32	18-Mar-14	30-Apr-14
PDC Foundation Installation (Balance)	62	18-Mar-14	11-Jun-14
Water Treatment Building Erection	120	02-Apr-14	16-Sep-14
CTG Building Erection	260	29-Apr-14	27-Apr-15
Pipe Rack Access Platform Erection	215	23-Jun-14	17-Apr-15
Pipe Rack Piping Installation	219	25-Jul-14	27-May-15
Transmission Line Structural Installation	30	02-Sep-14	13-Oct-14
Water Treatment Building Electrical Installation	100	02-Sep-14	19-Jan-15



Remaining Level of Effort | Actual Level of Effort | Remaining Work | Milestone

WBS Summary | Actual Work | Critical Remaining Work

TASK filter: Big Sandy - Level 1.

Big Sandy - Level 1 Schedule Layout

Rev D July 29, 2011

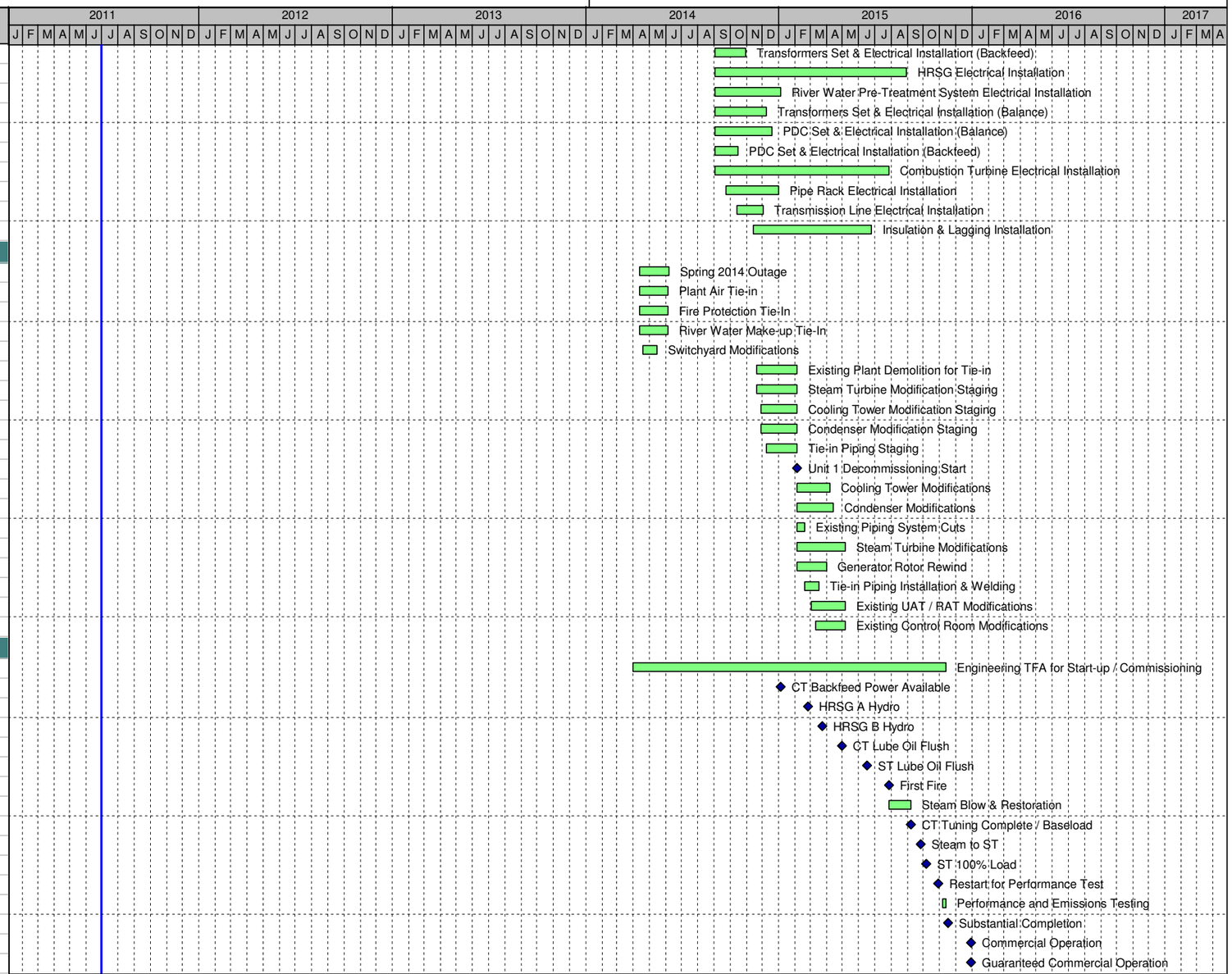
Big Sandy Unit 1 Repowering

Cost Estimate Study

Option 1 - Mitsubishi 501GAC

Data Date: 01-Jul-11 12:00 AM

Activity Name	Dur	Start	Finish
Transformers Set & Electrical Installation (Backfeed)	42	02-Sep-14	29-Oct-14
HRSG Electrical Installation	260	02-Sep-14	31-Aug-15
River Water Pre-Treatment System Electrical Installation	90	02-Sep-14	05-Jan-15
Transformers Set & Electrical Installation (Balance)	70	02-Sep-14	08-Dec-14
PDC Set & Electrical Installation (Balance)	79	02-Sep-14	19-Dec-14
PDC Set & Electrical Installation (Backfeed)	32	02-Sep-14	15-Oct-14
Combustion Turbine Electrical Installation	235	02-Sep-14	27-Jul-15
Pipe Rack Electrical Installation	71	24-Sep-14	31-Dec-14
Transmission Line Electrical Installation	35	14-Oct-14	01-Dec-14
Insulation & Lagging Installation	160	13-Nov-14	24-Jun-15
Existing Plant Tie-In Construction	278	12-Apr-14	06-May-15
Spring 2014 Outage	58	12-Apr-14*	08-Jun-14
Plant Air Tie-in	56	12-Apr-14	06-Jun-14
Fire Protection Tie-In	56	12-Apr-14	06-Jun-14
River Water Make-up Tie-In	56	12-Apr-14	06-Jun-14
Switchyard Modifications	28	19-Apr-14	16-May-14
Existing Plant Demolition for Tie-in	56	19-Nov-14	04-Feb-15
Steam Turbine Modification Staging	56	19-Nov-14	04-Feb-15
Cooling Tower Modification Staging	49	28-Nov-14	04-Feb-15
Condenser Modification Staging	49	28-Nov-14	04-Feb-15
Tie-in Piping Staging	42	09-Dec-14	04-Feb-15
Unit 1 Decommissioning Start	0	05-Feb-15*	
Cooling Tower Modifications	45	05-Feb-15	08-Apr-15
Condenser Modifications	48	05-Feb-15	13-Apr-15
Existing Piping System Cuts	10	05-Feb-15	18-Feb-15
Steam Turbine Modifications	65	05-Feb-15	06-May-15
Generator Rotor Rewind	40	05-Feb-15	01-Apr-15
Tie-in Piping Installation & Welding	20	19-Feb-15	18-Mar-15
Existing UAT / RAT Modifications	46	04-Mar-15	06-May-15
Existing Control Room Modifications	40	12-Mar-15	06-May-15
Start-up	458	01-Apr-14	31-Dec-15
Engineering TFA for Start-up / Commissioning	420	01-Apr-14	13-Nov-15
CT Backfeed Power Available	0		05-Jan-15
HRSG A Hydro	0		24-Feb-15
HRSG B Hydro	0		24-Mar-15
CT Lube Oil Flush	0		30-Apr-15
ST Lube Oil Flush	0		17-Jun-15
First Fire	0		27-Jul-15
Steam Blow & Restoration	42	28-Jul-15	07-Sep-15
CT Tuning Complete / Baseload	0		07-Sep-15
Steam to ST	0		25-Sep-15
ST 100% Load	0		07-Oct-15
Restart for Performance Test	0		29-Oct-15
Performance and Emissions Testing	7	06-Nov-15	12-Nov-15
Substantial Completion	0		16-Nov-15
Commercial Operation	0		31-Dec-15
Guaranteed Commercial Operation	0		31-Dec-15*

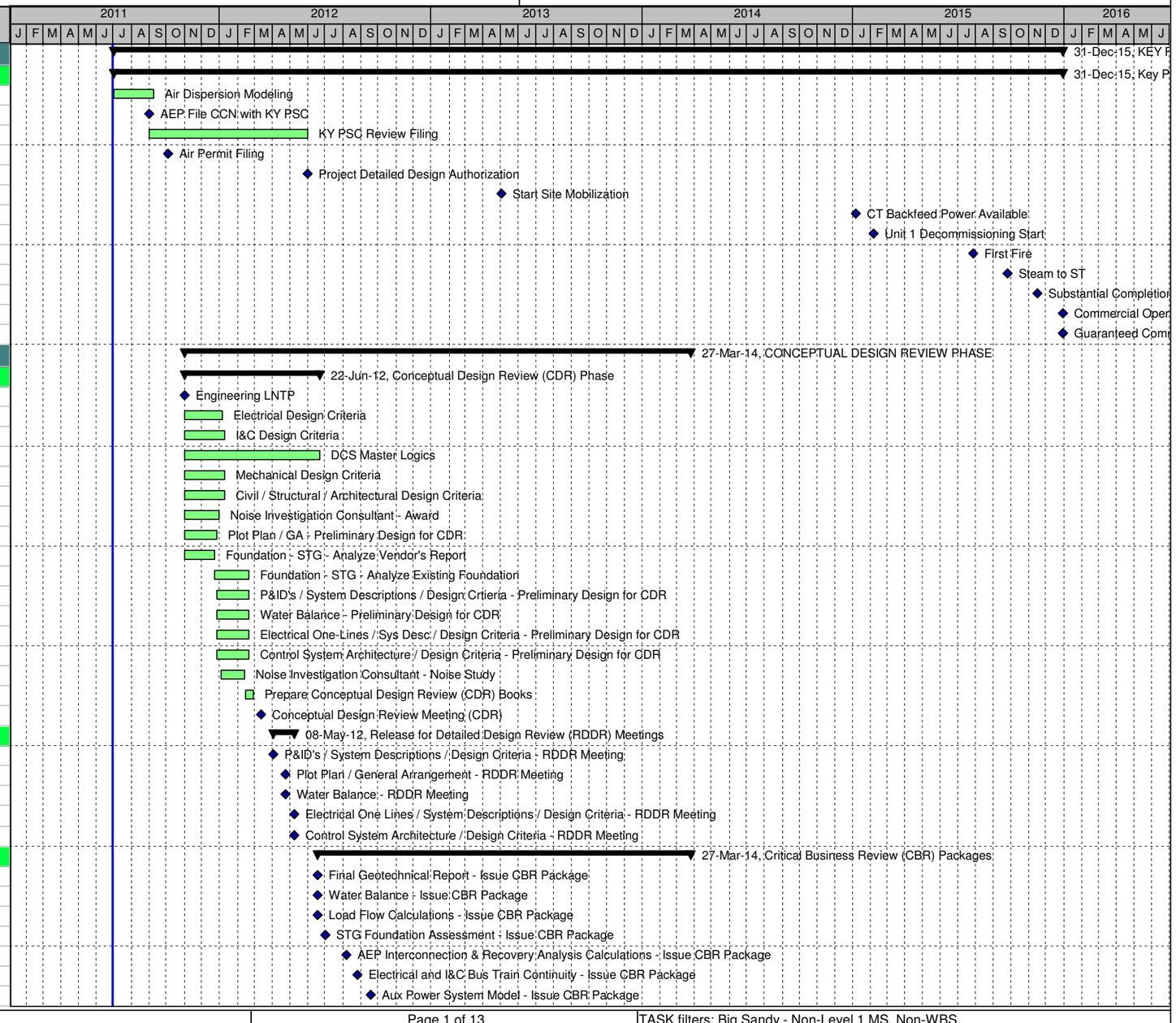


Remaining Level of Effort | Actual Level of Effort | Remaining Work | Milestone

WBS Summary | Actual Work | Critical Remaining Work

TASK filter: Big Sandy - Level 1.

.	Activity ID	Activity Name	Dur	Start	Finish
KEY PROJECT MILESTONES			1175	01-Jul-11	31-Dec-15
Key Project Milestones			1175	01-Jul-11	31-Dec-15
	MS.100	Air Dispersion Modeling	50	01-Jul-11*	08-Sep-11
	MS.010	AEP File CCN with KY PSC	0	02-Sep-11*	
	MS.015	KY PSC Review Filing	195	02-Sep-11	31-May-12
	MS.110	Air Permit Filing	0		03-Oct-11*
	MS.020	Project Detailed Design Authorization	0		01-Jun-12
	MS.190	Start Site Mobilization	0		02-May-13
	MS.195	CT Backfeed Power Available	0		05-Jan-15
	MS.210	Unit 1 Decommissioning Start	0	05-Feb-15	
	MS.200	First Fire	0		27-Jul-15
	MS.220	Steam to ST	0		25-Sep-15
	MS.225	Substantial Completion	0		16-Nov-15
	MS.230	Commercial Operation	0		31-Dec-15
	MS.250	Guaranteed Commercial Operation	0		31-Dec-15*
CONCEPTUAL DESIGN REVIEW PHASE			627	01-Nov-11	27-Mar-14
Conceptual Design Review (CDR) Phase			168	01-Nov-11	22-Jun-12
	SL.0000.00	Engineering LNTP	0		01-Nov-11*
	SL.E3100.00	Electrical Design Criteria	44	02-Nov-11	06-Jan-12
	SL.J5000.00	I&C Design Criteria	45	02-Nov-11	09-Jan-12
	SL.J4000.00	DCS Master Logics	163	02-Nov-11	22-Jun-12
	SL.MM6500.00	Mechanical Design Criteria	45	02-Nov-11	09-Jan-12
	SL.CC0800.00	Civil / Structural / Architectural Design Criteria	45	02-Nov-11	09-Jan-12
	SL.BSCC-12.00	Noise Investigation Consultant - Award	40	02-Nov-11	30-Dec-11
	SL.01.00	Plot Plan / GA - Preliminary Design for CDR	40	02-Nov-11	27-Dec-11
	SL.CK0030.00	Foundation - STG - Analyze Vendor's Report	35	02-Nov-11*	22-Dec-11
	SL.CK0040.00	Foundation - STG - Analyze Existing Foundation	40	23-Dec-11	20-Feb-12
	SL.02.00	P&ID's / System Descriptions / Design Crtieria - Preliminary Design for CDR	40	28-Dec-11	21-Feb-12
	SL.03.00	Water Balance - Preliminary Design for CDR	40	28-Dec-11	21-Feb-12
	SL.04.00	Electrical One-Lines / Sys Desc / Design Criteria - Preliminary Design for CDR	40	28-Dec-11	21-Feb-12
	SL.05.00	Control System Architecture / Design Criteria - Preliminary Design for CDR	40	28-Dec-11	21-Feb-12
	SL.BSCC-12.90	Noise Investigation Consultant - Noise Study	30	03-Jan-12	13-Feb-12
	SL.99.50	Prepare Conceptual Design Review (CDR) Books	10	15-Feb-12	28-Feb-12
	SL.99.80	Conceptual Design Review Meeting (CDR)	0		13-Mar-12
Release for Detailed Design Review (RDDR) Meetings			25	03-Apr-12	08-May-12
	SL.20.02	P&ID's / System Descriptions / Design Criteria - RDDR Meeting	0		03-Apr-12
	SL.20.01	Plot Plan / General Arrangement - RDDR Meeting	0		24-Apr-12
	SL.20.03	Water Balance - RDDR Meeting	0		24-Apr-12
	SL.20.04	Electrical One Lines / System Descriptions / Design Criteria - RDDR Meeting	0		08-May-12
	SL.20.05	Control System Architecture / Design Criteria - RDDR Meeting	0		08-May-12
Critical Business Review (CBR) Packages			463	18-Jun-12	27-Mar-14
	SL.40.05	Final Geotechnical Report - Issue CBR Package	0		18-Jun-12
	SL.40.06	Water Balance - Issue CBR Package	0		18-Jun-12
	SL.40.08	Load Flow Calculations - Issue CBR Package	0		18-Jun-12
	SL.40.03	STG Foundation Assessment - Issue CBR Package	0		02-Jul-12
	SL.40.09	AEP Interconnection & Recovery Analysis Calculations - Issue CBR Package	0		06-Aug-12
	SL.40.10	Electrical and I&C Bus Train Continuity - Issue CBR Package	0		27-Aug-12
	SL.40.11	Aux Power System Model - Issue CBR Package	0		18-Sep-12

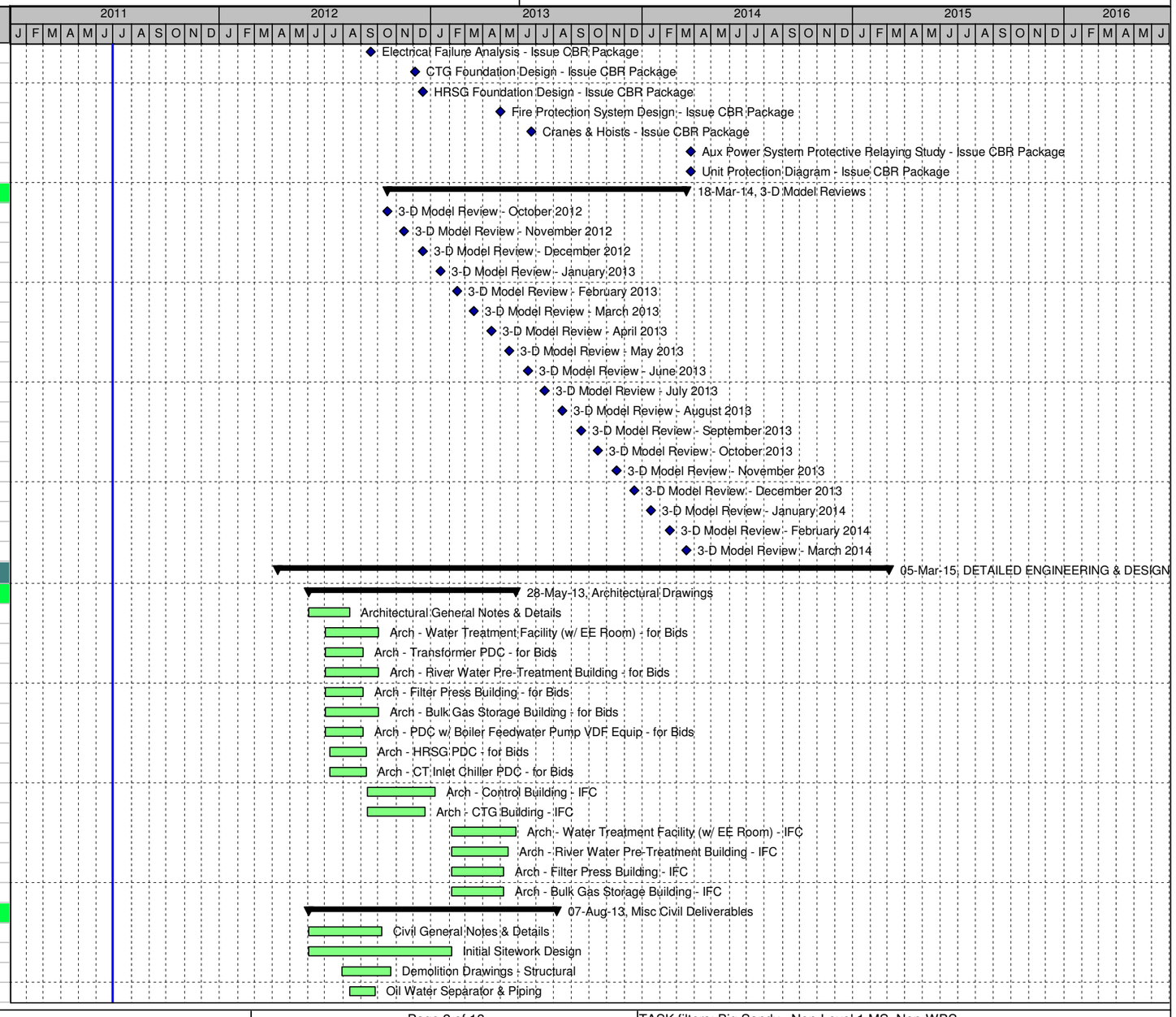


Remaining Level of Effort | Actual Level of Effort | Remaining Work | Milestone

WBS Summary | Actual Work | Critical Remaining Work | Summary

TASK filters: Big Sandy - Non-Level 1 MS, Non-WBS.

Activity ID	Activity Name	Dur	Start	Finish
SL.40.13	Electrical Failure Analysis - Issue CBR Package	0		18-Sep-12
SL.40.01	CTG Foundation Design - Issue CBR Package	0		03-Dec-12
SL.40.02	HRSG Foundation Design - Issue CBR Package	0		17-Dec-12
SL.40.07	Fire Protection System Design - Issue CBR Package	0		01-May-13
SL.40.15	Cranes & Hoists - Issue CBR Package	0		24-Jun-13
SL.40.12	Aux Power System Protective Relaying Study - Issue CBR Package	0		27-Mar-14
SL.40.14	Unit Protection Diagram - Issue CBR Package	0		27-Mar-14
3-D Model Reviews		370	16-Oct-12	18-Mar-14
SL.3D.01	3-D Model Review - October 2012	0		16-Oct-12
SL.3D.02	3-D Model Review - November 2012	0		15-Nov-12
SL.3D.03	3-D Model Review - December 2012	0		17-Dec-12
SL.3D.04	3-D Model Review - January 2013	0		16-Jan-13
SL.3D.05	3-D Model Review - February 2013	0		15-Feb-13
SL.3D.06	3-D Model Review - March 2013	0		15-Mar-13
SL.3D.07	3-D Model Review - April 2013	0		16-Apr-13
SL.3D.08	3-D Model Review - May 2013	0		16-May-13
SL.3D.09	3-D Model Review - June 2013	0		17-Jun-13
SL.3D.10	3-D Model Review - July 2013	0		17-Jul-13
SL.3D.11	3-D Model Review - August 2013	0		16-Aug-13
SL.3D.12	3-D Model Review - September 2013	0		17-Sep-13
SL.3D.13	3-D Model Review - October 2013	0		17-Oct-13
SL.3D.14	3-D Model Review - November 2013	0		18-Nov-13
SL.3D.15	3-D Model Review - December 2013	0		18-Dec-13
SL.3D.16	3-D Model Review - January 2014	0		17-Jan-14
SL.3D.17	3-D Model Review - February 2014	0		18-Feb-14
SL.3D.18	3-D Model Review - March 2014	0		18-Mar-14
DETAILED ENGINEERING & DESIGN		743	11-Apr-12	05-Mar-15
Architectural Drawings		250	04-Jun-12	28-May-13
SL.CA6000.00	Architectural General Notes & Details	50	04-Jun-12	13-Aug-12
SL.CA1200.00	Arch - Water Treatment Facility (w/ EE Room) - for Bids	65	02-Jul-12	02-Oct-12
SL.CA2900.00	Arch - Transformer PDC - for Bids	45	02-Jul-12	04-Sep-12
SL.CA1400.00	Arch - River Water Pre-Treatment Building - for Bids	65	02-Jul-12	02-Oct-12
SL.CA1500.00	Arch - Filter Press Building - for Bids	45	02-Jul-12	04-Sep-12
SL.CA1700.00	Arch - Bulk Gas Storage Building - for Bids	65	02-Jul-12	02-Oct-12
SL.CA2900.0	Arch - PDC w/ Boiler Feedwater Pump VDF Equip - for Bids	45	02-Jul-12	04-Sep-12
SL.CA2900.10	Arch - HRSG PDC - for Bids	45	10-Jul-12	11-Sep-12
SL.CA2900.20	Arch - CT Inlet Chiller PDC - for Bids	45	10-Jul-12	11-Sep-12
SL.CA2300.00	Arch - Control Building - IFC	80	12-Sep-12	08-Jan-13
SL.CA5650.00	Arch - CTG Building - IFC	70	13-Sep-12	21-Dec-12
SL.CA1200.50	Arch - Water Treatment Facility (w/ EE Room) - IFC	80	06-Feb-13	28-May-13
SL.CA1400.50	Arch - River Water Pre-Treatment Building - IFC	70	06-Feb-13	14-May-13
SL.CA1500.50	Arch - Filter Press Building - IFC	65	06-Feb-13	07-May-13
SL.CA1700.50	Arch - Bulk Gas Storage Building - IFC	65	06-Feb-13	07-May-13
Misc Civil Deliverables		300	04-Jun-12	07-Aug-13
SL.CC1000.00	Civil General Notes & Details	89	04-Jun-12	08-Oct-12
SL.CC4000.00	Initial Sitework Design	170	04-Jun-12	05-Feb-13
SL.CC1500.00	Demolition Drawings - Structural	60	31-Jul-12	23-Oct-12
SL.CC5300.00	Oil Water Separator & Piping	30	14-Aug-12	25-Sep-12

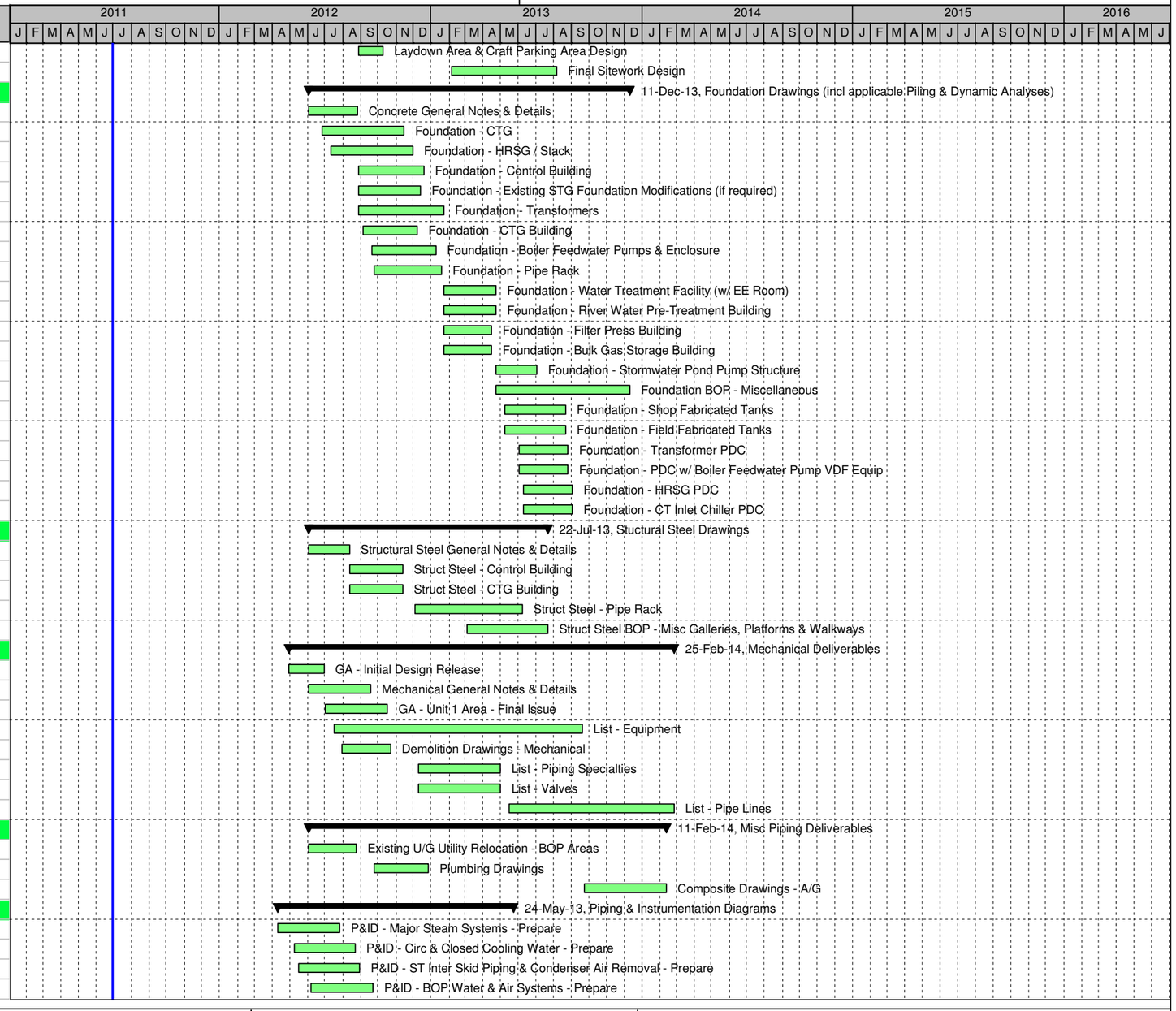


Remaining Level of Effort | Actual Level of Effort | Remaining Work | Milestone

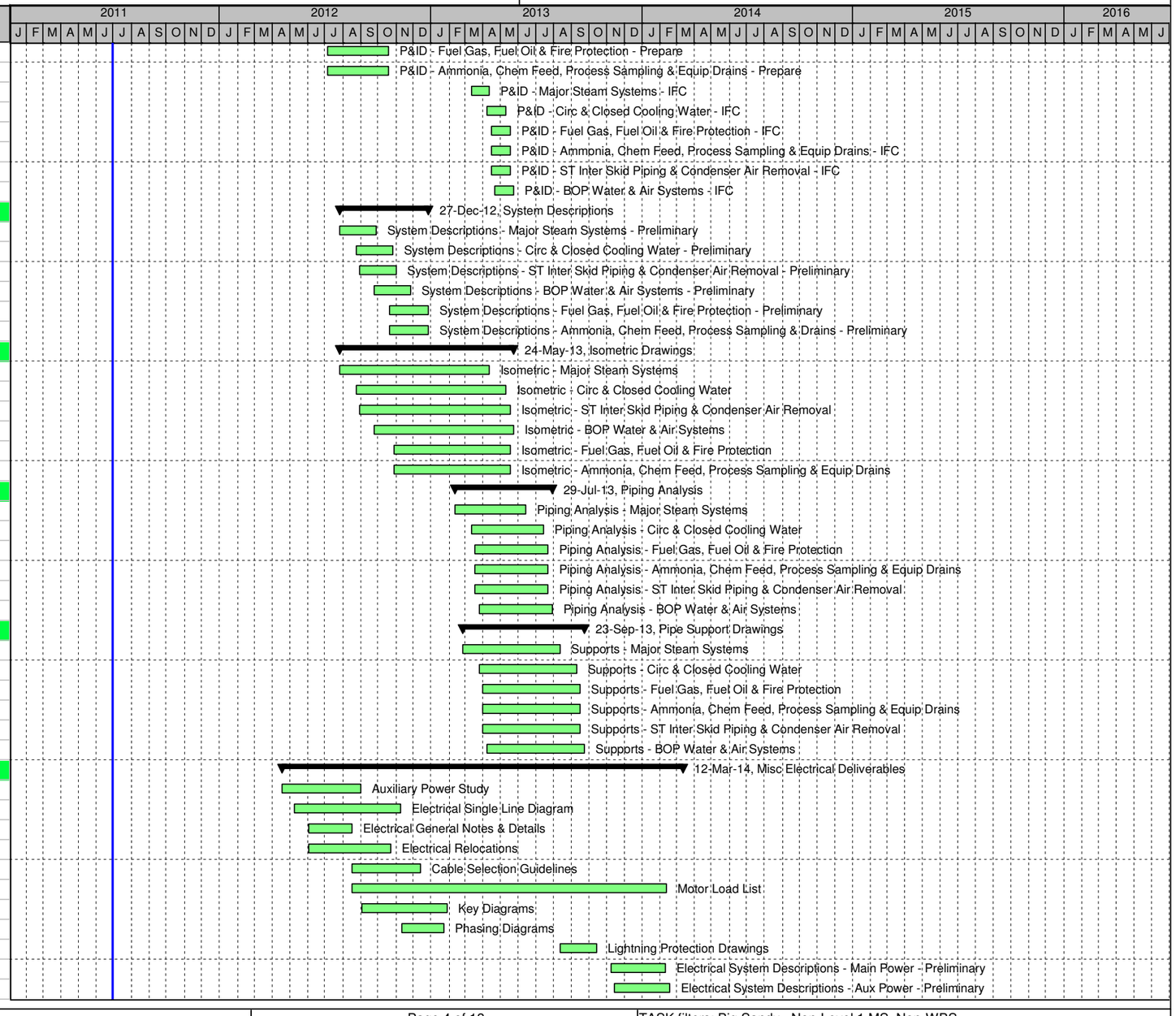
WBS Summary | Actual Work | Critical Remaining Work | Summary

TASK filters: Big Sandy - Non-Level 1 MS, Non-WBS.

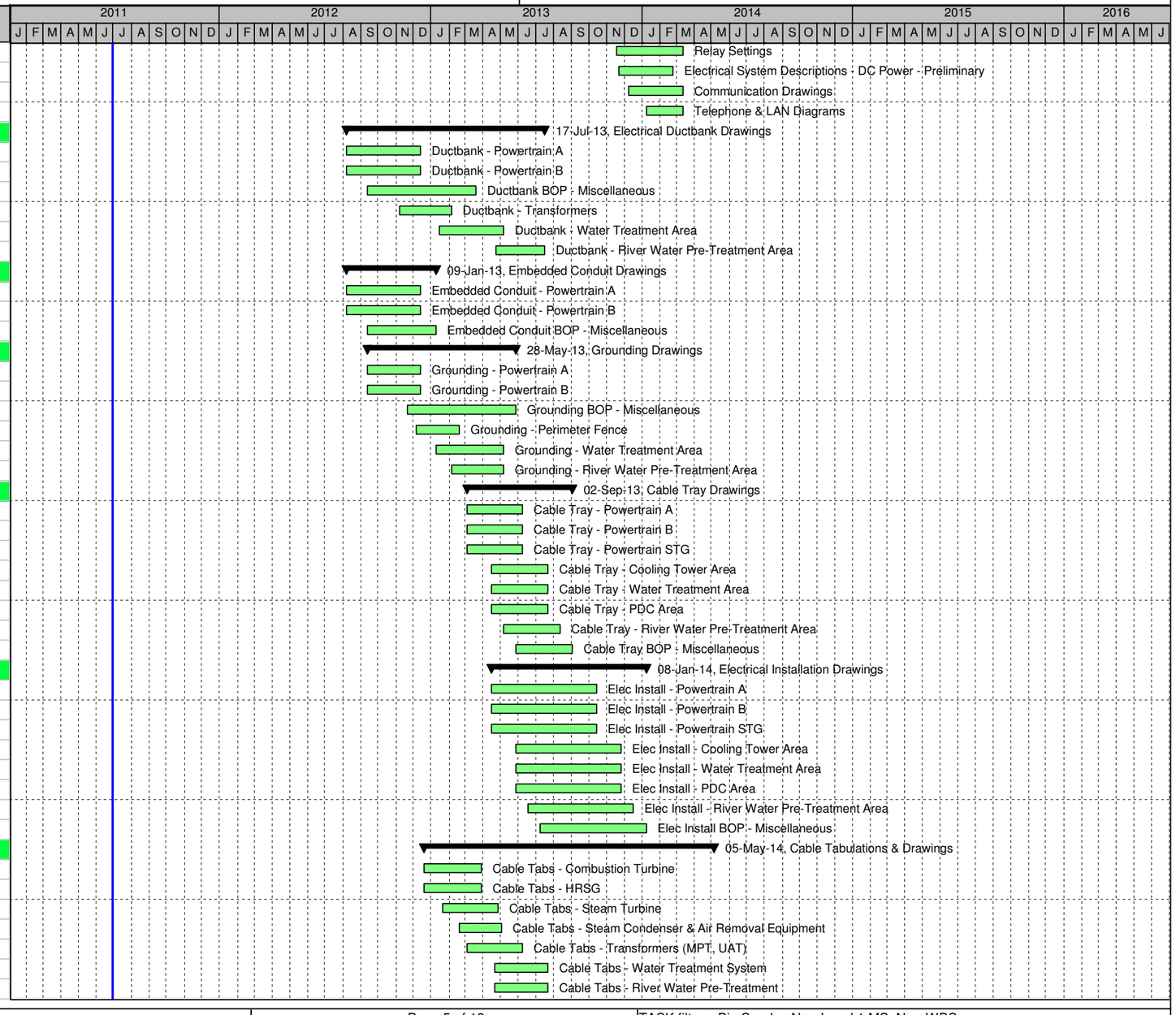
Activity ID	Activity Name	Dur	Start	Finish
SL.CC4400.00	Laydown Area & Craft Parking Area Design	30	28-Aug-12	09-Oct-12
SL.CC3000.00	Final Sitework Design	130	06-Feb-13	07-Aug-13
Foundation Drawings (incl applicable Piling & Dynamic Analyses)		390	04-Jun-12	11-Dec-13
SL.CK1100.00	Concrete General Notes & Details	60	04-Jun-12	27-Aug-12
SL.CK5600.00	Foundation - CTG	100	26-Jun-12	14-Nov-12
SL.CK5900.00	Foundation - HRSG / Stack	100	11-Jul-12	30-Nov-12
SL.CK3100.00	Foundation - Control Building	80	28-Aug-12	20-Dec-12
SL.CK5750.00	Foundation - Existing STG Foundation Modifications (if required)	75	28-Aug-12	13-Dec-12
SL.CK6200.00	Foundation - Transformers	100	29-Aug-12	23-Jan-13
SL.CK5650.00	Foundation - CTG Building	65	06-Sep-12	07-Dec-12
SL.CK6300.00	Foundation - Boiler Feedwater Pumps & Enclosure	75	20-Sep-12	09-Jan-13
SL.CK4700.00	Foundation - Pipe Rack	80	24-Sep-12	18-Jan-13
SL.CK1200.00	Foundation - Water Treatment Facility (w/ EE Room)	65	23-Jan-13	23-Apr-13
SL.CK1400.00	Foundation - River Water Pre-Treatment Building	65	23-Jan-13	23-Apr-13
SL.CK1500.00	Foundation - Filter Press Building	60	23-Jan-13	16-Apr-13
SL.CK1700.00	Foundation - Bulk Gas Storage Building	60	23-Jan-13	16-Apr-13
SL.CK4800.00	Foundation - Stormwater Pond Pump Structure	50	24-Apr-13	02-Jul-13
SL.CK8000.00	Foundation BOP - Miscellaneous	165	24-Apr-13	11-Dec-13
SL.CK4600.00	Foundation - Shop Fabricated Tanks	75	08-May-13	21-Aug-13
SL.CK4300.00	Foundation - Field Fabricated Tanks	75	08-May-13	21-Aug-13
SL.CK4200.00	Foundation - Transformer PDC	60	03-Jun-13	26-Aug-13
SL.CK4500.00	Foundation - PDC w/ Boiler Feedwater Pump VDF Equip	60	03-Jun-13	26-Aug-13
SL.CK5000.00	Foundation - HRSG PDC	60	10-Jun-13	02-Sep-13
SL.CK5200.00	Foundation - CT Inlet Chiller PDC	60	10-Jun-13	02-Sep-13
Stuctural Steel Drawings		288	04-Jun-12	22-Jul-13
SL.CS7000.00	Structural Steel General Notes & Details	50	04-Jun-12	13-Aug-12
SL.CS2300.00	Struct Steel - Control Building	65	14-Aug-12	13-Nov-12
SL.CS5650.00	Struct Steel - CTG Building	65	14-Aug-12	13-Nov-12
SL.CS4900.00	Struct Steel - Pipe Rack	130	05-Dec-12	07-Jun-13
SL.CS5800.00	Struct Steel BOP - Misc Galleries, Platforms & Walkways	100	04-Mar-13	22-Jul-13
Mechanical Deliverables		466	30-Apr-12	25-Feb-14
SL.MM3000.00	GA - Initial Design Release	44	30-Apr-12	29-Jun-12
SL.MM7000.00	Mechanical General Notes & Details	75	04-Jun-12	18-Sep-12
SL.MM3300.00	GA - Unit 1 Area - Final Issue	75	02-Jul-12	16-Oct-12
SL.MM5200.00	List - Equipment	300	18-Jul-12	19-Sep-13
SL.MM1200.00	Demolition Drawings - Mechanical	60	31-Jul-12	23-Oct-12
SL.MM5600.00	List - Piping Specialties	100	10-Dec-12	01-May-13
SL.MM5800.00	List - Valves	100	10-Dec-12	01-May-13
SL.MM5500.00	List - Pipe Lines	200	17-May-13	25-Feb-14
Misc Piping Deliverables		432	04-Jun-12	11-Feb-14
SL.MP0700.00	Existing U/G Utility Relocation - BOP Areas	59	04-Jun-12	24-Aug-12
SL.MP7800.00	Plumbing Drawings	65	24-Sep-12	27-Dec-12
SL.MP0400.00	Composite Drawings - A/G	99	24-Sep-13	11-Feb-14
Piping & Instrumentation Diagrams		285	11-Apr-12	24-May-13
SL.MP6003.00	P&ID - Major Steam Systems - Prepare	75	11-Apr-12	26-Jul-12
SL.MP6004.00	P&ID - Circ & Closed Cooling Water - Prepare	75	09-May-12	23-Aug-12
SL.MP6007.00	P&ID - ST Inter Skid Piping & Condenser Air Removal - Prepare	75	16-May-12	30-Aug-12
SL.MP6030.00	P&ID - BOP Water & Air Systems - Prepare	75	07-Jun-12	21-Sep-12



Activity ID	Activity Name	Dur	Start	Finish
SL.MP6005.00	P&ID - Fuel Gas, Fuel Oil & Fire Protection - Prepare	75	06-Jul-12	19-Oct-12
SL.MP6006.00	P&ID - Ammonia, Chem Feed, Process Sampling & Equip Drains - Prepare	75	06-Jul-12	19-Oct-12
SL.MP6003.50	P&ID - Major Steam Systems - IFC	25	11-Mar-13	12-Apr-13
SL.MP6004.50	P&ID - Circ & Closed Cooling Water - IFC	25	08-Apr-13	10-May-13
SL.MP6005.50	P&ID - Fuel Gas, Fuel Oil & Fire Protection - IFC	25	15-Apr-13	17-May-13
SL.MP6006.50	P&ID - Ammonia, Chem Feed, Process Sampling & Equip Drains - IFC	25	15-Apr-13	17-May-13
SL.MP6007.50	P&ID - ST Inter Skid Piping & Condenser Air Removal - IFC	25	15-Apr-13	17-May-13
SL.MP6030.50	P&ID - BOP Water & Air Systems - IFC	25	22-Apr-13	24-May-13
System Descriptions		105	27-Jul-12	27-Dec-12
SL.MP9003.00	System Descriptions - Major Steam Systems - Preliminary	45	27-Jul-12	28-Sep-12
SL.MP9004.00	System Descriptions - Circ & Closed Cooling Water - Preliminary	45	24-Aug-12	26-Oct-12
SL.MP9007.00	System Descriptions - ST Inter Skid Piping & Condenser Air Removal - Prelimi...	45	31-Aug-12	02-Nov-12
SL.MP9030.00	System Descriptions - BOP Water & Air Systems - Preliminary	45	24-Sep-12	27-Nov-12
SL.MP9005.00	System Descriptions - Fuel Gas, Fuel Oil & Fire Protection - Preliminary	45	22-Oct-12	27-Dec-12
SL.MP9006.00	System Descriptions - Ammonia, Chem Feed, Process Sampling & Drains - Pr...	45	22-Oct-12	27-Dec-12
Isometric Drawings		210	27-Jul-12	24-May-13
SL.MP1003.00	Isometric - Major Steam Systems	180	27-Jul-12	12-Apr-13
SL.MP1004.00	Isometric - Circ & Closed Cooling Water	180	24-Aug-12	10-May-13
SL.MP1007.00	Isometric - ST Inter Skid Piping & Condenser Air Removal	180	31-Aug-12	17-May-13
SL.MP1030.00	Isometric - BOP Water & Air Systems	170	24-Sep-12	24-May-13
SL.MP1005.00	Isometric - Fuel Gas, Fuel Oil & Fire Protection	140	29-Oct-12	17-May-13
SL.MP1006.00	Isometric - Ammonia, Chem Feed, Process Sampling & Equip Drains	140	29-Oct-12	17-May-13
Piping Analysis		120	11-Feb-13	29-Jul-13
SL.MP7003.00	Piping Analysis - Major Steam Systems	90	11-Feb-13	14-Jun-13
SL.MP7004.00	Piping Analysis - Circ & Closed Cooling Water	90	11-Mar-13	15-Jul-13
SL.MP7005.00	Piping Analysis - Fuel Gas, Fuel Oil & Fire Protection	90	18-Mar-13	22-Jul-13
SL.MP7006.00	Piping Analysis - Ammonia, Chem Feed, Process Sampling & Equip Drains	90	18-Mar-13	22-Jul-13
SL.MP7007.00	Piping Analysis - ST Inter Skid Piping & Condenser Air Removal	90	18-Mar-13	22-Jul-13
SL.MP7030.00	Piping Analysis - BOP Water & Air Systems	90	25-Mar-13	29-Jul-13
Pipe Support Drawings		150	25-Feb-13	23-Sep-13
SL.MP8003.00	Supports - Major Steam Systems	120	25-Feb-13	12-Aug-13
SL.MP8004.00	Supports - Circ & Closed Cooling Water	120	25-Mar-13	09-Sep-13
SL.MP8005.00	Supports - Fuel Gas, Fuel Oil & Fire Protection	120	01-Apr-13	16-Sep-13
SL.MP8006.00	Supports - Ammonia, Chem Feed, Process Sampling & Equip Drains	120	01-Apr-13	16-Sep-13
SL.MP8007.00	Supports - ST Inter Skid Piping & Condenser Air Removal	120	01-Apr-13	16-Sep-13
SL.MP8030.00	Supports - BOP Water & Air Systems	120	08-Apr-13	23-Sep-13
Misc Electrical Deliverables		484	19-Apr-12	12-Mar-14
SL.E0200.00	Auxiliary Power Study	95	19-Apr-12	31-Aug-12
SL.E3700.00	Electrical Single Line Diagram	130	09-May-12	09-Nov-12
SL.E3200.00	Electrical General Notes & Details	53	04-Jun-12	16-Aug-12
SL.E3600.00	Electrical Relocations	100	04-Jun-12	23-Oct-12
SL.E0400.00	Cable Selection Guidelines	82	17-Aug-12	13-Dec-12
SL.E7800.00	Motor Load List	380	17-Aug-12	12-Feb-14
SL.E5600.00	Key Diagrams	100	04-Sep-12	28-Jan-13
SL.E8200.00	Phasing Diagrams	48	12-Nov-12	23-Jan-13
SL.E6700.00	Lightning Protection Drawings	45	13-Aug-13	14-Oct-13
SL.E3820.00	Electrical System Descriptions - Main Power - Preliminary	65	08-Nov-13	10-Feb-14
SL.E3840.00	Electrical System Descriptions - Aux Power - Preliminary	65	15-Nov-13	17-Feb-14



Activity ID	Activity Name	Dur	Start	Finish
SL.E8600.00	Relay Settings	81	18-Nov-13	12-Mar-14
SL.E3860.00	Electrical System Descriptions - DC Power - Preliminary	65	22-Nov-13	24-Feb-14
SL.E1300.00	Communication Drawings	65	10-Dec-13	12-Mar-14
SL.E8800.00	Telephone & LAN Diagrams	45	09-Jan-14	12-Mar-14
Electrical Ductbank Drawings		239	08-Aug-12	17-Jul-13
SL.E2040.00	Ductbank - Powertrain A	90	08-Aug-12	14-Dec-12
SL.E2060.00	Ductbank - Powertrain B	90	08-Aug-12	14-Dec-12
SL.E2090.00	Ductbank BOP - Miscellaneous	130	13-Sep-12	20-Mar-13
SL.E2020.00	Ductbank - Transformers	60	08-Nov-12	06-Feb-13
SL.E2030.00	Ductbank - Water Treatment Area	80	16-Jan-13	07-May-13
SL.E2050.00	Ductbank - River Water Pre-Treatment Area	60	24-Apr-13	17-Jul-13
Embedded Conduit Drawings		105	08-Aug-12	09-Jan-13
SL.E4040.00	Embedded Conduit - Powertrain A	90	08-Aug-12	14-Dec-12
SL.E4060.00	Embedded Conduit - Powertrain B	90	08-Aug-12	14-Dec-12
SL.E4090.00	Embedded Conduit BOP - Miscellaneous	80	13-Sep-12	09-Jan-13
Grounding Drawings		179	13-Sep-12	28-May-13
SL.E5040.00	Grounding - Powertrain A	65	13-Sep-12	14-Dec-12
SL.E5060.00	Grounding - Powertrain B	65	13-Sep-12	14-Dec-12
SL.E5090.00	Grounding BOP - Miscellaneous	130	21-Nov-12	28-May-13
SL.E5050.0	Grounding - Perimeter Fence	50	07-Dec-12	19-Feb-13
SL.E5030.00	Grounding - Water Treatment Area	85	09-Jan-13	07-May-13
SL.E5050.00	Grounding - River Water Pre-Treatment Area	65	06-Feb-13	07-May-13
Cable Tray Drawings		130	04-Mar-13	02-Sep-13
SL.E1040.00	Cable Tray - Powertrain A	70	04-Mar-13	07-Jun-13
SL.E1060.00	Cable Tray - Powertrain B	70	04-Mar-13	07-Jun-13
SL.E1070.00	Cable Tray - Powertrain STG	70	04-Mar-13	07-Jun-13
SL.E1030.00	Cable Tray - Cooling Tower Area	70	15-Apr-13	22-Jul-13
SL.E1035.00	Cable Tray - Water Treatment Area	70	15-Apr-13	22-Jul-13
SL.E1080.00	Cable Tray - PDC Area	70	15-Apr-13	22-Jul-13
SL.E1050.00	Cable Tray - River Water Pre-Treatment Area	70	06-May-13	12-Aug-13
SL.E1090.00	Cable Tray BOP - Miscellaneous	70	27-May-13	02-Sep-13
Electrical Installation Drawings		190	15-Apr-13	08-Jan-14
SL.E3040.00	Elec Install - Powertrain A	130	15-Apr-13	14-Oct-13
SL.E3060.00	Elec Install - Powertrain B	130	15-Apr-13	14-Oct-13
SL.E3070.00	Elec Install - Powertrain STG	130	15-Apr-13	14-Oct-13
SL.E3030.00	Elec Install - Cooling Tower Area	130	27-May-13	25-Nov-13
SL.E3035.00	Elec Install - Water Treatment Area	130	27-May-13	25-Nov-13
SL.E3080.00	Elec Install - PDC Area	130	27-May-13	25-Nov-13
SL.E3050.00	Elec Install - River Water Pre-Treatment Area	130	17-Jun-13	16-Dec-13
SL.E3090.00	Elec Install BOP - Miscellaneous	130	09-Jul-13	08-Jan-14
Cable Tabulations & Drawings		353	19-Dec-12	05-May-14
SL.E0-6814.00	Cable Tabs - Combustion Turbine	70	19-Dec-12	29-Mar-13
SL.E0-6815.00	Cable Tabs - HRSG	70	19-Dec-12	29-Mar-13
SL.E0-6822.00	Cable Tabs - Steam Turbine	70	21-Jan-13	26-Apr-13
SL.E0-6860.00	Cable Tabs - Steam Condenser & Air Removal Equipment	55	18-Feb-13	03-May-13
SL.E0-6872.00	Cable Tabs - Transformers (MPT, UAT)	70	04-Mar-13	07-Jun-13
SL.E0-6850.00	Cable Tabs - Water Treatment System	65	22-Apr-13	22-Jul-13
SL.E0-6851.00	Cable Tabs - River Water Pre-Treatment	65	22-Apr-13	22-Jul-13



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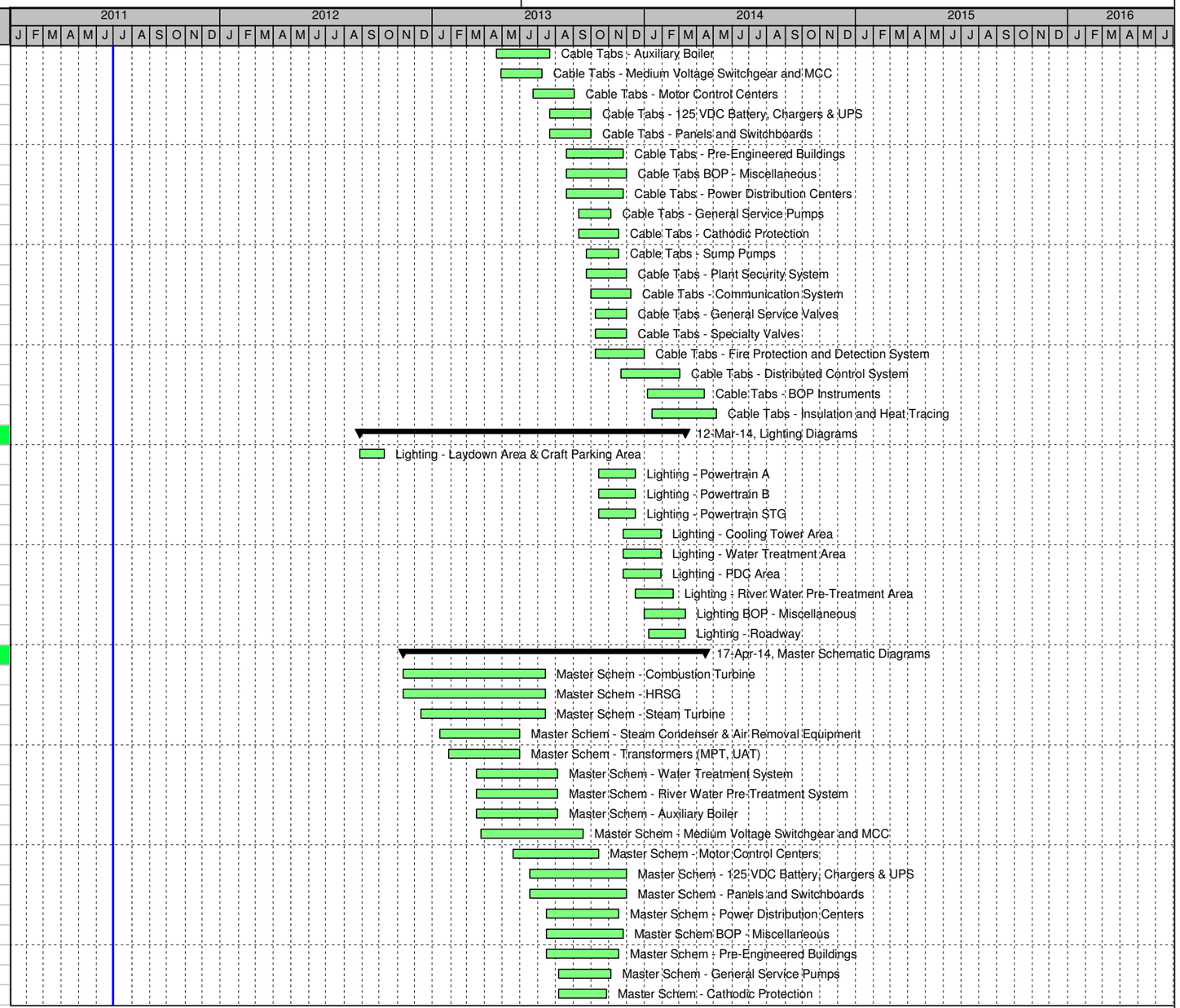
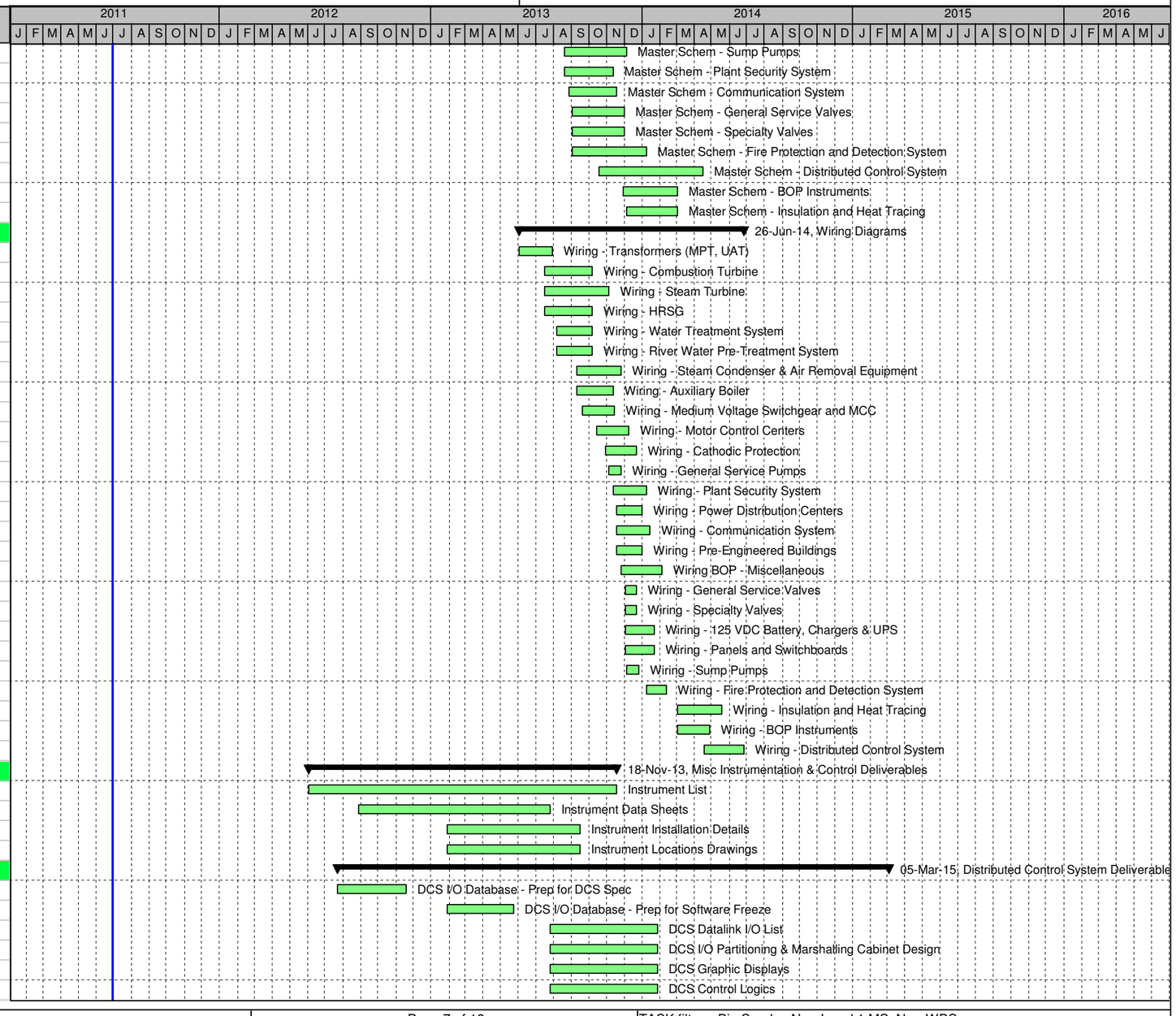
TASK filters: Big Sandy - Non-Level 1 MS, Non-WBS.

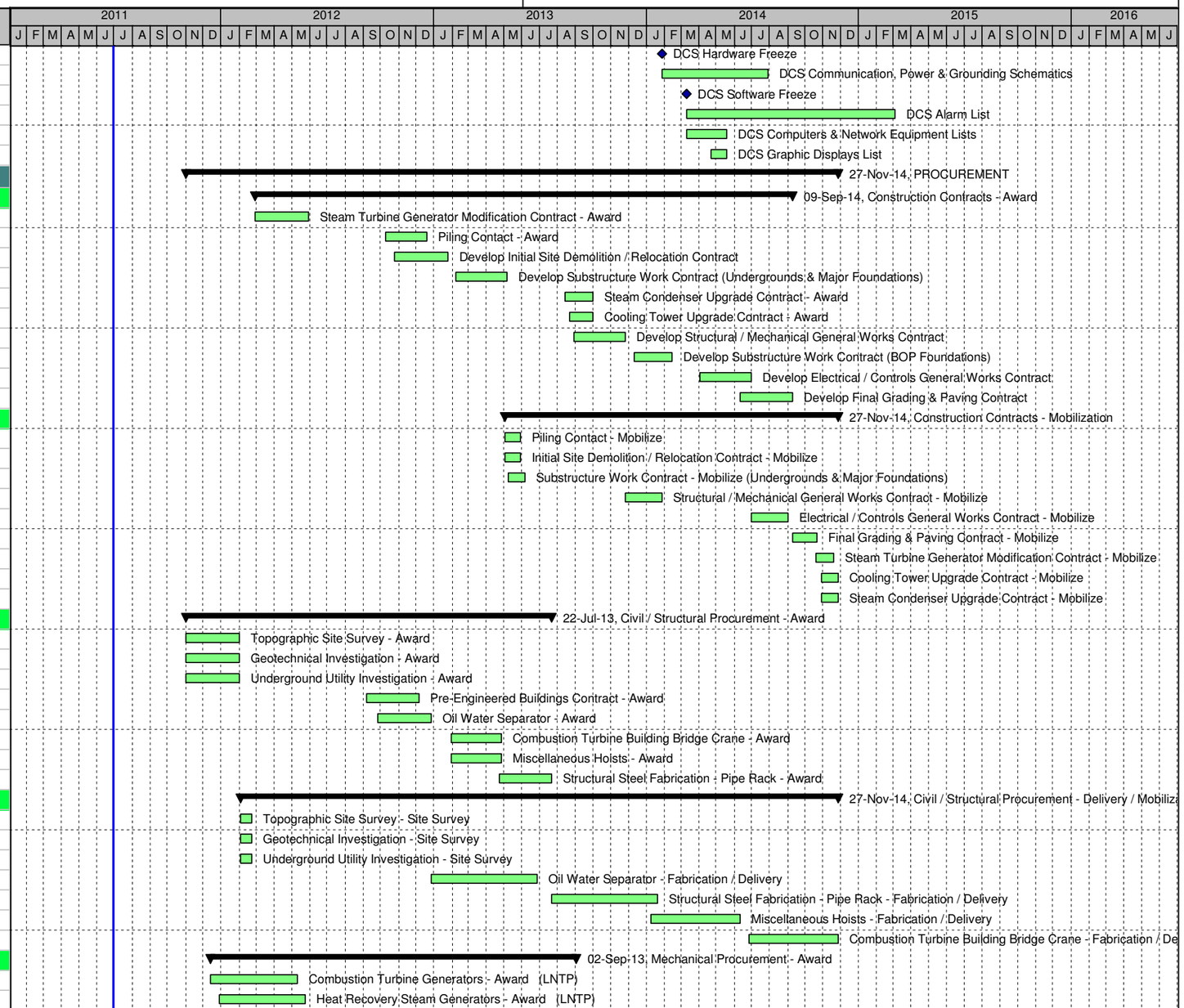
Activity ID	Activity Name	Dur	Start	Finish
SL.E0-6875.00	Cable Tabs - Auxiliary Boiler	65	22-Apr-13	22-Jul-13
SL.E0-6862.00	Cable Tabs - Medium Voltage Switchgear and MCC	50	29-Apr-13	08-Jul-13
SL.E0-6864.00	Cable Tabs - Motor Control Centers	50	24-Jun-13	02-Sep-13
SL.E0-6866.00	Cable Tabs - 125 VDC Battery, Chargers & UPS	50	23-Jul-13	30-Sep-13
SL.E0-6867.00	Cable Tabs - Panels and Switchboards	50	23-Jul-13	30-Sep-13
SL.E0-6811.00	Cable Tabs - Pre-Engineered Buildings	70	20-Aug-13	25-Nov-13
SL.E0-6999.00	Cable Tabs BOP - Miscellaneous	75	20-Aug-13	02-Dec-13
SL.E0-6810.00	Cable Tabs - Power Distribution Centers	70	20-Aug-13	25-Nov-13
SL.E0-6826.00	Cable Tabs - General Service Pumps	40	10-Sep-13	04-Nov-13
SL.E0-6882.00	Cable Tabs - Cathodic Protection	50	10-Sep-13	18-Nov-13
SL.E0-6827.00	Cable Tabs - Sump Pumps	40	24-Sep-13	18-Nov-13
SL.E0-6869.00	Cable Tabs - Plant Security System	50	24-Sep-13	02-Dec-13
SL.E0-6870.00	Cable Tabs - Communication System	50	01-Oct-13	09-Dec-13
SL.E0-6830.00	Cable Tabs - General Service Valves	40	08-Oct-13	02-Dec-13
SL.E0-6831.00	Cable Tabs - Specialty Valves	40	08-Oct-13	02-Dec-13
SL.E0-6838.00	Cable Tabs - Fire Protection and Detection System	60	08-Oct-13	31-Dec-13
SL.E0-6890.00	Cable Tabs - Distributed Control System	70	22-Nov-13	03-Mar-14
SL.E0-6891.00	Cable Tabs - BOP Instruments	70	07-Jan-14	14-Apr-14
SL.E0-6837.00	Cable Tabs - Insulation and Heat Tracing	80	14-Jan-14	05-May-14
Lighting Diagrams		393	28-Aug-12	12-Mar-14
SL.E6010.0	Lighting - Laydown Area & Craft Parking Area	30	28-Aug-12	09-Oct-12
SL.E6040.00	Lighting - Powertrain A	45	15-Oct-13	16-Dec-13
SL.E6060.00	Lighting - Powertrain B	45	15-Oct-13	16-Dec-13
SL.E6070.00	Lighting - Powertrain STG	45	15-Oct-13	16-Dec-13
SL.E6030.00	Lighting - Cooling Tower Area	45	26-Nov-13	29-Jan-14
SL.E6035.00	Lighting - Water Treatment Area	45	26-Nov-13	29-Jan-14
SL.E6080.00	Lighting - PDC Area	45	26-Nov-13	29-Jan-14
SL.E6050.00	Lighting - River Water Pre-Treatment Area	45	17-Dec-13	19-Feb-14
SL.E6090.00	Lighting BOP - Miscellaneous	50	02-Jan-14	12-Mar-14
SL.E6010.00	Lighting - Roadway	45	09-Jan-14	12-Mar-14
Master Schematic Diagrams		366	12-Nov-12	17-Apr-14
SL.E7-6814.00	Master Schem - Combustion Turbine	170	12-Nov-12	15-Jul-13
SL.E7-6815.00	Master Schem - HRSG	170	12-Nov-12	15-Jul-13
SL.E7-6822.00	Master Schem - Steam Turbine	150	12-Dec-12	15-Jul-13
SL.E7-6860.00	Master Schem - Steam Condenser & Air Removal Equipment	100	14-Jan-13	31-May-13
SL.E7-6872.00	Master Schem - Transformers (MPT, UAT)	90	28-Jan-13	31-May-13
SL.E7-6850.00	Master Schem - Water Treatment System	100	18-Mar-13	05-Aug-13
SL.E7-6851.00	Master Schem - River Water Pre-Treatment System	100	18-Mar-13	05-Aug-13
SL.E7-6875.00	Master Schem - Auxiliary Boiler	100	18-Mar-13	05-Aug-13
SL.E7-6862.00	Master Schem - Medium Voltage Switchgear and MCC	127	25-Mar-13	18-Sep-13
SL.E7-6864.00	Master Schem - Motor Control Centers	105	20-May-13	14-Oct-13
SL.E7-6866.00	Master Schem - 125 VDC Battery, Chargers & UPS	120	17-Jun-13	02-Dec-13
SL.E7-6867.00	Master Schem - Panels and Switchboards	120	17-Jun-13	02-Dec-13
SL.E7-6810.00	Master Schem - Power Distribution Centers	90	16-Jul-13	18-Nov-13
SL.E7-6999.00	Master Schem BOP - Miscellaneous	95	16-Jul-13	25-Nov-13
SL.E7-6811.00	Master Schem - Pre-Engineered Buildings	90	16-Jul-13	18-Nov-13
SL.E7-6826.00	Master Schem - General Service Pumps	65	06-Aug-13	04-Nov-13
SL.E7-6882.00	Master Schem - Cathodic Protection	60	06-Aug-13	28-Oct-13



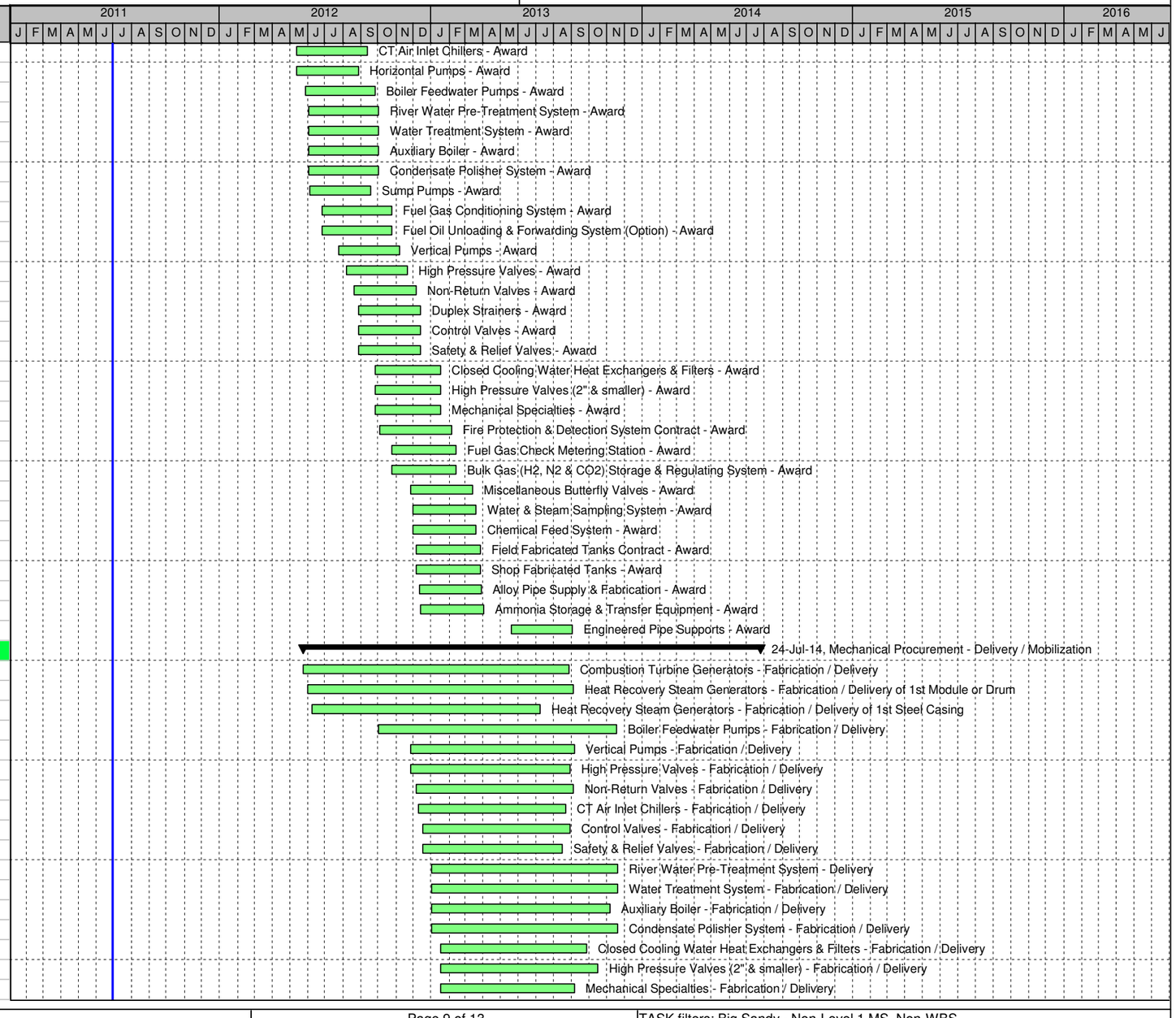
Activity ID	Activity Name	Dur	Start	Finish
SL.E7-6827.00	Master Schem - Sump Pumps	77	20-Aug-13	04-Dec-13
SL.E7-6869.00	Master Schem - Plant Security System	60	20-Aug-13	11-Nov-13
SL.E7-6870.00	Master Schem - Communication System	60	27-Aug-13	18-Nov-13
SL.E7-6830.00	Master Schem - General Service Valves	65	03-Sep-13	02-Dec-13
SL.E7-6831.00	Master Schem - Specialty Valves	65	03-Sep-13	02-Dec-13
SL.E7-6838.00	Master Schem - Fire Protection and Detection System	90	03-Sep-13	08-Jan-14
SL.E7-6890.00	Master Schem - Distributed Control System	128	18-Oct-13	17-Apr-14
SL.E7-6891.00	Master Schem - BOP Instruments	65	29-Nov-13	03-Mar-14
SL.E7-6837.00	Master Schem - Insulation and Heat Tracing	60	06-Dec-13	03-Mar-14
Wiring Diagrams		276	03-Jun-13	26-Jun-14
SL.E9-6872.00	Wiring - Transformers (MPT, UAT)	40	03-Jun-13	29-Jul-13
SL.E9-6814.00	Wiring - Combustion Turbine	60	16-Jul-13	07-Oct-13
SL.E9-6822.00	Wiring - Steam Turbine	80	16-Jul-13	04-Nov-13
SL.E9-6815.00	Wiring - HRSG	60	16-Jul-13	07-Oct-13
SL.E9-6850.00	Wiring - Water Treatment System	45	06-Aug-13	07-Oct-13
SL.E9-6851.00	Wiring - River Water Pre-Treatment System	45	06-Aug-13	07-Oct-13
SL.E9-6860.00	Wiring - Steam Condenser & Air Removal Equipment	55	10-Sep-13	25-Nov-13
SL.E9-6875.00	Wiring - Auxiliary Boiler	45	10-Sep-13	11-Nov-13
SL.E9-6862.00	Wiring - Medium Voltage Switchgear and MCC	40	19-Sep-13	13-Nov-13
SL.E9-6864.00	Wiring - Motor Control Centers	40	15-Oct-13	09-Dec-13
SL.E9-6882.00	Wiring - Cathodic Protection	40	29-Oct-13	23-Dec-13
SL.E9-6826.00	Wiring - General Service Pumps	15	05-Nov-13	25-Nov-13
SL.E9-6869.00	Wiring - Plant Security System	40	12-Nov-13	08-Jan-14
SL.E9-6810.00	Wiring - Power Distribution Centers	30	19-Nov-13	31-Dec-13
SL.E9-6870.00	Wiring - Communication System	40	19-Nov-13	15-Jan-14
SL.E9-6811.00	Wiring - Pre-Engineered Buildings	30	19-Nov-13	31-Dec-13
SL.E9-6999.00	Wiring BOP - Miscellaneous	50	26-Nov-13	05-Feb-14
SL.E9-6830.00	Wiring - General Service Valves	15	03-Dec-13	23-Dec-13
SL.E9-6831.00	Wiring - Specialty Valves	15	03-Dec-13	23-Dec-13
SL.E9-6866.00	Wiring - 125 VDC Battery, Chargers & UPS	35	03-Dec-13	22-Jan-14
SL.E9-6867.00	Wiring - Panels and Switchboards	35	03-Dec-13	22-Jan-14
SL.E9-6827.00	Wiring - Sump Pumps	15	05-Dec-13	26-Dec-13
SL.E9-6838.00	Wiring - Fire Protection and Detection System	25	09-Jan-14	12-Feb-14
SL.E9-6837.00	Wiring - Insulation and Heat Tracing	55	04-Mar-14	19-May-14
SL.E9-6891.00	Wiring - BOP Instruments	40	04-Mar-14	28-Apr-14
SL.E9-6890.00	Wiring - Distributed Control System	50	18-Apr-14	26-Jun-14
Misc Instrumentation & Control Deliverables		373	04-Jun-12	18-Nov-13
SL.J6300.00	Instrument List	373	04-Jun-12	18-Nov-13
SL.J6100.00	Instrument Data Sheets	230	29-Aug-12	25-Jul-13
SL.J6200.00	Instrument Installation Details	165	28-Jan-13	16-Sep-13
SL.J6400.00	Instrument Locations Drawings	165	28-Jan-13	16-Sep-13
Distributed Control System Deliverables		672	23-Jul-12	05-Mar-15
SL.J3700.00	DCS I/O Database - Prep for DCS Spec	85	23-Jul-12	19-Nov-12
SL.J3750.00	DCS I/O Database - Prep for Software Freeze	85	28-Jan-13	24-May-13
SL.J2500.00	DCS Datalink I/O List	130	26-Jul-13	27-Jan-14
SL.J3800.00	DCS I/O Partitioning & Marshalling Cabinet Design	130	26-Jul-13	27-Jan-14
SL.J3100.00	DCS Graphic Displays	130	26-Jul-13	27-Jan-14
SL.J2400.00	DCS Control Logics	130	26-Jul-13	27-Jan-14



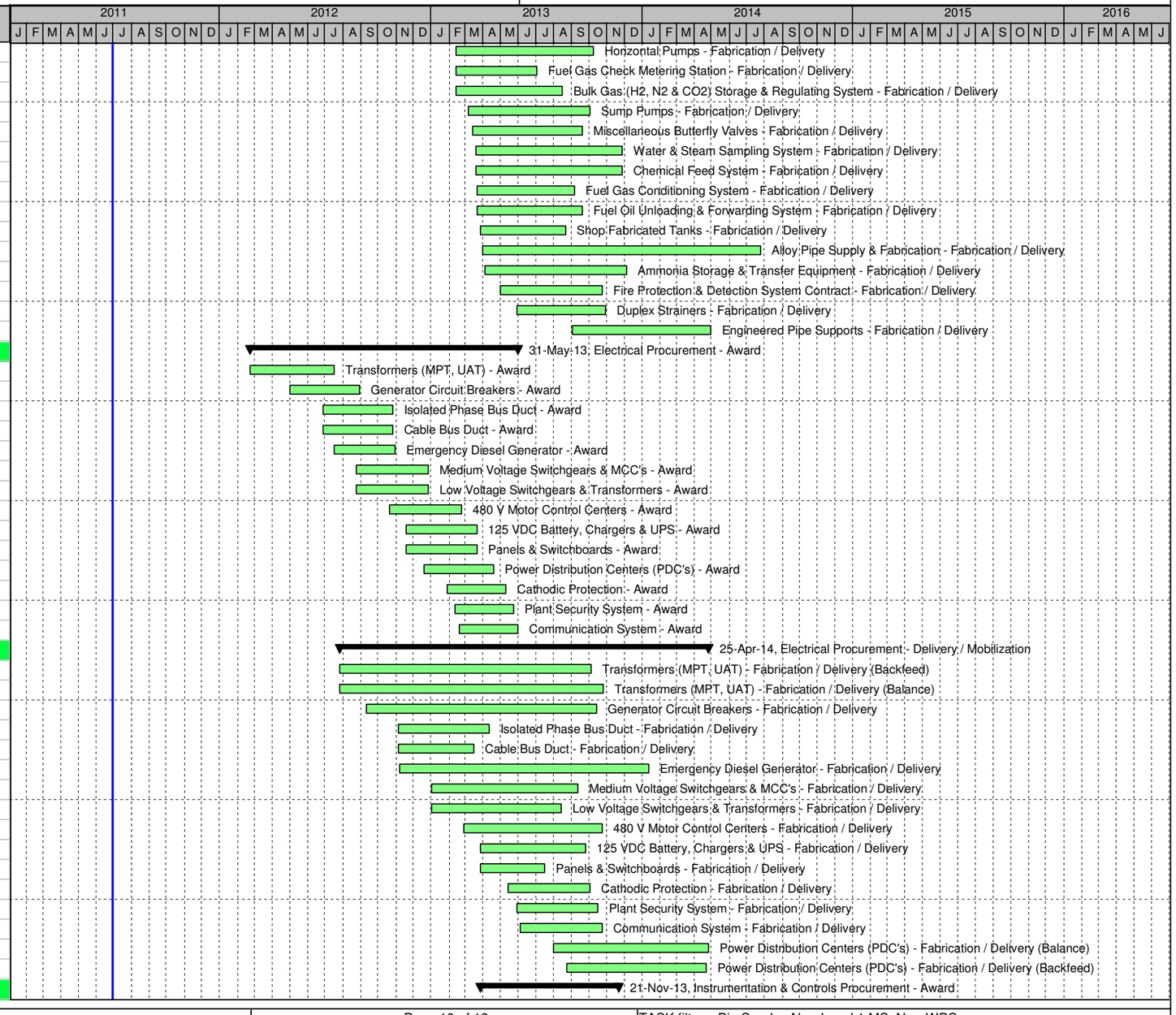
Activity ID	Activity Name	Dur	Start	Finish
SL.J3000.00	DCS Hardware Freeze	0		27-Jan-14
SL.J2200.00	DCS Communication, Power & Grounding Schematics	130	28-Jan-14	29-Jul-14
SL.J2900.00	DCS Software Freeze	0		10-Mar-14
SL.J2000.00	DCS Alarm List	255	11-Mar-14	05-Mar-15
SL.J2300.00	DCS Computers & Network Equipment Lists	50	11-Mar-14	19-May-14
SL.J3200.00	DCS Graphic Displays List	20	22-Apr-14	19-May-14
PROCUREMENT		802	02-Nov-11	27-Nov-14
Construction Contracts - Award		648	29-Feb-12	09-Sep-14
SL.BSCC-3.00	Steam Turbine Generator Modification Contract - Award	65	29-Feb-12	30-May-12*
SL.BSCC-51.00	Piling Contact - Award	50	09-Oct-12	19-Dec-12
SL.BSCC-49.00	Develop Initial Site Demolition / Relocation Contract	63	24-Oct-12	25-Jan-13
SL.BSCC-58.00	Develop Substructure Work Contract (Undergrounds & Major Foundations)	63	08-Feb-13	07-May-13
SL.BSCC-5.00	Steam Condenser Upgrade Contract - Award	35	14-Aug-13	01-Oct-13*
SL.BSCC-4.00	Cooling Tower Upgrade Contract - Award	30	21-Aug-13	01-Oct-13*
SL.BSCC-45.00	Develop Structural / Mechanical General Works Contract	63	29-Aug-13	25-Nov-13
SL.BSCC-58.02	Develop Substructure Work Contract (BOP Foundations)	45	12-Dec-13	14-Feb-14
SL.BSCC-74.00	Develop Electrical / Controls General Works Contract	63	03-Apr-14	30-Jun-14
SL.BSCC-59.00	Develop Final Grading & Paving Contract	63	12-Jun-14	09-Sep-14
Construction Contracts - Mobilization		411	02-May-13	27-Nov-14
SL.BSCC-51.90	Piling Contact - Mobilize	20	02-May-13	29-May-13
SL.BSCC-57.90	Initial Site Demolition / Relocation Contract - Mobilize	20	02-May-13	29-May-13
SL.BSCC-58.90	Substructure Work Contract - Mobilize (Undergrounds & Major Foundations)	22	08-May-13	06-Jun-13
SL.BSCC-45.90	Structural / Mechanical General Works Contract - Mobilize	45	26-Nov-13	27-Jan-14
SL.BSCC-74.90	Electrical / Controls General Works Contract - Mobilize	45	01-Jul-14	01-Sep-14
SL.BSCC-59.90	Final Grading & Paving Contract - Mobilize	30	10-Sep-14	21-Oct-14
SL.BSCC-3.90	Steam Turbine Generator Modification Contract - Mobilize	22	20-Oct-14	18-Nov-14
SL.BSCC-4.90	Cooling Tower Upgrade Contract - Mobilize	22	29-Oct-14	27-Nov-14
SL.BSCC-5.90	Steam Condenser Upgrade Contract - Mobilize	22	29-Oct-14	27-Nov-14
Civil / Structural Procurement - Award		436	02-Nov-11	22-Jul-13
SL.BSCC-46.00	Topographic Site Survey - Award	63	02-Nov-11	02-Feb-12
SL.BSCC-47.00	Geotechnical Investigation - Award	63	02-Nov-11	02-Feb-12
SL.BSCC-48.00	Underground Utility Investigation - Award	63	02-Nov-11	02-Feb-12
SL.BSCC-56.00	Pre-Engineered Buildings Contract - Award	63	07-Sep-12	06-Dec-12
SL.BSCC-52.00	Oil Water Separator - Award	63	26-Sep-12	27-Dec-12
SL.BSCC-54.00	Combustion Turbine Building Bridge Crane - Award	63	30-Jan-13	26-Apr-13
SL.BSCC-55.00	Miscellaneous Hoists - Award	63	30-Jan-13	26-Apr-13
SL.BSCC-50.00	Structural Steel Fabrication - Pipe Rack - Award	63	24-Apr-13	22-Jul-13
Civil / Structural Procurement - Delivery / Mobilization		735	03-Feb-12	27-Nov-14
SL.BSCC-46.90	Topographic Site Survey - Site Survey	15	03-Feb-12	23-Feb-12
SL.BSCC-47.90	Geotechnical Investigation - Site Survey	15	03-Feb-12	23-Feb-12
SL.BSCC-48.90	Underground Utility Investigation - Site Survey	15	03-Feb-12	23-Feb-12
SL.BSCC-52.90	Oil Water Separator - Fabrication / Delivery	130	28-Dec-12	27-Jun-13
SL.BSCC-50.90	Structural Steel Fabrication - Pipe Rack - Fabrication / Delivery	130	23-Jul-13	20-Jan-14
SL.BSCC-55.90	Miscellaneous Hoists - Fabrication / Delivery	110	08-Jan-14	10-Jun-14
SL.BSCC-54.90	Combustion Turbine Building Bridge Crane - Fabrication / Delivery	110	27-Jun-14	27-Nov-14
Mechanical Procurement - Award		438	14-Dec-11	02-Sep-13
SL.BSCC-1.00	Combustion Turbine Generators - Award (LNTP)	106	14-Dec-11	11-May-12
SL.BSCC-2.00	Heat Recovery Steam Generators - Award (LNTP)	106	29-Dec-11	25-May-12



Activity ID	Activity Name	Dur	Start	Finish
SL.BSCC-13.00	CT Air Inlet Chillers - Award	85	14-May-12	12-Sep-12
SL.BSCC-18.00	Horizontal Pumps - Award	75	14-May-12	28-Aug-12
SL.BSCC-14.00	Boiler Feedwater Pumps - Award	85	29-May-12	26-Sep-12
SL.BSCC-7.00	River Water Pre-Treatment System - Award	85	04-Jun-12	02-Oct-12
SL.BSCC-8.00	Water Treatment System - Award	85	04-Jun-12	02-Oct-12
SL.BSCC-10.00	Auxiliary Boiler - Award	85	04-Jun-12	02-Oct-12
SL.BSCC-78.00	Condensate Polisher System - Award	85	04-Jun-12	02-Oct-12
SL.BSCC-20.00	Sump Pumps - Award	75	05-Jun-12	19-Sep-12
SL.BSCC-38.00	Fuel Gas Conditioning System - Award	85	26-Jun-12	24-Oct-12
SL.BSCC-40.00	Fuel Oil Unloading & Forwarding System (Option) - Award	85	26-Jun-12	24-Oct-12
SL.BSCC-19.00	Vertical Pumps - Award	75	25-Jul-12	07-Nov-12
SL.BSCC-28.00	High Pressure Valves - Award	75	08-Aug-12	21-Nov-12
SL.BSCC-35.00	Non-Return Valves - Award	75	20-Aug-12	05-Dec-12
SL.BSCC-21.00	Duplex Strainers - Award	75	29-Aug-12	14-Dec-12
SL.BSCC-30.00	Control Valves - Award	75	29-Aug-12	14-Dec-12
SL.BSCC-32.00	Safety & Relief Valves - Award	75	29-Aug-12	14-Dec-12
SL.BSCC-16.00	Closed Cooling Water Heat Exchangers & Filters - Award	75	27-Sep-12	16-Jan-13
SL.BSCC-29.00	High Pressure Valves (2" & smaller) - Award	75	27-Sep-12	16-Jan-13
SL.BSCC-36.00	Mechanical Specialties - Award	75	27-Sep-12	16-Jan-13
SL.BSCC-44.00	Fire Protection & Detection System Contract - Award	85	03-Oct-12	05-Feb-13
SL.BSCC-39.00	Fuel Gas Check Metering Station - Award	75	25-Oct-12	13-Feb-13
SL.BSCC-41.00	Bulk Gas (H2, N2 & CO2) Storage & Regulating System - Award	75	25-Oct-12	13-Feb-13
SL.BSCC-34.00	Miscellaneous Butterfly Valves - Award	75	26-Nov-12	13-Mar-13
SL.BSCC-25.00	Water & Steam Sampling System - Award	75	30-Nov-12	19-Mar-13
SL.BSCC-26.00	Chemical Feed System - Award	75	30-Nov-12	19-Mar-13
SL.BSCC-22.00	Field Fabricated Tanks Contract - Award	75	07-Dec-12	26-Mar-13
SL.BSCC-23.00	Shop Fabricated Tanks - Award	75	07-Dec-12	26-Mar-13
SL.BSCC-42.00	Alloy Pipe Supply & Fabrication - Award	75	12-Dec-12	29-Mar-13
SL.BSCC-27.00	Ammonia Storage & Transfer Equipment - Award	75	14-Dec-12	02-Apr-13
SL.BSCC-37.00	Engineered Pipe Supports - Award	75	20-May-13	02-Sep-13
Mechanical Procurement - Delivery / Mobilization		553	25-May-12	24-Jul-14
SL.BSCC-1.90	Combustion Turbine Generators - Fabrication / Delivery	320	25-May-12*	28-Aug-13
SL.BSCC-2.91	Heat Recovery Steam Generators - Fabrication / Delivery of 1st Module or Drum	320	01-Jun-12*	03-Sep-13
SL.BSCC-2.90	Heat Recovery Steam Generators - Fabrication / Delivery of 1st Steel Casing	275	08-Jun-12*	09-Jul-13
SL.BSCC-14.90	Boiler Feedwater Pumps - Fabrication / Delivery	290	01-Oct-12*	18-Nov-13
SL.BSCC-19.90	Vertical Pumps - Fabrication / Delivery	200	26-Nov-12*	05-Sep-13
SL.BSCC-28.90	High Pressure Valves - Fabrication / Delivery	195	26-Nov-12*	29-Aug-13
SL.BSCC-35.90	Non-Return Valves - Fabrication / Delivery	190	06-Dec-12*	03-Sep-13
SL.BSCC-13.90	CT Air Inlet Chillers - Fabrication / Delivery	180	10-Dec-12*	22-Aug-13
SL.BSCC-30.90	Control Valves - Fabrication / Delivery	180	17-Dec-12*	29-Aug-13
SL.BSCC-32.90	Safety & Relief Valves - Fabrication / Delivery	170	17-Dec-12*	15-Aug-13
SL.BSCC-7.90	River Water Pre-Treatment System - Delivery	230	02-Jan-13*	20-Nov-13
SL.BSCC-8.90	Water Treatment System - Fabrication / Delivery	230	02-Jan-13*	20-Nov-13
SL.BSCC-10.90	Auxiliary Boiler - Fabrication / Delivery	220	02-Jan-13*	06-Nov-13
SL.BSCC-78.90	Condensate Polisher System - Fabrication / Delivery	230	02-Jan-13*	20-Nov-13
SL.BSCC-16.90	Closed Cooling Water Heat Exchangers & Filters - Fabrication / Delivery	180	17-Jan-13*	26-Sep-13
SL.BSCC-29.90	High Pressure Valves (2" & smaller) - Fabrication / Delivery	195	17-Jan-13*	17-Oct-13
SL.BSCC-36.90	Mechanical Specialties - Fabrication / Delivery	165	17-Jan-13*	05-Sep-13

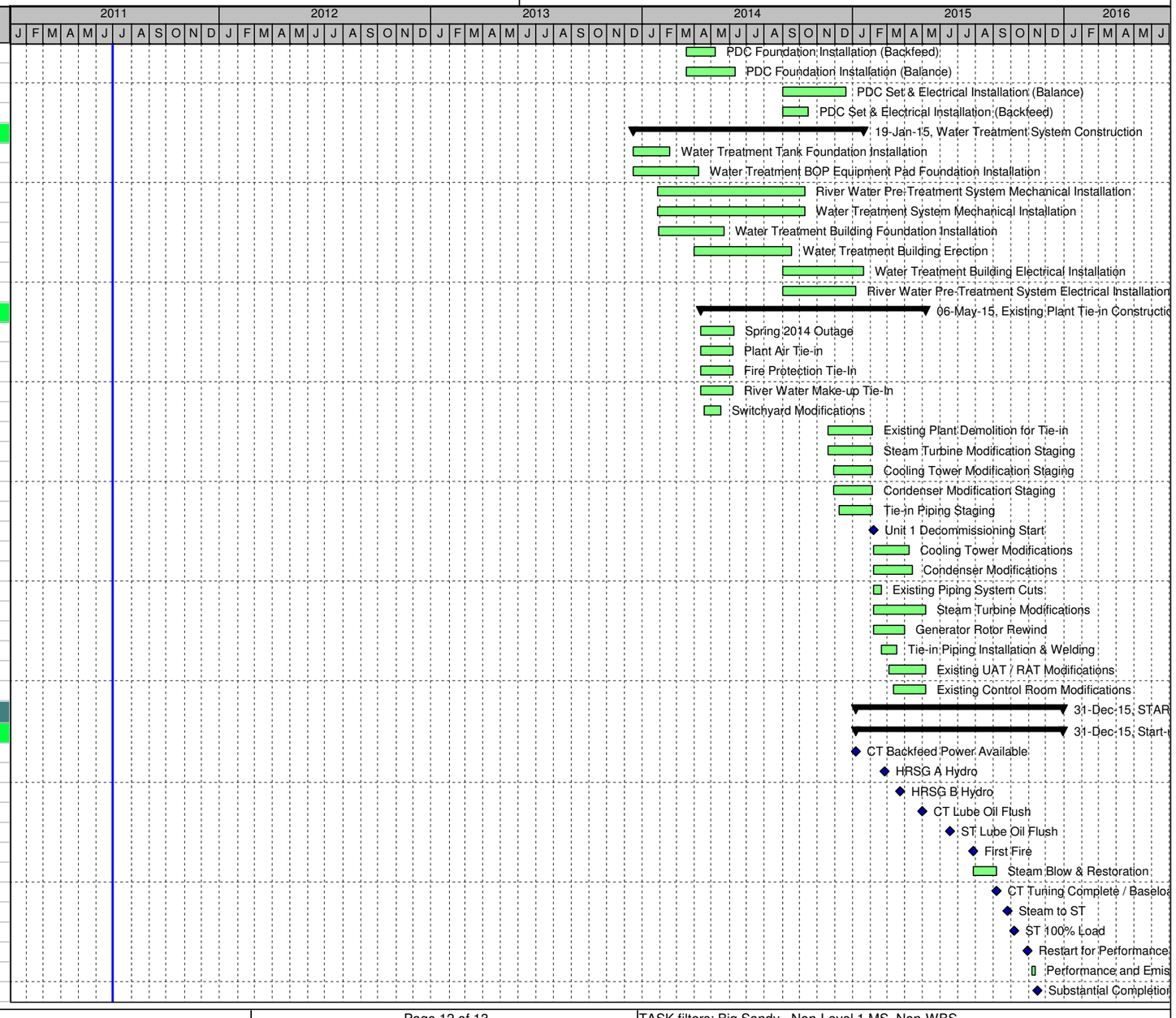


Activity ID	Activity Name	Dur	Start	Finish
SL.BSCC-18.90	Horizontal Pumps - Fabrication / Delivery	170	13-Feb-13*	09-Oct-13
SL.BSCC-39.90	Fuel Gas Check Metering Station - Fabrication / Delivery	100	14-Feb-13*	03-Jul-13
SL.BSCC-41.90	Bulk Gas (H2, N2 & CO2) Storage & Regulating System - Fabrication / Delivery	130	14-Feb-13*	15-Aug-13
SL.BSCC-20.90	Sump Pumps - Fabrication / Delivery	150	06-Mar-13*	02-Oct-13
SL.BSCC-34.90	Miscellaneous Butterfly Valves - Fabrication / Delivery	135	14-Mar-13*	19-Sep-13
SL.BSCC-25.90	Water & Steam Sampling System - Fabrication / Delivery	180	20-Mar-13*	27-Nov-13
SL.BSCC-26.90	Chemical Feed System - Fabrication / Delivery	180	20-Mar-13*	27-Nov-13
SL.BSCC-38.90	Fuel Gas Conditioning System - Fabrication / Delivery	120	21-Mar-13*	05-Sep-13
SL.BSCC-40.90	Fuel Oil Unloading & Forwarding System - Fabrication / Delivery	130	21-Mar-13*	19-Sep-13
SL.BSCC-23.90	Shop Fabricated Tanks - Fabrication / Delivery	105	27-Mar-13*	21-Aug-13
SL.BSCC-42.90	Alloy Pipe Supply & Fabrication - Fabrication / Delivery	340	01-Apr-13*	24-Jul-14
SL.BSCC-27.90	Ammonia Storage & Transfer Equipment - Fabrication / Delivery	175	03-Apr-13*	04-Dec-13
SL.BSCC-44.90	Fire Protection & Detection System Contract - Fabrication / Delivery	125	01-May-13*	23-Oct-13
SL.BSCC-21.90	Duplex Strainers - Fabrication / Delivery	110	29-May-13*	30-Oct-13
SL.BSCC-37.90	Engineered Pipe Supports - Fabrication / Delivery	170	03-Sep-13*	30-Apr-14
Electrical Procurement - Award		325	22-Feb-12	31-May-13
SL.BSCC-6.00	Transformers (MPT, UAT) - Award	103	22-Feb-12	17-Jul-12
SL.BSCC-60.00	Generator Circuit Breakers - Award	85	02-May-12	30-Aug-12
SL.BSCC-61.00	Isolated Phase Bus Duct - Award	85	28-Jun-12	26-Oct-12
SL.BSCC-62.00	Cable Bus Duct - Award	85	28-Jun-12	26-Oct-12
SL.BSCC-72.00	Emergency Diesel Generator - Award	75	18-Jul-12	31-Oct-12
SL.BSCC-63.00	Medium Voltage Switchgears & MCC's - Award	85	24-Aug-12	27-Dec-12
SL.BSCC-64.00	Low Voltage Switchgears & Transformers - Award	85	24-Aug-12	27-Dec-12
SL.BSCC-65.00	480 V Motor Control Centers - Award	85	22-Oct-12	22-Feb-13
SL.BSCC-66.00	125 VDC Battery, Chargers & UPS - Award	85	19-Nov-12	22-Mar-13
SL.BSCC-68.00	Panels & Switchboards - Award	85	19-Nov-12	22-Mar-13
SL.BSCC-67.00	Power Distribution Centers (PDC's) - Award	85	19-Dec-12	19-Apr-13
SL.BSCC-69.00	Cathodic Protection - Award	75	28-Jan-13	10-May-13
SL.BSCC-70.00	Plant Security System - Award	75	11-Feb-13	24-May-13
SL.BSCC-71.00	Communication System - Award	75	18-Feb-13	31-May-13
Electrical Procurement - Delivery / Mobilization		448	26-Jul-12	25-Apr-14
SL.BSCC-6.90	Transformers (MPT, UAT) - Fabrication / Delivery (Backfeed)	305	26-Jul-12*	04-Oct-13
SL.BSCC-6.91	Transformers (MPT, UAT) - Fabrication / Delivery (Balance)	320	26-Jul-12*	25-Oct-13
SL.BSCC-60.90	Generator Circuit Breakers - Fabrication / Delivery	280	10-Sep-12*	14-Oct-13
SL.BSCC-61.90	Isolated Phase Bus Duct - Fabrication / Delivery	110	05-Nov-12*	12-Apr-13
SL.BSCC-62.90	Cable Bus Duct - Fabrication / Delivery	90	05-Nov-12*	15-Mar-13
SL.BSCC-72.90	Emergency Diesel Generator - Fabrication / Delivery	300	08-Nov-12*	13-Jan-14
SL.BSCC-63.90	Medium Voltage Switchgears & MCC's - Fabrication / Delivery	180	02-Jan-13*	11-Sep-13
SL.BSCC-64.90	Low Voltage Switchgears & Transformers - Fabrication / Delivery	160	02-Jan-13*	14-Aug-13
SL.BSCC-65.90	480 V Motor Control Centers - Fabrication / Delivery	170	27-Feb-13*	23-Oct-13
SL.BSCC-66.90	125 VDC Battery, Chargers & UPS - Fabrication / Delivery	130	27-Mar-13*	25-Sep-13
SL.BSCC-68.90	Panels & Switchboards - Fabrication / Delivery	80	27-Mar-13*	17-Jul-13
SL.BSCC-69.90	Cathodic Protection - Fabrication / Delivery	100	15-May-13*	02-Oct-13
SL.BSCC-70.90	Plant Security System - Fabrication / Delivery	100	29-May-13*	16-Oct-13
SL.BSCC-71.90	Communication System - Fabrication / Delivery	100	05-Jun-13*	23-Oct-13
SL.BSCC-67.91	Power Distribution Centers (PDC's) - Fabrication / Delivery (Balance)	190	01-Aug-13*	25-Apr-14
SL.BSCC-67.90	Power Distribution Centers (PDC's) - Fabrication / Delivery (Backfeed)	170	23-Aug-13*	21-Apr-14
Instrumentation & Controls Procurement - Award		170	28-Mar-13	21-Nov-13



Activity ID	Activity Name	Dur	Start	Finish
SL.BSCC-11.00	Distributed Control System - Award	85	28-Mar-13	25-Jul-13
SL.BSCC-76.00	BOP Instruments & Enclosures - Award	85	09-May-13	05-Sep-13
SL.BSCC-75.00	Continuous Emission Monitors (CEM) - Award	85	26-Jul-13	21-Nov-13
Instrumentation & Controls Procurement - Delivery / Mobilization		240	23-May-13	28-Apr-14
SL.BSCC-11.90	Distributed Control System - Fabrication / Delivery (to PDC Shop)	190	23-May-13	17-Feb-14
SL.BSCC-76.90	BOP Instruments & Enclosures - Fabrication / Delivery	130	06-Sep-13	10-Mar-14
SL.BSCC-75.90	Continuous Emission Monitors (CEM) - Fabrication / Delivery	110	22-Nov-13	28-Apr-14
SL.BSCC-11.80	Distributed Control System - Hardware FAT	5	28-Jan-14	03-Feb-14
SL.BSCC-11.85	Distributed Control System - Software FAT	20	11-Mar-14	07-Apr-14
ENGINEERING TFA		633	03-Jun-13	13-Nov-15
Engineering TFA		633	03-Jun-13	13-Nov-15
SL.TFA.50	Engineering TFA for Construction	591	03-Jun-13	16-Sep-15
SL.TFA.70	Engineering TFA for Start-up / Commissioning	420	01-Apr-14	13-Nov-15
CONSTRUCTION		608	02-May-13	31-Aug-15
Civil / Sitework Construction		387	02-May-13	24-Oct-14
P1EPC7000	Start Site Mobilization	25	02-May-13*	05-Jun-13
P1EPC7010	Site Development	30	07-Jun-13	18-Jul-13
P1EPC7020	Demo / Utility Relocation (Underground)	50	21-Jun-13	29-Aug-13
P1EPC8150	Demo / Utility & Building Relocation (Aboveground)	65	21-Jun-13	19-Sep-13
P1EPC8188	Test Piles	25	05-Jul-13	08-Aug-13
P1EPC8198	Piles Installation	80	09-Aug-13	28-Nov-13
P1EPC7030	BOP Foundations / Undergrounds Installation	180	17-Feb-14	24-Oct-14
Combustion Turbine Construction		503	22-Aug-13	27-Jul-15
P1EPC8208	Combustion Turbine Foundation Installation	82	22-Aug-13	13-Dec-13
P1EPC8288	Combustion Turbine Mechanical Installation	328	28-Jan-14	30-Apr-15
P1EPC8437	CTG Building Erection	260	29-Apr-14	27-Apr-15
P1EPC8426	Combustion Turbine Electrical Installation	235	02-Sep-14	27-Jul-15
Heat Recovery Steam Generator Construction		528	22-Aug-13	31-Aug-15
P1EPC8218	HRSG Foundation Installation	67	22-Aug-13	22-Nov-13
P1EPC8298	HRSG Steel Casing Erection	170	28-Jan-14	22-Sep-14
P1EPC8378	Auxiliary Boiler Mechanical Installation	175	28-Jan-14	29-Sep-14
P1EPC8408	HRSG Mechanical Installation	230	26-Feb-14	13-Jan-15
P1EPC8412	HRSG Electrical Installation	260	02-Sep-14	31-Aug-15
Pipe Rack Construction		398	16-Dec-13	24-Jun-15
P1EPC8258	Pipe Rack Foundation Installation	69	16-Dec-13	20-Mar-14
P1EPC7180	Pipe Rack Steel Erection	157	10-Mar-14	14-Oct-14
P1EPC8418	Pipe Rack Access Platform Erection	215	23-Jun-14	17-Apr-15
P1EPC8419	Pipe Rack Piping Installation	219	25-Jul-14	27-May-15
P1EPC8420	Pipe Rack Electrical Installation	71	24-Sep-14	31-Dec-14
P1EPC7170	Insulation & Lagging Installation	160	13-Nov-14	24-Jun-15
Transformer Construction		256	16-Dec-13	08-Dec-14
P1EPC8238	Transformer Foundation Installation (Backfeed)	66	16-Dec-13	17-Mar-14
P1EPC8421	Transformer Foundation Installation (Balance)	32	18-Mar-14	30-Apr-14
P1EPC7150	Transmission Line Structural Installation	30	02-Sep-14	13-Oct-14
P1EPC8388	Transformers Set & Electrical Installation (Backfeed)	42	02-Sep-14	29-Oct-14
P1EPC8422	Transformers Set & Electrical Installation (Balance)	70	02-Sep-14	08-Dec-14
P1EPC8140	Transmission Line Electrical Installation	35	14-Oct-14	01-Dec-14
Power Distribution Center Construction		199	18-Mar-14	19-Dec-14

Activity ID	Activity Name	Dur	Start	Finish
P1EPC8120	PDC Foundation Installation (Backfeed)	37	18-Mar-14	07-May-14
P1EPC8425	PDC Foundation Installation (Balance)	62	18-Mar-14	11-Jun-14
P1EPC8423	PDC Set & Electrical Installation (Balance)	79	02-Sep-14	19-Dec-14
P1EPC8424	PDC Set & Electrical Installation (Backfeed)	32	02-Sep-14	15-Oct-14
Water Treatment System Construction		286	16-Dec-13	19-Jan-15
P1EPC8268	Water Treatment Tank Foundation Installation	46	16-Dec-13	17-Feb-14
P1EPC8416	Water Treatment BOP Equipment Pad Foundation Installation	83	16-Dec-13	09-Apr-14
P1EPC8348	River Water Pre-Treatment System Mechanical Installation	184	28-Jan-14	10-Oct-14
P1EPC8358	Water Treatment System Mechanical Installation	184	28-Jan-14	10-Oct-14
P1EPC8415	Water Treatment Building Foundation Installation	82	29-Jan-14	22-May-14
P1EPC7140	Water Treatment Building Erection	120	02-Apr-14	16-Sep-14
P1EPC8130	Water Treatment Building Electrical Installation	100	02-Sep-14	19-Jan-15
P1EPC8417	River Water Pre-Treatment System Electrical Installation	90	02-Sep-14	05-Jan-15
Existing Plant Tie-in Construction		278	12-Apr-14	06-May-15
P1EPC8552	Spring 2014 Outage	58	12-Apr-14*	08-Jun-14
P1EPC8562	Plant Air Tie-in	56	12-Apr-14	06-Jun-14
P1EPC8572	Fire Protection Tie-In	56	12-Apr-14	06-Jun-14
P1EPC8612	River Water Make-up Tie-In	56	12-Apr-14	06-Jun-14
P1EPC8622	Switchyard Modifications	28	19-Apr-14	16-May-14
P1EPC8413	Existing Plant Demolition for Tie-in	56	19-Nov-14	04-Feb-15
P1EPC8602	Steam Turbine Modification Staging	56	19-Nov-14	04-Feb-15
P1EPC8582	Cooling Tower Modification Staging	49	28-Nov-14	04-Feb-15
P1EPC8592	Condenser Modification Staging	49	28-Nov-14	04-Feb-15
P1EPC8542	Tie-in Piping Staging	42	09-Dec-14	04-Feb-15
P1EPC8308	Unit 1 Decommissioning Start	0	05-Feb-15*	
P1EPC8318	Cooling Tower Modifications	45	05-Feb-15	08-Apr-15
P1EPC8482	Condenser Modifications	48	05-Feb-15	13-Apr-15
P1EPC8492	Existing Piping System Cuts	10	05-Feb-15	18-Feb-15
P1EPC8512	Steam Turbine Modifications	65	05-Feb-15	06-May-15
P1EPC8632	Generator Rotor Rewind	40	05-Feb-15	01-Apr-15
P1EPC8502	Tie-in Piping Installation & Welding	20	19-Feb-15	18-Mar-15
P1EPC8522	Existing UAT / RAT Modifications	46	04-Mar-15	06-May-15
P1EPC8532	Existing Control Room Modifications	40	12-Mar-15	06-May-15
START-UP		360	05-Jan-15	31-Dec-15
Start-up		360	05-Jan-15	31-Dec-15
P1EPC7500	CT Backfeed Power Available	0		05-Jan-15
P1EPC8452	HRSG A Hydro	0		24-Feb-15
P1EPC8457	HRSG B Hydro	0		24-Mar-15
P1EPC8467	CT Lube Oil Flush	0		30-Apr-15
P1EPC8472	ST Lube Oil Flush	0		17-Jun-15
P1EPC8000	First Fire	0		27-Jul-15
P1EPC8462	Steam Blow & Restoration	42	28-Jul-15	07-Sep-15
P1EPC8002	CT Tuning Complete / Baseload	0		07-Sep-15
P1EPC8005	Steam to ST	0		25-Sep-15
P1EPC8007	ST 100% Load	0		07-Oct-15
P1EPC8009	Restart for Performance Test	0		29-Oct-15
P1EPC8020	Performance and Emissions Testing	7	06-Nov-15	12-Nov-15
P1EPC8035	Substantial Completion	0		16-Nov-15



Remaining Level of Effort | Actual Level of Effort | Remaining Work | Milestone

WBS Summary | Actual Work | Critical Remaining Work | Summary

TASK filters: Big Sandy - Non-Level 1 MS, Non-WBS.

.	Activity ID	Activity Name	Dur	Start	Finish
	P1EPC8040	Commercial Operation	0		31-Dec-15
	P1EPC8050	Guaranteed Commercial Operation	0		31-Dec-15*

2011 2012 2013 2014 2015 2016

J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J

◆ Commercial Oper

◆ Guaranteed Comi

ATTACHMENT 1-18
Civil Design Commodity Quantity Data

DWG. NO. RPCSK-001

ASPHALT PAVEMENT SURFACING QUANTITIES:

SYMBOL =

ASPHALT PAVEMENT SURFACING WILL BE PROVIDED FOR THE PLANT ROADS.

THE TOTAL AREA TO RECEIVE ASPHALT PAVEMENT SURFACING IS APPROXIMATELY 12,500 SY.

APPROXIMATE ASPHALT ROAD LENGTHS:
- 30 FT WIDE ROAD = 2,400 FT
- 12 FT WIDE ROAD = 760 FT

ALL ASPHALT PAVEMENT SURFACING WILL HAVE THE FOLLOWING PROFILE:
- 1.5" ASPHALT SURFACE COURSE
- 1.5" ASPHALT BINDER COURSE
- 12" BASE COURSE
- 10" OZ/SY GEOTEXTILE
- 12" SUBGRADE PREP

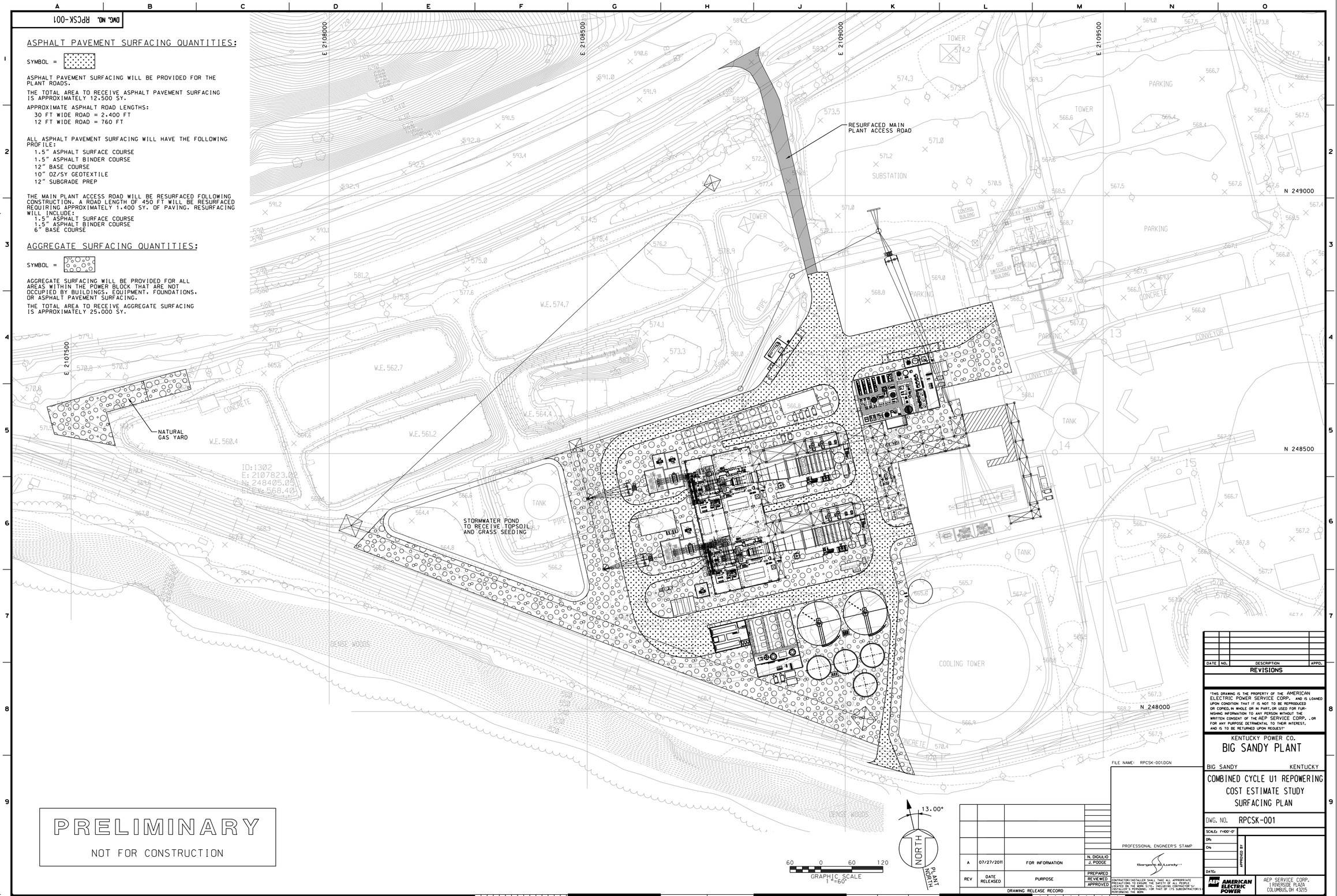
THE MAIN PLANT ACCESS ROAD WILL BE RESURFACED FOLLOWING CONSTRUCTION. A ROAD LENGTH OF 450 FT WILL BE RESURFACED REQUIRING APPROXIMATELY 1,400 SY. OF PAVING. RESURFACING WILL INCLUDE:
- 1.5" ASPHALT SURFACE COURSE
- 1.5" ASPHALT BINDER COURSE
- 6" BASE COURSE

AGGREGATE SURFACING QUANTITIES:

SYMBOL =

AGGREGATE SURFACING WILL BE PROVIDED FOR ALL AREAS WITHIN THE POWER BLOCK THAT ARE NOT OCCUPIED BY BUILDINGS, EQUIPMENT, FOUNDATIONS, OR ASPHALT PAVEMENT SURFACING.

THE TOTAL AREA TO RECEIVE AGGREGATE SURFACING IS APPROXIMATELY 25,000 SY.



PRELIMINARY

NOT FOR CONSTRUCTION

GRAPHIC SCALE 1"=60'

13.00° NORTH PLANT NORTH

REV	DATE RELEASED	PURPOSE	PREPARED	REVIEWED	APPROVED
A	07/27/2011	FOR INFORMATION	N. DIGIULIO	J. POOGE	

DRAWING RELEASE RECORD

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE SAFETY PRECAUTIONS FOR THE PROTECTION OF PERSONS LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUBCONTRACTORS) PERFORMING THE WORK.

PROFESSIONAL ENGINEER'S STAMP

Sargent & Lundy

FILE NAME: RPCSK-001.DGN

DATE	NO.	DESCRIPTION	APPD.
		REVISIONS	

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

COMBINED CYCLE U1 REPOWERING
COST ESTIMATE STUDY
SURFACING PLAN

DWG. NO. RPCSK-001

SCALE: 1"=100'-0"

DRN

CHK

APPROVED BY

DATE

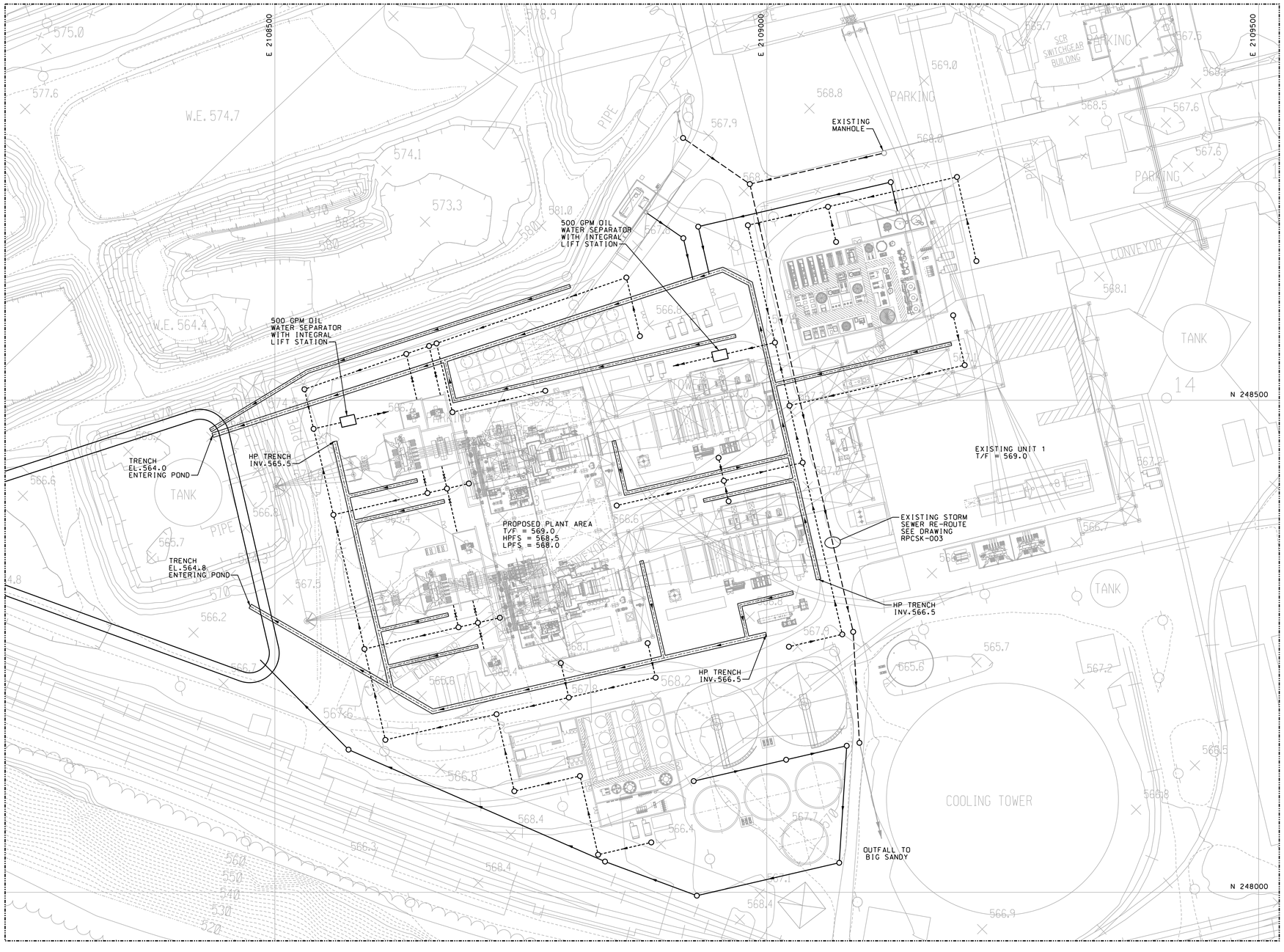
AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOUR:MINUTE

IGS0694

DWG. NO. RPCSK-002



CIVIL UNDERGROUND UTILITY QUANTITIES:

STORM SEWER

2' WIDE STORM SEWER TRENCH = 1,700 FT
3' WIDE STORM SEWER TRENCH = 1,600 FT
6"Ø CARBON STEEL PIPE = 100 FT
18"Ø CHDPE = 700 FT
24"Ø CHDPE = 450 FT
24"Ø CHDPE END SECTION = 1 EACH
4"Ø I.D. MANHOLE = 7 EACH
5"Ø I.D. MANHOLE = 3 EACH
POST INDICATOR VALVE = 2 EACH

OILY WATER SEWER

6"Ø CARBON STEEL PIPE = 1,700 FT
8"Ø CARBON STEEL PIPE = 1,600 FT
POST INDICATOR VALVE = 8 EACH
4'Ø I.D. MANHOLE = 43 EACH
500 GPM OIL WATER SEPARATOR WITH INEGRAL LIFT STATION = 2 EACH

SANITARY SEWER

NO SANITARY SEWER SERVICES HAVE BEEN INCLUDED IN THIS ESTIMATE. NO WASHROOM FACILITIES WILL BE INSTALLED IN ANY OF THE NEWLY INSTALLED BUILDINGS. THIS ESTIMATE ASSUMES THAT THE EXISTING UNIT 1 SANITARY SERVICES WILL BE USED.

LEGEND

- 2' TRENCH
- 3' TRENCH
- STORM PIPE
- STORM RE-ROUTE PIPE
- EXISTING STORM PIPE
- OILY WATER SEWER

PRELIMINARY

NOT FOR CONSTRUCTION

GRAPHIC SCALE 1"=40'

13.00° NORTH PLANT NORTH

REV	DATE RELEASED	PURPOSE	
A	07/27/2011	FOR INFORMATION	N. DIGIULIO / J. POGGE
			PREPARED
			REVIEWED
			APPROVED

DRAWING RELEASE RECORD

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THAT ALL UTILITIES ARE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUBCONTRACTORS) PERFORMING THE WORK.

PROFESSIONAL ENGINEER'S STAMP

Sergely A. Landy

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

COMBINED CYCLE U1 REPOWERING COST STUDY ESTIMATE CIVIL UG UTILITY PLAN

FILE NAME: RPCSK-002.DGN

DWG. NO. RPCSK-002

SCALE: 1"=100'-0"

DR: CH: APPROVED BY:

DATE:

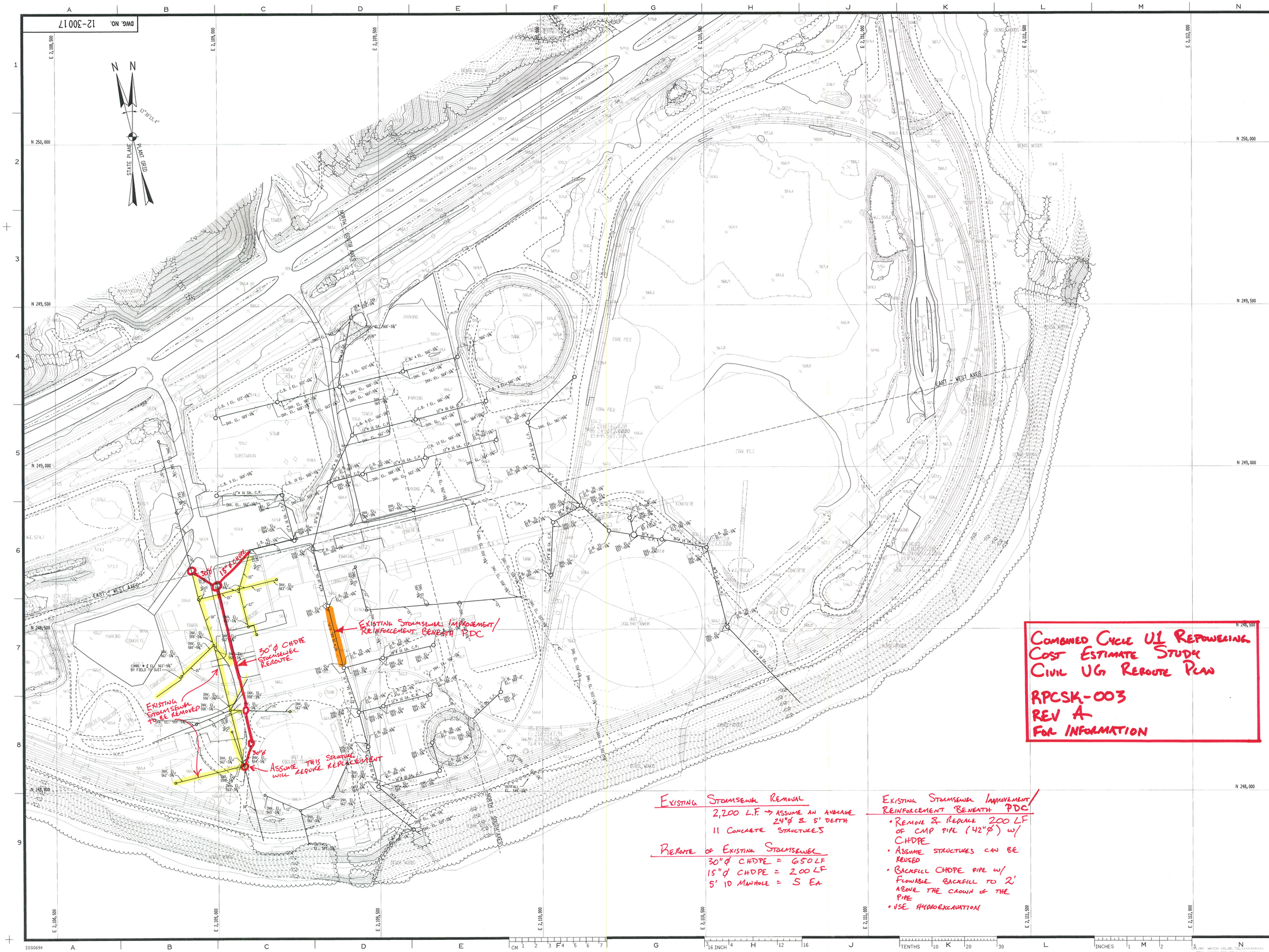
AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOUR:MINUTE

IGS0694

DWG. NO. 12-30017



EXISTING STORMSEWER REMOVAL

2,200 L.F. → ASSUME AN AVERAGE 24"⌀ & 5' DEPTH

11 CONCRETE STRUCTURES

REROUTE OF EXISTING STORMSEWER

30"⌀ CHDPE = 650 LF

15"⌀ CHDPE = 200 LF

5' ID MANHOLE = 5 EA

EXISTING STORMSEWER IMPROVEMENT/ REINFORCEMENT BENEATH PDC

- REMOVE & REPLACE 200 LF OF CMP PIPE (42"⌀) W/ CHDPE
- ASSUME STRUCTURES CAN BE REUSED
- BACKFILL CHDPE PIPE W/ FLOWABLE BACKFILL TO 2' ABOVE THE CROWN OF THE PIPE
- USE HYDROEXCAVATION

COMBINED CYCLE U1 REPOWERING
COST ESTIMATE STUDY
CIVIL UG REROUTE PLAN

RPCSK-003
REV A
FOR INFORMATION

GENERAL NOTES

1.- THE STATE PLANE GRID SHOWN, AND ALL ELEVATIONS SHOWN ARE IN NAD83 AND NADV88 DATUM.

2.- ALL STORM DRAIN LINES SHOWN WERE LIFTED FROM ORIGINAL DWGS. BY TAKING MEASUREMENTS FROM PLANT AXES. LOCATIONS ARE APPROXIMATE. FOR SPECIFIC PROJECTS THE LOCATIONS OF CATCH BASINS ect., SHOULD BE CONFIRMED BY FIELD SURVEY. INVERT ELEVATIONS LISTED WERE ADJUSTED TO NEW DATUM FROM ELEVATIONS LISTED ON ORIGINAL DWGS.

REFERENCE DRAWINGS

1-3004	ELEVATION, GRADING, DRAINAGE & TRACK LAYOUT PLAN
1-3005	GRADING, DRAINAGE, SECTIONS & DETAILS
1-3008	CORRUGATED METAL CATCH BASINS FOR YARD DRAINAGE
12-3008	PLANT LAYOUT WITH FRAINAGE AREA
2-3008	TRACK LAYOUT & YARD DRAINAGE
2-3050	ROADS, PARKING AREAS AND YARD DRAINAGE
2-3061	DIESEL OIL STORAGE TANK, GASOLINE, DIESEL OIL PUMPS - FOUNDATIONS
2-5135	YARD PIPING

DATE	NO.	DESCRIPTION	APPD.
	0	ISSUED FOR COMMENTS	

REVISIONS

S: BS/12/GEO_HYDRO_SITE/30017dgn.

KENTUCKY POWER COMPANY

BIG SANDY PLANT

BIG SANDY, KENTUCKY

PARTIAL YARD DRAINAGE SYSTEM

DWG. NO. 12-30017-0

SCALE: 100' = 1" | CIVIL ENGINEERING DIVISION

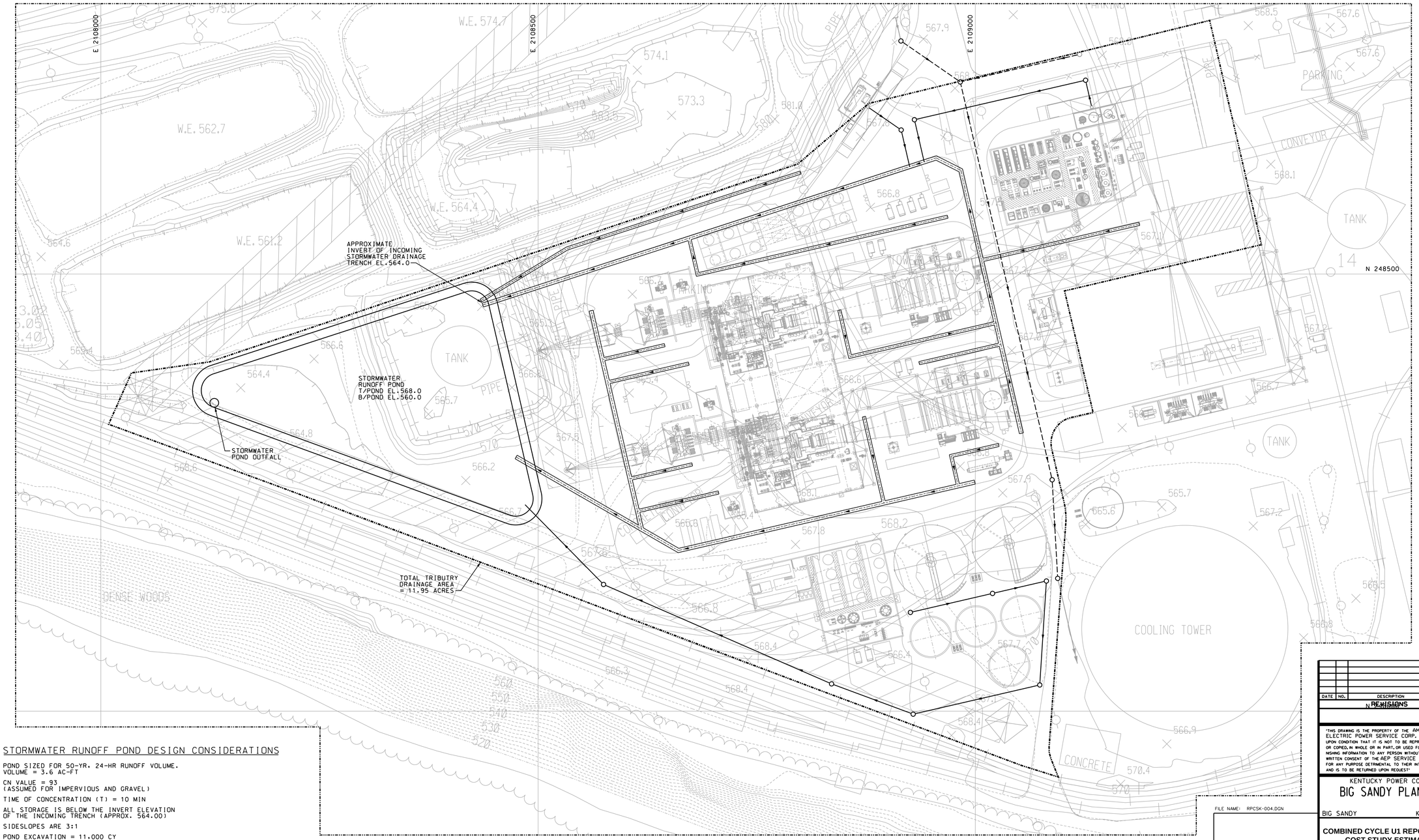
DR: Amanda Graphics
CH:
ENGR:
DATE: 1/30/09

APPROVED BY

AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

DWG. NO. RPCSK-004



STORMWATER RUNOFF POND DESIGN CONSIDERATIONS

POND SIZED FOR 50-YR. 24-HR RUNOFF VOLUME.
VOLUME = 3.6 AC-FT

CN VALUE = 93
(ASSUMED FOR IMPERVIOUS AND GRAVEL)

TIME OF CONCENTRATION (T) = 10 MIN

ALL STORAGE IS BELOW THE INVERT ELEVATION OF THE INCOMING TRENCH (APPROX. 564.00)

SIDESLOPES ARE 3:1

POND EXCAVATION = 11,000 CY

RIPRAP = 200 CY

TOPSOIL & GRASS SEEDING = 1.5 ACRES

STORMWATER POND OUTFALL DESIGN CONSIDERATIONS

DEPENDING UPON PERMITTING AND DESIGN CONSIDERATIONS, THE PROPOSED STORMWATER POND OUTFALL WILL HAVE A DRAINAGE PIPE JACKED UNDER THE RAILROAD THAT WILL DRAIN TO A NEW OUTFALL ON THE BIG SANDY RIVER, OR WILL BE DRAINED BY A CONCRETE PUMP STRUCTURE WHERE 3-500 GPM PUMPS WILL FORWARD STORMWATER TO AN EXISTING DRAINAGE OUTFALL.

PRELIMINARY

NOT FOR CONSTRUCTION

40 0 40 80
GRAPHIC SCALE
1"=40'

13.00°
PLANT NORTH
NORTH

REV	DATE RELEASED	PURPOSE	
A	07/27/2011	FOR INFORMATION	N. DIGIULIO
			J. PODGE
			PREPARED
			REVIEWED
			APPROVED

DRAWING RELEASE RECORD

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE SAFETY PRECAUTIONS AND BE RESPONSIBLE FOR SAFETY CREATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUBCONTRACTORS) PERFORMING THE WORK.

PROFESSIONAL ENGINEER'S STAMP

Sergely A. Lesky

DATE	NO.	DESCRIPTION	APPD.
		REVISIONS	

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

COMBINED CYCLE U1 REPOWERING COST STUDY ESTIMATE STORMWATER RUNOFF PLAN

DWG. NO. RPCSK-004

SCALE: 1"=100'-0"

DR: CH: APPROVED BY: DATE:

FILE NAME: RPCSK-004.DGN

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE- DD-MMM-YYYY
SYSTEM TIME- HOUR:MINUTE

IGS0694

Laydown Areas

1.7 ACRE LAYDOWN AREA

2 Laydown area
riverside I
acre and RR
side 1/2 acre.
(Currently
Grass)

1/2 Acre
laydown area
(Currently
Grass)

3 acres
laydown area

7 acres laydown
area
Needs development
(Power from Coal Yard)

2.5 Acres
laydown area
on river bank
(Currently grass and gravel)
(Power from coal yard)

RIVER BANK AREA
0.5 ACRES OF
USABLE AREA
(Currently partly gravel)

KEY PLAN
SCALE: 1" = 1000'

REFERENCE DRAWINGS
12-5039A - SCR PROJECT PLOT PLAN

COMBINED CYCLE U1 REPOWERING
COST ESTIMATE STUDY
LAYDOWN AND CONTRACTOR
PARKING PLAN

RPCSK-005 SHEET 1 OF 2
REV A FOR INFORMATION

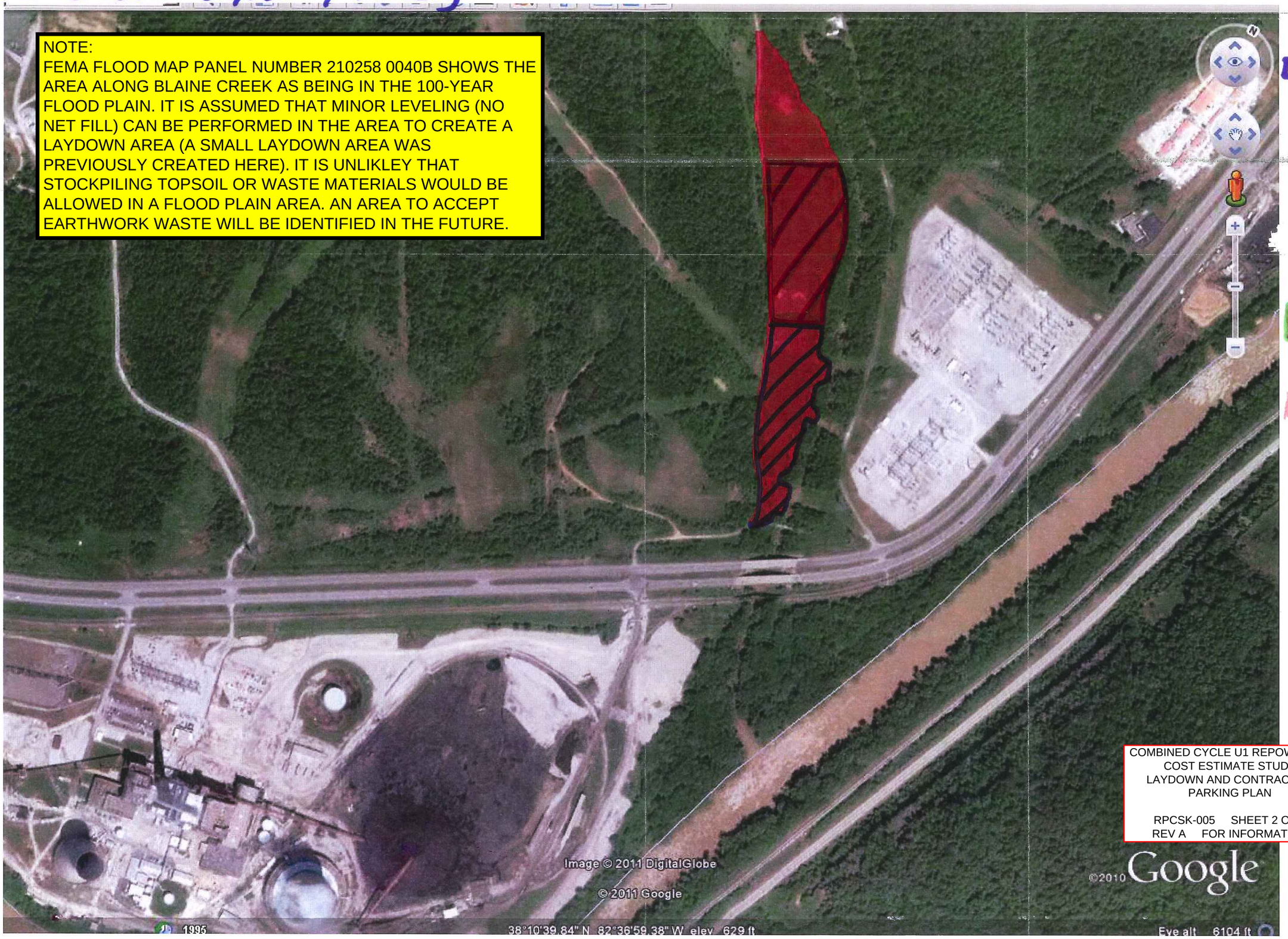
DWG. NO. 12-5030

KENTUCKY POWER CO
BIG SANDY PLANT
BIG SANDY KENTUCKY
PLOT PLAN
DWG. NO. 12-5030-2

AMERICAN ELECTRIC POWER
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

Blaine Creek Laydown / Parking

NOTE:
FEMA FLOOD MAP PANEL NUMBER 210258 0040B SHOWS THE AREA ALONG BLAINE CREEK AS BEING IN THE 100-YEAR FLOOD PLAIN. IT IS ASSUMED THAT MINOR LEVELING (NO NET FILL) CAN BE PERFORMED IN THE AREA TO CREATE A LAYDOWN AREA (A SMALL LAYDOWN AREA WAS PREVIOUSLY CREATED HERE). IT IS UNLIKLEY THAT STOCKPILING TOPSOIL OR WASTE MATERIALS WOULD BE ALLOWED IN A FLOOD PLAIN AREA. AN AREA TO ACCEPT EARTHWORK WASTE WILL BE IDENTIFIED IN THE FUTURE.



COMBINED CYCLE U1 REPOWERING
COST ESTIMATE STUDY
LAYDOWN AND CONTRACTOR
PARKING PLAN

RPCSK-005 SHEET 2 OF 2
REV A FOR INFORMATION

ATTACHMENT 1-19
Structural Design Commodity Quantity Data

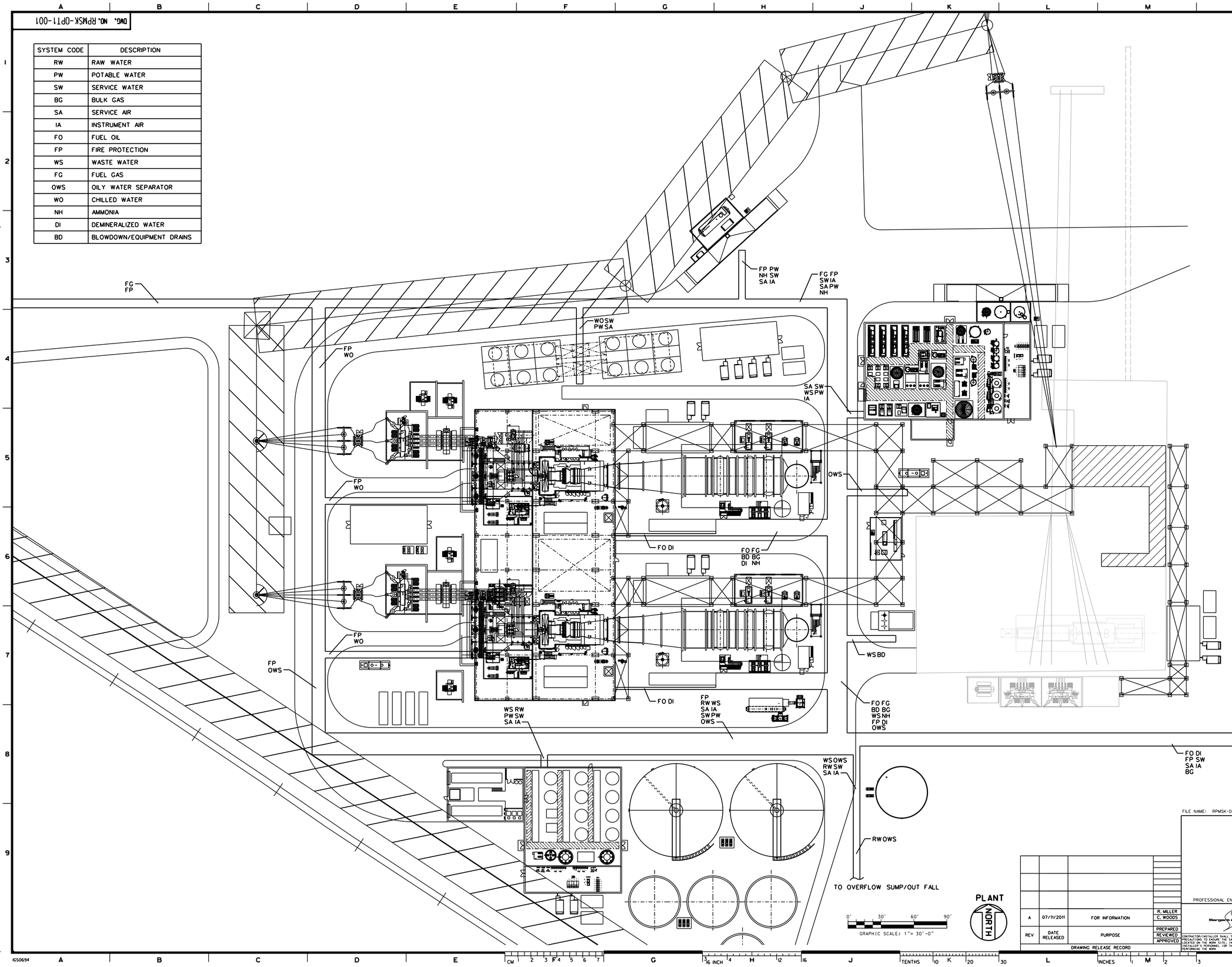
DEMOLISH CONCRETE
TO 3 FEET BELOW GRADE
AND BACKFILL AREA
REINFORCE RAIL
SUPPORT BEAMS
AND PROVIDE NEW
CONCRETE COVER
OVER TOP OF HOPPER
NEW CONCRETE
BULKHEAD
SKETCH RPSSK-001-A
COAL TUNNEL
REMOVAL AND CAPPING
GENERAL NOTES
DO NOT SCALE THIS DRAWING
HIGH WATER 1937 - EL. 560'
COAL BUNKER CAPACITY - 3000 TONS
BIG SANDY RIVER
NORTH
PREVAILING WINDS
EAST-WEST AXIS
NORTH-SOUTH AXIS
CONVEYOR 1
CONVEYOR 2
CONVEYOR 3
CONVEYOR 4
STATION 1
STATION 2
STATION 3
PLAN
SECTION B-B
SECTION C-C
SECTION A-A
REFERENCE DRAWINGS
UNIT 1
BUNKER
CAP. 3000 T.
REVISIONS
GENERAL PLAN
BIG SANDY PLANT
BIG SANDY, KENTUCKY
DR. NO. 1-3500-10
AMERICAN ELECTRIC POWER SERVICE CORP.
2 BROADWAY
NEW YORK
SCALE - INCHES


SKETCH RPSSK-002-A
PIPE RACK
FRAMING CONCEPT
INSIDE BOILER BUILDING
AND HEATER BAY
T/STEEL EL 582'-0"
T/STEEL EL 582'-0" & 588'-0"
DR. No. 1-3126
PULVERIZER FOUNDATION SLAB - SEE DWG. 1-3102
MATCH LINE
FOR CONTINUATION SEE DWG. 1-3105
ASH PIT (BOTT. EL. 556'-0)
℄ ASH HOPPER
FOR CONTINUATION SEE DWG 1-3154
FOR CONTINUATION SEE 1-3079
FOR SECTIONS & DETAILS SEE DWG. 1-3127 & 1-3130
SECTION 7-M
ALL FAN & MOTOR FOUNDATIONS BETWEEN COLUMN LINES K TO J & 8 TO 12 WERE REMOVED. REFINISH FLOOR TO MAINTAIN SLOPES AS REQUIRED.
NOTE A: 4" FLOOR DRAIN WADE TYPE W1434 S.O.(T) CAULKED OUTLET, WITH TRACTOR GRATE TOP OF DRAIN EL. 568'-10½
NOTE B: 4" FLOOR DRAIN WADE TYPE W1434T B.O. CAULKED OUTLET, TOP OF DRAIN EL. 568'-10½
NOTE C: POCKETS FOR GIRT FRAMING TO BE FILLED WITH GROUT AFTER STEEL IS IN PLACE, FOR BOTT. EL. OF POCKETS SEE DWG. 1-3122 EXCEPT AS NOTED.
NOTE D: CURBS ABOVE COLUMN PADS TO BE POURED AFTER COLUMNS ARE IN PLACE. SEE SECTION 6-6 (DWG 1-3123) FOR CURBS ALONG (13) LINE - SEE SECTION (1-3127) FOR CURBS ALONG (7) LINE.
NOTE E: EXISTING CURB TOP EL. 569'-4 SEE DWG 1-3122
SURFACE DRAINAGE: H.P. INDICATES HIGH POINT OF CONC. SURFACE @ EL. 569'-0 EXCEPT AS NOTED.
GENERAL NOTES
ALL CONCRETE MATERIALS AND WORKMANSHIP SHALL CONFORM TO THE A. E. P. S. CORP. SPECIFICATIONS #1000.
DIMENSIONS GIVEN FOR REINFORCING STEEL ARE TO CENTER LINE OF BARS.
CONSTRUCTION JOINTS ARE NOT TO BE ADDED, OMITTED OR RELOCATED, EXCEPT WITH THE WRITTEN APPROVAL OF THE N. Y. OFFICE AND FURTHER, PROVIDED THAT THE CONTRACTOR'S MIXING AND PLACING EQUIPMENT IS PROPERLY SIZED SO THAT NO COLD JOINTS WILL RESULT IN THE CONCRETE.
EXPANSION JOINTS MUST BE LOCATED AS SHOWN.
ALL EXPOSED EDGES SHALL HAVE A ONE INCH BEVEL.
FLOOR FINISH SHALL CONFORM TO THE A. E. P. S. CORP'S. SPEC. AND TYPE OF SAME WILL BE DECIDED UPON BY CONCRETE LABORATORY.
ALL EXPOSED VERTICAL EXTERIOR CONCRETE SURFACES TO HAVE RUBBED FINISH.
ALL ELECTRICAL CONDUITS, GROUNDING WIRES, AND PIPES TO BE IN PLACE BEFORE CONCRETE IS POURED.
ALL ANCHOR BOLTS ARE PREFIXED BY 1-3431A
ALL STRUCTURAL DEPT. PIPE SLEEVES ARE PREFIXED BY 1-3432 A
FOR LOCATION OF MECH. DEPT. PIPE SLEEVES MK SP SEE DWG. 1-5053
ALL REFERENCE POINTS TO BE TRANSFERED TO FILL SLAB, SEE INSTALLATION PROCEDURE ON DWG. 1-3012
MATERIAL
CONCRETE: 735 C.Y. By: BECHTEL CORP.
8-4" FLOOR DRAINS PER NOTE "A"
11-4" FLOOR DRAINS PER NOTE "B"
By WADE MFG. Co. ORD. Nº BSX17
3-LADDER RUNGS MK R1 By: SEE S-SK-55
1½ø PAINTED HANDRAIL By: LOGAN Co. ORD. Nº BSX-4735
Y INSERTS By: FIELD
1-STAIR NOSING MK N22 (3½" x 5/16" x 1'-10" Lg) By: LOGAN Co ORD. Nº BSX-1894-1
REFERENCE DRAWINGS
1-5053 - FLOOR & WALL SLEEVES
1-5057 - STATION DRAINAGE PIPING
1-5058 - " "
1-3100 - BUNKER BAY FNDT SLAB
1-3122 - BOILER RM. FNDT SLAB
1-3150 - HEATER BAY FNDT SLAB
1-3079 - SERV. BLDG. FNDT SLAB
1-3300 - COLUMN CENTER PLAN
1-3301 - COLUMN SCHEDULE
1-3102 - PULV. FNDT SLAB
1-3105 - BUNKER BAY FILL SLAB
1-3127 - BLR. RM. FILL SLAB SECTIONS & DETAILS
1-1411 - PLAN ELECT'L EQUIPM'T & CONDUITS
1-3442 - ASH LINE TRENCH FRAME
1-3443 - PYRITE TRENCH FRAME
1-3444 - BLR. RM. MISC. STEEL
1-3431A - ANCHOR BOLT SCHEDULE
1-3432A - PIPE SLEEVE SCHEDULE
RS - REINF. SCHEDULE
1-3128 - TEMPORARY POCKETS FOR STEEL ERECTION
1-5323 - CONTROL AIR FILTER STATION FLOW DIAGRAM & PIPING ARRANGEMENT
1-3130 - VACUUM PUMP FOUNDATION
1-5109A - VACUUM PUMPS
D-1-5114 - COOLING WATER PIPING
VENDOR DRAWING
NASH ENG. CO. DWG. 15-3062
4/8/91 5 EDR 85-01-4361: ADDED VAC. PUMP FDN'S. AT J-8
9/27/68 4 ADDED PAD FOR RECTIFIER CONTROL CONSOLES BETW. COL LINE (J) & (K) AT/3 LINE
8-31-61 3 ADDED DRYER PAD @ COL'S. J7 & REF. DWG. 1-5323 S.S
5-11-61 2 ADDED CURB AT COL'S N8, N11, & N12 S.S
3-29-61 1 ADDED ELEC. PAD @ S.S
DATE REV. DESCRIPTION APPD.
REVISIONS
UNIT #1
BOILER ROOM
FILL SLAB ~ EL. 569'-0
PLAN ~ MASONRY
KENTUCKY POWER CO.
BIG SANDY PLANT
BIG SANDY, KENTUCKY
DR. No. 1-3126-5
SCALE ¼" = 1'-0
DR. M.E.R.
CH. J.K.
MATERIAL RELEASE DATE
STRUCT. STEEL
REINF. STEEL 3-24-61
DECKING
GRATING
STAIR TREADS
HANDRAILING 5-26-61
NOSING 3-27-61
FLOOR DRAINS 1-13-61

ATTACHMENT 1-20
Mechanical Design Commodity Quantity Data

DWG. NO. RPMSK-OPT1-001

SYSTEM CODE	DESCRIPTION
RW	RAW WATER
PW	POTABLE WATER
SW	SERVICE WATER
BG	BULK GAS
SA	SERVICE AIR
IA	INSTRUMENT AIR
FO	FUEL OIL
FP	FIRE PROTECTION
WS	WASTE WATER
FG	FUEL GAS
OWS	OILY WATER SEPARATOR
WO	CHILLED WATER
NH	AMMONIA
DI	DEMINERALIZED WATER
BD	BLOWDOWN/EQUIPMENT DRAINS



NOTES

DATE	NO.	DESCRIPTION	APPD.
		REVISIONS	

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

COMBINED CYCLE U1 REPOWERING COST ESTIMATE STUDY

OPTION 1 UNDERGROUND

DWG. NO. RPMSK-OPT1-001

FILE NAME: RPMSK-OPT1-001.DGN

SCALE: 1"=30'-0"

DR:

CK:

APPROVED BY:

DATE:

PROFESSIONAL ENGINEER'S STAMP

Burgess & Lundy

REV	DATE RELEASED	PURPOSE	
A	07/11/2011	FOR INFORMATION	R. MILLER
			C. WOODS
			PREPARED
			REVIEWED
			APPROVED

DRAWING RELEASE RECORD

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/ INSTALLER'S OWN PERSONNEL FOR THAT OF ITS SUBCONTRACTORS PERFORMING THE WORK.

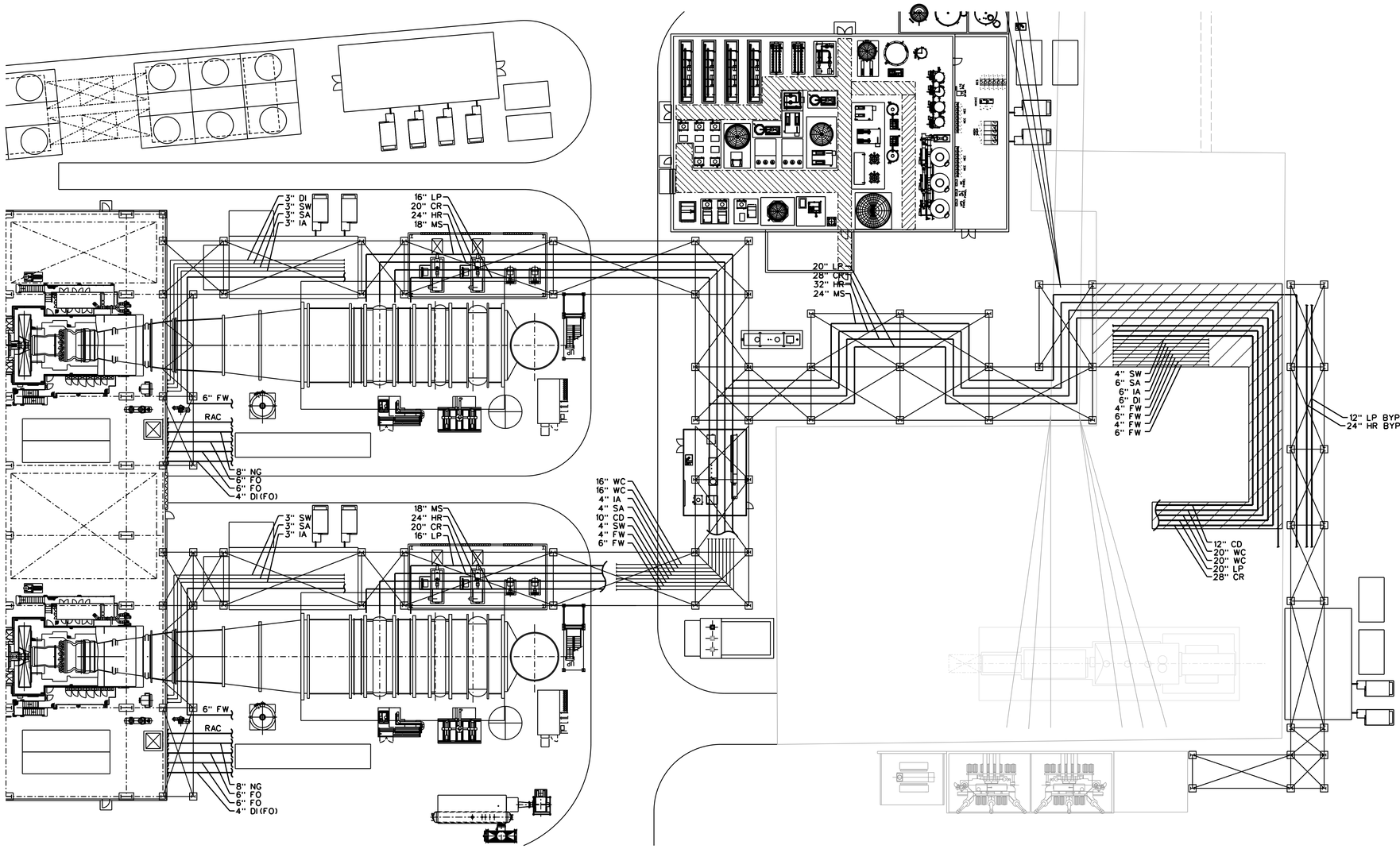
AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

IGS0694

SYSTEM DATE= DD-MMM-YYYY
SYSTEM TIME= HOUR:MINUTE

DWG. NO. RPMSK-OPT1-003



NOTES

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

COMBINED CYCLE U1 REPOWERING COST ESTIMATE STUDY

ABOVE GROUND PIPING

DWG. NO. RPMSK-OPT1-003

SCALE: 1"=0"

DR:

CH:

APPROVED BY:

DATE:

FILE NAME: RPMSK-OPT1-003.DGN

PROFESSIONAL ENGINEER'S STAMP

Burgess & Lundy

REV	DATE RELEASED	PURPOSE	
A	07/11/2011	FOR INFORMATION	R. MILLER / C. WOODS
			PREPARED
			REVIEWED
			APPROVED

DRAWING RELEASE RECORD

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE ASSOCIATED WITH THE WORK. THE CONTRACTOR/INSTALLER, PERSONNEL, OR PART OF ITS SUBCONTRACTORS PERFORMING THE WORK

0' 20' 40' 60'

GRAPHIC SCALE: 1"= 20'-0"

PLANT NORTH

AEP AMERICAN ELECTRIC POWER

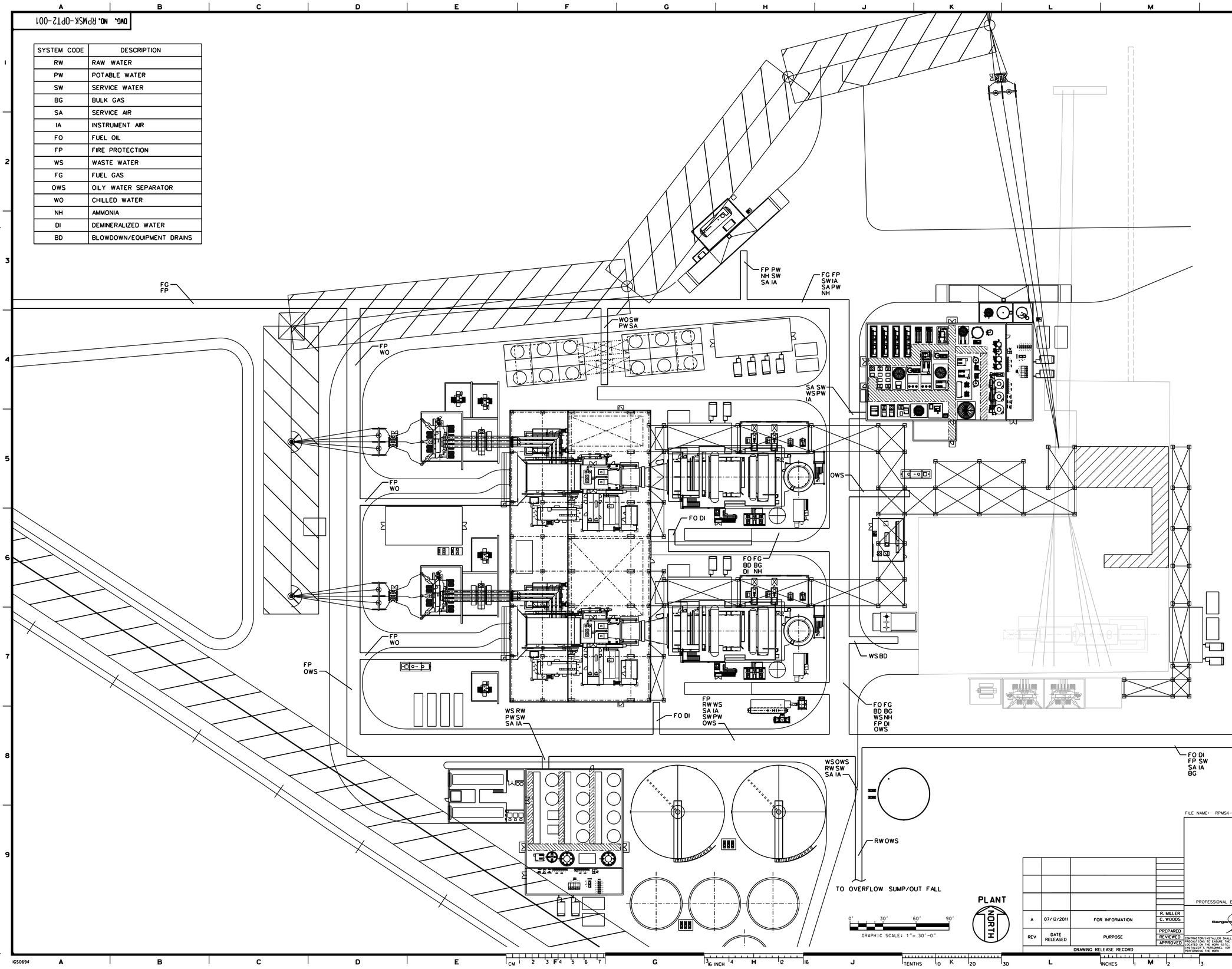
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOUR:MIN:SS

IGS0694

DWG. NO. RPMSK-OPT2-001

SYSTEM CODE	DESCRIPTION
RW	RAW WATER
PW	POTABLE WATER
SW	SERVICE WATER
BG	BULK GAS
SA	SERVICE AIR
IA	INSTRUMENT AIR
FO	FUEL OIL
FP	FIRE PROTECTION
WS	WASTE WATER
FG	FUEL GAS
OWS	OILY WATER SEPARATOR
WO	CHILLED WATER
NH	AMMONIA
DI	DEMINERALIZED WATER
BD	BLOWDOWN/EQUIPMENT DRAINS



NOTES

DATE	NO.	DESCRIPTION	APPD.
		REVISIONS	

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

COMBINED CYCLE U1 REPOWERING COST ESTIMATE STUDY

OPTION 2 UNDERGROUND

DWG. NO. RPMSK-OPT2-001

FILE NAME: RPMSK-OPT2-001.DGN

SCALE: 1"=30'-0"

DR:

CK:

APPROVED BY:

DATE:

PROFESSIONAL ENGINEER'S STAMP

Burgess & Lundy

REV	DATE RELEASED	PURPOSE	PREPARED	REVIEWED	APPROVED
A	07/12/2011	FOR INFORMATION		R. MILLER	C. WOODS

DRAWING RELEASE RECORD

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/ INSTALLER'S OWN PERSONNEL FOR THAT OF ITS SUBCONTRACTORS PERFORMING THE WORK.

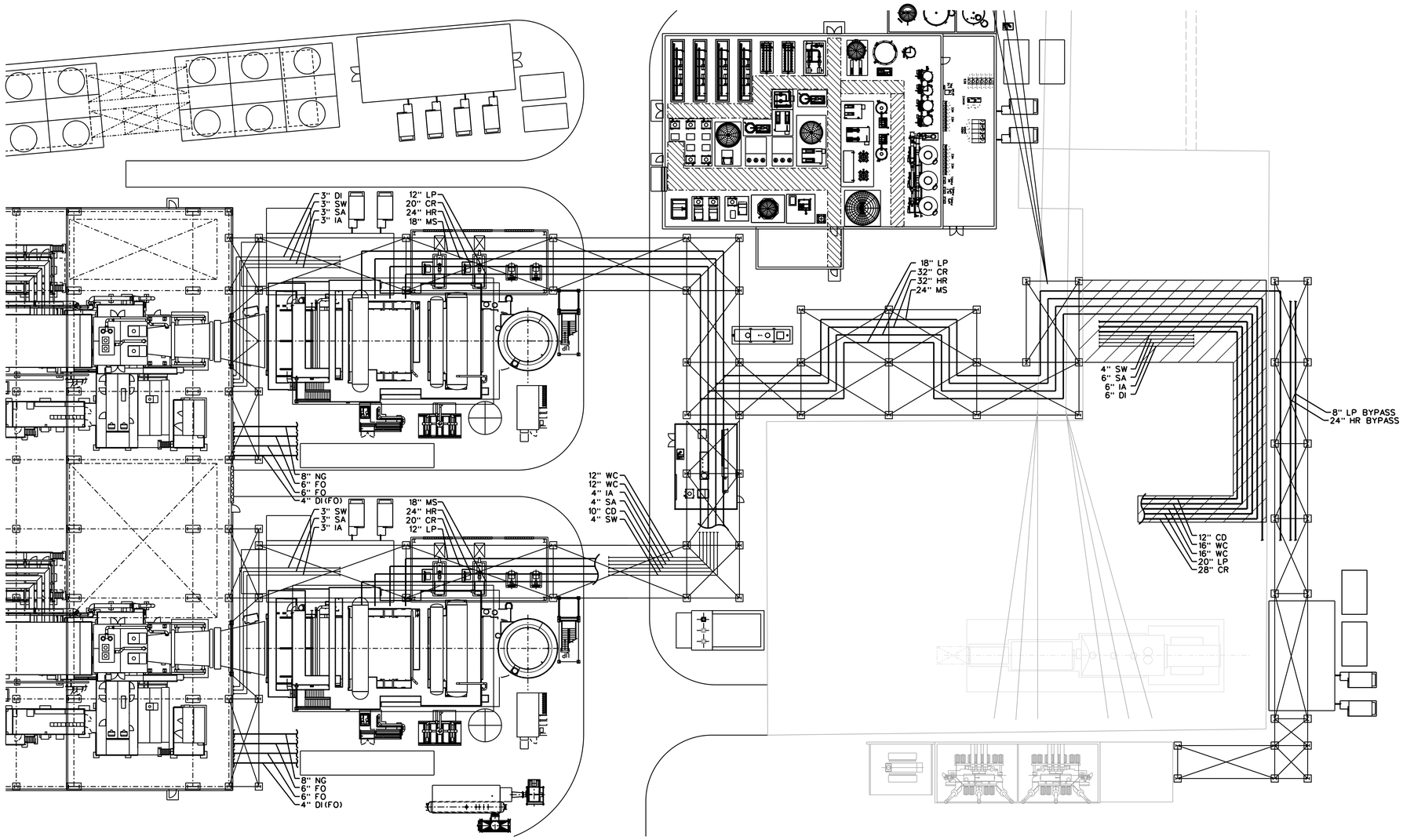
AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOUR:MINUTE

IGS0694

DWG. NO. RPMSK-OPT2-003



NOTES

DATE	NO.	DESCRIPTION	APPD.
		REVISIONS	

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

COMBINED CYCLE U1 REPOWERING COST ESTIMATE STUDY

ABOVE GROUND PIPING

DWG. NO. RPMSK-OPT2-003

SCALE: 1"=0"

DR:

CH:

APPROVED BY:

DATE:

FILE NAME: RPMSK-OPT2-003.DGN

PROFESSIONAL ENGINEER'S STAMP

Bargent & Lundy

REV	DATE RELEASED	PURPOSE	
A	07/12/2011	FOR INFORMATION	R. MILLER / C. WOODS
			PREPARED
			REVIEWED
			APPROVED

DRAWING RELEASE RECORD

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PERSONS LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL, OR THAT OF ITS SUBCONTRACTORS PERFORMING THE WORK.

0' 20' 40' 60'

GRAPHIC SCALE: 1"= 20'-0"

PLANT NORTH

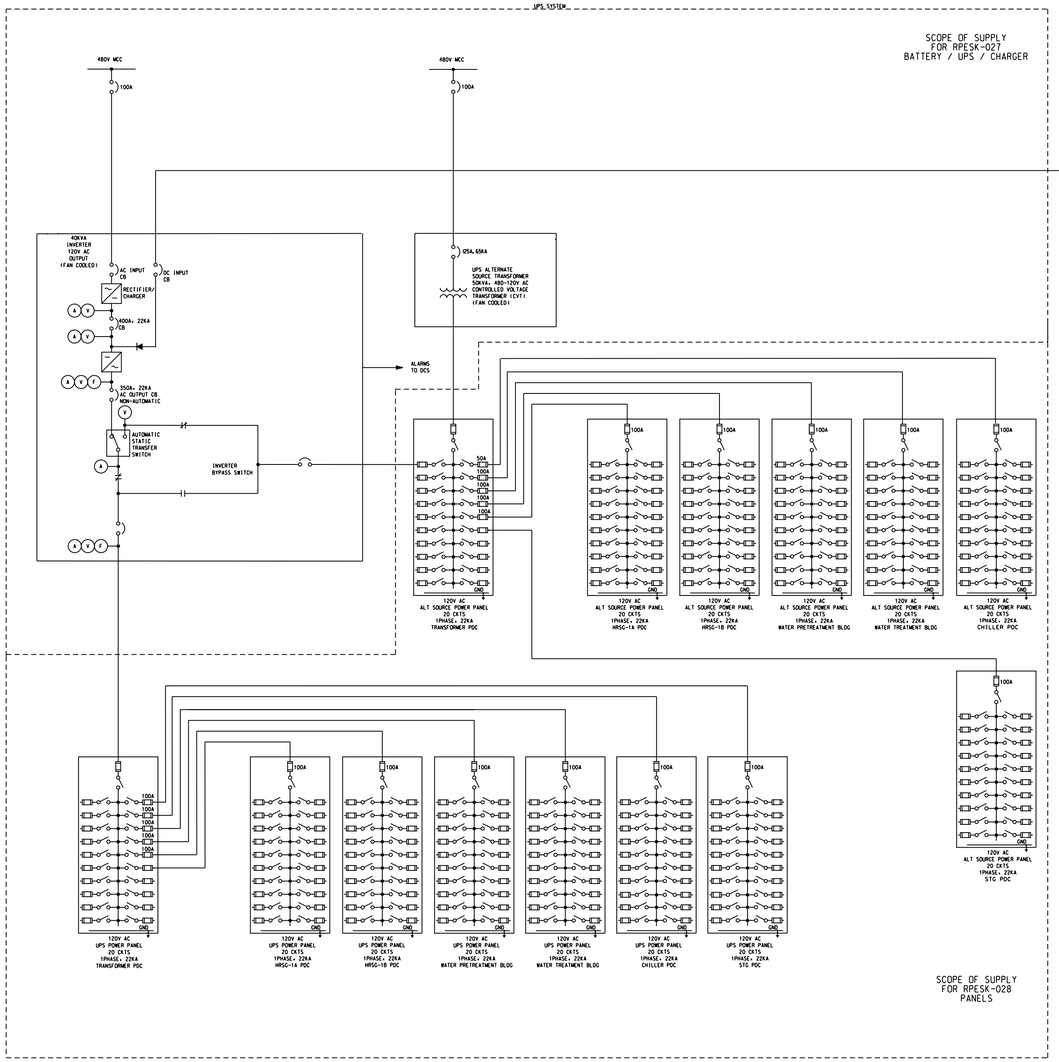
AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOUR:MINUTE

IGS0694

ATTACHMENT 1-21
Electrical Design Commodity Quantity Data



NOTES

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY — KENTUCKY

COMBINDED CYCLE U1 REPOWERING
COST ESTIMATE STUDY
DC & UPS ONE LINE DIAGRAM

DWG. NO. RPESK-002

SCALE: 1"=100'-0"

DR: M. SRONCE

CH:

DATE:

FILE NAME: RPESK-002.DGN

REV	DATE RELEASED	PURPOSE	PREPARED	REVIEWED	APPROVED
A	07/25/2011	ISSUED FOR USE	M. SRONCE		

DRAWING RELEASE RECORD

PROFESSIONAL ENGINEER'S STAMP

Sargent & Lundy

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S EMPLOYEES AND PERSONNEL FOR THAT OF ITS SUBCONTRACTOR'S PERFORMING THE WORK

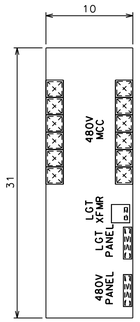
AEP AMERICAN ELECTRIC POWER

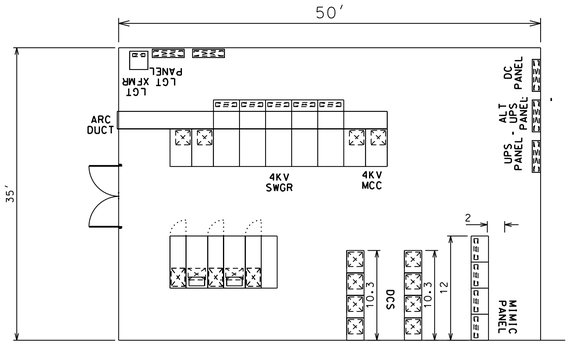
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOURMINUTE

IGS0694

DWG. NO. ESK-003



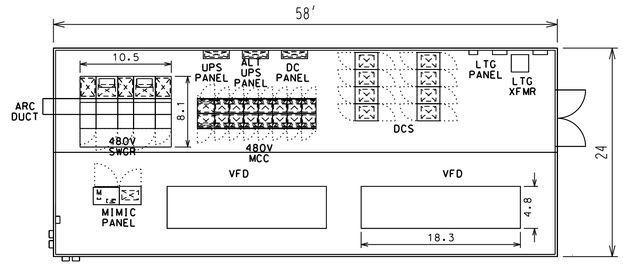


CTG HVAC PDC

QUANTITY: 1
2 X WALL MOUNTED AC UNITS (EACH)

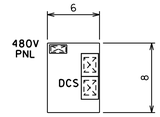
STG PDC

QUANTITY: 2
2 X 25 TON PAD MOUNTED AC UNITS (EACH)



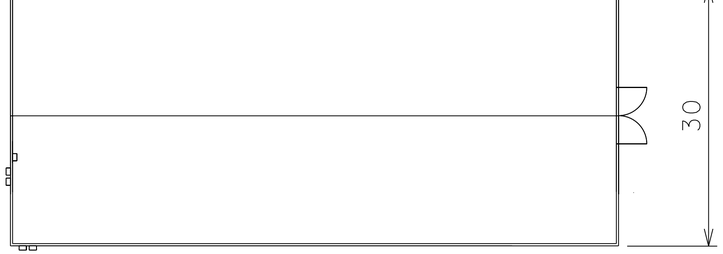
HRSG PDC

QUANTITY: 2
2 X 25 TON PAD MOUNTED AC UNITS (EACH)



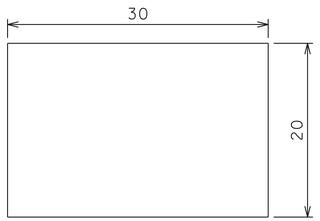
HRSG PDC UPPER

QUANTITY: 2
2 X WALL MOUNTED AC UNITS (EACH)



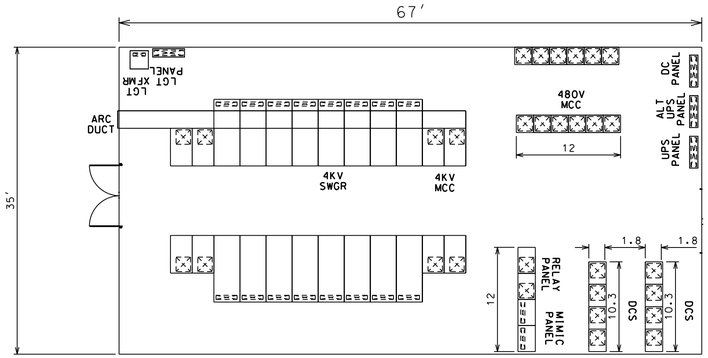
CHILLER PDC

QUANTITY: 2
2 X 25 TON PAD MOUNTED AC UNITS (EACH)



FUEL OIL PDC

QUANTITY: 2
2 X 25 TON PAD MOUNTED AC UNITS (EACH)



TRANSFORMER PDC

QUANTITY: 1
2 X 25 TON PAD MOUNTED AC UNITS

NOTES

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

COMBINED CYCLE U1 REPOWERING
COST ESTIMATE STUDY
PDC LAYOUTS

DWG. NO. RPESK-004

SCALE: 1"=0"-0"
DR:
CH:
DATE:
APPROVED BY

FILE NAME: RPESK-004.DGN

PROFESSIONAL ENGINEER'S STAMP

REV	DATE RELEASED	PURPOSE	
A	7/25/11	ISSUED FOR USE	M. SRONCE
			PREPARED
			REVIEWED
			APPROVED

DRAWING RELEASE RECORD

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S AND OWNER'S PERSONNEL FOR THAT OF ITS SUBCONTRACTORS PERFORMING THE WORK.

AEP AMERICAN ELECTRIC POWER
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

0' 10' 20' 30'
GRAPHIC SCALE: 1"= 10'-0"

PLANT NORTH

IGS0694

SYSTEM DATE- DD-MMM-YYYY
SYSTEM TIME- HOURMINUTE

BIG SANDY REPOWERING
RPESK-OPT1-005
Quantity Estimate for Small LV, Control, Instrument and FO Cable

Basis for the Estimate

1. The basis for the quantity is the Stall design.
2. Adjustments considered to the Stall design are as follows:
    a. M501G Combustion Turbine
    b. Aux Boiler not on Stall
    c. CTG Building not on Stall
    d. WT Pretreatment not on Stall
    e. Less heat tracing than Stall due to indoor turbines.
    f. 2 BFPs per HRSG whereas Stall had one BFP per HRSG.
    g. Liquid Fuel not on Stall
    h. Fewer electrical PDCs than Stall.
3. Cables have been estimated by account 70 or 75.
4. The methodology used has been to take the Stall cable quantities and apply a 15% adder to adjust for the systems mentioned above. 80% of control, instrument and FO cables have been assumed to be related to DCS and have been applied to account 75. All other cables are applied to account 70.

Big Sandy Repowering
Small LV, Control, Instrument and Fiber Cables
RPESK-OPT1-005

Segregation Code	Cable Type	Number of Cables at Stall	(Pulled Length + Routed Length for cables with no pulled length available + Allownace for cables with no pulled length available)	Number of Cables Adjusted for Big Sandy Total (x1.15)	Cable Length Adjusted for Big Sandy Total (x1.15)	Number of Cables Adjusted for Big Sandy Account 70	Cable Length Adjusted for Big Sandy Account 70	Number of Cables Adjusted for Big Sandy Account 75	Cable Length Adjusted for Big Sandy Account 75
L2	2/C # 10 W/G, 600V	789	131419	907	151132	1114	90753		
L2	2/C # 12 W/G, 600V	142	29993	163	34492	189	37414		
L2	3/C # 2 W/G, 600V	38	7843	44	9019	46	12793		
L2	3/C # 6 W/G, 600V	49	10598	56	12188	56	12188		
L2	3/C # 8 W/G, 600V	26	4683	30	5385	35	8737		
L2	3/C # 10 W/G, 600V	143	29535	164	33965	164	33965		
L2	3/C # 2/0 W/G, 600V	16	1571	18	1807	22	4513		
L2	2/C # 12 W/G, 600V, PDC CABLE	26	0	30	0	36	0		
L2	3/C # 2/0 W/G, W/S, 1KV	8	1091	9	1255	9	1089		
L2	AEP_GASPW1	1	168	1	193	1	460		
L2	AEP_GASPW2	1	180	1	207	1	426		
L2	AEP_GASPW3	1	170	1	196	1	426		
C	2/C # 10 W/G, 600V	15	4739	17	5450	45	3259		
C	2/C # 12 W/G, 600V	90	19226	104	22110	108	16542		
C	2/C # 14, 600V	160	48416	184	55678	37	11136	147	44543
C	3/C # 2 W/G, 600V	4	892	5	1026	5	454		
C	3/C # 6 W/G, 600V	4	910	5	1047	5	1047		
C	3/C # 10 W/G, 600V	42	16956	48	19499	48	6803		
C	3/C # 2/0 W/G, 600V	8	3120	9	3588	9	840		
C	4/C # 10, 600V	42	13816	48	15888	58	8723		
C	4/C # 14, 600V	102	25907	117	29793	23	5959	94	23834
C	7/C # 14, 600V	188	48572	216	55858	43	11172	173	44686
C	12/C # 14, 600V	37	13901	43	15986	9	3197	34	12789
C	1/C # 14, W/S, 600V, FP	32	11054	37	12712	37	2401		
C	1/C #14, 600V, JMPR	4	1280	5	1472	5	21		
C	2/C # 10 W/G, 600V, AEP CABLE	2	1413	2	1625	2	2328		
C	2/C # 14, 600V, PDC CABLE	41	0	47	0	9	0	38	0
C	3/C # 6 W/G, W/S, 1000V	2	320	2	368	2	368		
C	4/C # 10, 600V, PDC CABLE	2	0	2	0	0	0	2	0
C	4/C # 14, 600V, PDC CABLE	105	0	121	0	24	0	97	0
C	7/C # 14, 600V, PDC CABLE	86	0	99	0	20	0	79	0
C	9/C # 14, 600V, PDC CABLE	20	0	23	0	5	0	18	0
C	1 PR # 16, W/S, 600V	2	935	2	1075	0	215	2	860
C	1 PR # 16, W/S, 600V	2	935	2	1075	0	215	2	860
CX1	RG58U	3	226	3	260	3	294		
CX2	COAX CABLE W/ BNC CONNECTOR	2	50	2	58	2	71		
D	1 PR # 16, W/S, 600V	12	556	14	639	15	760		
D	PRE-FAB USB CABLE	1	450	1	518	1	132		
E1	CAT6 CABLE	11	892	13	1026	13	1323		
E1	CAT6 CABLE, ABB	14	807	16	928	16	622		
E2	CAT6 CABLE	2	85	2	98	2	161		
FO1	FIBER 12MM, 12SM	10	1394	12	1603	2	321	9	1282
FO1	FO-12 FIBER MULTIMODE	29	1796	33	2065	7	413	27	1652
FO1	FO-2 FIBER MULTIMODE, FORNEY	2	141	2	162	0	32	2	130
FO1	FIBER 24MM, 24SM	4	195	5	224	1	45	4	179
FO2	FO-12 FIBER MULTIMODE	13	1114	15	1281	3	256	12	1025
FO2	FIBER 24MM, 24SM	1	245	1	282	1	1840		
H	1/C # 2/0, 25KV	0	0	0	0	1	115		
K	2/C # 14, 600V	3	250	3	288	1	58	3	230
K	2/C # 10 W/G, 600V, AEP CABLE	2	0	2	0	2	2185		
K	4/C # 14, 600V, PDC CABLE	1	150	1	173	0	35	1	138
K	16/C # 14, 600V, AEP CABLE	2	130	2	150	2	2185		
K	1 PR # 16, W/S, 600V	529	71268	608	81958	122	16392	487	65567
K	1 PR # 16, W/S, 600V, TYPE K	241	38000	277	43700	55	8740	222	34960
K	1 PR # 18, W/IOS, 600V, TYPE KXH	216	29232	248	33617	50	6723	199	26893
K	1 PR # 16, W/IOS, 600V, TYPE SIH	6	733	7	843	1	169	6	674
K	1 TR # 16, W/S, 600V	92	14808	106	17029	21	3406	85	13623
K	2 PR # 16, W/IOS, 600V	180	33464	207	38484	41	7697	166	30787
K	2 PR # 16, W/IOS, 600V, PDC CABLE	18	2050	21	2358	4	472	17	1886
K	4 PR # 16, W/IOS, 600V	77	13582	89	15619	18	3124	71	12495
K	4 PR # 16, W/IOS, 600V, TYPE K	4	473	5	544	1	109	4	435
K	4 PR # 16, W/IOS, 600V, PDC CABLE	3	439	3	505	1	101	3	404

Big Sandy Repowering
Small LV, Control, Instrument and Fiber Cables
RPESK-OPT1-005

Segregation Code	Cable Type	Number of Cables at Stall	(Pulled Length + Routed Length for cables with no pulled length available + Allownace for cables with no pulled length available)	Number of Cables Adjusted for Big Sandy Total (x1.15)	Cable Length Adjusted for Big Sandy Total (x1.15)	Number of Cables Adjusted for Big Sandy Account 70	Cable Length Adjusted for Big Sandy Account 70	Number of Cables Adjusted for Big Sandy Account 75	Cable Length Adjusted for Big Sandy Account 75
K	4 TR # 16, W/IOS, 600V	24	3284	28	3777	6	755	22	3021
K	8 PR # 16, W/IOS, 600V	87	13228	100	15212	20	3042	80	12170
K	8 PR # 16, W/IOS, 600V, AEP CABLE	2	140	2	161	3	2162		
K	8 PR # 16, W/IOS, 600V, TYPE KX	24	3740	28	4301	6	860	22	3441
K	8 PR # 16, W/IOS, 600V, PDC	0	0	0	0	2	0		
K	COAX CABLE TYPE RG6	4	513	5	590	5	340		
K	SPG CABLE (COAX)	16	1451	18	1669	18	644		
K	SPG CABLE (2/C)	64	9197	74	10577	74	0		
K	SPG CABLE (2/C W/S)	32	4318	37	4966	37	0		
	Total	3961	678044	4555	779751				

BIG SANDY REPOWERING
RPESK-OPT2-005
Quantity Estimate for Small LV, Control, Instrument and FO Cable

Basis for the Estimate

1. The basis for the quantity is the Stall design.
2. Adjustments considered to the Stall design are as follows:
    a. GE 7FA Combustion Turbine
    b. Aux Boiler not on Stall
    c. CTG Building not on Stall
    d. WT Pretreatment not on Stall
    e. Less heat tracing than Stall due to indoor turbines.
    f. 2 BFPs per HRSG whereas Stall had one BFP per HRSG.
    g. Liquid Fuel not on Stall
    h. Fewer electrical PDCs than Stall.
3. Cables have been estimated by account 70 or 75.
4. The methodology used has been to take the Stall cable quantities and apply a 10% adder to adjust for the systems mentioned above. 80% of control, instrument and FO cables have been assumed to be related to DCS and have been applied to account 75. All other cables are applied to account 70.

Big Sandy Repowering
Small LV, Control, Instrument and Fiber Cables
RPESK-OPT2-005

Segregation Code	Cable Type	Number of Cables at Stall	(Pulled Length + Routed Length for cables with no pulled length available + Allownace for cables with no pulled length available)	Number of Cables Adjusted for Big Sandy Total (x1.10)	Cable Length Adjusted for Big Sandy Total (x1.10)	Number of Cables Adjusted for Big Sandy Account 70	Cable Length Adjusted for Big Sandy Account 70	Number of Cables Adjusted for Big Sandy Account 75	Cable Length Adjusted for Big Sandy Account 75
L2	2/C # 10 W/G, 600V	789	131419	868	144561	1114	90753		
L2	2/C # 12 W/G, 600V	142	29993	156	32992	189	37414		
L2	3/C # 2 W/G, 600V	38	7843	42	8627	46	12793		
L2	3/C # 6 W/G, 600V	49	10598	54	11658	54	11658		
L2	3/C # 8 W/G, 600V	26	4683	29	5151	35	8737		
L2	3/C # 10 W/G, 600V	143	29535	157	32489	157	32489		
L2	3/C # 2/0 W/G, 600V	16	1571	18	1728	22	4513		
L2	2/C # 12 W/G, 600V, PDC CABLE	26	0	29	0	36	0		
L2	3/C # 2/0 W/G, W/S, 1KV	8	1091	9	1200	9	1089		
L2	AEP_GASPW1	1	168	1	185	1	460		
L2	AEP_GASPW2	1	180	1	198	1	426		
L2	AEP_GASPW3	1	170	1	187	1	426		
C	2/C # 10 W/G, 600V	15	4739	17	5213	45	3259		
C	2/C # 12 W/G, 600V	90	19226	99	21149	108	16542		
C	2/C # 14, 600V	160	48416	176	53258	35	10652	141	42606
C	3/C # 2 W/G, 600V	4	892	4	981	5	454		
C	3/C # 6 W/G, 600V	4	910	4	1001	5	1047		
C	3/C # 10 W/G, 600V	42	16956	46	18652	48	6803		
C	3/C # 2/0 W/G, 600V	8	3120	9	3432	9	840		
C	4/C # 10, 600V	42	13816	46	15198	58	8723		
C	4/C # 14, 600V	102	25907	112	28498	22	5700	90	22798
C	7/C # 14, 600V	188	48572	207	53429	41	10686	165	42743
C	12/C # 14, 600V	37	13901	41	15291	8	3058	33	12233
C	1/C # 14, W/S, 600V, FP	32	11054	35	12159	37	2401		
C	1/C #14, 600V, JMPR	4	1280	4	1408	5	21		
C	2/C # 10 W/G, 600V, AEP CABLE	2	1413	2	1554	2	2328		
C	2/C # 14, 600V, PDC CABLE	41	0	45	0	9	0	36	0
C	3/C # 6 W/G, W/S, 1000V	2	320	2	352	2	368		
C	4/C # 10, 600V, PDC CABLE	2	0	2	0	0	0	2	0
C	4/C # 14, 600V, PDC CABLE	105	0	116	0	23	0	92	0
C	7/C # 14, 600V, PDC CABLE	86	0	95	0	19	0	76	0
C	9/C # 14, 600V, PDC CABLE	20	0	22	0	4	0	18	0
C	1 PR # 16, W/S, 600V	2	935	2	1029	0	206	2	823
C	1 PR # 16, W/S, 600V	2	935	2	1029	0	206	2	823
CX1	RG58U	3	226	3	249	3	294		
CX2	COAX CABLE W/ BNC CONNECTOR	2	50	2	55	2	71		
D	1 PR # 16, W/S, 600V	12	556	13	612	15	760		
D	PRE-FAB USB CABLE	1	450	1	495	1	132		
E1	CAT6 CABLE	11	892	12	981	13	1323		
E1	CAT6 CABLE, ABB	14	807	15	888	16	622		
E2	CAT6 CABLE	2	85	2	94	2	161		
FO1	FIBER 12MM, 12SM	10	1394	11	1533	2	307	9	1227
FO1	FO-12 FIBER MULTIMODE	29	1796	32	1976	6	395	26	1580
FO1	FO-2 FIBER MULTIMODE, FORNEY	2	141	2	155	0	31	2	124
FO1	FIBER 24MM, 24SM	4	195	4	215	1	43	4	172
FO2	FO-12 FIBER MULTIMODE	13	1114	14	1225	3	245	11	980
FO2	FIBER 24MM, 24SM	1	245	1	270	1	1840		
H	1/C # 2/0, 25KV	0	0	0	0	1	115		
K	2/C # 14, 600V	3	250	3	275	1	55	3	220
K	2/C # 10 W/G, 600V, AEP CABLE	2	0	2	0	2	2185		
K	4/C # 14, 600V, PDC CABLE	1	150	1	165	0	33	1	132
K	16/C # 14, 600V, AEP CABLE	2	130	2	143	2	2185		
K	1 PR # 16, W/S, 600V	529	71268	582	78395	116	15679	466	62716
K	1 PR # 16, W/S, 600V, TYPE K	241	38000	265	41800	53	8360	212	33440
K	1 PR # 18, W/IOS, 600V, TYPE KXH	216	29232	238	32155	48	6431	190	25724
K	1 PR # 16, W/IOS, 600V, TYPE SIH	6	733	7	806	1	161	5	645
K	1 TR # 16, W/S, 600V	92	14808	101	16289	20	3258	81	13031
K	2 PR # 16, W/IOS, 600V	180	33464	198	36810	40	7362	158	29448
K	2 PR # 16, W/IOS, 600V, PDC CABLE	18	2050	20	2255	4	451	16	1804
K	4 PR # 16, W/IOS, 600V	77	13582	85	14940	17	2988	68	11952
K	4 PR # 16, W/IOS, 600V, TYPE K	4	473	4	520	1	104	4	416
K	4 PR # 16, W/IOS, 600V, PDC CABLE	3	439	3	483	1	97	3	386

Big Sandy Repowering
Small LV, Control, Instrument and Fiber Cables
RPESK-OPT2-005

Segregation Code	Cable Type	Number of Cables at Stall	(Pulled Length + Routed Length for cables with no pulled length available + Allownace for cables with no pulled length available)	Number of Cables Adjusted for Big Sandy Total (x1.10)	Cable Length Adjusted for Big Sandy Total (x1.10)	Number of Cables Adjusted for Big Sandy Account 70	Cable Length Adjusted for Big Sandy Account 70	Number of Cables Adjusted for Big Sandy Account 75	Cable Length Adjusted for Big Sandy Account 75
K	4 TR # 16, W/IOS, 600V	24	3284	26	3612	5	722	21	2890
K	8 PR # 16, W/IOS, 600V	87	13228	96	14551	19	2910	77	11641
K	8 PR # 16, W/IOS, 600V, AEP CABLE	2	140	2	154	3	2162		
K	8 PR # 16, W/IOS, 600V, TYPE KX	24	3740	26	4114	5	823	21	3291
K	8 PR # 16, W/IOS, 600V, PDC	0	0	0	0	2	0		
K	COAX CABLE TYPE RG6	4	513	4	564	5	340		
K	SPG CABLE (COAX)	16	1451	18	1596	18	644		
K	SPG CABLE (2/C)	64	9197	70	10117	74	0		
K	SPG CABLE (2/C W/S)	32	4318	35	4750	37	0		
	Total	3961	678044	4357	745848				

BIG SANDY REPOWERING
RPESK-006
Quantity Estimate Lightning Protection

Basis for the Estimate

1. The basis for the quantity is the Stall design.
2. Perimeters for buildings were taken that will require a form of lightning protection.
3. An air terminal was located every 22.5’

American Electric Power
Big Sandy Plant
Combined Cycle
Unit 1 Repowering Cost Estimate Study

Quantity Estimate for Lightning Protection
RPESK-006

7/25/2011
Rev. A

Item	Ground Conductor	lf	Air Terminals	ea	Remarks
CTG Building	#2/0 Bare Conductor	874	5/8" x 2' terminal	39	Building is 262 x 125' estimated 10 x 10' downcomers will round up for submittal
Water Treatment Building	#2/0 Bare Conductor	580	5/8" x 2' terminal	26	Building is 150 x 90' estimated 10 x 10' downcomers will round up for submittal
Transformer PDC	#2/0 Bare Conductor	260	5/8" x 2' terminal	12	Building is 70 x 35' estimated 5 x 10' downcomers will round up for submittal
Pre Treatment Building	#2/0 Bare Conductor	520	5/8" x 2' terminal	23	Building is 120 x 90' estimated 10 x 10' downcomers will round up for submittal
Filter Building	#2/0 Bare Conductor	290	5/8" x 2' terminal	13	Building is 70 x 50' estimated 5 x 10' downcomers will round up for submittal
Fire Protection Building	#2/0 Bare Conductor	290	5/8" x 2' terminal	13	Building is 60 x 60' estimated 5 x 10' downcomers will round up for submittal
Fuel Oil Storage Tank 1	#2/0 Bare Conductor	414	5/8" x 2' terminal	18	Tank Diameter is 58' estimated 5 x 10' downcomers will round up for submittal
Fuel Oil Storage Tank 2	#2/0 Bare Conductor	414	5/8" x 2' terminal	18	Tank Diameter is 58' estimated 5 x 10' downcomers will round up for submittal
Chiller PDC	#2/0 Bare Conductor	250	5/8" x 2' terminal	11	Building is 70 x 30' estimated 5 x 10' downcomers will round up for submittal
Fuel Oil PDC	#2/0 Bare Conductor	150	5/8" x 2' terminal	7	Building is 20 x 30' estimated 5 x 10' downcomers will round up for submittal
Total		3,892		173	

BIG SANDY REPOWERING
RPESK-007
Quantity Estimate Heat Tracing

Basis for the Estimate

1. The basis for the quantity is the Stall design.
2. Adjustments considered to the Stall design are as follows:
    a. The location of Big Sandy (Ohio) has a much lower ambient air temperature in the winter than Stall (Louisana). (adder)
    b. A water pretreatment facility being included. (adder)
    c. CTG being located indoors along with auxiliaries. (deduct)
    d. The STG and auxiliary systems are existing. (deduct)
3. 600V field cables for the feeds to the transformers, panels, and junction boxes are included in Big Sandy Repowering Cost Estimate Study RPESK-005 Small Cable Estimate.

American Electric Power
Big Sandy Plant
Combined Cycle
Unit 1 Repowering Cost Estimate Study

Quantity Estimate for Heat Tracing
RPESK-007

7/25/2011
Rev. A

Item	Description	Scope Definition	Quantity	Unit	Remarks
1	Heat Tracing Transformers	480-208/120; 45KVA	6	EA	
2	Heat Tracing Distribution Panels	208/120VAC; 30CKT Panels	6	EA	
3	Heat Tracing Cable	MI Cable	30,938	FT	
	Heat Tracing Cable	Self Limiting	10,313	EA	
4	Heat Tracing Junction Boxes		447	EA	

BIG SANDY REPOWERING
RPESK-008
Quantity Estimate Cathodic Protection

Basis for the Estimate

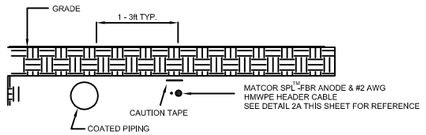
1. The basis for the quantity is the Stall design.
2. Adjustments considered to the Stall design are as follows:
    a. A water pretreatment facility being included.
    b. An instrument air line and water line will be routed to the fuel oil storage area.
    c. A fuel gas line from the gas yard to the power block.
3. Cables for the feeds to the transformers and panels are included in the RPESK-005 Small cable estimate.
4. The methodology used has been to take the Stall quantities and apply a 15% adder to account for adjustments identified.

American Electric Power
Big Sandy Plant
Combined Cycle
Unit 1 Repowering Cost Estimate Study

Quantity Estimate for Cathodic Protection
ESK-008

7/25/2011
Rev. A

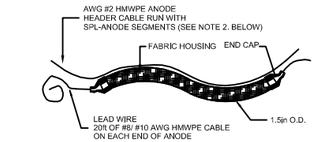
Item	Description	Scope Definition	lf/ea	Remarks
1	TRANSFORMER RECTIFIER		2	
2	ANODE JUNCTION BOX		4	
3	BOND BOX		3	
4	BOND TESTING STATION		5	
5	REFERENCE ELECTRODE		10	
6	SPL FBR ANODE		6,090	
Cathodic Protection Design Considerations				
1)	Approximately the same amount of CP required from Stall			
2)	CP will be requird for the IA line out to the Fuel Oil area therefore add 1865 anode length, a rectifier,			
	two anode junction boxes, two bond boxes, two reference electrodes, two test stations			



GENERAL NOTES:

1. LOCATE ANODE AS SHOWN ON PLAN DRAWINGS.
2. IF NECESSARY, DIG A TRENCH A MINIMUM OF 101,6mm(4in) WIDE TO INSTALL THE SPL(TM)-ANODE AT THE DEPTH EQUAL TO THE PIPE CENTERLINE.
3. WHERE THE SPL™ANODE WILL CROSS A METALLIC PIPE REFER TO DETAIL 2B ON THIS SHEET FOR THE ISOLATION (SHIELDING?) OF THE ANODE AT THAT LOCATION.
4. BACKFILL WITH NATIVE SOIL OR CLEAN SAND FILL TO A TOTAL DEPTH OF 6in OVER THE ANODE. DO NOT ALLOW DEBRIS, LARGE ROCKS, ETC. TO BE PLACED OVER THE ANODE.
5. HAND TAMP THE 6in OF FINE BACKFILL THEN PLACE CAUTION TAPE PRIOR TO BACKFILLING THE TRENCH WITH NATIVE SOIL/SAND FILL.
6. LAY CAUTION TAPE 12in ABOVE ANODE.

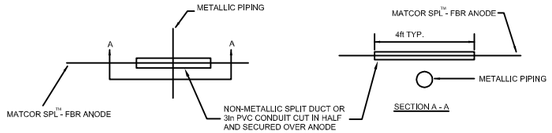
1 MATCOR SPL™ - FBR ANODE TYPICAL INSTALLATION
SCALE: NONE



NOTES:

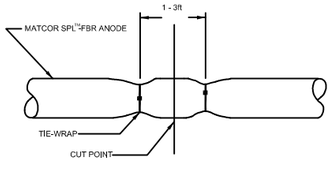
1. ANODES TO BE PROVIDED IN LENGTHS OF 500/t AND MAY NEED TO BE CUT IN FIELD TO LENGTHS NECESSARY. REFER TO DETAIL 2B& 2C THIS SHEET FOR CUTTING AND SPLICING THE ANODE.
2. ANODES SEGMENTS IN LENGTHS LESS THEN 100/t LONG DO NOT REQUIRE THE #2 AWG HMWPE HEADER CABLE TO BE RUN. SPLICE SMALL SEGMENTS INTO CLOSEST HEADER CABLE.
3. ROUTE ALL ANODE HEADER CABLES TO ANODE JUNCTION BOX.
4. INCLUDE CABLE IDENTIFIER ON ALL ANODE CABLES LABELED: A1, A2, A3, ..., A13
5. LAY CABLE WARNING TAPE 12in ABOVE ANODE.

2 MATCOR SPL™ - ANODE
SCALE: NONE



NOTE:
THE 3in NON-METALLIC PIPE IS TO BE CUT IN HALF ALONG ITS LENGTH IN ORDER TO BE PLACED OVER THE INSTALLED SECTION OF ANODE. THEN, THE PIPE SECTIONS ARE TO BE TAPED TOGETHER TO SECURE THE TWO SECTIONS.

2A ANODE ISOLATION AT METALLIC CROSSING
SCALE: NONE



TYPICAL PROCEDURE TO CUT MATCOR SPL™FBR ANODE

1. PLACE AND TIGHTEN TIE-WRAPS ON EITHER SIDE OF AREA TO BE CUT.
2. CUT CLOTH CAREFULLY - DO NOT NICK ANODE OR CABLE.
3. CUT CABLE & ANODE (NOT AT EXISTING ANODE SPLICE LOCATION).
4. SPLICE WIRE TO END OF CABLE IF NEEDED. (SEE DETAIL 2C THIS SHEET).
5. PLACE HEAT SHRINK OVER END OF CABLE AND HEAT. (SEE DETAIL 2C THIS SHEET AS NEEDED FOR PLACEMENT.)

2B MATCOR SPL™ - ANODE SPLICE - PART 1
SCALE: NONE

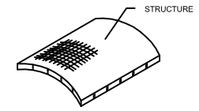
REVIEWED FOR
J. LAMAR STALL COMBINED CYCLE GENERATION PROJECT
J.LAMMAR STALL UNIT 1 AT ARSENAL HILL
AMERICAN ELECTRIC POWER
JLS PARTNRS

1. ☒ No exception taken. Contractor may proceed with fabrication or construction.
2. ☐ Revise as noted and resubmit. Contractor can proceed based on making revisions noted.
3. ☐ Results do not meet specification requirements. Revise and resubmit.
4. ☐ For information/construction. S&L review not required. Client and S&L distribution only.
5. ☐ Void.

NOTE: ANY ACTION SHOWN ABOVE IS SUBJECT TO THE TERMS OF THE CONTRACT AND DOES NOT RELIEVE CONTRACTOR FROM THE OBLIGATIONS UNDER THE CONTRACT INCLUDING DESIGN AND DETAILING.

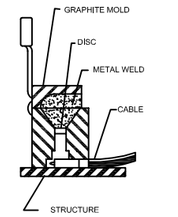
FOR : Matcor Drawings Return
SPECIFICATION NO.:S-8145
BY ROBERT ZARETSKY

LETTER NO.: JLS-JLSP-S8145-0005
PROJECT NO.: 12157-000
DATE: SEPTEMBER 11, 2008



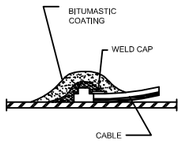
1) FILE STRUCTURE TO BARE METAL AND CLEAN SURFACE

2) STRIP INSULATION FROM WIRE AND ATTACH SLEEVE



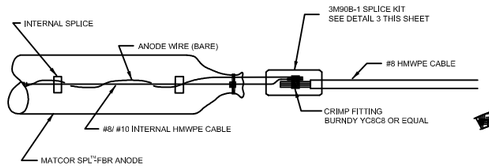
3) HOLD MOLD FIRMLY WITH OPENING AWAY FROM OPERATOR. IGNITE WITH FLINT GUN

4) REMOVE SLAG FROM CONNECTION WITH CHIPPING HAMMER



5) COVER CONNECTION WITH BITUMASTIC COATING OVER ALL EXPOSED METAL. COVER WITH WELD CAP

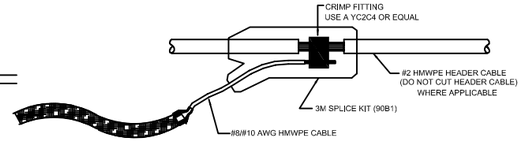
4 EXOTHERMIC WELD



TYPICAL ANODE CABLE SPLICE PROCEDURE

1. CUT BACK INSULATION FROM END OF #8 CABLE APPROX. 1in BE SURE ALL CABLE ENDS AND CONNECTIONS ARE CLEAN OF DIRT AND FOREIGN MATTER, AND THAT ALL CONNECTIONS ARE BARE METAL.
2. PUT CABLES AND ANODE WIRE IN CRIMP FITTING.
3. CRIMP THE FITTING.
4. APPLY SCOTCHKOTE ELECTRICAL COATING TO CRIMP FITTING AND CABLE WHERE INSULATION WAS REMOVED FOR 2in ON EITHER SIDE OF CRIMP.
5. SLIDE 3in LONG PIECE OF HEAT SHRINK OVER CONNECTION, CENTER OVER CRIMP, AND HEAT.

2C MATCOR SPL™- ANODE SPLICE - PART 2
SCALE: NONE



NOTES:

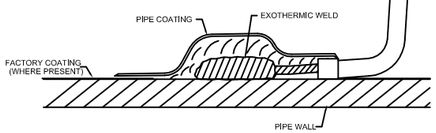
1. REMOVE SUFFICIENT INSULATION FROM EACH END OF #8/#10 & #2 CABLE.
2. REMOVE INSULATION FROM #6 HEADER CABLE. WHERE POSSIBLE, DO NOT CUT CABLE.
3. INSTALL CRIMP FITTING.
4. INSTALL SPLICE KITS AS PER 3M SPECS PROVIDED WITH SPLICE KITS.

3 3M 90-B1 EPOXY RESIN SPLICE KIT
SCALE: NONE

NOTES:

USE CADWELD MOLD CAHAA-1G FOR 4in AND LARGER PIPE
USE CADWELD MOLD CAHAA-1GA FOR 3/4in TO 3-1/2in PIPE
USE CA15 WELD METAL FOR ALL CADWELD CONNECTIONS.

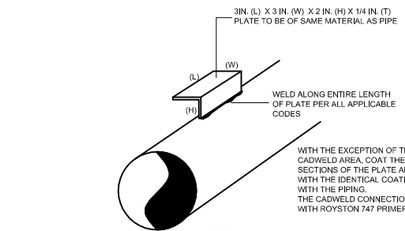
#8 AWG HMWPE CABLE - SYSTEM NEGATIVE BOND CABLE
OR
#10 AWG HMWPE CABLE - TEST STATION GROUND CABLE
USE CADWELD SLEEVE CAB-133-1L CRIMPED TO CABLE END PRIOR TO CADWELDING.



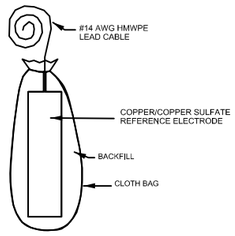
INSTALLATION OF SYSTEM NEGATIVE, TEST NEGATIVE AND CONTINUITY BOND

NOTES:
1. CUT 2in SQUARE OF COATING OFF PIPE, AND FILE PIPE TO WHITE METAL.
2. USE CHIPPING HAMMER TO MARK STEEL WITH ANCHOR PATTERN.
3. MAKE WELD PER MANUFACTURER'S DIRECTIONS IN MOLD PACKAGE.
4. STRIKE WELD WITH HAMMER TO REMOVE SCALE AND WIRE BRUSH.
5. SPRAY WELD AREA WITH PRIMER AND APPLY SHIELD OR COAT WITH SITE APPROVED PIPE COATING.
6. REFER TO DETAIL 11 ON SHEET R-2081227-DET2 FOR UN-BONDED PIPING

4A CABLE TO PIPE (NEGATIVE) CONNECTION
SCALE: NONE



5 REFERENCE ELECTRODE - TEST STATION



NOTES:

1. THE REFERENCE ELECTRODE IS TO BE INSTALLED ON THE SIDE OF THE PIPE THE FURTHEST FROM OF THE LINEAR ANODE.
2. THE REFERENCE ELECTRODE CAN BE INSTALLED VERTICALLY OR HORIZONTALLY.
3. THE REFERENCE ELECTRODE IS TO BE INSTALLED A MINIMUM OF 1ft., BUT NO MORE THAN 2ft., FROM THE PIPING.
4. INSTALL REFERENCE ELECTRODES AT LOCATIONS AS SHOWN ON THE PLANS. LEAD WIRE FROM REFERENCE ELECTRODES TO BE ROUTED TO AND TERMINATED AT TEST STATION - SEE DETAIL 5
5. SOAK REFERENCE ELECTRODES BY PLACING IN CONTAINER OF WATER APPROXIMATELY 30-60 MINUTES PRIOR TO INSTALLING. BACKFILL WITH NATIVE SOIL / SAND
6. SOAK AREA WITH WATER 5 GAL. MIN. PRIOR TO COMPLETE BACKFILLING.

6 REFERENCE ELECTRODE (TYP)

WITH THE EXCEPTION OF THE CADWELD AREA, COAT THE EXPOSED SECTIONS OF THE PLATE AND WELD AREA WITH THE IDENTICAL COATING AS SUPPLIED WITH THE PIPING.
THE CADWELD CONNECTION IS TO BE COATED WITH ROYSTON 747 PRIMER AND HANDY CAP.

4B CABLE TO PIPE (NEGATIVE) CONNECTION
SCALE: NONE
(IF REQUIRED)

DRAWING RELEASE RECORD						DRAWING RELEASE RECORD					
REV.	DATE REL'D.	PREPARED	REVIEWED	APPROVED	PURPOSE	REV.	DATE REL'D.	PREPARED	REVIEWED	APPROVED	PURPOSE
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SCALE	NONE
PAPER SIZE	11 x 17
	08-08-08

CATHODIC PROTECTION SYSTEM DETAILS
UNDERGROUND METALLIC PIPING

J. LAMAR STALL UNIT AT ARSENAL HILL
SHREVEPORT, LOUISIANA

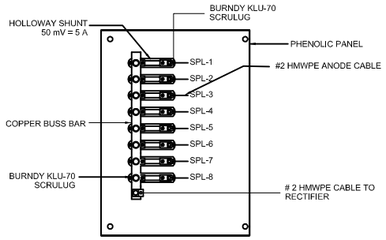
AMERICAN ELECTRIC POWER

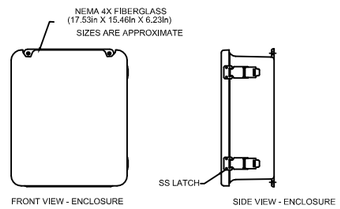
AEP DRAWING NO. NONE

JLS PARTNERS
A TIC/S&L JOINT VENTURE

MATCOR
301 AIRPORT BLVD
BOYLESTOWN PA 18902
(215)345-2974 WWW.MATCOR.COM

DRAWING NO.	REV.
R-2081253-DET1	A
SHEET 1 OF 2	

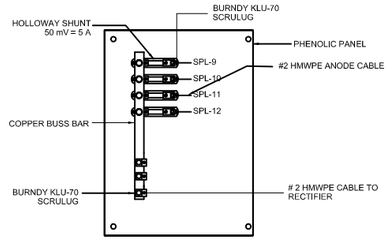


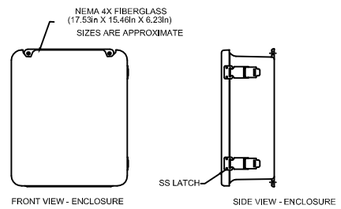


NOTE:

INSTALL ANODE SHUNT BOX WITH UNISTRUT OR POST ANCHORED IN CONCRETE

7A ANODE JUNCTION BOX (ASB 1)
SCALE: NONE

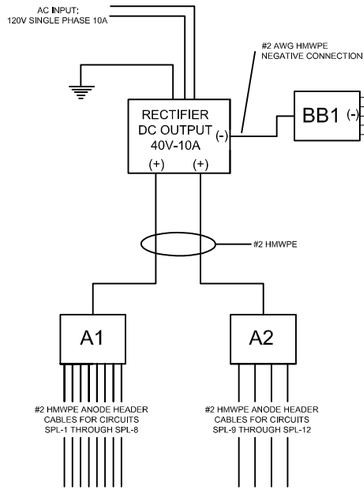




NOTE:

INSTALL ANODE SHUNT BOX WITH UNISTRUT OR POST ANCHORED IN CONCRETE

7B ANODE JUNCTION BOX (ASB 2)
SCALE: NONE



10 UNDER GROUND PIPING SYSTEM SCHEMATIC
SCALE: NONE

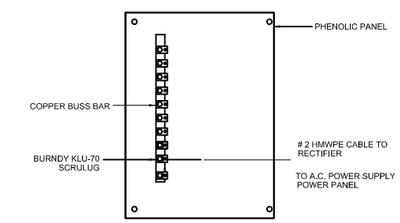
REVIEWED FOR
J. LAMAR STALL COMBINED CYCLE GENERATION PROJECT
J.LAMMAR STALL UNIT 1 AT ARSENAL HILL
AMERICAN ELECTRIC POWER
JLS PARTNRS

1. ☒ No exception taken. Contractor may proceed with fabrication or construction.
2. ☐ Revise as noted and resubmit. Contractor can proceed based on making revisions noted.
3. ☐ Results do not meet specification requirements. Revise and resubmit.
4. ☐ For information/construction. S&L review not required. Client and S&L distribution only.
5. ☐ Void.

NOTE: ANY ACTION SHOWN ABOVE IS SUBJECT TO THE TERMS OF THE CONTRACT AND DOES NOT RELIEVE CONTRACTOR FROM THE OBLIGATIONS UNDER THE CONTRACT INCLUDING DESIGN AND DETAILING.

FOR : Matcor Drawings Return
SPECIFICATION NO.:S-8145
BY ROBERT ZARETSKY

LETTER NO.: JLS-JLSP-S8145-0005
PROJECT NO.: 12157-000
DATE: SEPTEMBER 11, 2008

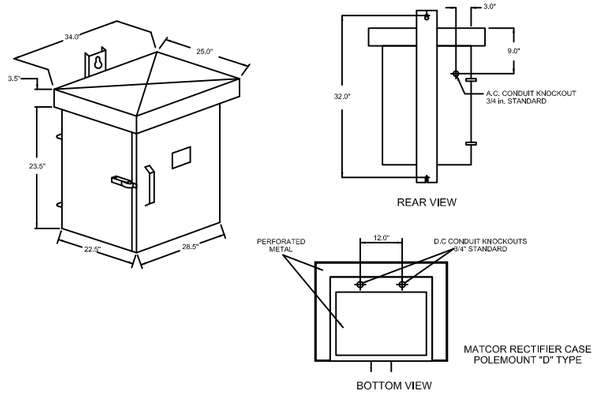


NOTE:

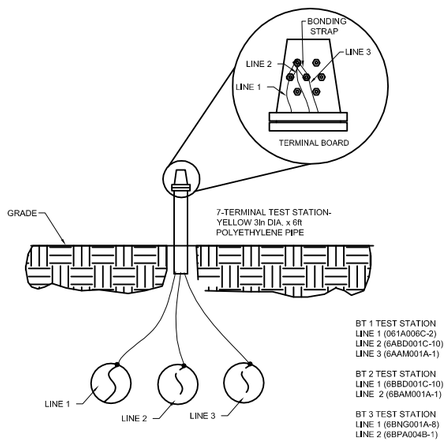
INSTALL BOND BOX WITH UNISTRUT OR POST ANCHORED IN CONCRETE

8 BOND BOX
SCALE: NONE

ALL SIZES ARE APPROXIMATE



9 TYPICAL AIR-COOLED RECTIFIER CABINET



11 BONDING TEST STATION:

DRAWING RELEASE RECORD

REV.	DATE REL'D.	PREPARED	REVIEWED	APPROVED	PURPOSE
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DRAWING RELEASE RECORD

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SCALE: NONE
PAPER SIZE: 11 x 17
08-08-08

CATHODIC PROTECTION SYSTEM
DETAILS
UNDERGROUND METALLIC PIPING

J. LAMAR STALL UNIT AT
ARSENAL HILL
SHREVEPORT, LOUISIANA

AEP DRAWING NO. NONE

JLS PARTNERS
A TIC/S&L JOINT VENTURE

MATCOR
301 AIRPORT BLVD
DOYLESTOWN, PA 18902
(215)348-2974 WWW.MATCOR.COM

DRAWING NO. R-2081253-DET2
REV. A
SHEET 2 OF 2

American Electric Power
Big Sandy Plant
Combined Cycle
Unit 1 Repowering Cost Estimate Study

Quantity Estimate for Security System
RPESK-009

July 25, 2011
Rev. A

Item	Description	Scope Definition	Quantity	Unit	Remarks
1	Intercom	Algo - 3026/3004 (or equivalent)		2	
2	Card Access Controller - Readers	GE - PXNplus - 2000 (or equivalent)		10	
3	Cameras	Panasonic - WV-CW964 (or equivalent)		7	
4	DVR	Pelco - DX8116-1000 (or equivalent)		1	
5	Enclosures				Where required based on previous JL Stall scope of work
6	RG-59 Coaxial Cable			1,500	Estimated quantity
7	CAT6 Cable			1,500	Estimated quantity
8	18/2 Cable w/ Ground			1,500	Estimated quantity
9	Misc Devices	(pole mounts, card cage, power supplies)			

Big Sandy Unit 1 Repowering Cost Estimate Study
RPESK-010
Quantity Estimate for Underground Grounding

Basis for the Estimate

1. The basis for the quantity is also a grounding layout drawing prepared from the GA's.
2. Additional design basis provided on the spread sheet in the next page.
3. Layouts to support the quantities will be on separate sketches.

American Electric Power
Big Sandy Plant
Combined Cycle
Unit 1 Repowering Cost Estimate Study

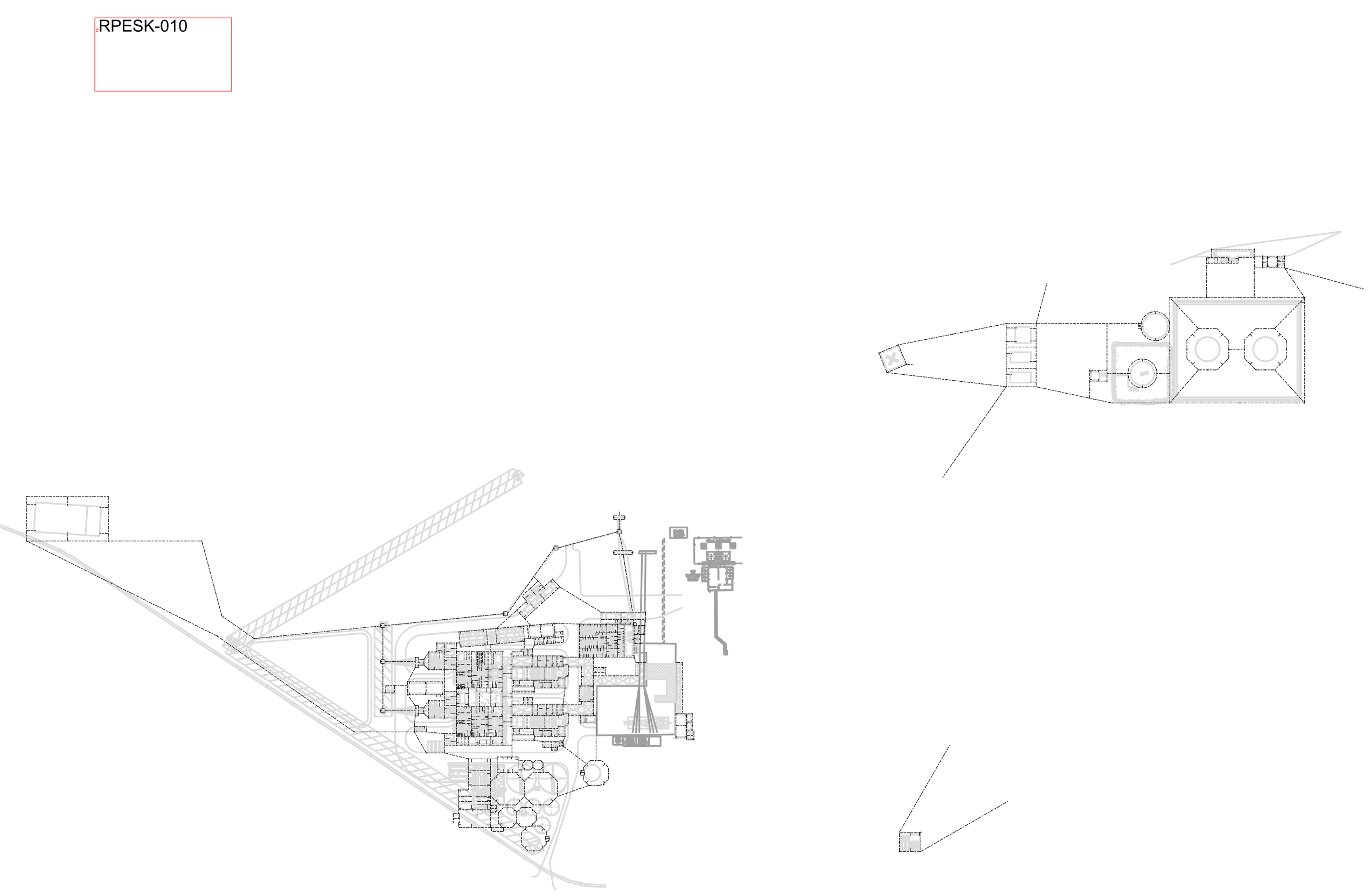
Quantity Estimate for Underground Grounding
RPESK-010

7/25/2011
Rev. A

ITEM	QTY/FOOTAGE	10% EXTRA	TOTAL QTY/FOOTAGE
500MCM BARE COPPER GROUND CABLE	1200	120	1320
4/0 BARE COPPER GROUND CABLE	34180	3418	37598
10' GROUND COPPERWELD GROUND ROD	128	13	141
CABLE TO GROUND ROD EXOTHERMIC WELD	128	13	141
"T" TYPE EXOTHERMIC WELD	96	10	106

NOTE: 1) THIS ESTIMATE IS FOR UNDERGROUND GROUNDING ONLY
AND DOES NOT INCLUDE GROUND CABLE RUN WITH THE DUCT RUNS.
2) PIGTAILS ARE INCLUDED IN THIS ESTIMATE

RPESK-010



Big Sandy Repowering Cost Estimate Study
RPESK-011
Quantity Estimate for Lighting Fixtures, Transformers and Panels

Basis for the Estimate

1. The basis for the quantity is Stall.
2. The basis of the quantity is also other projects that utilize CTG buildings.
3. The estimate does not include lighting conduit, wire. These items should be estimated on the basis of total number and type of fixtures.

American Electric Power
Big Sandy Plant
Combined Cycle
Unit 1 Repowering Cost Estimate Study

Quantity Estimate for Lighting Fixtures, Transformers and Panels
RPESK-011

7/25/2011
Rev. A

FIXTURE TYPE	ROADWAY	UNIT 1A	UNIT 1B	BULK GAS STORAGE	PRE-TREATMENT FACILITY	WATER TREATMENT FACILITY	HELIPORT	FUEL OIL AREA	AMMONIA/ CHILLERS	NATURAL GAS YARD	TOTALS
2' x 4' FLOURESCENT FIXTURE (70W TOTAL)					4						4
4' FLOURESCENT FIXTURE (70W TOTAL)		12	12		52	52					128
175W MH MEDIUM CLOSED REFRACT. (210W TOTAL)		48	48		60	70					226
100W MH SMALL CLOSED REFRACT. (130W TOTAL)		48	48								96
100W MH SMALL CLOSED REFRACT., STANCHION (130W TOTAL)		190	190	4	12	2		4	24	4	430
175W MH OUTDOOR WALLPACK (210W TOTAL)		12	12		13	8					45
70W MH OUTDOOR WALLPACK (95W TOTAL)		10	10								20
60W INCANDESCANT, GREEN LEXAN GLASS, FLUSH MOUNTED IN-GROUND PERIMETER LIGHT FIXTURE, MODEL "1601" (60W TOTAL)							24				24
150W INCANDESCANT FLODLIGHT WITH OBSTRUCTION LIGHT, SURFACE MOUNTED, MODEL "500S" (200W TOTAL)							6				6
LIGHTED WINDSOCK WITH 2-100W INTERNAL FLOODLIGHTS AND 1-116W OBSTRUCTION LIGHT, MODEL "WC-WC818-16" (316W TOTAL)							1				1
400W MH FLOODLIGHT (460W TOTAL)		25	25					10		6	66
400W MH ROADWAY FIXTURE (460W TOTAL)	24										24
30' ALUMINUM POLE	24							10		6	40
ROADWAY CABLE LENGTH (FT.)	3300										3300
ESTIMATED LIGHTING LOADS	11040	56830	56830	520	20810	20280	2956	5120	3120	3280	180786
ESTIMATED RECEPTACLE LOADS		22680	22680	1080	7200	7200	360	720	1080	1080	64080
TOTAL ESTIMATED LOADS		79510	79510	1600	28010	27480	3316	5840	4200	4360	244866
ADDITIONAL 480 - 120/277V TRANSFORMERS NEEDED ABOVE AND BEYOND WHAT IS SUPPLIED WITH THE PDC'S: (MPZ DENOTES MINI POWER ZONE WITH 12 CKT PANELBOARD)		45kva	45kva	5kva MPZ	45kva	45kva	5kva MPZ			5kva MPZ	(4) 45kva (3) 5kva MPZ
480/277V 42 CKT PANELBOARD W/COPPER BUSSING:		1	1		1	1					4
208/120V 42 CKT PANELBOARD W/COPPER BUSSING:		1	1		1	1					4
PHOTOELECTRIC CONTROL (PRECISION MULTIPLE ST-15):	1	1	1	1	1	1	1	1	1	1	10
HAND-OFF-AUTO SWITCH/CONTACTOR, 4 POLE, 120V, WITH PHOTOELECTRIC CONTROL, NEMA 1 (ASCO 641-S):	1	1	1	1	1	1	1	1	1	1	10
GFCI SELF TESTING DUPLEX RECEPT. NEMA 20R W/WEATHERPROOF COVER:		127	127	6	32	32	2	4	6	6	342
DUPLEX RECEPTACLE NEMA 20R:					8	8					16

Big Sandy Repowering Cost Estimate Study
RPESK-OPT1-012
Quantity Estimate for Embedded Conduits

Basis for the Estimate

1. The basis for the quantity is Stall.
2. Adjustments considered to the Stall design are as follows:
    a. M501G Combustion Turbine
    b. Aux Boiler not on Stall
    c. CTG Building not on Stall
    d. WT Pretreatment not on Stall
    e. 2 BFPs per HRSG whereas Stall had one BFP per HRSG.
    f. Liquid Fuel not on Stall
    g. Fewer electrical PDCs than Stall.
3. Conduits have been estimated by account 70 or 75.
4. The methodology used has been to take the Stall conduit quantities and apply a 15% adder to adjust for the systems mentioned above. 80% of control and instrument segregated conduits have been assumed to be related to DCS and have been applied to account 75. All other conduits are applied to account 70.

American Electric Power
Big Sandy Plant
Combined Cycle
Unit 1 Repowering Cost Estimate Study

Big Sandy Plant Quantity Estimate for Embedded Conduit OPT1
RPESK-OPT1-012

7/25/2011
Rev. A

Description	Stall Total (-STG)	Stall Total (x1.15)	Account 70	Account 75	Remarks
1" Conduit - (M, L1, L2)	40	46	46	N/A	
1" Conduit - (C, K)	3	4	1	3	
2" Conduit - (M, L1, L2)	136	157	157	N/A	
2" Conduit - (C, K)	2,957	3,401	680	2,721	
3" Conduit - (M, L1, L2)	50	58	58	N/A	
3" Conduit - (C, K)	2,424	2,788	558	2,230	
4" Conduit - (M, L1, L2)	42	49	49	N/A	
4" Conduit - (C, K)	0	0	0	0	

Big Sandy Repowering Cost Estimate Study
RPESK-OPT 2-012
Quantity Estimate for Embedded Conduits

Basis for the Estimate

1. The basis for the quantity is Stall.
    a. GE 7FA Combustion Turbine
    b. Aux Boiler not on Stall
    c. CTG Building not on Stall
    d. WT Pretreatment not on Stall
    e. 2 BFPs per HRSG whereas Stall had one BFP per HRSG.
    f. Liquid Fuel not on Stall
    g. Fewer electrical PDCs than Stall.

2. Conduits have been estimated by account 70 or 75.
3. The methodology used has been to take the Stall conduit quantities and apply a 15% adder to adjust for the systems mentioned above. 80% of control and instrument segregated conduits have been assumed to be related to DCS and have been applied to account 75. All other conduits are applied to account 70.

American Electric Power
Big Sandy Plant
Combined Cycle
Unit 1 Repowering Cost Estimate Study

Big Sandy Plant Quantity Estimate for Embedded Conduit OPT2
RPESK-OPT2-012

7/26/2011
Rev. A

Description	Stall Total (-STG)	Stall Total (x1.10)	Account 70	Account 75	Remarks
1" Conduit - (M, L1, L2)	40	44	44	N/A	
1" Conduit - (C, K)	3	4	1	3	
2" Conduit - (M, L1, L2)	136	150	150	N/A	
2" Conduit - (C, K)	2,957	3,253	651	2,602	
3" Conduit - (M, L1, L2)	50	55	55	N/A	
3" Conduit - (C, K)	2,424	2,667	533	2,134	
4" Conduit - (M, L1, L2)	42	47	47	N/A	
4" Conduit - (C, K)	0	0	0	0	

American Electric Power
Big Sandy Plant
Combined Cycle
Unit 1 Repowering Cost Estimate Study

Quantity Estimate for MV and Large LV Cable
RPESK-013

7/25/11
Rev. A

Item	Equipment Description (Load)	HP / KVA / KW	Unit (HP, KVA,	Bus	Location of MCC	KV	Feeder Cable Size	Feeder Cable Quantity	Feeder Cable Length	Total Circuit Length
1	SWGR/MCC 14A (CHILLER PDC)			**12A**		4.16	1/C 750 KCMIL - 5KV	6	3960	660
2	SWGR/MCC 14B (CHILLER PDC)			**13B**		4.16	1/C 750 KCMIL - 5KV	6	3960	660
3	UST 26A (AT CHILLER PDC)			**14A**		4.16	1/C 250 KCMIL - 5KV	3	180	60
4	UST 26B (AT CHILLER PDC)			**14B**		4.16	1/C 250 KCMIL - 5KV	3	180	60
5	UST 27A (AT FUEL OIL PDC)			**1A**		4.16	1/C 250 KCMIL - 5KV	3	180	60
6	UST 27B (AT FUEL OIL PDC)			**1B**		4.16	1/C 250 KCMIL - 5KV	3	180	60
7	CHILLER MCC (AT CHILLER PDC)			**35A**		0.48	3/C 500 KCMIL - 600V	3	180	60
8	CHILLER MCC (AT CHILLER PDC)			**35A**		0.48	3/C 500 KCMIL - 600V	3	180	60
9	CHILLER MCC (AT CHILLER PDC)			**35B**		0.48	3/C 500 KCMIL - 600V	3	180	60
10	CHILLER MCC (AT CHILLER PDC)			**35B**		0.48	3/C 500 KCMIL - 600V	3	180	60
11	CHILLER MCC (AT CHILLER PDC)			**36A**		0.48	3/C 500 KCMIL - 600V	3	180	60
12	CHILLER MCC (AT CHILLER PDC)			**36A**		0.48	3/C 500 KCMIL - 600V	3	180	60
13	CHILLER MCC (AT CHILLER PDC)			**36B**		0.48	3/C 500 KCMIL - 600V	3	180	60
14	CHILLER MCC (AT CHILLER PDC)			**36B**		0.48	3/C 500 KCMIL - 600V	3	180	60
15	CHILLER 1 COOLING FAN	100	HP	**CHILLER MCC 35A**		0.46	3/C #4/0 - 600V	1	250	250
16	CHILLER 1 COOLING FAN	100	HP	**CHILLER MCC 35A**		0.46	3/C #4/0 - 600V	1	250	250
17	CHILLER 1 COOLING FAN	100	HP	**CHILLER MCC 35A**		0.46	3/C #4/0 - 600V	1	250	250
18	CHILLER 1 COOLING FAN	100	HP	**CHILLER MCC 35B**		0.46	3/C #4/0 - 600V	1	250	250
19	CHILLER 1 COOLING FAN	100	HP	**CHILLER MCC 35B**		0.46	3/C #4/0 - 600V	1	250	250
20	CHILLER 1 COOLING FAN	100	HP	**CHILLER MCC 35B**		0.46	3/C #4/0 - 600V	1	250	250
21	CHILLER 1 COOLING PUMP	200	HP	**CHILLER MCC 35A**		0.46	3/C #4/0 - 600V	2	500	250
22	CHILLER 1 COOLING PUMP	200	HP	**CHILLER MCC 35B**		0.46	3/C #4/0 - 600V	2	500	250
23	CHILLER 1 COOLING PUMP	200	HP	**CHILLER MCC 35B**		0.46	3/C #4/0 - 600V	2	500	250
24	CHILLER 1 WATER PUMP	250	HP	**CHILLER MCC 35B**		0.46	3/C 250 KCMIL - 600V	2	500	250
25	CHILLER 1 WATER PUMP	250	HP	**CHILLER MCC 35B**		0.46	3/C 250 KCMIL - 600V	2	500	250

American Electric Power
Big Sandy Plant
Combined Cycle
Unit 1 Repowering Cost Estimate Study

Quantity Estimate for MV and Large LV Cable
RPESK-013

7/25/11
Rev. A

Item	Equipment Description (Load)	HP / KVA / KW	Unit (HP, KVA,	Bus	Location of MCC	KV	Feeder Cable Size	Feeder Cable Quantity	Feeder Cable Length	Total Circuit Length
26	CHILLER 1 WATER PUMP	250	HP	**CHILLER MCC 35A**		0.46	3/C 250 KCMIL - 600V	2	500	250
27	CHILLER 1	3150	HP	**14A**		4	1/C 250 KCMIL - 5KV	3	750	250
28	CHILLER 1	3150	HP	**14B**		4	1/C 250 KCMIL - 5KV	3	750	250
29	CHILLER 2 COOLING FAN	100	HP	**CHILLER MCC 36A**		0.46	3/C #4/0 - 600V	1	350	350
30	CHILLER 2 COOLING FAN	100	HP	**CHILLER MCC 36A**		0.46	3/C #4/0 - 600V	1	350	350
31	CHILLER 2 COOLING FAN	100	HP	**CHILLER MCC 36A**		0.46	3/C #4/0 - 600V	1	350	350
32	CHILLER 2 COOLING FAN	100	HP	**CHILLER MCC 36B**		0.46	3/C #4/0 - 600V	1	350	350
33	CHILLER 2 COOLING FAN	100	HP	**CHILLER MCC 36B**		0.46	3/C #4/0 - 600V	1	350	350
34	CHILLER 2 COOLING FAN	100	HP	**CHILLER MCC 36B**		0.46	3/C #4/0 - 600V	1	350	350
35	CHILLER 2 COOLING PUMP	200	HP	**CHILLER MCC 36A**		0.46	3/C #4/0 - 600V	2	700	350
36	CHILLER 2 COOLING PUMP	200	HP	**CHILLER MCC 36B**		0.46	3/C #4/0 - 600V	2	700	350
37	CHILLER 2 COOLING PUMP	200	HP	**CHILLER MCC 36B**		0.46	3/C #4/0 - 600V	2	700	350
38	CHILLER 2 WATER PUMP	250	HP	**CHILLER MCC 36B**		0.46	3/C 250 KCMIL - 600V	2	700	350
39	CHILLER 2 WATER PUMP	250	HP	**CHILLER MCC 36B**		0.46	3/C 250 KCMIL - 600V	2	700	350
40	CHILLER 2 WATER PUMP	250	HP	**CHILLER MCC 36A**		0.46	3/C 250 KCMIL - 600V	2	700	350
41	CHILLER 2	3150	HP	**14A**		4	1/C 250 KCMIL - 5KV	3	1050	350
42	CHILLER 2	3150	HP	**14B**		4	1/C 250 KCMIL - 5KV	3	1050	350
43	HRSG PDC 1A MCC			**31A**		0.48	3/C 500 KCMIL - 600V	3	120	40
44	HRSG PDC 1A MCC			**31B**		0.48	3/C 500 KCMIL - 600V	3	120	40
45	HRSG PDC 1B MCC			**32A**		0.48	3/C 500 KCMIL - 600V	3	120	40
46	HRSG PDC 1B MCC			**32B**		0.48	3/C 500 KCMIL - 600V	3	120	40
47	FUEL OIL PUMP 1	350	HP	**1A**		4	1/C #2/0 - 5KV	3	9330	3110
48	FUEL OIL PUMP 2	350	HP	**1B**		4	1/C #2/0 - 5KV	3	9330	3110
49	HOT WELL PUMP 1 (COMPLETE NEW FEEDER)	300	HP	**1A**		4	1/C #2/0 - 5KV	3	1200	400
50	HOT WELL PUMP 2 (COMPLETE NEW FEEDER)	300	HP	**1B**		4	1/C #2/0 - 5KV	3	1200	400

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Item	Equipment Description (Load)	HP / KVA / KW	Unit (HP, KVA,	Bus	Location of MCC	KV	Feeder Cable Size	Feeder Cable Quantity	Feeder Cable Length	Total Circuit Length
51	CONDENSATE BOOSTER PUMP 1 (COMPLETE NEW FEEDER)	900	HP	**1A**		4	1/C #4/0 - 5KV	3	1200	400
52	CONDENSATE BOOSTER PUMP 2 (COMPLETE NEW FEEDER)	900	HP	**1B**		4	1/C #4/0 - 5KV	3	1200	400
53	CLOSED COOLING WATER PUMP 2	775	HP	**12A**		4	1/C #2/0 - 5KV	3	1200	400
54	CLOSED COOLING WATER PUMP 1	775	HP	**11B**		4	1/C #2/0 - 5KV	3	1200	400
55	AIR COMPRESSOR 2 (TO SPLICE BOX IN EXISTING EE ROOM)	450	HP	**1B**		4	1/C #2/0 - 5KV	3	900	300
56	AIR COMPRESSOR 1 (TO SPLICE BOX IN EXISTING EE ROOM)	450	HP	**1A**		4	1/C #2/0 - 5KV	3	900	300
57	GAS TURBINE GENERATOR 1B EXCITATION TRANSFORMER	1350	KW	**12B**		4.16	1/C 250 KCMIL - 5KV	3	1155	385
58	GAS TURBINE GENERATOR 1A EXCITATION TRANSFORMER	1350	KW	**11A**		4.16	1/C 250 KCMIL - 5KV	3	495	165
59	SERVICE BUILDNIG LTG XFMR	900	KVA	**1A**		4.16	1/C 250 KCMIL - 5KV	3	750	250
60	RIVER WATER/FIRE PUMP SUBSTATIONS	3300	KVA	**1A**		4.16	1/C 750 KCMIL - 5KV	3	900	300
61	UNIT 1 PLANT LTG XFMR	300	KVA	**1B**		4.16	1/C #2/0 - 5KV	3	900	300
62	UST 11A			**1A**		4.16	1/C 250 KCMIL - 5KV	3	180	60
63	UST 11B			**1B**		4.16	1/C 250 KCMIL - 5KV	3	180	60
64	UST 26B			**14B**		4.16	1/C 500 KCMIL - 5KV	3	180	60
65	UST 26A			**14A**		4.16	1/C 500 KCMIL - 5KV	3	180	60
66	UST 25B			**14B**		4.16	1/C 500 KCMIL - 5KV	3	180	60
67	UST 25A			**14A**		4.16	1/C 500 KCMIL - 5KV	3	180	60
68	UST 24B			**13B**		4.16	1/C 500 KCMIL - 5KV	3	2640	880
69	UST 24A			**12A**		4.16	1/C 500 KCMIL - 5KV	3	2640	880
70	UST 23B			**13B**		4.16	1/C 500 KCMIL - 5KV	3	3150	1050
71	UST 23A			**12A**		4.16	1/C 500 KCMIL - 5KV	3	3150	1050
72	UST 22B			**13A**		4.16	1/C 500 KCMIL - 5KV	3	1350	450
73	UST 22A			**12B**		4.16	1/C 500 KCMIL - 5KV	3	1350	450
74	UST 21B			**13A**		4.16	1/C 500 KCMIL - 5KV	3	1590	530
75	UST 21A			**12B**		4.16	1/C 500 KCMIL - 5KV	3	1590	530

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Item	Equipment Description (Load)	HP / KVA / KW	Unit (HP, KVA,	Bus	Location of MCC	KV	Feeder Cable Size	Feeder Cable Quantity	Feeder Cable Length	Total Circuit Length
76	BOILER FEED PUMP 1B 2	4000	HP	**12B**		4	1/C 750 KCMIL - 5KV	3	1500	500
77	BOILER FEED PUMP 1B 1	4000	HP	**12A**		4	1/C 750 KCMIL - 5KV	3	1500	500
78	BOILER FEED PUMP 1A 2	4000	HP	**11B**		4	1/C 750 KCMIL - 5KV	3	1800	600
79	BOILER FEED PUMP 1A 1	4000	HP	**11A**		4	1/C 750 KCMIL - 5KV	3	1800	600
80	CIRCULATING WATER PUMP 2 (TO SPLICE BOX IN EXISTING EE ROOM)	1500	HP	**1B**		4	1/C #4/0 - 5KV	3	900	300
81	CIRCULATING WATER PUMP 1 (TO SPLICE BOX IN EXISTING EE ROOM)	1500	HP	**1A**		4	1/C #4/0 - 5KV	3	900	300
82	GAS TURBINE GENERATOR 1B ISOLATION TRANSFORMER	10000	KW	**13B**		4.16	1/C 1000 KCMIL- 5KV	6	1200	200
83	GAS TURBINE GENERATOR 1A ISOLATION TRANSFORMER	10000	KW	**12A**		4.16	1/C 1000 KCMIL- 5KV	6	1980	330
84	WATER TREATMENT MCC			**33A**		0.48	3/C 500 KCMIL - 600V	3	195	65
85	WATER TREATMENT MCC			**33A**		0.48	3/C 500 KCMIL - 600V	3	195	65
86	WATER TREATMENT MCC			**33B**		0.48	3/C 500 KCMIL - 600V	3	150	50
87	WATER TREATMENT MCC			**33B**		0.48	3/C 500 KCMIL - 600V	3	150	50
88	WATER PRETREATMENT MCC			**34A**		0.48	3/C 500 KCMIL - 600V	3	150	50
89	WATER PRETREATMENT MCC			**34A**		0.48	3/C 500 KCMIL - 600V	3	150	50
90	WATER PRETREATMENT MCC			**34B**		0.48	3/C 500 KCMIL - 600V	3	180	60
91	TRANSFORMER PDC MCC			**32A**		0.48	3/C 500 KCMIL - 600V	3	1410	470
92	TRANSFORMER PDC MCC			**32B**		0.48	3/C 500 KCMIL - 600V	3	1440	480
93	GAS SKID 1B			**32A**		0.48	3/C 250 KCMIL - 600V	2	420	210
94	GAS SKID 1A			**31B**		0.48	3/C 250 KCMIL - 600V	2	420	210
95	GAS YARD AND SKID SPOWER SUPPLIES			**WTR PRE-TREAT MCC**		0.48	3/C 250 KCMIL - 600V	1	1780	1780
96	CTG HVAC MCC			**31A**		0.48	3/C 500 KCMIL - 600V	3	1050	350
97	CTG HVAC MCC			**31B**		0.48	3/C 500 KCMIL - 600V	3	1050	350
98	CTG 1B MCC	337	KW	**32A**		0.48	3/C 500 KCMIL - 600V	3	1110	370
99	CTG 1B MCC			**32B**		0.48	3/C 500 KCMIL - 600V	3	1110	370
100	CTG 1B FUEL OIL MCC	625	KW	**32B**		0.48	3/C 500 KCMIL - 600V	3	1110	370

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Item	Equipment Description (Load)	HP / KVA / KW	Unit (HP, KVA,	Bus	Location of MCC	KV	Feeder Cable Size	Feeder Cable Quantity	Feeder Cable Length	Total Circuit Length
101	CTG 1A MCC	337	KW	**31A**		0.48	3/C 500 KCMIL - 600V	3	1110	370
102	CTG 1A MCC			**31B**		0.48	3/C 500 KCMIL - 600V	3	1110	370
103	CTG 1A FUEL OIL MCC	625	KW	**31A**		0.48	3/C 500 KCMIL - 600V	3	1110	370
104	CT 1B AMMONIA BLOWER B			**1B HRSG MCC**		0.46	3/C 500 KCMIL - 600V	1	230	230
105	CT 1B AMMONIA BLOWER A			**1B HRSG MCC**		0.46	3/C 500 KCMIL - 600V	1	230	230
106	CT 1A AMMONIA BLOWER B			**1A HRSG MCC**		0.46	3/C 500 KCMIL - 600V	1	230	230
107	CT 1A AMMONIA BLOWER A			**1A HRSG MCC**		0.46	3/C 500 KCMIL - 600V	1	230	230
108	125VDC BATTERY CHARGER B			**XFMR PDC MCC**		0.48	3/C 500 KCMIL - 600V	2	200	100
109	125VDC BATTERY CHARGER A			**XFMR PDC MCC**		0.48	3/C 500 KCMIL - 600V	2	200	100
110	125VDC BATTERY			**DC SW BOARD**		0.125	1/C 500 KCMIL - 600V	2	60	30
111	125VDC BATTERY			**DC SW BOARD**		0.125	1/C 500 KCMIL - 600V	2	60	30
112	125VDC DC POWER PANEL WATER TREATMENT			**DC SW BOARD**		0.125	1/C 250 KCMIL - 600V	2	2100	1050
113	125VDC DC POWER PANEL WATER PRE TREATMENT			**DC SW BOARD**		0.125	1/C 250 KCMIL - 600V	2	1760	880
114	125VDC DC POWER PANEL HRSG PDC 1B			**DC SW BOARD**		0.125	1/C 250 KCMIL - 600V	2	1056	528
115	125VDC DC POWER PANEL HRSG PDC 1A			**DC SW BOARD**		0.125	1/C 250 KCMIL - 600V	2	1340	670
116	125VDC DC POWER PANEL STG PDC			**DC SW BOARD**		0.125	1/C 250 KCMIL - 600V	2	2760	1380
117	125VDC DC POWER PANEL XFMR PDC			**DC SW BOARD**		0.125	1/C 250 KCMIL - 600V	2	120	60
118	125VDC DC POWER PANEL CHILLER PDC			**DC SW BOARD**		0.125	1/C 250 KCMIL - 600V	2	1320	660
119	120VAC UPS POWER PANEL WATER TREATMENT			**XFMR PDC UPS PNL**		0.12	1/C 250 KCMIL - 600V	2	2100	1050
120	120VAC UPS POWER PANEL WATER PRE TREATMENT			**XFMR PDC UPS PNL**		0.12	1/C 250 KCMIL - 600V	2	1760	880
121	120VAC UPS POWER PANEL HRSG PDC 1B			**XFMR PDC UPS PNL**		0.12	1/C 250 KCMIL - 600V	2	900	450
122	120VAC UPS POWER PANEL HRSG PDC 1A			**XFMR PDC UPS PNL**		0.12	1/C 250 KCMIL - 600V	2	1060	530
123	120VAC UPS POWER PANEL STG PDC			**XFMR PDC UPS PNL**		0.12	1/C 250 KCMIL - 600V	2	2760	1380
124	120VAC UPS POWER PANEL XFMR PDC			**XFMR PDC UPS PNL**		0.12	1/C 250 KCMIL - 600V	2	120	60
125	120VAC UPS POWER PANEL CHILLER PDC			**XFMR PDC UPS PNL**		0.12	1/C 250 KCMIL - 600V	2	1320	660

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Item	Equipment Description (Load)	HP / KVA / KW	Unit (HP, KVA,	Bus	Location of MCC	KV	Feeder Cable Size	Feeder Cable Quantity	Feeder Cable Length	Total Circuit Length
126	120VAC ALT UPS POWER PANEL WATER TREATMENT			**XFMR PDC UPS PNL**		0.12	1/C 250 KCMIL - 600V	2	2100	1050
127	120VAC ALT UPS POWER PANEL WATER PRE TREATMENT			**XFMR PDC UPS PNL**		0.12	1/C 250 KCMIL - 600V	2	1760	880
128	120VAC ALT UPS POWER PANEL HRSG PDC 1B			**XFMR PDC UPS PNL**		0.12	1/C 250 KCMIL - 600V	2	1056	528
129	120VAC ALT UPS POWER PANEL HRSG PDC 1A			**XFMR PDC UPS PNL**		0.12	1/C 250 KCMIL - 600V	2	1340	670
130	120VAC ALT UPS POWER PANEL STG PDC			**XFMR PDC UPS PNL**		0.12	1/C 250 KCMIL - 600V	2	2760	1380
131	120VAC ALT UPS POWER PANEL XFMR PDC			**XFMR PDC UPS PNL**		0.12	1/C 250 KCMIL - 600V	2	120	60
132	120VAC ALT UPS POWER PANEL CHILLER PDC			**XFMR PDC UPS PNL**		0.12	1/C 250 KCMIL - 600V	2	1320	660
133	BLOW DOWN WATER SUMP PUMP	90	HP	**HRSG 1A MCC**		0.46	3/C #4/0 - 600V	1	410	410
134	BLOW DOWN WATER SUMP PUMP	90	HP	**HRSG 1A MCC**		0.46	3/C #4/0 - 600V	1	410	410
135	BLOW DOWN WATER SUMP PUMP	90	HP	**HRSG 1A MCC**		0.46	3/C #4/0 - 600V	1	410	410
138	PRETREATMENT SUMUP PUMP 1	100	HP	**WPT MCC**		0.46	3/C #4/0 - 600V	1	80	80
139	PRETREATMENT SUMUP PUMP 1	100	HP	**WPT MCC**		0.46	3/C #4/0 - 600V	1	80	80
140	SFC 1A TO GENERATOR 1A						1/C 1000 KCMIL- 5KV	9	765	85
141	SFC 1A TO SFC 1B						1/C 1000 KCMIL- 5KV	9	1215	135
142	SFC 1B TO GENERATOR 1B						1/C 1000 KCMIL- 5KV	9	765	85
143	EXCITER 1A TO GENERATOR 1A						1/C 1550 KCMIL - 2KV	6	510	85
144	EXCITER 1B TO GENERATOR 1B						1/C 1550 KCMIL - 2KV	6	510	85
145	CHEM BUILDNG MCC 1CM-A (TO SPLICE BOX IN EXISTING EE ROOM)			11A		0.6	3/C 500 KCMIL - 1000V	2	600	300
146	MCC 1-5BRP (TO SPLICE BOX IN EXISTING EE ROOM)			11A		0.6	3/C 500 KCMIL - 1000V	2	600	300
147	MCC 1-APRP (TO SPLICE BOX IN EXISTING EE ROOM)			11A		0.6	3/C 500 KCMIL - 1000V	2	600	300
148	PP1TOH-A (TO SPLICE BOX IN EXISTING EE ROOM)			11A		0.6	3/C 500 KCMIL - 1000V	2	600	300
149	MCC1-TB-A (TO SPLICE BOX IN EXISTING EE ROOM)			11A		0.6	3/C 500 KCMIL - 1000V	2	600	300
150	MCC1-TC-A (TO SPLICE BOX IN EXISTING EE ROOM)			11A		0.6	3/C 500 KCMIL - 1000V	2	600	300
151	MCC 1-BMF-A (TO SPLICE BOX IN EXISTING EE ROOM)			11A		0.6	3/C 500 KCMIL - 1000V	2	600	300
152	PP 1SBF-A (TO SPLICE BOX IN EXISTING EE ROOM)			11A		0.6	3/C 500 KCMIL - 1000V	2	600	300

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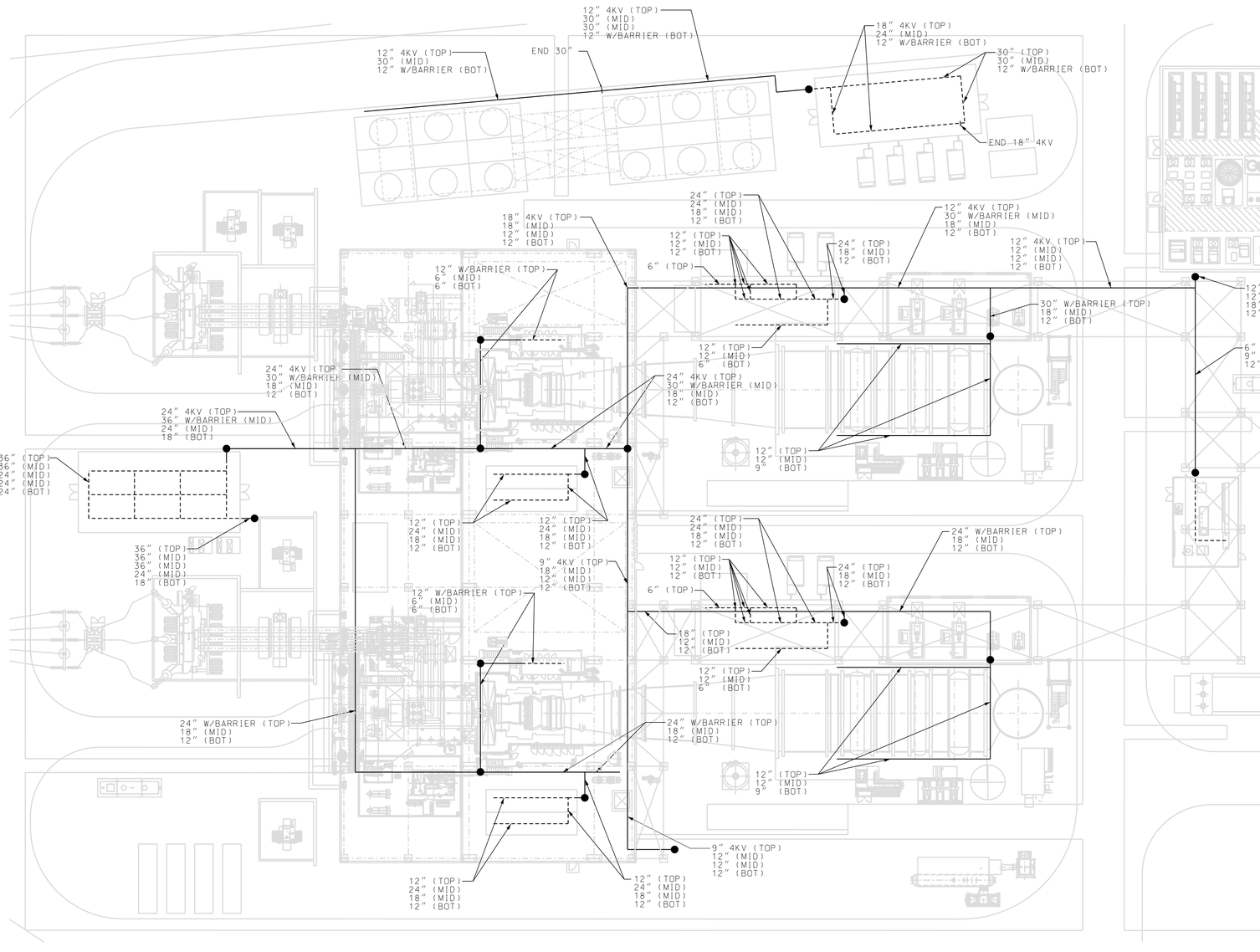
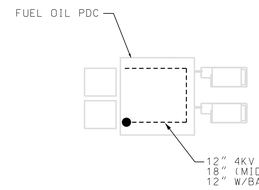
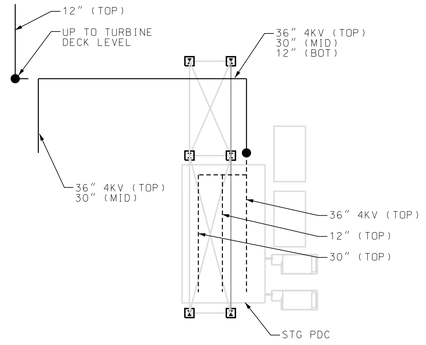
Item	Equipment Description (Load)	HP / KVA / KW	Unit (HP, KVA,	Bus	Location of MCC	KV	Feeder Cable Size	Feeder Cable Quantity	Feeder Cable Length	Total Circuit Length
153	MCC 1-TB-B (TO SPLICE BOX IN EXISTING EE ROOM)			11A		0.6	3/C 500 KCMIL - 1000V	2	600	300
154	MCC 1-HF-A (TO SPLICE BOX IN EXISTING EE ROOM)			11A		0.6	3/C 500 KCMIL - 1000V	2	600	300
155	PP 1-MS-B (TO SPLICE BOX IN EXISTING EE ROOM)			11B		0.6	3/C 500 KCMIL - 1000V	2	600	300
156	MCC 1-TC-B (TO SPLICE BOX IN EXISTING EE ROOM)			11B		0.6	3/C 500 KCMIL - 1000V	2	600	300
157	MCC 1-BB-B (TO SPLICE BOX IN EXISTING EE ROOM)			11B		0.6	3/C 500 KCMIL - 1000V	2	600	300
158	MCC 1-F-B (TO SPLICE BOX IN EXISTING EE ROOM)			11B		0.6	3/C 500 KCMIL - 1000V	2	600	300
159	MCC 1-BMF-B (TO SPLICE BOX IN EXISTING EE ROOM)			11B		0.6	3/C 500 KCMIL - 1000V	2	600	300
160	MCC 1-FF-B (FROM MCC ON SAME FLOOR)			MCC 1-BUF-B		0.6	3/C 500 KCMIL - 1000V	2	140	70
161	MCC 1-BUF-B (TO SPLICE BOX IN EXISTING EE ROOM)			11B		0.6	3/C 500 KCMIL - 1000V	2	600	300
162	MCC 2-PH-1 (TO SPLICE BOX IN EXISTING EE ROOM)			11B		0.6	3/C 500 KCMIL - 1000V	2	600	300
163	MCC 2-PH-2 (TO SPLICE BOX IN EXISTING EE ROOM)			11B		0.6	3/C 500 KCMIL - 1000V	2	600	300
164	MCC 1-SH (TO SPLICE BOX IN EXISTING EE ROOM)			11B		0.6	3/C 500 KCMIL - 1000V	2	600	300
165	AUX OIL PUMP (TO SPLICE BOX IN EXISTING EE ROOM)	100		11B		0.6	3/C #4/0 - 1000V	1	300	300
166	HEATER DRAIN PUMP (TO SPLICE BOX IN EXISTING EE ROOM)	150		11A		0.6	3/C 500 KCMIL - 1000V	1	300	300
167	HEATER DRAIN PUMP (TO SPLICE BOX IN EXISTING EE ROOM)	150		11B		0.6	3/C 500 KCMIL - 1000V	1	300	300
168	COOLING TOWER MAKE UP PUMP 1	125		WPT MCC		0.46	3/C 500 KCMIL - 600V	1	420	420
169	COOLING TOWER MAKE UP PUMP 2	125		WPT MCC		0.46	3/C 500 KCMIL - 600V	1	420	420
170	AUXILARY BOILER FEED 1			HRSG 1B MCC		0.46	3/C 250 KCMIL - 600V	1	350	350
171	AUXILARY BOILER FEED 2			HRSG 1B MCC		0.46	3/C 250 KCMIL - 600V	1	350	350

DWG. NO. RPESK-014







90° HORIZONTAL

6" - 7
9" - 4
12" - 56
18" - 15
24" - 17
30" - 10
36" - 7

90° VERTICAL OUTSIDE

6" - 9
9" - 2
12" - 26
18" - 11
24" - 9
30" - 5
36" - 5

90° VERTICAL INSIDE

6" - 9
9" - 1
12" - 18
18" - 8
24" - 8
30" - 5
36" - 2

HORIZONTAL TEE

6" - 0
9" - 0
12" - 37
18" - 21
24" - 36
30" - 7
36" - 18

HORIZONTAL CROSS

6" - 0
9" - 0
12" - 0
18" - 0
24" - 6
30" - 0
36" - 4

REDUCER

3" - 2
6" - 38
9" - 2
12" - 15
18" - 3

TOTAL FOOTAGE

6" - 1,007'-0"
9" - 685'-0"
12" - 5,298'-0"
18" - 1,620'-0"
24" - 1,869'-0"
30" - 923'-0"
36" - 854'-0"

NOTES

1. CABLE TRAY SHALL BE 6" NOMINAL DEPTH, LADDER TYPE, ALUMINUM, CLASS 20C.

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

COMBINED CYCLE PROJECT
ELECTRICAL CABLE TRAY
CT/STG AREA

DWG. NO. RPESK-014

SCALE: 1"=1'-0"
DR:
CH:
APPROVED BY
DATE:

FILE NAME: RPESK-014.DGN

PLANT NORTH

REV	DATE RELEASED	PURPOSE	
A	07/19/2011	FOR ESTIMATING	T. MILLER
			PREPARED
			REVIEWED
			APPROVED

DRAWING RELEASE RECORD

PROFESSIONAL ENGINEER'S STAMP

Sargent & Lundy

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PERSONS AND PROPERTY AT THE WORK SITE. CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUBCONTRACTORS) PERFORMING THE WORK.

AEP AMERICAN ELECTRIC POWER

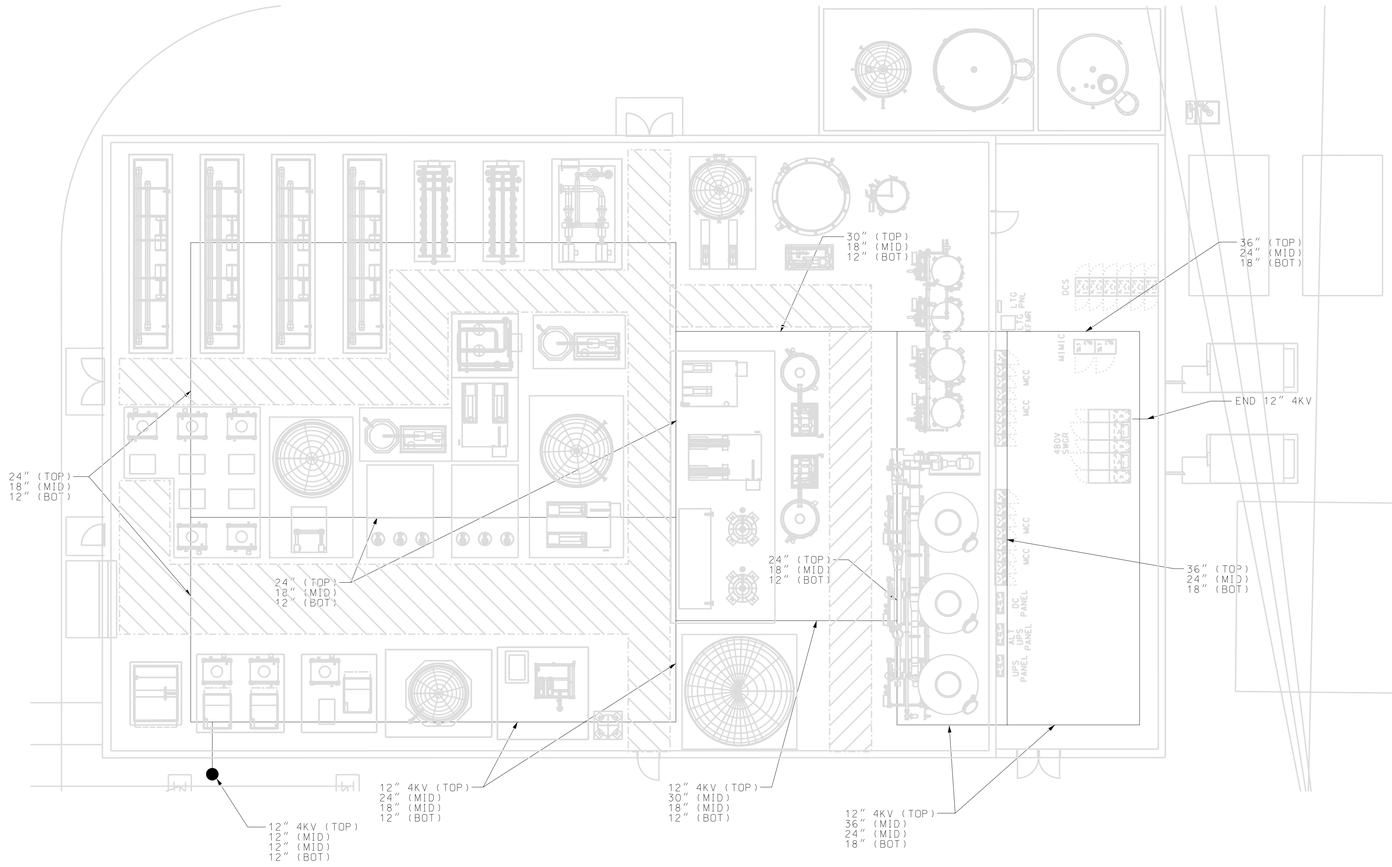
AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOURMINUTE

IGS0694

RPESK-014.dgn 7/19/2011 3:30:15 PM

DWG. NO. RPESK-015



WATER TREATMENT BUILDING

90° HORIZONTAL

12" - 10
18" - 7
24" - 7
30" - 0
36" - 3

90° VERTICAL OUTSIDE

12" - 4
18" - 0
24" - 0
30" - 0
36" - 0

HORIZONTAL TEE

12" - 5
18" - 9
24" - 7
30" - 2
36" - 4

REDUCER

6" - 15
12" - 3

TOTAL FOOTAGE

12" - 712'-"
18" - 632'-0"
24" - 569'-0"
30" - 63'-0"
36" - 197'-0"

NOTES

1. CABLE TRAY SHALL BE 6" NOMINAL DEPTH. LADDER TYPE. ALUMINUM. CLASS 20C.

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

COMBINED CYCLE PROJECT
ELECTRICAL CABLE TRAY
WATER TREATMENT BUILDING

DWG. NO. RPESK-015

SCALE: 1"=1/8'-0"
DR:
CH:
APPROVED BY
DATE:

FILE NAME: RPESK-015.DGN

PROFESSIONAL ENGINEER'S STAMP

Sargent & Lundy

REV	DATE RELEASED	PURPOSE	
A	07/19/2011	FOR ESTIMATING	T. MILLER
			PREPARED
			REVIEWED
			APPROVED

DRAWING RELEASE RECORD

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUBCONTRACTOR'S) PERFORMING THE WORK.

AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOUR:MINUTE

PLANT NORTH

0' 8' 16' 24'
GRAPHIC SCALE: 1"= 1/8'-0"

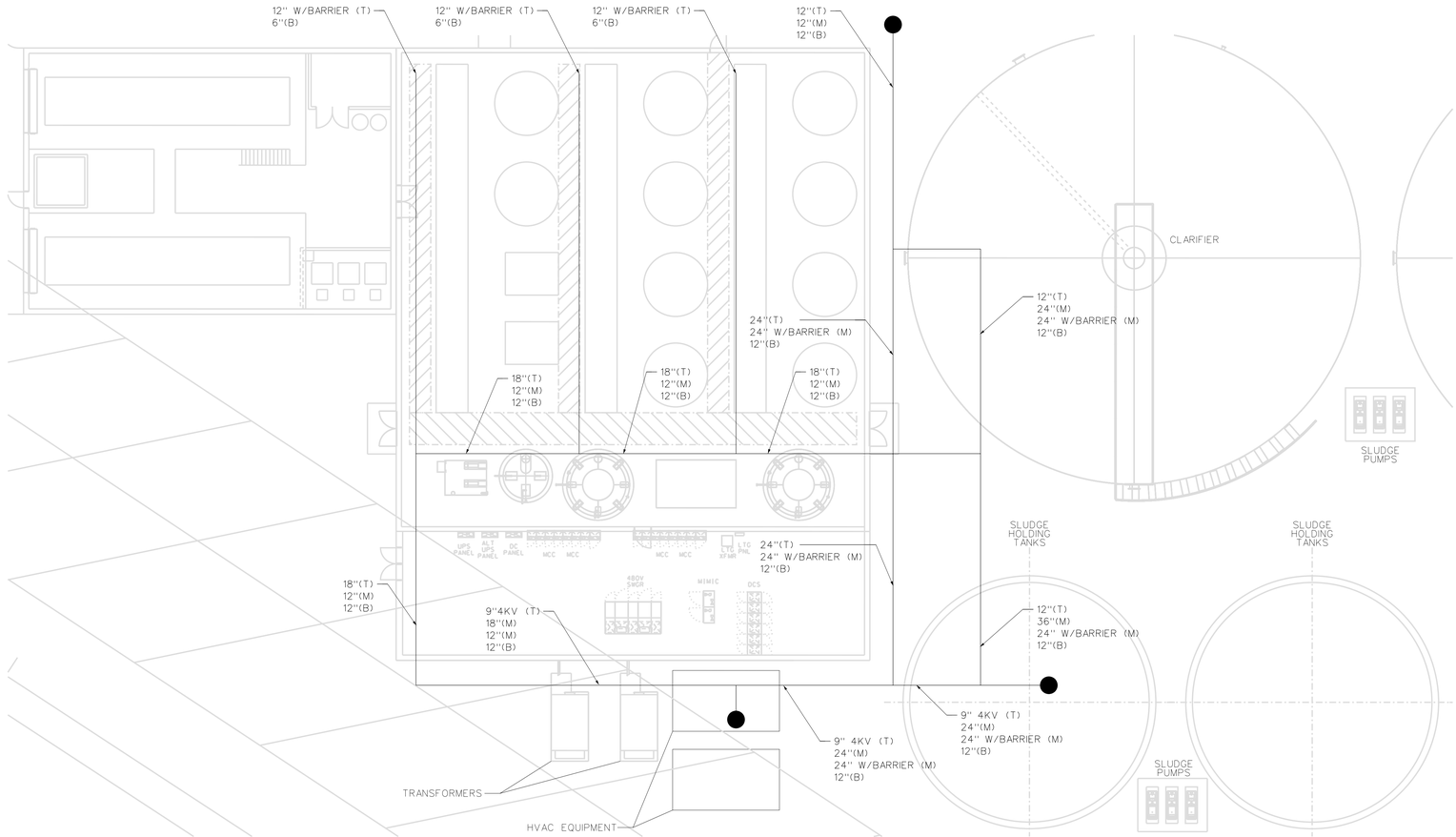
IGS0694

A B C D E F G H J K L M N O

CM 1 2 3 4 5 6 7
3/16 INCH 4 12 16
TENTHS 10 20 30
INCHES 1 2 3

RPESK-015.dgn 7/19/2011 3:29:37 PM

DWG. NO. RPESK-016



STRAIGHT TRAY:
6" = 216'
9" = 108'
12" = 1052'
18" = 202'
24" = 410'
36" = 44'

BARRIER:
12" = 216'
24" = 247'

HORIZONTAL 90°:
12" = 7
24" = 4
36" = 1

HORIZONTAL TEE:
12" = 8
18" = 3
24" = 6
36" = 1

HORIZONTAL CROSS:
12" = 1
24" = 2

OFFSET REDUCING SPLICE PLATE:
6" = 9
12" = 7

VERTICAL 90°:
9" = 1
12" = 5
18" = 1

VERTICAL 45° INSIDE:
12" = 8
18" = 3
24" = 6
36" = 1

VERTICAL 45° OUTSIDE:
12" = 8
18" = 3
24" = 6
36" = 1

NOTES

1. CABLE TRAY SHALL BE 6" NOMINAL DEPTH, LADDER TYPE, ALUMINUM, CLASS 20C.
2. BUILDING SIZE & EQUIPMENT ARE SIMILAR TO THE CCP LAYOUT.

GRAPHIC SCALE: 1"= 10'-0"

PLANT NORTH

REV	DATE RELEASED	PURPOSE	
A	07/19/2011	FOR ESTIMATING	T. MILLER
			-
			-
			PREPARED
			REVIEWED
			APPROVED

DRAWING RELEASE RECORD

PROFESSIONAL ENGINEER'S STAMP

Sargent & Lundy

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUBCONTRACTOR(S)) PERFORMING THE WORK.

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

COMBINED CYCLE PROJECT ELECTRICAL CABLE TRAY PRETREATMENT WATER FACILITY

DWG. NO. RPESK-016

SCALE: 1"=10'-0"

DR:

CK:

APPROVED BY:

DATE:

FILE NAME: RPESK-016.DGN

AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

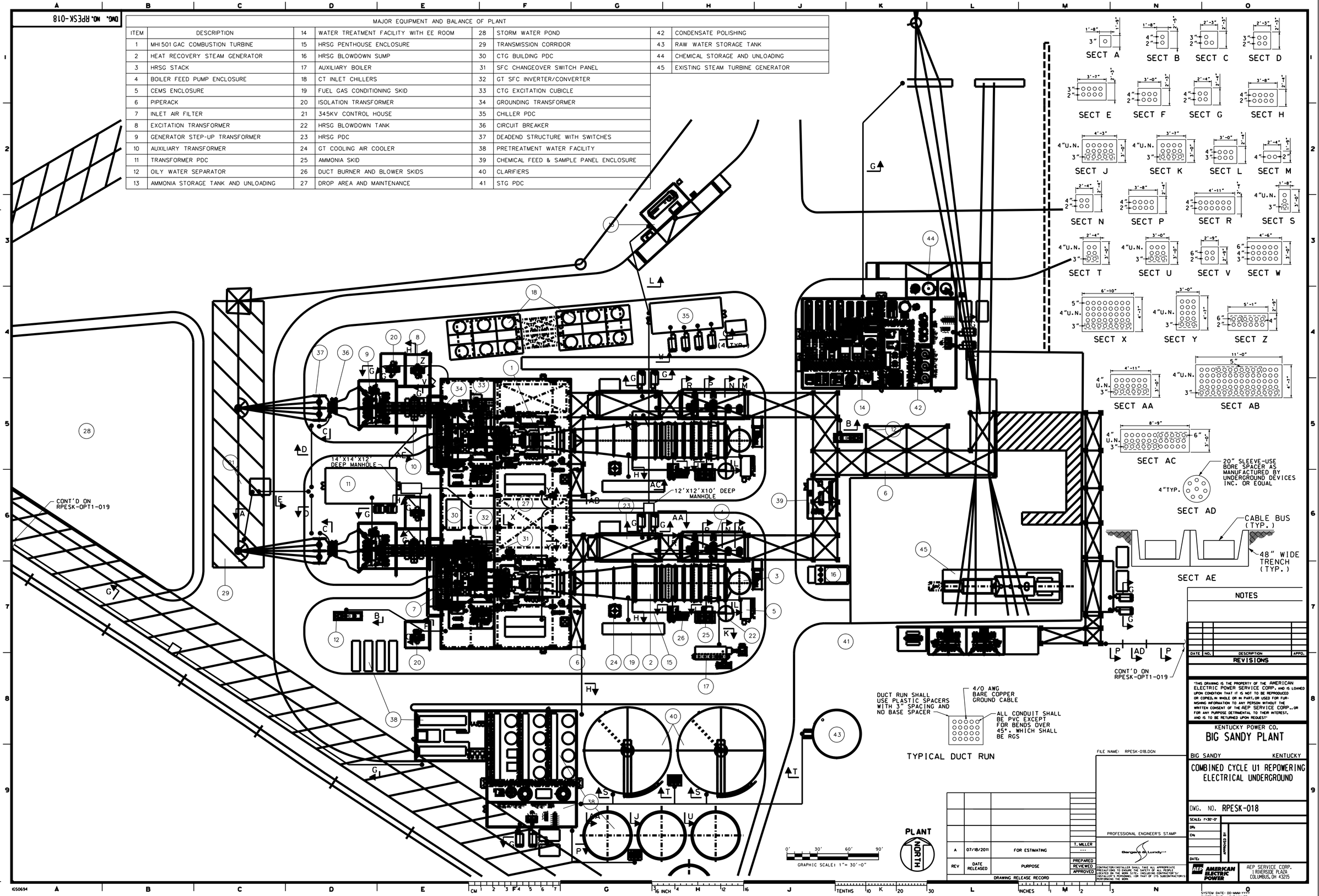
SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOUR:MINUTE

IGS0694

RPESK-016.dgn 7/19/2011 3:28:37 PM

DWG. NO. RPESK-018

MAJOR EQUIPMENT AND BALANCE OF PLANT							
ITEM	DESCRIPTION	14	WATER TREATMENT FACILITY WITH EE ROOM	28	STORM WATER POND	42	CONDENSATE POLISHING
1	MHI 501 GAC COMBUSTION TURBINE	15	HRSG PENTHOUSE ENCLOSURE	29	TRANSMISSION CORRIDOR	43	RAW WATER STORAGE TANK
2	HEAT RECOVERY STEAM GENERATOR	16	HRSG BLOWDOWN SUMP	30	CTG BUILDING PDC	44	CHEMICAL STORAGE AND UNLOADING
3	HRSG STACK	17	AUXILIARY BOILER	31	SFC CHANGEOVER SWITCH PANEL	45	EXISTING STEAM TURBINE GENERATOR
4	BOILER FEED PUMP ENCLOSURE	18	CT INLET CHILLERS	32	GT SFC INVERTER/CONVERTER		
5	CEMS ENCLOSURE	19	FUEL GAS CONDITIONING SKID	33	CTG EXCITATION CUBICLE		
6	PIPERACK	20	ISOLATION TRANSFORMER	34	GROUNDING TRANSFORMER		
7	INLET AIR FILTER	21	345KV CONTROL HOUSE	35	CHILLER PDC		
8	EXCITATION TRANSFORMER	22	HRSG BLOWDOWN TANK	36	CIRCUIT BREAKER		
9	GENERATOR STEP-UP TRANSFORMER	23	HRSG PDC	37	DEADEND STRUCTURE WITH SWITCHES		
10	AUXILIARY TRANSFORMER	24	GT COOLING AIR COOLER	38	PRETREATMENT WATER FACILITY		
11	TRANSFORMER PDC	25	AMMONIA SKID	39	CHEMICAL FEED & SAMPLE PANEL ENCLOSURE		
12	OILY WATER SEPARATOR	26	DUCT BURNER AND BLOWER SKIDS	40	CLARIFIERS		
13	AMMONIA STORAGE TANK AND UNLOADING	27	DROP AREA AND MAINTENANCE	41	STG PDC		



TYPICAL DUCT RUN

NOTES

DATE	NO.	DESCRIPTION	APPD.
		REVISIONS	

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

COMBINED CYCLE U1 REPOWERING ELECTRICAL UNDERGROUND

DWG. NO. RPESK-018

SCALE: 1"=30'-0"

DRN

CHK

APPROVED BY

DATE

FILE NAME: RPESK-018.DGN

PROFESSIONAL ENGINEER'S STAMP

REV	DATE RELEASED	PURPOSE	PREPARED / REVIEWED / APPROVED
A	07/18/2011	FOR ESTIMATING	T. MILLER

DRAWING RELEASE RECORD

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/ INSTALLER'S EMPLOYEES, OR THAT OF ITS SUBCONTRACTORS, PERFORMING THE WORK.

AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE: DD-MMM-YY
SYSTEM TIME: HOUR:MINUTE

IGS0694

DWG. NO. RPESK-019

138kv TRANSMISSION LINE
(EXISTING)

FUEL OIL UNLOADING

DRAINAGE DITCH

6'X6' DEEP MANHOLE

FIREHOUSE

RSO TRAILER

HEADQUARTERS

EXISTING DUCT BANK

138/4.16kv LINE

4'X6' DEEP MANHOLE

6'X6' DEEP MANHOLE

FUEL OIL STORAGE

METAL WASTE CLEANING TANK

6'X6'X8' DEEP MANHOLE

138kv TRANSMISSION LINE
(RELOCATED)

NATURAL GAS YARD

34.5kv TRANSMISSION LINE
(EXISTING)

6'X6'X8' DEEP MANHOLE

6'X6'X8' DEEP MANHOLE

CONT'D ON RPESK-018

CONT'D ON RPESK-018

6'X6'X8' DEEP MANHOLE

SECT F

SECT G

SECT H

SECT P

SECT AA

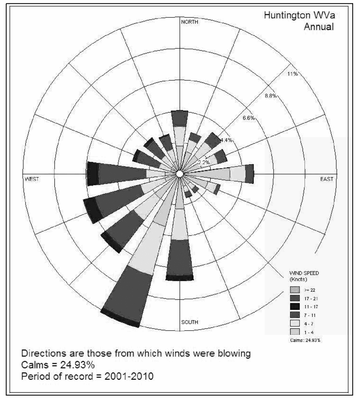
20" SLEEVE-USE BORE SPACER AS MANUFACTURED BY UNDERGROUND DEVICES INC. OR EQUAL

SECT AD

12" SLEEVE-USE BORE SPACER AS MANUFACTURED BY UNDERGROUND DEVICES INC. OR EQUAL

SECT AF

SPUR TRACK UPGRADE
FOR EQUIPMENT UNLOADING



Directions are those from which winds were blowing
Calms = 24.93%
Period of record = 2001-2010

0' 100' 200' 300'
GRAPHIC SCALE: 1"= 100'-0"

TRUE NORTH

NOTES

DATE	NO.	DESCRIPTION	APPD.
		REVISIONS	

KENTUCKY POWER CO.
BIG SANDY PLANT

BIG SANDY KENTUCKY

COMBINED CYCLE U1 REPOWERING
ELECTRICAL UNDERGROUND
OPTION 1 PLAN

DWG. NO. RPESK-019

SCALE: 1"=100'-0"

DRN

CHK

APPROVED BY

DATE:

FILE NAME: RPESK-019.DGN

PROFESSIONAL ENGINEER'S STAMP

Sargent & Lundy

REV	DATE RELEASED	PURPOSE	PREPARED	REVIEWED	APPROVED
A	07/18/2011	FOR ESTIMATING	T. MILLER	---	---

DRAWING RELEASE RECORD

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO PROTECT ALL UTILITIES THAT ARE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUBCONTRACTORS) PERFORMING THE WORK

AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

IGS0694

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOUR:MINUTE

BIG SANDY Repowering Project
RPESK-022
Quantity Estimate for Above Ground Grounding

Basis for the Estimate

1. The basis for the quantity is the Stall cable take off and new cable tray design.
2. Adjustments considered to the Stall design are as follows:
    a. Aux Boiler not on Stall
    b. CTG Buildings not on Stall
    c. WT Pretreatment not on Stall
    d. 2 BFPs per HRSG whereas Stall had one BFP per HRSG.
    e. Liquid Fuel not on Stall
3. The methodology used has been to take the Stall quantities for L2 cables and apply a 6 foot length of #6 ground conductor to account for elevated equipment grounds. Additionally, take offs were preformed of the cable tray design drawings to account for #4/0 ground conductor that would be run along the cable tray. This total length would provide the quantity of ground conductor to be provided

American Electric Power
Big Sandy Plant
Combined Cycle
Unit 1 Repowering Cost Estimate Study

Quantity Estimate for Above Ground Grounding
RPESK-022

7/25/2011
Rev. A

Item	Description	Scope Definition	Quantity	Unit	Remarks
1	CABLE TRAY GROUNDING	#4/0 Bare Ground Conductor		FT	
2	EQUIPMENT GROUNDING	#6 Bare Ground Conductor	8,556	FT	Accounts for elevated equipment not included in underground grounding estimated

BIG SANDY REPOWERING
RPESK-OPT1-023
Quantity Estimate for Above Ground Conduit

Basis for the Estimate

1. The basis for the quantity is the Stall design.
2. Adjustments considered to the Stall design are as follows:
    a. M501G Combustion Turbine
    b. Aux Boiler not on Stall
    c. CTG Building not on Stall
    d. WT Pretreatment not on Stall
    e. Less heat tracing than Stall due to indoor turbines.
    f. 2 BFPs per HRSG whereas Stall had one BFP per HRSG.
    g. Liquid Fuel not on Stall
    h. Fewer electrical PDCs than Stall.
3. Conduits have been estimated by account 70 or 75.
4. The methodology used has been to take the Stall conduit quantities and apply a 15% adder to adjust for the systems mentioned above. 80% of control and instrument segregated conduits have been assumed to be related to DCS and have been applied to account 75. All other conduits are applied to account 70.

American Electric Power
Big Sandy Plant
Combined Cycle
Unit 1 Repowering Cost Estimate Study

Quantity Estimate for Above Ground Conduit OPT1
RPESK-OPT1-023

7/25/2011
Rev. A

Description	Stall Total (-STG)	Stall Total (x1.15)	Account 70	Account 75	Remarks
.75" Conduit - (M, L1, L2)	11,298	12,993	12,993	N/A	
.75" Conduit - (C, K)	8,001	9,202	1,840	7,362	
1" Conduit - (M, L1, L2)	1,521	1,750	1,750	N/A	
1" Conduit - (C, K)	5,793	6,662	1,332	5,330	
1.5" Conduit - (M, L1, L2)	9,072	10,433	10,433	N/A	
1.5" Conduit - (C, K)	6,054	6,963	1,393	5,570	
2" Conduit - (M, L1, L2)	1,353	1,556	1,556	N/A	
2" Conduit - (C, K)	3,362	3,867	773	3,094	
3" Conduit - (M, L1, L2)	1,099	1,264	1,264	N/A	
3" Conduit - (C, K)	1,317	1,515	303	1,212	
4" Conduit - (M, L1, L2)	784	902	902	N/A	
4" Conduit - (C, K)	203	234	47	187	
5" Conduit - (M, L1, L2)	0	0	0	N/A	
5" Conduit - (C, K)	0	0	0	0	
6" Conduit - (M, L1, L2)	96	111	111	N/A	
6" Conduit - (C, K)	0	0	0	0	

BIG SANDY REPOWERING
RPESK-OPT2-023
Quantity Estimate for Above Ground Conduit

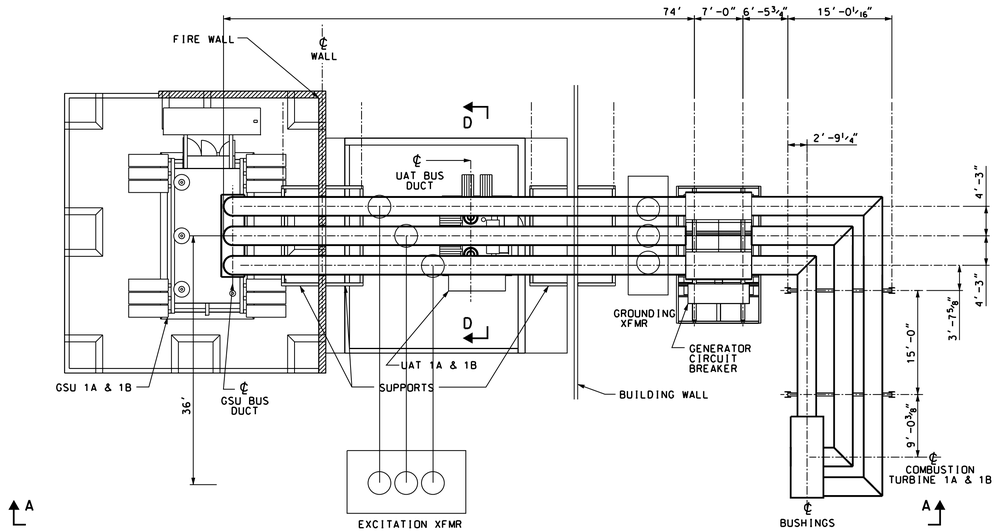
Basis for the Estimate

1. The basis for the quantity is the Stall design.
2. Adjustments considered to the Stall design are as follows:
    a. GE 7FA Combustion Turbine
    b. Aux Boiler not on Stall
    c. CTG Building not on Stall
    d. WT Pretreatment not on Stall
    e. Less heat tracing than Stall due to indoor turbines.
    f. 2 BFPs per HRSG whereas Stall had one BFP per HRSG.
    g. Liquid Fuel not on Stall
    h. Fewer electrical PDCs than Stall.
3. Conduits have been estimated by account 70 or 75.
4. The methodology used has been to take the Stall conduit quantities and apply a 10% adder to adjust for the systems mentioned above. 80% of control and instrument segregated conduits have been assumed to be related to DCS and have been applied to account 75. All other conduits are applied to account 70.

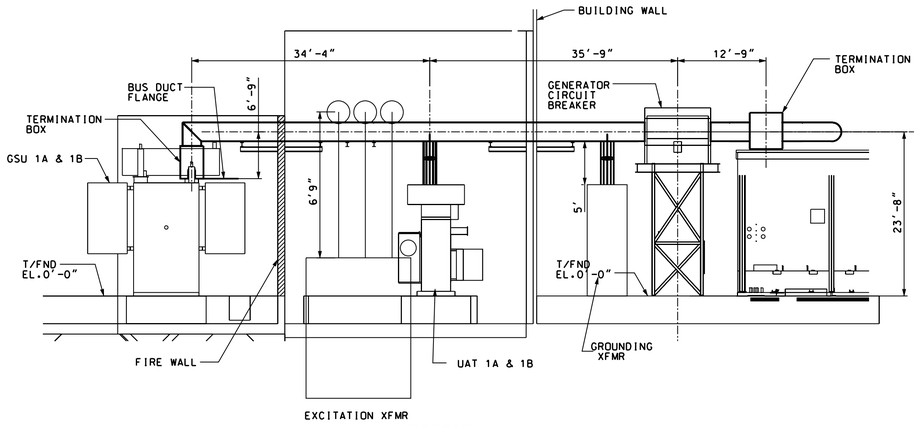
Big Sandy Plant Repowering Cost Estimate Study
RPESK-OPT2-023

Description	Stall Total (-STG)	Stall Total (x1.10)	Account 70	Account 75	Remarks
.75" Conduit - (M, L1, L2)	11,298	12,428	12,428	N/A	
.75" Conduit - (C, K)	8,001	8,802	1,760	7,042	
1" Conduit - (M, L1, L2)	1,521	1,674	1,674	N/A	
1" Conduit - (C, K)	5,793	6,373	1,275	5,098	
1.5" Conduit - (M, L1, L2)	9,072	9,980	9,980	N/A	
1.5" Conduit - (C, K)	6,054	6,660	1,332	5,328	
2" Conduit - (M, L1, L2)	1,353	1,489	1,489	N/A	
2" Conduit - (C, K)	3,362	3,699	740	2,959	
3" Conduit - (M, L1, L2)	1,099	1,209	1,209	N/A	
3" Conduit - (C, K)	1,317	1,449	290	1,159	
4" Conduit - (M, L1, L2)	784	863	863	N/A	
4" Conduit - (C, K)	203	224	45	179	
5" Conduit - (M, L1, L2)	0	0	0	N/A	
5" Conduit - (C, K)	0	0	0	0	
6" Conduit - (M, L1, L2)	96	106	106	N/A	
6" Conduit - (C, K)	0	0	0	0	

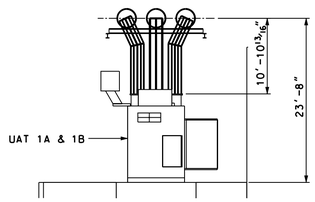
DWG. NO. RPESK-025



PLAN



SECTION A-A



SECTION D-D

GRAPHIC SCALE: 1/4" = 1'-0"

REV	DATE RELEASED	PURPOSE	PREPARED	REVIEWED	APPROVED
A	07/25/2011	ISSUED FOR USE	T. MILLER	---	

DRAWING RELEASE RECORD

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO WORK SAFELY IN THE AREAS ASSIGNED TO HIM/HER. SAFETY OF CONTRACTOR'S/ INSTALLER'S PERSONNEL IS THAT OF ITS SUBCONTRACTORS PERFORMING THE WORK.

PROFESSIONAL ENGINEER'S STAMP

Sargent & Lundy

FILE NAME: RPESK-025.DGN

NOTES

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

COMBINED CYCLE U1 REPOWERING
COST ESTIMATE STUDY
ELECTRICAL ISOLATED PHASE
BUS DUCT CTG 1A & 1B

DWG. NO. RPESK-025

SCALE: 3/4"-0"
DR:
CK:
APPROVED BY
DATE:

AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

IGS0694

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOUR&MINUTE

American Electric Power
Big Sandy Plant
Unit 1 Repowering
Cost Estimate Study

Quantity Estimate for Battery_UPS_Battery Chargers

RPESK-027

July 25, 2011
Rev. A

Item	Description	Scope Definition	Quantity	Unit	Remarks
1	Battery				
1.1	Battery	3000 AH, 125VDC, 2 wire ungrounded, lead antimony, 4 hour duration, 60 cells, 105V min - 140V max; All interconnecting hardware; Refer to ESK-002	1	EA	
2	Battery Rack				
2.1	Battery Rack	Battery Rack shall be two step type	2	EA	
3	Battery Accessories				
3.1	Battery Accessories	Provide standard accessories (i.e. lifting straps, two spare cells, inter-rack connectors, intercell connectors etc.)	1	LT	
4	Battery Charger				
4.1	Battery Charger	500 Amp, 480VAC Input, 90% conversion efficiency, 65 kA input breaker, NEMA 1 cabinet, Standard AC/DC meters (voltage, amps, ground detection) Refer to ESK-002	2	EA	
5	UPS				
5.1		40kVA, Ferroresonant or PWM inverter, AC rectifier, Static transfer switch, Manual bypass switch. Input 125VDC (105-140) / 480VAC and maintain output 120VAC +/-2%. RS-485 out for communications. Refer to ESK-002	1	EA	
6	Bypass Source Transformer				
6.1	Bypass Source Transformer	50 kVA 480-120VAC, 60 Hz, single phase.	1	EA	
7	Satellite UPS				
7.1		Liebert 15 kVA (or equivalent) Stand alone UPS system with 2 hour back up for remote area. (Includes distribution panels, battery, and all additional interconnection components)	1	EA	
8	Additional Costs to Include				
8.1	Layout Drawings, Schematics, Installation details, Manuals				
8.2	Shipping F.O.B to Ashland, Kentucky (Break out if possible)				
8.3	This equipment will be purchased by AEP under their Terms & Conditions.				

American Electric Power
Big Sandy Plant
U1 Repowering Cost Estimate Study

Quantity Estimate for Electrical Panels

RPESK-028

July 25, 2011

Item	Description	Scope Definition	Quantity	Unit	Remarks
1	Mimic Panels				
1.1	Transformer PDC Mimic Panel	11 - 24PB38D & 3 - 74PB201MK Pistol Grip Electroswitches; Refer to RPESK-028B for typical panel layout	2	EA	
1.2	HRSG PDC Mimic Panel	12 - 24PB38D Pistol Grip Electroswitches; Refer to RPESK-028B for typical panel layout	2	EA	
1.3	Water Treatment Building Mimic Panel	8 - 24PB38D Pistol Grip Electroswitches; Refer to ESK-028B for typical panel layout	1	EA	
1.4	Water PreTreatment Building Mimic Panel	8 - 24PB38D Pistol Grip Electroswitches; Refer to ESK-028B for typical panel layout	1	EA	
1.5	Chiller PDC Mimic Panel	20 - 24PB38D & 4 - 74PB201MK Pistol Grip Electroswitches; Refer to RPESK-028B for typical panel layout	1	EA	
1.6	STG PDC	33 - 24PB38D & 10 - 74PB201MK Pistol Grip Electroswitches; Refer to RPESK-028B for typical panel layout	1	EA	
1.7	Fuel Oil PDC	7 - 24PB38D Pistol Grip Electroswitches; Refer to RPESK-028B for typical panel layout	1	EA	
2	Relay Panels				
2.1	CTG Relay Panel	Refer to ESK-028A for typical panel layout and device type and quantities	2	EA	
2.2	STG Relay	Refer to ESK-028A for typical panel layout and device type and quantities	1	EA	Devices only, No panel. Relays will be installed in the existing STG Protection Panel.
2.3	DFR Panel	Qualitrol IDM Digital Fault Recorder	2	EA	1 Slave and 1 Master
3	UPS Panels				
3.1	Main UPS Panels	120VAC, single phase, 2 wire, power panel rated at 400A with 20 fused switch circuits; 22 kA	1	EA	
3.2	UPS Panels	120VAC, single phase, 2 wire, power panel rated at 200A with 20 fused switch circuits; 22 kA	7	EA	
4	Alt UPS Panels				
4.1	Main Alt UPS Panels	120VAC, single phase, 2 wire, power panel rated at 400A with 20 fused switch circuits; 22 kA	1	EA	
4.2	UPS Panels	120VAC, single phase, 2 wire, power panel rated at 200A with 20 fused switch circuits; 22 kA	7	EA	
5	DC Switchboard				

American Electric Power
Big Sandy Plant
U1 Repowering Cost Estimate Study

Quantity Estimate for Electrical Panels

RPESK-028

July 25, 2011

Item	Description	Scope Definition	Quantity	Unit	Remarks
5.1	DC Switchboard	125VDC, 1,200A copper, 22 kA SC, main and feed connections shall be 2 - pole disconnect switch with fuses. Standard meters, undervoltage and ground fault relays shall be provided. Refer to ESK-002.	1	EA	
6	DC Panels				
6	DC Panels	125VDC, main and feed connections shall be 2 - pole disconnect switch with fuses, 20 circuits, 22kA SC	7	EA	
7	Additional Costs to Include				
7.1	Layout Drawings, Schematics, Installation details, Manuals				
7.2	Shipping F.O.B to Ashland, Kentucky (Break out if possible)				
7.3	This equipment will be purchased by AEP under their Terms & Conditions.				

DWG. NO. RPESK-028A

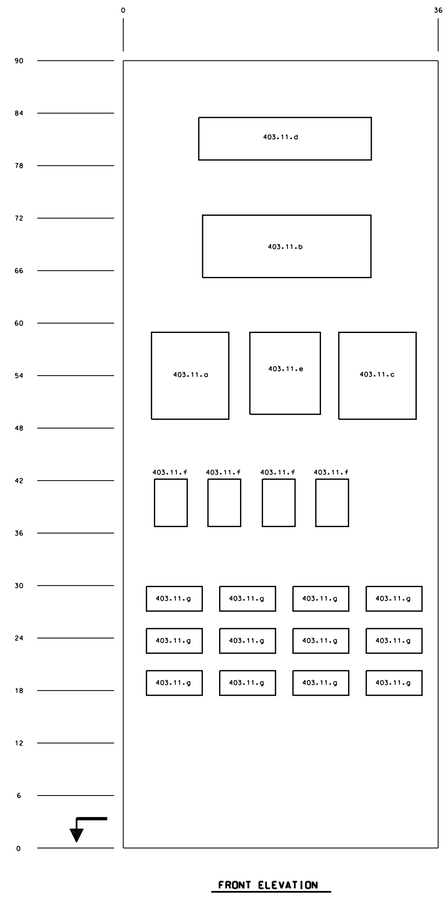
RELAY PANEL (SEE RPESK-028 SPEC 2.1)

LEGEND		
ITEM NUMBER	QUANTITY	SPECIFICATION
403.11.a	1	GE MULTILIN SR745 RELAY (CAT. # 745-W2-P5-G5-HI-E-H)
403.11.b	1	GE T60 RELAY (CAT. # T60-E00-HKH-F8F-H6G-M8H-PXX-UXX-WXX)
403.11.c	1	GE MULTILIN SR750 (CAT. # 750-P5-G5-S5-HI-A20-R-E)
403.11.d	1	SEL 387E RELAY (CAT. # 0387E003X53XX4X)
403.11.e	1	BASLER BE1-59N RELAY
403.11.f	4	ELECTROSWITCH LOCKOUT RELAY
403.11.g	12	FT TEST SWITCHES
LOCATION BY PANEL VENDOR		FUSES. TERMINAL BLOCKS. SPACE HEATER. LIGHTING FIXTURES. RECEPTACLES. LIGHT SWITCHES ETC.

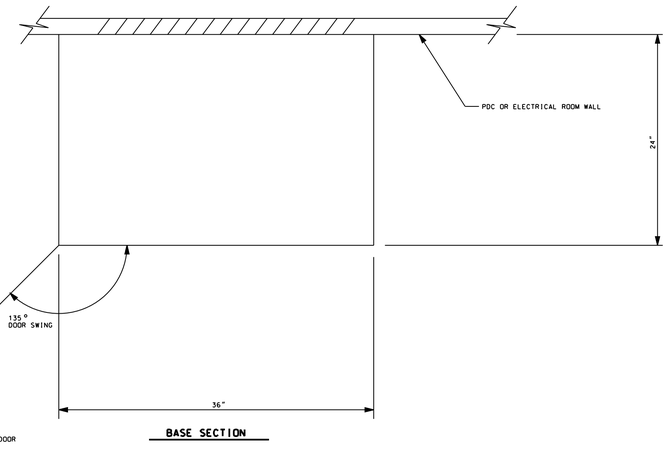
RELAYS ONLY (SEE RPESK-028 SPEC 2.2)

LEGEND		
ITEM NUMBER	QUANTITY	SPECIFICATION
403.11.a	1	GE MULTILIN SR745 RELAY (CAT. # 745-W2-P5-G5-HI-E-H)
403.11.b	1	GE T60 RELAY (CAT. # T60-E00-HKH-F8F-H6G-M8H-PXX-UXX-WXX)
403.11.c	1	GE MULTILIN SR750 (CAT. # 750-P5-G5-S5-HI-A20-R-E)
403.11.d	1	SEL 387E RELAY (CAT. # 0387E003X53XX4X)
403.11.e	1	BASLER BE1-59N RELAY
403.11.f	4	ELECTROSWITCH LOCKOUT RELAY
403.11.g	12	FT TEST SWITCHES
LOCATION BY PANEL VENDOR		FUSES. TERMINAL BLOCKS. SPACE HEATER. LIGHTING FIXTURES. RECEPTACLES. LIGHT SWITCHES ETC.

NO PANEL REQUIRED FOR STG PROTECTION RELAYS. RELAYS WILL BE INSTALLED IN EXISTING PANEL



FRONT ELEVATION



BASE SECTION

NOTES

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

COMBINED CYCLE U1 REPOWERING COST ESTIMATE STUDY RELAY PANEL LAYOUT

DWG. NO. RPESK-028A

SCALE: 1"=100'-0"

DR: M. SRONCE

CH:

DATE:

AS SHOWN

FILE NAME: RPESK-028A.DGN

PROFESSIONAL ENGINEER'S STAMP

Bergen & Lundy

REV	DATE RELEASED	PURPOSE	
A	07/25/2011	ISSUED FOR USE	PREPARED
			REVIEWED
			APPROVED

DRAWING RELEASE RECORD

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/ SUBCONTRACTOR'S PERSONNEL FOR THAT OF ITS SUBCONTRACTOR'S PERFORMING THE WORK.

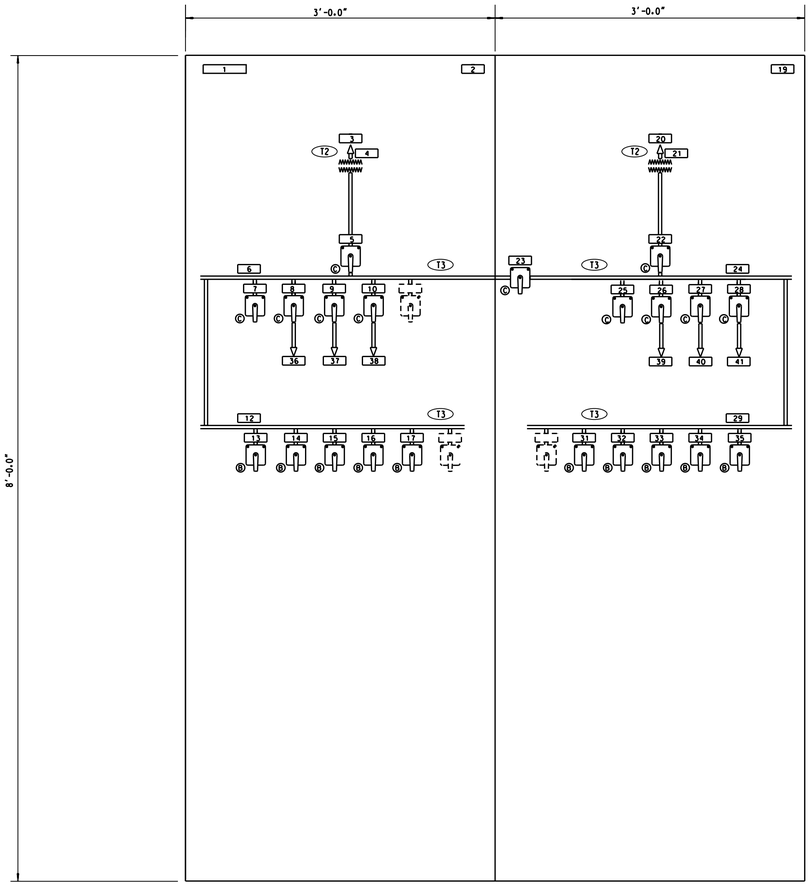
AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOUR:MINUTE

IGS0694

DWG. NO. RPESK-028A



NOTES

DEVICE LIST						
DEVICE	QTY	MANUFACTURER	CATALOG NO.	AEP ITEM NO.	CUTOUT NO.	DESCRIPTION
A						
B		ELECTROSWITCH	74PB201WK	LATER	BY PANEL MFR	BREAKER CONTROL SWITCH
C		ELECTROSWITCH	24PB38D	LATER	BY PANEL MFR	BREAKER CONTROL SWITCH
D						
E						
F						
G						

DRAWING RELEASE RECORD				
REV	DATE RELEASED	PURPOSE		
A	07/25/2011	ISSUED FOR USE	W. SRONCE	PREPARED
				REVIEWED
				APPROVED

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE WORKING ON THE JOB SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL, FOR THAT OF ITS SUBCONTRACTORS PERFORMING THE WORK.

PROFESSIONAL ENGINEER'S STAMP

Sargent & Lundy

FILE NAME: RPESK-028B.DGN

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

COMBINED CYCLE U1 REPOWERING COST ESTIMATE STUDY

MIMIC PANEL LAYOUT

DWG. NO. RPESK-028B

SCALE: 1"=00'-0"

DRN:

CHK:

APPROVED BY:

DATE:

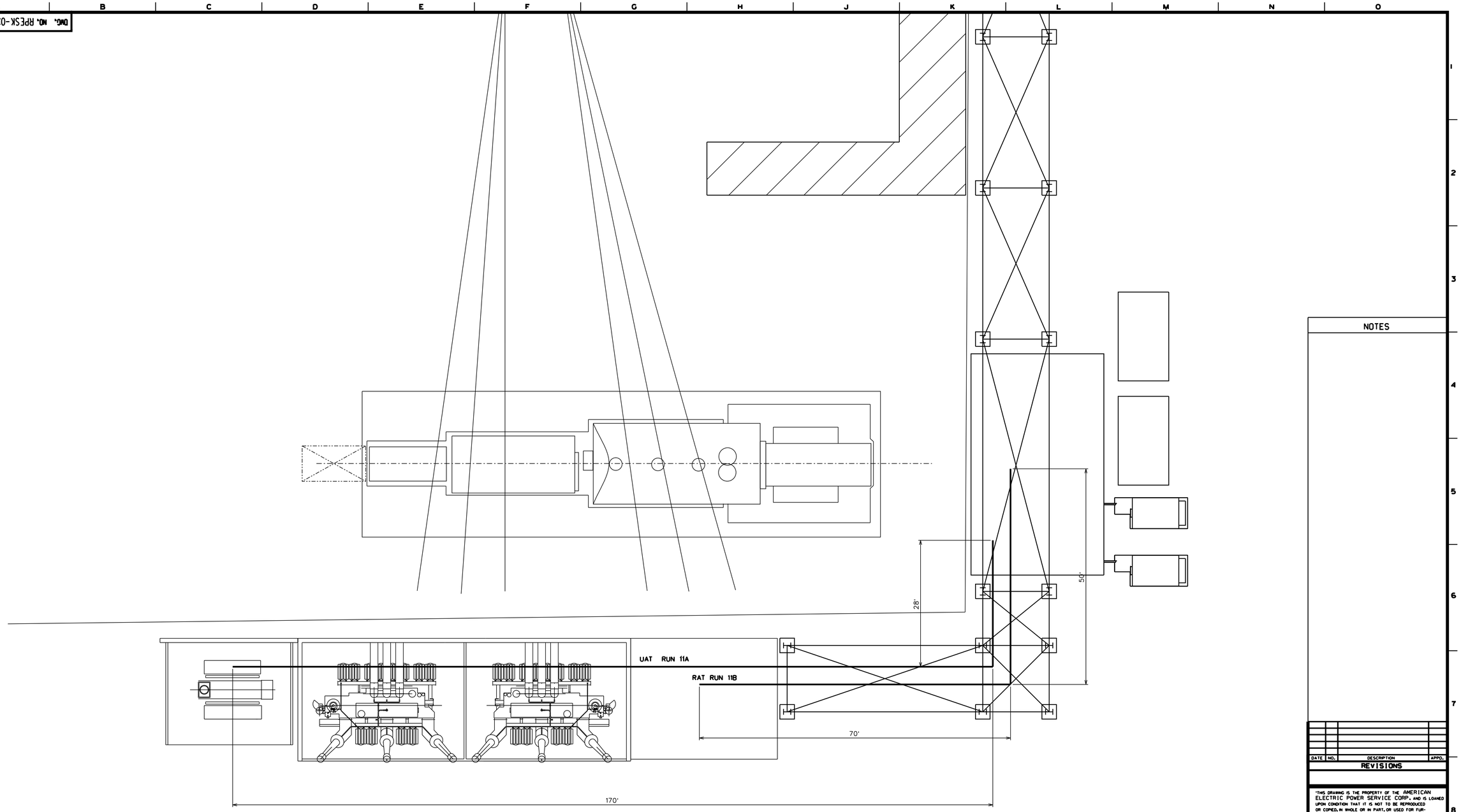
AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

IGS0694

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOUR:MINUTE

DWG. NO. RPESK-029



NOTES

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

KENTUCKY POWER CO.

BIG SANDY PLANT

BIG SANDY KENTUCKY

COMBINED CYCLE U1 REPOWERING COST ESTIMATE STUDY

CABLE BUS LAYOUT

DWG. NO. RPESK-029

SCALE: 1"=1'-0"

DR:

CK:

APPROVED BY:

DATE:

FILE NAME: RPESK-029.DGN

PROFESSIONAL ENGINEER'S STAMP

Bergen & Lundy

REV	DATE RELEASED	DRAWING RELEASE RECORD	
A	07/25/2011	FOR INFORMATION	M. SRONCE
		PURPOSE	PREPARED
			REVIEWED
			APPROVED

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE INCLUDING AEP'S, THE CONTRACTOR'S AND THE CONTRACTOR'S/ INSTALLER'S PERSONNEL FOR THAT OF ITS SUBCONTRACTORS PERFORMING THE WORK.

AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

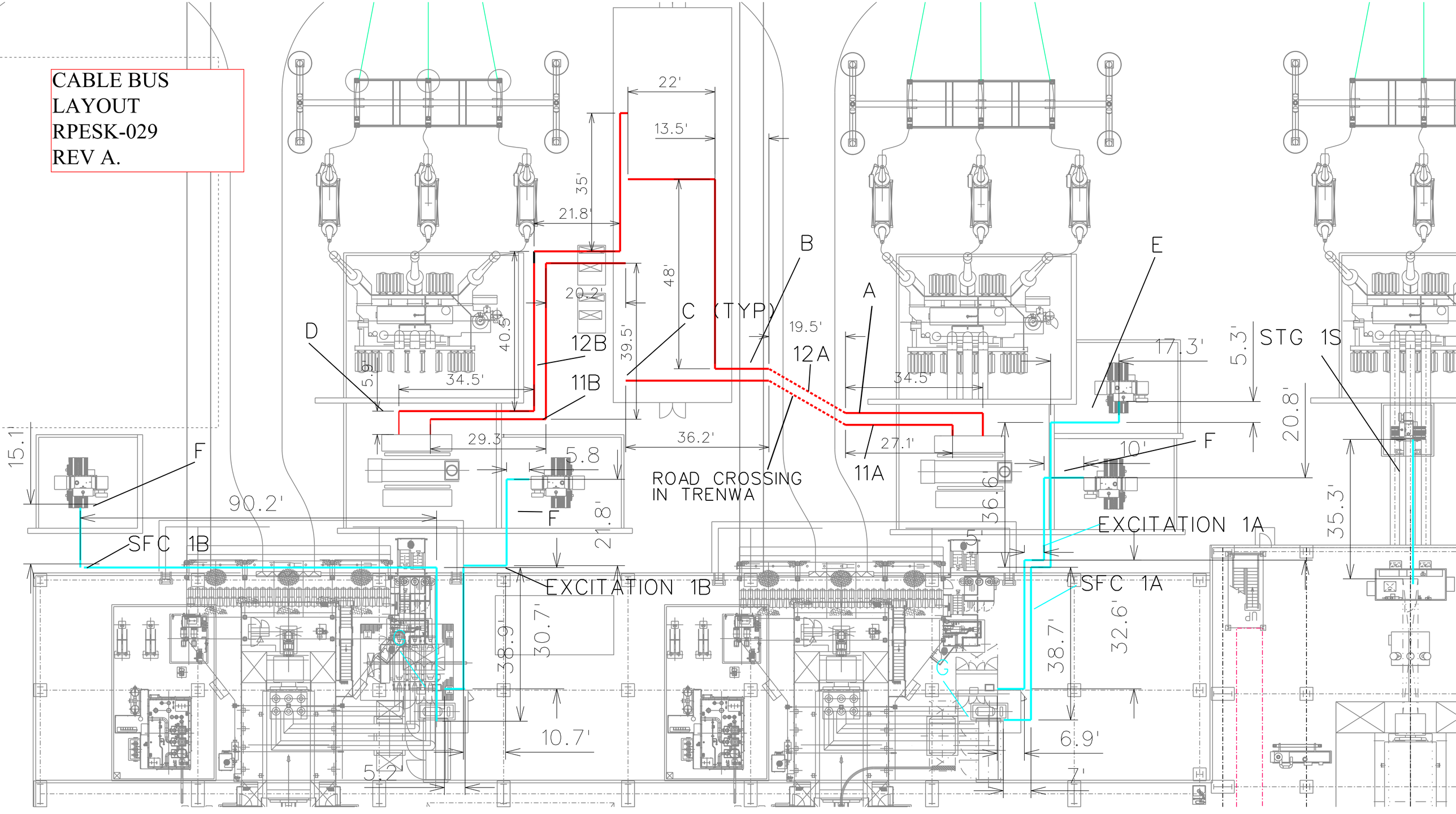
GRAPHIC SCALE: 1"= 1/8'-0"

NORTH

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOURMINUTE

IGS0694

CABLE BUS
LAYOUT
RPESK-029
REV A.



LOW VOLTAGE TRANSFORMER

9'

NON SEG BUS DUCT

2'

8.25'

LOW VOLTAGE TRANSFORMER (DRY TYPE)

5.15'

PDC BUILDING

Big Sandy CC Brownfield Build Cost Estimate Study
Cable Bus Duct
RPESK-029A

Item	Section		Quantity	Unit	Continous Current Rating	Symmetrical Short Circuit	Voltage	Remarks
	From	To						
	CABLE BUS RUN 12B							
1	UAT 1B	SWITCHGEAR 11B	100	FT	3,000 A	50 KA	4.16kV	Horizontal Length
2	POINT D ELEVATION CHANGE (UP)		10	FT				Vertical Length
3	POINT C ELEVATION CHANGE (DOWN)		5	FT				Vertical Length
4	90^{O} ELBOWS		5	EA				
5	UAT TERMINATION		1	EA				
6	SWITCHGEAR TERMINATION		1	EA				
7	SUPPORTS		1	LT				
	CABLE BUS RUN 13B							
1	UAT 1B	SWITCHGEAR 12B	140	FT	3,000 A	50 KA	4.16 kV	Horizontal Length
2	POINT D ELEVATION CHANGE		10	FT				Vertical Length
3	POINT C ELEVATION CHANGE		5	FT				Vertical Length
4	90^{O} ELBOWS		7	EA				
5	UAT TERMINATION		1	EA				
6	SWITCHGEAR TERMINATION		1	EA				
7	SUPPORTS		1	LT				
	CABLE BUS RUN 12A							
1	UAT 1A	SWITCHGEAR 11A	90	FT	3,000 A	50 KA	4.16 kV	Horizontal Length
2	POINT A ELEVATION CHANGE (DOWN)		15	FT				Vertical Length
3	POINT B ELEVATION CHANGE (UP)		24	FT				Vertical Length
4	POINT C ELEVATION CHANGE (DOWN)		5	FT				Vertical Length
5	90^{O} ELBOWS		6	EA				
6	160^{O} BENDS		2	EA				
7	UAT TERMINATION		1	EA				
8	SWITCHGEAR TERMINATION		1	EA				
9	SUPPORTS		1	LT				
10	TRANSPOSITION		1	EA				

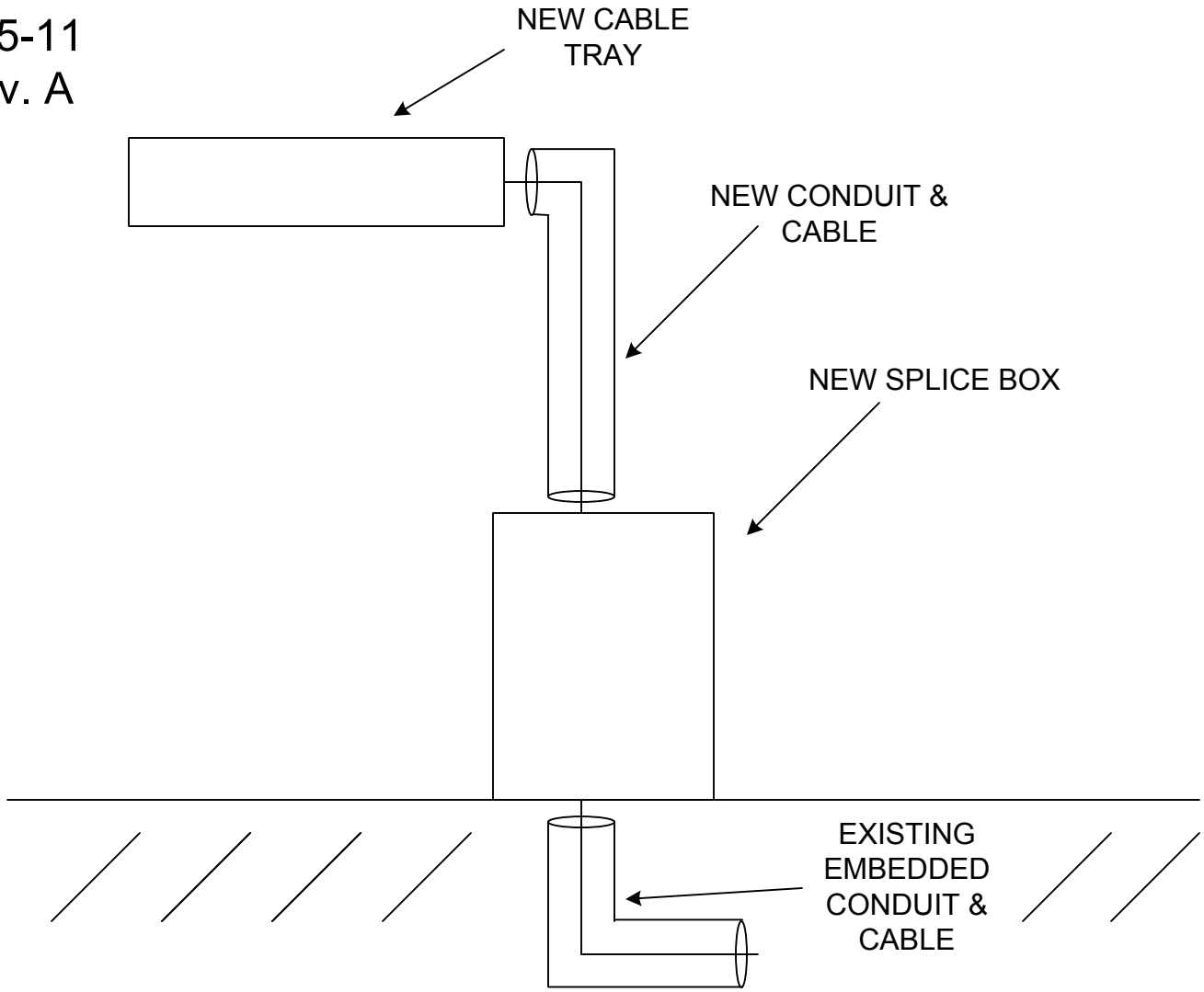
Big Sandy CC Brownfield Build Cost Estimate Study
Cable Bus Duct
RPESK-029A

Item	Section		Quantity	Unit	Continous Current Rating	Symmetrical Short Circuit	Voltage	Remarks
	From	To						
	CABLE BUS RUN 13B							
1	UAT 1A	SWITCHGEAR 12A	100	FT	3,000 A	50 KA	4.16 kV	Horizontal Length
2	POINT A ELEVATION CHANGE (DOWN)		15	FT				Vertical Length
3	POINT B ELEVATION CHANGE (UP)		24	FT				Vertical Length
4	POINT C ELEVATION CHANGE (DOWN)		5	FT				Vertical Length
5	90^{O} ELBOWS		7	EA				
6	160^{O} BENDS		2	EA				
7	UAT TERMINATION		1	EA				
8	SWITCHGEAR TERMINATION		1	EA				
9	SUPPORTS		1	LT				
10	TRANSPOSITION		1	EA				
	CABLE BUS RUN 11A							
1	UAT 1A	SWITCHGEAR 11A	220	FT	1,600 A	40 KA	4.16 kV	Horizontal Length
2	90^{O} ELBOWS		4	EA				
3	UAT TERMINATION		1	EA				
4	SWITCHGEAR TERMINATION		1	EA				
5	SUPPORTS		1	LT				
	CABLE BUS RUN 11B							
1	UAT 1A	SWITCHGEAR 12A	120	FT	1,600 A	40 KA	4.16 kV	Horizontal Length
5	90^{O} ELBOWS		4	EA				
7	UAT TERMINATION		1	EA				
8	SWITCHGEAR TERMINATION		1	EA				
9	SUPPORTS		1	LT				

Big Sandy CC Brownfield Build Cost Estimate Study
Cable Bus Duct
RPESK-029A

Item	Section		Quantity	Unit	Continous Current Rating	Symmetrical Short Circuit	Voltage	Remarks
	From	To						
CABLE BUS LV XFMR (PDC) (Quantity - 12)								
1	XFMR (TYP)	LV SWGR (TYP)	15	FT	4,000 A	65 KA	.48 kV	Horizontal Length
2	90^{O} ELBOWS		3	EA				
3	ELEVATION CHANGE (UP/DOWN)		10	FT				Vertical Length
5	XFMR TERMINATION		1	EA				
6	SWITCHGEAR TERMINATION		1	EA				
CABLE BUS LV XFMR (BUILDING) (Quantity - 4)								
1	XFMR (TYP)	LV SWGR (TYP)	15	FT	4,000 A	65 KA	.48 kV	Horizontal Length
2	90^{O} ELBOWS		3	EA				
3	ELEVATION CHANGE (UP/DOWN)		5	FT				Vertical Length
5	XFMR TERMINATION		1	EA				
6	SWITCHGEAR TERMINATION		1	EA				

RPESK-032
SPLICE BOX
7-25-11
Rev. A



ATTACHMENT 1-22
I&C Design Commodity Quantity Data

a) HRSG #1 PDC - BOP

I/O Description	Required Points	I/O Cabinets
Analog Input (Inclusive of all T/C, RTD, & 4-20ma inputs)	182	
Analog Outputs	34	
Digital Inputs	279	
Digital Outputs (Dry contacts with some 120 VAC DCS power to power field solenoids, etc.)	181	
TOTAL I/O FOR THIS AREA	676	6

b) HRSG #1 PDC - BMS

I/O Description	Required Points	I/O Cabinets
Analog Input (Inclusive of all T/C, RTD, & 4-20ma inputs)	3	
Analog Outputs	1	
Digital Inputs	35	
Digital Outputs (Dry contacts with some 120 VAC DCS power to power field solenoids, etc.)	19	
TOTAL I/O FOR THIS AREA	58	2

c) HRSG #1 PENTHOUSE

I/O Description	Required Points	I/O Cabinets
Analog Input (Inclusive of all T/C, RTD, & 4-20ma inputs)	107	
Analog Outputs	17	
Digital Inputs	76	
Digital Outputs (Dry contacts with some 120 VAC DCS power to power field solenoids, etc.)	49	
TOTAL I/O FOR THIS AREA	249	4

d) HRSG #2 PDC - BOP

I/O Description	Required Points	I/O Cabinets
Analog Input (Inclusive of all T/C, RTD, & 4-20ma inputs)	182	
Analog Outputs	34	
Digital Inputs	279	
Digital Outputs (Dry contacts with some 120 VAC DCS power to power field solenoids, etc.)	181	
TOTAL I/O FOR THIS AREA	676	6

e) HRSG #2 PDC - BMS

I/O Description	Required Points	I/O Cabinets
Analog Input (Inclusive of all T/C, RTD, & 4-20ma inputs)	3	
Analog Outputs	1	
Digital Inputs	35	
Digital Outputs (Dry contacts with some 120 VAC DCS power to power field solenoids, etc.)	19	
TOTAL I/O FOR THIS AREA	58	2

f) HRSG #2 - PENTHOUSE

I/O Description	Required Points	I/O Cabinets
Analog Input (Inclusive of all T/C, RTD, & 4-20ma inputs)	107	
Analog Outputs	17	
Digital Inputs	76	
Digital Outputs (Dry contacts with some 120 VAC DCS power to power field solenoids, etc.)	49	
TOTAL I/O FOR THIS AREA	249	4

g) CHILLERS PDC

I/O Description	Required Points	I/O Cabinets
Analog Input (Inclusive of all T/C, RTD, & 4-20ma inputs)	5	
Analog Outputs	3	
Digital Inputs	92	
Digital Outputs (Dry contacts with some 120 VAC DCS power to power field solenoids, etc.)	46	
TOTAL I/O FOR THIS AREA	146	2

h) WATER / PRE TREATMENT EE ROOM

I/O Description	Required Points	I/O Cabinets
Analog Input (Inclusive of all T/C, RTD, & 4-20ma inputs)	130	
Analog Outputs	18	
Digital Inputs	297	
Digital Outputs (Dry contacts with some 120 VAC DCS power to power field solenoids, etc.)	103	
TOTAL I/O FOR THIS AREA	548	4

i) WATER TREATMENT EE ROOM

I/O Description	Required Points	I/O Cabinets
Analog Input (Inclusive of all T/C, RTD, & 4-20ma inputs)	66	
Analog Outputs	20	
Digital Inputs	255	
Digital Outputs (Dry contacts with some 120 VAC DCS power to power field solenoids, etc.)	145	
TOTAL I/O FOR THIS AREA	486	4

j) TRANSFORMER PDC #1

I/O Description	Required Points	I/O Cabinets
Analog Input (Inclusive of all T/C, RTD, & 4-20ma inputs)	13	
Analog Outputs	0	
Digital Inputs	102	
Digital Outputs (Dry contacts with some 120 VAC DCS power to power field solenoids, etc.)	14	
TOTAL I/O FOR THIS AREA	129	2

k) TRANSFORMER PDC #2

I/O Description	Required Points	I/O Cabinets
Analog Input (Inclusive of all T/C, RTD, & 4-20ma inputs)	13	
Analog Outputs	0	
Digital Inputs	102	
Digital Outputs (Dry contacts with some 120 VAC DCS power to power field solenoids, etc.)	14	
TOTAL I/O FOR THIS AREA	129	2

l) TRANSFORMER PDC COMMON

I/O Description	Required Points	I/O Cabinets
Analog Input (Inclusive of all T/C, RTD, & 4-20ma inputs)	80	
Analog Outputs	3	
Digital Inputs	60	
Digital Outputs (Dry contacts with some 120 VAC DCS power to power field solenoids, etc.)	22	
TOTAL I/O FOR THIS AREA	165	2

m) STG PDC

I/O Description	Required Points	I/O Cabinets
Analog Input (Inclusive of all T/C, RTD, & 4-20ma inputs)	26	
Analog Outputs	5	
Digital Inputs	70	
Digital Outputs (Dry contacts with some 120 VAC DCS power to power field solenoids, etc.)	40	
TOTAL I/O FOR THIS AREA	141	2

n) EXISTING STG BOP & TURBINE CONTROL SYSTEM

I/O Description	Required Points	I/O Cabinets
Analog Input (Inclusive of all T/C, RTD, & 4-20ma inputs)	275	
Analog Outputs	60	
Digital Inputs	275	
Digital Outputs (Dry contacts with some 120 VAC DCS power to power field solenoids, etc.)	160	
TOTAL I/O FOR THIS AREA	770	11

TOTAL AI	***1192***
TOTAL AO	***213***
TOTAL DI	***2033***
TOTAL DO	***1042***

TOTAL I/O FOR BIG SANDY U1 REPOWER — *4480* — *53*

BIG SANDY BOP INSTRUMENT ESTIMATE						
Description	Analyzer	FE	Switch	Transmitter	TE / TEW	Total
BOP Main Steam Transducers/sensors	0	2	0	15	27	44
BOP Hot Reheat Steam Transducers/sensors	0	2	0	15	25	42
BOP Cold Reheat Steam Transducers/sensors	0	0	16	6	5	27
BOP Low Pressure Steam System Transducer/Sensors	0	2	20	15	11	48
BOP Condensate System Transducers/sensors	0	5	5	26	9	45
BOP Feedwater System Transducers/sensors	0	9	0	70	18	97
BOP Circulating Water System Transducers/sensors	3	2	0	18	10	33
BOP Closed Cooling Water System Transducers/sensors	0	20	0	13	20	53
BOP Natural Gas Transducers/sensors	0	3	0	10	6	19
BOP Fuel Oil Transducers/sensors	0	1	0	10	1	12
BOP Compressed Air Transducers/sensors	2	2	0	5	0	9
BOP Fire Protection Transducers/sensors	0	0	0	0	0	0
BOP Water Systems Transducers/sensors	3	9	0	50	10	72
BOP Chemical Feed Transducers/sensors	0	0	0	6	0	6
BOP Ammonia Transducers/sensors	0	0	0	6	0	6
GRAND TOTAL:	8	57	41	265	142	513