Cooper Station – 2x1 Combined Cycle Project Scoping Report

East Kentucky Power Cooperative

Cooper 2x1 Combined Cycle PSR
Project No. 157787

Revision 0
11/07/2024

Cooper Station – 2x1 Combined Cycle Project Scoping Report

prepared for

East Kentucky Power Cooperative
Cooper 2x1 Combined Cycle PSR
Somerset, Kentucky

Project No. 157787

Revision 0
11/07/2024

prepared by

Burns & McDonnell Engineering Company, Inc.
Kansas City, Missouri

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INDEX AND CERTIFICATION

East Kentucky Power Cooperative
Cooper Station – 2x1 Combined Cycle
Project Scoping Report
Project No. 157787

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Certification

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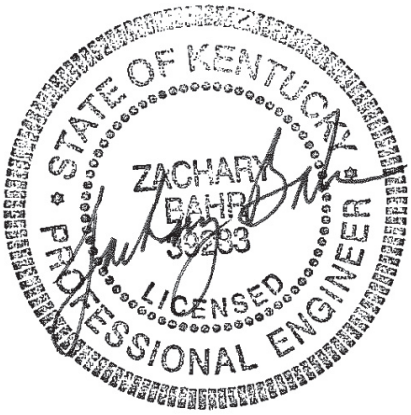

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LIST OF ABBREVIATIONS

Abbreviation	Term/Phrase/Name
AACE	Association for the Advancement of Cost Engineering
ANSI	American National Standards Institute
Aux	Auxiliary
BAAH	Breaker-and-a-half
BACT	Best Available Control Technology
BMcD	Burns & McDonnell Engineering Company, Inc.
BOP	Balance of plant
CIP	Clean-in-Place
CM	Construction management
CMU	Concrete masonry unit
CO	Carbon monoxide
COD	Commercial operational date
CPCN	Certificate of Public Convenience
CTG	Combustion turbine generators
2x1 CCGT	Combined cycle gas turbine
DCS	Distributed control system
DLN	Dry low NOx
DOR	Division of Responsibility
EA	Environmental Assessment
EQ	Email quote
FNTP	Full Notice-To-Proceed

Abbreviation	Term/Phrase/Name
GE	General Electric
GSU	Generator Step-up
HP	High pressure
HRSG	Heat recovery steam generators
HVAC	Heating, Ventilation, and Air Conditioning
I/O	Input/output
KPDES	Kentucky Pollutant Discharge Elimination System
LNTP	Limited Notice-To-Proceed
LP	Low pressure
LTSA	Long-term service agreement
MCC	Motor controls center
MSL	Mean sea level
M&R	Meter and regulation
NDE	Non-destructive evaluation
NEPA	National Environmental Policy Act
NERC CIP	North American Electric Reliability Corp. Critical Infrastructure Protection
NOx	Nitrous oxides
OEM	Original equipment manufacturer
O&M	Operation and maintenance
PO	Purchase order
PSC	Public Service Commission
PSD	Prevention of Significant Deterioration

Abbreviation	Term/Phrase/Name
PSR	Project scoping report
PWHT	Post weld heat treatment
P&IDs	Piping & Instrumentation Diagrams
P&P	Performance and payment
RFP	Request for proposal
RO	Reverse osmosis
RTU	Remote Terminal Unit
RUS	Rural Utilities Service
SCR	Selective catalytic reduction
STG	Steam turbine generator
UF	Ultra Filtration
ULSD	Ultra-low sulfur diesel
USEPA	United States Environmental Protection Agency
VOC	Volatile organic compounds

1.0 EXECUTIVE SUMMARY

East Kentucky Power Cooperative (EKPC; Owner) is reviewing the viability of a new two-on-one combined cycle "F" class combined cycle gas turbine (2x1 CCGT) facility at their John Sherman Cooper Power Station (Cooper) to meet their customers' growing needs for additional energy (Project). This new facility will provide up to approximately 775 MW (net) of base loaded generation by the end of 2030.

Located near Somerset, KY, the Cooper Power Station currently has two operating pulverized coal generating units rated at 114 MW (Unit 1) and 230 MW (Unit 2) for a total active capacity of 344 MW. Both units are wholly owned and operated by EKPC. The 2x1 CCGT plant will add approximately 775 MW to the generation capacity at Cooper. EKPC retained Burns & McDonnell Engineering Corp. Inc. (BMcD) to assist in developing the scope, preliminary design, schedule, and cost estimate for the additional 2x1 CCGT plant. The cost estimate was developed in accordance with the Association for the Advancement of Cost Engineering (AACE) Class 3 cost estimate guidelines.

This report summarizes the Project scope and presents the study results for use in EKPC's evaluation of Project feasibility and budgeting. Further, this report provides a basis document for obtaining Rural Utilities Service (RUS) funding, preparing the Kentucky Department of Environmental Protection Division of Air Quality permit application, and providing input for preparation of the Environmental Assessment (EA), project definition, cost estimate, and milestone schedule.

The proposed Cooper Units 4, 5, and 6 will consist of two F-class combustion turbine generators (CTG), two heat recovery steam generators (HRSG) and one steam turbine generator (STG) with balance of plant equipment, including backup fuel oil infrastructure. The new units will include selective catalytic reduction (SCR) and carbon monoxide (CO) catalyst to meet current Best Available Control Technology (BACT) standards.

1.1 Purpose

The purpose of this report is to define the overall scope, schedule, performance, capital costs and operating and maintenance costs of the new Cooper 2x1 CCGT plant based on the documents and information contained herein, and to provide general information to support the following activities:

- Permitting
- Internal budget appropriations
- Approval from the RUS for project financing

1.2 Project Configuration Summary

The new facility will consist of a nominal output of up to approximately 775 MW (annual average) 2x1 CCGT electric generating units at the Cooper Station in Pulaski County, Kentucky. This is a modern combined cycle plant design that is based on the Siemens SGT6-5000F (5000F) combustion turbine and generators paired with unfired (no duct firing) HRSG's sending steam to a new steam turbine generator. In general, based on the direction from EKPC for cold weather protection, the majority of the operating equipment will be located within enclosed structures to be insulated and heated, including the CTGs and STG. The STG will be cooled by a new counterflow cooling tower which will also serve as the cooling medium for the closed cooling water system used throughout the plant.

The CTGs will be designed to burn pipeline quality natural gas with ultra-low sulfur diesel (ULSD), fuel oil, as a backup. A new natural gas supply pipeline will be installed to the site as part of a separate project. The natural gas pipeline costs are not included in the Project or owner costs presented in this report. On-site heating, regulation, and fuel gas filtering to meet the pressure, superheat, and cleanliness requirements are included in this Project to meet the supply requirements of the CTGs and auxiliary boiler. The pipeline supply pressure of at least 600 psig will be adequate for the plant; fuel gas compression is not required due to adequate pipeline supply pressure.

To support emergency backup operation, the fuel oil storage tanks are designed to provide 72 hours of fuel while firing at full load. Two fuel oil storage tanks are located in concrete secondary containment structures with redundant offloading and forwarding pumps. All fuel oil piping outside of the containment structure is supplied with double wall piping. Fuel oil heaters are supplied to ensure fuel oil temperature meets CTG's atomizing temperature requirements.

A new 161 kV switchyard will be installed to interconnect the output from the 2x1 CCGT generating plant to the existing high voltage transmission lines on the site. Existing transmission lines that traverse the site and would interfere with the new equipment will be relocated to the north end of the access road, south of the landfill. The EKPC transmission group worked with BMcD to investigate the transmission system requirements for network system upgrades. EKPC provided planning level direct cost estimates for the network system upgrades. BMcD estimated the engineering and construction management costs associated with the network system upgrade projects. Costs for the new switchyard, new transmission lines, transmission line relocation, and transmission system upgrades are included in the project estimate.

Makeup raw water will be sourced from Cumberland Lake at the existing Unit 2 intake using new makeup pumps. The raw water will be clarified and stored on-site in a new 400,000 gallon tank prior to

being pumped to the cooling tower for makeup water. The clarified water tank is sized to provide two hours of surge / make-up water to the cooling tower at summer base load operation. This clarified water tank will also feed a filtration system prior to being stored on-site in a 400,000 gallon service/fire water tank. Fire water volume will be kept separate by use of a standpipe. This tank provides storage capacity for all fire water needs for the new facility along with any service water users. It also feeds additional filtration and reverse osmosis skids to create demineralized water for cycle makeup and combustion turbine fuel oil firing. The demineralized water will be stored in a 1,500,000 gallon tank sized for 72 hours of operation on fuel oil at full load.

Potable water supply for the facility will tap off the city supply main and feed a potable water supply tank and booster pump system. This will feed to all locations with chemical storage for safety showers and eye wash stations in addition to building restrooms and showers.

All process wastewater, reverse osmosis reject water, cooling tower blowdown, and HRSG blowdown will be combined, chemically treated to meet Kentucky Pollutant Discharge Elimination System (KPDES) permit requirements and pumped to a new wastewater storage tank system. There it will be merged with existing plant wastewater and pumped to Outfall 003. Sanitary wastewater will be collected in lift stations and pumped to a new leech field for disposal.

Site storm water will be collected and directed to a new on-site storm water runoff pond. The storm water runoff pond will discharge by gravity to the Cumberland Lake via existing Outfall 007. No treatment or monitoring of the storm water discharge is included. The storm water pond was sized for a 100-year storm event over a 24-hour period for the 2x1 CCGT facility site area. All oily contaminated drains will collect in either of two oil water separators before discharging to the stormwater runoff pond.

1.3 Contracting Approach

The selected contracting strategy for this report and basis of the estimate for this project is a multiple prime contract approach. This approach was selected based on EKPC's input and past experience with recent projects. Under this approach, Owner will hire an Owner's Engineer (OE) to perform detailed design, develop procurement packages and administer after award, and assist Owner in management of on-site construction activities including startup and commissioning activities. All procurements will be by Owner on Owner's paper.

In the multiple contract approach, the Owner and OE work together to procure the project equipment, construction, and site services contracts. The procurement of long lead equipment such as the CTGs, STG, HRSGs, Generator Step-up (GSU) transformers, switchgear, and substation power transformers is

needed earlier in the project to support plant detailed design and permitting efforts. The estimate is based on procuring this major equipment under separate procurement contracts and not combined into a single power island contract.

The multiple prime contracting approach includes an estimated 57 equipment and material supply contracts, 7 furnish and erect contracts (for example, field erected tanks, fire protection and detection, pre-engineered metal buildings, etc.), 14 construction contracts, and 12 service contracts (for example, subsurface investigation, electrical testing, performance and emissions testing, etc.). A listing of the anticipated equipment, furnish and erect, construction, and service contracts is included in Section 5.1 and Appendix C to this report.

1.4 Schedule

For an estimated commercial operation date in December 2030 (commercial operation date includes schedule margin), the critical path of the project is based on obtaining the Certificate of Public Convenience (CPCN) by July 2025 to support detailed design, and obtaining the RUS National Environmental Policy Act (NEPA) EA approval by May 2027 and PJM Interconnect Application approval by December 2027 to support equipment procurement and construction activities. This path of activities commences with issuing the PJM Interconnect Application by December 2023 (completed) and NEPA EA application submitted by August 2025. Table 1-1 reflects the major milestones for the project. The complete schedule is shown in Appendix Q.

Table 1-1: Cooper 2x1 CCGT Project Milestones

Permitting Activities	**Date**
Submit PJM Interconnect Application (complete)	December 2023
CPCN Advance Notice	November 2024
Submit Air Permit Application	December 2024
Submit RUS NEPA EA Application	August 2025
RUS NEPA EA Approval	May 2027
Engineering/Procurement	
Limited Notice-To-Proceed (LNTP) Engineering for Long Lead Equipment	November 2024
Full Notice-To-Proceed (FNTP) Engineering	July 2025
GTG Contract FNTP	July 2025
HRSG Contract Award	August 2025
STG Contract Award	August 2025

GSU Contract Award	October 2025
Award Power Transformers for Cooper Substation	March 2025
Award High Voltage Circuit Breakers	August 2025
Construction/Startup Period – 40 Months	
Start Construction	July 2027
Start Major Equipment Erection	August 2028
Start Balance of Plant Mechanical and Electrical Construction	September 2028
Energize Startup Power / Startup Commissioning	August 2029
Target Commercial Operation[1]	November 2030
Commercial Operation with Schedule Margin	December 2030

[1]Project cost estimate is based on meeting Commercial Operation prior to December 1, 2030. Costs for extended staff and construction for later Commercial Operation are excluded.

1.5 Cost Estimate

The estimated capital cost for the new facility is approximately $1,317 million, excluding all escalation through the project timeline (overnight costs). This equates to approximately $1,705/kW, with an average annual output of 772.4 MW (net) based on utilizing Siemens 5000F combustion turbines. These costs include approximately $140.8 million attributed to new transmission lines, a new switchyard, and various estimated transmission line and substation construction ("network upgrades"). This does not account for the cost to bring a new natural gas pipeline onsite. Detailed costs are shown in Appendix R.

To reduce the risk of project cost overruns, an estimate contingency of approximately $107 million is included in this estimate, equating to 10% of the estimated capital cost. This contingency is included to cover pricing based on the level of preliminary design completed for the estimate development. However, this contingency does not account for project scope changes, nor does it account for the impact of major shifts in market conditions, or escalation, which may be experienced prior to the commercial operation date.

The estimated incremental additional operation and maintenance (O&M) costs above the existing Unit 1 & 2 O&M costs are as follows in Table 1-2. All O&M costs are represented in 2024 dollars and are based on 75% capacity factor. Detailed costs are shown in Appendix T.

Table 1-2: Annualized Estimated O&M Costs

	Cost
Annual Fixed Operating Costs	$7.50 / kW-yr
Levelized CTG Major Maintenance Costs	$1.60 / MWh
Non-Fuel Variable Operating Costs	$1.70 / MWh
Incremental Evaporative Cooler Operation Cost	$0.45/MWh

Fixed O&M costs include allowances for general maintenance activities, staffing, office and administration costs, and standby energy costs. A total staff of 28 personnel is included in the Fixed costs. Levelized combustion turbine major maintenance costs include accrual to perform the recommended combustion inspection, hot gas path, and major overhaul. Variable O&M costs include water costs, steam turbine maintenance, balance of plant (BOP) equipment maintenance, chemical treatment costs, ammonia consumption, and catalyst replacement.

1.6 Performance and Emissions Estimates

The Plant will have an estimated electric generating capacity and heat rate as follows, based on new and clean conditions for all major equipment.

Table 1-3: Plant Performance Summary

Estimated Total Plant Net Performance		
CTG Inlet Conditioning	Evap Cooler Off	Evap Cooler On
AVERAGE ANNUAL PERFORMANCE @ 56.6°F on Nat Gas		
Net Plant Output, MW	772.4	N/A
Net Plant Heat Rate, Btu/kWh (HHV)	6,417	N/A
Heat Input, MMBtu/h (HHV)	4,956	N/A
AVERAGE ANNUAL PERFORMANCE @ 56.6°F on ULSD		
Net Plant Output, MW	694.7	N/A
Net Plant Heat Rate, Btu/kWh (HHV)	6,659	N/A
Heat Input, MMBtu/h (HHV)	4,630	N/A
SUMMER DESIGN PERFORMANCE @ 86.6°F on Nat Gas		
Net Plant Output, MW	708.8	734.7
Net Plant Heat Rate, Btu/kWh (HHV)	6,475	6,466
Heat Input, MMBtu/h (HHV)	4,590	4,750
SUMMER DESIGN PERFORMANCE @ 86.6°F on ULSD		
Net Plant Output, MW	634.0	655.1
Net Plant Heat Rate, Btu/kWh (HHV)	6,768	6,745
Heat Input, MMBtu/h (HHV)	4,290	4,419

Notes:
[1]Evaporative coolers do not operate below 59°F.

The Plant will meet emissions criteria through use of SCR systems and CO catalysts. The SCR will utilize aqueous ammonia injection to reduce NOx emissions and an oxidation catalyst to decrease CO and VOC emissions to levels shown in Table 1-4 for operation above minimum emissions compliance load (MECL).

Table 1-4: Preliminary Cooper 2x1 CCGT Facility Target Emissions Rates

	Siemens 5000F	
Pollutant	Gas Operation	Diesel Operation
NO_X, ppm @ 15% O_2	2	5
CO, ppm @ 15% O_2	2	2
VOC, ppm @ 15% O_2	1	1

1.7 Project Risks

Project risks which can affect scope, schedule, budget, safety, or quality can be subdivided into four categories which include permitting/regulatory risks, design/engineering risks, procurement risks, and construction/startup risks. Each risk category is listed below for consideration with some key risks identified. The complete risk matrix is included in Appendix P.

1.7.1 Permitting/Regulatory Risks

Several permitting and regulatory risks identified include the following:

- Air permitting taking longer than expected. Although EKPC and BMcD have considered general rule of thumb durations for the major air permit applications and processes, ultimately these timelines are controlled by the permitted authorities and can vary dramatically by State or Individual.
- RUS approval takes longer than expected. If RUS approval occurs later than expected, then the project completion date will be delayed since the start of construction is tied to RUS approval.
- PJM interconnect review process and approval taking longer than expected. There is over one- and one-half years of schedule float between the expected PJM interconnect approval date and anticipated back feed date. Therefore, a delay in this approval likely has a low risk of impacting back feed and startup. However, it could impact the schedule for procuring transmission equipment and completing network upgrade projects.
- Gas pipeline FERC approval is delayed. A delay in the approval could delay RUS approval and delay gas being available at the plant. However, there are currently multiple years of schedule float between this activity and when the units will reach first fire.

1.7.2 Design/Engineering Risks

Several design and engineering risks identified include the following:

- Lack of detailed subsurface data under the existing coal pile. Although the project did complete a preliminary subsurface report and reviewed test borings around the perimeter of the coal pile, a more thorough investigation will need to be completed to confirm soil variability, depth of bedrock, and locations of karst. For the purpose of the project scoping report (PSR), the few test borings completed for this Project were assumed to be representative across the entire coal pile area. The findings from these borings were used to estimate an average depth to bedrock for micro pile length and an allowance for flowable fill for karst formations that are anticipated (to an

unknown extent) throughout the site. A more comprehensive subsurface investigation will be completed prior to the start of detailed design.

- Coal pile and coal pond removal and remediation. The project scope and cost estimate include an allowance for removal of coal material from 1 foot above grade to 4 feet below grade across the area of the existing coal pile that will be impacted by the project. It is unknown at the time of this report development whether there will be additional depth and/or area impacted by coal material that will need to be removed. It is also unknown at the time of this report development whether remediation or additional work will be required to adequately remove coal material prior to the construction of the Project. These will be determined during the coal pile removal.
- Transportation study. Transportation studies will be needed to confirm what impacts are associated with being able to deliver the Equipment to site.
- Scope/design changes or scope gaps not identified during the PSR. Any design or scope changes could impact project costs and may affect multiple systems throughout the project. Additionally, should any scope gaps become apparent during detailed design, these could impact project cost and schedule to properly incorporate.

1.7.3 Procurement Risks

Some key procurement risks include:

- Late major equipment award or design changes. Key design deliverables are based on receiving certain submittals and input data from the major equipment and will be delayed if these contracts are awarded late. In addition, late design changes by these manufacturers will have ripple effects on the BOP design that could affect the project schedule and cost. Finally, late award or design changes could affect scheduled delivery dates, which would impact the construction schedule.
- Price escalation for equipment. As the anticipated commercial operational date (COD) is not until 2030, the long project development and permitting schedule will make it more difficult to lock in equipment costs early which increases the risk of price escalation.

1.7.4 Construction/Startup Risks

Several construction and startup related risks to consider are:

- Wage rate increases and/or labor issues with contractors. Similar to equipment price escalation, due to the long project duration local wage rate increases are very possible. Additionally, the

local labor pool may be affected by other capital projects in the area which are out of EKPC's control.

- Change in construction sequence due to engineering changes or late equipment deliveries. Design changes or late equipment deliveries may force the construction team to revise sequences to less favorable activities which may impact costs or schedule.
- Lack of commodity materials or price escalation. Commodity prices and lead time can be affected by other projects in the region outside of EKPC's control which can impact project schedule or costs.
- Equipment/systems does not operate as designed or needs to be repaired/replaced. Equipment malfunctioning or systems not behaving as expected can delay startup as these issues are troubleshot to resolve. Lack of timely vendor corrections to improperly performing equipment can negatively impact the project schedule.
- Flushing, cleaning, or steam blows take longer than expected. A host of variables such as pipe manufacturing, proper storage and handling, and quality of installation can affect the speed and efficiency of cleaning out the various systems to prepare for operation. In addition, some equipment vendors have very strict cleanliness requirements and procedures which must be followed and approved by the vendor's field representatives prior to proceeding to the subsequent steps.

1.8 Conclusions & Recommendations

BMcD recommends EKPC utilize the information presented in this report to evaluate the Project for approval and further development. If EKPC approves the Project, then BMcD recommends EKPC proceed/continue with necessary project execution activities in order to meet a desired Substantial Completion date as determined by EKPC. BMcD recommends EKPC consider the following activities to maintain the project schedule:

1. Develop major commercial terms for project procurements and subcontracts.
2. Finalize natural gas pipeline design and permitting requirements, drawings, costs and negotiate firm gas contract.
3. Monitor long lead equipment lead-times and consider when to reserve long lead equipment.
4. Refine civil and structural preliminary design based on final geotechnical recommendations.
5. Prioritize the preparation of air permitting and RUS NEPA EA applications and support of natural gas pipeline FERC processes.
6. Submit CPCN advance notice.

2.0 INTRODUCTION

2.1 Background

East Kentucky Power Cooperation is developing a natural gas-fired 2x1 combined cycle combustion turbine generating plant at their existing Cooper Station near Somerset, Kentucky. The 2x1 CCGT plant will consist of two (2) F-class combustion turbine generators, two (2) heat recovery steam generators, and one (1) steam turbine generator. No additional new generation capacity was taken into consideration during the development of this facility. The plant will be connected to a new on-site 161 kV switchyard and tie into existing and new transmission lines. The capacity factor for the combined cycle resource is planned to be approximately 75%.

EKPC retained Burns & McDonnell to provide conceptual engineering design to support the development of a cost estimate in accordance with the AACE Class 3 cost estimate guidelines. This report summarizes the project scoping definition and presents the results for use in the Owner's evaluation of project feasibility and budgeting. This report assumes the plant is planned for commercial operation no later than December 2030.

2.2 Scope of Study

The scope of work included preparing the following major items:

1. Project Design Site Criteria and Scope Assumptions Matrix
2. Division of Responsibility
3. Key Conceptual Design Documents
4. Preliminary Project Execution Plan
5. Noise Assessment
6. Permit Matix
7. Risk Matrix
8. Project Execution Schedule
9. Capital Cost Estimate
10. Owner's Cost Estimate
11. Project Annual Cash Flow
12. Operations and Maintenance (O&M) Cost Estimate

2.3 Objectives

The objectives of this study are to establish the Project overall scope and preliminary design parameters of major components of the Project to provide adequate information to support the following activities:

1. Evaluation of the economics of the Project
2. Preparation of a Project schedule
3. Support PJM Interconnect Application process
4. CPCN Application and Public Service Commission (PSC) Approval process
5. Support required federal and state permitting processes

2.4 Limitations and Qualifications

The costs presented within this report are subject to:

- Final negotiation of the terms and conditions with the major equipment suppliers and construction contractors.
- Final geotechnical report findings and final foundation design.
- Final site survey and topographic information.
- Final determination/negotiation of the project schedule.
- Final selection of the engineered equipment and construction contractors.
- Final permitting requirements.
- Events prior to FNTP that may cause price escalation in equipment, materials, or labor beyond that included in the costs.

Estimates and projections prepared by BMcD relating to schedules, performance, construction costs, and operating and maintenance costs are based on professional experience, qualifications and judgment as a professional consultant. Since BMcD has no control over weather, cost and availability of labor, material and equipment, labor productivity, energy or commodity pricing, demand or usage, population demographics, changes in technology, construction contractor's procedures and methods, unavoidable delays, construction contractor's method of determining prices, economic conditions, government regulations and laws (including interpretation thereof), competitive bidding and market conditions or other factors affecting such estimates or projections, BMcD does not guarantee or warranty (actual, expressed, or implied) that actual results, rates, costs, performance, schedules, etc., will not vary from the estimates, analysis, projections, and recommendations prepared by BMcD and contained herein.

3.0 PROJECT DEFINITION

3.1 Project Overview

The Cooper 2x1 CCGT project includes construction of a nominal 775 MW (net) two-on-one unfired combined cycle electric generating station at the existing John Sherman Cooper Power Station. The project's major components will include two (2) F-class combustion turbines, two (2) heat recovery steam generators, one (1) steam turbine generator, and a new counter flow wet cooling tower. This is a modern combined cycle plant design that will use the most recent commercially available F-Class combustion turbines, heat recovery steam generators, steam turbine generator, and cooling tower technology.

The units will be designed to burn pipeline quality natural gas from a new pipeline supply (separate from Project scope) or fuel oil as a backup. A new meter and regulation (M&R) station will be constructed on the northwest side of the site as part of the offsite gas pipeline scope to supply natural gas (excluded from Project or Owner costs). As the new pipeline will supply a minimum of 600 psig natural gas, no new gas compressors will be required to maintain the operating pressure necessary for an F-class turbine. On-site heating, regulation, and fuel gas filtering to meet the pressure, superheat, and cleanliness requirements are included in this Project to meet the supply requirements of the CTGs, auxiliary boiler, and house gas for building heat.

To support emergency backup operation, the fuel oil storage tanks will be designed to provide 72 hours of fuel while firing at full load on both combustion turbines. Two fuel oil storage tanks are located in concrete secondary containment structures with redundant offloading and forwarding pumps. All fuel oil piping outside of the containment structure is supplied with double wall piping. Fuel oil heaters are supplied to ensure fuel oil temperature meets CTG's atomizing temperature requirements.

The combustion turbines will burn natural gas or fuel oil to convert the fuel into mechanical energy to drive an electric generator. Waste heat from the combustion turbine exhaust will flow into the HRSG to produce steam. Superheated steam at design pressure and temperature from the HRSG superheater outlet will be piped to the high-pressure steam turbine. Steam exiting the high-pressure steam turbine section will be reheated in the HRSG and returned to the intermediate and low-pressure sections of the steam turbine for improved cycle efficiency. Expanding the steam through the steam turbine converts steam pressure and temperature to mechanical energy and turns the generator to produce electricity. When the steam reaches the lowest practical pressure (i.e., significantly below atmospheric pressure, which results in higher cycle efficiency), it leaves the steam turbine and enters the condenser. The condenser removes heat from the exhaust steam and condenses it for return to the condensate system. Heat entering the

condenser will be transferred through the condenser tubes into the circulating water system, which will be returned to the mechanical draft wet cooling tower where the heat is transferred to the atmosphere.

After the steam is condensed, condensate pumps and boiler feedwater pumps return the water to the HRSG through the high pressure (HP) economizer and low pressure (LP) economizer tubes to preheat the water prior to returning to steam to repeat the process.

Makeup water will be required because water and steam will be lost in the boiler, turbines, cooling tower and other equipment and systems (Refer to Section 3.3.10 for more information on water supply). The makeup water will be delivered to the plant site from the existing Unit 2 intake in Lake Cumberland using new makeup pumps. The water will be clarified, filtered, softened, and cleaned in new reverse osmosis (RO) systems to demineralize it prior to being used as condensate makeup.

The 161kV output of the GSU's will be routed via transmission line to a four-bay, 161kV Breaker-and-a-half (BAAH) switchyard. The existing transmission lines in the area will be removed / re-routed to tie the 161kV BAAH switchyard into the transmission network. Several network upgrades will be made to the transmission system to accommodate the new load produced by the generating station.

3.2 Project Scope and Design Assumptions

3.2.1 Project Scope

The site design criteria and project scope matrix which are included in Appendices A and B form the basis of the plant development effort. The site design criteria and scope matrix provide general design conditions for the plant including plant operational characteristics as well as basic engineering discipline (Architectural, Civil, Structural, Mechanical, Electrical, Switchyard, and Instrument and Control) design criteria. These documents were developed, reviewed, and revised in coordination with EKPC to provide a clear and consistent understanding of the major underlying assumptions used in development of this project.

3.2.2 Key Design Documents

In addition to the design criteria and scope matrix, the following preliminary design documents were developed to form the basis of the Project preliminary design and are included in the Appendices attached to this report. These documents were reviewed with the Owner to confirm the basis of understanding of the Project.

- Appendix C: Project Division of Responsibility (DOR) Matrix

- Appendix D: Equipment List
- Appendix E: Preliminary Project Scoping Drawings
    - Site and General Arrangement Drawings
    - Switchyard Arrangement Drawings
    - Architectural Building Drawings
    - Electrical Single Line Diagrams
    - Mechanical/Process Piping & Instrumentation Diagrams
    - Control System Architecture
- Appendix F: Heat Balance Diagrams
- Appendix G: Water Balance Diagrams
- Appendix H: Preliminary Subsurface Investigation
- Appendix I: Noise Assessment
- Appendix J: Permit Matrix
- Appendix K: Tie-In List and Locations
- Appendix L: Design Fuel Basis
- Appendix M: Water Quality Basis
- Appendix N: Preliminary Fire Protection Design Basis
- Appendix O: Life Safety Code and Criteria

3.3 General Design Criteria

The following criteria were used as the basis for the plant preliminary design.

3.3.1 Operating and Control Philosophy

The Plant is expected to be operated as a base-loaded asset throughout the year with minimal outages for routine maintenance and catalyst replacement. Although less frequent, the plant may also be required to perform daily on/off cycling depending on area load requirements and other asset utilization.

The plant is expected to operate at a 75% capacity factor with operation of 24 hours a day with minimum load turn down overnight or potential shut down overnight. The plant will be controlled using a new control room staffed at all times. The control room will house the distributed control system (DCS) that

will control all the major systems of the plant. Plant personnel will be fully qualified to operate all plant systems.

Plant automation will be designed for secure and safe operation of all equipment. Maintenance support will be supplied by on-site staff as required for routine maintenance activities. Maintenance support for major shutdown work (combustion turbine overhauls, etc.) may be contracted to a third party via long term service agreement (LTSA) or competitive bid. If EKPC decides to enter into an LTSA contract with the CTG original equipment manufacturer (OEM), BMcD recommends that the LTSA contract be negotiated in parallel with the CTG equipment contract. A vibration monitoring system (VMS) has been included in the scope to monitor vibration for the CTGs, STG, medium voltage motors and equipment, and cooling tower fans. During detailed design, EKPC would be interested in determining if the VMS will have permissible capability to shut down equipment in the event a critical tolerance / threshold is met or if the system will only send an alarm to the operator for operations to respond to.

The Plant will have dedicated full-time operations and maintenance staff. A total of approximately 28 people are expected to operate the new units.

The Plant is not configured to generate electricity while isolated from the utility grid or to have "black-start" capability.

3.3.2 Plant Location and Layout

The Cooper 2x1 CCGT plant will be located at the existing John Sherman Cooper Power Station approximately 13 miles south of Somerset, Kentucky. Access to site is from KY-1247 N or US Hwy 27 N. New equipment and structures will be located adjacent to the existing Unit 2 coal plant in the area currently used for the coal pile. As a separate project, EKPC is reviewing the feasibility of converting Unit 2 to firing on natural gas. Should this project proceed, the existing coal pile could be significantly reduced and would provide the majority of the site space for the 2x1 CCGT plant.

The CTGs will be located next to each other inside standard OEM supplied outdoor weather enclosures with axis running plant north and south. The STG will be located in a building east of the CTGs with its axis running plant north and south. This arrangement was selected to provide the shortest path to a new switchyard from the turbine generators and to provide ease of access to the CTGs and the STG building's main access bay. Adequate spacing between the CTGs and STG is included to allow access for maintenance and major overhauls. A main pipe rack will run plant east to west to carry steam and water piping from the HRSGs to and from the STG/Condenser. The Administration/Control building will be located south of the STG building with communication between the two buildings. Except for the CTG

auxiliaries, HRSGs, and HRSG stacks, the majority of the powertrain equipment is housed inside heated and ventilated buildings or enclosures. The HRSGs will include weather rated penthouse enclosures. Collectively, the CTGs, HRSGs and STG building form the powerhouse area which is adjacent to the Administration/Control building which will also house the STG electrical and battery room and auxiliary boiler equipment. The Cooling Tower will be located southeast of the STG building. A new I&C Tech/maintenance shop area building will be located on the east side of Administration/Control building. The fuel oil storage tanks, secondary concrete containments, unloading and forwarding pumps are located east of the STG building.

The Water Treatment Building and fuel gas yard will be located plant west of the power block with access from either the north or south side from a new paved road loop. Clarified water, service/fire water, and demineralized water storage tanks will be located adjacent to the water treatment building. A new wastewater storage tank is located north of the power block adjacent to the existing plant wastewater treatment building and clarifier. New aqueous ammonia storage will be located inside the existing ammonia tank containment north of Unit 2 (west of the 2x1 CCGT plant). A new storm water pond for the site will be located in the northeast corner of the site outside of the power block adjacent to the fuel oil tanks.

EKPC requested an approximate 10-day coal storage pile left in place for emergency use by Unit 2. This coal storage pile would continue to use the existing unloading and transfer conveyors in their current location. Due to this reduced coal pile footprint, a new coal pile runoff pond will be located south of the pile (west of the water treatment building) and merge its flow into the plant wastewater treatment system. A wind wall, which will be installed around the coal pile, is included in the scope and costs reflected in this report to minimize coal dust infiltrating the new CCGT air intakes.

An asphalt paved loop road will be included around the new units to provide access. Minor roads will be surfaced with crushed rock. Construction parking, construction offices, and construction trailers will be located north and east of the site (north of existing coal units). Construction craft parking will be located north and west of the Project site near the main entrance road to the plant. Although construction parking will be inside the main plant fence, new temporary fencing will be installed to direct craft labor into and out of the CCGT construction areas to control access to the existing plant facilities. Construction laydown areas will be spread out throughout the site as identified on the Site Plan (Appendix E), with primary locations north and east of the power block. Although excess laydown space is limited, it is believed there is sufficient space for construction laydown onsite without requiring additional offsite laydown. The construction laydown plan does not account for the potential Unit 2 gas co-fire conversion

project. If that project's construction overlaps with the combined cycle Project, then additional off-site laydown may be required.

A new switchyard is located plant north of the new units. Each of the three generators (two CTG generators and one STG generator) will tie into the new 161 kV BAAH switchyard with an individual line. These transmission lines will then connect to existing lines north of the existing unit's switchyard before heading offsite.

Refer to Appendix E for Site Arrangement drawings for additional information.

3.3.3 Design Conditions

The following site ambient conditions were used as the basis for preliminary design.

1) Site Elevation: 825 feet above mean sea level (MSL)
2) Ambient Design Conditions:
   a) Extreme Summer Maximum: 108.2°F dry bulb (db)
      Applicable design conditions for the following:
      (1) Equipment cooling (lube oil, generators, etc.).
      (2) Motor design.
      (3) Water supply.
   b) Summer Design (1% Wet Bulb, °Fdb / °Fwb): 86.6°F / 76.1°F
      Applicable design conditions for the following:
      (1) Cooling tower.
      (2) Condenser.
      (3) Steam turbine max operating pressures and flows (59°Fdb)
      (4) Building enclosure cooling and ventilation.
   c) Average Ambient (°Fdb / %RH): 56.2°F / 70%
      Applicable design conditions for the following:
      (1) HRSG (pinch points).
   d) Winter Design – 99.6 % of time above (°Fdb): 11.8°F
      Applicable design conditions for the following:
      (1) Heating, Ventilation, and Air Conditioning (HVAC) indoor heating systems.
      (2) Insulation systems.
   e) Extreme Winter Minimum (°Fdb): -13.1°F
      Applicable design conditions for the following:

(1) Freeze Protection (design conditions shall assume -20°F with 20 mph coincident wind).

(2) Heating of heated areas.

(3) Material compatibility of outdoor located equipment.

3.3.4 Redundancy

Plant redundancy was based on maintaining a base-loaded unit throughout the year. Critical systems or equipment were provided with 100% redundant equipment or an N+1 configuration except as noted below. Where redundant mechanical equipment is supplied, the idle device will be capable of immediately backing up the operating device. The switchover is accomplished automatically through the control system. All failure analysis was based on a single contingency basis and was not evaluated on a double contingency basis (i.e. double equipment or system failures). A full plant failure analysis will be completed during detailed design of the Project.

Equipment/systems without full redundancy:

- 1x100% Steam Turbine and Generator (most ancillary systems and equipment such as lube oil pumps, coolers, etc. will be supplied with 100% redundancy)
- 1x100% Combustion Turbines and Generators (similar to the STG, most ancillary systems and equipment are supplied with 100% redundancy)
- 1x100% HRSG per combustion turbine
- 1x100% Auxiliary Circulating Water Pump
- 1x100% Surface Condenser (includes redundant air removal skids)
- 1x100% Potable Water Tank and Booster Pump skid
- 1x100% Aqueous Ammonia Storage Tank (can be tied into existing ammonia tanks for redundancy)
- 1x100% Fuel Gas Filter/Separator skid (low probability of failure with no moving parts)
- 1x100% Auxiliary Boiler (only used for Startup and will include redundant feedwater pumps)
- 1x100% False Start/Wash Water Drains Tanks (low probability of failure with no moving parts)
- 1x100% Oil/Water Separators (low probability of failure with no moving parts except for discharge pumps which will include 100% redundancy)

- 1x100% Air Receivers, CCW Head Tank, STG Atmospheric Drains Tank (low probability of failure with no moving parts)
- 1x100% Water Treatment Chemical Storage Tanks (low probability of failure with no moving parts)
- 2x60% High-Rate Contact Clarifiers (system oversized so with one clarifier out of service, other can handle majority of normal capacity demands)
- 1x100% Clarifier Sludge Tank/Mixer (tank will have low probability of failure with no moving parts, but EKPC may consider stocking an on-shelf spare for the mixer components)
- 2x50% Filter Presses (sized for worst case sludge production and single will be able to handle 90% of flow cases with backup storage in sludge tank)
- 2x50% Ultra Filtration (UF) Skids (system oversized so with one UF train out of service, other can handle majority of normal capacity demands)
- 1x100% UF and Reverse Osmosis (RO) Permeate Tanks (low probability of failure with no moving parts)
- 1x100% Clean-in-Place (CIP) System (only used for system cleaning)
- 1x100% Sample Analysis Panel and Cooler
- 1x100% Building Cranes (will not result in unit outage or derates)
- 1x100% HRSG Elevator (will not result in unit outage or derates)
- 1x100% GSU per Turbine (matched to each turbine generator with same level of redundancy)
- 1x100% Generator Breakers per Turbine
- 1x100% Isophase Bus Ducts per Generator
- 1x100% Emergency Diesel Generator (used as backup)
- 1x100% UPS and 125VDC System (used as backup)
- 1x100% DCS (low probability of failure)
- Building HVAC (air handling units, fans, louvers, heaters, etc.)
- Cooling Tower (loss of individual fans will derate unit, loss of tower as a whole will bring unit down)

- 1x100% each Demineralized Water, Clarified Water, Service/Fire Water, and Waste Water Storage Tanks (low probability of failure with no moving parts)
- 2x50% Fuel Oil Storage Tanks (low probability of failure with no moving parts)

3.3.5 Life Safety Considerations

Life and Safety requirements of the effective building code will set the minimum design considerations for the various buildings and enclosures. The list of codes and standards which may apply to the Project are included in Appendix O.

The code requirements for each building are dependent on the occupancy classification and intended use of the space. The occupancy classification then indicates and affects fire protection requirements and separation distances, maximum rated occupant use, minimum exit distances and secondary egress requirements, required plumbing fixture units, and energy code requirements.

Fire protection systems for the following areas are outlined in Appendix N.

The Administration building will house the control room, DCS room, offices, STG electrical room, and auxiliary boiler equipment. Due to its expected use, it was given a B (Business) occupancy rating. This occupancy classification allows for a higher density of occupants per square foot and will require sprinkler protection. The I&C Tech/Warehouse building was also given a B occupancy rating and will be sprinkled for fire protection.

The STG building was classified as an F-1 (Industrial Moderate Hazard) building due to the large industrial generating equipment and high pressure/high temperature systems. This building will require standpipes and hose stations for manual firefighting, mechanical ventilation requirements for hazardous gases, and certain minimum egress requirements.

The Water Treatment building was classified as an F-2 (Industrial Low Hazard) building. All storage or corrosive chemicals will be outdoors in separate concrete containment. Because this building would typically not have any personnel with the exception of maintenance, sprinklers are not required.

The main Gas Turbine Electrical building will house electrical equipment associated with the combustion turbines such as medium & low voltage switchgear, motor control centers, power panels and switchboards. This building was classified as Group S-1 (Moderate Hazard Storage) and will require smoke detection, CO2 fire extinguishers and alarms.

More details around the planned design features related to these life and safety considerations can be found in Appendix O. The final determination of building occupancy classification, and approval of the planned design features for life & safety are the responsibility of the Authority Having Jurisdiction (AHJ). Therefore, BMcD recommends that EKPC communicate the project design concept to the AHJ early in the detailed design phase and seek preliminary approval of the planned basis of design for the new buildings.

3.3.6 Future Expansion

In general, the new 2x1 CCGT facility will not be designed to include future expansion at its current location and layout. Due to available space constraints, additional generation units would have to be located where the current coal units are currently located. Otherwise, the entire plant would need to be located farther NW or SE to allow for future expansion. This topic can be further explored during the detailed design phase.

3.3.7 Environmental Design Criteria

The site will be a Prevention of Significant Deterioration (PSD) major source so emissions controls will be required for NOx and CO. In addition to dry low NOx (DLN) combustion system and good combustion practice for the CTGs, a SCR catalyst system will be installed in the HRSGs to reduce CTG NOx emissions down to a HRSG stack value of 2 ppm @ 15% O_2 (while firing natural gas) and 5 ppm @ 15% O_2 (while firing on fuel oil) with 5 ppmvd of ammonia slip. An aqueous ammonia storage and supply system with 14 days of storage (based on firing on natural gas) is included to supply ammonia to the injection grids in the HRSGs. An oxidation catalyst will also be included in the HRSGs to reduce CTG CO emissions down to a HRSG stack 2 ppm @ 15% O_2 (while firing on natural gas or fuel oil). In addition to reduction of CO emission rates, the CO catalyst will also serve to reduce CTG VOC emissions to a stack value of 1 ppm @ 15% O_2 (while firing on natural gas or fuel oil).

3.3.8 Fuel

Pipeline natural gas will be used to supply fuel to the gas turbine and the auxiliary boiler. As a separate project, EKPC will bring a new gas pipeline to the site boundary with a new M&R station owned and operated by the gas pipeline company. This project will tie into the M&R station and bring the natural gas pipeline onsite to a new gas conditioning yard located north of the water treatment building. Once further filtration and regulation is completed, it will be fed to various equipment throughout the site. A tap off this system with additional regulation will provide house gas for building heat. Project scope does not include gas odorizing. It is anticipated the pipeline gas supply will be odorized. See Appendix E General Arrangement drawings for location of the new M&R station and fuel yard. Project scope does not account

for the potential Unit 2 gas co-fire conversion project. If Unit 2 is converted to gas co-fire, then the design and scope of the fuel gas pipeline and conditioning equipment downstream of the M&R station will be modified to accommodate both projects.

It is expected that the fuel gas supply pressure at the M&R station will be regulated to approximately 600 psig at all times. The 5000F requires approximately 515 psig at the inlet of the combustion turbine. Therefore, no fuel gas compressors will be required for this project. The fuel yard will include additional regulation to throttle supply pressure to match the combustion turbine supply requirements.

A gas fired dew point fuel gas heater will be furnished to heat the fuel gas above dew point to remove excess moisture. Fuel gas conditioning equipment, such as fuel gas filter/separator, will be used accordingly to meet fuel specifications as required by the combustion turbine OEM.

As a backup fuel source, each combustion turbine will be dual fuel rated for ULSD fuel. Approximately 72 hours of fuel oil storage will be provided in two field erected tanks (1.4 million gallons each) with secondary containment structures. In a separate containment, fuel oil unloading pumps, inline heaters, and forwarding pumps with filters will supply the necessary fuel oil to the combustion turbines and will include full recirculation via double wall piping.

3.3.9 Ammonia Supply and Storage

Aqueous ammonia (19% solution) will be delivered by truck to the site. The ammonia storage area will be located in the existing storage area which supports Unit 2. The existing area contains two 39,000-gallon storage tanks and auxiliary equipment. To support the new Unit 3 and Unit 4 emissions controls, one new 39,000-gallon storage tank will be added to solely contain a minimum 14-day supply at full load on natural gas for the new CCGT block or a minimum 11-day supply at full load on fuel oil for the CCGT block. Trucks will utilize the existing on-site unloading system to fill either the existing or new storage tanks. A cross-tie on both the ammonia unloading and ammonia transfer sides of the system will allow for sharing of capacity with the existing system. Two transfer pumps will be included to transfer the aqueous ammonia from the storage tank to the ammonia flow control units of the SCR systems (one for each HRSG). Ammonia will be vaporized then mixed with air before being injected upstream of the SCR catalyst to reduce NOx emissions.

3.3.10 Water Supply

The primary source of raw water will be supplied from Lake Cumberland which receives its water from the Cumberland River. Water from the lake will be supplied to the new plant by two new clarifier makeup pumps which will be installed in the existing Unit 2 Intake Wet Well after minor modifications to

the intake. The lake water will first be strained to remove large solids before being directed to two new high-rate clarifiers which will further remove suspended solids too small to have been rejected by the strainers. The high-rate clarifiers will be fed a combination of coagulant and polymer which will aid in the removal of the suspended solids. The clarifiers will also be treated with sodium hypochlorite to reduce iron and bacterial levels in the river water. The raw water clarification system will include caustic feed to ensure adequate alkalinity is available to support the coagulant reaction as well as providing an adequate pH control of the treated water to reduce potential corrosivity of the process water. Clarified water will be sent to a new Clarified Water Storage Tank. Water from the Clarified Water Storage Tank will be used for two purposes: cooling tower makeup and service water. Water being used for service water will be further filtered through multi-media filters to remove suspended solids that have passed through the clarifiers. This filtered water will source the service/fire water for the site and will be stored in a new Service/Fire Water Storage Tank. Service water will be utilized for evaporative cooler makeup. Fire water volume will be kept separately using a standpipe inside the tank. Water forwarded to the cooling tower will not be filtered.

A cycle makeup treatment system will be installed to provide high purity makeup to the steam-condensate-feedwater cycle. The cycle makeup treatment system capacity will be designed to provide makeup at a rate equal to two percent of the steaming rate. Additional capacity is included in order to support NOx control requirements while burning fuel oil in the gas turbine system. Plant demineralized water makeup system is designed for 150 gpm demineralized water production and includes redundant systems for operational reliability. This sizing accounts for required flow for steam cycle makeup and CTG NOx water injection for fuel oil firing at full load (2x100% demineralized water trains required in operation). A single demineralized water train can provide steam cycle makeup as well as start to makeup the demineralized water storage tank. Cycle makeup system will include ultrafiltration, two-pass reverse osmosis, and off-site regenerated mixed bed polishers, also known as Service Deionization (SDI) bottles, as well as necessary supporting systems such as chemical feeds, clean-in-place (CIP) system, and wastewater neutralization. Demineralized water will be forwarded to the new Demineralized Water Storage Tank. Water balance diagrams are included in Appendix G indicating average make-up flow rates and major consumers for the following cases:

- Performance at base load annual average rated output while firing natural gas with evaporative coolers out of service.
- Performance at summer average ambient conditions while firing natural gas with evaporative coolers in operation.
- Performance at base load at 20-year maximum ambient conditions while firing natural gas with evaporative coolers out of service.

- Performance at base load at 20-year maximum ambient conditions while firing natural gas with evaporative coolers in operation.
- Performance at base load at one percent wet bulb ambient design conditions while firing fuel oil with evaporative coolers out of service.
- Performance at base load at one percent wet bulb ambient design conditions while firing fuel oil with evaporative coolers in operation.
- Performance at base load at 20-year maximum ambient conditions while firing fuel oil with evaporative coolers out of service.
- Performance at base load at 20-year maximum ambient conditions while firing fuel oil with evaporative coolers in operation.

Two raw water quality samples for Lake Cumberland were provided by EKPC. This quality data, along with two years of samples near the plant from United States Environmental Protection Agency (USEPA) was evaluated to establish the water quality basis for this report, which is shown in Table 3-1 below.

Table 3-1: Cumberland Lake Makeup Water Quality

Constituent (mg/l unless noted otherwise)	Minimum	Maximum	Average
pH, Std Units	6.2	9.2	7.2
Conductivity, uS/cm	105	380	198
Total Suspended Solids, mg/l	0.7	59	5.2
Total Dissolved Solids, mg/l	132	235	134
Sodium	2.05	20	7.6
Calcium	9.3	26	20.2
Magnesium	3.2	11.5	7.2
Manganese, mg/l	0.0002	2.4	0.2
Copper, mg/l	0.0002	0.0017	0.0008
Iron	0.007	2.5	0.2
Alkalinity, as CaCO3	32	86	57.5
Chloride	1.76	5.4	3.9
Total Sulfur, as SO4	6.2	74	37.7
Silica (SiO2) (1)	unknown	unknown	unknown

1. Silica is believed to be < 15 mg/l based on analyses balance versus total dissolved solids.

Potable water will be supplied from the existing city tap and will be distributed to locations handling corrosive chemicals for eye wash stations and safety showers. It will also be supplied to the Administrative building and I&C Tech/Maintenance building for drinking fountains, washrooms, showers, and toilets. Incoming potable water pressure will be pressurized by a new booster pump skid and will be supplied with either hot water heaters or recirculation loops to maintain tepid water temperatures per Code.

3.3.11 Fire Protection Water

Fire protection water will be sourced from clarified and filtered raw water at the existing site and stored in a new common tank with service water. It will be heated and insulated to meet NFPA temperature requirements and will be supplied with a dedicated suction to ensure sufficient capacity for the most demanding fire protection requirements plus a 500-gpm hose allowance for a two-hour duration fire event. A new underground distribution loop will be added to supply the new fire water throughout the 2x1 CCGT facility. The buried loop will tie into the existing plant fire protection water system and connect to all buildings requiring fixed piping suppression along with hydrants dispersed around the plant. Cooper's existing fire water pumps do not have capacity for the CCGT facility. Therefore, fire water will be supplied to the header system via a new electric motor driven pump backed up by a new diesel engine-driven pump. Header pressure will be maintained via a jockey pump. All fire pumps will be located in a dedicated enclosure adjacent to the Service/Fire Water Storage tank.

3.3.12 Wastewater

Wastewater at the site will primarily consist of cooling tower blowdown, flows from the existing site's wastewater, and existing landfill leachate. Other plant wastewater streams will first be recycled by sending to the plant cooling tower for reuse. These streams include UF backwash and reverse osmosis reject, neutralization tank effluent, quenched HRSG blowdown, and wastewater yard sump effluent.

Process blowdown from the HRSG drums will be directed to a blowdown tank, which will then be quenched and sent to cooling tower basin. The blowdown tank will also be designed to receive drains from the steam piping and valves and HRSG drains.

Water collected from floor drains and containment areas around equipment that may contain small amounts of oil will be directed through a new oil/water separator. The water discharged from the oil/water separator will be returned to the cooling tower for makeup.

Storm water runoff from non-process equipment areas, such as parking lots and building roofs, will be collected in a new stormwater runoff pond and discharged to existing permitted outfalls through new ditches.

Sanitary waste from showers, wash basins, and toilet facilities will be collected and discharged to a new septic leech field east of the facility for treatment and discharge.

Major wastewater sources, streams and flow rates are indicated on the water balance diagrams included in Appendix G.

3.3.13 Fast Start Capabilities

To prepare for a changing market, system demands and environmental regulation, faster plant start times are becoming increasingly more important. With the varying requirements for fast start capabilities, there are many options for fast start design, depending on the specific requirements and operational considerations of the plant.

Multiple levels of fast start capability, ranging from conventional design with limited to no fast provisions, to fast start provisions to support expedited startup of both CTGs simultaneously were considered. Following EKPC's direction, as this facility is expected to be base loaded with minimal cycling, the scope and costs in this report for the HRSG and piping account for a more traditional startup, which would likely include a hold point for each train at low CTG load (duration and load may vary by startup temperature/condition and final equipment design) followed by normal CTG ramp to MECL. Each train would be held at MECL until stacks are in emissions compliance, temperature matching is complete, and STG is ready to ramp in load. Additional fast start capability was not considered further during this preliminary phase and thus not included in the capital cost estimate.

3.3.14 Noise Criteria

BMcD performed a desktop analysis for potential noise created by the new 2x1 CCGT facility. This analysis reviewed local noise regulations and industry guidelines, considered estimated existing ambient sound levels, modeled operational sound levels for the plant, and compared these to the applicable noise guidelines. The Project is not subject to specific noise requirements. As such, it will be designed to generally comply with EPA guidelines for sound emissions, as considered feasible and practical. Based on the preliminary sound assessment, equipment selection considers low noise options in order to generally comply with the guidelines. Due to the proximity of nearby receptors, additional sound attenuating options such as low noise cooling tower fans, cooling tower splash mats, and increased HRSG exhaust stack silencing are selected for the Project. The Project also includes standard noise controls, such as silencers on relief valves and start-up steam vents, and standard noise enclosures over the CTGs and some additional auxiliary equipment. Personnel will be required to wear hearing protection while within the vicinity of this operating equipment. A preliminary sound assessment is provided in Appendix I.

3.3.15 Aesthetics and Landscaping

Landscaping for the Cooper 2x1 CCGT facility consists of seeding for erosion control of disturbed areas only. No other effort is included to improve the aesthetics of the site.

3.3.16 Geotechnical Data

A preliminary geotechnical exploration has been completed by S&ME, Inc for the 2x1 CCGT plant. Borings were taken around the perimeter of the existing coal pile and to the northeast of the coal pile in the area of the proposed switchyard. These borings were used to obtain preliminary geotechnical data to support an estimate of the foundation design requirements for buildings, structures, and equipment for the new plant. Based on the findings, it is expected that major foundations for the steam turbine building, main GT electrical building, water treatment building, administrative building, maintenance building, along with the equipment inside these buildings will be supported by micro-piles. The large transformers, tanks, clarifiers, and cooling tower foundations will also be supported by micro-piles. Switchyard equipment and structures will be supported on standard drilled piers. All other equipment and structures are expected to be supported on mat foundations or spread footings. Existing soils are assumed to be stable in and around the area anticipated for laydown uses and will be suitable without any further preparation. Over excavation and re-compaction is included for the foundations in the power block area and other foundation locations as needed. Additional suitable fill material as required for site preparation and grading will be required off-site with hauling costs included in the estimate. The areas around the new plant contain abundant natural karst features. If a karst void is encountered at a foundation location, flowable fill will be used to fill the voids prior to installing the foundations. An estimated allowance for flowable fill was estimated based on historical values at Cooper by evaluating the actual volume of flowable fill used during the Cooper air quality control system project and scaling quantities for the CCGT Project and foundation footprints and sizes. It was determined to carry an allowance for approximately 20,830 cubic yards of flowable fill for unknown karst voids. Although not anticipated, rock excavation was not included. The preliminary geotechnical investigation report has been included in Appendix H. A more comprehensive geotechnical investigation will be completed prior to detailed design. The findings of that investigation may impact final civil and foundation design.

3.3.17 Construction Power

Power supply for construction will come from an existing 13.8 kV existing overhead line that will be modified to create a 13.8kV downcomer. This new 13.8kV feed will supply power to two pad-mounted transformers (included in project costs) located near the power pole that will step down the voltage to 480V. The first transformer will be a 1000kVA transformer intended for power to the construction trailer area. The second transformer will be a 2000kVA transformer intended for power to the power block area. These 480V feeds will then be distributed around site to 400A power skids located throughout the construction areas to provide 480V and 120V power to welder packs, spider boxes, and bridge cranes.

After installation of this temporary power system, an allowance has been provided for electrician support for general maintenance to this system during the duration of construction.

3.3.18 Electrical and Transmission Interconnection

The combustion turbine generators and steam turbine generator output will be connected through three (3) generator step-up transformers to a new 161 kV, 4-bay, BAAH switchyard located north of the power block.

The following transmission line modifications will be completed to install the BAAH switchyard and connect the new switchyard to the 161kV transmission system:

- The 161kV transmission lines in the location of the new BAAH switchyard will be removed and re-routed to tie in the station. Five (5) circuits will be modified, totaling approximately 2.7 miles of new installation.
- A new 161kV line will be constructed from Cooper Substation to Alcalde Substation. A portion of the new line will be constructed double circuit with adjacent existing line. The entire route is approximately 6.2 miles with about 2.4 miles as double circuit.
- Reroute the existing 69kV line at Cooper to avoid the new substations. The reroute is approximately 1.4 miles of new line.

The 2x1 CCGT plant startup source will be provided through auxiliary transformers for the units connected to the low side of the GSUs. The auxiliary transformers will be supplied as two winding transformers with 6.9 kV on the low side winding. The 6.9 kV system will be used for all motors 251 hp and larger.

3.3.19 Transmission Network Upgrades

Various network upgrades to the existing transmission and distribution grid are required to accommodate the additional capacity from the Project. The following projects were identified by EKPC as being required to be completed prior to commercial operation of the facility:

- All 161kV and 69kV circuit breakers at the existing Cooper Substation will need to be replaced with circuit breakers rated at 63kA fault current rating.
- Upgrade the 161 / 69 kV transformer at Cooper Substation to a 200MVA unit. A spare unit will also be purchased as a spare.

- Maximum conductor operating temperature will need to be increased to 212 degrees Fahrenheit on the Casey County – Marion County 161kV transmission line. This transmission line is approximately 17.8 miles in length.
- Rebuild the South Lancaster-Garrard County 69 kV line using 556 ACSR conductor. Transmission line is approximately 1.8 miles in length.
- Rebuild the existing 161kV line to Elihu sub. The line will tap the double circuit section at the first junction. The rebuild is 4.2 miles of single circuit rebuild replacing structures in place.
- Kentucky Utilities upgrade on the Alcade-Farley 161kV transmission line. This transmission line is approximately 27.19 miles in length.
- Kentucky Utilities upgrade on the Farley-Artemus Tap 161kV transmission line. This transmission line is approximately 12.77 miles in length.
- Kentucky Utilities rebuilds the Lebanon-Springfield 69kV transmission line. This transmission line is approximately 7.2 miles in length.
- Kentucky Utilities rebuilds the Alcade-Elihu 161kV transmission line. This transmission line is approximately 2.95 miles in length.
- Kentucky Utilities to expand the Alcade 161kV substation for the new 161kV transmission line exit to Cooper Substation.
- Kentucky Utilities to construct a 345kV bus at the Alcade Substation and installed and second Alcade 345/161kV transformer.

4.0 PLANT PERFORMANCE & EMISSIONS

4.1 Performance Estimates

Tables 4-1 and 4-2 below show the estimated performance of the new 2x1 CCGT plant in different modes of operation. Preliminary heat balances indicating additional estimated performance information are included in Appendix F:

Table 4-1: Performance Estimates (Siemens 5000F), Natural Gas Operation

Case	Extreme Minimum	Annual Average	Summer Design	Summer Design (EC On)	MECL (32%) Annual Average
Gas Turbines Operating	2	2	2	2	2
Gas Turbine Load, %	100%	100%	100%	100%	32%
Evaporative Cooler Operation	Off	Off	Off	On	Off
Ambient Temperature, °F	-7.6	56.2	86.6	86.6	56.2
Ambient Relative Humidity, %	38%	73%	63%	63%	73%
Estimated Net Plant Output, MW	754.6	772.4	708.8	734.7	312.2
Estimated Net Plant Heat Rate, Btu/kWh (HHV)	6,540	6,417	6,475	6,466	7,702
Auxiliary Load, % of Gross Output	2.2%	2.3%	2.4%	2.4%	4.2%
Total CTG Heat Input, MMBtu/hr (HHV)	4,935	4,956	4,590	4,750	2,405
Fuel Flow, lb/hr	215,580	216,500	200,500	207,500	105,050

Table 4-2: Performance Estimates (Siemens 5000F), Fuel Oil Operation

Case	Extreme Minimum	Annual Average	Summer Design	Summer Design (EC On)	MECL (32%) Annual Average
Gas Turbines Operating	2	2	2	2	2
Gas Turbine Load, %	100%	100%	100%	100%	32%
Evaporative Cooler Operation	Off	Off	Off	On	Off
Ambient Temperature, °F	-7.6	56.2	86.6	86.6	56.2
Ambient Relative Humidity, %	38%	73%	63%	63%	73%
Estimated Net Plant Output, MW	667.9	694.7	634.0	655.1	396.4
Estimated Net Plant Heat Rate, Btu/kWh (HHV)	6,932	6,659	6,768	6,745	7,179
Auxiliary Load, % of Gross Output	2.5%	2.6%	2.8%	2.7%	3.9%
Total CTG Heat Input, MMBtu/hr (HHV)	4,630	4,630	4,290	4,419	2,850
Fuel Flow, lb/hr	235,170	234,980	217,940	224,430	144,500

4.2 Performance Estimate Basis

A heat balance model was developed using EBSILON® Professional performance simulation software. The model is based upon the following:

- Steam turbine performance is based on a modern subcritical, downward-exhaust double flow steam turbine using large 34.5-inch alloy steel last stage blades with low condenser backpressures. Backpressures assume cooling tower and surface condensers sized as indicated below.
- Steam turbine performance indicated assumes the plant will operate in a valves wide open sliding pressure operation at the maximum allowable continuous throttle pressure consistent with modern combined cycle plants.
- Steam turbine performances assume that the steam turbine will be operated at a maximum throttle pressure of 2,400 psia and a main steam temperature of 1,050ºF.

Heat rejection system performance is based upon achieving the following:

- Cooling tower approach: 10°F at the summer design condition (86.6°Fdb / 76.1°Fwb)
- Condenser arrangement: Single pressure, single shell
- Condenser design: 5°F terminal temperature difference
- Built in full steam bypass capability for startup

HRSG performance is based upon the following:

- Number of Pressure: Triple pressure with reheat
- Design: 59.0°Fdb / 51.4°Fwb with varying drum pinches (12-15°F)
- Boiler feed pump type: 2 x 100% motor driven pump with flow margin

Steam turbine inlet steam conditions:

- Main Steam: 2,400 psia / 1,050°F
- Hot Reheat Steam: 550 psia / 1,050°F

4.3 Performance Estimate Qualifications

Performance estimates are presented for new and clean equipment and operation. Degradation has not been included in the performance estimates. Information used to generate performance estimates includes budgetary-level performance information from OEMs, in-house data available and past project experience. Guaranteed performance was not solicited to support this report and performances and emissions provided in this report should not be considered guaranteed performance.

4.4 Emissions Estimates

The emissions estimates assume that the plant is operating with the air quality control equipment operating at BACT limits for each combustion turbine. Table 4-3 includes a summary of the anticipated steady-state stack emissions rates on a ppm basis for the Cooper 2x1 CCGT facility. CTG NOx emissions are expected to be 15 ppm @ 15% O_2 while firing natural gas and 25 ppm @ 15% O_2 while firing fuel oil. Particulate emissions (PM10/PM2.5), SO_2 and greenhouse gases (as carbon dioxide equivalents) will also be subject to BACT. However, there are no add-on controls that are available for these pollutants and BACT will be good combustion practices with low-sulfur fuel.

Table 4-3: Preliminary Cooper 2x1 CCGT Facility Target Emissions Rates

	Siemens 5000F	
Pollutant	Gas Operation	Diesel Operation
NO_X, ppm @ 15% O_2	2	5
CO, ppm @ 15% O_2	2	2
VOC, ppm @ 15% O_2	1	1

Notes:

1. Emissions estimates are per HRSG/stack in steady-state conditions.
2. Emissions estimates are based on turbine exhaust emissions provided by turbine supplier and assume typical SCR and CO catalyst reduction rates for NOx, CO, and VOC.
3. Emissions estimates are for combustion turbine loads of MECL to base load.
4. Values are subject to change and should not be used for permitting purposes.

5.0 PROJECT EXECUTION PLAN

5.1 General Approach

The estimate is based on a multiple prime contracting approach. All procurements and subcontracts will be on Owner paper with support from OE's engineering, procurement, and construction staff. The estimate is set up such that OE's cost for construction administration, field engineering, and startup and commissioning can be removed from OE's cost and carried as an Owner cost, should Owner proceed as the sole construction manager for the project.

The contracting approach used as a basis for the Project cost estimate was a multiple contract approach. As shown in Table 5-1, the contracts were broken into two major categories: equipment contracts and construction contracts. This approach was selected based on EKPC's input and past experience with recent projects. Under this approach, engineered equipment will be procured directly by EKPC and turned over to the appropriate installation contractors. This approach provides the following benefits:

- Cost savings to EKPC in return for manageable increased Owner's risk.
- Facilitates early award of major equipment procurements to allow detailed design engineering to proceed expeditiously to meet the Project schedule.
- Offers the greatest flexibility for EKPC to be involved in key decisions regarding design.

Table 5-1: Project Procurement Plan

CONTRACT NO.	DESCRIPTION
EQUIPMENT AND MATERIALS	
5.1110	Steam Turbine and Generator
5.1120	Gas Turbine and Generator
5.1215	Heat Recovery Steam Generator
5.2110	Feedwater Pumps
5.2120	Circulating Water Pumps
5.2130	Condensate Pumps
5.2150	Fire Water Pumps
5.2180	Sump Pumps
5.2190	Miscellaneous Pumps
5.2191	Lift Stations
5.2220	Surface Condenser
5.2280	Plate and Frame Heat Exchangers
5.2310	Critical Pipe
5.2320	General Service Pipe
5.2330	Critical Pipe Supports
5.2340	General Service Pipe Supports
5.2350	Concrete Circulating Water Pipe

CONTRACT NO.	DESCRIPTION
5.2490	Miscellaneous Piping Specials
5.2491	Below Grade Piping Specials
5.2512	Large Butterfly Valves
5.2520	AG Valves
5.2521	UG Valves
5.2530	Control Valves
5.2532	Steam Bypass Valves
5.2570	Fuel Gas Ball Valves
5.2710	Compressed Air Equipment
5.2750	Ammonia Storage and Supply
5.2762	Fuel Gas Conditioning
5.2910	Auxiliary Boiler
5.2940	Oil Water Separator/UG Tanks
5.2980	Shop Fabricated Tanks
5.3120	Circ Water/Cycle Chemical Feed
5.3210	Raw Water Treatment System
5.3220	Demineralized Water System
5.3310	Sample Analysis Panel
5.4210	Cranes and Hoists
5.4320	Elevators
5.4520	Fabricated Steel
5.4525	Rebar Supply
5.4570	Precast Firewalls
5.4590	Wind Fence Furnish & Erect
5.5110	Generator Step-up Transformers
5.5120	Unit Auxiliary Transformers
5.5210	Generator Circuit Breakers
5.5220	Isophase Bus Duct
5.5240	Emergency Generators
5.5310	Major Electrical Equipment
5.5410	Batteries & UPS
5.5510	Electrical Cable
5.5620	Freeze Protection System
5.6110	Distributed Control System
5.6210	Instruments
5.6270	Vibration Monitoring
5.6310	CEMS
C201	Power Transformers
C202	High Voltage Breakers
C203	Substation / Transmission Materials
C207	Control Enclosure
CONSTRUCTION SUBCONTRACTS	
CONTRACT NO.	**DESCRIPTION**
5.8110	Site Preparation
5.8140	Site Finishes
5.8210	Piling

CONTRACT NO.	DESCRIPTION
5.8220	Foundations and Undergrounds
5.8240	Structural Steel Erection
5.8315	Heavy Haul
5.8321	Mechanical Construction - CTGs & STG
5.8322	Mechanical Construction – HRSGs & Pipe Rack
5.8323	Mechanical Construction – BOP, Water Treatment & Yard Piping
5.8330	Coatings, Insulation, Lagging, and Scaffolding
5.8340	HVAC Furnish & Erect
5.8410	Electrical Installation
5.8480	Cathodic Protection Furnish & Erect
5.8510	Cooling Tower Furnish & Erect
5.8530	Buildings Furnish & Erect
5.8560	Fire Protection and Detection Furnish & Erect
5.8570	Field Erected Tanks
5.9010	Subsurface Investigation
5.9020	Surveying
5.9021	Site Services
5.9110	Site Security
5.9130	Medical Services
5.9215	Pile Inspections
5.9230	Electrical Testing
5.9250	Performance Testing
5.9260	Emissions Testing
5.9270	Noise Testing
5.9400	O&M Manuals and Training
5.9610	Start-up Cleaning Services
C402	Substation Deep Foundations
C403	Substation Construction
C501	Transmission Line OH / Civil

While the contracts list has been developed to support the capital cost estimate for the PSR, some contracts may be added/broken-down/adjusted during the execution phase. In the multiple contract approach, EKPC and the OE will work together to procure the major equipment and construction contracts. The procurement of long lead time equipment such as the CTGs, HRSGs, STG, GSUs, substation power transformers, high voltage breakers, and switchgear and motor control centers (MCC) are necessary early in the Project to support detailed design. The contracting approach includes multiple equipment/material contracts and several construction contracts, as shown in Table 5-1. The equipment contracts allow EKPC to reduce the cost of subcontractor markup via competitive bidding. There are alternate contracting approaches available, however, these may lead to additional markups on equipment/material contracts. Additionally, the multiple subcontracting approach allows EKPC more

input into the equipment selection for the Project and provides more control of the quality of materials purchased.

The equipment contracts were set up in recognition of long lead time items that will need to be ordered early in the Project to support the schedule and are not impacted by the selection of other contractors. For a more detailed list of the scope being provided with each contract, refer to Appendix D – Equipment List. To assist in understanding the coordination of work between the multiple contracts, including responsibilities for design, fabrication, delivery, receipt & protection, foundations, piping, wiring, erection, commissioning and startup interfaces, refer to Appendix C – Division of Responsibility.

5.2 Construction Administration

Construction Administration personnel would leverage recent experience with construction, subcontract management, and schedule adherence/development, to direct the construction and safety of the project to meet the Owner's requirements.

5.2.1 Project Controls

OE will be responsible for developing the initial Level III (Level II Construction) Project Schedule in coordination with the Owner including:

- Establish, monitor, and update the overall schedule.
- Monitor design and procurement status and update accordingly.
- Develop construction and startup schedules and work with subcontractors to maintain in field during construction and commissioning activities.

5.2.2 Site Specific Project Documentation / Procedures

OE shall coordinate with Owner to develop:

- Overall Project Quality Assurance Plan.
- Site Specific Safety and Security Plan.
- Inspection Test Plan.

5.2.3 Startup and Commissioning

The cost estimate assumes the start-up for the Project will be administered by OE, including an on-site Startup Manager and Field Engineers provided by OE. Vendor representatives, contractors, and Owner's operating personnel will perform physical activities required to support startup and commissioning. Startup and commissioning include the work required to transition the project from construction to full operation and final Owner acceptance.

5.2.4 Performance and Emissions Testing

Overall net plant performance demonstrating output, heat rate, and functional tests will be managed by Owner with support from OE and performed by a third-party testing contractor. Plant emissions testing will be managed by Owner with support from OE and performed by a third-party testing contractor. Owner will witness all tests and agree to accepted results.

5.2.5 Engineering

OE will serve as the focal point for all engineering and design coordination of the Project. OE's project manager, project engineering leads, and main support staff will be located in the OE's design office. Additionally, preliminary design, procurement specification development, detailed engineering, and modeling will be performed by OE. Field Engineering will be supplied by OE for the duration of the construction and startup schedule.

5.2.6 Safety & Environmental

The project will require all on-site employees and contractors to comply with applicable governmental and local safety regulations and the Cooper site-specific safety program. Measures will be taken to provide safe and quality work in a productive manner. The site-specific safety plan will take into consideration project conditions that are potentially hazardous and implement programs that are designed to mitigate safety risks. The Project will comply with local and governmental mandates for environmental controls. Fuel containment practices and spill prevention will be utilized. Prior to mobilization, site-specific safety and environmental plans will be developed specifically for the Project.

5.2.7 Quality

A Project Quality Plan specifically tailored to the Project will be established and implemented, complying with the Quality Program Manual. The Project Quality Plan will describe the quality assurance and quality control requirements, organization, and division of responsibility for the project and the procedures to be followed to meet those requirements. Quality audits will be conducted to confirm that systems are followed and that the technical standards are achieved. The Project Quality Plan applies to all quality activities performed by the subcontractor's personnel in the management and control of facilities, products and services.

A focus on Quality throughout the construction phase of this project will be critical to the successful achievement of project goals associated with operability, cost, and schedule.

5.2.8 Subcontracts

Subcontractors will be evaluated and prequalified by Owner and OE for safety performance, environmental performance, bonding ability, and insurance required to be carried. Multiple Contract packages will be executed to perform the construction of the project. It is anticipated that specialty contract packages will be segregated by trade and generally follow the Contracting plan. Major Contracted scopes are:

- Site preparation work
- Site finishing work
- Deep foundations/piling
- Underground foundations and utilities
- Structural steel erection
- Heavy haul
- Mechanical construction
- Electrical construction
- Substation construction
- Transmission line construction
- Furnish and erection contracts:
    - HVAC
    - Cooling Tower
    - Pre-Engineered Metal Buildings
    - Cathodic Protection
    - Wind Fence
    - Fire Protection
    - Field-Erected Tanks
- Site service contracts:
    - Subsurface investigation/geotechnical exploration
    - Surveying
    - Site services
    - Security
    - Medical
    - Pile inspections
    - Testing
        - Electrical

        - Performance
        - Emissions
        - Noise
    - Miscellaneous:
        - O&M Manuals & Training
        - Start-up cleaning

5.3 Detailed Engineering

OE will execute engineering design as follows:

- During the engineering and procurement phase, Owner involvement is anticipated to understand and incorporate expectations into each phase and aspect of the project.
- OE will manage all aspects of technical procurement management. OE will provide engineering support for procurement of long lead equipment prior to detailed engineering. During detailed engineering, OE will review vendor engineering documentation and manage interfaces.
- Controlled project documents will be maintained in the OE's document management system. This enables all documents associated with the project to be filed in a standardized and accessible system.
- Design engineering results in finished designs, drawings, lists, and technical specifications for procurement and construction.

5.3.1 Architectural Design

The following architectural design engineering services will be performed:

- Design and coordination of pre-engineered metal buildings including plans, reflected ceiling plans, sections, elevations, details, interior walls, and door schedules.
- Design and coordination of roofing and siding for custom engineered "stick built" buildings and enclosures including plans, reflected ceiling plans, sections, elevations, details, and door schedules.
- Design and coordination of specialty items such as precast concrete wall systems, storm shelter rated control room, and unconditioned Truck Unloading area.
- Design of interior finishes.
- Design of restroom fixtures and layout.
- Review vendor designs and drawings.
- Prepare technical specifications to support subcontracts.

5.3.2 Civil Design

The following civil design engineering services will be performed:

- Site preparation, bathtub grading, finish grading, and site drainage design including construction facilities, roads, parking lots, laydown areas, erosion control, fencing, temporary and final fencing, and security.
- Design of the storm water run-off pond and coal pile run-off pond.
- Design of the storm water network.
- Analysis of geotechnical investigations and soil borings for roadway design.
- Review vendor designs and drawings.
- Prepare technical specifications to support subcontracts.

Concerns have been noted with the storage volume of the coal pile run-off pond without the ability to immediately drain. The coal pile run-off pond will need to be designed to account for storage and holding of the coal pile run-off stormwater to account for out of range pH values that require detention time as treatment prior to discharge. The possibility of stormwater re-routes to other ponds on site or the proposed stormwater pond will need to be investigated during detailed design if the coal pile run-off pond size will not suffice due to the storage wait period.

5.3.1 Geotechnical Design

The following geotechnical engineering services will be performed:

- Review of geotechnical recommendations and support foundation and civil design efforts based on geotechnical recommendations.
- Site surveillance of test and production pile activities.

5.3.2 Structural Design

The following structural design engineering services will be performed:

- Analysis of geotechnical investigations and soil borings for foundation design.
- Design of structures in accordance with applicable code, wind, snow, and seismic design criteria.
- Design of structures including reinforcing steel, structural steel, platforms, stairs, and enclosures.
- Design of deep and shallow foundations for equipment and structures.
- Review vendor designs and drawings.
- Prepare technical specifications to support equipment and materials procurement and subcontracts.

5.3.3 Mechanical Design

The following mechanical engineering services will be performed:

- Finalize site plan and BOP equipment layout drawings.
- Prepare equipment specifications for procuring equipment and materials.
- Finalize Piping & Instrumentation Diagrams (P&IDs) for piping systems.
- Prepare detailed piping isometrics for large and small-bore pipe.
- Finalize and maintain General Arrangement drawings.
- Prepare, finalize, and maintain detailed drawings and bill of materials for HVAC equipment and design.
- Prepare and maintain pipeline, valve, and mechanical device lists.
- Review vendor designs and drawings.
- Prepare technical specifications to support equipment procurement and subcontracts

5.3.4 Electrical Design

The following electrical design engineering services will be performed:

- Finalize one-line diagrams.
- Prepare low- and medium-voltage auxiliary power system electrical one-line diagrams for metering and protective relaying systems.
- Prepare arrangement drawings for electrical cable trays, and raceways.
- Prepare grounding plans and details.
- Prepare raceway and circuit lists with the capability to provide interconnection drawings for electrical cable installation.
- Prepare schematic and interconnection diagrams for electrical equipment showing control circuits and equipment interconnections to be used to create a software database for generating circuit schedules and routing cable.
- Prepare lighting plans and details for permanent facilities.
- Prepare communication block diagram for permanent facilities.
- Prepare required load flow and fault calculations to design the power system and procure electrical equipment.
- Provide design of emergency power and essential service alternating current and DC systems.
- Provide lightning protection performance specification.
- Provide freeze protection performance specification.
- Provide electrical area hazardous plans.

- Review vendor designs and drawings.
- Prepare technical specifications to support equipment procurement and subcontracts.

5.3.5 Instrumentation and Controls Design

The following instrumentation and controls engineering services will be performed:

- Finalize control system architecture drawing.
- Prepare control room layout drawing and console sketch for console vendor.
- Prepare instrument procurement list/datasheets for BOP instruments.
- Prepare instrument list for BOP instruments including sensors, transmitters, switches, and indicators for installing contractor(s) scope.
- Prepare instrument installation details for BOP instruments for field installation.
- Prepare initial BOP control system input/output (I/O) list including instrumentation and electrical system inputs and outputs.
- Prepare fiber-optic block and termination diagrams for interconnection of plant control system.
- Design field instrumentation cabling from the field devices to the plant control system.
- Prepare network wiring diagrams for field installed network cables for plant control system.
- Review vendor designs and drawings.
- Prepare technical specifications to support equipment procurement and subcontracts.

5.3.6 Cyber Security Design

The following cyber security design engineering services will be performed:

- Assist Owner in creating North American Electric Reliability Corp. Critical Infrastructure Protection (NERC CIP)-002-5 Cyber Asset Methodology.
- Assist Owner in identifying and developing a list of Cyber Assets.
- Review of vendor designs and drawings.

5.3.7 Project Tools

OE will use its standard engineering tools to design the Cooper 2x1 CCGT plant. A three-dimensional computer model of the plant will be developed. Major OEM models will be inported into the model as required to complete design. Physical drawings will be produced by extracting information from the model. The design tools will also provide for automatic detection of physical interferences and checks for consistency between documents. The design tools will also create a useful tool for operation and constructability reviews throughout the project allowing personnel to do a virtual walk through to view

access availability for valves, operating areas, maintenance equipment and other similar characteristics. Drawings generated by OE will be provided in AutoCAD format to the Owner at the end of the project.

5.4 Constructability

Constructability reviews are an integral part of the overall project execution. Early involvement by the Owner's and OE's construction management team will provide for a solid integration of the design parameters and construction philosophy. The focus will be on project optimization and the following primary constructability issues:

- Master project schedule noting site area constraints, winter work, seasonal road and waterway restrictions, building enclosure, etc.
- Site access
- Erection sequences
- Safety during erection
- Heavy lifts and construction access issues
- Laydown requirements and areas needed
- Major OEM equipment requires detailed reviews prior to fabrication/supply advancement to confirm the following:
    - Components are being fabricated to the greatest extent that works for the Project and any limited constraints.
    - Storage and preventative maintenance requirements
- Delivery sequence of equipment
    - Early receipt of critical components
    - Contemplate deferred shipments of soft trade scopes and post startup components
- Prefabrication areas
- Procurement procedures
- Quality control
- Inspections
- Vendor services

5.5 Contract List

Reference to Appendix C for the list of contracts, interface schedules and responsibilities.

5.6 Procurement Execution

OE procurement personnel will leverage recent experience with procuring equipment, materials, and subcontracts for other power plants of similar scope and size, with the goal of reducing the timeframe necessary to conform and award contracts. Owner's relationships and master purchase agreements with key suppliers will be leveraged when possible.

5.6.1 Procurement & Materials Management

OE shall create technical specifications, work with EKPC to develop approved vendors lists, issue contract specifications for bids, provide technical evaluation of bids, assist Owner in technical and commercial negotiation of contracts, expedite and track deliverables, document control of submittals, review submittals in parallel with Owner, and coordinate/assist Owner with reviewing invoices and managing change order processes.

OE will work with Owner to develop template front end commercial documents to issue with procurement packages. OE shall track and verify receipt of Owner procured equipment submittals. Logs shall be issued to inform Owner of the receipt status.

Procurement packages will be issued for bid through Owner's processes and software tools.

5.6.2 Critical Equipment & Materials

Owner will be responsible for procuring all materials and equipment. Significant procurement activities must occur immediately following the FNTP, beginning with the procurement of the following equipment and materials:

- CTGs
- STG
- HRSGs
- GSUs
- Switchgear and MCC
- High Voltage Breakers

5.6.3 Procurement Summary

The procurement team will be responsible for daily execution of procurement activities throughout the course of the project. Major responsibilities of the team include:

- Provide technical specifications to bid all procurements per plan.
- Provide technical evaluations of all bid packages.

- Update procurement schedule.
- Coordinate supplier/contractor pre-qualifications.
- Support expediting, logistics, and materials management functions.
- Provide quality support with shop inspections and pre-shipment delivery inspections.
- Tracking receipt and control of materials.
- Assist Owner in reviewing invoices.

5.6.4 Procurement Status Reporting

OE will use a procurement schedule which is integrated with the schedule for the entire project. Data reported in the procurement schedule includes specification/requisition dates, request for proposal (RFP) issuance, contract award, and fabrication/delivery durations for each procurement agreement. Initial input comes from integrated construction and engineering schedules and will be updated appropriately throughout the life of the project. All updates (actual dates achieved) are fed back to the Project Schedule, with any discrepancies addressed and resolved to support the needs of the project.

5.7 Construction Planning

A Construction Execution Plan will be developed to support the COD date.

Project execution planning begins well before the Subcontractors will mobilize to the site. Once the project is awarded, OE would engage its Pre-Construction team to begin reviewing the preliminary project documents as well as the project risks to begin looking for efficiencies to allow for safe and efficient execution of the project. The Pre-Construction team would work in parallel with the project team to outline and deploy the optimized execution strategies into the project design through the mobilization phase.

During construction, daily coordination meetings outline the upcoming work for the following day and allow an open forum for OE, Owner and Subcontract leads to safely plan and coordinate the work for each day on site. Communication by all parties would continue throughout the project lifecycle to allow for well-coordinated interface points between all Subcontractors and stakeholders.

OE and Owner will hold a weekly progress meeting to review the plan with each Subcontractor and discipline to aid in coordination to maintain progressing activities on the critical path. During the weekly progress meetings, an in-depth review of the Subcontractor metrics will be reviewed. Metrics include safety, quality, cost, and schedule performance. This time would also be used to follow-up on any outstanding action items required for the efficient execution of each Subcontract. EKPC would typically

attend these update meetings and would have the opportunity to engage in the planning activities that occur.

5.7.1 Facility Logistics Plan

The proposed site facility layout drawing has been developed during the Project Definition Phase in a manner that allows for safe egress on to the site for all site personnel. Personnel walk paths have been laid out considering vehicular traffic and access to the site. The site layout allows for safe foot access to the project footprint without having to cross traffic routes. The craft break trailer location is within proximity to the Workfront and will allow for efficient break times without having any of the craft workers walking long distances over break times. The craft break trailer yard also would have portable wash cars within the area to keep the wash cars off the work site footprint. The entire site trailer area would be fenced in and secured to allow the personnel and their personal belongings to be secured while on site.

Appendix E provides the general arrangement site layout for the Project.

5.7.1.1 Craft Parking

The craft parking lot was developed during the Project Scoping Phase to allow direct access into the lot without driving through the project site near the craft work area. The layout would not include fencing around the parking lot. Due to its distance away from the work areas, bussing is expected and included in the cost estimate. The full craft parking lot is shown on the site facility layout drawing.

5.7.1.2 Laydown Area

The proposed site facility layout drawing has been developed to allow for facility unobstructed lanes (as much as possible) to and from the laydown yards. The laydown areas were sized based on comparison to similar, historical projects. The laydown areas have been laid out to include temporary power connections to allow OE to utilize this area for preservation activities as well as pre-fabrication activities off the site footprint. Since this Project is located at an existing plant some of the space near the Project site is already claimed by permanent equipment, structures, or other uses. Therefore, several smaller laydown areas will be required throughout the plant property in order to have adequate laydown space for the Project. This may impact handling efficiency and productivity for the various craft labor. The laydown areas are all within the site permanent or temporary security fencing.

5.7.2 Mobilization and Utilities

Mobilization would include the delivery and placement of the trailer courtyard area. OE will mobilize the trailer complex for the site staff team and will install the craft break trailer and associated wash cars. As

the Subcontractors mobilize to site, OE will assist in the placement of the trailers and will assign tool crib areas and Subcontractor lay down space, as required. Once the trailer complex is in place, the site preparation will begin, and power block & BOP underground activities will commence.

5.7.3 Civil Work

Civil work planned for this Project includes site preparation, mass grading, and site finishing. Major civil work starts with site preparation. This work would include site clearing (stripping), rough cutting the site to subgrade elevation in the power block area and preparing the site roads for use during construction. After the power block area has been prepared it will be bathtub excavated to remove unused coal material located in the coal pile and accommodate for construction of the storm water network and other subgrade site work. The civil work and project cost estimate include the excavation and removal of native soil and coal material from 1 foot above grade to a depth of 4 feet below grade (including existing clay barrier) within the area of the existing coal pile that will be impacted by the project. Hauling off the associated coal material spoils (assumed onsite) and storage of minimal remaining coal material spoils from this excavation are also included. The civil work and project cost estimate also include the dewatering of the existing coal runoff pond (water pumped to Lake Cumberland), along with an allowance for the removal of coal material spoils up to 4 feet below the bottom of the coal runoff pond and hauling off the associated coal material spoils to an onsite landfill. Coal material spoils from bathtub grading will be hauled to the onsite landfill and the remaining spoil material will be stored on site. The civil work and project cost estimate assume the scoped excavation and removal of coal material, along with associated drainage and erosion control work will be completed in the same timeframe and mobilization as the rest of the civil work for this project. Since the coal pile and coal runoff pond need to be adjusted prior to the final geotechnical investigation, the coal pile and coal materials likely need to be removed well in advance of the project civil contractor mobilization. The project scope and cost estimate do not include the following associated with removing the coal pile spoils and coal runoff pond in advance of project mobilization:

- Separate mobilization and associated costs for contractor(s) to excavate, remove, dewater, and haul off coal spoils materials.
- Grading, drainage, and erosion control required to maintain impacted area for time between coal materials removal and project mobilization.
- Additional excavation and hauling off coal materials/spoils beyond the allowance stated above.
- Cost and schedule impacts for searching for and removal of additional coal materials/spoils.
- Remediation or additional work to address areas impacted by coal materials.

After the bathtub grading has been built back up to grade and the entire power block area has been adjusted to the finish grade elevation, the craft parking lot and surrounding laydown areas will be cut to subgrade elevation and surfaced for use by the Subcontractors. Once the site is surfaced, temporary and permanent fencing will be installed to secure the project site. The cost estimate for this project includes excavation of remaining

After all major construction activities have been completed, the site finishing Subcontractor will mobilize on site to perform the final grade adjustments, pave the permanent plant roads, and restore the areas disturbed by the construction activities.

5.7.4 Structural

The piling Subcontractor would mobilize to site to begin installing the micro-piles for the associated structures throughout the site once the subgrade elevation has been established by the site preparation Subcontractor. Test piles may be required and approved prior to installation of the production piles. Major foundations would be installed in sequence following the installation of the associated piling by foundation. The sequence of installation would be to start with the HRSG, CTG and STG building areas followed by the construction warehouse, electrical building, water treatment building, and the administration building areas. Installation of the remaining major foundations would follow, including the large tank areas and cooling tower area and finishing with the BOP foundations. After the foundations are complete and major centerline equipment is installed, the pre-engineered metal buildings, stick-built buildings, mezzanines, and the structural steel support components will be installed in the proper erection sequence to allow for installation of the major equipment. Finally, the remainder of the structural steel supports, pipe racks, utility racks, platforms, HRSG elevator, stairs, cable tray and pipe supports will be installed in sequence to support the remaining mechanical, electrical, and general access activities. Cranes and monorail systems will be installed after construction of the major buildings is complete.

5.7.5 Major Equipment Installation

Building, steel, and major pieces of equipment would be received and installed or temporarily stored. Smaller components, if not installed immediately, would be received, inventoried, and safely stored and maintained in one of the dedicated storage areas (new construction warehouse or outdoor laydown yard) until they are to be installed. Foundations would be complete before the site begins the receiving process for most major equipment. Major equipment would be planned to be delivered and immediately placed on the associated foundation to eliminate double handling. All major equipment is planned to be placed with a crane except for the following: combustion turbine generators, steam turbine generator, some HRSG components, auxiliary (aux) transformers, and the GSUs. This equipment would be rough set by the Jack

and Slide / Gantry heavy-haul Subcontractor. Final alignment activities on all the equipment would be the responsibility of the major mechanical Subcontractor(s).

After the major equipment, auxiliary equipment and accessories will be installed by either the major mechanical or major electrical Subcontractors. The centerline equipment (turbines and generators) will be the starting point for all the major equipment with the auxiliary equipment and BOP equipment following.

5.7.6 Mechanical & Electrical BOP

After the Project P&IDs and Electrical One Line Diagrams are established, OE will scope Mechanical and Electrical Systems and review with the construction team. Procurement delivery sequences and Subcontractor construction system turnovers will be finalized and integrated into the Subcontract Agreements for each Subcontract on the project. Mechanical and Electrical system turnovers are sequenced to support the startup and commissioning schedule.

Large-bore piping and chrome alloy steam system routing would be designed and reviewed by the Pre-Construction and Mechanical-Piping teams to identify and optimize field weld locations. Large bore piping would then be prefabricated and spooled off-site and shipped to the site for installation following the placement of the associated major equipment. Small-bore piping would be prefabricated and spooled off-site as much as possible and will follow the delivery of the large bore piping. Piping installation would take place as soon as the associated major equipment is placed and general areas become available.

Major long lead electrical cable would be prioritized by system and procured to align with the Subcontract construction turnover schedule. As the cable tray and conduit raceway installations are completed, cable pulls would commence. Cables would be installed by area until about sixty percent of the schedule is complete. Cable pulls would then shift to the systems required for back feed of the plant. OE will make the determination when enough work is completed to allow for the back feed milestone and allow for the safe working conditions for the remainder of the work to be completed.

5.8 Start-up and Commissioning

Start-up is one of the project phases with the most risk. Planning for start-up and commissioning defines the systems or sub-systems to be commissioned by scope identification on the P&ID's and electrical one-lines. The Startup Manager works with Subcontractors and OEM suppliers to define the isolations required to start up separate areas of the plant to sequence the workflow. During the planning stage, the Startup Manager, working with the OEM suppliers, would also define the processes for bringing auxiliary power and major flushing and cleaning, and would direct the turnover process to make sure the facility turnover is documented in the turnover packages.

Project start-up and commissioning provides for documented, safe, timely, and orderly testing, start-up and transfer of packages, systems, and facilities. Start-up and commissioning planning will begin in the engineering stage with the definition of start-up packages. Engineering, procurement, and construction planning would support early commissioning of as many start-up packages as practical. Early checkout and testing of as many packages as possible would distribute the start-up workload more efficiently, reducing the risks and uncertainties associated with facility start-up and commissioning.

Checkout of each system or sub-system would be completed utilizing Owner's Operations staff and handed over to Operations once all are completed. At this time, Owner would operate each system as permanent plant equipment with support from the CTG equipment supplier and OE on any issues that arise with the equipment. Startup is complete when Performance and Emissions Testing is finished and Commercial Operation with full acceptance by Owner is achieved. The principal start-up activities include the following:

- Preparation and planning
- Pre-Commissioning checkout (electrical testing, instrument calibration and I/O checkout)
- Flushing and cleaning of piping system (lube oil flushing, air blows, HRSG chemical cleaning, steam blowing)
- Initial operation of equipment and startup of the plant equipment
- Operator training

5.9 Project Closeout Plan

5.9.1 Engineering Completion and Project Closeout

As the plant begins the operation phase, OE would demobilize its field operations staff from the project site. Once the demobilization phase is complete, OE would stay engaged with the project until the warranty period has expired to support Owner to help make sure the contractual requirements have been fulfilled between Owner and the Subcontractors.

OE will maintain a set of all field changes and will require subcontractors to maintain a record of all field changes on the documents. At the completion of construction and startup, the field staff would return a copy of the record set to the design team along with the subcontractors' record sets. The design team would incorporate the changes into a set of "Conformed to Construction Records" documents.

6.0 PROJECT SCHEDULE

6.1 General

The project schedule is based on a Commercial Operation date of December 2030 and is included in Appendix Q to this report. The schedule encompasses activities from permitting through commercial operation. The schedule reflects a 40-month plan for the construction and commissioning period. The schedule reflects a multiple prime contracting approach. Table 6-1 reflects the major milestones for the project.

Table 6-1: Project Milestones

Permitting Activities	**Date**
Submit PJM Interconnection Application (complete)	December 2023
CPCN Advance Notice	November 2024
Submit Air Permit Application	December 2024
Submit RUS NEPA EA Application	August 2025
CPCN Complete	July 2025
Air Permit Approval	December 2026
Gas Pipeline FERC Approval	February 2027
RUS NEPA EA Approval	May 2027
PJM Interconnection Approval	December 2027
Engineering/Procurement	
LNTP for Engineering for Long Lead Equipment	November 2024
FNTP for Detailed Design	July 2025
GTG Contract FNTP	July 2025
HRSG Contract Award	August 2025
STG Contract Award	August 2025
GSU Contract Award	October 2025
Award Power Transformers for Cooper Substation	March 2025
Award High Voltage Circuit Breakers	August 2025
Construction Period – 40 Months	
Start Construction	July 2027
Start Major Equipment Erection	August 2028
Start BOP Mechanical and Electrical Construction	September 2028
Energize Startup Power/Back feed	August 2029

First Fire Unit 3 (First Unit)	January 2030
Target Commercial Operation	November 2030
Commercial Operation with Schedule Margin	December 2030

6.2 Permitting

Owner is responsible for permitting activities with OE's support. In general, the permitting critical path is through preparation and receipt of the CPCN application and approval, NEPA EA application and approval along with the PJM interconnect approval. The NEPA EA must be received before start of construction. Note that construction cannot break ground until the air permit is received, however, it is expected to be in hand before construction commencement. Furthermore, here are additional notes regarding these necessary permitting schedule activities:

- The air permit application approval is required to begin construction. The overall duration to obtain the air permit is estimated to be approximately 24 months between submittal and approval. Once the air permit and RUS approval are received, mobilization can occur.
- CPCN is required for FNTP, major equipment contract awards, and start of detailed design. Should CPCN be delayed, overall design, procurement, and possibly construction and project commercial operation date will move to the right.
- RUS NEPA EA approval may impact the timeline for major expenditures. Should RUS approval be delayed, overall procurement activities may need to move to the right, along with construction, and project commercial operation date will move to the right.
- The interconnect application approval is required for dispatching power to the grid, as well as for back feed for commissioning activities.

6.3 Engineering

The engineering for the project is summarized in Sections 3.0 and 5.0. An engineering timeframe has been included in the project schedule that supports issuing construction documents that are fully (or mostly) complete at construction contract award to minimize rework and revisions in the field. Engineering and procurement support is required for long-lead equipment contracts in order to be ready to award these contracts upon or shortly after CPCN is received and FNTP.

6.4 Major Equipment

The project schedule is based on current delivery lead times including 27 months for the CTGs, 26 months for the HRSGs, 24 months for the STG, 41 months for the GSUs, 42 months for substation

transformers, and 37 months for high voltage breakers. It may be necessary to issue LNTPs for some long lead equipment to support the project schedule. After permitting and regulatory, the critical path of the project runs through the CTG and HRSG procurement and delivery, and then through erection and commissioning.

6.5 Construction

Construction is planned to begin with construction facilities, site prep, mass excavation and backfill in July 2027. This work is expected to continue through January 2028. Piling commences in August 2027 and is followed by foundation installations which are to be completed February 2029. Construction of the cooling tower begins in Summer 2028. Major power train equipment deliveries are scheduled for late 2027 with power block construction starting August 2028 and continuing through early 2030. CTG/HRSG erection, STG building erection, and STG erection will occur during these same timeframes. Pre-engineered metal buildings and stick built buildings will be erected early 2028 through Spring 2029. BOP equipment, tank erection, mechanical and electrical construction occurs between Summer 2030 through Fall 2031. New switchyard construction will begin Summer 2028 and continue through Summer 2029. Transmission and network upgrade construction will be complete before the end of 2029.

6.6 Startup

Preliminary startup and commissioning activities will be performed using construction power which will be fed from new infrastructure connecting the site to a new transformer tapped into a nearby utility line. Major startup and commissioning activities will commence with energizing of the Plant switchyard to back-energize the plant auxiliary electrical system. The Plant electrical and mechanical systems are commissioned in a sequence to support first firing of the combustion turbines on natural gas and then fuel oil. System operations continue with synchronization, then ramping the turbines up to full load, and tuning of the plant and systems to prepare for performance and emissions compliance testing. Once the Plant is capable of reliable full load operation, performance testing is performed in accordance with the ASME Performance Test Codes.

The project schedule is based on all necessary transmission network upgrade projects being complete prior to electrical back feed.

6.7 Critical Path

For an estimated commercial operation date in December 2030 (commercial operation date includes schedule margin) with a multiple prime contracting approach, the critical path is 1) first receiving the CPCN to support awards/LNTP for major equipment contracts and long lead equipment contracts (CTG,

STG, HRSG, GSU, breakers, substation transformers) to support receipt of power train equipment vendor submittals to support detailed plant design and construction timeline, then 2) RUS approval for project funding to allow for start of construction and to support further procurement and project expenditures , and finally 3) completion of design, procurement, construction, and startup. Preparation of site prep, piling, foundation, mechanical, and electrical construction packages leads to award and mobilization for construction. High voltage breakers and substation transformers may also become critical path depending on lead time and may require award or LNTP prior to receiving CPCN to support the necessary construction duration for the switchyard prior to back feed. With this, CTG delivery and erection, and the checkout and energizing of the auxiliary power system to be used for commissioning of the plant to achieve first fire and synchronization is the critical path of construction. First fire and synchronization of each CTG will be followed by steam blows and a tuning and testing period prior to Substantial Completion and Commercial Operation.

7.0 COST ESTIMATES (*CONFIDENTIAL BUSINESS*)

7.1 General

The capital cost estimate for the proposed Cooper 2x1 CCGT plant is included in Appendix R. The cost estimate was developed in accordance with the AACE Class 3 cost estimate guidelines. The estimated cost for this project is $[redacted] excluding all escalation through the project timeline (overnight costs). The scope and costs developed for this report are based on utilizing the Siemens 5000F combustion turbine. The cost would vary for a plant utilizing a different combustion turbine technology. The Project cost of [redacted] with an annual average net output of 772 MW (net) based on Siemens 5000F turbines. Table 7-1 provides a summary breakdown of the project estimated capital costs. Indicative cost deltas for various scope options were developed and provided to EKPC separate from this report.

[redacted]	[redacted]
[redacted]	
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
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[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

[redacted]

*$/kW calculated based on net output of 772,400 kW for annual average ambient conditions.
**All escalation is excluded.
***Total cost buildup may not align due to rounding.
****Based on EKPC developed planning level cost estimates

7.2 Cost Estimating Methodology and Assumptions

Burns & McDonnell performed a detailed cost estimate in a "bottoms up" fashion based on a multiple prime contracting methodology. The following describes the methodology used in the development of the cost estimate:

- Estimates are based on the assumptions and project scope described in this report. Design parameters and scope typically defined by these studies are estimated based on information provided by EKPC, preliminary calculations and BMcD experience.
- Contracting Methodology: Estimate assumes a multi-prime subcontractor approach with all equipment procured by EKPC. Overhead and fees were estimated based on current market conditions and assuming all scope, schedule, performance, payment, and warranty risk will be covered by EKPC.
- Major Engineered and Balance of Plant Equipment: Budgetary quotes received Q1/Q2 2024 and in-house information from similar projects were utilized.
- Construction Estimates: Construction commodities were estimated using recent pricing from similar projects and budgetary vendor quotes. Quantify take-offs were performed for each discipline specific to this project and supplied to a variety of Subcontractors to confirm erection and installation budgetary pricing and approach.
- Project will be executed with durations similar to those shown on the Project schedule with the objective of achieving the Project milestone dates. It is assumed the Project will be executed with

a schedule sufficient to minimize overtime. A 50-hour workweek was assumed as a means of providing an incentive to attract labor. This includes 40 hours of straight time and 10 hours of overtime for normal construction periods. A 60-hour workweek was assumed during commissioning until first fire. An 84-hour workweek was assumed during commissioning and startup from first fire to commercial operation. No additional overtime is included to accommodate a compressed work schedule. Project costs are based on meeting the target COD of November 2030 and do not include construction, construction management, engineering, and startup costs to extend to a COD past December 1, 2030.

- Labor Rates: Labor rates and productivity factors were developed based on BMcD in-house information and adjusted based on subcontractor budgetary bids for open shop construction (some bidders are union).
- Project Indirects: Estimates are based on BMcD's experience and executing multiple prime contract projects of similar scope.
- Several major assumptions were used in developing the capital cost estimate. These assumptions include the following:
    - Labor is assumed to be a combination of union and nonunion labor and available without excessive hourly incentives or incentive packages. However, per diem was included for several trades based on subcontractor feedback and recent feedback from other projects in the region.
    - Estimate is based on the availability of housing being in the Project area (e.g., trailer parks, campgrounds, local housing, and local hotels).
    - Contingency is included at 10% for Project estimate contingency. Owner's contingency for discretionary expenditures is included in Owner's Costs.
    - Additional contingency allowance of $7 million is included for flow fill for unknown karst formations.
    - Cost for Builder's Risk Insurance was based on approximately 1% of the total project costs (without Owner Costs) and is included in Owner Costs.
    - No sales tax was included.
    - No financing fees or interest during construction was included.
    - No escalation (for duration of project or for future start/completion date) was included.

7.3 Direct Cost Basis

7.3.1 Engineered Equipment

The equipment supply includes the procurement of all major equipment by the Owner. Refer to the Project DOR included in Appendix C for a listing of anticipated equipment and material supply contracts. The equipment supply cost includes the supply of specified equipment as well as the transportation cost to the site, technical field advisers, and training. Equipment installation includes the receiving, initial inspection, and erection of all equipment, as well as the installation of vendor pipe supplied with the equipment. Productivity factors for the equipment installation were derived from BMcD past project information and construction rates for the project area. Refer to Table 7-2 below for a listing of all contract packages utilized in development of the cost estimate including how each contract cost was sourced. Budgetary bids and email quotes were received in Q1 through Q2 of 2024.

Table 7-2: Equipment and Subcontract Pricing Source

Contract No.	Contract Name	Target Price Source
5.1110	Steam Turbine Generator	Bid - Budgetary
5.1120	Combustion Turbine Generator	Bid - Budgetary
5.1215	HRSG	Bid - Budgetary
5.2110	Boiler Feed Pumps	Bid - Budgetary
5.2120	Circulating Water Pumps	Bid - Budgetary
5.2130	Condensate Pumps	Bid - Budgetary
5.2150	Fire Water Pumps	In-House
5.2180	Sump Pumps	Bid - Budgetary
5.2190	Miscellaneous Pumps	Bid - Budgetary
5.2191	Lift Stations	EQ (Email Quote)
5.2220	Surface Condenser	Bid - Budgetary
5.2280	Plate and Frame Heat Exchangers	Bid - Budgetary
5.2310	Critical Pipe	EQ (Email Quote)
5.2340	Pipe Supports	In-House
5.2360	Circulating Water Pipe	Bid - Budgetary
5.2490	Piping Specials	In-House
5.2491	Below Grade Piping Specials	In-House
5.2512	Large Butterfly Valves	Bid - Budgetary
5.2520	Valves	In-House
5.2530	Control Valves	EQ (Email Quote)
5.2532	Bypass Control Valves	EQ (Email Quote)
5.2710	Compressed Air Equipment	In-House
5.2750	Ammonia Storage and Supply	Bid - Budgetary
5.2762	Fuel Gas Conditioning	Bid - Budgetary

Contract No.	Contract Name	Target Price Source
5.2910	Auxiliary Boiler	Bid - Budgetary
5.2940	Below Grade Storage Tanks	EQ (Email Quote)
5.2980	Shop Fabricated Tanks	In-House
5.3120	Cycle and Cooling Tower Chemical Feed Equipment	Bid - Budgetary
5.3210	Water Treatment Equipment	Bid - Budgetary
5.3220	Demineralized Water System	Bid - Budgetary
5.3310	Sample Analysis Panel	Bid - Budgetary
5.4210	Cranes and Hoists	EQ (Email Quote)
5.4320	Elevators	EQ (Email Quote)
5.4520	Fabricated Steel	EQ (Email Quote)
5.4525	Rebar Supply	In-House
5.4570	Precast Firewall	EQ (Email Quote)
5.4590	Wind Fence	Bid - Budgetary
5.5110	Generator Step-up Transformers	Bid - Budgetary
5.5120	Unit Auxiliary Transformers	Bid - Budgetary
5.5210	Generator Circuit Breakers	Bid - Budgetary
5.5220	Isolated Phase Bus Duct	Bid - Budgetary
5.5240	Emergency Generator	Bid - Budgetary
5.5310	Major Electrical Equipment	Bid - Budgetary
5.5410	Batteries & UPS	Bid - Budgetary
5.5510	Electrical Cable	EQ (Email Quote)
5.5620	Freeze Protection	In-House
5.5670	Plant Communications	In-House
5.6110	DCS	Bid - Budgetary
5.6210	Instruments	EQ (Email Quote)
5.6270	Vibration Monitoring System	Bid - Budgetary
5.6310	CEMS	Bid - Budgetary
C202	High Voltage Breakers	Bid - Budgetary
C203	Substation / Transmission Materials	Bid - Budgetary
5.8110	Site Prep	Bid - Budgetary
5.8140	Site Finishes	Bid - Budgetary
5.8210	Piling	Bid - Budgetary
5.8220	Foundations & U/G	Bid - Budgetary
5.8240	Steel Erection	Bid - Budgetary
5.8315	Heavy Haul	Bid - Budgetary
5.8321 /8322 /8323	Mechanical Construction	Bid - Budgetary
5.8330	Coatings, Insulation, & Scaffold	Bid - Budgetary
5.8340	HVAC F&E	Bid - Budgetary
5.8410	Electrical Construction	Bid - Budgetary

Contract No.	Contract Name	Target Price Source
5.8510	F&E Cooling Tower	Bid - Budgetary
5.8530	Buildings	Bid - Budgetary
5.8560	Fire Protection and Detection	Bid - Budgetary
5.8570	Field Erected Tanks	Bid - Budgetary
5.9010	Subsurface Investigation	In-House
5.9020	Surveying	In-House
5.9021	Site Services	In-House
5.9110	Site Security	In-House
5.9130	Site Medical	In-House
5.9215	Piling Inspections	In-House
5.9230	Electrical Testing	In-House
5.9250	Performance Testing	In-House
5.9260	Emissions Testing	In-House
5.9270	Noise Testing	In-House
5.9320	Chemical Clean	EQ (Email Quote)
5.9330	Steam Blow	EQ (Email Quote)
5.9340	Lube Oil Flushing	In-House
5.9350	Gas Piping Air Blow	In-House
5.9400	O&M Manuals / Training	In-House
5.9610	Startup Cleaning Services	In-House
C402	Substation Deep Foundations	Bid - Budgetary
C403	Substation Construction	Bid - Budgetary
C501	Transmission Line OH / Civil	Bid - Budgetary

7.3.2 Site Development and Finishing

The site development scope includes site preparation along with construction laydown, trailer, and parking areas as well as over-excavation of coal pile area in preparation for piling and foundations. The civil scope also includes development of the on-site storm water retention and new coal ponds. Excavation and backfill for underground utilities are included but underground pipe supply and installation are not included in civil costs (piping costs). This scope also includes the estimated quantities for the structural excavation and backfill required for the foundation construction. Site finishes including paving and gravel are included. Cost was included to dewater the existing coal pond (pumped to Lake Cumberland) but no additional costs for dewatering and disposing of groundwater were included.

The civil scope of work material quantities were derived from a preliminary site grading sketch developed from the site GA and general topography data. The labor rate, production rates, and material prices were constructed from BMcD previous project metrics and estimates for construction in the project area.

7.3.3 Concrete

The concrete scope includes cast-in-place concrete for the support of equipment, containment and firewalls, buildings and structure foundations and floor slabs, which are all pile supported. For reinforcing steel, a density of rebar per unit of concrete was provided by engineering for internal estimating purposes. For formwork quantities, basic quantity information was developed relative to the type of concrete such as mats, walls, slabs, etc. from which were estimated formwork quantities.

7.3.4 Piling

The piling quantities were estimated using the site arrangement, equipment information from similar project, engineering estimates of equipment loads, or engineer developed loads based on conceptual design. Micro-pile foundations lengths and capacity were assumed based on review of the preliminary geotechnical report provided by S&ME, Inc. Micro-piles are anticipated to be used to support all major equipment and structures. Piling costs were developed from BMcD previous project estimates for construction in the project area and verified by comparing with subcontractor budgetary bids.

7.3.5 Structural Steel

The structural steel scope of work includes the steel erection for stick-built buildings and structures (e.g. STG building, administration building, Main GT electrical and cooling tower electrical buildings, water treatment electrical and mezzanine building steel), main pipe and utility rack steel as well as other support steel for branch lines of piping and cable tray. Miscellaneous steel such as platforms, grating, decking, handrail, stairs and ladders are included for structure access that is not otherwise provided as part of the equipment contracts. Structural steel for pre-engineered buildings is included in the architectural scope.

The structural steel scope of work was estimated from conceptual design of the buildings, structures, pipe/utility racks, individual piping and tray supports, and platform areas based upon information shown or implied from the site GA. The structural productivity rates, wage rates, and material pricing were based on BMcD previous project history for construction in the area and verified using subcontractor pricing and input.

7.3.6 Architectural

The architectural scope of work includes the supply and installation of pre-engineered buildings, roofing and siding of custom engineered stick-built buildings, and concrete masonry unit (CMU) structures. This also includes the supply and installation of primary and secondary framing, walls, plumbing, restrooms and showers, building insulation, windows, doors, flashing, gutters, and building finishes.

The buildings are sized per the general arrangement drawings in Appendix E to accommodate the equipment and spaces as defined and agreed-to in the project Scope Matrix (Appendix B). The building sizes and pricing were based on previous projects and budgetary quotes from subcontractors. Electrical lighting, convenience power, and communication are included in electrical cost. Productivity factors, wage rates, and material costs were derived from BMcD previous project estimates and rates for projects in the area.

Building HVAC scope included fans, makeup air units, air conditioning units, gas and electric heaters, louvers. Furnish and erection costs were developed based on quantities and sizing from preliminary engineering and compared to subcontractor budgetary pricing.

7.3.7 Painting & Coatings

The painting scope includes field touch up painting of factory coated equipment to repair damage during construction as well as final coating to all carbon steel field welds and final pipe labeling. The painting of the building steel is included in the architectural scope. Structural steel is hot-dip galvanized, not painted, but will include field touch to any galvanization scratched/damaged during construction. Pipe priming is assumed to be applied in the shop and estimated as material cost. Insulated carbon steel pipe will be primed only and does not include a finish coat.

7.3.8 Piping

The piping scope of work includes above and below ground piping supply and installation. Vendor supplied pipe is included in the equipment installation cost. The piping scope covers purchase of non-critical pipe, fittings, flanges, valves, specials, bolt-up kits, and non-engineered supports. Purchase of the critical pipe, large valves and engineered supports are carried in the equipment pricing. The piping scope of work does not include trenches (civil scope), heat trace (electrical scope), insulation (insulation scope); touch up painting (painting) or pipe labeling (painting). The piping scope of work does include applicable non-destructive evaluation (NDE), pre and post weld heat treatment (PWHT), and hydrotesting.

The piping estimate was based on takeoffs from the general arrangement with P&IDs. Using these quantities, pricing for bulk material, valves, and pipe fabrication was based on BMcD recent project pricing and confirmed using subcontractor budgetary quotes. The labor estimate was based on rates in the area and subcontractor budgetary quotes.

7.3.9 Insulation

The insulation scope of work includes the installation of thermal, personnel protection, and freeze protection insulation. This includes insulation for BOP piping and equipment, CTG, HRSG, and STG

supplied equipment and piping. Pricing was based on recent BMcD projects and compared to subcontractor pricing for use in the cost estimate.

7.3.10 Electrical

The electrical scope includes supply and installation of all raceway including underground duct bank, above grade rigid conduit and the cable tray system with grounding and all required supports. It also includes the installation of all cable and terminations. Cable material costs are carried in the equipment pricing. Terminations include wire labels, cable tags, connectors, continuity testing, and Hi-Pot testing. Temporary construction power includes installation, lighting, and maintenance. Equipment includes MCCs and switchgear, transformers, emergency generator, heat trace, communications systems, and lightning protection. The electrical estimate was completed using take off quantities that were derived from a combination of one-line drawings and the equipment layout.

7.3.11 Instrumentation & Controls

The instrument and controls scope of work includes supply and installation of the DCS with a simulator, vibration monitoring system (VMS) with integration to the OEM system, CEMS, and instrumentation for the BOP systems not already provided by the equipment suppliers. The instruments are supplied by the equipment vendors and with the BOP systems. Pricing for the DCS, simulator, VMS, and CEMS were based on budgetary vendor quotes. The instrumentation estimate was completed based on installation rates in conjunction with instrument budgetary email quotes and in-house information from similar projects.

7.3.12 Switchyard & Transmission

The 161kV BAAH switchyard scope includes below and above grade infrastructure and protection, control and communication systems.

Supply and installation costs include the following:

- Below grade drilled pier and pad foundations for equipment
- Conduit and cable trench
- Control, power and communication yard cabling and terminations
- Ground grid.
- Circuit breakers
- Disconnect switches
- Instrument transformers

- Structural steel
- Surge Arresters
- Insulators
- Bus work.
- Costs were also included for A-frame, dead-end structures and disconnect switches at each of the GSU transformers.

The protection, controls and communication systems will be in an enclosed, prefabricated control enclosure. Enclosure will include the following:

- Control enclosure shell
- Auxiliary AC and DC power supply systems
- Relay and control panels
- Remote Terminal Unit (RTU),
- Communication racks,
- Wire, cable and terminations.

The 161kV and 69kV line scope includes line modifications, additions, demolition and re-routing of existing transmission lines.

The Transmission line scope consisted of the following sections of construction:

- Reroute the existing 161kV lines near the existing Cooper Switching Station and the New Switching Station to tie-in or avoid the New Switching Station. Line construction includes five (5) different circuits totaling about 2.7 miles of 954 kcmil ACSS conductor shielded by either 7 No. 7 Alumoweld or OPGW with four (4) splice boxes.
- Build a new 161kV line from Cooper Substation to Alcalde Substation. A portion of the new line will be constructed double circuit with adjacent existing line. The entire route is approximately 6.2 miles with about 2.4 miles as double circuit.
- Reroute the existing 69kV line at Cooper to avoid the new substations. The reroute is approximately 1.4 miles of new line.

BMcD worked with EKPC to understand the direct costs associated with the transmission network upgrades:

- All 161kV and 69kV circuit breakers at the existing Cooper Substation will need to be replaced with circuit breakers rated at 63kA fault current rating.
- Upgrade the 161 / 69 kV transformer at Cooper Substation to a 200MVA unit. A spare unit will also be purchased as a spare.
- Maximum conductor operating temperature will need to be increased to 212 degrees Fahrenheit on the Casey County – Marion County 161kV transmission line. This transmission line is approximately 17.8 miles in length.
- Rebuild the South Lancaster-Garrard County 69 kV line using 556 ACSR conductor. Transmission line is approximately 1.8 miles in length.
- Rebuild the existing 161kV line to Elihu sub. The line will tap the double circuit section at the first junction. The rebuild is 4.2 miles of single circuit rebuild replacing structures in place.
- Kentucky Utilities upgrade on the Alcade-Farley 161kV transmission line. This transmission line is approximately 27.19 miles in length.
- Kentucky Utilities upgrade on the Farley-Artemus Tap 161kV transmission line. This transmission line is approximately 12.77 miles in length.
- Kentucky Utilities rebuilds the Lebanon-Springfield 69kV transmission line. This transmission line is approximately 7.2 miles in length.
- Kentucky Utilities rebuilds the Alcade-Elihu 161kV transmission line. This transmission line is approximately 2.95 miles in length.
- Kentucky Utilities to expand the Alcade 161kV substation for the new 161kV transmission line exit to Cooper Substation.
- Kentucky Utilities to construct a 345kV bus at the Alcade Substation and installed and second Alcade 345/161kV transformer.

7.3.13 Miscellaneous Directs

Miscellaneous Directs include the following estimated costs:

- Subcontractor indirect costs, including mobilization, construction management, construction facilities, home office costs, and performance and payment (P&P) bonds.
- Craft per diem: The estimate was based on tradesmen and professional staff all receiving a per diem of $120/day.
- Scaffolding for all craft

- Large crane rental and other equipment rental and tool management
- Start-up craft support: Craft labor required for all start-up activities
- Start-up subcontracts

7.4 Indirect Cost Estimate Basis

The following methods were used for indirects:

- The construction management, startup management, and construction indirects were estimated based on the project field staffing plan, the project execution schedule, and project historical indirect costs. Construction management includes field engineering cost. Also included are the construction management staff expenses including travel, living expenses, site offices, and a technology fee.
- Engineering costs are based on the staffing plan required for detailed design, procurement support, and project management from the office. The engineering estimate includes expenses for site travel, lodging and a technology fee.
- Construction permits, including electrical and building permits, are not included.
- It is assumed builders risk insurance is provided by Owner (included in Owner Costs).

7.4.1 Taxes

Sales and use tax are not included in the estimate.

7.4.2 Construction Labor Basis

The estimate was developed on the basis of using a mix of local labor and travelers and compared/confirmed using subcontractor pricing.

7.4.2.1 Labor Wage Rates & Expenses

Wage rates were taken from building trade contracts through 2024 for the area and compared against budgetary pricing received for each scope of work. The wage rates include wages, fringes, general liability and workers compensation insurance and overtime. The wages range from $55 – $85 / hour inclusive.

7.4.2.2 Work Hours

The estimate assumes construction shifts are 50-hour work weeks with anything over 40 hours as premium time at 1.5 times the base wage rate to attract labor.

Startup shifts are assumed to be 60-hour work weeks (6 days at 10-hours/day) for the first 8 months, then increase to 84-hour weeks (7 days at 12-hours/day) for the remainder of the Startup period (approximately 8 months).

7.4.2.3 Labor Housing

The estimate is based on housing being available in the Project area (trailer parks, camp grounds, local housing, and local hotels).

7.4.2.4 Labor Per Diem

Craft per diem is included in Miscellaneous Direct costs.

7.4.2.5 Retention Plan

Subcontractors will manage the labor turnover. No funds were added to the estimate for excessive labor turnover rate.

7.4.3 Escalation

Escalation has not been included in the capital cost estimate, but estimated escalation is shown as an estimated value for EKPC's review in the cost summary in Appendix R.

7.4.4 Project Contingency

Contingency was included to cover accuracy of pricing, commodity estimates, and omissions from the defined project scope. Typically, the level of contingency is set by the amount of scope definition provided, the amount of engineering and estimating conducted prior to providing cost certainty on the project price, and the amount of risk born by the installing subcontractors (performance, schedule, scope, payment, etc.). This contingency is not intended to cover changes in the general project scope (i.e. addition of buildings, addition of redundant equipment, addition of systems, etc.) nor major shifts in market conditions that could result in significant increases in contractor margins, major shortages of qualified labor, significant increases in escalation, or major changes in the cost of money (interest rate on loans). Deviations that may cause the project costs to exceed the estimated costs inclusive of contingency include excessive inflation (>3%), extreme high demand for major equipment due to proposed regulations, extreme shortage of qualified labor, extreme shortage of qualified construction contractors, change in contracting approach, and other similar changes. A 10% contingency was included based on the level of project scoping and engineering completed during the PSR.

Owner's contingency has been excluded from project contingency and is included as a part of Owner's costs.

7.4.5 Owner's Costs & Contingency

Owner's costs as provided by EKPC are included in the estimate. Appendix R includes a buildup of the Owner's cost. These costs generally include Owner's project development and management staff, operations and startup personnel, temporary utilities used during construction, permitting and licensing fees, site upgrades to support the project, initial consumable fill costs and startup costs, site security, off-site and onsite transmission upgrades including switchyard modifications, spare parts, permanent equipment and furnishings for the new buildings, Builder's Risk insurance, and Owner's contingency. Owner's cost contingency of ten percent was included for all Owner's costs except transmission network upgrade projects, per EKPC's direction. These are also listed in Table 7-1.

7.5 Risk Analysis

A project risk matrix was developed to highlight potential risks to the project as well as assumed mitigation. Project risks which can affect scope, schedule, budget, safety, or quality can be subdivided into four categories which include permitting/regulatory/miscellaneous risks, design/engineering risks, procurement risks, and construction/startup risks. Each risk category is listed below for consideration with some key risks identified. The complete risk matrix is included in Appendix P. Major risks include delay in RUS approval, transmission upgrade projects delayed, labor uncertainty, late equipment delivery, adverse weather conditions, etc. The risk matrix is shown in Appendix P.

7.5.1 Permitting/Regulatory/Miscellaneous Risks

Several permitting and regulatory risks identified include the following:

- Air permitting taking longer than expected. Although EKPC and BMcD have considered general rule of thumb durations for the major air permit applications and processes, ultimately these timelines are controlled by the permitted authorities and can vary dramatically by State or Individual.
- RUS approval takes longer than expected. If RUS approval occurs later than expected, then the project completion date will be delayed since the start of construction is tied to RUS approval.
- PJM interconnect review process and approval taking longer than expected. There is over one- and one-half years of schedule float between the expected PJM interconnect approval date and anticipated back feed date. Therefore, a delay in this approval likely has a low risk of impacting back feed and startup. However, it could impact the schedule for procuring transmission equipment and completing network upgrade projects.

- Gas pipeline FERC approval is delayed. A delay in the approval could delay RUS approval and delay gas being available at the plant. However, there are currently multiple years of schedule float between this activity and when the units will reach first fire.

7.5.2 Design/Engineering Risks

Several design and engineering risks identified include the following:

- Lack of detailed subsurface data under the existing coal pile. Although the project did complete a preliminary subsurface report and reviewed test borings around the perimeter of the coal pile, a more thorough investigation will need to be completed to confirm soil variability, depth of bedrock, and locations of karst. For the purpose of the project scoping report (PSR), the few test borings completed for this Project were assumed to be representative across the entire coal pile area. The findings from these borings were used to estimate an average depth to bedrock for micro pile length and an allowance for flowable fill for karst formations that are anticipated (to an unknown extent) throughout the site. A more comprehensive subsurface investigation will be completed prior to the start of detailed design.
- Coal pile and coal pond removal and remediation. The project scope and cost estimate include an allowance for removal of coal material from 1 foot above grade to 4 feet below grade across the area of the existing coal pile that will be impacted by the project. It is unknown at the time of this report development whether there will be additional depth and/or area impacted by coal material that will need to be removed. It is also unknown at the time of this report development whether remediation or additional work will be required to adequately remove coal material prior to the construction of the Project. These will be determined during the coal pile removal.
- Transportation study. Transportation studies will be needed to confirm what impacts are associated with being able to deliver the Equipment to site.
- Scope/design changes or scope gaps not identified during the PSR. Any design or scope changes could impact project costs and may affect multiple systems throughout the project. Additionally, should any scope gaps become apparent during detailed design, these could impact project cost and schedule to properly incorporate. For example, the assumed location for the gas pipeline metering and regulating station (as depicted in Appendix E general arrangement) should be confirmed to align with the gas pipeline contractor's location. If the actual location changes, it will impact the costs for this Project.

7.5.3 Procurement Risks

Some key procurement risks include:

- Late major equipment award or design changes. Key design deliverables are based on receiving certain submittals and input data from the major equipment and will be delayed if these contracts are awarded late. In addition, late design changes by these manufacturers will have ripple effects on the BOP design that could affect the project schedule and cost. Finally, late award or design changes could affect scheduled delivery dates, which would impact the construction schedule.

- Price escalation for equipment. As the anticipated commercial operational date (COD) is not until 2030, the long project development and permitting schedule will make it more difficult to lock in equipment costs early which increases the risk of price escalation.

7.5.4 Construction/Startup Risks

Several construction and startup related risks to consider are:

- Wage rate increases and/or labor issues with contractors. Similar to equipment price escalation, due to the long project duration local wage rate increases are very possible. Additionally, the local labor pool may be affected by other capital projects in the area which are out of EKPC's control.

- Change in construction sequence due to engineering changes or late equipment deliveries. Design changes or late equipment deliveries may force the construction team to revise sequences to less favorable activities which may impact costs or schedule.

- Lack of commodity materials or price escalation. Commodity prices and lead time can be affected by other projects in the region outside of EKPC's control which can impact project schedule or costs.

- Equipment/systems does not operate as designed or needs to be repaired/replaced. Equipment malfunctioning or systems not behaving as expected can delay startup as these issues are troubleshot to resolve. Lack of timely vendor corrections to improperly performing equipment can negatively impact the project schedule.

- Flushing, cleaning, or steam blows take longer than expected. A host of variables such as pipe manufacturing, proper storage and handling, and quality of installation can affect the speed and efficiency of cleaning out the various systems to prepare for operation. In addition, some equipment vendors have very strict cleanliness requirements and procedures which must be

followed and approved by the vendor's field representatives prior to proceeding to the subsequent steps.

7.6 Cash Flow

A cash flow based on the Project schedule, contracting approach, and the cost estimate was developed and is included in Appendix S.

7.7 Operations & Maintenance Estimates

The following is a summary of the non-fuel fixed and variable O&M cost estimates for the Plant in 2024 dollars. Unless noted, the costs are based on the annual average plant output. A more detailed summary of these costs is included in Appendix T.

- Annual Fixed Operating Costs: $7.0 / kW-yr
- Levelized CTG Major Maintenance Costs: $1.60 / MWh
- Non-Fuel Variable Operating Costs (excluding CTG major maintenance): $1.70 / MWh
- Incremental Evaporative Cooler Operation Cost: $0.45 / Incremental Evap MWh

O&M costs are based upon the assumptions included in the following paragraphs.

7.7.1 Plant Operation & Fuel

O&M estimates are based upon the plant operating at average ambient output conditions. The incremental evaporative cooler operation cost is based on the annual maximum condition and may vary with ambient condition. No consideration has been included for part load operation which would increase the O&M costs. O&M costs also exclude emission allowance costs and operational fuel costs. O&M costs are based on natural gas operation 70% of the year and fuel oil operation 5% of the year for a total annual capacity factor of 75%.

7.7.2 Plant Staffing

The major fixed operating cost is the expected staffing for the Plant. This cost equates to approximately $3,080,000 per year for the staff of 28. Average staffing cost is assumed to be $110,000 per person per year.

7.7.3 Other Fixed O&M Costs

Additional fixed O&M costs include office and administration costs for additional staffing as required to support dispatching, budgeting and other management duties, labor indirect costs (i.e. employee training, safety, phones and other communications, computers, software, supplies, uniforms, travel, mileage, shipping, and similar expenses, environmental monitoring and annual permitting costs, buildings and

grounds maintenance, and control room and lab expenses). These costs also include warehouse equipment, fire system testing, and unplanned maintenance work. Fixed O&M costs also include standby energy costs to supply essential service power for lighting, controls systems, and turning gears during periods of plant downtime for outages.

7.7.4 Levelized Combustion Turbine Major Maintenance Costs

Levelized combustion turbine major maintenance costs are estimated based on the LTSA negotiated with the CTG manufacturer or third-party and these costs are based on in-house information and similar project pricing. The estimated CTG major maintenance costs include mobilization fees, monthly fixed fees, and variable fees to cover expenses for hot gas paths and major inspections at the required intervals. Major maintenance for frame combustion turbines will be dependent on operating hours per start and number of starts. A factor may be applied for operation on fuel oil. If there are more than approximately 25 operating hours per start, the maintenance may be hours based (i.e. the milestones for an inspection will be reached based on operating hours calculations rather than start quantities). If there are less than approximately 25 operating hours per start, the maintenance may be starts based. This study assumes that the plant will be a starts-based facility. Appendix T provides the estimated major maintenance costs for the facility.

7.7.5 Variable Operating Costs

Variable operating cost estimates include costs that vary with operation of the Plant including the following:

- Water consumption costs
- Steam cycle make-up water treatment costs
- Steam cycle chemical costs
- Cooling tower make-up water treatment costs
- Routine maintenance of equipment (excluding costs associated with the CTG major maintenance)
- Ammonia consumption costs (based on cost provided by EKPC - $380/ton)
- SCR and CO/VOC catalyst replacement

7.7.6 Water Treatment and Wastewater Discharge

O&M costs include costs for chemicals for the reverse osmosis operation and demineralized water treatment. O&M costs assume the wastewater will be discharged to the permitted outfalls. Wastewater treatment costs are not included.

7.7.7 Qualifications

BMcD's estimates, analysis, and recommendations contained in this report are based on professional experience, qualifications, and judgment. BMcD has no control over weather; cost and availability of labor, material, and equipment; labor productivity; energy or commodity pricing; demand or usage; population demographics; market conditions; changes in technology; and other economic or political factors affecting such estimates, analysis, and recommendations. Therefore, BMcD makes no guarantee or warranty (actual, expressed, or implied) that actual results will not vary, perhaps significantly, from the estimates, analysis, and recommendations contained herein.

8.0 CONCLUSIONS AND RECOMMENDATIONS

8.3 Conclusions

BMcD recommends EKPC utilize the information presented in this report to evaluate the Project for approval and further development. If EKPC approves the Project, then BMcD recommends EKPC proceed/continue with necessary project execution activities in order to meet a desired Commercial Operation date as determined by EKPC. BMcD recommends EKPC consider the following activities to support the project schedule:

1. Develop major commercial terms for project procurements and subcontracts.
2. Finalize natural gas pipeline design and permitting requirements, drawings, costs and negotiate firm gas contract.
3. Monitor long lead equipment lead-times and consider when to reserve long lead equipment.
4. Refine civil and structural preliminary design based on final geotechnical recommendations.
5. Prioritize the preparation of air permitting and RUS NEPA EA applications and support of natural gas pipeline FERC processes.
6. Submit CPCN advance notice.

Appendix A - SITE DESIGN CONDITIONS AND CODES & STANDARDS

SECTION 1.1 –DESIGN DATA

1.01 SUMMARY:

A. This Section summarizes the design criteria and parameters for the Cooper 2x1 Combined Cycle Station. Supplier shall use these criteria to develop the detailed design necessary to furnish Equipment and Materials in accordance with the technical Specifications included in the Contract Documents and to meet the specified performance.

B. The Materials specified in the technical Specifications are the minimum requirements and are not intended to limit to a single design approach. Supplier shall provide higher grade Materials where required to provide the specified service life.

C. Supplier shall provide Submittals sealed by a Professional Engineer, registered in the Commonwealth of Kentucky, as required by statute. This shall include, but is not limited to, structural drawings, calculations, and loads as required by Kentucky Building Code-2018.

1.02 SITE SPECIFIC DATA:

A. This Section includes the basic Site/Project information and certain design criteria applicable to the Project. This information is general in nature and may be additionally defined within the Specifications. Where additionally defined or specified within the Specifications, the Specification criteria shall control. If additional specific information regarding the Site is required, Supplier shall obtain such information from Engineer.

B. Building Code of Record: All Work shall be in accordance with the Kentucky Building Code – 2018 including all appendices, amendments, reference standard(s), and the following:

1. Wind Design: Per Kentucky Building Code – 2018 and the following:
   a. Vult = 120 mph Basic Ground Wind Speed at 33 feet above ground (3-second gust) for Risk Category III and IV Building and other Structures.
   b. $I_W = 1.00$.
   c. Exposure C.
   d. No wind shielding shall be considered.
   e. Design to include Topographic K_{zt} and Directionality K_d Factors as applicable per code.
   f. Structures and equipment to be permanently located indoors shall be designed for no less than a 5 psf 'wind' load.
2. Snow Design: Per Kentucky Building Code – 2018 and the following:
   a. Ground snow load = 15 PSF.
   b. $I_S = 1.1$.
   c. Design to include Exposure C_e and Thermal C_t Factors as applicable per code.
   d. Design to include drifting increases when applicable due to adjacent structures.
   e. Include rain-on-snow load increase for 'roof' areas sloped less than ½ inch per foot.
3. Ice Loads: Per Kentucky Building Code – 2018 and the following:
   a. Nominal Ice Thickness $t = 0.75$ in.
   b. Concurrent Wind Speed $V_c = 30$ mph
   c. $I_i = 1.25$.
   d. $I_W = 1.00$.
4. Seismic Design: Per Kentucky Building Code – 2018 and the following:
   a. Seismic Importance Factor $I_E = 1.25$.
   b. Mapped Spectral Accelerations:
      (1) Short Period $S_S = 0.200$ g, $S_{DS} = 0.16$ g
      (2) 1-second Period $S_1 = 0.100$ g, $S_{D1} = 0.113$ g
   c. Site Class C.
5. Structures and Equipment shall be considered as Occupancy Category III.

C. Site Conditions:
1. Elevation:
   a. Approximately 825 ft above mean sea level (MSL).
2. Unless otherwise noted, criteria referenced below is based on ASHRAE 2021 edition of climatic data for Lake Cumberland, KY (Station #724354).
3. Plant Site Frost Depth: Per Kentucky Building Code – 2018, a minimum depth of 24 in. or erecting on solid rock.
4. Precipitation:
   a. Average Annual Rainfall: 51 inches.
   b. Design Storm (24-hour, 10-year): NOAA Atlas 14

Duration	1-year Return Period	10-year Return Period	25-year Return Period	100-year Return Period
24-hour	2.63 inches	4.37 inches	5.14 inches	6.42 inches
6-hour	1.79 inches	2.98 inches	3.55 inches	4.52 inches
1-hour	1.15 inches	1.97 inches	2.33 inches	3.13 inches*

* Includes KHBC Revisions

5. HVAC Outdoor Design Temperatures:

HVAC Design Conditions						
Location	Lake Cumberland, KY		2021 ASHRAE Weather Station (WMO#)			724354
Ambient Design Conditions						
Summer (F)		Winter (F)		50 Year Extreme Conditions (F)		
0.4%, DB/MCWB	1%, DB/MCWB	99.6%, DB	99%, DB	Min, DB	Max, DB	Max, WB
93.2/74.2	90.8/73.6	11.8	17.7	-20	108.2	84.0

6. HVAC Indoor Design Conditions-See table below:

Building/Area	**Indoor Temperature**		**Humidity Control (%RH)**	**Room Ventilation Rate (ACH)**	**Filtration Efficiency (%)**	**Pressurization Requirement**	**Redundancy**	**Noise Criteria**	**Design Outdoor Cooling/ Heating (DB)**
	Max (ºF)	Min (ºF)							
STG Building	Notes 1,5	45	None	Based on 10°F rise	None	None	Multiplicity	<85 dBA	0.4%/99.6%
Admin Building	78	70	30 to 65	ASHRAE 62-1	ASHRAE 62-1	Positive	None	NC 40	1%/99%
Warehouse/Maint. Shop	Notes 1,5	65	None	15	None	None	None	<85 dBA	1%/99%
Water Treatment Building	Notes 1,5	60	None	10	None	None	None	<85 dBA	0.4%/99.6%
Construction Warehouse	Notes 1,5	65	None	15	None	None	None	<85 dBA	1%/99%
Electrical Equipment Rooms (Admin Bldg., Main GT Electrical Bldg., Water Treatment Electrical Room, Cooling Tower PCM)	80	60	30 to 65	ASHRAE 62-1	ASHRAE 62-1	None	Multiplicity	<85 dBA	1%/99%

Notes:

1. Indoor maximum temperature is the resultant temperature: Design Outdoor temperature plus 10°F.
2. Gaseous equipment areas, such as gas chlorine if used, shall include design requirements to assure personnel safety.
3. Equipment will exceed a near field sound pressure level of 85 dBA within enclosure.
4. Ventilation shall be as required to meet maximum indoor temperature.
5. Indoor electrical equipment will be designed for a maximum temperature of 104°F.

D. Freeze protection design conditions: -20˚F with 20 mph coincident wind.

E. Noise control: All Equipment provided by Supplier shall be designed to comply with an average near-field noise requirement of 85 dBA measured 3 feet horizontally from the base of the equipment and 5 feet above floor level or personnel platform. Testing shall be performed in accordance with ASME PTC-36. In addition, provide octave band sound levels for each piece of Equipment furnished for Owner and Engineer review.

F. Source Water Quality

1. Cumberland Lake Water

Constituent (mg/l unless noted otherwise)	Minimum	Maximum	Average
pH, Std Units	6.2	9.2	7.2
Conductivity, uS/cm	105	380	198
Total Suspended Solids, mg/l	0.7	59	5.2
Total Dissolved Solids, mg/l	132	235	134
Sodium	2.05	20	7.6
Calcium	9.3	26	20.2
Magnesium	3.2	11.5	7.2
Manganese, mg/l	0.0002	2.4	0.2
Copper, mg/l	0.0002	0.0017	0.0008
Iron	0.007	2.5	0.2
Alkalinity, as CaCO3	32	86	57.5
Chloride	1.76	5.4	3.9
Total Sulfur, as SO4	6.2	74	37.7
Silica (SiO2) (1)	unknown	unknown	unknown

1) Silica is believed to be < 15 mg/l based on analyses balance versus total dissolved solids.

1.03 UTILITIES:

A. Water Source:

SERVICE	SUPPLY	PRESSURE	TEMP
Plant Service Water	Lake Cumberland, clarified and filtered	80 - 150 psig	40-100 °F

B. Compressed Air:

SERVICE	DEW POINT	PRESSURE	MAX. TEMP
Service Air	-40 °F	60 - 110 psig	125 °F
Instrument Air	-40 °F	60 - 110 psig	125 °F

C. Electrical Power:

VOLTAGE	PHASE	FREQUENCY HZ	USER
6,900 V	3	60	Motors (201 HP and Larger)
480 V	3	60	Motors (½ < HP ≤ 200)
120 V	1	60	Motors (≤ ½ HP)
120 V	1	60	Instrumentation
480 V	3	60	Welding Receptacles
208 V / 120 V	3	60	General Service / Lighting
120 V	1	60	Convenience receptacles
24 VDC	-	-	Controls – Digital Input
125 VDC	-	-	DC Power Supply

1.04 FUEL OIL SUPPLY:

A. Backup fuel: Ultra Low Sulphur Diesel

PRODUCT SPECIFICATIONS

3.23.1 SPECIFICATIONS FOR FUNGIBLE 15 ppm SULFUR DIESEL FUEL GRADE 62

EPA Designation: MVNRLM, Motor vehicle diesel fuel, 15 ppm sulfur

Cancels Previous Issues of Grade 62

PRODUCT PROPERTY	ASTM Test Method	Test Results Minimum	Maximum	Note
Gravity API	D4052	30		
Flash Point, °F				
Pensky-Martin	D93	130		
Physical Distillation, °C(°F)	D86			[W]~~5~~4
50%			Report	
90%		282(540)	338(640)	
End Point			366(690)	
or Simulated Distillation, °C(°F)	D2887			[W]~~5~~4
50% recovered			Report	
90% recovered		300(572)	356(673)	
End Point			421(790)	
Color ASTM	D6045		2.5	
Color Visual		Undyed		
Viscosity, cSt @ 40°C (104°F)	D445	1.9	4.1	
Pour Point	D97			2
Cloud Point	D2500			2

Corrosion, 3 hrs. @ 50°C (122°F)	D130		1		
Total Sulfur, ppmwt	D5453		11	Origin	3
			14	Delivery	
Cetane Number	D613	40			[C]4
Aromatics (Volume %)	D1319		31.7		
or Aromatics by Cetane Index	D976	40			
Ash, wt.%	D482		0.01		
Carbon Residue: Ramsbottom on 10% Bottom	D524		0.35		
BS&W, vol.%	D2709 or equivalent		< 0.05		
Thermal stability, 90 minutes 150°CPad rating, DuPont scale			7		
OR					
Thermal stability	D6468				
Y/Green		73%			
W Unit		65%			
OR					
Oxidation stability, mg/100 ml	D2274		2.5		
Haze rating @ 25°C (77°F)	D4176 Procedure 2		2		
Nace Corrosion	TM0172	B+ (Origin)			
Electrical Conductivity, pS/m @ 21°C(70°F)	D2624		250		

1.05 GENERAL EQUIPMENT DESIGN CRITERIA:

A. Equipment shall be designed for an service life of not less than 30 years.

B. Equipment and components located outdoors or exposed to outdoor temperatures shall be designed for operation and start up under cold temperature conditions down to the site extreme ambient minimum dry bulb temperature. This shall include protection of temperature sensitive electrical components. Pressure piping, vessels, valves, or other pressure components located outdoors shall be designed to meet the minimum outdoor design temperature without the need for reliance on heat tracing. This may require using ASTM A-333 and selecting valves suitable for cold weather service. Consideration for low temperature service shall be given to all design aspects, including all steel, selection of gaskets and seals, drainage of condensate, as well as ensuring materials are of sufficient ductility.

C. All equipment and materials shall be assembled at the factory prior to shipment to the fullest extent practical. Equipment shall be skid mounted on common skids with interconnecting piping and control wiring to the extent allowed within shipping constraints.

D. All Equipment and Materials for the Project shall comply with the Occupational Safety and Health Administration (OSHA) Regulations and Standards 29CFR1910. If conflicts between Kentucky Building – 2018 and OSHA occur, Kentucky Building Code – 2018 shall control. All Work performed on Site shall comply with OSHA Regulations and Standards 29CFR1926 and 29CFR1926 Subpart R, and Kentucky OSHA Regulations and Standards.

E. All Work shall be in compliance with local, county, state, federal regulations, codes, standards, laws, and ordinances.

F. Asbestos and lead containing material is strictly prohibited in the Equipment furnished under this Contract.

G. Coating/Painting: Unless specified more explicitly in the technical Specifications, all equipment and maufactured components (valves, instruments, electrical cabinets, etc.) shall be factory finished with manufacturer's standard coating system suitable for the intended final

service conditions and environment without need for any additional field painting. All exterior and interior structural steel shall be hot dip galvanized.

H. Standards of Design and Workmanship:
   1. The finished Work and/or product shall be complete in all respects. All hardware shall be manufactured, fabricated, assembled, finished, and documented with the workmanship of the highest quality throughout, and all of the components shall be new.
   2. The Work shall be carried out in accordance with best recognized practices and customary industry quality unless otherwise specified within the technical sections of this specification.

1.06 STRUCTURAL DESIGN CRITERIA:

A. General design methods and materials:
   1. Design and engineering for structures shall be performed under the supervision of a professional engineer licensed in the Commonwealth of Kentucky. Drawings and specifications shall be sealed.
   2. Structures or components from an off-site manufacturing facility per Kentucky Revised Statute (KRS) 198B, if applicable, shall comply with the Kentucky Industrialized Building Systems (KIBS) program.
   3. Engineer of Record requirements:
      a. Supplier responsible for the design of various structures and foundations is defined as the Engineer of Record (EOR) for these structures.
         (1) Determine locations and layout of structures as required to support new Equipment, piping, electrical conduit, or other items which are included in the scope or work.
         (2) Design new structures, Equipment supports, piping and utility supports, for all items included in the scope of Work.
         (3) Design of all structures shall be in accordance with the Building Code of Record.
   4. Building Code and structural loading:
      a. Kentucky Building Code - 2018.
      b. Design loads
         (1) Wind, seismic, ice, and snow loading criteria are specified in ARTICLE 1.02, Site Specific Data, above.
         (2) Area live loads shall be in accordance with the Building Code of Record or the following loads, with the larger load controlling.
            (a) Grating floors and walkways 100 psf
            (b) Stairs and landings 100 psf
            (c) Checkered plate floor areas 100 psf
            (d) Ground floor 300 psf and fork lift
         (3) Weights and operating loads from Equipment shall be based on shop drawings received from the respective Equipment vendor.

B. Steel:
   1. Structural steel and miscellaneous steel shall be designed in accordance with the Building Code of Record and the American Institute of Steel Construction (AISC) Steel Construction Manual.
   2. Loading to pipe rack support structures shall include horizontal and vertical thrust loads from piping, thermal loads, piping contents, all loads determined from analysis of the piping, and environmental loads as prescribed by the Building Code of Record.

C. Design Information:
   1. Supplier shall furnish load data for each column or interface point to foundations for each load condition. The load data shall be broken down into components due to each

individual load applied to the structure; i.e. dead load, live load, seismic, wind, snow, thermal expansion, internal pressure, ash, etc., at each column baseplate or connection point. In addition, provide both the maximum and minimum vertical values and the horizontal forces for each loading condition, which must be considered simultaneously. Direction or sensibility of each load shall be graphically defined. The load data shall be presented in such a manner as to clearly show which loads occur simultaneously at the various columns or support locations. Loads submitted shall be service loads only, without a safety factor or overstress factor applied.

2. Include size of column base plates, anchor bolt requirements such as quantity, spacing, diameter, projection length, sleeve requirements, shear key dimensions, and any other data required for foundation design.
3. Drawings shall show details of all points where connections external to equipment must be made, including ductwork connections.
4. Drawing shall show layout and details as required for all access platforms, stairs, ladders and handrails.

D. Piping and cable tray corridors shall be mutally agreed upon.
   1. Cable tray supports shall be designed for 200 lb/ft loading per layer of cable tray, unless stated otherwise.

1.07 PERSONNEL AND MAINTENANCE ACCESS REQUIREMENTS:

A. Personnel Access Requirements:
   1. General:
      a. Head room shall be a minimum of 7'-0" clear including adequate allowance for installation of piping, conduit, and lighting fixtures.
      b. Operating platforms and access walkways shall be not less than 4’-0” in width.
      c. Stairs shall not be less than 3'-0" in width.
      d. Avoid dead ends in platforms. Provide emergency escape ladders from any platform for which dead ends cannot be avoided in compliance with Kentucky Building Code – 2018.
      e. Access platforms shall be provided at elevations where equipment needing regular maintenance is located.
      f. For all enclosures, in addition to clearances required for maintenance and removal, there shall be a minimum clearance of 3’-0” between equipment and structural wall member and between any two separate pieces of equipment.
      g. Arrange structural steel columns such that when the steel girts and metal panel walls are applied to the outside face of the columns all platforms, stairs, walkways, and unit auxiliaries, drives, piping, and other items are totally enclosed with specified walkway space provided between wall and all parts of the units where access is required. No projections or cutouts will be permitted in the metal panel walls except for duct openings through the walls and as required for cable trays, pipes, conduits, doors, and louvers.
      h. All ladders shall have a self-closing safety gate at the top.
   2. Class 1: Regularly attended, daily or weekly operation and maintenance, areas shall have access walkways and operating platforms which are fully accessible by stairs. Access walkways and stairs shall be in accordance with the following:
      a. Provide access (minimum 3’-0”) to walk around all sides of Equipment requiring periodic inspection or maintenance.
      b. Access platforms shall be of adequate size to permit two people to work (12 square feet minimum).
      c. Provide platforms if Equipment component requiring inspection or periodic maintenance is more than 6’-0” above standing surface.

d. Access areas will have platforms which are fully accessible by stairs. Ladders, ships' ladders, or trap doors for access shall not be permitted unless approved by Owner.

3. Class 2: Periodically attended monthly access areas for operation and maintenance shall have access walkways and platforms which are accessible by stairs or access ladders. Access platforms, maintenance access walkways and ladders shall be in accordance with the following:
   a. Provide access, minimum 2'-6", to walk around all sides of Equipment requiring periodic inspection or maintenance
   b. Access platforms shall be of adequate size to permit two people to work, 12 square feet minimum.
   c. Ladders, where approved by Owner, shall have a minimum width of 1'-6", minimum rung diameter of 3/4-inch, rungs spaced 12 inches on centers, and 3/8-inch by 2-1/2-inch minimum side rails. Ladders shall be of steel construction.
4. Class 3: Maintenance access areas, where access is only required for painting, re-insulation, or replacement of components which have a service life of 10 years or more, shall be met by providing facilities to enable Owner to access with portable lifts (preferred) or erect scaffolding, temporary ladders, platforms, and safety nets to safely perform the work involved. Supplier shall obtain owner approval on any such areas that are not accessible by portable lifts.

B. Existing Equipment and structures may not comply with the provisions below. New Equipment and structures shall comply with the provisions below except as noted.
   1. Access ways: Unless otherwise approved by Owner, provide horizontal and vertical access ways which allow all Equipment to be removed for maintenance or replacement without affecting adjacent Equipment or requiring Equipment to be lifted over other plant Equipment for removal.
   2. Monorails and trolleys: For Equipment (including valves and pipe spools) in excess of 100 lb, there shall either be a monorail, hoist, or rated structural beam provided for removal of the equipment, valves, and/or pipe spools or shall have sufficient space for removal via a hydraulic crane (or similar).

PART 2 - PRODUCTS - NOT APPLICABLE.

PART 3 - EXECUTION – NOT APPLICABLE.

END OF APPENDIX 01 11 00-A

APPENDIX B - SCOPE MATRIX

East Kentucky Power Cooperative
Cooper 2x1 Combined Cycle
Scope Assumptions Matrix

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	Description	Y/N	Number	% Capacity (per Unit)	Notes
GENERAL PROJECT INFORMATION					
Project Description		-	-	-	New 2x1 dual fuel combined cycle combustion turbine power plant consisting of two (2) advanced F-class combustion turbines (CTGs), two (2) heat recovery steam generators (HRSGs), a single condensing steam turbine generator (STG), and a cooling tower. The new STG, auxiliary boiler, and associated auxiliary equipment will be located indoors. The new CTGs, HRSGs, and associated auxiliary equipment will be located outdoors.
	Project Location	-	-	-	Pulaski County, KY.
	Site Description	-	-	-	Existing brownfield site at Cooper Power Station. The new units will be east of existing units on top of existing coal pile. New units will be Unit 3 and Unit 4 for combustion turbines, and Unit 5 for the steam turbine. Plant elevation is 827.5 ft msl.
	Design Fuel	-	-	-	New natural gas pipeline routed to site with fuel oil backup (ultra low sulfur diesel). Equipment layout might have space for future hydrogen blending.
	Heat Rejection	-	-	-	New wet counterflow, mechanical draft cooling tower
	Operation	-	-	-	Baseloaded with outages for maintenance
	Capacity Factor	-	-	-	75% to 90%
	Contracting Approach	-	-	-	Multi-prime.
	Labor	-	-	-	Union or Non-Union.
	Project Liquidated Damages	-	-	-	Schedule and performance for each contract.
	Project Bonding /LOC	-	-	-	100% Bonding.
	Project COD Dates	-	-	-	2030
	Project Expansion	-	-	-	None considered
MECHANICAL SYSTEMS/EQUIPMENT					
CTG (Combined Cycle)					
	Turbine	Y	2	100%	Dual fuel rated (natural gas and ULSD) F-class combustion turbine generators provided with inlet evaporative coolers, inlet silencers, air filtration systems, low NOx combustors, lube oil systems, hydraulic oil systems, starting systems, acoustical weather enclosures with HVAC, controls, fire protection and fuel systems
	Generator	Y	2	100%	TEWAC sized per the manufacturer's standards for maximum expected turbine output as a minimum with a 0.85 power factor capability.
	Normal Start	Y			
	Rapid Start	N			
	Dual fuel	Y			Natural gas primary, with fuel oil (ULSD) as backup.
	Purge credit	Y			Purge on shutdown, per NFPA 85 Pressurized Pipe Section Method
	Inlet cooling	Y			Evaporative Cooling
	Inlet heating	Y			Compressor bleed heat from CTG.
	Inlet Filter	Y			Pulse filter with option for HEPA
	Inlet Silencing	Y			Scope based on standard inlet silencing levels. Additional silencing can be added (more cost) in detailed design if lower noise level is required.
	Diluent for NOx Control	Y			25 ppm (and performance) on fuel oil (based on Siemens 5000F)
	Steam Aug	N			
	Rotor Air Cooling / Kettle Boiler	Y			Kettle boiler for 5000F to produce IP steam and cool rotor air system.
STG					
	Turbine	Y	1	100%	Multi-stage, reheat, straight-condensing steam turbine including HP, reheat, and LP steam from HRSG's. Provided with stop and control valves, non-return valves, hydraulic control oil systems, lube oil systems, exhaust hood spray system, gland steam system including condenser with exhausters, turning gear, water induction prevention, and turbine control system with DCS interface. 1050F/1050F design main and reheat steam temperature, 2400 psia design throttle pressure.
	Generator	Y	1	100%	TEWAC sized per the manufacturer's standards for maximum expected turbine output as a minimum with a 0.85 power factor capability. H2 and CO2 systems not currently included.
	Ramp Rate				Manufacturer's standard
	Last stage blades				Not to exceed 40" class last stage blade, steel
	Best Heat Rate Operating Point				Unfired operation at average annual ambient condition
	Sliding pressure	Y			
	Full arc admission	Y			
HRSG					
	General	Y	2	100%	Triple pressure level, reheat, natural circulation type with horizontal gas turbine exhaust flow through vertical tube heat transfer sections. Includes SCR and CO/VOC catalysts. Self-supported stacks with ports for emission monitoring, platforms and ladder access. HRSG design to allow personnel to walk under HRSG. SU duration to be 1 hour (hot) to 5 hour (cold) to full plant load. Water chemistry controlled via continuous blowdown and chemical addition as required. One elevator at one HRSG included. Catwalk platform included between two HRSG units. Penthouse included for weather protection for outdoor installation.
	Uninhibited GTG Start	Y*			Included for uninhibited start to CTG MECL for hot and warm startup. Cold startup may require hold point(s) at low CTG load before uninhibited ramp to MECL.
	Rapid Start	N			Not included
	Duct firing	N			No duct firing
	Duct Burner Fuel	N/A			
	Purge credit	Y			Per NFPA 85 System 2
	Sky valves	Y			30% of base flow capacity and as required to prevent SRVs from lifting.
	Safety Relief Valves	Y			Drains to be heat traced/insulated, as required when outside building
	Silencers	Y			85dBA at nearest personnel platform for normal operating valves, 105 dBA for relief valves. 104 dBA exhaust stack silencers.
	Terminal point desuperheating	N			
	Sparging	Y			Fed from auxiliary boiler. Will be sized to keep HRSG drums warm to reduce startup times.

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	Description	Y/N	Number	% Capacity (per Unit)	Notes
	Preheater bypass	Y			If needed, controlled bypass to facilitate stack temperature control to a minimum exhaust gas exit temperature of the exhaust gas acid dewpoint + 15 deg. F (typically approx 170 F) for natural gas operation. Specifications will provide GTG exhaust and fuel gas analysis and request OEM explain their philosophy to avoid corrosion at all operating cases.
	Preheater construction	Y			If needed, Carbon Steel construction. P11 used for FAC areas.
	Preheater recirc pumps	Y			If needed, control condensate supply temperature to 140 deg. F. HRSG OEM dependent, but heat exchanger preferred over recirculation pumps.
	HP/IP/LP Drum Storage				3 minutes for normal start. Surge Volume: During startup, shutdown, and transients, the drums shall be adaquately sized such that the water level does not vary more than the range between 4" over low low alarm to 2" under high level alarm.
	Blowdown cascade	Y			As part of this system, provide a HP continuous blowdown that directs flow to the IP drum, then from the IP drum to the blowdown tank.
	SCR	Y			Catalyst life 4-5 yrs (or equivalent operating hours), space for spare layer for future installation of catalyst.
	Ammonia vaporizer	Y			Electric vaporizer located adjacent to HRSG.
	CO/VOC	Y			Catalyst life 4-5 yrs (or equivalent operating hours), space for spare layer for future installation of catalyst.
	Stack damper	Y			Insulated up to stack damper. Bypass stack not included.
AQUEOUES AMMONIA SYSTEM					
	Ammonia Flow Control Skid	Y	2	100%	One per HRSG.
	Ammonia Forwarding Pump Skid	Y	3	100%	One per HRSG plus common spare
	Ammonia Storage Tank	Y	1	100%	One tank for a total of 14 days storage (firing gas), assume 24 hrs per day, full load operation for sizing. Co-locate tank with existing storage tanks in existing containment.
	Ammonia Unloading Skid	Y	1	100%	
	SCR Ammonia Distribution Grid	Y	2	100%	One per HRSG.
	SCR Catalyst	Y	2	100%	One per HRSG.
	Detection	Y	2	-	Include at SCR distribution grids
AUXILIARY STEAM					
	Aux Steam Electric Superheater	Y	1	100%	
	Aux Boiler	Y	1	100%	Natural gas-fired for plant startup. Capacity: 45,000 lb/hr; 462 psig, Sat steam Aux boiler not dual-fuel rated.
	Aux Boiler Deaerator	Y	1	100%	
	Aux Boiler Blowdown Tank	Y	1	100%	
	Aux Boiler Forced Draft (FD) Fan	Y	1	100%	
	Aux Boiler Feedwater Pumps	Y	2	100%	
	Aux Boiler Sample Analysis Panel	Y	2	100%	
CIRCULATING WATER					
	Cooling Tower	Y	1	100%	Wet, mechanical draft counterflow, high efficiency/low fouling fill, FRP cooling tower on concrete basin. Each cell capable of isolation, single isolation valve. Include enclosed stairwells, bypass system. Low noise splash mats.
	Cooling Tower Fans	Y	9	100%	Fans to be VFD and reversible. Number of cells/fans varies by supplier. Low noise fans.
	Circulating Water Pumps	Y	3	50%	Vertical turbine, installed in cooling tower basin, each with its own segregated intake/pit. Spare pump allows for loss of one pump without impacting STG backpressure at higher ambient conditions.
	Aux Cooling Water Pump	Y	1	100%	Vertical turbine, installed in cooling tower basin, intake/pit segragated from circ water pumps. Sized to support CCW system while plant is offline and not economical to operate circulating water pumps.
	Cooling Tower Chem Feed Tanks	Y	2	100%	Chemicals as required based on source water quality
	Cooling Tower Chem Feed Skids	Y	5	100%	Each skid will have 2x100% or 3x50% redundancy. Chemicals as required based on source water quality.
CLOSED COOLING WATER (CCW)					
	CCW Heat Exchangers	Y	2	100%	Plate and frame. Option cost provided for shell & tube which may be selected later. Ball type cleaning system excluded.
	CCW Pumps	Y	2	100%	
	CCW Head Tank	Y	1	100%	
	Glycol type	Y	-	-	Propylene: 50 / 50
	CTG Cooler	Y	4	50%	2x50% per CTG
	CTG Lube Oil Cooler	Y	4	50%	2x50% per CTG
	BFP Heat Exchanger	Y	2	100%	
	HRSG Recirc Pump Heat Exchanger	Y	2	100%	
COMPRESSED AIR					
	System Type				Combined IA/SA with Central Governor for Control and Monitoring (or local regulation at service air bibs to preference instrument air if pressure in system pressure drops).
	Air Compressors	Y	3	50%	Air-Cooled, Oil-Free, Rotary Screw
	Air Dryer/Filters	Y	2	100%	Twin-Tower, Heatless Desiccant with pre- and after-filters
	Wet Air Receiver	Y	1	100%	
	Dry Air Receiver	Y	2	100%	One dry receiver for powerhouse with second receiver in water treatment building for filter press purge cycles
CONDENSATE SYSTEM					
	Condenser	Y	1	100%	Single shell, single pressure, dual pass, divided waterbox, self-deaerating, downward exhaust steam surface condenser with tube sheets, expansion joints, steam turbine bypass sparger tubes and hotwell sparger, baffles and distribution piping, and drains flash box. Supplied with vacuum pumps and recirc pumps. 304 stainless steel tubes. Tube cleaning system included.
	Hogging Operations	Y	2	100%	Mechanical, liquid ring vacuum pump(s) - hog to 6" HG. 2 ran for hogging
	Holding Operations	Y			Use one hogging vacuum pump for holding
	Condensate Pumps	Y	3	50%	Vertical can-type; No VFD
	Gland Steam Condenser	Y	1	100%	
CYCLE CHEMICAL FEED					

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	Description	Y/N	Number	% Capacity (per Unit)	Notes
	Ammonia/Amine System	Y	2	100%	
	Phosphate System	Y	6	50%	3x50% per HRSG
	Oxygen Scavenger System	Y	2	100%	Includes 2x100% feed pumps
DEMINERALIZED WATER SYSTEM					
	Demineralized Water Transfer Pumps	Y	2	100%	
	Demineralized Water Storage Tank	Y	1	100%	Field erected tank. Sizing based on steam cycle makeup and NOx water injection for 72 hours (while firing on fuel oil); Capacity: 1,500,000 gallons
	Reverse Osmosis (RO) Prefilters	Y	2	100%	
	Two-Pass RO Skids	Y	2	100%	Skids include booster pumps; Sizing based on 2x100% (both trains) operation provides makeup for Nox water injection and cycle makeup.
	Mixed Bed Deminerization System	Y	2	100%	
	Clean in Place (CIP) System	Y	1	100%	Includes tank, heater, cartridge filter and forwarding pump
	Chemical Dosing Skids	Y	9	100%	Each skid will have 2x100% or 3x50% redundancy. Chemicals as required based on source water quality.
	Chemical Tanks/Totes	Y	9	100%	Corrosive chemicals to be stored in tanks outdoors in separate containments. Non-corrosive chemicals to be stored in toted indoors.
FEEDWATER SYSTEM					
	Feedwater pumps	Y	4	100%	With interstage bleed and control valves. Designed for max flow during full load operation with both combustion turbines and full steam turbine bypass. 2x100% for each HRSG (100% capacity defined by max unfired demand with STG bypass); No VFD
FIRE PROTECTION					
	Design Basis	Y	-	-	NFPA 850 recommended practice.
	Insurer/special requirements	Y	-	-	FM Global
	CTG Fire Protection	Y	-	-	CO2 and alarm
	STG Fire Protection	Y			A Pre-action sprinkler system will be provided for STG bearing protection. A deluge spray system will be provided for STG lube oil storage tank and piping.
	Cooling Tower	Y	-	-	Hydrant protection
	Electrical Equipment Rooms / PCMs	Y	-	-	CO2 and alarm
	Pump supply source(s)	Y	2	100%	Electric motor and Diesel driven fire pump taking suction from the Service/Fire Water Storage Tank. Jockey pump to maintain header pressure and for small leaks.
	Storage	Y	1	100%	Combined Service/Fire Water Storage Tank fed from makeup water source
	Fire loop	Y	-	-	Standalone fire loop
	I&C Tech and Maintenance Building	Y			Wet pipe sprinkler system. Manual and fire alarm boxes. Per NFPA 13
	Administration Building	Y			Detectors and fused head sprinkler system (wet pipe). Per NFPA 13
	Control Room	Y			Detection only.
	CTG/HRSG Areas	Y			Standpipe and hose stations, gas detection and alarms
	Electrical Rooms	Y			Detection, HVAC shutdown
	Water Treatment Building	Y			Entire water treatment building will be sprinkled
	Ammonia	Y			Detection only.
	Transformer Sprinklers	Y	-	-	Firewall/separation, Deluge Spray Systems
	Foam System	N	-	-	
	Smoke/heat detectors	Y	-	-	Where necessary or recommended by NFPA
	Fire walls	Y	-	-	2-hr fire walls where required by NFPA
FUEL OIL					
	Storage Tanks	Y	2	50%	Field Erected tank sized for 72 hours of GT operation at full load. Additional tank capacity of 8 hours of continuous operation of backup diesel generator. Located within secondary containment structure
	Transfer Pumps	Y	3	100%	1 x 100% for each combustion turbine unit with 1 x 100% common spare located near fuel oil tank.
	Unloading Pumps	Y	3	100%	Two (2) truck unloading stations. 1 x 100% unloading pump for each unloading station with 1 x 100% common spare.
	Heating	Y	3	50%	3 x 50% inline electric heaters with recirculation system. Each heater sized for 50% of total plant fuel oil flow (all three units).
	Duplex Filter	Y	2	100%	One skid for each CTG (provided by CTG supplier)
	Meter	Y	2	100%	One for each CTG (provided by CTG supplier)
HVAC SYSTEMS					
	Building electric heaters, exhaust fans and intake louvers, air-conditioning	Y	-	100%	As required for occupied buildings and electrical rooms
MAKE-UP WATER					
	Supply Source	-	-	-	New makeup pumps fed from Cumberland Lake in Unit 2 intake. Existing clarifier does not have capacity.
	Clarified Water Transfer Pumps	Y	2	100%	
	Clarified Water Storage Tank	Y	1	100%	
	Clarified Water Ultra Filtration (UF) Filters	Y	2	100%	
	UF Backwash Tank	Y	1	100%	
	UF Backwash Pumps	Y	2	100%	
	Chemical Feed Pumps	Y	8	100%	Chemicals as required based on source water quality
	Chemical Tanks/Totes	Y	4	100%	
	Service/Fire Water Storage	Y	1	100%	Field erected tank, includes immersion heater(s) and insulation. Standpipe for dedicated fire water volume.
	Service Water Transfer Pumps	Y	2	100%	Service water will provide make-up to evaporative coolers.
NATURAL GAS					
	General	Y	-	-	New off-site natural gas pipeline routed to site by Owner. No gas chromatograph. Project scope does not account for potential Unit 2 gas conversion in gas piping routing and equipment sizing/location.
	Compression	N	-	-	Not required. Minimum supply pressure to site is 600 psig.
	Metering & Regulation	Y	-	-	Separate project for offsite gas pipeline will include M&R station.
	Dew Point Heating	Y	2	100%	1 x 100% per CTG. Natural gas fired dew point heaters
	Performance Heating	Y	2	100%	1 x 100% per CTG. Heated by IP feedwater when temperature is sufficient.
	Combustion Gas Turbine (CTG)	Y	2	50%	
	Fuel Gas Filter Separator	Y	2	100%	

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	Description	Y/N	Number	% Capacity (per Unit)	Notes
	Fuel Gas Metering Skid	Y	2	100%	
	Fuel Gas Pilot Fuel Filter Separator Skid	Y	2	100%	
	Fuel Gas Heater Skid	Y	2	100%	
	Fuel Gas Knockout Drum	Y	2	100%	
	Fuel Gas Filter Separator Skid	Y	1	100%	Supply gas filter separator and drains tank
	Fuel Gas Drains Tank	Y	2	100%	1x100% per CTG
	Building Heating	Y	-	-	Gas heating for STG building/Admin/Warehouse, and Aux Boiler room with electrical heating for smaller spaces.
POTABLE WATER					
	Supply Source	Y	-	-	City tap, assumes sufficient pressure and flow
	Water Treatment	N			
	Emergency Eye Wash/Safety Showers	Y	12	100%	
	Potable Water Heater Tanks	Y	5	100%	
SAMPLE ANALYSIS					
	Sample Analysis Panel	Y	1	100%	Sample cycle make-up, reclaim water supply, condensate pump discharge and after chemical feed, HRSG water and steam, BFP suction and discharge, and wastewater discharge
	Sample Analysis Cooler	Y	1	100%	
SANITARY SEWER					
	Sanitary Lift Station	Y	3	100%	Lift station includes 2x100% sewage pumps
	Sanitary Sewer Pumps	Y	2	100%	
	Bathrooms/Showers	Y	-	-	Bathrooms in Admin and Maintenance bldg. Showers in Maintenance bldg
	Sanitary Treatment Facility	N	-	-	All sanitary for new facility will be routed to a new leech field.
STEAM					
	STG Atmospheric Drains Tank	Y	1	100%	
	Turbine Gland Steam Condenser Module	Y	1	100%	
STEAM BYPASS					
	MS to CRH	Y	2		Full unfired flow
	HRH to condenser	Y	2		Full unfired flow
	LP to condenser	Y	2		Full unfired flow
WASTEWATER					
	Contaminated Wastewater	Y	-	-	Drains for areas around equipment that could be contaminated with oil will be directed through an oil/water separator.
	Oil/water Separator (OWS)	Y	2	100%	OWS includes 2x100% pumps. Effluent discharged to wastewater treatment system
	Plant Drains Sump Pumps	Y	4	100%	Sumps and sump pumps as required
	Washwater/False Start Drains Tank	Y	2	100%	1x100% per CTG; Two (2) washes per CTG sizing criteria - wash water tank for offsite disposal
	Blowdown/Recycle Tank	Y	1	100%	Recover steam drum blowdown and recycle into influent water treatment system
	RO Reject	Y			Reject water sent to cooling tower basin
	Recycle Pumps	N	-	-	
COMPRESSED GAS					
	Hydrogen	N			Not required for generator cooling
	Carbon Dioxide	N			Not required for generator cooling
	Nitrogen	Y			Nitrogen from bottles
CATHODIC PROTECTION					
	Underground Steel Piping	Y	-	-	Cathodic protection system will be impressed current based on existing plant impressed current.
	Underground Steel Tanks	Y	-	-	Coated with sacrificial anodes, if required.
DEMOLITION		Y	-	-	Existing coal yard equipment and foundations will be maintained for Unit 2 emergency coal backup. Existing piping under and around coal pile will be relocated or demolished as necessary for new project requirements. Existing warehouse will be demolished for cooling tower.
FUTURE ACCOMMODATIONS					No accommodations for future expansion of equipment or hydrogen blend.
CONTROLS					
Equipment Control					
	CTG	Y	-	-	Control system provided by equipment OEM with local HMI for each CTG and with foreign device interface to Plant DCS with information and limited control.
	STG	Y	-	-	Control system provided by equipment OEM with local HMI and with foreign device interface to Plant DCS with information and limited control.
	HRSG BMS	Y	-	-	BMS control in plant DCS and will utililze DCS HMI. No local operator interface for BMS.
	Medium Voltage Switchgear	Y	-	-	Hardwire Start / Stop / Breaker Status. Soft communications for other I/O.
	Motor Control Centers	Y	-	-	Hardwire Start / Stop / Breaker Status. Soft communications for other I/O.
	Low Voltage Switchgear	Y	-	-	Hardwire Start / Stop / Breaker Status. Soft communications for other I/O.

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	Description	Y/N	Number	% Capacity (per Unit)	Notes
	Plant Control System (DCS)	Y	-	-	- Provided system will link all CTG and STG controllers and HMI application servers. Provided with redundant ethernet to application servers. - Distributed Control System with remote mounted I/O panels, except misc. equipment that has own control (air compressors) which are monitor only in the DCS. - DCS will be specified with AMS. I/O points to be grouped by functional area but no high performance graphics. - Each Air Compressor will be provided with the hardwired means to start and stop from the DCS. Additionally a trouble and trip signalwill be wired to the DCS. An interface to the air compressors central governer will be provided (See Compressors). - Auxiliary boiler control to be migrated to DCS, including BMS. Process Sumps, DCS control except local control for remote sumps. Water treatment (RO) control in DCS. - Separate dedicated Room in admin bldg shall be provided for utility owned network/communication cabinets. - Specify that all software revisions be provided to Owner for approval and must be updated to latest version. - Include provisions for remote control of the plant from another location.
	Plant Historian	Y	-	-	DCS historian for 50,000 points
	Offsite Interfaces	Y	-	-	Dispatching, OEM Monitoring, EKPC Monitoring, natural gas supply, foreign device interface
Automatic Generation Control		Y			
	Distributed Control System (DCS)	Y	1	100%	Balance of Plant controls same as CTG and STG control for Siemens. Separate DCS would be needed for GE turbines. Interface to RTU/DCS AGC.
Turbine Supervisory Instruments					
	GTG	Y			Manufacturer's std supply
	STG	Y			Manufacturer's std supply, include stress analyzer.
Vibration monitoring					
	CTG	Y	-	-	Probes wired to Bently Nevada; Hardwire Points between Bently Nevada and Unit Controllers
	STG	Y	-	-	Probes wired to Bently Nevada; Hardwire Points between Bently Nevada and Unit Controllers
	Medium voltage motors and driven equipment	Y	-	-	Probes wired to Bently Nevada; Hardwire Points between Bently Nevada and Unit Controllers BFP, Condensate Pump and CW pump motors and pumps. Monitor in DCS. MHM modules.
	Cooling Tower fans	Y	-	-	MHM modules.
	Fin-Fan Cooler Fans	N	-	-	
Plant Simulator		Y	-	-	High fidelity simulator to mimic DCS with quad screen. Located in Admin building in separate room adjacent to control room.
Digital Bus					
	Foundation Fieldbus	N	-	-	
	Remote I/O	Y	-	-	
Instrumentation					
	Redundancy	Y	-	-	Redundancy provided if loss results in unit trip or derate
	Transmitters	Y	-	-	
	HART	Y	-	-	Hardwired 4-20mA from positioner for feedback.
	Performance Testing	Y	-	-	
	Meteorological Station	Y	-	-	
Continuous Emissions Monitoring System		Y	2	100%	1x100% per stack. Datalink to DCS
Relaying Data Link		Y	-	-	Redundant relay communications network for protection and control for CEMS and AGC. Non-redundant datalinks if for information only. See Equipment Control section for equipment / relay interfaces to the control system.
Communication		Y	-	-	Datalinks for Battery Monitoring, Gas Yard, Gas Compressors/Dewpoint Heaters, Air Compresors, CEMS
	Dispatching	Y	-	-	Automatic Generation Control through RTU communication
	Off site monitoring/administrations	Y	-	-	OEM for Turbine Controller Remote Connection
	Switchyard	Y	-	-	Communication Interface with Switchyard RTU
	Internal plant	Y	-	-	Assumed 50 IO and fiber to existing plant
	External	Y	-	-	Corporate office to receive Historian
NERC CIP Requirements		Y	-	-	Low impact facility since total MW is less than 1500 MW. New switchyard only serves new Units.
HMI		Y	-	-	Stand Alone Controllers with local HMI's. Plant Control HMI located in New Control Room, Admin DCS Room and Switchgear building.
ELECTRICAL					
Generator Step-Up Transformers:					
	Gas Turbine	Y	2	100%	1x100% for each CTG: 161 kV-Wye / 20 kV-Delta, sized for Generator MVA @ 65°C Rise
	Steam Turbine	Y	1	100%	161 kV-Wye / 20kV-Delta, sized for Generator MVA @ 65°C Rise
Auxiliary/Reserve Transformers:					
	Reserve Auxiliary Transformer	N			
	Auxiliary	Y	2	100%	
Generator Buses:					
	Gas Turbine	Y	2	100%	Self-cooled, Isolated Phase Bus: 1x100% for each CTG. Size based on capacity. Space heaters used for moisture protection.
	Steam Turbine	Y	1	100%	Self-cooled, Isolated Phase Bus: 1x100% for STG. Size based on capacity. Space heaters used for moisture protection.
Generator Circuit Breakers:					
	Gas Turbine	Y	2	100%	Generator Circuit Breaker in Isolated Phase Bus for Synchronization

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	Description	Y/N	Number	% Capacity (per Unit)	Notes
	Steam Turbine	Y	1	100%	Generator Circuit Breaker in Isolated Phase Bus for Synchronization
Blackstart Generator(s) and Capability		N	-	-	
Electrical Equipment Enclosures:		Y	-	-	CTG electrical scope will be housed in CTG OEM provided electrical package (one for each CTG). Base scope will house electrical equipment inside separate electrical building, STG building electrical room, or water treament building electrical room. Separate electrical building for cooling tower. DCS cabinets in separate room segregated from main electrical room. HRSG electrical scope will be housed in PDCs.
Switchgear:					
	6.9kV Switchgear	Y	-	-	Arc-Resistant 6.9kV, 50kA Interrupting min, Low resistance grounded system, two lineups configured as main-main, SEL Relays, remote racking, maintenance switch, remote manual close switches for main and tie breakers, sufficient capacity to source main-tie-tie-main from one main breaker with source transformers and buses rated to power the entire lineup during the loss of a single source.
	480V Switchgear	Y	-	-	Arc-Resistant 480V, 65kA Interrupting, High resistance grounded system with dedicated ground detection system, main-tie-main configuration, sufficient capacity to source main-tie-main from one main breaker, closed bus transfer, remote breaker racking, maintenance switches, remote manual switches for main and tie breakers with source transformers and buses rated to power the entire lineup during the loss of a single source
Motor Control Centers:					
	480 V MCCs	Y	-	-	480V, 3-Phase, 3-Wire, 65kA, NEMA Type 1 gasketed for indoor installation, arc-resistant design, rated for the operating load. Provided with 20% spare usuable buckets.
Emergency Power:					
	Uninterruptible Power (UPS)	Y	-	-	A single Balance of Plant UPS system will be provided for the STG and BOP loads with 30% spare capacity. The CTG OEM will provide the essential system for their equipment and safe shutdown.
	DC System	Y	-	-	A single Balance of Plant DC system will be provided for the STG and BOP loads with a 4-hr load capacity. Battery location will be provided with 36" single or double door for access. The CTG OEM will provide the essential system for their equipment and safe shutdown.
Standby Diesel Generator		Y	-	-	Standby diesel generator rated for OEM and BOP Essential operating loads as well as heat trace to maintaining a safe shutdown condition.
Stand Alone Control Systems					
	Fire Protection/Detection	Y	-	-	See fire protection section in Mechanical for details
	Plant HVAC	Y	-	-	See HVAC section in Mechanical for details
	Building/Site Security	Y	-	-	
	Plant Communications	Y	-	-	
On-Line Battery Monitoring:		Y	-	-	
Lighting					
	Normal	Y	-	-	LED-lighting; lighting required for new road and plant buildings.
	Emergency Egress	Y	-	-	Local battery pack single fixtures will be provided for emergency egress.
Grounding		Y	-	-	Brownfield site. New grounding grid with ties to the existing plant grid as applicable.
Lightning Protection		Y	-	-	A UL Master Label will be provided for the new facility.
Freeze Protection		Y	-	-	Heat tracing designed to maintain 40F for fluids subject to freezing based on size and service
Electrical Studies:					
	Load Flow, voltage drop, short circuit	Y	-	-	Identify equipment and bus loading, motor terminal voltages and available fault currents at each voltage level
	Protective coordination/relay settings	Y	-	-	
	Arc Flash	Y	-	-	
Cabling		Y	-	-	Cable tray and field routed Aluminum conduit above grade, duct bank below grade. Cables to have CPE jacketing.
Transmission / Interconnection:		N	-	-	Per EKPC
TRANSMISSION					
Switchyard					
	Metering and relaying	Y			
	Revenue metering (Plant Net Output)	Y			Metering accuracy VTs and CTs on the high side of GSU transformers.
	Revenue metering (Generator Gross Output)	Y			CTs and PTs on the line side of generators
	Transmission Network System Upgrades	Y			System upgrade project scope and costs developed by EKPC.
	Interconnect with existing transmission	Y			By EKPC covered in separate costs.
CIVIL/STRUCTURAL					
Existing Facilities		Y	-	-	Brownfield site. New facility will interconnect to transmissions lines, river water supply, wastewater discharge to existing facilities, tie into existing Cooper system (roads, storm drainage) and new natural gas supply to the site. Topographic survey of the plant areas will be required.
Coal Pile Elevation at Construction Start		Y	-	-	Design/quantities based on coal pile (for entire new plant footprint) being at 1 ft above finished elevation at the time of start of construction. Coal pile will be moved or removed prior to start of project construction.
Layout Considerations		Y	-	-	Reuse part of existing infrastructure and road from previous coal plant construction
Disposal of Spoils		-	-	-	Excess spoils will be disposed of on-site, used for fill if possible. No hazardous materials accounted for in project estimate. Scope and estimate do not include any remediation nor additional coal spoils removal other than quantities associated with the defined coal pile excavation and over-excavation basis.
Soils Conditions / Stability		-	-	-	New combined cycle located in coal yard area. Minimal geotechnical information provided for area. A detailed geotechnical investigation will be needed when possible to confirm sloping and foundation stability requirements as well as native soil suitability throughout the new facility areas.
Soil Improvement		N	-	-	No soil improvement is assumed
Subsurface Rock		N	-	-	Assume no rock excavation required.
Subsurface water		N	-	-	Dewatering for moving the existing coal pond to new coal pond.
Cut/Fill		-	-	-	Use existing site materials to grade the site and any additional required fill will be sourced via off-site borrow.

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Description	Y/N	Number	% Capacity (per Unit)	Notes
Disposal of debris	-	-	-	Disposed of on-site. However, debris from the existing coal yard foundation demolition and existing equipment demolition would have to be transported to a permitted facility or the facility on-site would have to be pemitted for this use.
Permanent Stormwater	-	-	-	New surface water drainage ditches and piping to collect and direct to new stormwater pond which will direct flows to permitted outfall. Regrading as required to follow existing drainage paths.
Construction Stormwater	-	-	-	Erosion control will be in accordance with state and local guidelines and regulations and will include best management practices such as silt fence, rock check dams, slope protection, construction exits, and stormwater pond(s) for construction and permanent. A SWPPP will be prepared.
Roads	Y	-	-	Existing plant roads to allow for deliveries via truck. Roads to be repaired as required during Site Finishing and minor new roadway as shown in general arrangement.
Surfacing	-	-	-	Main access roads shall be paved. Maintenance roads and areas will be covered with crushed rock. Other areas top soil and seeded.
Soil Bearing Capacity	-	-	-	Foundation types assumed as noted below based on an allowable bearing capacity of approximately 3,000 psf for shallow foundations bearing on soil. It is assumed that Karst runs through out the site and that measures will have to be taken as it is encountered. These measure include, but are not limited to, micropiling foundation (in addition to those noted below) and filling voids with flowable fill. Subject to change after final geotech investigation.
Foundation type	-	-	-	CTG, STG, HRSG, Cooling Tower, GSU/UATs, electrical buildings, water treatment building, fuel oil storage tanks and containment, field erected tanks, and Generation Building (containing STG, Admin area and electrical room) will be pile-supported. All other outdoor equipment/structures will be supported on shallow foundations (mats or footings). A more thorough geotechnical investigation will be needed to confirm these assumptions.
Transformer Containment	-	-	-	Containment for oil-filled transformer will be provided with an open pit design.
Demolition (Foundation)	Y	-	-	See "Disposal of debris" and "Disposal of Spoils" sections above.
Enclosures				
STG Generation Building	Y	1	100%	Building housing STG and Aux Boiler. Building cranes included for STG
Water Treatment Building	Y	1	100%	Building housing water treament equipment
Cooling Tower Chemical Feed Enclosure	Y	1	100%	Building to house Cooling Tower chemical feed equipment
Electrical (see electrical section)	Y	-	-	Buildings for CTG/BOP elec and cooling tower elec
Warehouse/Admin Facilities	Y	1	100%	Building(s) for control room, construction warehouse, admin space with offices, and I&C tech and machine shop
Maintenance Shops	Y	1	100%	See Warehouse/Admin facilities
Misc/BOP Enclosures	Y	-	100%	Weather rated enclosures for outdoor equipment that may be impacted by cold weather. This includes BFP enclosures, fire water pumps, CTG turbine and generator enclosures, CTG lube oil cooler/aux module enclosures, CEMS enclosures, etc.
Maintenance cranes	Y	-	-	
Guardshack	N			Existing Cooper gaurdshack used. Construction turnstiles and card readers to be utilized.
Site Security	-	-	-	Excluded.
Landscaping	-	-	-	Minimal landscaping included. Disturbed areas will be seeded for erosion control.
Fence	N			Assume existing perimeter security fence is adequate for new plant
CONSTRUCTION				
Utilities				
Power	Y	-	-	Construction power from existing Cooper facility
Communication	Y	-	-	Tie-in to existing system (radio, internet)
Construction Water	Y	-	-	Tie-in to existing Cooper facility service water system
Potable Water	Y	-	-	Tie-in to existing Cooper facility potable water system
Sanitary	Y	-	-	Portable facilities provided by construction contractors
Parking	Y	-	-	New permanent parking adjacent to Admin building and Water Treament building. Temporary construction parking to be identified on Site Plan.
Gate Entry				
Main	-	-	-	Existing Cooper guard shack.
Personnel/Craft	-	-	-	Existing Cooper main gate and guard shack. New construction turnstiles and card readers provided for construction craft.
Delivery	-	-	-	New slide gate for construction.
Construction Field Office / Trailers				
Owner	Y	-	-	Trailers in Owners Costs.
Engineer	Y	-	-	Trailers in Owners Costs.
Vendors	Y	-	-	Trailers in Owners Costs
Contractors	Y	-	-	Trailers in Contractor's/Owner Costs.
Site Services	Y	-	-	Trailers in Owners Costs.
Laydown area	Y	-	-	Expected on site areas identified on Site Plan. Does not account for off-site laydown.
Warehouses	Y	-	-	Existing warehouse is full; New permenant construction warehouse to be provided for storage space during construction.
OWNER COSTS / MISC.				
Permits				
See Permit Matrix	Y	-	-	EKPC w/ BMcD Support.
Owner's Costs				
Project Development	Y	-	-	Allowance included in Owner Costs.
Owner's Operations Personnel	Y	-	-	Allowance included in Owner Costs.
Owner's Project Management	Y	-	-	Allowance included in Owner Costs.
Owner's Engineer	N	-	-	
Owner's Legal Counsel	Y	-	-	Allowance included in Owner Costs.
Political Concessions / Area Development Fees	Y	-	-	Allowance included in Owner Costs.
Permitting & License Fees	Y	-	-	Allowance included in Owner Costs.
Land	N	-	-	Brownfield, existing
Water Rights Costs	N	-	-	Existing

East Kentucky Power Cooperative
Cooper 2x1 Combined Cycle
Scope Assumptions Matrix

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	Description	Y/N	Number	% Capacity (per Unit)	Notes
	Water Infrastructure and Supply to Site	N	-	-	Existing
	Natural Gas Infrastructure and Supply to Site	N	-	-	Cost carried in separate project.
	Labor Camp	N	-	-	
	Permanent Plant Operating Spare Parts	Y	-	-	Allowance included in Owner Costs.
	Maintenance Tools & Equipment	Y	-	-	Allowance included in Owner Costs.
	Permanent Plant Equipment & Furnishings	Y	-	-	Allowance included in Owner Costs.
	Sales Tax	N	-	-	Sales tax is excluded, other than for non-permanent consumables and supplies
	Escalation	N	-	-	All escalation excluded (during execution and for future start and COD)
	Owner's Contingency	Y	-	-	Allowance included in Owner Costs.
	Interest During Construction	N	-	-	Excluded
	Temporary Utilities	Y	-	-	Power line drop and power purchasing included in Owner Costs. Transformer and downstream scope included in capital costs
	Startup Testing Fuels and Consumables	Y	-	-	Allowance included in Owner Costs.
	Operator training	Y	-	-	Allowance included in Owner Costs.
	Vehicles	Y	-	-	Allowance included in Owner Costs.
	Site Security during Construction	Y	-	-	Allowance included in Owner Costs.
GENERAL ASSUMPTIONS					
	Reuse of Existing Equipment and Systems	Y	-	-	Assumed existing equipment, piping, cables, etc. are in adequate working order and can be reused without modifications
EXCLUSIONS					
	Taxes	-	-	-	Sales, use, gross receipts, property, and other types.
	Insurance	-	-	-	Except Builder's risk carried in Owner Cost
	Sound abatement above reasonable mitigation	-	-	-	Except where noted above
	Aesthetic landscaping other than erosion control	-	-	-	
	All escalation	-	-	-	
	Financing fees	-	-	-	
	Interest during construction	-	-	-	

APPENDIX C – PROJECT DIVISION OF RESPONSIBILITY

Appendix B
Division of Responsibility

Contract No.	Description	Design Criteria / Functional Design	Technical Specification RFP	Detailed Design	Procure / Supply	Fabricate / Deliver	Receive / Maintenance	Erect / Install	Power Wiring	Control Wiring	Testing	Start-up	Commissioning	Remarks
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
BMcD	**BMcD (Engineer/Construction Manager)**													
	Temporary Services													
	Dumpsters / Refuse / Recyclables	-	-	-	BMcD	BMcD	BMcD	-	-	-	-	-	-	
	Temporary Toilets	-	-	-	BMcD	BMcD	BMcD	-	-	-	-	-	-	
	Construction Trailers	-	-	-	BMcD	BMcD	BMcD	-	-	-	-	-	-	Craft Break Trailers
	Electrical Distribution Panels to Work	Contractors	Contractors	Contractors	Contractors	Contractors	Contractors	Contractors	Contractors	Contractors	Contractors	Contractors	Contractors	
	Parking	Owner	Owner	Owner	Owner	Owner	Owner	Owner	Owner	Owner	Owner	Owner	Owner	
	BMcD Construction Trailer	-	-	-	-	-	-	-	-	-	-	-	-	
	Trailer(s)				BMcD / Contractors	BMcD / Contractors	BMcD / Contractors							Contractors to provide trailers for their staff as necessary. BMcD will provide trailers for BMcD and Owner's staff.
	Card Readers / Security Entrance and Exit				Owner	Owner	Owner							
	Badges				Contractors	Contractors	Contractors							Contractors to provide badges with appropriate contract tracing requirements
	Gate Access Equipment (including call box stand)				Owner	Owner	Owner							
	Communication Phone/Internet				BMcD / Contractors	BMcD / Contractors	BMcD / Contractors							Each contractor to provide hot spots as needed for their on-site staff.
	Janitorial Services				BMcD	BMcD	BMcD							
	Potable Water				BMcD / Contractors	BMcD / Contractors	BMcD / Contractors							Each to supply water for their own employees
	Office Consumables				BMcD / Contractors	BMcD / Contractors	BMcD / Contractors							Each to supply office supplies for their own staff employees
Common	**Common Areas - Shared Site Items and Services**													
	Temporary Services	-	-	-	-	-	-	-	-	-	-	-	-	
	Dumpsters / Refuse / Recyclables				8220 / 8322	8220 / 8322	8220 / 8322							8220 will supply and maintain for all Project Contractors until 8322 takes over and maintain for all Project Contractors until Substantial Completion
	Hand Wash Stations				BMcD	BMcD	BMcD							
	Temporary Toilets				BMcD	BMcD	BMcD							
	Heated Bathroom Trailer (by Break Trailers)				BMcD	BMcD	BMcD							
	Miscellaneous				-	-	-							
	Snow Removal				8220 / 8322	8220 / 8322	8220 / 8322							Common Areas Only, Work Areas by each Contractor
	Temporary Busing				8322 / 8410	8322 / 8410	8322 / 8410							As needed pending outage/owner park lot overflow. BMcD will call out time frame when this will apply.
Owner	**Owner Supplied**													
	Taxes	-	-	-	-	-	-	-	-	-	-	-	-	Owner to provide tax exemption certificate to BMcD and BMcD to provide to Suppliers and Contractors
	Insurance	BMcD	-	-	Supplier / Contractor	Supplier / Contractor	-	-	-	-	-	-	-	Each Supplier and Contractor to provide their own insurance.
	Builders Risk	Owner	Owner	Owner	Owner	Owner	Owner	Owner	Owner	Owner	Owner	Owner	Owner	
	Permitting	-	-	-	-	-	-	-	-	-	-	-	-	
	Transmission Permitting	-	-	-	Owner	-	-	-	-	-	-	-	-	
	Transmission Right of Way	-	-	-	Owner	-	-	-	-	-	-	-	-	
	Natural Gas Supply Permitting	-	-	-	Owner	-	-	-	-	-	-	-	-	
	Water Rights	-	-	-	Owner	-	-	-	-	-	-	-	-	
	Environmental Assessment		-	-	Owner	-	-	-	-	-	-	-	-	
	NPDES Mods		-	-	Owner	-	-	-	-	-	-	-	-	
	Building Permits	-	-	-	Owner	-	-	-	-	-	-	-	-	
	LOTO's	Owner / BMcD / Contractors	-	-	-	-	-	-	-	-	-	-	-	BMcD's LOTO program will be met until the system is turned over to the plant.
	Hot Work Permits	Owner / BMcD / Contractors	-	-	-	-	-	-	-	-	-	-	-	
	Initial Fills & Consumables	-	-	-	Owner	-	-	8321 / 8322 / 8323	-	-	-	-	-	8321/8322/8323 to Support first fills
	Water treatment chemicals & totes	-	-	-	Owner	-	-	8322 / 8323	-	-	-	-	-	8322/8323 to Support first fills
	Lubricating Oil	-	-	-	Owner	-	-	8321	-	-	-	-	-	8321 to Support first fills
	Bulk Compressed Gases (Carbon Dioxide, Nitrogen)	-	-	-	Owner	-	-	8322	-	-	-	-	-	8323 to Support first fills
	Diesel Fuel	-	-	-	Owner	-	-	8323	-	-	-	-	-	8323 to Support first fills
	CEMS (Gas Cylinders)	-	-	-	Owner	-	-	8322	-	-	-	-	-	8322 to Support first fills
	Natural Gas	-	-	-	Owner	-	-	-	-	-	-	-	-	
	Startup Power	-	-	-	Owner	-	-	-	-	-	-	-	-	
	Startup Water	-	-	-	Owner	-	-	-	-	-	-	-	-	
	Test Power Sales & Grid Coordination	-	-	-	Owner	-	-	-	-	-	-	-	-	
	Natural Gas Supply Infrastructure (Metering Yard)	-	-	-	Owner	-	-	-	-	-	-	-	-	
	Transmission and Substation Upgrades	-	BMcD	BMcD	C201 / C202 / C203	C201 / C202 / C203	C403 / C501	C403 / C501	C403 / C501	C403 / C501	C403 / C501	C403 / C501	C403 / C501	
	Plant Switchyard	-	BMcD	BMcD	C201 / C202 / C203	C201 / C202 / C203	C403 / C501	C403 / C501	C403 / C501	C403 / C501	C403 / C501	C403 / C501	C403 / C501	
	Communications / Security Equipment	-	-	-	Owner	-	-	-	-	-	-	-	-	See Site Security Below
	Conmunications / Security Infrastructure	-	-	-	Owner	-	-	-	-	-	-	-	-	See Site Security Below
	Maintenance Shop Tools & Test Equipment	-	-	-	Owner	Owner	Owner	Owner	-	-	-	-	-	
	Warehouse Shelves	-	-	-	Owner	Owner	Owner	Owner	-	-	-	-	-	
	Mobile Equipment / Vehicles	-	-	-	Owner	Owner	Owner	Owner	-	-	-	-	-	
	Laboratory Equipment and Furniture	-	-	-	Owner	Owner	Owner	Owner	-	-	-	-	-	
	Operating Spare Parts	-	-	-	Owner	Owner	Owner	Owner	-	-	-	-	-	
	Landscaping	-	-	-	Owner	Owner	Owner	Owner	-	-	-	-	-	
	Signage (Plant exterior permanent signage)	-	-	-	Owner	Owner	Owner	Owner	-	-	-	-	-	
	Construction Power Cost (metered)		-	-	Owner	-	-	-	-	-	-	-	-	
1110	**Steam Turbine and Generator**													
	STEAM TURBINE (ST) AND AUXILIARY SYSTEMS	-	-	-	-	-	-	-	-	-	-	-	-	
	ST Hotbox		BMcD	1110	1110	1110	8321	8321	-	-	BMcD/1110	1110	1110	

Appendix B
Division of Responsibility

Contract No.	Description	Design Criteria / Functional Design	Technical Specification RFP	Detailed Design	Procure / Supply	Fabricate / Deliver	Receive / Maintenance	Erect / Install	Power Wiring	Control Wiring	Testing	Start-up	Commissioning	Remarks
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	ST HP/IP Turbine		BMcD	1110	1110	1110	8321	8321	-	-	BMcD/1110	1110	1110	
	ST LP Turbine		BMcD	1110	1110	1110	8321	8321	-	-	BMcD/1110	1110	1110	
	Double flow LP Section w/ crossover pipe													
	ST BEARING SYSTEM		-	-	-	-	-	-	-	-	-	-	-	
	Bearing Lift Oil Filters		BMcD	1110	1110	1110	8321	8321	-	-	BMcD/1110	1110	1110	
	Bearing Lift Oil Pumps		BMcD	1110	1110	1110	8321	8321	8410	8410	BMcD/1110	1110	1110	
	Rotor Turning Device													
	ST LUBE OIL SYSTEM		-	-	-	-	-	-	-	-	-	-	-	
	Emergency Lube Oil Pump		BMcD	1110	1110	1110	8321	8321	8410	8410	BMcD/1110	1110	1110	
	Lube Oil Coolers		BMcD	1110	1110	1110	8321	8321	-	-	BMcD/1110	1110	1110	
	Lube Oil Filters		BMcD	1110	1110	1110	8321	8321	-	-	BMcD/1110	1110	1110	
	Lube Oil Module		BMcD	1110	1110	1110	8321	8321	8410	8410	BMcD/1110	1110	1110	
	Lube Oil Pumps		BMcD	1110	1110	1110	8321	8321	8410	8410	BMcD/1110	1110	1110	
	Lube Oil Vapor Exhaust Oil Separator		BMcD	1110	1110	1110	8321	8321	8410	8410	BMcD/1110	1110	1110	
	Lube Oil Vapor Exhausters		BMcD	1110	1110	1110	8321	8321	8410	8410	BMcD/1110	1110	1110	
	Lube Oil Purification Unit		BMcD	1110	1110	1110	8321	8321	8410	8410	BMcD/1110	1110	1110	
	Lube Oil Purification Heater		BMcD	1110	1110	1110	8321	8321	8410	8410	BMcD/1110	1110	1110	
	Lube Oil Purification Pump		BMcD	1110	1110	1110	8321	8321	8410	8410	BMcD/1110	1110	1110	
	ST GLAND STEAM SYSTEM		-	-	-	-	-	-	-	-	-	-	-	
	Gland Steam Condener		BMcD	1110	1110	1110	8321	8321	-	-	BMcD/1110	1110	1110	
	Gland Steam Exhausters		BMcD	1110	1110	1110	8321	8321	-	-	BMcD/1110	1110	1110	
	ST HYDRAULIC OIL SYSTEM		-	-	-	-	-	-	-	-	-	-	-	
	Hydraulic Oil Unit/Tank		BMcD	1110	1110	1110	8321	8321	-	-	BMcD/1110	1110	1110	
	Hydraulic Oil Cooling Circulation Pumps		BMcD	1110	1110	1110	8321	8321	8410	8410	BMcD/1110	1110	1110	
	Hydraulic Oil Cooling Fans		BMcD	1110	1110	1110	8321	8321	8410	8410	BMcD/1110	1110	1110	
	Hydraulic Oil Cooling Filters		BMcD	1110	1110	1110	8321	8321	-	-	BMcD/1110	1110	1110	
	Hydraulic Oil Cooling Heater		BMcD	1110	1110	1110	8321	8321	8410	8410	BMcD/1110	1110	1110	
	Hydraulic Oil Cooling Pumps		BMcD	1110	1110	1110	8321	8321	8410	8410	BMcD/1110	1110	1110	
	ST MISCELLANEOUS		-	-	-	-	-	-	-	-	-	-	-	
	Combined MS Stop and Control Valve		BMcD	1110	1110	1110	8321	8321	-	-	BMcD/1110	1110	1110	
	Combined HRH Stop and Control Valve		BMcD	1110	1110	1110	8321	8321	-	-	BMcD/1110	1110	1110	
	LP Admission Stop and Control Valves		BMcD	1110	1110	1110	8321	8321	-	-	BMcD/1110	1110	1110	
	Steam Strainer and Casing for LP Admission		BMcD	1110	1110	1110	8321	8321	-	-	BMcD/1110	1110	1110	
	HP Vent Valve		BMcD	1110	1110	1110	8321	8321	-	-	BMcD/1110	1110	1110	
	Exhaust Hood Spray		BMcD	1110	1110	1110	8321	8321	-	-	BMcD/1110	1110	1110	
	Piping within STG Package/skids		BMcD	1110	1110	1110	8321	8321	-	-	BMcD/1110	1110	1110	
	Piping between STG Packages/skids		BMcD	1110	1110	1110	8321	8321	-	-	BMcD/1110	1110	1110	
	Turbine Drain System		BMcD	1110	1110	1110	8321	8321	-	-	BMcD/1110	1110	1110	
	LP Cooling Air System		BMcD	1110	1110	1110	8321	8321	-	-	BMcD/1110	1110	1110	
	Baseplate and Enclosure		BMcD	1110	1110	1110	8321	8321	-	-	BMcD/1110	1110	1110	
	ST ELECTRICAL		-	-	-	-	-	-	-	-	-	-	-	
	LV AC Distribution		BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	LV Motor Starters		BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	Transformer SEE Package		BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	Transformer SEE		BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	VT Surge Cubicle		BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	ST CONTROL SYSTEM	-	-	-	-	-	-	-	-	-	-	-	-	
	Turbine Control System (TCS) Cabinets	BMcD	BMcD	1110	1110	1110	8410	1110	8410	8410	BMcD/1110	1110	1110	TCS Cabinets will ship installed in the electrical package
	Human Machine Interface (HMI) in STG in electrical package	BMcD	BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	Central Control Room Human Machine Interface (HMI)	BMcD	BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	One Engineering Work Station, in Plant BOP CS Room	BMcD	BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	Communication Interface between TCS and BOP CS	BMcD	BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	OPC Server between TCS and BOP CS	BMcD	BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	GPS Network Time Server	BMcD	BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	Supervisory Instrumentation		BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	Balance of Plant (BOP) CONTROL SYSTEM (CS)	-	-	-	-	-	-	-	-	-	-	-	-	Delivered to support backfeed.
	BOP Cabinets	BMcD	BMcD	1110 / BMcD	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	1110 to implement BMcD provided logic prior to shipment
	Network Switches, Routers, and Hardware required for a complete BOP CS	BMcD	BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	Thin Client in BOP PDC	BMcD	BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	Communication Interface between TCS and BOP CS	BMcD	BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	OPC Server between TCS and BOP CS	BMcD	BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	GPS Network Time Server	BMcD	BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	GENERATOR	BMcD	-	-	-	-	-	-	-	-	-	-	-	
	Generator Enclosure	BMcD	BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	Shipped with axial split - 2 pieces for field assembly
	Generator Coolers	BMcD	BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	High voltage bushings	BMcD	BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	Vibration detectors / Vibration System	BMcD	BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	Water leakage detectors	BMcD	BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	Terminal for local shaft voltage monitoring	BMcD	BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	Generator flux probe and partial discharge monitoring	BMcD	BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	Neutral tie enclosure(s)	BMcD	BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	Rotor Lift Oil System		BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	GENERATOR AUXILIARIES	-	-	-	-	-	-	-	-	-	-	-	-	
	Static Excitation System and Automatic Voltage Regulator	BMcD	BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	DC Link Reactor	BMcD	BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	Neutral Grounding System	BMcD	BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	Synchronization System		BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	Excitation Transformer (Dry Type)	BMcD	BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	SFC Transformer (Dry Type)	BMcD	BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	

Appendix B
Division of Responsibility

Contract No.	Description	Design Criteria / Functional Design	Technical Specification RFP	Detailed Design	Procure / Supply	Fabricate / Deliver	Receive / Maintenance	Erect / Install	Power Wiring	Control Wiring	Testing	Start-up	Commissioning	Remarks
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	Current Transformers	BMcD	BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	Voltage Transformers and Surge Protection	BMcD	BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	Generator Protection Relay Panel	BMcD	BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	Generator Auto/Manual Synchronizing Panel	BMcD	BMcD	1110	1110	1110	8410	8410	8410	8410	BMcD/1110	1110	1110	
	MISCELLANEOUS	-	-	-	-	-	-	-	-	-	-	-	-	
	Field Performance Test Temporary Instrumentation for PTC22	BMcD	BMcD	1110	1110	1110	8321	8321	8410	8410	BMcD/1110	1110	1110	
	Standard Enclosure		BMcD	1110	1110	1110	8321	8321	-	-	BMcD/1110	1110	1110	
	Acoustic Enclosure		BMcD	1110	1110	1110	8321	8321	-	-	BMcD/1110	1110	1110	
	Ladders, Stairs, and Walkways		BMcD	1110	1110	1110	8321	8321	-	-	BMcD/1110	1110	1110	
	Pedestal Bolts and Nuts for Bearing Casing		BMcD	1110	1110	1110	8321	8321	-	-	BMcD/1110	1110	1110	
	Startup/Commissioning Spares		BMcD	1110	1110	1110	8321	-	-	-	-	-	-	
	Special Tools		BMcD	1110	1110	1110	8321	-	-	-	-	-	-	
	Insulation and Lagging for ST Casing, removable custom-fitted type.	BMcD	BMcD	1110	1110	1110	8321	8321	-	-	-	-	-	
	Insulation and Lagging for ST piping and valves	BMcD	BMcD	1110	1110	1110	8321	8321	-	-	-	-	-	
	Stack Anchor Bolt Templates	BMcD	BMcD	1110	1110	1110	8321	8220	-	-	-	-	-	
1120	**Gas Turbine and Generator**													
	F-CLASS COMBUSTION TURBINE (CT) AND AUXILIARY SYSTEMS	-	-	-	-	-	-	-	-	-	-	-	-	
	Compressor, Inlet Guide Vanes / Actuators	BMcD	BMcD	1120	1120	1120	8321	8321	8410	8410	BMcD/1120	1120	1120	
	Turbine with Automatic Ignition System	BMcD	BMcD	1120	1120	1120	8321	8321	8410	8410	BMcD/1120	1120	1120	Removal and return of GT Shipping Assembly
	CT External Rotor Air Kettle Boilers	BMcD	BMcD	1120	1120	1120	8321	8321	8410	8410	BMcD/1120	1120	1120	
	Gas Turbine - Generator Coupling	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	-	-	-	8321 provide craft labor to support coupling of the generator and Turbine.
	Flame Monitoring Equipment	BMcD	BMcD	1120	1120	1120	8321	8321	8410	8410	BMcD/1120	1120	1120	
	Ignition Exciter Assembly	BMcD	BMcD	1120	1120	1120	8321	8321	8410	8410	BMcD/1120	1120	1120	
	Combustor DMS Field Equipment	BMcD	BMcD	1120	1120	1120	8321	8321	8410	8410	BMcD/1120	1120	1120	
	Auxiliary Control Valves and Instrumentation	BMcD	BMcD	1120	1120	1120	8321	8321	8410	8410	BMcD/1120	1120	1120	
	Gas Turbine Insulation	BMcD	BMcD	1120	1120	1120	8330	8330	-	-	-	-	-	
	LUBE OIL SYSTEM	-	-	-	-	-	-	-	-	-	-	-	-	
	Lube Oil Package	BMcD	BMcD	1120	1120	1120	8321	8321	8410	8410	BMcD/1120	1120	1120	
	Lube Oil Package Enclosure	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	BMcD/1120	1120	1120	Shipped Loose for Field Assembly
	Oil Coolers	BMcD	BMcD	1120	1120	1120	8321	8321	8410	8410	BMcD/1120	1120	1120	
	Lube Oil Interconnecting Piping, Piping Supports, Valves and Instrumentation	BMcD	BMcD	1120	1120	1120	8321	8321	-	8410	BMcD/1120	1120	1120	
	Lube Oil Purifier	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	BMcD/1120	1120	1120	
	FUEL SYSTEM (NATURAL GAS FUEL)	-	-	-	-	-	-	-	-	-	-	-	-	
	Fuel Gas Stop Valves	BMcD	BMcD	1120	1120	1120	8321	8321	-	8410	BMcD/1120	1120	1120	
	Fuel Gas Control Valves	BMcD	BMcD	1120	1120	1120	8321	8321	-	8410	BMcD/1120	1120	1120	
	Fuel Flow Meter	BMcD	BMcD	1120	1120	1120	8321	8321	-	8410	BMcD/1120	1120	1120	
	Differential Pressure gauges for all strainers and filters	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	BMcD/1120	1120	1120	
	Fuel Gas Piping (including interconnecting piping from interface point to turbine), Piping Supports, Valves, Hoses, and Instrumentation	BMcD	BMcD	1120	1120	1120	8321	8321	-	8410	BMcD/1120	1120	1120	
	Final Filter	BMcD	BMcD	1120	1120	1120	8321	8321	-	8410	BMcD/1120	1120	1120	
	Pressure transmitters, pressure gauges and thermometers	BMcD	BMcD	1120	1120	1120	8321	8321	-	8410	BMcD/1120	1120	1120	
	Fuel Oil / Water Injection Skid		BMcD	1120	1120	1120	8321	8321	8410	8410	BMcD/1120	1120	1120	
	CONTROL OIL SYSTEM	-	-	-	-	-	-	-	-	-	-	-	-	
	Control Oil Pump	BMcD	BMcD	1120	1120	1120	8321	8321	8410	8410	BMcD/1120	1120	1120	
	Oil Coolers	BMcD	BMcD	1120	1120	1120	8321	8321	8410	8410	BMcD/1120	1120	1120	
	Oil Reservoir	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	BMcD/1120	1120	1120	
	Dual Filters	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	BMcD/1120	1120	1120	
	Electric immersion heater	BMcD	BMcD	1120	1120	1120	8321	8321	8410	8410	BMcD/1120	1120	1120	
	Control Oil Piping (including interconnecting tubing), Piping Supports, Valves and Instrumentation	BMcD	BMcD	1120	1120	1120	8321	8321	-	8410	BMcD/1120	1120	1120	
	CLOSED COOLING WATER SYSTEM	-	-	-	-	-	-	-	-	-	-	-	-	
	Closed cooling isolation valves	BMcD	BMcD	1120	1120	1120	8321	8321	8410	8410	BMcD/1120	1120	1120	
	Equipment-specific heat exchangers / CCW users	BMcD	BMcD	1120	1120	1120	8321	8321	8410	8410	BMcD/1120	1120	1120	
	Glycol cooling system including circulation pumps, air cooled heat exchanger and supporting steel.	BMcD	BMcD	1120	1120	1120	8321	8321	8410	8410	BMcD/1120	1120	1120	
	Pumps skid	BMcD	BMcD	1120	1120	1120	8321	8321	8410	8410	BMcD/1120	1120	1120	
	Access equipment for motor/fan service only	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	BMcD/1120	1120	1120	
	INSTRUMENT AIR SYSTEM	-	-	-	-	-	-	-	-	-	-	-	-	
	Instrument Air Skid with compressor, receiver and accessories	BMcD	BMcD	1120	1120	1120	8321	8321	8410	8410	BMcD/1120	1120	1120	
	AIR INTAKE SYSTEM	-	-	-	-	-	-	-	-	-	-	-	-	
	Pulse type self-cleaning filtration system	BMcD	BMcD	1120	1120	1120	8321	8321	-	8410	BMcD/1120	1120	1120	
	Pulse Air Piping (including interconnecting piping), Piping Supports, Valves and Instrumentation	BMcD	BMcD	1120	1120	1120	8321	8321	-	8410	BMcD/1120	1120	1120	
	Inlet Duct	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	BMcD/1120	1120	1120	
	Inlet Filter transmitter	BMcD	BMcD	1120	1120	1120	8321	8321	-	8410	BMcD/1120	1120	1120	
	Steel inlet louver/weather hood with stainless bird screen	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	BMcD/1120	1120	1120	
	Makeup controls and pressure reducing valve	BMcD	BMcD	1120	1120	1120	8321	8321	-	8410	BMcD/1120	1120	1120	
	Silencer	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	BMcD/1120	1120	1120	
	Inlet air bleed heating system (anti-icing and turndown) including piping, piping supports, valves, and instrumentation	BMcD	BMcD	1120	1120	1120	8321	8321	-	8410	BMcD/1120	1120	1120	
	Jib crane davit to lift filter elements into filter house	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	BMcD/1120	1120	1120	
	EXHAUST SYSTEM	-	-	-	-	-	-	-	-	-	-	-	-	
	Exhaust gas diffuser	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	BMcD/1120	1120	1120	
	Expansion Joint between CTG and diffuser	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	BMcD/1120	1120	1120	
	Measurement test ports	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	BMcD/1120	1120	1120	

Appendix B
Division of Responsibility

Contract No.	Description	Design Criteria / Functional Design	Technical Specification RFP	Detailed Design	Procure / Supply	Fabricate / Deliver	Receive / Maintenance	Erect / Install	Power Wiring	Control Wiring	Testing	Start-up	Commissioning	Remarks
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	Exhaust thermocouples	BMcD	BMcD	1120	1120	1120	8321	8321	-	8410	BMcD/1120	1120	1120	
	Exhaust transition piece between diffuser and CO Catalyst Reactor	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	BMcD/1120	1120	1120	
	Expansion joint between transition piece and CO Catalyst Reactor	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	BMcD/1120	1120	1120	
	Exhaust Ductwork, Silencer and Stack	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	BMcD/1120	1120	1120	
	CO Catalytic Reduction System	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	BMcD/1120	1120	1120	
	CO Reactor housing	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	BMcD/1120	1120	1120	
	CO Oxidation catalyst elements	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	BMcD/1120	1120	1120	
	CO Reactor Instrumentation	BMcD	BMcD	1120	1120	1120	8321	8321	-	8410	BMcD/1120	1120	1120	
	Transition duct and expansion joints from CO Reactor Housing to Stack elbow	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	BMcD/1120	1120	1120	
	Insulation and cladding CO module and transition duct	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	BMcD/1120	1120	1120	
	Support steel legs for CO catalyst/stack	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	BMcD/1120	1120	1120	
	STARTING SYSTEM	-	-	-	-	-	-	-	-	-	-	-	-	
	Motor Driven Turning Gear	BMcD	BMcD	1120	1120	1120	8321	8321	8410	8410	BMcD/1120	1120	1120	
	Static Frequency Converter Starting Cabinet	BMcD	BMcD	1120	1120	1120	8410	8410	8410	8410	BMcD/1120	1120	1120	
	Static Frequency Converter Transformer	BMcD	BMcD	1120	1120	1120	8410	8410	8410	8410	BMcD/1120	1120	1120	
	Static Frequency Converter Switch	BMcD	BMcD	1120	1120	1120	8410	8410	8410	8410	BMcD/1120	1120	1120	
	COMPRESSOR WATER WASH SYSTEM	-	-	-	-	-	-	-	-	-	-	-	-	
	Water Wash Skid (permanent install)	BMcD	BMcD	1120	1120	1120	8321	8321	8410	8410	BMcD/1120	1120	1120	
	Detergent Storage Tank	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	BMcD/1120	1120	1120	
	Mixing Tank	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	BMcD/1120	1120	1120	
	FIRE PROTECTION	-	-	-	-	-	-	-	-	-	-	-	-	8560 to furnish and install all control conduit and wire for complete system installation
	Electrical Enclosures	BMcD	BMcD	1120	1120	1120	8560	8560	8410	8560	8560 / 1120	BMcD/1120	BMcD/1120	
	CTG Compartment and Accessory Compartment(s) (lube oil tanks and equipment)	BMcD	BMcD	1120	1120	1120	8560	8560	-	8560	8560 / 1120	BMcD/1120	BMcD/1120	
	Auxiliary/Lube Oil Open Skid	BMcD	BMcD	1120	1120	1120	8560	8560	-	8560	8560 / 1120	BMcD/1120	BMcD/1120	
	Fire Protection Piping (including interconnecting piping), Valves and Instrumentation	BMcD	BMcD	1120	1120	1120	8560	8560	-	-	8560 / 1120	BMcD/1120	BMcD/1120	
	CT ELECTRICAL EQUIPMENT	-	-	-	-	-	-	-	-	-	-	-	-	
	Electrical Building Package	BMcD	BMcD	1120	1120	1120	8410	8410	8410	8410	BMcD/1120	1120	1120	
	AC MCC	BMcD	BMcD	1120	1120	1120	8410	1120	8410	8410	BMcD/1120	1120	1120	Delivered to site within electrical package/enclosure
	DC MCC	BMcD	BMcD	1120	1120	1120	8410	1120	8410	8410	BMcD/1120	1120	1120	Delivered to site within electrical package/enclosure
	Battery bank, and chargers	BMcD	BMcD	1120	1120	1120	8410	8410	8410	8410	BMcD/1120	1120	1120	Delivered to site within electrical package/enclosure
	CT CONTROL SYSTEM	-	-	-	-	-	-	-	-	-	-	-	-	
	Turbine Control System (TCS) Cabinets	BMcD	BMcD	1120	1120	1120	8410	1120	8410	8410	BMcD/1120	1120	1120	TCS Cabinets will ship installed in the electrical package
	Human Machine Interface (HMI) in CTG in electrical package	BMcD	BMcD	1120	1120	1120	8410	8410	8410	8410	BMcD/1120	1120	1120	
	Central Control Room Human Machine Interface (HMI)	BMcD	BMcD	1120	1120	1120	8410	8410	8410	8410	BMcD/1120	1120	1120	
	One Engineering Work Station, in Plant BOP CS Room	BMcD	BMcD	1120	1120	1120	8410	8410	8410	8410	BMcD/1120	1120	1120	
	Communication Interface between TCS and BOP CS	BMcD	BMcD	1120	1120	1120	8410	8410	8410	8410	BMcD/1120	1120	1120	
	OPC Server between TCS and BOP CS	BMcD	BMcD	1120	1120	1120	8410	8410	8410	8410	BMcD/1120	1120	1120	
	GPS Network Time Server	BMcD	BMcD	1120	1120	1120	8410	8410	8410	8410	BMcD/1120	1120	1120	
	Balance of Plant (BOP) CONTROL SYSTEM (CS)	-	-	-	-	-	-	-	-	-	-	-	-	Delivered to support backfeed.
	BOP Cabinets	BMcD	BMcD	1120 / BMcD	1120	1120	8410	8410	8410	8410	BMcD/1120	1120	1120	1120 to implement BMcD provided logic prior to shipment.
	Network Switches, Routers, and Hardware required for a complete BOP CS	BMcD	BMcD	1120	1120	1120	8410	8410	8410	8410	BMcD/1120	1120	1120	
	Thin Client in BOP PDC	BMcD	BMcD	1120	1120	1120	8410	8410	8410	8410	BMcD/1120	1120	1120	
	Communication Interface between TCS and BOP CS	BMcD	BMcD	1120	1120	1120	8410	8410	8410	8410	BMcD/1120	1120	1120	
	OPC Server between TCS and BOP CS	BMcD	BMcD	1120	1120	1120	8410	8410	8410	8410	BMcD/1120	1120	1120	
	GPS Network Time Server	BMcD	BMcD	1120	1120	1120	8410	8410	8410	8410	BMcD/1120	1120	1120	
	GENERATOR	BMcD	BMcD	1120	1120	1120	8410	8410	8410	8410	BMcD/1120	1120	1120	
	Generator Enclosure	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	-	-	-	Shipped with axial split - 2 pieces for field assembly
	Generator Coolers	BMcD	BMcD	1120	1120	1120	8321	8321	8410	8410	BMcD/1120	1120	1120	
	High voltage bushings	BMcD	BMcD	1120	1120	1120	8410	8410	8410	8410	BMcD/1120	1120	1120	
	Vibration detectors / Vibration System	BMcD	BMcD	1120	1120	1120	8410	8410	8410	8410	BMcD/1120	1120	1120	
	Water leakage detectors	BMcD	BMcD	1120	1120	1120	8410	8410	8410	8410	BMcD/1120	1120	1120	
	Terminal for local shaft voltage monitoring	BMcD	BMcD	1120	1120	1120	8410	8410	8410	8410	BMcD/1120	1120	1120	
	Generator flux probe and partial discharge monitoring	BMcD	BMcD	1120	1120	1120	8410	8410	8410	8410	BMcD/1120	1120	1120	
	Neutral tie enclosure(s)	BMcD	BMcD	1120	1120	1120	8410	8410	8410	8410	BMcD/1120	1120	1120	
	GENERATOR AUXILIARIES	-	-	-	-	-	-	-	-	-	-	-	-	
	Static Excitation System and Automatic Voltage Regulator	BMcD	BMcD	1120	1120	1120	8410	8410	8410	8410	BMcD/1120	1120	1120	
	DC Link Reactor	BMcD	BMcD	1120	1120	1120	8410	8410	8410	8410	BMcD/1120	1120	1120	
	Neutral Grounding System	BMcD	BMcD	1120	1120	1120	8410	8410	8410	8410	BMcD/1120	1120	1120	
	Excitation Transformer (Dry Type)	BMcD	BMcD	1120	1120	1120	8410	8410	8410	8410	BMcD/1120	1120	1120	
	SFC Transformer (Dry Type)	BMcD	BMcD	1120	1120	1120	8410	8410	8410	8410	BMcD/1120	1120	1120	
	Current Transformers	BMcD	BMcD	1120	1120	1120	8410	8410	8410	8410	BMcD/1120	1120	1120	
	Voltage Transformers and Surge Protection	BMcD	BMcD	1120	1120	1120	8410	8410	8410	8410	BMcD/1120	1120	1120	
	Generator Protection Relay Panel	BMcD	BMcD	1120	1120	1120	8410	8410	8410	8410	BMcD/1120	1120	1120	
	Generator Auto/Manual Synchronizing Panel	BMcD	BMcD	1120	1120	1120	8410	8410	8410	8410	BMcD/1120	1120	1120	
	ENCLOSURES	-	-	-	-	-	-	-	-	-	-	-	-	
	Combustion turbine	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	-	-	-	
	Generator	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	-	-	-	
	Electrical and Control Package	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	-	-	-	
	Excitation and Starting Enclosure	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	-	-	-	
	Auxiliary (Lube Oil) Equipment	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	-	-	-	
	CTG ACCESS PLATFORMS	-	-	-	-	-	-	-	-	-	-	-	-	
	Combustion Turbine Access (internal to enclosure)	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	-	-	-	
	Combustion Turbine Access (external to enclosure)	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	-	-	-	
	Generator Access (internal to enclosure)	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	-	-	-	

Appendix B
Division of Responsibility

Contract No.	Description	Design Criteria / Functional Design	Technical Specification RFP	Detailed Design	Procure / Supply	Fabricate / Deliver	Receive / Maintenance	Erect / Install	Power Wiring	Control Wiring	Testing	Start-up	Commissioning	Remarks
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	Generator Access (external to enclosure)	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	-	-	-	
	Mechanical Package	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	-	-	-	
	External Rotor Air Cooler Access	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	-	-	-	
	Inlet Air Filter, Filter Elements, and Evaporative Cooler Sections	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	-	-	-	
	Exhaust Stack Access Platforms for Emissions Testing and Stack	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	-	-	-	
	MISCELLANEOUS	-	-	-	-	-	-	-	-	-	-	-	-	
	Field Performance Test Temporary Instrumentation for PTC22	BMcD	BMcD	1120	1120	1120	8321	8321	8410	8410	BMcD/1120	1120	1120	
	Insulation and Lagging for CT Casing, removable custom-fitted type.	BMcD	BMcD	1120	1120	1120	8330	8330	-	-	-	-	-	
	Insulation and Lagging for CT piping	BMcD	BMcD	1120	1120	1120	8330	8330	-	-	-	-	-	
	Stack Anchor Bolt Templates	BMcD	BMcD	1120	1120	1120	8220	8220	-	-	-	-	-	
	Support Frame and Access/Maintenance Platform for Air Inlet Enclosure	BMcD	BMcD	1120	1120	1120	8321	8321	-	-	-	-	-	
1215	**Heat Recovery Steam Generator**													
	STRUCTURAL FEATURES	-	-	-	-	-	-	-	-	-	-	-	-	
	Structural Steel		BMcD	1215	1215	1215	8322	8322	-	-	-	-	-	
	Stairs, Platforms, Walkways		BMcD	1215	1215	1215	8322	8322	-	-	-	-	-	
	Ductwork		BMcD	1215	1215	1215	8322	8322	-	-	-	-	-	All modules to be trucked to site
	Penthouse		BMcD	1215	1215	1215	8322	8322	-	-	-	-	-	
	PRESSURE PARTS		-	-	-	-	-	-	-	-	-	-	-	
	Steam Drums		BMcD	1215	1215	1215	8322	8322	-	-	-	-	-	
	Steam and Water Piping		BMcD	1215	1215	1215	8322	8322	-	-	-	-	-	
	PLATEWORK		-	-	-	-	-	-	-	-	-	-	-	
	Flue Gas Duct		BMcD	1215	1215	1215	8322	8322	-	-	-	-	-	
	Ductwork and Transition Piece		BMcD	1215	1215	1215	8322	8322	-	-	-	-	-	
	INSULATION		-	-	-	-	-	-	-	-	-	-	-	
	Internal Casing		BMcD	1215	1215	1215	8322	8322	-	-	-	-	-	
	External Drums, Tanks, and Piping		BMcD	1215	1215	1215	8322	8322	-	-	-	-	-	
	External Stack		BMcD	1215	1215	1215	8322	8322	-	-	-	-	-	
	MECHANICAL ACCESSORIES		-	-	-	-	-	-	-	-	-	-	-	
	Safety Valves w/ Silencers		BMcD	1215	1215	1215	8322	8322	-	-	-	-	-	
	Control Valve Stations		BMcD	1215	1215	1215	8322	8322	-	8410	1215 / BMcD	1215 / BMcD	1215 / BMcD	
	Flow Elements		BMcD	1215	1215	1215	8322	8322	-	8410	1215 / BMcD	1215 / BMcD	1215 / BMcD	
	Lagging		BMcD	1215	1215	1215	8322	8322	-	-	-	-	-	
	Expansion Joints		BMcD	1215	1215	1215	8322	8322	-	-	-	-	-	
	Scanner Air Blowers		BMcD	1215	1215	1215	8322	8322	8410	8410	1215 / BMcD	1215 / BMcD	1215 / BMcD	
	Ammonia Injection Grid		BMcD	1215	1215	1215	8322	8322	-	-	1215 / BMcD	1215 / BMcD	1215 / BMcD	
	SCR Catalyst		BMcD	1215	1215	1215	8322	8322	-	-	-	-	-	
	CO Catalyst		BMcD	1215	1215	1215	8322	8322	-	-	-	-	-	
	Ammonia Vaporization Skid		BMcD	1215	1215	1215	8322	8322	8410	8410	1215 / BMcD	1215 / BMcD	1215 / BMcD	
	Ammonia Flow Control Skid		BMcD	1215	1215	1215	8322	8322	8410	8410	1215 / BMcD	1215 / BMcD	1215 / BMcD	
	LP Economizer Recirc Pump		BMcD	1215	1215	1215	8322	8322	8410	8410	1215 / BMcD	1215 / BMcD	1215 / BMcD	
	Blowdown System (w/ tanks and piping)		BMcD	1215	1215	1215	8322	8322	8410	8410	1215 / BMcD	1215 / BMcD	1215 / BMcD	
	Piping (including valves, supports, and instruments)		BMcD	1215	1215	1215	8322	8322	-	8410	1215 / BMcD	1215 / BMcD	1215 / BMcD	
	ELECTRICAL ACCESSORIES		-	-	-	-	-	-	-	-	-	-	-	
	Thermocouples		BMcD	1215	1215	1215	8322	8322	-	8410	1215 / BMcD	1215 / BMcD	1215 / BMcD	
	Instruments and Controls		BMcD	1215	1215	1215	8322	8322	-	8410	1215 / BMcD	1215 / BMcD	1215 / BMcD	
	STACK		-	-	-	-	-	-	-	-	-	-	-	
	Exhaust Stack		BMcD	1215	1215	1215	8322	8322	-	-	-	-	-	
	Exhaust Stack Silencer		BMcD	1215	1215	1215	8322	8322	-	-	-	-	-	
	Exhaust Stack Access Platforms		BMcD	1215	1215	1215	8322	8322	-	-	-	-	-	
	CEMS		-	-	-	-	-	-	-	-	-	-	-	
	CEMS Shelter Analyzing Cabinets		BMcD	1215	1215	1215	8322	8322	8410	8410	1215 / BMcD	1215 / BMcD	1215 / BMcD	
	CEMS Analyzing Cabinets		BMcD	1215	1215	1215	8322	8322	8410	8410	1215 / BMcD	1215 / BMcD	1215 / BMcD	
2110	**Feedwater Pumps**													
	Boiler Feedwater Pumps	BMcD	BMcD	2110	2110	2110	8322	8322	8410	8410	BMcD	BMcD	BMcD	
	Boiler Feedwater Lube Oil Pumps		BMcD	2110	2110	2110	8322	8322	8410	8410	BMcD	BMcD	BMcD	
2120	**Circulating Water Pumps**													
	Circulating Water Pumps	BMcD	BMcD	2120	2120	2120	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	Auxiliary Cooling Water Pump		BMcD	2120	2120	2120	8323	8323	8410	8410	BMcD	BMcD	BMcD	
2130	**Condensate Pumps**													
	Condensate Pumps	BMcD	BMcD	2130	2130	2130	8322	8322	8410	8410	BMcD	BMcD	BMcD	
2150	**Fire Water Pumps**													
	Fire Pump Enclosure	BMcD	BMcD	2150	2150	2150	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	Electric Fire Water Pump	BMcD	BMcD	2150	2150	2150	2150	2150	2150	2150	BMcD	BMcD	BMcD	
	Diesel Fire Water Pump	BMcD	BMcD	2150	2150	2150	2150	2150	2150	2150	BMcD	BMcD	BMcD	
	Jockey Pump	BMcD	BMcD	2150	2150	2150	2150	2150	2150	2150	BMcD	BMcD	BMcD	
	Fire Pump Enclosure HVAC		BMcD	2150	2150	2150	2150	2150	2150	2150	BMcD	BMcD	BMcD	
2180	**Sump Pumps**													
	Wastewater Sump Pumps	BMcD	BMcD	2180	2180	2180	8322	8322	8410	8410	BMcD	BMcD	BMcD	
	Water Treatment Building Sump Pumps		BMcD	2180	2180	2180	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	Clearwell Sump Pumps	BMcD	BMcD	2180	2180	2180	8323	8323	8410	8410	BMcD	BMcD	BMcD	
2190	**Miscellaneous Pumps**													
	Clarifier Makeup Pumps	BMcD	BMcD	2190	2190	2190	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	Clarified Water Forwarding Pumps	BMcD	BMcD	2190	2190	2190	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	Cooling Tower Makeup Pumps		BMcD	2190	2190	2190	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	Service Water Pumps	BMcD	BMcD	2190	2190	2190	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	Demineralized Water Pumps	BMcD	BMcD	2190	2190	2190	8323	8323	8410	8410	BMcD	BMcD	BMcD	

Appendix B
Division of Responsibility

Contract No.	Description	Design Criteria / Functional Design	Technical Specification RFP	Detailed Design	Procure / Supply	Fabricate / Deliver	Receive / Maintenance	Erect / Install	Power Wiring	Control Wiring	Testing	Start-up	Commissioning	Remarks
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	Closed Cooling Water Booster Pumps	BMcD	BMcD	2190	2190	2190	8322	8322	8410	8410	BMcD	BMcD	BMcD	
	HRSG Blowdown Sump Pumps	BMcD	BMcD	2190	2190	2190	8322	8322	8410	8410	BMcD	BMcD	BMcD	
	Wastewater Forwarding Pumps	BMcD	BMcD	2190	2190	2190	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	Fuel Oil Forwarding Pumps	BMcD	BMcD	2190	2190	2190	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	Fuel Oil Unloading Pumps	BMcD	BMcD	2190	2190	2190	8323	8323	8410	8410	BMcD	BMcD	BMcD	
2191	**Lift Stations**													
	Admin/Control Room Sanitary Lift Station (Sump, Pumps, Controls and Instrumentation)	BMcD	BMcD	2191	2191	2191	8220	8220	8410	8410	BMcD	BMcD	BMcD	
	STG Powerhouse Sanitary Lift Station (Sump, Pumps, Controls and Instrumentation)	BMcD	BMcD	2191	2191	2191	8220	8220	8410	8410	BMcD	BMcD	BMcD	
	Fab/I&C Tech Shop Sanitary Lift Station (Sump, Pumps, Controls and Instrumentation)		BMcD	2191	2191	2191	8220	8220	8410	8410	BMcD	BMcD	BMcD	
	Wastewater Lift Station (Sump, Pumps, Controls and Instrumentation)		BMcD	2191	2191	2191	8220	8220	8410	8410	BMcD	BMcD	BMcD	
	Coal Runoff Pond Lift Station (Sump, Pumps, Controls and Instrumentation)		BMcD	2191	2191	2191	8220	8220	8410	8410	BMcD	BMcD	BMcD	
	Landfill Leachate Pond Lift Station (Sump, Pumps, Controls and Instrumentation)		BMcD	2191	2191	2191	8220	8220	8410	8410	BMcD	BMcD	BMcD	
	Unit 1&2 WWT Drains and Clarifier Lift Station (Sump, Pumps, Controls and Instrumentation)		BMcD	2191	2191	2191	8220	8220	8410	8410	BMcD	BMcD	BMcD	
2220	**Surface Condenser**													
	Condenser Waterbox	BMcD	BMcD	2220	2220	2220	8322	8322	-	-	BMcD	BMcD	BMcD	
	Tube Sheets	BMcD	BMcD	2220	2220	2220	8322	8322	-	-	BMcD	BMcD	BMcD	
	Expansion Joints	BMcD	BMcD	2220	2220	2220	8322	8322	-	-	BMcD	BMcD	BMcD	
	Sparger Tubes	BMcD	BMcD	2220	2220	2220	8322	8322	-	-	BMcD	BMcD	BMcD	
	Distrubution Piping		BMcD	2220	2220	2220	8322	8322	-	-	BMcD	BMcD	BMcD	
	Flash Box		BMcD	2220	2220	2220	8322	8322	-	-	BMcD	BMcD	BMcD	
	Vacuum Pumps		BMcD	2220	2220	2220	8322	8322	8410	8410	BMcD	BMcD	BMcD	
	Vacuum Pump Heat Exchangers		BMcD	2220	2220	2220	8322	8322	-	-	8322	BMcD	BMcD	
	Vacuum Pump Recirc Pumps		BMcD	2220	2220	2220	8322	8322	8410	8410	BMcD	BMcD	BMcD	
	Vacuum Pump Separator Tanks		BMcD	2220	2220	2220	8322	8322	-	-	8322	BMcD	BMcD	
2280	**Plate and Frame Heat Exchangers**													
	Closed Cooling Water Heat Exchangers	BMcD	BMcD	2280	2280	2280	8322	8322	-	-	BMcD	BMcD	BMcD	
	Auto Backwash Strainer		BMcD	2280	2280	2280	8322	8322	8410	8410	BMcD	BMcD	BMcD	
2310	**Critical Pipe**													
	Critical Pipe	BMcD	BMcD	2310	2310	2310	8322	8322	-	-	8322	-	-	
2320	**General Service Pipe**													
	Below Grade BOP Pipe	BMcD	BMcD	2320	2320	2320	8220	8220	-	-	8220	-	-	
	Above Grade BOP Pipe		BMcD	2320	2320	2320	8322 / 8323	8322 / 8323	-	-	8322 / 8323	-	-	
2330	**Critical Pipe Supports**													
	Critical Pipe Supports	BMcD	BMcD	2330	2330	2330	8322	8322	-	-	8322	-	-	
2340	**General Service Pipe Supports**													
	General Service Pipe Supports	BMcD	BMcD	2340	2340	2340	8322 / 8323	8322 / 8323	-	-	8322 / 8323	-	-	
2350	**Concrete Circulating Water Pipe**													
	Buried Concrete Circulating Water Pipe	BMcD	BMcD	2350	2350	2350	8220	8220	-	-	8220	-	-	
	AG Steel Circulating Water Pipe		BMcD	2350	2350	2350	8322	8322	-	-	8322	-	-	
2490	**Miscellaneous Piping Specials**													
	Relief Valves	BMcD	BMcD	2490	2490	2490	8322 / 8323	8322 / 8323	-	-	-	-	-	
	Steam Traps		BMcD	2490	2490	2490	8322 / 8323	8322 / 8323	-	-	-	-	-	
	ARC Valves		BMcD	2490	2490	2490	8322 / 8323	8322 / 8323	-	-	-	-	-	
	Regulators	BMcD	BMcD	2490	2490	2490	8322 / 8323	8322 / 8323	-	-	-	-	-	
	Strainers		BMcD	2490	2490	2490	8322 / 8323	8322 / 8323	-	-	-	-	-	
	Expansion Joints		BMcD	2490	2490	2490	8322 / 8323	8322 / 8323	-	-	-	-	-	
	Flexible Hoses		BMcD	2490	2490	2490	8322 / 8323	8322 / 8323	-	-	-	-	-	
	Drip-Pan Elbows		BMcD	2490	2490	2490	8322 / 8323	8322 / 8323	-	-	-	-	-	
	Safety Showers/Eye Washes		BMcD	2490	2490	2490	8322 / 8323	8322 / 8323	8410	8410	8322 / 8323	BMcD	BMcD	
	Instantaneous Elecric Water Heaters		BMcD	2490	2490	2490	8322 / 8323	8322 / 8323	8410	8410	8410	BMcD	BMcD	
	Backflow Preventers		BMcD	2490	2490	2490	8322 / 8323	8322 / 8323	-	-	-	-	-	
	Chemical Injection Quill/Corporation Stops		BMcD	2490	2490	2490	8322 / 8323	8322 / 8323	-	-	-	-	-	
	Insulating Flange Kits		BMcD	2490	2490	2490	8322 / 8323	8322 / 8323	-	-	-	-	-	
	Water Nozzles		BMcD	2490	2490	2490	8322 / 8323	8322 / 8323	-	-	-	-	-	
	Restricting Orifices		BMcD	2490	2490	2490	8322 / 8323	8322 / 8323	-	-	-	-	-	
	Hose Bibs	BMcD	BMcD	2490	2490	2490	8322 / 8323	8322 / 8323	-	-	-	-	-	
	Chemical Feed Injection Pot		BMcD	2490	2490	2490	8322 / 8323	8322 / 8323	-	-	-	-	-	
	Potable Water Heater Tank/Booster Pump Skid	BMcD	BMcD	2490	2490	2490	8322 / 8323	8322 / 8323	8410	8410	8322 / 8323	BMcD	BMcD	
2491	**Below Grade Piping Specials**													
	Fire Hydrants	BMcD	BMcD	2491	2491	2491	8220	8220	-	-	-	-	-	8220 to excavate & backfill for installation
	Post Indicator Valves	BMcD	BMcD	2491	2491	2491	8220	8220	-	-	-	-	-	8220 to excavate & backfill for installation
	Buried Valves	BMcD	BMcD	2491	2491	2491	8220	8220	-	-	-	-	-	8220 to excavate & backfill for installation
	Drain Hubs, Floor Drains and Cleanouts	BMcD	BMcD	2491	2491	2491	8220	8220	-	-	-	-	-	
2512	**Large Butterfly Valves**													
	Large Butterfly Valves	BMcD	BMcD	2512	2512	2512	8322 / 8323	8322 / 8323	-	8410	8322 / 8323	BMcD	BMcD	
2520	**Valves**													
	Manual Valves	BMcD	BMcD	2520	2520	2520	8322 / 8323	8322 / 8323	-	8410	2520	BMcD	BMcD	
2530	**Control Valves**													
	Control Valves	BMcD	BMcD	2530	2530	2530	8322 / 8323	8322 / 8323	8410	8410	2530	BMcD	BMcD	
2532	**Steam Bypass Valves**													
	Steam Bypass Valves	BMcD	BMcD	2532	2532	2532	8322	8322	-	8410	2532	BMcD	BMcD	
2570	**Fuel Gas Ball Valves**													

Appendix B
Division of Responsibility

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	Emergency Stop and Vent Valves (Actuated)	BMcD	BMcD	2570	2570	2570	8323	8323	8410	8410	2570	BMcD	BMcD	
	Manual Valves	BMcD	BMcD	2570	2570	2570	8322 / 8323	8322 / 8323	-	-	2570	BMcD	BMcD	
2710	**Compressed Air Equipment**													
	Air Compressors	BMcD	BMcD	2710	2710	2710	8322	8322	8410	8410	2710 / BMcD	2710 / BMcD	2710 / BMcD	
	Air Dryers Skids	BMcD	BMcD	2710	2710	2710	8322	8322	8410	8410	2710 / BMcD	2710 / BMcD	2710 / BMcD	
	Central Controller for Air Compressors	BMcD	BMcD	2710	2710	2710	8322	8322	8410	8410	2710 / BMcD	2710 / BMcD	2710 / BMcD	
2750	**Ammonia Storage and Supply**													
	Aqueous Ammonia Storage Tank		BMcD	2750	2750	2750	8323	8323	-	8410	2750 / BMcD	2750 / BMcD	2750 / BMcD	
	Aqueous Ammonia Forwarding Pumps		BMcD	2750	2750	2750	8323	8323	8410	8410	2750 / BMcD	2750 / BMcD	2750 / BMcD	
2762	**Fuel Gas Conditioning**													
	CTG Fuel Gas Dewpoint Heater Skids	BMcD	BMcD	2762	2762	2762	8323	8323	8410	8410	2762 / BMcD	2762 / BMcD	2762 / BMcD	Shipped Loose Expansion Tank, Stack and other auxiliaries
	CTG Fuel Oil Heater Skid		BMcD	2762	2762	2762	8323	8323	8410	8410	2762 / BMcD	2762 / BMcD	2762 / BMcD	
	CTG Fuel Gas Filter/Separator Skid	BMcD	BMcD	2762	2762	2762	8323	8323	8410	8410	2762 / BMcD	2762 / BMcD	2762 / BMcD	Shipped Loose Piping, Ladder and other Auxiliaries
	CTG Fuel Gas Filter/Separator Skid Drains Tanks		BMcD	2762	2762	2762	8323	8323	8410	8410	2762 / BMcD	2762 / BMcD	2762 / BMcD	
	CTG Main Fuel Gas Pressure Regulating/Metering Skid	BMcD	BMcD	2762	2762	2762	8323	8323	-	8410	2762 / BMcD	2762 / BMcD	2762 / BMcD	
	CTG House Gas Pressure Regulating/Metering Skid	BMcD	BMcD	2762	2762	2762	8323	8323	-	8410	2762 / BMcD	2762 / BMcD	2762 / BMcD	
2910	**Auxiliary Boiler**													
	Auxiliary Boiler		BMcD	2910	2910	2910	8322	8322	8410	8410	2910 / BMcD	2910 / BMcD	2910 / BMcD	
	Auxiliary Boiler Blowdown Tank		BMcD	2910	2910	2910	8322	8322	-	8410	2910 / BMcD	2910 / BMcD	2910 / BMcD	
	Auxiliary Boiler Deaerator		BMcD	2910	2910	2910	8322	8322	-	8410	2910 / BMcD	2910 / BMcD	2910 / BMcD	
	Auxiliary Boiler FD Fan		BMcD	2910	2910	2910	8322	8322	8410	8410	2910 / BMcD	2910 / BMcD	2910 / BMcD	
	Auxiliary Boiler Feedwater Pumps		BMcD	2910	2910	2910	8322	8322	8410	8410	2910 / BMcD	2910 / BMcD	2910 / BMcD	
	Auxiliary Steam Electric Superheater		BMcD	2910	2910	2910	8322	8322	8410	8410	2910 / BMcD	2910 / BMcD	2910 / BMcD	
2940	**Oil Water Separator/UG Tanks**													
	Oil Water Separators	BMcD	BMcD	2940	2940	2940	8220	8220	-	-	2940	BMcD	BMcD	8220 to provide Excavation and Backfill and concrete holddown installation
	Tank Risers and Accessories	BMcD	BMcD	2940	2940	2940	8220	8220	-	-	2940	BMcD	BMcD	Shipped Loose
	Control Panels & Instrumentation	BMcD	BMcD	2940	2940	2940	8220	8220	8410	8410	2940	BMcD	BMcD	Shipped Loose
	CTG Wash Water Drains Tanks	BMcD	BMcD	2940	2940	2940	8220	8220	-	-	2940	BMcD	BMcD	8220 to provide Excavation and Backfill and concrete holddown installation
2980	**Shop Fabricated Tanks**													
	Powerhouse Wet Air Receiver	BMcD	BMcD	2980	2980	2980	8322	8322	-	8410	-	BMcD	BMcD	
	Powerhouse Dry Air Receiver	BMcD	BMcD	2980	2980	2980	8322	8322	-	8410	-	BMcD	BMcD	
	Water Treatment Building Air Receiver		BMcD	2980	2980	2980	8323	8323	-	8410	-	BMcD	BMcD	
	Closed Cooling Water Head Tank	BMcD	BMcD	2980	2980	2980	8322	8322	-	8410	-	BMcD	BMcD	
	Closed Cooling Water Chemical Pot Feeder		BMcD	2980	2980	2980	8322	8322	-	8410	-	BMcD	BMcD	
	STG ATM Drains Tank		BMcD	2980	2980	2980	8322	8322	-	8410	-	BMcD	BMcD	
3120	**Circ Water/Cycle Chemical Feed**													
	Cooling Tower Chemical Feed Enclosure	BMcD	BMcD	3120	3120	3120	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	CT Chem Feed Enclosure HVAC		BMcD	3120	3120	3120	-	-	-	-	-	BMcD	BMcD	
	Circulating Water Sample Panel		BMcD	3120	3120	3120	-	-	-	-	-	BMcD	BMcD	
	Cooling Tower Acid Pump Skid		BMcD	3120	3120	3120	-	-	-	-	-	BMcD	BMcD	
	Cooling Tower Sodium Hypochlorite Pump Skid		BMcD	3120	3120	3120	-	-	-	-	-	BMcD	BMcD	
	Cooling Tower Corrosion Inhibitor Storage Tank		BMcD	3120	3120	3120	-	-	-	-	-	BMcD	BMcD	
	Cooling Tower Corrosion Inhibitor Pump Skid		BMcD	3120	3120	3120	-	-	-	-	-	BMcD	BMcD	
	Cooling Tower Anti-Scalant/Dispersant Storage Tank		BMcD	3120	3120	3120	-	-	-	-	-	BMcD	BMcD	
	Cooling Tower AntiScalant/Dispersant Pump Skid		BMcD	3120	3120	3120	-	-	-	-	-	BMcD	BMcD	
	Cooling Tower Sodium Bisulfite Pump Skid		BMcD	3120	3120	3120	-	-	-	-	-	BMcD	BMcD	
	Cooling Tower Acid Storage Tank		BMcD	3120	3120	3120	8323	8323	-	8410	BMcD	BMcD	BMcD	
	Cooling Tower Sodium Hypochlorite Storage Tank		BMcD	3120	3120	3120	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	Auxiliary Boiler Amine/Ammonia Metering Pump Skid		BMcD	3120	3120	3120	8322	8322	8410	8410	BMcD	BMcD	BMcD	
	HRSG HP/IP Phosphate Pump Skids		BMcD	3120	3120	3120	8322	8322	8410	8410	BMcD	BMcD	BMcD	
	Condensate Ammonia Feed Pump Skid		BMcD	3120	3120	3120	8322	8322	8410	8410	BMcD	BMcD	BMcD	
3210	**Raw Water Treatment System**													
	High Rate Contact Clarifiers	BMcD	BMcD	3210	3210	3210	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	Clarifier Rapid Mixer and Tank		BMcD	3210	3210	3210	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	Clarifier Slow Mixer and Tank		BMcD	3210	3210	3210	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	Clarifier Flocculation Mixer		BMcD	3210	3210	3210	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	Clarifier Sludge Recycle Pump Skids		BMcD	3210	3210	3210	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	Clarifier Sludge Waste Pump Skids		BMcD	3210	3210	3210	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	Clarifier Sludge Holding Tank		BMcD	3210	3210	3210	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	Clarifier Sludge Holding Tank Mixer		BMcD	3210	3210	3210	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	Filter Press Feed Pump Skid		BMcD	3210	3210	3210	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	Filter Presses		BMcD	3210	3210	3210	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	Multimedia Filters (MMF)		BMcD	3210	3210	3210	8323	8323	-	8410	BMcD	BMcD	BMcD	
	MMF Face Piping Skids		BMcD	3210	3210	3210	8323	8323	-	8410	BMcD	BMcD	BMcD	
	MMF Air Scour Blower Skid		BMcD	3210	3210	3210	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	MMF Backwash Pump Skid		BMcD	3210	3210	3210	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	Clarifier Polymer Tote Mixers		BMcD	3210	3210	3210	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	Clarifier Polymer Feed Pump Skid		BMcD	3210	3210	3210	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	Clarifier Polymer Blending System		BMcD	3210	3210	3210	8323	8323	-	8410	BMcD	BMcD	BMcD	
	Filter Press Feed Polymer Pump Skid		BMcD	3210	3210	3210	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	Filter Press Feed Polymer Blending System		BMcD	3210	3210	3210	8323	8323	-	8410	BMcD	BMcD	BMcD	
	Clarifier Coagulant Feed Pump Skid		BMcD	3210	3210	3210	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	Clarifier Coagulant Storage Tank		BMcD	3210	3210	3210	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	Clarifier Sodium Hydroxide Feed Pump Skid		BMcD	3210	3210	3210	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	Clarifier Sodium Hypochlorite Feed Pump Skid		BMcD	3210	3210	3210	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	Service Water Sodium Hypochlorite Feed Pump Skid		BMcD	3210	3210	3210	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	UF Sodium Hypochlorite Feed Pump Skid		BMcD	3210	3210	3210	8323	8323	8410	8410	BMcD	BMcD	BMcD	
3220	**Demineralized Water System**													

Appendix B
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Contract No.	Description	Design Criteria / Functional Design	Technical Specification RFP	Detailed Design	Procure / Supply	Fabricate / Deliver	Receive / Maintenance	Erect / Install	Power Wiring	Control Wiring	Testing	Start-up	Commissioning	Remarks
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	Ultra Filtration (UF) Cartridge Filter Skid		BMcD	3220	3220	3220	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	UF Feed Pump Skid		BMcD	3220	3220	3220	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	UF Trains		BMcD	3220	3220	3220	8323	8323	-	8410	BMcD	BMcD	BMcD	
	UF Backwash Pump Skid		BMcD	3220	3220	3220	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	UF Forwarding Pump Skid		BMcD	3220	3220	3220	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	UF Permeate Tank		BMcD	3220	3220	3220	8323	8323	-	8410	BMcD	BMcD	BMcD	
	Reverse Osmosis (RO) Trains		BMcD	3220	3220	3220	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	1st Pass RO Filter		BMcD	3220	3220	3220	8323	8323	-	-	BMcD	BMcD	BMcD	
	1st Pass RO Booster Pump		BMcD	3220	3220	3220	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	2nd Pass RO Filter		BMcD	3220	3220	3220	8323	8323	-	-	BMcD	BMcD	BMcD	
	2nd Pass RO Booster Pump		BMcD	3220	3220	3220	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	RO Cartridge Filter		BMcD	3220	3220	3220	8323	8323	-	-	BMcD	BMcD	BMcD	
	RO Permeate Tank		BMcD	3220	3220	3220	8323	8323	-	8410	BMcD	BMcD	BMcD	
	RO Permeate Forwarding Pump Skid		BMcD	3220	3220	3220	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	Chemically Enhanced Backwash (CEB) Neutralization Tank		BMcD	3220	3220	3220	8323	8323	-	8410	BMcD	BMcD	BMcD	
	CEB Neutralization Pump Skid		BMcD	3220	3220	3220	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	Service Deionization (SDI) Manifold		BMcD	3220	3220	3220	8323	8323	-	8410	BMcD	BMcD	BMcD	
	Clean in Place (CIP) Skid		BMcD	3220	3220	3220	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	UF/RO CIP Cartridge Filter		BMcD	3220	3220	3220	8323	8323	-	-	BMcD	BMcD	BMcD	
	UF/RO CIP Tank		BMcD	3220	3220	3220	8323	8323	-	8410	BMcD	BMcD	BMcD	
	UF/RO CIP Tank Heater		BMcD	3220	3220	3220	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	UF/RO CIP Forwarding Pump		BMcD	3220	3220	3220	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	Sodium Hypochlorite Storage Tank		BMcD	3220	3220	3220	8323	8323	-	8410	BMcD	BMcD	BMcD	
	Sodium Hydroxide Storage Tank		BMcD	3220	3220	3220	8323	8323	-	8410	BMcD	BMcD	BMcD	
	Sodium Hydroxide Storage Tank Heater		BMcD	3220	3220	3220	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	UF Sodium Hydroxide Feed Pump Skid		BMcD	3220	3220	3220	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	CEB Neutralization Sodium Hydroxide Feed Pump Skid		BMcD	3220	3220	3220	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	RO Sodium Hydroxide Feed Pump Skid		BMcD	3220	3220	3220	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	Sulfuric Acid Storage Tank		BMcD	3220	3220	3220	8323	8323	-	8410	BMcD	BMcD	BMcD	
	CEB Neutralization Sulfuric Acid Feed Pump Skid		BMcD	3220	3220	3220	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	UF Sulfuric Acid Feed Pump Skid		BMcD	3220	3220	3220	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	RO Sulfuric Acid Feed Pump Skid		BMcD	3220	3220	3220	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	RO Sodium Bisulfate Feed Pump Skid		BMcD	3220	3220	3220	8323	8323	8410	8410	BMcD	BMcD	BMcD	
	RO Anti-Scalant Feed Pump Skid		BMcD	3220	3220	3220	8323	8323	8410	8410	BMcD	BMcD	BMcD	
3310	**Sample Analysis Panel**													
	Sample Analysis Cooler	BMcD	BMcD	3310	3310	3310	8322	8322	8410	8410	BMcD	BMcD	BMcD	
	Sample Analysis Panel		BMcD	3310	3310	3310	8322	8322	8410	8410	BMcD	BMcD	BMcD	
	Condenser Sample Panel		BMcD	3310	3310	3310	8322	8322	8410	8410	BMcD	BMcD	BMcD	
	Condenser Air Removal Sample Panel		BMcD	3310	3310	3310	8322	8322	8410	8410	BMcD	BMcD	BMcD	
4210	**Cranes and Hoists**													
	STG Turbine Crane		BMcD	4210	4210	4210	8322	8322	8410	-	4210	8322 / BMcD	8322 / BMcD	Crane may be used during construction (re-test upon turnover to Contractor).
	WT Building Filter Press Crane		BMcD	4210	4210	4210	8323	8323	8410	-	4210	8323 / BMcD	8323 / BMcD	Crane may be used during construction (re-test upon turnover to Contractor).
	Runway Electrification System (all cranes)	BMcD	BMcD	4210	4210	4210	8410	8410	8410	-	8410	8322 / 8323 / BMcD	8323 / 8323 / BMcD	8410 to install electrification system.
4320	**Elevators**													
	Rack & Pinion HRSG Elevator	BMcD	BMcD	4320	4320	4320	8321	8321	8410	8410	8321 / BMcD	BMcD	BMcD	
4520	**Fabricated Steel**													
	Isophase Support Steel	BMcD	BMcD	BMcD	4520	4520	8321	8321	-	-	-	-	-	
	Pipe/Cable Tray rack and supports	BMcD	BMcD	BMcD	4520	4520	8322 / 8323	8322 / 8323	-	-	-	-	-	
	GSU Access Grating Steel	BMcD	BMcD	BMcD	4520	4520	8321	8321	-	-	-	-	-	
	STG Enclosure Steel	-	-	-	-	-	-	-	-	-	-	-	-	
	High Bay Structure	BMcD	BMcD	BMcD	4520	4520	8321	8321	-	-	-	-	-	
	Low Bay Structure	BMcD	BMcD	BMcD	4520	4520	8321	8321	-	-	-	-	-	
	Roof Deck	BMcD	BMcD	BMcD	4520	4520	8321	8321	-	-	-	-	-	
4525	**Rebar Supply**													
	Rebar for Foundations	BMcD	BMcD	BMcD	4525	4525	8220	8220	-	-	-	-	-	Including ladder & stair landing pads
4570	**Precast Firewalls**													
	Precast Firewalls	BMcD	BMcD	4570	4570	4570	8220	8220	-	-	-	-	-	
4590	**Wind Fence**													
	Wind Fence	BMcD	BMcD	4590	4590	4590	4590	4590	-	-	-	-	-	Furnish and erect contract. Scope can be installed by 8323
	Fence Structural Columns		BMcD	4590	4590	4590	4590	4590	-	-	-	-	-	
	Connection Hardware		BMcD	4590	4590	4590	4590	4590	-	-	-	-	-	
5110	**Generator Step-up Transformers**													
	CTG GSUs - 20kV - 161kV	BMcD	BMcD	5110	5110	5110	5110	5110 / 8315	8410	8410	5110 / 9230	BMcD	BMcD	Receipt, Assembly, Oil Filling, & Transformer Testing by 5110. Setting by 8315.
	STG GSU - 20kV - 161kV	BMcD	BMcD	5110	5110	5110	5110	5110 / 8315	8410	8410	5110 / 9230	BMcD	BMcD	Receipt, Assembly, Oil Filling, & Transformer Testing by 5110. Setting by 8315.
	161kV Jumpers From GSU Bushings to GSU Surge Arrestors	5110	BMcD	5110	5110	5110	5110	5110	5110	-	-	-	BMcD	
5120	**Unit Auxiliary Transformers**													
	Auxiliary Transformers (CTG)	BMcD	BMcD	5120	5120	5120	5120	5120	8410	8410	5120 / 9230	BMcD	BMcD	
5210	**Generator Circuit Breakers**													
	CTG Generator Circuit Breakers (GCB)	BMcD	BMcD	5210	5210	5210	8410	8410	8410	8410	5210 / 9230	BMcD / 5210	BMcD / 5210	BMcD will be responsible for testing plant interfaces
	STG Generator Circuit Breaker (GCB)		BMcD	5210	5210	5210	8410	8410	8410	8410	5210 / 9230	BMcD / 5210	BMcD / 5210	BMcD will be responsible for testing plant interfaces
5220	**Isophase Bus Duct**													
	Isophase Bus Duct (CTG)	BMcD	BMcD	5220	5220	5220	5220	5220	8410	-	5220	BMcD	BMcD	
	Isophase Bus Duct (STG)	BMcD	BMcD	5220	5220	5220	5220	5220	8410	-	5220	BMcD	BMcD	
	Seal Off Bushings At Buidling Wall	BMcD	BMcD	5220	5220	5220	5220	5220	-	-	-	-	-	

Appendix B
Division of Responsibility

Contract No.	Description	Design Criteria / Functional Design	Technical Specification RFP	Detailed Design	Procure / Supply	Fabricate / Deliver	Receive / Maintenance	Erect / Install	Power Wiring	Control Wiring	Testing	Start-up	Commissioning	Remarks
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	2 Hour Firewall Penetrations	BMcD	BMcD	5220	5220	5220	5220	5220	-	-	-	-	-	
	Bus T Tap Connections At Aux Transformer & SFC Switch / VT Cubicle	BMcD	BMcD	5220	5220	5220	5220	5220	8410	-	5220	BMcD	BMcD	
	Generator, Aux Transformer, & GSU Terminal Box enclosures	BMcD	BMcD	5220	5220	5220	5220	5220	8410	8410	5220	BMcD	BMcD	
5240	**Emergency Generators**													
	Auxiliary Generator	BMcD	BMcD	5240	5240	5240	8410	8410	8410	8410	BMcD / 5240 / 9230	BMcD / 5240	BMcD / 5240 / 9230	
5310	**Major Electrical Equipment**													
	MV Switchgear Lineups & Plenums	BMcD	BMcD	5310	5310	5310	8410	8410	8410	8410	BMcD / 5310/ 9230	BMcD / 5310/ 9230	BMcD / 5310/ 9230	
	LV Switchgear Lineups & Plenums	BMcD	BMcD	5320	5320	5320	8410	8410	8410	8410	BMcD / 5320/ 9230	BMcD / 5320/ 9230	BMcD / 5320/ 9230	
	CTG 4.16kV - 480V 2500/3333 kVA	BMcD	BMcD	5325	5325	5325	8410	8410	8410	8410	9230	BMcD / 9230	BMcD / 9230	
	STG 4.16kV - 480V 2500/3333 kVA	BMcD	BMcD	5325	5325	5325	8410	8410	8410	8410	9230	BMcD / 9230	BMcD / 9230	
	480V MCC Lineups	BMcD	BMcD	5330	5330	5330	8410	8410	8410	8410	BMcD	BMcD	BMcD	
	4.16kV CTG Cable Bus	BMcD	BMcD	5340	5340	5340	8410	8410	8410	8410	9230	BMcD	BMcD	
	CTG Generation GSU & T-Line Panels	BMcD	BMcD	5350	5350	5350	8410	8410	8410	8410	9230	BMcD	BMcD	
	STG Generation GSU & T-Line Panels	BMcD	BMcD	5350	5350	5350	8410	8410	8410	8410	9230	BMcD	BMcD	
	Panelboards and Small Transformers	BMcD	BMcD	5440	5440	5440	8410	8410	8410	8410	8410	BMcD	BMcD	
5410	**Batteries & UPS**													
	125VDC Batteries, Disconnects, DC Switchboard, Bypass Transformers & Chargers	BMcD	BMcD	5410	5410	5410	8410	8410	8410	8410	BMcD / 9230	BMcD / 5410	BMcD / 5410	
	UPS, Inverter & Bypass Switch	BMcD	BMcD	5410	5410	5410	8410	8410	8410	8410	BMcD / 9230	BMcD / 5410	BMcD / 5410	
5510	**Electrical Cable**													
	Cable - 15 kV	BMcD	BMcD	5510	5510	5510	8410	8410	8410	8410	9230	BMcD	BMcD	
	Cable - 5 kV	BMcD	BMcD	5510	5510	5510	8410	8410	8410	8410	9230	BMcD	BMcD	
	Cable - 600V Power and Control	BMcD	BMcD	5510	5510	5510	8410	8410	8410	8410	8410	BMcD	BMcD	
	Cable - 600V Instrument	BMcD	BMcD	5510	5510	5510	8410	8410	8410	8410	8410	BMcD	BMcD	
	Cable - Fiber Optic	BMcD	BMcD	5510	5510	5510	8410	8410 / Owner	-	8410 / Owner	Owner	BMcD	BMcD	Cable pulled by 8410. All fiber terminations and testing are By Owner
	Cable - 600V Power and Control (HV Take Off Structure Junction Box to the Generation Facitlity)	BMcD	BMcD	5510	5510	5510	8410	8410	8410	8410	8410	-	BMcD	
5620	**Freeze Protection System**													
	Heat Trace and Freeze Protection System	BMcD	BMcD	BMcD	5620	5620	8410	8410	8410	8410	8410	BMcD	BMcD	Includes Process and Roof and Gutter heat trace.
	Heat Trace Panels	BMcD	BMcD	BMcD	5620	5620	8410	8410	8410	8410	8410	BMcD	BMcD	
6110	**Distributed Control System**													
	BOP DCS	BMcD	BMcD	6110	6110	6110	8410	8410	8410	8410	BMcD / 6110	BMcD / 6110	BMcD / 6110	
	Controls Console	BMcD	BMcD	6110	6110	6110	8410	8410	8410	8410	BMcD	BMcD	BMcD	
6210	**Instruments**													
	Instruments	BMcD	BMcD	6210	6210	6210	8321 / 8322 / 8323	8321 / 8322 / 8323	8410	8410	BMcD / 6210	BMcD	BMcD	Calibrated in Factory
	Pressure/Temperature/Flow Transmitters	BMcD	BMcD	6210	6210	6210	8321 / 8322 / 8323	8321 / 8322 / 8323	8410	8410	BMcD / 6210	BMcD	BMcD	
	Pressure Gauges	BMcD	BMcD	6210	6210	6210	8321 / 8322 / 8323	8321 / 8322 / 8323	-	-	BMcD / 6210	BMcD	BMcD	
	Temperature Gauges	BMcD	BMcD	6210	6210	6210	8321 / 8322 / 8323	8321 / 8322 / 8323	-	-	BMcD / 6210	BMcD	BMcD	
	Thermowells	BMcD	BMcD	6210	6210	6210	8321 / 8322 / 8323	8321 / 8322 / 8323	-	-	BMcD / 6210	BMcD	BMcD	
	RTD and Thermocouples	BMcD	BMcD	6210	6210	6210	8321 / 8322 / 8323	8321 / 8322 / 8323	8410	8410	BMcD / 6210	BMcD	BMcD	
	Flow Elements	BMcD	BMcD	6210	6210	6210	8321 / 8322 / 8323	8321 / 8322 / 8323	-	-	BMcD / 6210	BMcD	BMcD	
6270	**Vibration Monitoring**													
	Vibration Monitoring Equipment	BMcD	BMcD	6270	6270	6270	8321	8321	8410	8410	BMcD / 6270	BMcD	BMcD	Calibrated in Factory
6310	**CEMS**													
	CEMS Enclosures	BMcD	BMcD	6310	6310	6310	8410	8410	8410	8410	6310 / BMcD	6310 / BMcD	6310 / BMcD	Owner to provide gas bottles.
	Umbilical	BMcD	BMcD	6310	6310	6310	8410	8410	8410	8410	6310 / BMcD	6310 / BMcD	6310 / BMcD	
8110	**Site Preparation**													
	Temporary Services													
	Construction Water	-	-	-	8110	8110	8110	8110	-	-	-	-	-	for Contractors Work from Contractor furnished terminal point.
	Construction Temporary Power & Maintenance	-	-	-	8110	8110	8110	8110	-	-	-	-	-	Temporary Power to be provided by Contractor via generators until the temporary power is available from Owner. Temp Power will be shared by all Contractors onsite when they mobilize. Contractor is responsible for temp power for Contractors Work from Contractor furnished terminal point.
	Snow Removal	-	-	-	-	-	8110	8110	-	-	-	-	-	Main site entrance road, plant roads and for Contractors Work Snow Removal responsibility will be turned over to 8220 / 8323 following their mobilization.
	Barricades	-	-	-	8110	8110	8110	8110	-	-	-	-	-	
	Construction Trailers	-	-	-	8110	8110	8110	-	-	-	-	-	-	
	Site Maintenance		-	-	-	-	-	-	-	-	-	-	-	
	Erosion control and SWPPP	BMcD	BMcD	BMcD	8110	8110	8110	8110	-	-	-	-	-	While onsite; Responsibility will be turned over to 8220 following 8110 demobilization.

Appendix B
Division of Responsibility

Contract No.	Description	Design Criteria / Functional Design	Technical Specification RFP	Detailed Design	Procure / Supply	Fabricate / Deliver	Receive / Maintenance	Erect / Install	Power Wiring	Control Wiring	Testing	Start-up	Commissioning	Remarks
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	Dust Control	-	-	-	-	-	8110	8110	-	-	-	-	-	While onsite Responsibility will be turned over to 8220 following 8110 demobilization.
	Miscellaneous		-	-	-	-	-	-	-	-	-	-	-	
	Testing: Compaction	BMcD	BMcD	-	8110	-	-	-	-	-	8110	-	-	
	Licensing	-	-	-	8110	8110	8110	-	-	-	-	-	-	for Contractors Work
	Survey & Layout including setting permanent benchmarks	BMcD	BMcD	8110	8110	8110	-	8110	-	-	-	-	-	Responsible for establishing site monuments & benchmarks. Establish one control drawing for project.
	Civil Work		-	-	-	-	-	-	-	-	-	-	-	
	Clearing, stripping, and stock piling - including all trees, limbs, stumps, and brush.	BMcD	BMcD	BMcD	8110	8110	8110	8110	-	-	-	-	-	
	Stabilized Construction Entrance(s)	BMcD	BMcD	BMcD	8110	8110	8110	8110	-	-	8110	-	-	
	Temporary Roads: Heavy Haul, Laydown, Parking, Trailers, Equipment storage, and assembly areas	BMcD	BMcD	BMcD	8110	8110	8110	8110	-	-	8110	-	-	To remain in place at end of project. All areas to be re-dressed, skimmed, leveled, and graded to drain (as required) upon completion.
	Geotextile and 6" Aggregate Surfacing		-	-	-	-	-	-	-	-	-	-	-	
	Laydown Areas		BMcD	BMcD	8110	8110	8110	8110	-	-	8110	-	-	
	Construction Parking		BMcD	BMcD	8110	8110	8110	8110	-	-	8110	-	-	
	Construction Trailer Area		BMcD	BMcD	8110	8110	8110	8110	-	-	8110	-	-	
	Mass Earthwork, Grading, Bathtubbing	BMcD	BMcD	BMcD	8110	8110	8110	8110	-	-	8110	-	-	Materials assumed to be non-hazardous.
	Stormwater Drainage Piping		BMcD	BMcD	8110	8110	8110	8110	-	-	8110	-	-	
	Dewatering		-	-	-	-	-	-	-	-	-	-	-	
	Existing Coal Pond		BMcD	BMcD	8110	8110	8110	8110	-	-	-	-	-	Assumed existing material can be discharged through existing WWT system to outfall (i.e. no frac trucks)
	Stormwater Management during construction		BMcD	BMcD	8110	8110	8110	8110	-	-	-	-	-	
	Rough and Final Grading & Drainage	BMcD	BMcD	BMcD	8110	8110	8110	8110	-	-	8110	-	-	Materials assumed to be non-hazardous.
	Site Security	-	-	-	-	-	-	-	-	-	-	-	-	
	Security Panels (Large/Small)	Owner	BMcD	BMcD	Owner	Owner	8110	8110	8110	8110/Owner	Owner	Owner	Owner	
	Large/Small Card Readers	Owner	Owner	Owner	Owner	Owner	Owner	Owner	8110	8110/Owner	Owner	Owner	Owner	8110 to install door security wiring per owner's typical install detail. Owner to provide card readers and install.
	Security Servers & Licensing	Owner	Owner	Owner	Owner	Owner	Owner	Owner	-	-	Owner	Owner	Owner	
	Communication Cabinets	Owner	Owner	Owner	8110	8110	8110	8110	8110	8110/Owner	-	-	-	8110 to procure the comms cabinets 8110 to terminate some fiber/Cat6a cables, owner to terminate some. Owner to provide equipment to be housed in communications cabinets.
	Gate Phones	Owner	Owner	Owner	Owner	Owner	Owner	Owner	8110	8110	Owner	Owner	Owner	
	Exit Loops	Owner	BMcD	BMcD	8110	8110	8110	8110	8110	8110	Owner	Owner	Owner	
	NEMA 4X Enclosures/Backplates (gate closure system)	Owner	BMcD	BMcD	8110	8110	8110	8110	8110	8110/Owner	Owner	Owner	Owner	Owner to provide equipment to be located inside enclosures. BMCD to pull cables back to enclosure and provide power to enclosures.
	Door Contacts (Overhead & Magnetic)	Owner	Owner	Owner	Owner	Owner	Owner	Owner	8110	8110/Owner	Owner	Owner	Owner	8110 to install door security wiring per owner's typical install detail. Owner to provide door contacts and install.
	PTZ/Bullet/Dome Cameras and mounts	Owner	BMcD	BMcD	Owner	Owner	8110	8110	8110	8110	Owner	Owner	Owner	
	Wall Mount Cabinets, rack angles, cable manager	Owner	BMcD	BMcD	8110	8110	8110	8110	8110	8110	Owner	Owner	Owner	These will be installed in Urea Storage Building, CEMs enclosures
	Power transfer hinges	Owner	BMcD	BMcD	8110	8110	8110	8110	8110	8110	Owner	Owner	Owner	
	Door TREX Motion Detectors	Owner	Owner	Owner	Owner	Owner	Owner	Owner	8410	8110/Owner	Owner	Owner	Owner	8110 to install door security wiring per owner's typical install detail. Owner to provide motion detectors and install.
	Site Finishes		-	-	-	-	-	-	-	-	-	-	-	
	Pavement / surfacing subgrade preparation	BMcD	BMcD	BMcD	8110	8110	8110	8110	-	-	8110	-	-	
	HMA (light and heavy duty) Pavement	BMcD	BMcD	BMcD	8110	8110	8110	8110	-	-	8110	-	-	HMA to be installed in two (2) phases **Phase 1** - HMA binder coarse, utilized as construction roads/access during project **Phase 2** - by 8140
	Road Bases and Aggregate Surfacing	BMcD	BMcD	BMcD	8110	8110	8110	8110	-	-	8110	-	-	
	Riprap	BMcD	BMcD	BMcD	8110	8110	8110	8110	-	-	-	-	-	
	Signs and Roadway Markings	BMcD	BMcD	BMcD	8110	8110	8110	8110	-	-	-	-	-	
	Temporary Fencing (including gates)	BMcD	BMcD	BMcD	8110	8110	8110	8110	-	-	-	-	-	
8140	**Site Finishes**													
	Temporary Services													
	Construction Water	-	-	-	8140	8140	8140	8140	-	-	-	-	-	for Contractors Work from Contractor furnished terminal point.
	Construction Temporary Power & Maintenance	-	-	-	8140	8140	8140	8140	-	-	-	-	-	Temporary Power to be provided by Contractor via generators until the temporary power is available from Owner. Temp Power will be shared by all Contractors onsite when they mobilize. Contractor is responsible for temp power for Contractors Work from Contractor furnished terminal point.
	Construction Trailers	-	-	-	8140	8140	8140	-	-	-	-	-	-	
	Site Finishes	-	-	-	-	-	-	-	-	-	-	-	-	
	Site Restoration including reseeding	BMcD	BMcD	BMcD	8140	8140	8140	8140	-	-	-	-	-	All disturbed areas to be restored.
	Remove Silt Fencing		BMcD	BMcD	8140	8140	8140	8140	-	-	-	-	-	
	Pipe Bollards	BMcD	BMcD	BMcD	8140	8140	8140	8140	-	-	-	-	-	
	Fencing - Permanent	BMcD	BMcD	BMcD	8140	8140	8140	8140	-	-	-	-	-	
	Concrete Surfacing, including sidewalks and curbs	BMcD	BMcD	BMcD	8140	8140	8140	8140	-	-	-	-	-	
	Repair to Ashpalt Road Surfaces		BMcD	BMcD	8140	8140	8140	8140	-	-	-	-	-	
	HMA (light and heavy duty) Pavement	BMcD	BMcD	BMcD	8140	8140	8140	8140			8140			**Phase 2** - HMA surface coarse; installed during site finishing efforts
8210	**Piling**													

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	Temporary Services													
	Construction Water	-	-	-	8210	8210	8210	8210	-	-	-	-	-	for Contractors Work from Contractor furnished terminal point.
	Construction Temporary Power & Maintenance	-	-	-	8210	8210	8210	8210	-	-	-	-	-	Temporary Power to be provided by Contractor via generators until the temporary power is available from Owner. Temp Power will be shared by all Contractors onsite when they mobilize. Contractor is responsible for temp power for Contractors Work from Contractor furnished terminal point.
	Construction Trailers	-	-	-	8210	8210	8210	-	-	-	-	-	-	
	Miscellaneous	-	-	-	-	-	-	-	-	-	-	-	-	
	Survey & Layout	BMcD	BMcD	BMcD	8210	8210	8210	8210	-	-	8210	8210	8210	
	Test Piling	BMcD	BMcD	BMcD	8210	8210	8210	8210	-	-	8210	-	-	
	Material Testing	BMcD	BMcD	BMcD	8210	-	-	-	-	-	8210	-	-	
	CTG	-	-	-	-	-	-	-	-	-	-	-	-	
	Combustion Turbine Piles	BMcD	BMcD	BMcD	8210	8210	8210	8210	-	-	-	-	-	
	GSU and Aux Transformer Area Piles	BMcD	BMcD	BMcD	8210	8210	8210	8210	-	-	-	-	-	
	Isophase Support Piles	BMcD	BMcD	BMcD	8210	8210	8210	8210	-	-	-	-	-	
	CTG Electrical Building Piles		BMcD	BMcD	8210	8210	8210	8210	-	-	-	-	-	
	HRSG		-	-	-	-	-	-	-	-	-	-	-	
	HRSG Piles		BMcD	BMcD	8210	8210	8210	8210	-	-	-	-	-	
	Stack Piles		BMcD	BMcD	8210	8210	8210	8210	-	-	-	-	-	
	STG	-	-	-	-	-	-	-	-	-	-	-	-	
	Steam Turbine Building Piles	BMcD	BMcD	BMcD	8210	8210	8210	8210	-	-	-	-	-	
	Steam Turbine Piles	BMcD	BMcD	BMcD	8210	8210	8210	8210	-	-	-	-	-	
	GSU and Aux Transformer Area Piles	BMcD	BMcD	BMcD	8210	8210	8210	8210	-	-	-	-	-	
	Isophase Support Piles	BMcD	BMcD	BMcD	8210	8210	8210	8210	-	-	-	-	-	
	Admin Building Piles		BMcD	BMcD	8210	8210	8210	8210	-	-	-	-	-	
	Water Treatment / Yard		-	-	-	-	-	-	-	-	-	-	-	
	Water Treatment Building Piles		BMcD	BMcD	8210	8210	8210	8210	-	-	-	-	-	
	Clarifier Piles		BMcD	BMcD	8210	8210	8210	8210	-	-	-	-	-	
	Clearwell Piles		BMcD	BMcD	8210	8210	8210	8210	-	-	-	-	-	
	Sludge Tank Piles		BMcD	BMcD	8210	8210	8210	8210	-	-	-	-	-	
	Clarified Water Storage Tank Piles		BMcD	BMcD	8210	8210	8210	8210	-	-	-	-	-	
	Service/Fire Water Storage Tank Piles		BMcD	BMcD	8210	8210	8210	8210	-	-	-	-	-	
	Demineralized Water Storage Tank Piles		BMcD	BMcD	8210	8210	8210	8210	-	-	-	-	-	
	Wastewater Storage Tank Piles		BMcD	BMcD	8210	8210	8210	8210	-	-	-	-	-	
	Fuel Oil Storage Tank Piles		BMcD	BMcD	8210	8210	8210	8210	-	-	-	-	-	
	Maintenance and I&C Tech Shop Building Piles		BMcD	BMcD	8210	8210	8210	8210	-	-	-	-	-	
	Cooling Tower Basin Piles		BMcD	BMcD	8210	8210	8210	8210	-	-	-	-	-	
	Cooling Tower Electrical Building Piles		BMcD	BMcD	8210	8210	8210	8210	-	-	-	-	-	
8220	**Foundations and Undergrounds**													
	Temporary Services													
	Construction Water	-	-	-	8220	8220	8220	8220	-	-	-	-	-	for Contractors Work from Contractor furnished terminal point.
	Construction Temporary Power & Maintenance	-	-	-	8220	8220	8220	8220	-	-	-	-	-	Temporary Power to be provided by Contractor via generators until the temporary power is available from Owner. Temp Power will be shared by all Contractors onsite when they mobilize. Contractor is responsible for temp power for Contractors Work from Contractor furnished terminal point.
	Construction Trailers	-	-	-	8220	8220	8220	-	-	-	-	-	-	
	Snow Removal	-	-	-	-	-	8220	8220	-	-	-	-	-	Main site entrance road, plant roads and for Contractors Work Snow Removal responsibility will be turned over to 8323 following their mobilization.
	Site Maintenance													
	Erosion control and SWPPP	BMcD	BMcD	BMcD	8220	8220	8220	8220	-	-	-	-	-	While onsite; Responsibility will be turned over to 8323 following their mobilization.
	Dust Control	-	-	-	-	-	8220	8220	-	-	-	-	-	While onsite Responsibility will be turned over to 83230 following their mobilization.
	Miscellaneous													
	Testing: Compaction, Concrete	BMcD	BMcD	-	8220	-	-	-	-	-	8220	-	-	
	Licensing	-	-	-	8220	8220	8220	-	-	-	-	-	-	for Contractors Work
	Survey & Layout for Contractors Work	BMcD	BMcD	8220	8220	8220	-	8220	-	-	-	-	-	
	Vapor barrier(s)	BMcD	BMcD	BMcD	8220	8220	8220	8220	-	-	-	-	-	
	Rebar/Fiber for Ductbank	BMcD	BMcD	BMcD	8220	8220	8220	8220	-	-	-	-	-	
	Foundations - formwork, shoring/bracing, appurtenances, embeds, cast-in-place anchor bolts, curing, sealing	-	-	-	-	-	-	-	-	-	-	-	-	For details. Supply of Reinforcing by 4525
	Concrete Batch Plant	BMcD	BMcD	8220	8220	8220	8220	8220	-	-	8220	-	-	
	CTG	-	-	-	-	-	-	-	-	-	-	-	-	
	CTG	BMcD	BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	HVAC Foundations	BMcD	BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	BOP Electrical Building and SS XFMR Foundations	BMcD	BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	GSU Transformer Foundations	BMcD	BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Aux Generator Foundation		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Exterior Tank Foundations	BMcD	BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Gas Conditioning Station Foundation	BMcD	BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Power Block Building and Apron(s)	BMcD	BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	

Appendix B
Division of Responsibility

Contract No.	Description	Design Criteria / Functional Design	Technical Specification RFP	Detailed Design	Procure / Supply	Fabricate / Deliver	Receive / Maintenance	Erect / Install	Power Wiring	Control Wiring	Testing	Start-up	Commissioning	Remarks
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	Pipe Support Foundation(s)		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Switchgear leveling channels		BMcD	BMcD	8220	8220	8220	8220	-	-	-	-	-	
	Roadway lighting piers		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Isophase Support Foundations		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	HRSG		-	-	-	-	-	-	-	-	-	-	-	
	HRSG		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	HVAC Foundations		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Electrical Building Foundations		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Stack Foundation		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	BFW Pump Building Foundations		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Pipe Support Foundation(s)		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	STG	-	-	-	-	-	-	-	-	-	-	-	-	
	STG Building and Apron(s)	BMcD	BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	HVAC Foundations	BMcD	BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	BOP Electrical Room and SS XFMR Foundations	BMcD	BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Admin Building Foundations		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Aux Boiler Room Foundations		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	GSU Transformer Foundations	BMcD	BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Aux Generator Foundation		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Exterior Tank Foundations	BMcD	BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Power Block Building and Apron(s)	BMcD	BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Pipe Support Foundation(s)		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Switchgear leveling channels		BMcD	BMcD	8220	8220	8220	8220	-	-	-	-	-	
	Roadway lighting piers		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Isophase Support Foundations		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Cooling Tower Foundations		-	-	-	-	-	-	-	-	-	-	-	
	Cooling Tower Basin Foundation		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Cooling Tower Chemical Feed Enclosure		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Cooling Tower Chemical Truck Unloading Pad Foundation		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Cooling Tower Electrical Building Foundation		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Fuel Oil Tank and Containment		-	-	-	-	-	-	-	-	-	-	-	
	Fuel Oil Tank Foundations		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Fuel Oil Tank Containment Foundation		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Fuel Oil Unloading and Transfer Pumps Containment Foundation		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Fuel Oil Truck Unloading Pad Foundation		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Maintenance and I&C Tech Shop Building Foundation	-	-	-	-	-	-	-	-	-	-	-	-	
	Building and Apron(s)	BMcD	BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Water Treatment Building and Yard		-	-	-	-	-	-	-	-	-	-	-	
	Water Treatment Building Foundation		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Water Treatment Building Electrical Room and SS XFMR Foundations		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Water Treatment Chemical Storage Tank Containment Foundations		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Water Treatment Chemical Truck Unloading Pad Foundation		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Clarifier Foundations		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Sludge Tank Foundation		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Clearwell Foundation		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Clarified Water Storage Tank Foundation		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Service/Fire Water Storage Tank Foundatiob		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Demineralized Storage Tank Foundation		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Wastewater Storage Tank Foundation		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Fire Water Enclosure Foundation		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Misc. Yard Compressed Gas Equipment Foundations		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Misc. Yard Natural Gas Equipment Foundations		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Misc. Buried Tank Foundations (Oil/Water Separators, False Start Drains Tanks, Lift Stations)		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Clarifier Makeup Uility Rack Foundations		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Ammonia Forwarding Pump Foundation		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Wastewater Forwarding Pump Foundation		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Minor Foundations	-	-	-	-	-	-	-	-	-	-	-	-	
	Door Stoops and Approach Slabs	BMcD	BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	To be protected down below frost line.
	Ladder and Stair Landings	BMcD	BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	Not required to be protected down to frost
	Clean out cover small pads	BMcD	BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	Not required to be protected down to frost
	Excavation, backfill and compaction for all civil, mech and elec	BMcD	BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Mechanical Underground(s) - piping, fittings.	-	-	-	-	-	-	-	-	-	-	-	-	
	Storm Sewer System	BMcD	BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Storm Sewer System for down spouts	BMcD	BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	From in-slab roof drains to storm system
	Potable Water System		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	-	-	
	Connection to Site Potable Water Main	BMcD	BMcD	BMcD	8220	8220	8220	8220	-	-	8220	BMcD	BMcD	Including Hot Tap; Inspection/permit cost by BMcD
	Compresed Air System		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	BMcD	BMcD	
	Sanitary Sewer System	BMcD	BMcD	BMcD	8220	8220	8220	8220	-	-	8220	BMcD	BMcD	PVC sanitary sewer in under buildings to '5' ft outside foundation.
	Fire Protection System		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	BMcD	BMcD	
	Connection to Site Fire Protection Water Main		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	8220	8220	
	Clarified/Service Water Supply		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	BMcD	BMcD	
	Circulating Water System		BMcD	BMcD	2360	2360	8220	8220	-	-	8220	BMcD	BMcD	
	Demineralized Water System		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	BMcD	BMcD	
	Fuel Gas System		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	BMcD	BMcD	
	Plant Drains / Oily Drains		BMcD	BMcD	8220	8220	8220	8220	-	-	8220	BMcD	BMcD	

Appendix B
Division of Responsibility

Contract No.	Description	Design Criteria / Functional Design	Technical Specification RFP	Detailed Design	Procure / Supply	Fabricate / Deliver	Receive / Maintenance	Erect / Install	Power Wiring	Control Wiring	Testing	Start-up	Commissioning	Remarks
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	Storm Drain Piping	BMcD	BMcD	BMcD	8220	8220	8220	8220	-	-	-	BMcD	BMcD	In CTG Building Slab to 5' outside of building foundation.
	Electrical Underground(s)	-	-	-	-	-	-	-	-	-	-	-	-	
	Duct bank(s), electrical conduit, turn-ups, pull boxes	BMcD	BMcD	BMcD	8220	8220	8220	8220	-	-	8220	8410	8410	Concrete by 8220
	Below Grade Conduit / Ductbank (For HV Take Off Structures)	BMcD	BMcD	BMcD	8220	8220	8220	8220	-	-	-	-	-	
	Grounding Grid	BMcD	BMcD	BMcD	8220	8220	8220	8220	-	-	8220	8410	8410	
	Below Grade Grounding (For HV Take Off Structures)	BMcD	BMcD	BMcD	8220	8220	8220	8220	-	-	-	-	-	
	Roadway lighting conduit(s)	BMcD	BMcD	BMcD	8220	8220	8220	8220	-	-	8220	8410	8410	Coordinate with 8211 on installation
8240	**Structural Steel Erection**													
	Temporary Services													
	Construction Water	-	-	-	8240	8240	8240	8240	-	-	-	-	-	for Contractors Work from Contractor furnished terminal point.
	Construction Temporary Power & Maintenance	-	-	-	8240	8240	8240	8240	-	-	-	-	-	Temporary Power to be provided by Contractor via generators until the temporary power is available from Owner. Temp Power will be shared by all Contractors onsite when they mobilize. Contractor is responsible for temp power for Contractors Work from Contractor furnished terminal point.
	Construction Trailers	-	-	-	8240	8240	8240	-	-	-	-	-	-	
	Miscellaneous	-	-	-	-	-	-	-	-	-	-	-	-	
	Survey & Layout	BMcD	BMcD	BMcD	8240	8240	8240	8240	-	-	8240	8240	8240	
	Post-Installed Anchor Bolts	-	-	-	-	-	-	-	-	-	-	-	-	
	Large Pipe Support Supplemental Steel & Racks	BMcD	BMcD	BMcD	8240	8240	8240	8240	-	-	-	-	-	
	Electrical Supports		BMcD	BMcD	8240	8240	8240	8240	-	-	-	-	-	
	Building Framed Openings		BMcD	BMcD	8240	8240	8240	8240	-	-	-	-	-	
	Stick-Built Building Steel		-	-	-	-	-	-	-	-	-	-	-	
	STG Building Steel		BMcD	BMcD	8240	8240	8240	8240	-	-	8240	-	-	
	Admin/Control Building Steel		BMcD	BMcD	8240	8240	8240	8240	-	-	8240	-	-	
	Cooling Tower Electrical Building Steel		BMcD	BMcD	8240	8240	8240	8240	-	-	8240	-	-	
	Main GTG Electrical Building Steel		BMcD	BMcD	8240	8240	8240	8240	-	-	8240	-	-	
	BFW Pump Buildings Steel		BMcD	BMcD	8240	8240	8240	8240	-	-	8240	-	-	
	Water Treatment Electrical Room and Mezzanine Building Steel		BMcD	BMcD	8240	8240	8240	8240	-	-	8240	-	-	
	Misc. Pipe Rack Steel		BMcD	BMcD	8240	8240	8240	8240	-	-	8240	-	-	
	Miscellaneous Structural Steel		-	-	-	-	-	-	-	-	-	-	-	
	Platform Structures		BMcD	BMcD	8240	8240	8240	8240	-	-	8240	-	-	
	Pipe Support Supplemental Steel		BMcD	BMcD	8240	8240	8240	8240	-	-	8240	-	-	
	Stairs		BMcD	BMcD	8240	8240	8240	8240	-	-	8240	-	-	
	Ladders		BMcD	BMcD	8240	8240	8240	8240	-	-	8240	-	-	
	Handrail		BMcD	BMcD	8240	8240	8240	8240	-	-	8240	-	-	
	Grating/Floor Plate		BMcD	BMcD	8240	8240	8240	8240	-	-	8240	-	-	
	Canopies		BMcD	BMcD	8240	8240	8240	8240	-	-	8240	-	-	
	Steel Decking		BMcD	BMcD	8240	8240	8240	8240	-	-	8240	-	-	
	Misc. Steel (Bar Joist, Moment Connections Bolted & Welded, Kickers, etc)		BMcD	BMcD	8240	8240	8240	8240	-	-	8240	-	-	
	Instrument Tubing, fittings, valves	BMcD	BMcD	BMcD	8240	8240	8240	8240	-	-	8240	BMcD	BMcD	As required for Instrument and actuated valve installations.
	Grouting	-	-	-	-	-	-	-	-	-	-	-	-	
	Structural steel	BMcD	BMcD	BMcD	8240	8240	8240	8240	-	-	8240	-	-	
	Pipe Supports	BMcD	BMcD	BMcD	8240	8240	8240	8240	-	-	8240	-	-	
	Equipment	BMcD	BMcD	BMcD	8240	8240	8240	8240	-	-	8240	-	-	
8315	**Heavy Haul**													
	Temporary Services		-	-	-	-	-	-	-	-	-	-	-	
	Construction Temporary Power & Maintenance	-	-	-	8315	8315	8315	8315	-	-	-	-	-	Temporary Power to be provided by Contractor via generators until the temporary power is available from Owner. Temp Power will be shared by all Contractors onsite when they mobilize. Contractor is responsible for temp power for Contractors Work from Contractor furnished terminal point.
	Construction Trailers	-	-	-	8315	8315	8315	8315	-	-	-	-	-	
	Heavy Haul		-	-	-	-	-	-	-	-	-	-	-	
	Combustion Turbines		BMcD	BMcD	8315	8315	8315	8315	-	-	-	-	-	
	Combustion Turbine Generators		BMcD	BMcD	8315	8315	8315	8315	-	-	-	-	-	
	Steam Turbine		BMcD	BMcD	8315	8315	8315	8315	-	-	-	-	-	
	Steam Turbine Generator		BMcD	BMcD	8315	8315	8315	8315	-	-	-	-	-	
	Generator Step-Up Transformers (GSUs)		BMcD	BMcD	8315	8315	8315	8315	-	-	-	-	-	
	HRSG Modules/Bundles		BMcD	BMcD	8315	8315	8315	8315	-	-	-	-	-	
8321	**Mechanical Construction - CTG's & STG**													
	Temporary Services													
	Construction Water	-	-	-	8321	8321	8321	8321	-	-	-	-	-	for Contractors Work from Contractor furnished terminal point.
	Construction Temporary Power & Maintenance	-	-	-	8321	8321	8321	8321	-	-	-	-	-	Temporary Power to be provided by Contractor via generators until the temporary power is available from Owner. Temp Power will be shared by all Contractors onsite when they mobilize. Contractor is responsible for temp power for Contractors Work from Contractor furnished terminal point.
	Construction Trailers	-	-	-	8321	8321	8321	-	-	-	-	-	-	
	Snow Removal	-	-	-	-	-	8321	8321	-	-	-	-	-	
	Miscellaneous	-	-	-	-	-	-	-	-	-	-	-	-	
	Survey & Layout	BMcD	BMcD	BMcD	8321	8321	8321	8321	-	-	8321	8321	8321	

Appendix B
Division of Responsibility

Contract No.	Description	Design Criteria / Functional Design	Technical Specification RFP	Detailed Design	Procure / Supply	Fabricate / Deliver	Receive / Maintenance	Erect / Install	Power Wiring	Control Wiring	Testing	Start-up	Commissioning	Remarks
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	SWPPP Maintenance	BMcD	BMcD	BMcD	8321	8321	8321	8321	-	-	8321	8321	8321	
	Dust Control		-	-	-	-	8321	8321	-	-	-	-	-	
	Initial Fills & Consumables		-	-	Owner	-	8321	-	-	-	-	8321	8321	8321 to support first fills for turbine oils, gases, and fuels
	Post-Installed Anchor Bolts	-	-	-	-	-	-	-	-	-	-	-	-	
	Equipment	BMcD	BMcD	BMcD	8321	8321	8321	8321	-	-	-	-	-	
	Pipe Supports & Supplemental Steel	BMcD	BMcD	BMcD	8321	8321	8321	8321	-	-	-	-	-	
	Electrical Supports		BMcD	BMcD	8321	8321	8321	8321	-	-	-	-	-	
	Building Framed Openings		BMcD	BMcD	8321	8321	8321	8321	-	-	-	-	-	
	PEMB Auxiliaries		-	-	-	-	-	-	-	-	-	-	-	
	Snow Guards		BMcD	BMcD	8321	8321	8321	8321	-	-	-	-	-	
	Grout		BMcD	8321	8321	8321	8321	8321	-	-	8321	-	-	For all Building Columns
	Architectural Finishes	-	-	-	-	-	-	-	-	-	-	-	-	
	Room Finishes	BMcD	BMcD	8321	8321 / 8530	8321 / 8530	8321	8321	-	-	-	-		including 2-Hour Rated Wall & Ceiling Systems
	Suspended ceilings	BMcD	BMcD	8321	8321	8321	8321	8321	-	-	-	-		
	Plumbing Schedules	BMcD	BMcD	BMcD	8321	8321	8321	8321	-	-	8321	-	-	Final color to be selected by owner
	In-Wall Blocking / fixture carriers	BMcD	BMcD	8321	8321	8321	8321	8321	-	-	-	-	-	
	Doors, Windows, and Hardware	BMcD	BMcD	BMcD	8321 / 8530	8321 / 8530	8321	8321	-	-	-	-	-	
	Sectional door(s)	BMcD	BMcD	BMcD	8321 / 8530	8321 / 8530	8321	8321	8410	8410	8321	8321	-	
	Interior Signage	BMcD	BMcD	BMcD	8321	8321	8321	8321	-	-	-	-	-	
	Building Shell & Appurtenances	-	-	-	-	-	-	-	-	-	-	-	-	STG/Electrical/Admin Building
	Masonry Wall System(s) & Appurtenances	BMcD	BMcD	BMcD	8321 / 8530	8321 / 8530	8321	8321	-	-	-	-	-	8560 furnish masonry for STG building
	Perforated Metal Wall System(s) & Appurtenances	BMcD	BMcD	BMcD	8321 / 8530	8321 / 8530	8321	8321	-	-	-	-	-	8560 furnish and erect PEMB and furnish siding/roofing/doors/windows/hardware/thermal protect/interior finishes for stick built buildings.
	Partition Wall System(s) & Appurtenances	BMcD	BMcD	BMcD	8321 / 8530	8321 / 8530	8321	8321	-	-	-	-	-	
	Roof Access Platform, Ladder, & Scuttle	BMcD	BMcD	8321	8321 / 8530	8321 / 8530	8321	8321	-	-	-	-	-	
	Standing Seam Metal Roof, Curbs, & Appurtenances	BMcD	BMcD	8321	8321 / 8530	8321 / 8530	8321	8321	-	-	-	-	-	
	Entry Door Canopies	BMcD	BMcD	8321	8321 / 8530	8321 / 8530	8321	8321	-	-	-	-	-	
	Gutter(s) & Downspout(s)	BMcD	BMcD	8321	8321	8321	8321	8321	-	-	-	-	-	
	Building Penetrations (Interior & Exterior)	-	-	-	-	-	-	-	-	-	-	-	-	
	Misc exterior wall and roof penetrations sealing	BMcD	BMcD	N/A	8321 / 8410 / 8340 / 8560	8321 / 8410 / 8340 / 8560	8321 / 8410 / 8340 / 8560	8321 / 8410 / 8340 / 8560	-	-	-	-	-	All penetrations by other Contractors shall be sealed by the respective Contractor.
	Interior wall - All fire stopping, sealing and caulking Misc. items	BMcD	BMcD	BMcD	8321 / 8410 / 8340 / 8560	8321 / 8410 / 8340 / 8560	8321 / 8410 / 8340 / 8560	8321 / 8410 / 8340 / 8560	-	-	-	-	-	All installed Work by 8321 shall be sealed by 8321. All penetrations by other Contractors shall be sealed by the respective Contractor.
	Roof Access Curb		BMcD	8321	8321	8321	8321	8321	-	-	-	-	-	
	Roof Tie-off Posts & System		BMcD	8321	8321	8321	8321	8321	-	-	-	-	-	
	Mechanical Aboveground(s) - piping, fittings, hardware to / from tie-in(s) to / from terminal point(s)	-	-	-	-	-	-	-	-	-	-	-	-	
	Auxiliary Steam System		BMcD	BMcD	8321	8321	8321	8321	-	-	8321	BMcD	BMcD	
	Fuel Gas System	BMcD	BMcD	BMcD	8321	8321	8321	8321	-	-	8321	BMcD	BMcD	
	Fuel Oil System		BMcD	BMcD	8321	8321	8321	8321	-	-	8321	BMcD	BMcD	
	Lubricating Oil System	BMcD	BMcD	BMcD	8321	8321	8321	8321	-	-	8321	BMcD	BMcD	
	Turbine Vents and Drains System	BMcD	BMcD	BMcD	8321	8321	8321	8321	-	-	8321	BMcD	BMcD	
	Steam System		-	-	-	-	-	-	-	-	-	-	-	
	Main Steam		BMcD	BMcD	8321	8321	8321	8321	-	-	8321	BMcD	BMcD	
	Cold Reheat Steam		BMcD	BMcD	8321	8321	8321	8321	-	-	8321	BMcD	BMcD	
	Hot Reheat Steam		BMcD	BMcD	8321	8321	8321	8321	-	-	8321	BMcD	BMcD	
	Plumbing - Above grade piping, hangers, supports, valves, fittings, specialties, appurtenances, insulation, etc.	-	-	-	-	-	-	-	-	-	-	-	-	8220 - furnish and install floor drains, cleanouts, and stub-ups to A/G sanitary system terminal point(s).
	Domestic Water System	BMcD	BMcD	BMcD	8321	8321	8321	8321	-	-	8321	8321 / BMcD	8321 / BMcD	System to be sanitized.
	Sanitary System (including vents, drains)	BMcD	BMcD	BMcD	8321	8321	8321	8321	-	-	8321	8321	8321	
	Plumbing Fixtures	BMcD	BMcD	BMcD	8321	8321	8321	8321	-	-	8321	8321	8321	
	Water Heater System	BMcD	BMcD	BMcD	8321	8321	8321	8321	-	-	8321	8321	8321	
	Roof Drain Piping	BMcD	BMcD	BMcD	8321	8321	8321	8321	-	-	8321	-	-	
	Pipe Supports & Supplemental Steel		BMcD	BMcD	8321	8321	8321	8321	-	-	-	BMcD	BMcD	
	Instrument Tubing, fittings, valves	BMcD	BMcD	BMcD	8321	8321	8321	8321	-	-	8321	BMcD	BMcD	As required for Instrument and actuated valve installations.
	Grouting	-	-	-	-	-	-	-	-	-	-	-	-	
	Structural steel	BMcD	BMcD	BMcD	8321	8321	8321	8321	-	-	8321	-	-	
	Pipe Supports	BMcD	BMcD	BMcD	8321	8321	8321	8321	-	-	8321	-	-	
	Equipment	BMcD	BMcD	BMcD	8321	8321	8321	8321	-	-	8321	-	-	
8322	**Mechanical Construction - HRSG's & Pipe Rack**													
	Temporary Services													
	Construction Water	-	-	-	8322	8322	8322	8322	-	-	-	-	-	for Contractors Work from Contractor furnished terminal point.
	Construction Temporary Power & Maintenance	-	-	-	8322	8322	8322	8322	-	-	-	-	-	Temporary Power to be provided by Contractor via generators until the temporary power is available from Owner. Temp Power will be shared by all Contractors onsite when they mobilize. Contractor is responsible for temp power for Contractors Work from Contractor furnished terminal point.
	Construction Trailers	-	-	-	8322	8322	8322	-	-	-	-	-	-	
	Miscellaneous	-	-	-	-	-	-	-	-	-	-	-	-	
	Survey & Layout	BMcD	BMcD	BMcD	8322	8322	8322	8322	-	-	8322	8322	8322	
	Initial Fills & Consumables		-	-	Owner	-	8322	-	-	-	-	8322	8322	8322 to Support first fills for chemicals, oils, gases, and fuels
	Post-Installed Anchor Bolts	-	-	-	-	-	-	-	-	-	-	-	-	

Appendix B
Division of Responsibility

Contract No.	Description	Design Criteria / Functional Design	Technical Specification RFP	Detailed Design	Procure / Supply	Fabricate / Deliver	Receive / Maintenance	Erect / Install	Power Wiring	Control Wiring	Testing	Start-up	Commissioning	Remarks
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	Equipment	BMcD	BMcD	BMcD	8322	8322	8322	8322	-	-	-	-	-	
	Pipe Supports & Supplemental Steel	BMcD	BMcD	BMcD	8322	8322	8322	8322	-	-	-	-	-	
	Electrical Supports		BMcD	BMcD	8322	8322	8322	8322	-	-	-	-	-	
	Building Framed Openings		BMcD	BMcD	8322	8322	8322	8322	-	-	-	-	-	
	Building Penetrations (Interior & Exterior)	-	-	-	-	-	-	-	-	-	-	-	-	
	Misc exterior wall penetrations sealing	BMcD	BMcD	N/A	8322 / 8410 / 8340 / 8560	8322 / 8410 / 8340 / 8560	8322 / 8410 / 8340 / 8560	8322 / 8410 / 8340 / 8560	-	-	-	-	-	All penetrations by other Contractors shall be sealed by the respective Contractor.
	Interior wall - All fire stopping, sealing and caulking Misc. items	BMcD	BMcD	BMcD	8322 / 8410 / 8340 / 8560	8322 / 8410 / 8340 / 8560	8322 / 8410 / 8340 / 8560	8322 / 8410 / 8340 / 8560	-	-	-	-	-	All installed Work by 8322 shall be sealed by 8322. All penetrations by other Contractors shall be sealed by the respective Contractor.
	PEMB Auxiliaries		-	-	-	-	-	-	-	-	-	-	-	
	Snow Guards		BMcD	BMcD	8322	8322	8322	8322	-	-	-	-	-	
	Grout		BMcD	8322	8322	8322	8322	8322	-	-	8322	-	-	For all Building Columns
	Mechanical Aboveground(s) - piping, fittings, hardware to / from tie-in(s) to / from terminal point(s)	-	-	-	-	-	-	-	-	-	-	-	-	
	Aqueous Ammonia System		BMcD	BMcD	8322	8322	8322	8322	-	-	8322	BMcD	BMcD	
	Auxiliary Steam System		BMcD	BMcD	8322	8322	8322	8322	-	-	8322	BMcD	BMcD	
	Circulating Water System		BMcD	BMcD	2360	2360	8322	8322	-	-	8322	BMcD	BMcD	
	Closed Cooling Water System	BMcD	BMcD	BMcD	8322	8322	8322	8322	-	-	8322	BMcD	BMcD	
	Instrument Air System	BMcD	BMcD	BMcD	8322	8322	8322	8322	-	-	8322	BMcD	BMcD	
	Compressed Gas System		BMcD	BMcD	8322	8322	8322	8322	-	-	8322	BMcD	BMcD	
	Condensate System		BMcD	BMcD	8322	8322	8322	8322	-	-	8322	BMcD	BMcD	
	Cycle Chemical Feed System		BMcD	BMcD	8322	8322	8322	8322	-	-	8322	BMcD	BMcD	
	Demineralized Water System		BMcD	BMcD	8322	8322	8322	8322	-	-	8322	BMcD	BMcD	
	Feedwater System		BMcD	BMcD	8322	8322	8322	8322	-	-	8322	BMcD	BMcD	
	Fuel Gas System	BMcD	BMcD	BMcD	8322	8322	8322	8322	-	-	8322	BMcD	BMcD	
	Fuel Oil System		BMcD	BMcD	8322	8322	8322	8322	-	-	8322	BMcD	BMcD	
	Service Water System		BMcD	BMcD	8322	8322	8322	8322	-	-	8322	BMcD	BMcD	
	Potable Water System	BMcD	BMcD	BMcD	8322	8322	8322	8322	-	-	8322	BMcD	BMcD	
	Potable Water Sanitization	BMcD	BMcD	BMcD	8322	8322	8322	8322	-	-	BMcD	BMcD	BMcD	8322 to provide craft support. Sanitization plan and direction by BMcD Start-up.
	Lubricating Oil System	BMcD	BMcD	BMcD	8322	8322	8322	8322	-	-	8322	BMcD	BMcD	
	Oily Drains/Plant Drains System	BMcD	BMcD	BMcD	8322	8322	8322	8322	-	-	8322	BMcD	BMcD	
	Turbine Vents and Drains System	BMcD	BMcD	BMcD	8322	8322	8322	8322	-	-	8322	BMcD	BMcD	
	Steam System		-	-	-	-	-	-	-	-	-	-	-	
	Main Steam		BMcD	BMcD	8322	8322	8322	8322	-	-	8322	BMcD	BMcD	
	Cold Reheat Steam		BMcD	BMcD	8322	8322	8322	8322	-	-	8322	BMcD	BMcD	
	Hot Reheat Steam		BMcD	BMcD	8322	8322	8322	8322	-	-	8322	BMcD	BMcD	
	Wastewater System		BMcD	BMcD	8322	8322	8322	8322	-	-	8322	BMcD	BMcD	
	Pipe Supports & Supplemental Steel		BMcD	BMcD	8322	8322	8322	8322	-	-	-	BMcD	BMcD	
	Instrument Tubing, fittings, valves	BMcD	BMcD	BMcD	8322	8322	8322	8322	-	-	8322	BMcD	BMcD	As required for Instrument and actuated valve installations.
	Grouting	-	-	-	-	-	-	-	-	-	-	-	-	
	Structural steel	BMcD	BMcD	BMcD	8322	8322	8322	8322	-	-	8322	-	-	
	Pipe Supports	BMcD	BMcD	BMcD	8322	8322	8322	8322	-	-	8322	-	-	
	Equipment	BMcD	BMcD	BMcD	8322	8322	8322	8322	-	-	8322	-	-	
	Miscellaneous - Equipment Installation	-	-	-	-	-	-	-	-	-	-	-	-	
	Shop Fab Tank 1/2" Asphalt Impregnated Felt Pads	BMcD	BMcD	BMcD	8322	8322	8322	8322	-	-	-	-	-	To be installed beneath all FRP and Steel Shop Fabricated Tank(s).
8323	**Mechanical Construction - BOP, Water Treatment, and Yard Piping**													
	Temporary Services													
	Construction Water	-	-	-	8323	8323	8323	8323	-	-	-	-	-	for Contractors Work from Contractor furnished terminal point.
	Construction Temporary Power & Maintenance	-	-	-	8323	8323	8323	8323	-	-	-	-	-	Temporary Power to be provided by Contractor via generators until the temporary power is available from Owner. Temp Power will be shared by all Contractors onsite when they mobilize. Contractor is responsible for temp power for Contractors Work from Contractor furnished terminal point.
	Construction Trailers	-	-	-	8323	8323	8323	-	-	-	-	-	-	
	Snow Removal	-	-	-	-	-	8323	8323	-	-	-	-	-	Main plant entrance road, plant roads and for Contractors Work after 8220 demobilizes
	Miscellaneous	-	-	-	-	-	-	-	-	-	-	-	-	
	Survey & Layout	BMcD	BMcD	BMcD	8323	8323	8323	8323	-	-	8323	8323	8323	
	Initial Fills & Consumables		-	-	Owner	-	8323	-	-	-	-	8323	8323	8323 to Support first fills for chemicals, oils, gases, and fuels
	SWPPP Maintenance	BMcD	BMcD	BMcD	8323	8323	8323	8323	-	-	8323	8323	8323	Take over from 8220 after 8220 demobilizes
	Dust Control		-	-	-	-	8323	8323	-	-	-	-	-	Take over from 8220 after 8220 demobilizes
	Post-Installed Anchor Bolts	-	-	-	-	-	-	-	-	-	-	-	-	
	Equipment	BMcD	BMcD	BMcD	8323	8323	8323	8323	-	-	-	-	-	
	Pipe Supports & Supplemental Steel	BMcD	BMcD	BMcD	8323	8323	8323	8323	-	-	-	-	-	
	Electrical Supports		BMcD	BMcD	8323	8323	8323	8323	-	-	-	-	-	
	Building Framed Openings		BMcD	BMcD	8323	8323	8323	8323	-	-	-	-	-	
	PEMB Auxiliaries		-	-	-	-	-	-	-	-	-	-	-	
	Snow Guards		BMcD	BMcD	8323	8323	8323	8323	-	-	-	-	-	
	Grout		BMcD	8323	8323	8323	8323	8323	-	-	8323	-	-	For all Building Columns
	Architectural Finishes	-	-	-	-	-	-	-	-	-	-	-	-	
	Room Finishes	BMcD	BMcD	8323	8323 / 8530	8323 / 8530	8323 / 8530	8323 / 8530	-	-	-	-		including 2-Hour Rated Wall & Ceiling Systems
	Suspended ceilings	BMcD	BMcD	8323	8323	8323	8323	8323	-	-	-	-		
	Plumbing Schedules	BMcD	BMcD	BMcD	8323	8323	8323	8323	-	-	8323	-	-	Final color to be selected by owner

Appendix B
Division of Responsibility

Contract No.	Description	Design Criteria / Functional Design	Technical Specification RFP	Detailed Design	Procure / Supply	Fabricate / Deliver	Receive / Maintenance	Erect / Install	Power Wiring	Control Wiring	Testing	Start-up	Commissioning	Remarks
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	In-Wall Blocking / fixture carriers	BMcD	BMcD	8323	8323	8323	8323	8323	-	-	-	-	-	
	Doors, Windows, and Hardware	BMcD	BMcD	BMcD	8323 / 8530	8323 / 8530	8323 / 8530	8323 / 8530	-	-	-	-	-	
	Sectional door(s)	BMcD	BMcD	BMcD	8323 / 8530	8323 / 8530	8323 / 8530	8323 / 8530	8410	8410	8323	8323	-	
	Interior Signage	BMcD	BMcD	BMcD	8323	8323	8323	8323	-	-	-	-	-	
	Building Shell & Appurtenances	-	-	-	-	-	-	-	-	-	-	-	-	CTG Main Electrical Building, Water Treatment Building/Electrical Room and Mezzanine Floor, Cooling Tower Chemical Feed Building, Cooling Tower Electrical Building, Construction Warehouse
	Masonry Wall System(s) & Appurtenances	BMcD	BMcD	BMcD	8323 / 8530	8323 / 8530	8323	8323	-	-	-	-	-	8560 furnish and erect PEMB and furnish siding/roofing/doors/windows/hardware/thermal protect/interior finishes for stick built buildings.
	Perforated Metal Wall System(s) & Appurtenances	BMcD	BMcD	BMcD	8323 / 8530	8323 / 8530	8323 / 8530	8323 / 8530	-	-	-	-	-	
	Partition Wall System(s) & Appurtenances	BMcD	BMcD	BMcD	8323 / 8530	8323 / 8530	8323	8323	-	-	-	-	-	
	Roof Access Platform, Ladder, & Scuttle	BMcD	BMcD	8323	8323	8323	8323	8323	-	-	-	-	-	
	Standing Seam Metal Roof, Curbs, & Appurtenances	BMcD	BMcD	8323	8323 / 8530	8323 / 8530	8323 / 8530	8323 / 8530	-	-	-	-	-	
	Entry Door Canopies	BMcD	BMcD	8323	8323 / 8530	8323 / 8530	8323 / 8530	8323 / 8530	-	-	-	-	-	
	Gutter(s) & Downspout(s)	BMcD	BMcD	8323	8323 / 8530	8323 / 8530	8323 / 8530	8323 / 8530	-	-	-	-	-	
	Building Penetrations (Interior & Exterior)	-	-	-	-	-	-	-	-	-	-	-	-	
	Misc exterior wall and roof penetrations sealing	BMcD	BMcD	N/A	8323 / 8410 / 8340 / 8560	8323 / 8410 / 8340 / 8560	8323 / 8410 / 8340 / 8560	8323 / 8410 / 8340 / 8560	-	-	-	-	-	All penetrations by other Contractors shall be sealed by the respective Contractor.
	Interior wall - All fire stopping, sealing and caulking Misc. items	BMcD	BMcD	BMcD	8323 / 8410 / 8340 / 8560	8323 / 8410 / 8340 / 8560	8323 / 8410 / 8340 / 8560	8323 / 8410 / 8340 / 8560	-	-	-	-	-	All installed Work by 8323 shall be sealed by 8323. All penetrations by other Contractors shall be sealed by the respective Contractor.
	Roof Access Curb		BMcD	8323	8323	8323	8323	8323	-	-	-	-	-	
	Roof Tie-off Posts & System		BMcD	8323	8323	8323	8323	8323	-	-	-	-	-	
	Mechanical Aboveground(s) - piping, fittings, hardware to / from tie-in(s) to / from terminal point(s)	-	-	-	-	-	-	-	-	-	-	-	-	
	Aqueous Ammonia System		BMcD	BMcD	8323	8323	8323	8323	-	-	8323	BMcD	BMcD	
	Circulating Water System		BMcD	BMcD	2360	2360	8323	8323	-	-	8323	BMcD	BMcD	
	Closed Cooling Water System	BMcD	BMcD	BMcD	8323	8323	8323	8323	-	-	8323	BMcD	BMcD	
	Instrument Air System	BMcD	BMcD	BMcD	8323	8323	8323	8323	-	-	8323	BMcD	BMcD	
	Compressed Gas System		BMcD	BMcD	8323	8323	8323	8323	-	-	8323	BMcD	BMcD	
	Condensate System		BMcD	BMcD	8323	8323	8323	8323	-	-	8323	BMcD	BMcD	
	Cycle Chemical Feed System		BMcD	BMcD	8323	8323	8323	8323	-	-	8323	BMcD	BMcD	
	Demineralized Water System		BMcD	BMcD	8323	8323	8323	8323	-	-	8323	BMcD	BMcD	
	Feedwater System		BMcD	BMcD	8323	8323	8323	8323	-	-	8323	BMcD	BMcD	
	Fuel Gas System	BMcD	BMcD	BMcD	8323	8323	8323	8323	-	-	8323	BMcD	BMcD	
	Fuel Oil System		BMcD	BMcD	8323	8323	8323	8323	-	-	8323	BMcD	BMcD	
	Service Water System		BMcD	BMcD	8323	8323	8323	8323	-	-	8323	BMcD	BMcD	
	Potable Water System	BMcD	BMcD	BMcD	8323	8323	8323	8323	-	-	8323	BMcD	BMcD	
	Potable Water Sanitization	BMcD	BMcD	BMcD	8323	8323	8323	8323	-	-	BMcD	BMcD	BMcD	8323 to provide craft support. Sanitization plan and direction by BMcD Start-up.
	Lubricating Oil System	BMcD	BMcD	BMcD	8323	8323	8323	8323	-	-	8323	BMcD	BMcD	
	Oily Drains/Plant Drains System	BMcD	BMcD	BMcD	8323	8323	8323	8323	-	-	8323	BMcD	BMcD	
	Wastewater System		BMcD	BMcD	8323	8323	8323	8323	-	-	8323	BMcD	BMcD	
	Plumbing - Above grade piping, hangers, supports, valves, fittings, specialties, appurtenances, insulation, etc.	-	-	-	-	-	-	-	-	-	-	-	-	8220 - furnish and install floor drains, cleanouts, and stub-ups to A/G sanitary system terminal point(s).
	Domestic Water System	BMcD	BMcD	BMcD	8323	8323	8323	8323	-	-	8323	8323 / BMcD	8323 / BMcD	System to be sanitized.
	Sanitary System (including vents, drains)	BMcD	BMcD	BMcD	8323	8323	8323	8323	-	-	8323	8323	8323	
	Plumbing Fixtures	BMcD	BMcD	BMcD	8323	8323	8323	8323	-	-	8323	8323	8323	
	Water Heater System	BMcD	BMcD	BMcD	8323	8323	8323	8323	-	-	8323	8323	8323	
	Roof Drain Piping	BMcD	BMcD	BMcD	8323	8323	8323	8323	-	-	8323	-	-	
	Pipe Supports & Supplemental Steel		BMcD	BMcD	8323	8323	8323	8323	-	-	-	BMcD	BMcD	
	Instrument Tubing, fittings, valves	BMcD	BMcD	BMcD	8323	8323	8323	8323	-	-	8323	BMcD	BMcD	As required for Instrument and actuated valve installations.
	Grouting	-	-	-	-	-	-	-	-	-	-	-	-	
	Structural steel	BMcD	BMcD	BMcD	8323	8323	8323	8323	-	-	8323	-	-	
	Pipe Supports	BMcD	BMcD	BMcD	8323	8323	8323	8323	-	-	8323	-	-	
	Equipment	BMcD	BMcD	BMcD	8323	8323	8323	8323	-	-	8323	-	-	
	Miscellaneous - Equipment Installation	-	-	-	-	-	-	-	-	-	-	-	-	
	Shop Fab Tank 1/2" Asphalt Impregnated Felt Pads	BMcD	BMcD	BMcD	8323	8323	8323	8323	-	-	-	-	-	To be installed beneath all FRP and Steel Shop Fabricated Tank(s).
8330	**Coatings, Insulation, Lagging, and Scaffolding**													
	Temporary Services													
	Construction Temporary Power & Maintenance	-	-	-	8330	8330	8330	8330	-	-	-	-	-	Temporary Power to be provided by Contractor via generators until the temporary power is available from Owner. Temp Power will be shared by all Contractors onsite when they mobilize. Contractor is responsible for temp power for Contractors Work from Contractor furnished terminal point.
	Construction Trailers	-	-	-	8330	8330	8330	-	-	-	-	-	-	
	Architectural Finishes	-	-	-	-	-	-	-	-	-	-	-	-	
	Painting	BMcD	BMcD	BMcD	8330	8330	8330	8330	-	-	-	-	-	All paint coating colors to be selected by owner.
	Field Coating		-	-	-	-	-	-	-	-	-	-	-	
	Field Coatings for Pipe located outdoors	BMcD	BMcD	BMcD	8330	8330	8330	8330	-	-	-	-	-	Piping coating outdoors
	Field Coatings for Equipment located outdoors	BMcD	BMcD	BMcD	8330	8330	8330	8330	-	-	-	-	-	Equipment coating outdoors, stacks, CO catalyst , etc.
	Coating of all field welds	BMcD	BMcD	BMcD	8330	8330	8330	8330	-	-	-	-	-	
	Touch-up (All Pipe and Equipment)	BMcD	BMcD	BMcD	8330	8330	8330	8330	-	-	-	-	-	
	Insulation and Lagging		-	-	-	-	-	-	-	-	-	-	-	
	Equipment Insulation / Personnel Protection		BMcD	BMcD	8330	8330	8330	8330	-	-	-	-	-	

Appendix B
Division of Responsibility

Contract No.	Description	Design Criteria / Functional Design	Technical Specification RFP	Detailed Design	Procure / Supply	Fabricate / Deliver	Receive / Maintenance	Erect / Install	Power Wiring	Control Wiring	Testing	Start-up	Commissioning	Remarks
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	Piping Insulation / Personnel Protection	BMcD	BMcD	BMcD	8330	8330	8330	8330	-	-	-	-	-	
	Scaffolding (areas as required for consturction activities)		BMcD	BMcD	8330	8330	8330	8330	-	-	-	-	-	
8340	**HVAC Furnish & Erect**													
	Temporary Services													
	Construction Water	-	-	-	8340	8340	8340	8340	-	-	-	-	-	for Contractors Work from Contractor furnished terminal point.
	Construction Temporary Power & Maintenance	-	-	-	8340	8340	8340	8340	-	-	-	-	-	Temporary Power to be provided by Contractor via generators until the temporary power is available from Owner. Temp Power will be shared by all Contractors onsite when they mobilize. Contractor is responsible for temp power for Contractors Work from Contractor furnished terminal point.
	Construction Trailers	-	-	-	8340	8340	8340	-	-	-	-	-	-	
	HVAC	-	-	-	-	-	-	-	-	-	-	-	-	
	Packaged roof top units (RTUs)	BMcD	BMcD	BMcD	8340	8340	8340	8340	8410	8340	8340	8340	8340	Including motors, disconnects, starters, drain piping, equipment supports, and appurtenances
	Make-up Air Handling Units (AHUs)	BMcD	BMcD	BMcD	8340	8340	8340	8340	8410	8340	8340	8340	8340	
	Wall Mounted Air-Conditioners	BMcD	BMcD	BMcD	8340	8340	8340	8340	8410	8340	8340	8340	8340	
	Supply Fans	BMcD	BMcD	BMcD	8340	8340	8340	8340	8410	8340	8340	8340	8340	
	Electric Unit Heaters	BMcD	BMcD	BMcD	8340	8340	8340	8340	8410	8340	8340	8340	8340	
	Gas Unit Heaters		BMcD	BMcD	8340	8340	8340	8340	-	8340	8340	8340	8340	
	Air Handling/Heating Units (ARUs)		BMcD	BMcD	8340	8340	8340	8340	8410	8340	8340	8340	8340	
	Exhaust Fans	BMcD	BMcD	BMcD	8340	8340	8340	8340	8410	8340	8340	8340	8340	
	Battery Room Exhaust Fans	BMcD	BMcD	BMcD	8340	8340	8340	8340	8410	8340	8340	8340	8340	Battery room exhaust fans to coordinate with 8560 hydrogen detection
	Split System Fan Coil Units	BMcD	BMcD	BMcD	8340	8340	8340	8340	8410	8340	8340	8340	8340	
	Louvers / Roof hoods	BMcD	BMcD	BMcD	8340	8340	8340	8340	8410	8340	8340	8340	8340	
	HVAC Gravity Hoods	BMcD	BMcD	BMcD	8340	8340	8340	8340	-	-	-	-	-	
	HVAC Ductwork & Air Compressor Ductwork	BMcD	BMcD	BMcD	8340	8340	8340	8340	-	-	-	-	-	Including controls, VAVs, diffusers, registers, sensors, dampers, TAB, and appurtenances. 8322 to include operator and crane support for the installation of this ductwork.
	Variable Air Volume (VAVs) Units with reheat		BMcD	BMcD	8340	8340	8340	8340	8410	8340	8340	8340	8340	
	Ventilating Units (MAUs) ducting (w/ flex connections)	BMcD	BMcD	BMcD	8340	8340	8340	8340	-	-	-	-	-	
	House Gas - Above grade piping, hangers, supports, valves, fittings, specialties, appurtenances, etc.	-	-	-	-	-	-	-	-	-	-	-	-	
	House Gas System	BMcD	BMcD	BMcD	8340	8340	8340	8340	-	-	8340	8340	8340	Final routing coordination is the responsibility of 8340 to coordinate with Contractor's other Contractors
	Miscellaneous		-	-	-	-	-	-	-	-	-	-	-	
	Building Automation System (BAS)	BMcD	BMcD	8340	8340	8340	8340	8340	8410 / 8340	8340	8340	8340	8340	8410 to provide single 120V power conection for building level control panel. One in each building.
	HVAC Controls	BMcD	BMcD	8340	8340	8340	8340	8340	8410 / 8340	8340	8340	8340	8340	
	Exterior building penetrations (wall & roof) - Including all fire stopping, sealing and caulking	BMcD	BMcD	BMcD	8340 / 8530	8340 / 8530	8340 / 8530	8340 / 8530	-	-	-	-	-	All exterior penetrations shown on architectural reference drawings are cut and sealed by 8321/8322/8323. Any other exterior wall penetrations for 8340 Work that not shown on the architectural drawings are cut and sealed by 8340.
	Interior building penetrations - Including all fire stopping, sealing and caulking	BMcD	BMcD	BMcD	8340	8340	8340	8340	-	-	-	-	-	
8410	**Electrical Installation**													
	Temporary Services	-	-	-	-	-	-	-	-	-	-	-	-	
	Construction Water	-	-	-	8410	8410	8410	8410	-	-	-	-	-	for Contractors Work from Contractor furnished terminal point.
	Construction Temporary Power & Maintenance	BMcD	BMcD	BMcD	8410	8410	8410	8410	8410	-	8410 (for initial main power connections)	BMcD (for initial main power connections)	BMcD (for initial main power connections)	Temp Power will be shared by all Contractors onsite when they mobilize. Contractor is responsible for temp power for Contractors Work from Contractor furnished terminal point.
	Construction Trailers	-	-	-	8410	8410	8410	-	-	-	-	-	-	
	Wiring / Raceway / Accessories & Appurtenances	-	-	-	-	-	-	-	-	-	-	-	-	
	Above Grade Grounding & Bonding	BMcD	BMcD	BMcD	8410	8410	8410	8410	-	-	8410	-	-	
	Emergency Lighting	BMcD	BMcD	BMcD	8410	8410	8410	8410	8410	8410	8410	BMcD	BMcD	
	Outdoor Lighting Fixtures & Poles	BMcD	BMcD	BMcD	8410	8410	8410	8410	8410	8410	8410	BMcD	BMcD	
	Above Ground Roadway Lighting	BMcD	BMcD	BMcD	8410	8410	8410	8410	8410	8410	8410	BMcD	BMcD	
	Indoor Lighting Fixtures	BMcD	BMcD	BMcD	8410	8410	8410	8410	8410	8410	8410	BMcD	BMcD	
	High Bay Lighting Fixtures	BMcD	BMcD	BMcD	8410	8410	8410	8410	8410	8410	8410	BMcD	BMcD	
	Outdoor Lighting Fixtures (as indicated)	BMcD	BMcD	BMcD	8410	8410	8410	8410	8410	8410	8410	BMcD	BMcD	
	Indoor Lighting Fixtures (as indicated)	BMcD	BMcD	BMcD	8410	8410	8410	8410	8410	8410	8410	BMcD	BMcD	
	MV Cable Pulls and Terminations	BMcD	BMcD	BMcD	8410	8410	8410	8410	8410	8410	8410	BMcD	BMcD	
	600V Power Cable Pulls and Terminations		BMcD	BMcD	8410	8410	8410	8410	8410	8410	8410	BMcD	BMcD	
	Instrumentation & Control Cable Pulls and Terminations		BMcD	BMcD	8410	8410	8410	8410	8410	8410	8410	BMcD	BMcD	
	Network/Fiber Cable Pulls and Terminations	BMcD	BMcD	BMcD	8410	8410	8410	8410	8410	8410	-	-	-	
	Raceway and supports	BMcD	BMcD	8410	8410	8410	8410	8410	8410	8410	-	-	-	
	Misc. Local Starters	BMcD	BMcD	BMcD	8410	8410	8410	8410	8410	8410	8410	BMcD	BMcD	
	Pull Boxes/Junction Boxes		BMcD	BMcD	8410	8410	8410	8410	8410	8410	8410	BMcD	BMcD	
	Panelboards and Small Transformers	BMcD	BMcD	BMcD	8410	8410	8410	8410	8410	8410	8410	BMcD	BMcD	
	Security conduit	BMcD	BMcD	8410	8410	8410	8410	8410	-	-	-	-	-	
	Above Grade Conduit	BMcD	BMcD	BMcD	8410	8410	8410	8410	-	-	5670	5670	BMcD/Owner	
	Cable Tray Wall Penetration Seals	BMcD	BMcD	BMcD	8410	8410	8410	8410	-	-	-	-	-	

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Contract No.	Description	Design Criteria / Functional Design	Technical Specification RFP	Detailed Design	Procure / Supply	Fabricate / Deliver	Receive / Maintenance	Erect / Install	Power Wiring	Control Wiring	Testing	Start-up	Commissioning	Remarks
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	Fiber Patch Panels	BMcD	BMcD	BMcD	8410	8410	8410	8410	-	8410	8410 / Owner	BMcD	BMcD	Some by Owner (See below under Comms) / Some by 8410 all terminations by Owner. All Cable install by 8410
	Disconnect Switches		BMcD	BMcD	8410	8410	8410	8410	-	-	-	-	-	
	Building Electrical	-	-	-	-	-	-	-	-	-	-	-	-	
	Lighting / receptacles / switches / electrical devices / emergency Lighting	BMcD	BMcD	BMcD	8410	8410	8410	8410	8410	8410	8410	BMcD	BMcD	
	Lightning Protection		-	-	-	-	-	-	-	-	-	-	-	
	Lightning Protection		BMcD	8410	8410	8410	8410	8410	8410	-	-	-	-	
	Lightning Protection (HV Take-off Structures)		BMcD	8410	8410	8410	8410	8410	8410	-	-	-	-	
	Heat Trace		-	-	-	-	-	-	-	-	-	-	-	
	Heat Trace Cable, Junction Boxes, Disconnects, Etc.		BMcD	8410	8410	8410	8410	8410	8410	8410	8410	BMcD	BMcD	
	Instrumentation & Controls		-	-	-	-	-	-	-	-	-	-	-	
	Instrument Stands		BMcD	8410	8410	8410	8410	8410	-	-	-	-	-	
	Instrument Enclosures		BMcD	8410	8410	8410	8410	8410	8410	8410	8410	BMcD	BMcD	
	Fire interlock wiring	BMcD	BMcD	BMcD	8410	8410	8410	8410	-	8410	8410	BMcD	BMcD	
8480	**Cathodic Protection Furnish & Erect**													
	Temporary Services	-	-	-	-	-	-	-	-	-	-	-	-	
	Construction Temporary Power & Maintenance	BMcD	BMcD	BMcD	8480	8480	8480	8480	8480	-	-	-	-	Temp Power will be shared by all Contractors onsite when they mobilize. Contractor is responsible for temp power for Contractors Work from Contractor furnished terminal point.
	Construction Trailers	-	-	-	8480	8480	8480	-	-	-	-	-	-	
	Cathodic Protection Systems		-	-	-	-	-	-	-	-	-	-	-	
	Cathodic Protection System & AC Mitigation	BMcD	BMcD	8480	8480	8480	8480	8480	8410	8410	8480	8480 / BMcD	8480 / BMcD	
	Rectifiers		BMcD	8480	8480	8480	8480	8480	8410	8410	8480	8480 / BMcD	8480 / BMcD	
	Cables		BMcD	8480	8480	8480	8480	8480	8410	8410	8480	8480 / BMcD	8480 / BMcD	
8510	**Cooling Tower Furnish & Erect**													
	Temporary Services													
	Construction Water	-	-	-	8510	8510	8510	8510	-	-	-	-	-	for Contractors Work from Contractor furnished terminal point.
	Construction Temporary Power & Maintenance	-	-	-	8510	8510	8510	8510	-	-	-	-	-	Temporary Power to be provided by Contractor via generators until the temporary power is available from Owner. Temp Power will be shared by all Contractors onsite when they mobilize. Contractor is responsible for temp power for Contractors Work from Contractor furnished terminal point.
	Construction Trailers	-	-	-	8510	8510	8510	-	-	-	-	-	-	
	Cooling Tower	Owner	-	-	-	-	-	-	-	-	-	-	-	
	Fans	Owner	BMcD	8510	8510	8510	8510	8510	8510	8510	8510 / BMcD	BMcD	BMcD	
	Drives		BMcD	8510	8510	8510	8510	8510	8510	8510	8410 / 8510 / BMcD	BMcD	BMcD	
	Structural FRP		BMcD	8510	8510	8510	8510	8510	8510	8510	8510 / BMcD	BMcD	BMcD	
	Exterior Walls	Owner	BMcD	8510	8510	8510	8510	8510	8510	8510	8510 / BMcD	BMcD	BMcD	
	Fill		BMcD	8510	8510	8510	8510	8510	8510	8510	8510 / BMcD	BMcD	BMcD	
	Fire Protection		BMcD	8510	8510	8510	8510	8510	8510	8510	8510 / BMcD	BMcD	BMcD	
	Trays/Piping		BMcD	8510	8510	8510	8510	8510	8510	8510	8510 / BMcD	BMcD	BMcD	
	Conduit/Cables		BMcD	8510	8510	8510	8510	8510	8510	8510	8410 / 8510 / BMcD	BMcD	BMcD	
8530	**Pre-Engineered Metal Building Furnish & Erect**													
	Temporary Services													
	Construction Water	-	-	-	8530	8530	8530	8530	-	-	-	-	-	for Contractors Work from Contractor furnished terminal point.
	Construction Temporary Power & Maintenance	-	-	-	8530	8530	8530	8530	-	-	-	-	-	Temporary Power to be provided by Contractor via generators until the temporary power is available from Owner. Temp Power will be shared by all Contractors onsite when they mobilize. Contractor is responsible for temp power for Contractors Work from Contractor furnished terminal point.
	Construction Trailers	-	-	-	8530	8530	8530	-	-	-	-	-	-	
	Miscellaneous	-	-	-	-	-	-	-	-	-	-	-	-	
	Survey & Layout	BMcD	BMcD	BMcD	8530	8530	8530	8530	-	-	8530	8530	8530	
	Water Treatment Building		-	-	-	-	-	-	-	-	-	-	-	
	Main Frame Building Steel	BMcD	BMcD	8530	8530	8530	8530	8530	-	-	-	-	-	
	Metal Wall Panels	BMcD	BMcD	8530	8530	8530	8530	8530	-	-	-	-	-	
	Ancillary Building Steel	BMcD	BMcD	8530	8530	8530	8530	8530	-	-	-	-	-	
	Entry Door Canopies	BMcD	BMcD	8530	8530	8530	8530	8530	-	-	-	-	-	
	Standing Seam Metal Roof, Curbs, & Appurtenances	BMcD	BMcD	8530	8530	8530	8530	8530	-	-	-	-	-	
	Exterior Wall and Roof Openings per Contract Drawings	BMcD	BMcD	BMcD / 8530	8530	8530	8530	8530	-	-	-	-	-	8323 is responsible for sealing and temporarily weather- protecting all penetrations as shown on the contract drawings.
	Gutter(s) & Downspout(s)	BMcD	BMcD	8530	8530	8530	8530	8530	-	-	-	-	-	8220 to install transition and appurtenances to U/G storm sewer system.
	I&C Tech and Maintenance Building		-	-	-	-	-	-	-	-	-	-	-	
	Main Frame Building Steel	BMcD	BMcD	8530	8530	8530	8530	8530	-	-	-	-	-	
	Metal Wall Panels	BMcD	BMcD	8530	8530	8530	8530	8530	-	-	-	-	-	
	Ancillary Building Steel	BMcD	BMcD	8530	8530	8530	8530	8530	-	-	-	-	-	
	Entry Door Canopies	BMcD	BMcD	8530	8530	8530	8530	8530	-	-	-	-	-	
	Standing Seam Metal Roof, Curbs, & Appurtenances	BMcD	BMcD	8530	8530	8530	8530	8530	-	-	-	-	-	

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	Exterior Wall Openings per Contract Drawings	BMcD	BMcD	BMcD / 8530	8530	8530	8530	8530	-	-	-	-	-	8323 is responsible for sealing and temporarily weather - protecting all penetrations as shown on the contract drawings.
	Gutter(s) & Downspout(s)	BMcD	BMcD	8530	8530	8530	8530	8530	-	-	-	-	-	8220 to install transition and appurtenances to U/G storm sewer system.
	Construction Warehouse		-	-	-	-	-	-	-	-	-	-	-	
	Main Frame Building Steel	BMcD	BMcD	8530	8530	8530	8530	8530	-	-	-	-	-	
	Metal Wall Panels	BMcD	BMcD	8530	8530	8530	8530	8530	-	-	-	-	-	
	Ancillary Building Steel	BMcD	BMcD	8530	8530	8530	8530	8530	-	-	-	-	-	
	Entry Door Canopies	BMcD	BMcD	8530	8530	8530	8530	8530	-	-	-	-	-	
	Standing Seam Metal Roof, Curbs, & Appurtenances	BMcD	BMcD	8530	8530	8530	8530	8530	-	-	-	-	-	
	Exterior Wall Openings per Contract Drawings	BMcD	BMcD	BMcD / 8530	8530	8530	8530	8530	-	-	-	-	-	8323 is responsible for sealing and temporarily weather - protecting all penetrations as shown on the contract drawings.
	Gutter(s) & Downspout(s)	BMcD	BMcD	8530	8530	8530	8530	8530	-	-	-	-	-	8220 to install transition and appurtenances to U/G storm sewer system.
	STG/Admin/Aux Boiler Building		-	-	-	-	-	-	-	-	-	-	-	
	Metal Wall Panels	BMcD	BMcD	8530	8530	8530	8321	8321	-	-	-	-	-	
	Entry Door Canopies	BMcD	BMcD	8530	8530	8530	8321	8321	-	-	-	-	-	
	Standing Seam Metal Roof, Curbs, & Appurtenances	BMcD	BMcD	8530	8530	8530	8321	8321	-	-	-	-	-	
	Exterior Wall Openings per Contract Drawings	BMcD	BMcD	BMcD / 8530	8530	8530	8321	8321	-	-	-	-	-	8321 is responsible for sealing and temporarily weather - protecting all penetrations as shown on the contract drawings.
	Gutter(s) & Downspout(s)	BMcD	BMcD	8530	8530	8530	8321	8321	-	-	-	-	-	8220 to install transition and appurtenances to U/G storm sewer system.
	Maint GT Elec Building		-	-	-	-	-	-	-	-	-	-	-	
	Metal Wall Panels	BMcD	BMcD	8530	8530	8530	8323	8323	-	-	-	-	-	
	Entry Door Canopies	BMcD	BMcD	8530	8530	8530	8323	8323	-	-	-	-	-	
	Standing Seam Metal Roof, Curbs, & Appurtenances	BMcD	BMcD	8530	8530	8530	8323	8323	-	-	-	-	-	
	Exterior Wall Openings per Contract Drawings	BMcD	BMcD	BMcD / 8530	8530	8530	8323	8323	-	-	-	-	-	8323 is responsible for sealing and temporarily weather - protecting all penetrations as shown on the contract drawings.
	Gutter(s) & Downspout(s)	BMcD	BMcD	8530	8530	8530	8323	8323	-	-	-	-	-	
	Maint GT Elec Building		-	-	-	-	-	-	-	-	-	-	-	
	Metal Wall Panels	BMcD	BMcD	8530	8530	8530	8323	8323	-	-	-	-	-	
	Entry Door Canopies	BMcD	BMcD	8530	8530	8530	8323	8323	-	-	-	-	-	
	Standing Seam Metal Roof, Curbs, & Appurtenances	BMcD	BMcD	8530	8530	8530	8323	8323	-	-	-	-	-	
	Exterior Wall Openings per Contract Drawings	BMcD	BMcD	BMcD / 8530	8530	8530	8323	8323	-	-	-	-	-	8323 is responsible for sealing and temporarily weather - protecting all penetrations as shown on the contract drawings.
	Gutter(s) & Downspout(s)	BMcD	BMcD	8530	8530	8530	8323	8323	-	-	-	-	-	
	Construction Warehouse		-	-	-	-	-	-	-	-	-	-	-	
	Main Frame Building Steel	BMcD	BMcD	8530	8530	8530	8530	8530	-	-	-	-	-	
	Metal Wall Panels	BMcD	BMcD	8530	8530	8530	8530	8530	-	-	-	-	-	
	Ancillary Building Steel	BMcD	BMcD	8530	8530	8530	8530	8530	-	-	-	-	-	
	Entry Door Canopies	BMcD	BMcD	8530	8530	8530	8530	8530	-	-	-	-	-	
	Standing Seam Metal Roof, Curbs, & Appurtenances	BMcD	BMcD	8530	8530	8530	8530	8530	-	-	-	-	-	
	Exterior Wall Openings per Contract Drawings	BMcD	BMcD	BMcD / 8530	8530	8530	8530	8530	-	-	-	-	-	8323 is responsible for sealing and temporarily weather - protecting all penetrations as shown on the contract drawings.
	Gutter(s) & Downspout(s)	BMcD	BMcD	8530	8530	8530	8530	8530	-	-	-	-	-	8220 to install transition and appurtenances to U/G storm sewer system.
8560	**Fire Protection and Detection Furnish & Erect**													
	Temporary Services													
	Construction Water	-	-	-	8560	8560	8560	8560	-	-	-	-	-	for Contractors Work from Contractor furnished terminal point.
	Construction Temporary Power & Maintenance	-	-	-	8560	8560	8560	8560	-	-	-	-	-	Temporary Power to be provided by Contractor via generators until the temporary power is available from Owner. Temp Power will be shared by all Contractors onsite when they mobilize. Contractor is responsible for temp power for Contractors Work from Contractor furnished terminal point.
	Construction Trailers	-	-	-	8560	8560	8560	-	-	-	-	-	-	
	Fire Protection	-	-	-	-	-	-	-	-	-	-	-	-	
	Piping, supports, auxiliary steel, fittings, couplings, valves, specialties	BMcD	BMcD	8560	8560	8560	8560	8560	-	-	-	-	-	
	Wall penetrations, sleeves, seals (interior & exterior)	BMcD	BMcD	8560	8560	8560	8560	8560	-	-	-	-	-	
	Fire-department connections, tie-ins	BMcD	BMcD	8560	8560	8560	8560	8560	-	-	-	-	-	
	Sprinklers	BMcD	BMcD	8560	8560	8560	8560	8560	-	-	-	-	-	
	Monitoring, Alarm devices	BMcD	BMcD	8560	8560	8560	8560	8560	-	8560	8560	8560	8560	
	Pressure gauges	BMcD	BMcD	8560	8560	8560	8560	8560	-	-	8560	-	-	Calibrated in Factory
	Inspector's test valving, piping	BMcD	BMcD	8560	8560	8560	8560	8560	-	-	-	-	-	
	Drain valves, piping	BMcD	BMcD	8560	8560	8560	8560	8560	-	-	-	-	-	
	Fire Alarm System	-	-	-	-	-	-	-	-	-	-	-	-	
	Panel(s) / Communication Devices	BMcD	BMcD	8560	8560	8560	8560	8560	8410	8560	8560	8560	8560	
	Fire Alarm Control Units / Panels	BMcD	BMcD	8560	8560	8560	8560	8560	8410	8560	8560	8560	8560	
	Secondary Power Supply / Battery Back-up	BMcD	BMcD	8560	8560	8560	8560	8560	8410	8560	8560	8560	8560	
	Fire Panel Remote Monitoring System	BMcD	BMcD	8560	8560	8560	8560	8560	8410	8560	8560	8560	8560	
	Initiating Devices	-	-	-	-	-	-	-	-	-	-	-	-	
	Heat detection	BMcD	BMcD	8560	8560	8560	8560	8560	8560	8560	8560	8560	8560	
	Smoke detectors	BMcD	BMcD	8560	8560	8560	8560	8560	8560	8560	8560	8560	8560	

Appendix B
Division of Responsibility

Contract No.	Description	Design Criteria / Functional Design	Technical Specification RFP	Detailed Design	Procure / Supply	Fabricate / Deliver	Receive / Maintenance	Erect / Install	Power Wiring	Control Wiring	Testing	Start-up	Commissioning	Remarks
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Natural gas detectors	BMcD	BMcD	8560	8560	8560	8560	8560	8560	8560	8560	8560	8560	
	Hydrogen detectors	BMcD	BMcD	8560	8560	8560	8560	8560	8560	8560	8560	8560	8560	
	Manual Fire Alarm Pull Stations	BMcD	BMcD	8560	8560	8560	8560	8560	8560	8560	8560	8560	8560	
	Notification Appliances	-	-	-	-	-	-	-	-	-	-	-	-	
	Horns	BMcD	BMcD	8560	8560	8560	8560	8560	8560	8560	8560	8560	8560	
	Strobes	BMcD	BMcD	8560	8560	8560	8560	8560	8560	8560	8560	8560	8560	
	Accessories	-	-	-	-	-	-	-	-	-	-	-	-	
	Addressable Input Modules (AIMs)	BMcD	BMcD	8560	8560	8560	8560	8560	8560	8560	8560	8560	8560	
	Addressable Output Modules (AOMs)	BMcD	BMcD	8560	8560	8560	8560	8560	8560	8560	8560	8560	8560	
	Surge protection devices / Surge suppressors (SS)	BMcD	BMcD	8560	8560	8560	8560	8560	8560	8560	8560	8560	8560	
	Fire Extinguishers and Cabinets	BMcD	BMcD	8560	8560	8560	8560	8560	-	-	-	-	-	
8570	**Field Erected Tanks**													
	Temporary Services		-	-	-	-	-	-	-	-	-	-	-	
	Construction Temporary Power & Maintenance	-	-	-	8570	8570	8570	8570	-	-	-	-	-	Temporary Power to be provided by Contractor via generators until the temporary power is available from Owner. Temp Power will be shared by all Contractors onsite when they mobilize. Contractor is responsible for temp power for Contractors Work from Contractor furnished terminal point.
	Construction Trailers	-	-	-	8570	8570	8570	-	-	-	-	-	-	
	Hydrotest Water - From Tie Point	BMcD	BMcD	8570	8570	8570	8570	8570	8570	-	-	-	-	
	Maintenance, Dust Control, & Snow Removal for Work Area	BMcD	BMcD	8570	8570	8570	8570	8570	8570	-	-	-	-	
	Spill Prevention, Control, and Countermeasures for Work Area	BMcD	BMcD	8570	8570	8570	8570	8570	8570	-	-	-	-	8570 to meet any plant SPCC requirements and develop an SPCC for 8570's Work.
	Temporary barricades, fencing, signage, etc.	BMcD	BMcD	8570	8570	8570	8570	8570	8570	-	-	-	-	
	Confined Space Entry for Tank Coating	BMcD	BMcD	8570	8570	8570	8570	8570	8570	8570	8570	8570	8570	
	Conditioning of Tank for Coatings (heating, ventilation, protection, dehumidification, etc.) as required	BMcD	BMcD	8570	8570	8570	8570	8570	8570	8570	8570	8570	8570	
	Miscellaneous	-	-	-	-	-	-	-	-	-	-	-	-	
	Survey & Layout for Contractors Work	BMcD	BMcD	BMcD	8570	8570	8570	8570	-	-	8570	8570	8570	
	Tanks	BMcD	-	-	-	-	-	-	-	-	-	-	-	
	Demineralized Water Storage Tank		BMcD	8570	8570	8570	8570	8570	-	-	8570	8570	8570	
	Service/Fire Water Storage Tank		BMcD	8570	8570	8570	8570	8570	-	-	8570	8570	8570	
	Service/Fire Water Storage Tank Immersion Heaters		BMcD	8570	8570	8570	8570	8570	8410	8410	8570	8570	8570	
	Clarified Water Storage Tank		BMcD	8570	8570	8570	8570	8570	-	-	8570	8570	8570	
	Fuel Oil Storage Tanks		BMcD	8570	8570	8570	8570	8570	-	-	8570	8570	8570	
	Wastewater Storage Tank		BMcD	8570	8570	8570	8570	8570	-	-	8570	8570	8570	
	Tank Appurtenances													
	Insulation/Lagging (Service/Fire Water Tank)	BMcD	BMcD	8570	8570	8570	8570	8570	-	-	-	-	-	
	Tank Vertical Pipe Supports	BMcD	BMcD	8570	8570	8570	8570	8570	-	-	-	-	-	
	Spiral Stair Access and Roof Access Platform	BMcD	BMcD	8570	8570	8570	8570	8570	-	-	-	-	-	
	Tank Piping (Overflow, Vortex Breaker, Internal Downcomer)		BMcD	8570	8570	8570	8570	8570	-	-	-	-	-	
	Coatings	BMcD	BMcD	8570	8570	8570	8570	8570	-	-	8570	-	-	
9010	**Subsurface Investigation**													
	Geotechnical Investigation	-	BMcD	-	-	-	-	-	-	-	9010	-	-	
9020	**Surveying**													
	Surveying	-	BMcD	-	-	-	-	-	-	-	9020	-	-	
9021	**Site Services**													
	Site Services	-	BMcD	-	-	-	-	-	-	-	9021	-	-	
9110	**Site Security**													
	Site Security	-	BMcD	-	-	-	-	-	-	-	9110	-	-	
9130	**Medical Services**													
	Medical Services	-	BMcD	-	-	-	-	-	-	-	9130	-	-	
9215	**Pile Inspections**													
	Pile Inspections	-	BMcD	9215	-	-	-	-	-	-	9215	-	-	
9230	**Electrical Testing**													
	Electrical Testing	BMcD	BMcD	9230	-	-	-	-	-	-	9230	-	-	Detailed design referring to testing plans, procedures, etc. as required
9250	**Performance Testing**													
	Performance Testing (CTG)	BMcD	BMcD	BMcD	9250	9250	-	-	-	-	9250	9250	9250	Need to Review with CTG OEM
	Performance Testing (HRSG)		BMcD	BMcD	9250	9250	-	-	-	-	9250	9250	9250	Need to Review with HRSG OEM
	Performance Testing (STG)		BMcD	BMcD	9250	9250	-	-	-	-	9250	9250	9250	Need to Review with STG OEM
	Performance Testing (Cooling Tower)		BMcD	BMcD	9250	9250	-	-	-	-	9250	9250	9250	Need to Review with Cooling Tower OEM
	Emissions Testing	-	BMcD	BMcD	9250	9250	-	-	-	-	9250	9250	9250	
9260	**Emisions Testing**													
	Emissions Testing	BMcD	BMcD	BMcD	9260	9260	-	-	-	-	9260	9260	9260	
9270	**Noise Testing**													
	Noise Testing	BMcD	BMcD	BMcD	9270	9270	-	-	-	-	9270	9270	9270	
9400	**O&M Manuals and Training**													
	O&M Manuals / Training Manuals	BMcD	BMcD	BMcD	9400	9400	-	-	-	-	-	-	-	
	Training	BMcD	BMcD	BMcD	9400	9400	-	-	-	-	-	-	-	
9610	**Start-up Cleaning Services**													
	Lube Oil Flush	BMcD	BMcD	BMcD	9610	9610	9610	9610	-	-	9610 / BMcD	9610 / BMcD	9610 / BMcD	
	Glycol Water & Service Water Flush (CTG/CCW)	BMcD	BMcD	BMcD	9610	9610	9610	9610	-	-	9610 / BMcD	9610 / BMcD	9610 / BMcD	
	Fuel Gas Pigging (CTG)	BMcD	BMcD	BMcD	9610	9610	9610	9610	-	-	9610 / BMcD	9610 / BMcD	9610 / BMcD	
	Steam Pipe Chemical Clean (HRSG, STG)		BMcD	BMcD	9610	9610	9610	9610	-	-	9610 / BMcD	9610 / BMcD	9610 / BMcD	
	Steam Blow (HRSG, STG)		BMcD	BMcD	9610	9610	9610	9610	-	-	9610 / BMcD	9610 / BMcD	9610 / BMcD	

Appendix D – EQUIPMENT LIST

157787 - COOPER 2x1 CCGT EQUIPMENT LIST

Unit	Redundancy	Risk	Equipment Name/Description	Parent Skid	Supply Contract	Install Contract	Insulation Contract	Insulation Thickness	Heat Trace Contract	Heat Trace Requirements	P&ID Drawing No.	Indoor / Outdoor	Motor Rating / Rated Load (nameplate) *see status*	Rating Unit (Hp, kW)	Rated Voltage
0	1x100%	Low	AUXILIARY BOILER AMINE/AMMONIA TOTE		OWNER	5.8320		N/A		N/A	MM0-CFF-005	INDOOR	N/A	-	-
0	1x100%	Low	NITROGEN BOTTLE RACK		OWNER	5.8320		N/A		N/A	MM0-CGN-001	OUTDOOR	N/A	-	-
0	1x100%	Low	RO ANTI-SCALANT TOTE		OWNER	5.8320		N/A		N/A	MM0-CFF-008	INDOOR	N/A	-	-
0	1x100%	Low	RO SODIUM BISULFITE TOTE		OWNER	5.8320		N/A		N/A	MM0-CFF-007	INDOOR	N/A	-	-
0	1x100%	Low	COOLING TOWER SODIUM BISULFITE TOTE		OWNER	5.8320		N/A		N/A	MM5-CFF-001	INDOOR	N/A	-	-
0	1x100%	Low	CLARIFIER POLYMER TOTE		OWNER	5.8320		N/A		N/A	MM0-CFF-003	INDOOR	N/A	-	-
0	1x100%	Low	FILTER PRESS FEED POLYMER TOTE		OWNER	5.8320		N/A		N/A	MM0-CFF-003	INDOOR	N/A	-	-
3	1x100%	Low	UNIT 3 PHOSPHATE TOTE		OWNER	5.8320		N/A		N/A	MM3-CFF-001	INDOOR	N/A	-	-
4	1x100%	Low	UNIT 4 PHOSPHATE TOTE		OWNER	5.8320		N/A		N/A	MM4-CFF-001	INDOOR	N/A	-	-
5	1x100%	Low	CONDENSATE AMMONIA TOTE		OWNER	5.8320		N/A		N/A	MM5-CFF-003	INDOOR	N/A	-	-
5	1x100%	Unit Outage	STEAM TURBINE GENERATOR (STG)		5.1110	5.8320	5.8330	4"		N/A	VENDOR PID	INDOOR	N/A	-	-
5	1x100%	Low	STG HOTBOX		5.1110	5.8320	5.8330	4"		N/A	VENDOR PID	INDOOR	N/A	-	-
5	1x100%	Unit Outage	STG HP/IP TURBINE		5.1110	5.8320	5.8330	4"		N/A	MM5-SHA-001 MM5-SHH-001 MM5-SLP-001	INDOOR	N/A	-	-
5	1x100%	Unit Outage	STG LP TURBINE		5.1110	5.8320	5.8330	4"		N/A	MM5-SLP-001	INDOOR	N/A	-	-
5	1x100%	Low	STG LUBE OIL MODULE/TANK		5.1110	5.8320		N/A		N/A	MM5-LOT-001	INDOOR	N/A	-	-
5	1x100%	Low	STG BEARING LIFT OIL FILTER 1	STG LUBE OIL MODULE/TANK	5.1110	5.1110		N/A		N/A	VENDOR PID	INDOOR	56	kW	480
5	1x100%	Low	STG BEARING LIFT OIL FILTER 2	STG LUBE OIL MODULE/TANK	5.1110	5.1110		N/A		N/A	VENDOR PID	INDOOR	56	kW	480
5	1x100%	Low	STG BEARING LIFT OIL PUMP A	STG LUBE OIL MODULE/TANK	5.1110	5.1110		N/A		N/A	MM5-LOT-001	INDOOR	56	kW	480
5	1x100%	Low	STG BEARING LIFT OIL PUMP B	STG LUBE OIL MODULE/TANK	5.1110	5.1110		N/A		N/A	MM5-LOT-001	INDOOR	56	kW	480
5	1x100%	Low	STG BEARING LIFT OIL PUMP C	STG LUBE OIL MODULE/TANK	5.1110	5.1110		N/A		N/A	MM5-LOT-001	INDOOR	56	kW	480
5	1x100%	Low	STG EMERGENCY LUBE OIL PUMP	STG LUBE OIL MODULE/TANK	5.1110	5.1110		N/A		N/A	MM5-LOT-001	INDOOR			
5	1x100%	Low	STG LUBE OIL COOLER A		5.1110	5.8320		N/A		N/A	MM5-LOT-001	INDOOR	N/A	-	-
5	1x100%	Low	STG LUBE OIL COOLER B		5.1110	5.8320		N/A		N/A	MM5-LOT-001	INDOOR	N/A	-	-
5	1x100%	Low	STG LUBE OIL FILTER 1	STG LUBE OIL MODULE/TANK	5.1110	5.1110		N/A		N/A	MM5-LOT-001	INDOOR	N/A	-	-
5	1x100%	Low	STG LUBE OIL FILTER 2	STG LUBE OIL MODULE/TANK	5.1110	5.1110		N/A		N/A	MM5-LOT-001	INDOOR	N/A	-	-
5	1x100%	Low	STG LUBE OIL PUMP 1	STG LUBE OIL MODULE/TANK	5.1110	5.1110		N/A		N/A	MM5-LOT-001	INDOOR	90	kW	480
5	1x100%	Low	STG LUBE OIL PUMP 2	STG LUBE OIL MODULE/TANK	5.1110	5.1110		N/A		N/A	MM5-LOT-001	INDOOR	90	kW	480
5	1x100%	Low	STG LUBE OIL VAPOR EXHAUST OIL SEPARATOR	STG LUBE OIL MODULE/TANK	5.1110	5.1110		N/A		N/A	MM5-LOT-001	INDOOR	2	kW	480
5	1x100%	Low	STG LUBE OIL VAPOR EXHAUSTER 1	STG LUBE OIL MODULE/TANK	5.1110	5.1110		N/A		N/A	MM5-LOT-001	INDOOR	2	kW	480
5	1x100%	Low	STG LUBE OIL VAPOR EXHAUSTER 2	STG LUBE OIL MODULE/TANK	5.1110	5.1110		N/A		N/A	MM5-LOT-001	INDOOR	2	kW	480
5	1x100%	Unit Derate	STG OIL PURIFICATION UNIT		5.1110	5.8320		N/A		N/A	MM5-LOT-001	INDOOR	N/A	-	-
5	1x100%	Unit Derate	STG OIL PURIFICATION UNIT HEATER	STG OIL PURIFICATION UNIT	5.1110	5.1110		N/A		N/A	MM5-LOT-001	INDOOR			
5	1x100%	Unit Derate	STG OIL PURIFICATION UNIT PUMP	STG OIL PURIFICATION UNIT	5.1110	5.1110		N/A		N/A	MM5-LOT-001	INDOOR			
5	1x100%	Unit Outage	STG GLAND STEAM CONDENSER		5.1110	5.8320	5.8330	4"		N/A	MM5-BCD-002 MM5-STS-001	INDOOR	N/A	-	-
5	1x100%	Low	STG GLAND STEAM EXHAUSTER 1	STG GLAND STEAM CONDENSER	5.1110	5.1110		N/A		N/A	MM5-STS-001	INDOOR	6	kW	480
5	1x100%	Low	STG GLAND STEAM EXHAUSTER 2	STG GLAND STEAM CONDENSER	5.1110	5.1110		N/A		N/A	MM5-STS-001	INDOOR	6	kW	480
5	1x100%	Unit Outage	STG HYDRAULIC OIL UNIT/TANK		5.1110	5.8320		N/A		N/A	MM5-LOT-004	INDOOR	1	kW	480
5	1x100%	Low	STG HYDRAULIC/CONTROL OIL COOLING CIRCULATION PUMP 1	STG HYDRAULIC OIL UNIT/TANK	5.1110	5.1110		N/A		N/A	MM5-LOT-004	INDOOR	2	kW	480

157787 - COOPER 2x1 CCGT EQUIPMENT LIST

Unit	Redundancy	Risk	Equipment Name/Description	Parent Skid	Supply Contract	Install Contract	Insulation Contract	Insulation Thickness	Heat Trace Contract	Heat Trace Requirements	P&ID Drawing No.	Indoor / Outdoor	Motor Rating / Rated Load (nameplate) *see status*	Rating Unit (Hp, kW)	Rated Voltage
5	1x100%	Low	STG HYDRAULIC/CONTROL OIL COOLING CIRCULATION PUMP 2	STG HYDRAULIC OIL UNIT/TANK	5.1110	5.1110		N/A		N/A	MM5-LOT-004	INDOOR	2	kW	480
5	1x100%	Low	STG HYDRAULIC/CONTROL OIL COOLING FAN 1	STG HYDRAULIC OIL UNIT/TANK	5.1110	5.1110		N/A		N/A	VENDOR PID	INDOOR			
5	1x100%	Low	STG HYDRAULIC/CONTROL OIL COOLING FAN 2	STG HYDRAULIC OIL UNIT/TANK	5.1110	5.1110		N/A		N/A	VENDOR PID	INDOOR			
5	1x100%	Low	STG HYDRAULIC/CONTROL OIL FILTER 1	STG HYDRAULIC OIL UNIT/TANK	5.1110	5.1110		N/A		N/A	VENDOR PID	INDOOR	N/A	-	-
5	1x100%	Low	STG HYDRAULIC/CONTROL OIL FILTER 2	STG HYDRAULIC OIL UNIT/TANK	5.1110	5.1110		N/A		N/A	VENDOR PID	INDOOR	N/A	-	-
5	1x100%	Low	STG HYDRAULIC/CONTROL OIL HEATER	STG HYDRAULIC OIL UNIT/TANK	5.1110	5.1110		N/A		N/A	VENDOR PID	INDOOR	1	kW	480
5	1x100%	Low	STG HYDRAULIC/CONTROL OIL PUMP 1	STG HYDRAULIC OIL UNIT/TANK	5.1110	5.1110		N/A		N/A	VENDOR PID	INDOOR	19	kW	480
5	1x100%	Low	STG HYDRAULIC/CONTROL OIL PUMP 2	STG HYDRAULIC OIL UNIT/TANK	5.1110	5.1110		N/A		N/A	VENDOR PID	INDOOR	19	kW	480
5	1x100%	Unit Outage	STG TRANSFORMER SEE		5.1110	5.8320		N/A		N/A	VENDOR PID	OUTDOOR	1070	kVA	6900
5	1x100%	Unit Outage	STG TRANSFORMER SEE PACKAGE		5.1110	5.8320		N/A		N/A	VENDOR PID	OUTDOOR	60	kVA	480
5	1x100%	Unit Outage	STG VT SURGE CUBICLE		5.1110	5.8320		N/A		N/A	VENDOR PID	OUTDOOR	60	kVA	480
0	2x100%	Low	COMMON GT WATER WASH SKID		5.1120	5.8320		N/A		N/A	MM3-GTG-003	OUTDOOR	5	HP	480
3	1x100%	Unit Outage	GAS TURBINE GENERATOR - UNIT 3		5.1120	5.8320		N/A		N/A	VENDOR PID	OUTDOOR	N/A	-	-
3	1x100%	Unit Outage	GT3 AIR INLET FILTER		5.1120	5.8320		N/A		N/A	MM3-GTG-002	OUTDOOR	10	kVA	480
3	1x100%	Unit Derate if Operating	GT3 EVAP COOLER SKID		5.1120	5.8320		N/A		N/A	MM3-GTG-002	OUTDOOR			
3	1x100%	Low	GT3 EVAP COOLER PUMP A	GT3 EVAP SKID	5.1120	5.1120		N/A		N/A	MM3-GTG-002	OUTDOOR	20	HP	480
3	1x100%	Low	GT3 EVAP COOLER PUMP B	GT3 EVAP SKID	5.1120	5.1120		N/A		N/A	MM3-GTG-002	OUTDOOR	20	HP	480
3	1x100%	Unit Outage	GT3 BATTERY CHARGER		5.1120	5.8410		N/A		N/A	VENDOR PID	INDOOR	50	kVA	480
3	1x100%	Low	GT3 COLLECTOR BLOWER #1		5.1120	5.8320		N/A		N/A	VENDOR PID	INDOOR	50	HP	480
3	1x100%	Low	GT3 COLLECTOR BLOWER #2		5.1120	5.8320		N/A		N/A	VENDOR PID	INDOOR	50	HP	480
3	1x100%	Unit Outage	GT3 HYDRAULIC SKID		5.1120	5.8320		N/A		N/A	VENDOR PID	OUTDOOR			
3	1x100%	Low	GT3 CONTROL OIL FAN	GT3 HYDRAULIC SKID	5.1120	5.1120		N/A		N/A	MM3-GTG-002	INDOOR	0.25	HP	480
3	1x100%	Low	GT3 CONTROL OIL FILTER #1	GT3 HYDRAULIC SKID	5.1120	5.1120		N/A		N/A	MM3-GTG-002	INDOOR	N/A	-	-
3	1x100%	Low	GT3 CONTROL OIL FILTER #2	GT3 HYDRAULIC SKID	5.1120	5.1120		N/A		N/A	MM3-GTG-002	INDOOR	N/A	-	-
3	1x100%	Low	GT3 CONTROL OIL PUMP #1	GT3 HYDRAULIC SKID	5.1120	5.1120		N/A		N/A	MM3-GTG-002	INDOOR	25	HP	480
3	1x100%	Low	GT3 CONTROL OIL PUMP #2	GT3 HYDRAULIC SKID	5.1120	5.1120		N/A		N/A	MM3-GTG-002	INDOOR	25	HP	480
3	1x100%	Unit Outage	GT3 CONTROL OIL RESERVOIR	GT3 HYDRAULIC SKID	5.1120	5.1120		N/A		N/A	MM3-GTG-002	INDOOR	N/A	-	-
3	1x100%	Low	GT3 CONTROL OIL RESERVOIR HEATER #1	GT3 HYDRAULIC SKID	5.1120	5.1120		N/A		N/A	MM3-GTG-002	INDOOR	1	kW	480
3	1x100%	Low	GT3 CONTROL OIL RESERVOIR HEATER #2	GT3 HYDRAULIC SKID	5.1120	5.1120		N/A		N/A	MM3-GTG-002	INDOOR	1	kW	480
3	1x100%	Unit Outage	GT3 ELECTRICAL PACKAGE		5.1120	5.8410		N/A		N/A	VENDOR PID	OUTDOOR	N/A	-	-
3	1x100%	Low	GT3 ELECTRICAL PACKAGE HVAC UNIT #1		5.1120	5.8410		N/A		N/A	VENDOR PID	INDOOR	15	kW	480
3	1x100%	Low	GT3 ELECTRICAL PACKAGE HVAC UNIT #2		5.1120	5.8410		N/A		N/A	VENDOR PID	INDOOR	15	kW	480
3	1x100%	Low	GT3 ENCLOSURE		5.1120	5.8320		N/A		N/A	MM3-GTG-002	OUTDOOR	N/A	-	-
3	1x25%	Low	GT3 TURBINE VENT FAN #1	GT3 ENCLOSURE	5.1120	5.1120		N/A		N/A	VENDOR PID	INDOOR	10	HP	480
3	1x25%	Low	GT3 TURBINE VENT FAN #2	GT3 ENCLOSURE	5.1120	5.1120		N/A		N/A	VENDOR PID	INDOOR	10	HP	480
3	1x25%	Low	GT3 TURBINE VENT FAN #3	GT3 ENCLOSURE	5.1120	5.1120		N/A		N/A	VENDOR PID	INDOOR	10	HP	480
3	1x25%	Low	GT3 TURBINE VENT FAN #4	GT3 ENCLOSURE	5.1120	5.1120		N/A		N/A	VENDOR PID	INDOOR	10	HP	480

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Unit	Redundancy	Risk	Equipment Name/Description	Parent Skid	Supply Contract	Install Contract	Insulation Contract	Insulation Thickness	Heat Trace Contract	Heat Trace Requirements	P&ID Drawing No.	Indoor / Outdoor	Motor Rating / Rated Load (nameplate) *see status*	Rating Unit (Hp, kW)	Rated Voltage
3	1x100%	Unit Derate	GT3 FUEL GAS PERFORMANCE HEATER		5.2762	5.8320	5.8330	4"		N/A	MM3-BFW-002 MM3-FGS-001	OUTDOOR			
3	1x100%	Unit Outage	GT3 KNOCKOUT DRUM		5.2762	5.8320	5.8330	4"		N/A	MM3-FGS-001	OUTDOOR	N/A	-	-
3	1x100%	Low	GT3 FUEL OIL SKID		5.1120	5.8320		N/A		N/A	MM3-GTG-002	OUTDOOR	400	HP	6900
3	1x100%	Derate if Burning FO	GT3 WATER INJECTION SKID		5.1120	5.8320		N/A		N/A	MM3-GTG-002	OUTDOOR	250	HP	480
3	1x100%	Unit Outage	GT3 GENERATOR		5.1120	5.8320		N/A		N/A	VENDOR PID	OUTDOOR	N/A	-	-
3	1x100%		GT3 GENERATOR SPACE HEATER		5.1120	5.8320		N/A		N/A	VENDOR PID	OUTDOOR	6	kW	480
3	1x100%	Low	GT3 TURNING GEAR ASSEMBLY		5.1120	5.8320		N/A		N/A	VENDOR PID	OUTDOOR	125	HP	480
3	1x100%	Low	GT3 HIGH SPEED TURNING GEAR	GT3 TURNING GEAR ASSEMBLY	5.1120	5.1120		N/A		N/A	VENDOR PID	INDOOR	125	HP	480
3	1x100%	Low	GT3 LOW SPEED TURNING GEAR	GT3 TURNING GEAR ASSEMBLY	5.1120	5.1120		N/A		N/A	VENDOR PID	INDOOR	3	HP	480
3	1x100%	Low	GT3 LP CO2 FIRE PROTECTION SKID		5.1120	5.8320		N/A		N/A	MM3-GTG-001	OUTDOOR	N/A	-	-
3	1x100%	Unit Outage	GT3 OIL SKID & COOLER		5.1120	5.8320		N/A		N/A	MM3-GTG-002	OUTDOOR	N/A	-	-
3	1x100%	Unit Outage	GT3 BEARING LIFT OIL PUMP	GT3 OIL SKID & COOLER	5.1120	5.1120		N/A		N/A	MM3-GTG-002	INDOOR	25	HP	480
3	1x100%	Low	GT3 LUBE OIL COOLER #1 (PLATE & FRAME HX)	GT3 OIL SKID & COOLER	5.1120	5.1120		N/A		N/A	MM3-GTG-002	INDOOR	N/A	-	-
3	1x100%	Low	GT3 LUBE OIL COOLER #2 (PLATE & FRAME HX)	GT3 OIL SKID & COOLER	5.1120	5.1120		N/A		N/A	MM3-GTG-002	INDOOR	N/A	-	-
3	1x100%	Low	GT3 LUBE OIL FILTER #1	GT3 OIL SKID & COOLER	5.1120	5.1120		N/A		N/A	MM3-GTG-002	INDOOR	N/A	-	-
3	1x100%	Low	GT3 LUBE OIL FILTER #2	GT3 OIL SKID & COOLER	5.1120	5.1120		N/A		N/A	MM3-GTG-002	INDOOR	N/A	-	-
3	1x100%	Low	GT3 EMERGENCY DC LUBE OIL PUMP	GT3 OIL SKID & COOLER	5.1120	5.1120		N/A		N/A	MM3-GTG-002	INDOOR			
3	1x100%	Low	GT3 LUBE OIL PUMP #1	GT3 OIL SKID & COOLER	5.1120	5.1120		N/A		N/A	MM3-GTG-002	INDOOR	100	HP	480
3	1x100%	Low	GT3 LUBE OIL PUMP #2	GT3 OIL SKID & COOLER	5.1120	5.1120		N/A		N/A	MM3-GTG-002	INDOOR	100	HP	480
3	1x100%	Unit Outage	GT3 LUBE OIL RESERVOIR	GT3 OIL SKID & COOLER	5.1120	5.1120		N/A		N/A	MM3-GTG-002	INDOOR	N/A	-	-
3	1x50%	Low	GT3 LUBE OIL RESERVOIR HEATER #1	GT3 OIL SKID & COOLER	5.1120	5.1120		N/A		N/A	MM3-GTG-002	INDOOR	12	kW	480
3	1x50%	Low	GT3 LUBE OIL RESERVOIR HEATER #2	GT3 OIL SKID & COOLER	5.1120	5.1120		N/A		N/A	MM3-GTG-002	INDOOR	12	kW	480
3	1x50%	Low	GT3 LUBE OIL RESERVOIR HEATER #3	GT3 OIL SKID & COOLER	5.1120	5.1120		N/A		N/A	MM3-GTG-002	INDOOR	12	kW	480
3	1x100%	Low	GT3 LUBE OIL VAPOR EXTRACTOR #1	GT3 OIL SKID & COOLER	5.1120	5.1120		N/A		N/A	MM3-GTG-002	INDOOR	5	HP	480
3	1x100%	Low	GT3 LUBE OIL VAPOR EXTRACTOR #2	GT3 OIL SKID & COOLER	5.1120	5.1120		N/A		N/A	MM3-GTG-002	INDOOR	5	HP	480
3	1x100%	Unit Outage	GT3 LV PANEL BOARD TRANSFORMER		5.1120	5.8410		N/A		N/A	VENDOR PID	INDOOR	30	kVA	480
3	1x100%	Unit Derate	GT3 MAIN FUEL GAS FILTER		5.1120	5.8320		N/A		N/A	MM3-GTG-002	INDOOR	N/A	-	-
3	1x100%	Unit Derate	GT3 PILOT FLOW DIVIDER		5.1120	5.1120		N/A		N/A	MM3-GTG-002	INDOOR	0.33	HP	480
3	1x100%	Unit Derate	GT3 PILOT FUEL GAS FILTER		5.1120	5.1120		N/A		N/A	MM3-GTG-002	INDOOR	N/A	-	-
3	1x100%	Unit Derate	GT3 PURGE/INSTRUMENT AIR COMPRESSOR		5.1120	5.8320		N/A		N/A	VENDOR PID	INDOOR	150	HP	480
3	1x100%	Unit Outage	GT3 ROTOR AIR COOLER (KETTLE BOILER)		5.1120	5.8320		N/A		N/A	VENDOR PID	INDOOR	N/A	-	-
3	1x100%	Unit Outage	GT3 SEE TRANSFORMER		5.1120	5.8410		N/A		N/A	VENDOR PID	INDOOR	1070	kVA	6900
3	1x100%	Unit Outage	GT3 SEE/SFC PACKAGE		5.1120	5.8410		N/A		N/A	VENDOR PID	INDOOR	60	kVA	480
3	1x100%	Unit Outage	GT3 SFC TRANSFORMER		5.1120	5.8410		N/A		N/A	VENDOR PID	INDOOR	5100	kVA	6900
3	1x100%	Unit Outage	GT3 STAGE A FLOW DIVIDER		5.1120	5.1120		N/A		N/A	VENDOR PID	INDOOR	0.33	HP	480
3	1x100%	Unit Outage	GT3 STAGE B FLOW DIVIDER		5.1120	5.1120		N/A		N/A	VENDOR PID	INDOOR	0.33	HP	480
3	1x100%	Unit Outage	GT3 VT SURGE/SFC SWITCH CUBICLE		5.1120	5.8410		N/A		N/A	VENDOR PID	INDOOR			
4	1x100%	Unit Outage	GAS TURBINE GENERATOR - UNIT 4		5.1120	5.8320		N/A		N/A	VENDOR PID	OUTDOOR	N/A	-	-
4	1x100%	Unit Outage	GT4 AIR INLET FILTER		5.1120	5.8320		N/A		N/A	MM4-GTG-002	OUTDOOR	10	kVA	480
4	1x100%	Unit Derate if Operating	GT4 EVAP COOLER SKID		5.1120	5.8320		N/A		N/A	MM3-GTG-002	OUTDOOR			
4	1x100%	Low	GT4 EVAP COOLER PUMP A	GT3 EVAP SKID	5.1120	5.1120		N/A		N/A	MM3-GTG-002	OUTDOOR	10	HP	480
4	1x100%	Low	GT4 EVAP COOLER PUMP B	GT3 EVAP SKID	5.1120	5.1120		N/A		N/A	MM3-GTG-002	OUTDOOR	10	HP	480
4	1x100%	Unit Outage	GT4 BATTERY CHARGER		5.1120	5.8410		N/A		N/A	VENDOR PID	INDOOR	50	kVA	480
4	1x100%	Low	GT4 COLLECTOR BLOWER #1		5.1120	5.8320		N/A		N/A	VENDOR PID	INDOOR	50	HP	480
4	1x100%	Low	GT4 COLLECTOR BLOWER #2		5.1120	5.8320		N/A		N/A	VENDOR PID	INDOOR	50	HP	480

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Unit	Redundancy	Risk	Equipment Name/Description	Parent Skid	Supply Contract	Install Contract	Insulation Contract	Insulation Thickness	Heat Trace Contract	Heat Trace Requirements	P&ID Drawing No.	Indoor / Outdoor	Motor Rating / Rated Load (nameplate) *see status*	Rating Unit (Hp, kW)	Rated Voltage
4	1x100%	Unit Outage	GT4 HYDRAULIC SKID		5.1120	5.8320		N/A		N/A	VENDOR PID	OUTDOOR			
4	1x100%	Low	GT4 CONTROL OIL FAN	GT4 HYDRAULIC SKID	5.1120	5.1120		N/A		N/A	MM4-GTG-002	INDOOR	0.25	HP	480
4	1x100%	Low	GT4 CONTROL OIL FILTER #1	GT4 HYDRAULIC SKID	5.1120	5.1120		N/A		N/A	MM4-GTG-002	INDOOR	N/A	-	-
4	1x100%	Low	GT4 CONTROL OIL FILTER #2	GT4 HYDRAULIC SKID	5.1120	5.1120		N/A		N/A	MM4-GTG-002	INDOOR	N/A	-	-
4	1x100%	Low	GT4 CONTROL OIL PUMP #1	GT4 HYDRAULIC SKID	5.1120	5.1120		N/A		N/A	MM4-GTG-002	INDOOR	25	HP	480
4	1x100%	Low	GT4 CONTROL OIL PUMP #2	GT4 HYDRAULIC SKID	5.1120	5.1120		N/A		N/A	MM4-GTG-002	INDOOR	25	HP	480
4	1x100%	Unit Outage	GT4 CONTROL OIL RESERVOIR	GT4 HYDRAULIC SKID	5.1120	5.1120		N/A		N/A	MM4-GTG-002	INDOOR	N/A	-	-
4	1x100%	Low	GT4 CONTROL OIL RESERVOIR HEATER #1	GT4 HYDRAULIC SKID	5.1120	5.1120		N/A		N/A	MM4-GTG-002	INDOOR	1	kW	480
4	1x100%	Low	GT4 CONTROL OIL RESERVOIR HEATER #2	GT4 HYDRAULIC SKID	5.1120	5.1120		N/A		N/A	MM4-GTG-002	INDOOR	1	kW	480
4	1x100%	Unit Outage	GT4 ELECTRICAL PACKAGE		5.1120	5.8410		N/A		N/A	VENDOR PID	OUTDOOR	N/A	-	-
4	1x100%	Low	GT4 ELECTRICAL PACKAGE HVAC UNIT #1		5.1120	5.8410		N/A		N/A	VENDOR PID	INDOOR	15	kW	480
4	1x100%	Low	GT4 ELECTRICAL PACKAGE HVAC UNIT #2		5.1120	5.8410		N/A		N/A	VENDOR PID	INDOOR	15	kW	480
4	1x100%	Low	GT4 ENCLOSURE		5.1120	5.8320		N/A		N/A	MM4-GTG-002	OUTDOOR	N/A	-	-
4	1x25%	Low	GT4 TURBINE VENT FAN #1	GT4 ENCLOSURE	5.1120	5.1120		N/A		N/A	VENDOR PID	INDOOR	10	HP	480
4	1x25%	Low	GT4 TURBINE VENT FAN #2	GT4 ENCLOSURE	5.1120	5.1120		N/A		N/A	VENDOR PID	INDOOR	10	HP	480
4	1x25%	Low	GT4 TURBINE VENT FAN #3	GT4 ENCLOSURE	5.1120	5.1120		N/A		N/A	VENDOR PID	INDOOR	10	HP	480
4	1x25%	Low	GT4 TURBINE VENT FAN #4	GT4 ENCLOSURE	5.1120	5.1120		N/A		N/A	VENDOR PID	INDOOR	10	HP	480
4	1x100%	Unit Derate	GT4 FUEL GAS PERFORMANCE HEATER		5.2762	5.8320	5.8330	4"		N/A	MM4-BFW-002 MM4-FGS-001	OUTDOOR			
4	1x100%	Unit Outage	GT4 KNOCKOUT DRUM		5.2762	5.8320	5.8330	4"		N/A	MM4-FGS-001	OUTDOOR	N/A	-	-
4	1x100%	Low	GT4 FUEL OIL SKID		5.1120	5.8320		N/A		N/A	MM4-GTG-002	OUTDOOR	400	HP	6900
4	1x100%	Derate if Burning FO	GT4 WATER INJECTION SKID		5.1120	5.8320		N/A		N/A	MM4-GTG-002	OUTDOOR	250	HP	480
4	1x100%	Unit Outage	GT4 GENERATOR		5.1120	5.8320		N/A		N/A	VENDOR PID	OUTDOOR	N/A	-	-
4	1x100%	Unit Derate	GT4 GENERATOR SPACE HEATER		5.1120	5.8320		N/A		N/A	VENDOR PID	OUTDOOR	6	kW	480
4	1x100%	Low	GT4 TURNING GEAR ASSEMBLY		5.1120	5.8320		N/A		N/A	VENDOR PID	OUTDOOR	125	HP	480
4	1x100%	Low	GT4 HIGH SPEED TURNING GEAR	GT4 TURNING GEAR ASSEMBLY	5.1120	5.1120		N/A		N/A	VENDOR PID	INDOOR	125	HP	480
4	1x100%	Low	GT4 LOW SPEED TURNING GEAR	GT4 TURNING GEAR ASSEMBLY	5.1120	5.1120		N/A		N/A	VENDOR PID	INDOOR	3	HP	480
4	1x100%	Low	GT4 LP CO2 FIRE PROTECTION SKID		5.1120	5.8320		N/A		N/A	MM4-GTG-001	OUTDOOR	N/A	-	-
4	1x100%	Unit Outage	GT4 OIL SKID & COOLER		5.1120	5.8320		N/A		N/A	MM4-GTG-002	OUTDOOR	N/A	-	-
4	1x100%	Low	GT4 BEARING LIFT OIL PUMP	GT4 OIL SKID & COOLER	5.1120	5.1120		N/A		N/A	MM4-GTG-002	INDOOR	25	HP	480
4	1x100%	Low	GT4 LUBE OIL COOLER #1 (PLATE & FRAME HX)	GT4 OIL SKID & COOLER	5.1120	5.1120		N/A		N/A	MM4-GTG-002	INDOOR	N/A	-	-
4	1x100%	Low	GT4 LUBE OIL COOLER #2 (PLATE & FRAME HX)	GT4 OIL SKID & COOLER	5.1120	5.1120		N/A		N/A	MM4-GTG-002	INDOOR	N/A	-	-
4	1x100%	Low	GT4 LUBE OIL FILTER #1	GT4 OIL SKID & COOLER	5.1120	5.1120		N/A		N/A	MM4-GTG-002	INDOOR	N/A	-	-
4	1x100%	Low	GT4 LUBE OIL FILTER #2	GT4 OIL SKID & COOLER	5.1120	5.1120		N/A		N/A	MM4-GTG-002	INDOOR	N/A	-	-
4	1x100%	Low	GT4 EMERGENCY DC LUBE OIL PUMP	GT4 OIL SKID & COOLER	5.1120	5.1120		N/A		N/A	MM4-GTG-002	INDOOR			
4	1x100%	Low	GT4 LUBE OIL PUMP #1	GT4 OIL SKID & COOLER	5.1120	5.1120		N/A		N/A	MM4-GTG-002	INDOOR	100	HP	480
4	1x100%	Low	GT4 LUBE OIL PUMP #2	GT4 OIL SKID & COOLER	5.1120	5.1120		N/A		N/A	MM4-GTG-002	INDOOR	100	HP	480
4	1x100%	Unit Outage	GT4 LUBE OIL RESERVOIR	GT4 OIL SKID & COOLER	5.1120	5.1120		N/A		N/A	MM4-GTG-002	INDOOR	N/A	-	-
4	1x50%	Low	GT4 LUBE OIL RESERVOIR HEATER #1	GT4 OIL SKID & COOLER	5.1120	5.1120		N/A		N/A	MM4-GTG-002	INDOOR	12	kW	480

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Unit	Redundancy	Risk	Equipment Name/Description	Parent Skid	Supply Contract	Install Contract	Insulation Contract	Insulation Thickness	Heat Trace Contract	Heat Trace Requirements	P&ID Drawing No.	Indoor / Outdoor	Motor Rating / Rated Load (nameplate) *see status*	Rating Unit (Hp, kW)	Rated Voltage
4	1x50%	Low	GT4 LUBE OIL RESERVOIR HEATER #2	GT4 OIL SKID & COOLER	5.1120	5.1120		N/A		N/A	MM4-GTG-002	INDOOR	12	kW	480
4	1x50%	Low	GT4 LUBE OIL RESERVOIR HEATER #3	GT4 OIL SKID & COOLER	5.1120	5.1120		N/A		N/A	MM4-GTG-002	INDOOR	12	kW	480
4	1x100%	Low	GT4 LUBE OIL VAPOR EXTRACTOR #1	GT4 OIL SKID & COOLER	5.1120	5.1120		N/A		N/A	MM4-GTG-002	INDOOR	5	HP	480
4	1x100%	Low	GT4 LUBE OIL VAPOR EXTRACTOR #2	GT4 OIL SKID & COOLER	5.1120	5.1120		N/A		N/A	MM4-GTG-002	INDOOR	5	HP	480
4	1x100%	Unit Outage	GT4 LV PANEL BOARD TRANSFORMER		5.1120	5.8410		N/A		N/A	VENDOR PID	INDOOR	30	kVA	480
4	1x100%	Unit Derate	GT4 MAIN FUEL GAS FILTER		5.1120	5.8320		N/A		N/A	MM4-GTG-002	INDOOR	N/A	-	-
4	1x100%	Unit Derate	GT4 PILOT FLOW DIVIDER		5.1120	5.1120		N/A		N/A	MM4-GTG-002	INDOOR	0.33	HP	480
4	1x100%	Unit Derate	GT4 PILOT FUEL GAS FILTER		5.1120	5.1120		N/A		N/A	MM4-GTG-002	INDOOR	N/A	-	-
4	1x100%	Unit Derate	GT4 PURGE/INSTRUMENT AIR COMPRESSOR		5.1120	5.8320		N/A		N/A	VENDOR PID	INDOOR	150	HP	480
4	1x100%	Unit Outage	GT4 ROTOR AIR COOLER (KETTLE BOILER)		5.1120	5.8320		N/A		N/A	VENDOR PID	INDOOR	N/A	-	-
4	1x100%	Unit Outage	GT4 SEE TRANSFORMER		5.1120	5.8410		N/A		N/A	VENDOR PID	INDOOR	1070	kVA	6900
4	1x100%	Unit Outage	GT4 SEE/SFC PACKAGE		5.1120	5.8410		N/A		N/A	VENDOR PID	INDOOR	60	kVA	480
4	1x100%	Unit Outage	GT4 SFC TRANSFORMER		5.1120	5.8410		N/A		N/A	VENDOR PID	INDOOR	5100	kVA	6900
4	1x100%	Unit Outage	GT4 STAGE A FLOW DIVIDER		5.1120	5.1120		N/A		N/A	VENDOR PID	INDOOR	0.33	HP	480
4	1x100%	Unit Outage	GT4 STAGE B FLOW DIVIDER		5.1120	5.1120		N/A		N/A	VENDOR PID	INDOOR	0.33	HP	480
4	1x100%	Unit Outage	GT4 VT SURGE/SFC SWITCH CUBICLE		5.1120	5.8410		N/A		N/A	VENDOR PID	INDOOR			
3	1x100%	Unit Derate	HRSG3		5.1215	5.8320		N/A		N/A	VENDOR PID	OUTDOOR	N/A	-	-
4	1x100%	Unit Derate	HRSG3 AMMONIA VAPORIZER/FLOW CONTROL SKID		5.1215	5.8320		N/A		N/A	VENDOR PID	OUTDOOR	N/A	-	-
4	1x100%	Low	HRSG3 AIG BLOWER A		5.1215	5.1215		N/A	N/A	N/A	VENDOR PID	OUTDOOR	125	HP	480
4	1x100%	Low	HRSG3 AIG BLOWER B	HRSG3 AMMONIA VAPORIZER/FLO W CONTROL SKID	5.1215	5.1215		N/A		N/A	VENDOR PID	OUTDOOR	125	HP	480
3	1x100%	Unit Derate	HRSG3 BLOWDOWN TANK		5.1215	5.8320	5.8330	2"		N/A	MM3-BBD-001	OUTDOOR	N/A	-	-
3	1x100%	Unit Derate	HRSG3 CONDENSATE RECIRCULATION PUMP		5.1215	5.8320	5.8330	2"		N/A	VENDOR PID	INDOOR	125	HP	480
3	1x100%	Unit Derate	HRSG3 EXHAUST STACK		5.1215	5.8320		N/A		N/A	VENDOR PID	OUTDOOR	N/A	-	-
3	1x100%	Unit Outage	HRSG3 ELEC ENCLOSURE		5.1215	5.8320		N/A		N/A	VENDOR PID	OUTDOOR	N/A	-	-
3	1x100%	Unit Derate	HRSG3 CEMS SHELTER ANALYZER CABINET		5.1215	5.8320		N/A		N/A	VENDOR PID	OUTDOOR	50	kW	480
3	1x100%	Unit Derate	GTG3 CEMS ANALYZER CABINET		5.1215	5.8410		N/A		N/A	VENDOR PID	INDOOR	50	kW	480
4	1x100%	Unit Derate	HRSG4		5.1215	5.8320		N/A		N/A	VENDOR PID	OUTDOOR	N/A	-	-
4	1x100%	Unit Derate	HRSG4 AMMONIA VAPORIZER/FLOW CONTROL SKID		5.1215	5.8320		N/A		N/A	VENDOR PID	OUTDOOR	N/A	-	-
4	1x100%	Low	HRSG4 AIG BLOWER A	HRSG4 AMMONIA VAPORIZER/FLO W CONTROL SKID	5.1215	5.1215		N/A	N/A	N/A	VENDOR PID	OUTDOOR	125	HP	480
4	1x100%	Low	HRSG4 AIG BLOWER B	HRSG4 AMMONIA VAPORIZER/FLO W CONTROL SKID	5.1215	5.1215		N/A		N/A	VENDOR PID	OUTDOOR	125	HP	480
4	1x100%	Unit Derate	HRSG4 BLOWDOWN TANK		5.1215	5.8320	5.8330	2"		N/A	MM4-BBD-001	OUTDOOR	N/A	-	-
4	1x100%	Unit Derate	HRSG4 CONDENSATE RECIRCULATION PUMP		5.1215	5.8320	5.8330	2"		N/A	VENDOR PID	INDOOR	125	HP	480
4	1x100%	Unit Derate	HRSG4 EXHAUST STACK		5.1215	5.8320		N/A		N/A	VENDOR PID	OUTDOOR	N/A	-	-
4	1x100%	Unit Outage	HRSG4 ELEC ENCLOSURE		5.1215	5.8320		N/A		N/A	VENDOR PID	OUTDOOR	N/A	-	-
4	1x100%	Unit Derate	HRSG4 CEMS SHELTER ANALYZER CABINET		5.1215	5.8320		N/A		N/A	VENDOR PID	OUTDOOR	50	kW	480
4	1x100%	Unit Derate	GTG4 CEMS ANALYZER CABINET		5.1215	5.8410		N/A		N/A	VENDOR PID	INDOOR	50	kW	480
3	1x100%	Low	BOILER FEEDWATER PUMP 3A		5.2110	5.8320	5.8330	2"		N/A	MM3-BFW-001	INDOOR	4200	HP	6900
3	1x100%	Low	BOILER FEEDWATER PUMP 3B		5.2110	5.8320	5.8330	2"		N/A	MM3-BFW-001	INDOOR	4200	HP	6900
3	1x100%	Low	BOILER FEEDWATER PUMP LUBE OIL PUMP 3A	BOILER FEEDWATER PUMP 3A	5.2110	5.2110		N/A		N/A	MM3-BFW-001	INDOOR	15	HP	480
3	1x100%	Low	BOILER FEEDWATER PUMP LUBE OIL PUMP 3B	BOILER FEEDWATER PUMP 3B	5.2110	5.2110		N/A		N/A	MM3-BFW-001	INDOOR	15	HP	480
3	1x100%	Low	BOILER FEEDWATER PUMP 3 ENCLOSURE/BUILDING		5.2110	5.8320	5.8330	N/A		N/A	MM3-BFW-001	OUTDOOR	50	KW	480
4	1x100%	Low	BOILER FEEDWATER PUMP 4A		5.2110	5.2110		TBD		N/A	MM4-BFW-001	INDOOR	4200	HP	6900
4	1x100%	Low	BOILER FEEDWATER PUMP 4B		5.2110	5.8320	5.8330	2"		N/A	MM4-BFW-001	INDOOR	4200	HP	6900
4	1x100%	Low	BOILER FEEDWATER PUMP LUBE OIL PUMP 4A	BOILER FEEDWATER PUMP 4A	5.2110	5.2110		N/A		N/A	MM4-BFW-001	INDOOR	15	HP	480

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Unit	Redundancy	Risk	Equipment Name/Description	Parent Skid	Supply Contract	Install Contract	Insulation Contract	Insulation Thickness	Heat Trace Contract	Heat Trace Requirements	P&ID Drawing No.	Indoor / Outdoor	Motor Rating / Rated Load (nameplate) *see status*	Rating Unit (Hp, kW)	Rated Voltage
4	1x100%	Low	BOILER FEEDWATER PUMP LUBE OIL PUMP 4B	BOILER FEEDWATER PUMP 4B	5.2110	5.2110		N/A		N/A	MM4-BFW-001	INDOOR	15	HP	480
4	1x100%	Low	BOILER FEEDWATER PUMP 4 ENCLOSURE/BUILDING		5.2110	5.8320	5.8330	N/A		N/A	MM3-BFW-001	OUTDOOR	50	KW	480
0	1x100%	Low	AUXILIARY COOLING WATER PUMP		5.2120	5.8320		N/A		N/A	MM5-CWM-001	OUTDOOR	300	HP	6900
0	1x50%	Low	CIRCULATING WATER PUMP A		5.2120	5.8320		N/A		N/A	MM5-CWM-001	OUTDOOR	2900	HP	6900
0	1x50%	Low	CIRCULATING WATER PUMP B		5.2120	5.8320		N/A		N/A	MM5-CWM-001	OUTDOOR	2900	HP	6900
0	1x50%	Low	CIRCULATING WATER PUMP C		5.2120	5.8320		N/A		N/A	TBD	OUTDOOR	2900	HP	6900
5	1x50%	Low	CONDENSATE PUMP A		5.2130	5.8320		N/A		N/A	MM5-BCD-001	INDOOR	600	HP	6900
5	1x50%	Low	CONDENSATE PUMP B		5.2130	5.8320		N/A		N/A	MM5-BCD-001	INDOOR	600	HP	6900
5	1x50%	Low	CONDENSATE PUMP C		5.2130	5.8320		N/A		N/A	MM5-BCD-001	INDOOR	600	HP	6900
0	1x100%	Low	FIRE PUMP ENCLOSURE		5.2150	5.8320		N/A		N/A	MM0-FPW-001	OUTDOOR	N/A	-	-
0	1x100%	Low	DIESEL FIRE PUMP	FIRE PUMP ENCLOSURE	5.2150	5.2150		N/A		N/A	MM0-FPW-001	INDOOR	N/A	-	-
0	1x100%	Low	ELECTRIC FIRE PUMP	FIRE PUMP ENCLOSURE	5.2150	5.2150		N/A		N/A	MM0-FPW-001	INDOOR	250	HP	480
0	1x100%	Low	JOCKEY FIRE PUMP	FIRE PUMP ENCLOSURE	5.2150	5.2150		N/A		N/A	MM0-FPW-001	INDOOR	20	HP	480
0	1x100%	Low	FIRE PUMP ENCLOSURE HEATER	FIRE PUMP ENCLOSURE	5.2150	5.2150		N/A		N/A	MM0-FPW-001	INDOOR	2	kW	480
0	1x100%	Low	FIRE PUMP ENCLOSURE EXHAUST FAN	FIRE PUMP ENCLOSURE	5.2150	5.2150		N/A		N/A	MM0-FPW-001	OUTDOOR	0.5	HP	120
0	1x100%	Low	FIRE PUMP ENCLOSURE INTAKE LOUVER	FIRE PUMP ENCLOSURE	5.2150	5.2150		N/A		N/A	MM0-FPW-001	INDOOR	N/A	-	-
0	1x100%	Low	WASTEWATER SUMP PUMP A		5.2180	5.8320		N/A		N/A	MISSING	OUTDOOR	20	HP	480
0	1x100%	Low	WASTEWATER SUMP PUMP B		5.2180	5.8320		N/A		N/A	MISSING	OUTDOOR	20	HP	480
0	1x100%	Low	WASTEWATER YARD LIFT STATION		5.2191	5.8320		N/A		N/A	MM0-DGN-001	OUTDOOR	N/A	-	-
0	1x100%	Low	WASTEWATER YARD LIFT STATION PUMP A	WASTEWATER YARD LIFT STATION	5.2191	5.2191		N/A		N/A	MM0-DGN-001	OUTDOOR	10	HP	480
0	1x100%	Low	WASTEWATER YARD LIFT STATION PUMP A	WASTEWATER YARD LIFT STATION	5.2191	5.2191		N/A		N/A	MM0-DGN-001	OUTDOOR	10	HP	480
0	1x100%	Low	CLEARWELL SUMP PUMP A		5.2180	5.8320		N/A		N/A	MM0-WRW-003	OUTDOOR	125	HP	480
0	1x100%	Low	CLEARWELL SUMP PUMP B		5.2180	5.8320		N/A		N/A	MM0-WRW-003	OUTDOOR	125	HP	480
0	1x100%	Low	WATER TREATMENT BUILDING SUMP PUMP A		5.2180	5.8320		N/A		N/A	MM0-DGN-002	INDOOR	7.5	HP	480
0	1x100%	Low	WATER TREATMENT BUILDING SUMP PUMP B		5.2180	5.8320		N/A		N/A	MM0-DGN-002	INDOOR	7.5	HP	480
3	1x100%	Low	UNIT 3 HRSG BLOWDOWN SUMP PUMP A		5.2190	5.8320		N/A		N/A	MM3-BBD-001	OUTDOOR	15	HP	480
3	1x100%	Low	UNIT 3 HRSG BLOWDOWN SUMP PUMP B		5.2190	5.8320		N/A		N/A	MM3-BBD-001	OUTDOOR	15	HP	480
4	1x100%	Low	UNIT 4 HRSG BLOWDOWN SUMP PUMP A		5.2190	5.8320		N/A		N/A	MM4-BBD-001	OUTDOOR	15	HP	480
4	1x100%	Low	UNIT 4 HRSG BLOWDOWN SUMP PUMP B		5.2190	5.8320		N/A		N/A	MM4-BBD-001	OUTDOOR	15	HP	480
0	1x100%	Low	CLARIFIER MAKEUP PUMP A		5.2190	5.8320		N/A		N/A	MM0-WRW-001	INDOOR	475	HP	6900
0	1x100%	Low	CLARIFIER MAKEUP PUMP B		5.2190	5.8320		N/A		N/A	MM0-WRW-001	INDOOR	475	HP	6900
0	1x100%	Low	CLARIFIED WATER FORWARDING PUMP A		5.2190	5.8320		N/A		N/A	MM0-WRW-003	INDOOR	15	HP	480
0	1x100%	Low	CLARIFIED WATER FORWARDING PUMP B		5.2190	5.8320		N/A		N/A	MM0-WRW-003	INDOOR	15	HP	480
0	1x50%	Low	FUEL OIL FORWARDING PUMP A		5.2190	5.8320		N/A		N/A	MM0-FOL-002	OUTDOOR	40	HP	480
0	1x50%	Low	FUEL OIL FORWARDING PUMP B		5.2190	5.8320		N/A		N/A	MM0-FOL-002	OUTDOOR	40	HP	480
0	1x50%	Low	FUEL OIL FORWARDING PUMP C		5.2190	5.8320		N/A		N/A	MM0-FOL-002	OUTDOOR	40	HP	480
0	1x50%	Low	FUEL OIL UNLOADING PUMP A		5.2190	5.8320		N/A		N/A	MM0-FOL-001	OUTDOOR	10	HP	480
0	1x50%	Low	FUEL OIL UNLOADING PUMP B		5.2190	5.8320		N/A		N/A	MM0-FOL-001	OUTDOOR	10	HP	480
0	1x50%	Low	FUEL OIL UNLOADING PUMP C		5.2190	5.8320		N/A		N/A	MM0-FOL-001	OUTDOOR	10	HP	480
0	1x100%	Low	DEMINERALIZED WATER PUMP A		5.2190	5.8320		N/A		N/A	MM0-WDM-001	INDOOR	40	HP	480
0	1x100%	Low	DEMINERALIZED WATER PUMP B		5.2190	5.8320		N/A		N/A	MM0-WDM-001	INDOOR	40	HP	480
0	1x100%	Low	SERVICE WATER PUMP A		5.2190	5.8320		N/A		N/A	MM0-WSW-001	INDOOR	40	HP	480
0	1x100%	Low	SERVICE WATER PUMP B		5.2190	5.8320		N/A		N/A	MM0-WSW-001	INDOOR	40	HP	480
0	1x100%	Low	COOLING TOWER MAKEUP PUMP A		5.2190	5.8320		N/A		N/A	MM0-WRW-003	INDOOR	310	HP	6900
0	1x100%	Low	COOLING TOWER MAKEUP PUMP B		5.2190	5.8320		N/A		N/A	MM0-WRW-003	INDOOR	310	HP	6900
0	1x100%	Low	WASTEWATER FORWARDING PUMP A		5.2190	5.8320	5.8330	2"		YES	MM0-WWT-001	OUTDOOR	100	HP	480
0	1x100%	Low	WASTEWATER FORWARDING PUMP B		5.2190	5.8320	5.8330	2"		YES	MM0-WWT-001	OUTDOOR	100	HP	480
0	1x100%	Low	CLOSED COOLING WATER PUMP A		5.2190	5.8320		N/A		N/A	MM0-CWC-001	INDOOR	600	HP	6900
0	1x100%	Low	CLOSED COOLING WATER PUMP B		5.2190	5.8320		N/A		N/A	MM0-CWC-001	INDOOR	600	HP	6900
0	1x100%	Low	ADMIN/CONTROL ROOM SANITARY LIFT STATION		5.2191	5.8320		N/A		N/A	MM0-DSD-001	OUTDOOR	5	HP	480
0	1x100%	Low	SANITARY LIFT STATION PUMP A	ADMIN/CONTROL ROOM SANITARY LIFT STATION	5.2191	5.2191		N/A		N/A	MM0-DSD-001	OUTDOOR	5	HP	480
0	1x100%	Low	SANITARY LIFT STATION PUMP B	ADMIN/CONTROL ROOM SANITARY LIFT STATION	5.2191	5.2191		N/A		N/A	MM0-DSD-001	OUTDOOR	5	HP	480

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Unit	Redundancy	Risk	Equipment Name/Description	Parent Skid	Supply Contract	Install Contract	Insulation Contract	Insulation Thickness	Heat Trace Contract	Heat Trace Requirements	P&ID Drawing No.	Indoor / Outdoor	Motor Rating / Rated Load (nameplate) *see status*	Rating Unit (Hp, kW)	Rated Voltage
0	1x100%	Low	FAB SHOP SANITARY LIFT STATION		5.2191	5.8320		N/A		N/A	MM0-DSD-001	OUTDOOR	5	HP	480
0	1x100%	Low	SANITARY LIFT STATION PUMP A	FAB SHOP SANITARY LIFT STATION	5.2191	5.2191		N/A		N/A	MM0-DSD-001	OUTDOOR	5	HP	480
0	1x100%	Low	SANITARY LIFT STATION PUMP B	FAB SHOP SANITARY LIFT STATION	5.2191	5.2191		N/A		N/A	MM0-DSD-001	OUTDOOR	5	HP	480
5	1x100%	Unit Outage	COOLING TOWER		5.2210	5.2210		N/A		N/A	MM5-CWM-003	OUTDOOR	N/A	-	-
5	1x8.3%	Unit Derate	COOLING TOWER FAN 1		5.2210	5.2210		N/A		N/A	MM5-CWM-003	OUTDOOR	250	HP	480
5	1x8.3%	Unit Derate	COOLING TOWER FAN 2		5.2210	5.2210		N/A		N/A	MM5-CWM-003	OUTDOOR	250	HP	480
5	1x8.3%	Unit Derate	COOLING TOWER FAN 3		5.2210	5.2210		N/A		N/A	MM5-CWM-003	OUTDOOR	250	HP	480
5	1x8.3%	Unit Derate	COOLING TOWER FAN 4		5.2210	5.2210		N/A		N/A	MM5-CWM-003	OUTDOOR	250	HP	480
5	1x8.3%	Unit Derate	COOLING TOWER FAN 5		5.2210	5.2210		N/A		N/A	MM5-CWM-003	OUTDOOR	250	HP	480
5	1x8.3%	Unit Derate	COOLING TOWER FAN 6		5.2210	5.2210		N/A		N/A	MM5-CWM-003	OUTDOOR	250	HP	480
5	1x8.3%	Unit Derate	COOLING TOWER FAN 7		5.2210	5.2210		N/A		N/A	MM5-CWM-003	OUTDOOR	250	HP	480
5	1x8.3%	Unit Derate	COOLING TOWER FAN 8		5.2210	5.2210		N/A		N/A	MM5-CWM-003	OUTDOOR	250	HP	480
5	1x8.3%	Unit Derate	COOLING TOWER FAN 9		5.2210	5.2210		N/A		N/A	MM5-CWM-003	OUTDOOR	250	HP	480
5	1x8.3%	Unit Derate	COOLING TOWER FAN 10		5.2210	5.2210		N/A		N/A	MM5-CWM-003	OUTDOOR	250	HP	480
5	1x100%	Unit Outage	CONDENSER		5.2220	5.8320		N/A		N/A	MM5-CND-001 MM5-CWM-002	INDOOR	N/A	-	-
5	1x100%	Low	CONDENSER AIR REMOVAL SKID A		5.2220	5.8320		N/A		N/A	MM5-CNV-001	INDOOR	N/A	-	-
5	1x100%	Low	CONDENSER AIR SEPARATION TANK A	CONDENSER AIR REMOVAL SKID A	5.2220	5.2220		N/A		N/A	MM5-CNV-001	INDOOR	N/A	-	-
5	1x100%	Low	CONDENSER VACUUM PUMP A	CONDENSER AIR REMOVAL SKID A	5.2220	5.2220		N/A		N/A	MM5-CNV-001	INDOOR	150	HP	480
5	1x100%	Low	CONDENSER VACUUM PUMP A RECIRC PUMP	CONDENSER AIR REMOVAL SKID A	5.2220	5.2220		N/A		N/A	MM5-CNV-001	INDOOR	5	HP	480
5	1x100%	Low	CONDENSER HEAT EXCHANGER A	CONDENSER AIR REMOVAL SKID A	5.2220	5.2220		N/A		N/A	MM5-CNV-001	INDOOR	N/A	-	-
5	1x100%	Low	CONDENSER AIR REMOVAL SKID B		5.2220	5.8320		N/A		N/A	MM5-CNV-001	INDOOR	N/A	-	-
5	1x100%	Low	CONDENSER AIR SEPARATION TANK B	CONDENSER AIR REMOVAL SKID B	5.2220	5.2220		N/A		N/A	MM5-CNV-001	INDOOR	N/A	-	-
5	1x100%	Low	CONDENSER VACUUM PUMP B	CONDENSER AIR REMOVAL SKID B	5.2220	5.2220		N/A		N/A	MM5-CNV-001	INDOOR	150	HP	480
5	1x100%	Low	CONDENSER VACUUM PUMP B RECIRC PUMP	CONDENSER AIR REMOVAL SKID B	5.2220	5.2220		N/A		N/A	MM5-CNV-001	INDOOR	5	HP	480
5	1x100%	Low	CONDENSER HEAT EXCHANGER B	CONDENSER AIR REMOVAL SKID B	5.2220	5.2220		N/A		N/A	MM5-CNV-001	INDOOR	N/A	-	-
0	1x100%	Low	CLOSED COOLING WATER HEAT EXCHANGER A		5.2280	5.8320		N/A		N/A	MM0-CWC-001	INDOOR	N/A	-	-
0	1x100%	Low	CLOSED COOLING WATER HEAT EXCHANGER B		5.2280	5.8320		N/A		N/A	MM0-CWC-001	INDOOR	N/A	-	-
0	1x100%	Low	CLARIFIER MAKEUP AUTOMATIC STRAINER		5.2490	5.8320		N/A		N/A	MM0-WRW-001	INDOOR		kW	480
0	1x100%	Low	POTABLE WATER TANK AND BOOSTER PUMP SKID		5.2490	5.8320		N/A		N/A	MM0-WPO-001	INDOOR	25	HP	480
0	5x100%	Low	POTABLE WATER WATER HEATER TANKS		5.2490	5.8320		N/A		N/A	MISSING	INDOOR	3	kW	480
0	3x100%	Low	POTABLE WATER INSTATANEOUS HEATERS		5.2490	5.8320		N/A		N/A	MM0-WPO-001	OUTDOOR	120	kW	480
0	4x100%	Low	EMERGENCY EYE WASH/SAFETY SHOWER (OUTDOOR)		5.2490	5.8320		N/A		YES	MM0-WPO-001	OUTDOOR	N/A	-	-
0	8x100%	Low	EMERGENCY EYE WASH/SAFETY SHOWER (INDOOR)		5.2490	5.8320		N/A		N/A	MM0-WPO-001	INDOOR	N/A	-	-
0	1x50%	Low	AIR COMPRESSOR A		5.2710	5.8320		N/A		N/A	MM0-ACA-001	INDOOR	200	HP	480
0	1x50%	Low	AIR COMPRESSOR B		5.2710	5.8320		N/A		N/A	MM0-ACA-001	INDOOR	200	HP	480
0	1x50%	Low	AIR COMPRESSOR C		5.2710	5.8320		N/A		N/A	MM0-ACA-001	INDOOR	200	HP	480
0	1x100%	Low	AIR DRYER A		5.2710	5.8320		N/A		N/A	MM0-ACA-001	INDOOR	1	kW	480
0	1x100%	Low	AIR DRYER B		5.2710	5.8320		N/A		N/A	MM0-ACA-001	INDOOR	1	kW	480
0	1x100%	Low	AQUEOUS AMMONIA STORAGE TANK		5.2750	5.8320		N/A		N/A	MM0-AAU-001	OUTDOOR	N/A	-	-
0	1x100%	Low	AQUEOUS AMMONIA FORWARDING PUMP SKID		5.2750	5.8320		N/A		N/A	MM0-AAU-001	OUTDOOR	N/A	-	-
0	1x100%	Low	AQUEOUS AMMONIA FORWARDING PUMP A	AQUEOUS AMMONIA FORWARDING PUMP SKID	5.2750	5.2750		N/A		N/A	MM0-AAU-001	OUTDOOR	3	HP	480
0	1x100%	Low	AQUEOUS AMMONIA FORWARDING PUMP B	AQUEOUS AMMONIA FORWARDING PUMP SKID	5.2750	5.2750		N/A		N/A	MM0-AAU-001	OUTDOOR	3	HP	480
0	1x100%	Low	FUEL GAS DEWPOINT HEATER A		5.2762	5.8320		N/A		N/A	MM0-FGS-001	OUTDOOR	25	HP	480
0	1x100%	Low	FUEL GAS DEWPOINT HEATER B		5.2762	5.8320		N/A		N/A	MM0-FGS-001	OUTDOOR	25	HP	480
0	1x100%	Low	FUEL GAS REGULATING/METERING SKID		5.2762	5.8320		N/A		N/A	MM0-FGS-001	OUTDOOR	N/A	-	-
0	1x50%	Low	FUEL OIL HEATER A		5.2762	5.8320	5.2762	2"		N/A	MM0-FOL-003	OUTDOOR	930	kW	480
0	1x50%	Low	FUEL OIL HEATER B		5.2762	5.8320	5.2762	2"		N/A	MM0-FOL-003	OUTDOOR	930	kW	480

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Unit	Redundancy	Risk	Equipment Name/Description	Parent Skid	Supply Contract	Install Contract	Insulation Contract	Insulation Thickness	Heat Trace Contract	Heat Trace Requirements	P&ID Drawing No.	Indoor / Outdoor	Motor Rating / Rated Load (nameplate) *see status*	Rating Unit (Hp, kW)	Rated Voltage
0	1x50%	Low	FUEL OIL HEATER C		5.2762	5.8320	5.2762	2"		N/A	MM0-FOL-003	OUTDOOR	930	kW	480
0	1x100%	Unit Derate	FUEL GAS COALESCING FILTER SEPARATOR SKID		5.2762	5.8320	5.8330	2"		40 F	MM0-FGS-001	OUTDOOR	N/A	-	-
0	1x100%	Low	DRAINS TANK		5.2762	5.2762	5.8330	2"		40 F	MM0-FGS-001	OUTDOOR	N/A	-	-
0	1x100%	Unit Derate	FUEL GAS COALESCING FILTER SEPARATOR		5.2762	5.2762	5.8330	2"		40 F	MM0-FGS-001	OUTDOOR	N/A	-	-
0	1x100%	Low	AUXILIARY BOILER		5.2910	5.8320		N/A		N/A	MM0-SLA-001	INDOOR	N/A	-	-
0	1x100%	Low	AUXILIARY BOILER BLOWDOWN TANK		5.2910	5.8320	5.8330	2"		N/A	MM0-SLA-001	INDOOR	N/A	-	-
0	1x100%	Low	AUXILIARY BOILER DEAERATOR		5.2910	5.8320		N/A		N/A	MM0-SLA-001	INDOOR	N/A	-	-
0	1x100%	Low	AUXILIARY BOILER FD FAN		5.2910	5.8320		N/A		N/A	MM0-SLA-001	INDOOR	200	HP	480
0	1x100%	Low	AUXILIARY BOILER FEEDWATER PUMP SKID		5.2910	5.8320		N/A		N/A	MM0-SLA-001	INDOOR	N/A	-	-
0	1x100%	Low	AUXILIARY BOILER FEEDWATER PUMP A	AUXILIARY BOILER FEEDWATER PUMP SKID	5.2910	5.2910		N/A		N/A	MM0-SLA-001	INDOOR	50	HP	480
0	1x100%	Low	AUXILIARY BOILER FEEDWATER PUMP B	AUXILIARY BOILER FEEDWATER PUMP SKID	5.2910	5.2910		N/A		N/A	MM0-SLA-001	INDOOR	50	HP	480
0	1x100%	Low	AUXILIARY STEAM ELECTRIC SUPERHEATER		5.2910	5.8320		N/A		N/A	MM5-SLA-001	INDOOR	400	kW	480
3	1x100%	Low	WASH WATER DRAINS TANK		5.2940	5.8320		N/A		N/A	MM3-GTG-003	INDOOR	N/A	-	-
4	1x100%	Low	WASH WATER DRAINS TANK		5.2940	5.8320		N/A		N/A	MM4-GTG-003	INDOOR	N/A	-	-
0	1x100%	Low	OIL WATER SEPARATOR A		5.2940	5.8320		N/A		N/A	MM0-DOC-001	OUTDOOR	N/A	-	-
0	1x100%	Low	OIL WATER SEPARATOR A PUMP A		5.2940	5.2940		N/A		N/A	MM0-DOC-001	OUTDOOR	5	HP	480
0	1x100%	Low	OIL WATER SEPARATOR A PUMP B		5.2940	5.2940		N/A		N/A	MM0-DOC-001	OUTDOOR	5	HP	480
0	1x100%	Low	OIL WATER SEPARATOR B PUMP B		5.2940	5.8320		N/A		N/A	MISSING	OUTDOOR	N/A	-	-
0	1x100%	Low	OIL WATER SEPARATOR B PUMP A		5.2940	5.2940		N/A		N/A	MISSING	OUTDOOR	5	HP	480
0	1x100%	Low	OIL WATER SEPARATOR B PUMP B		5.2940	5.2940		N/A		N/A	MISSING	OUTDOOR	5	HP	480
0	1x100%	Low	DRY AIR RECEIVER		5.2710	5.8320		N/A		N/A	MM0-ACA-001	INDOOR	N/A	-	-
0	1x100%	Low	WET AIR RECEIVER		5.2710	5.8320		N/A		N/A	MM0-ACA-001	INDOOR	N/A	-	-
0	1x100%	Low	WATER TREATMENT BLDG AIR RECEIVER		5.2710	5.8320		N/A		N/A	MM0-UD-001	INDOOR	N/A	-	-
0	1x100%	Low	CLOSED COOLING WATER HEAD TANK		5.2980	5.8320		N/A		N/A	MM0-CWC-001	INDOOR	N/A	-	-
0	1x100%	Low	CLOSED COOLING WATER CHEMICAL POT FEEDER		5.2490	5.8320		N/A		N/A	MM0-CWC-001	INDOOR	N/A	-	-
5	1x100%	Low	STG ATM DRAINS TANK		5.2980	5.8320	5.8330	2"		N/A	MM5-STD-002	INDOOR	N/A	-	-
0	1x100%	Low	AUXILIARY BOILER AMINE/AMMONIA METERING PUMP SKID		5.3110	5.8320		N/A		N/A	MM0-CFF-005	INDOOR	N/A	-	-
0	1x100%	Low	AUXILIARY BOILER AMINE/AMMONIA METERING PUMP A	AUXILIARY BOILER AMINE/AMMONIA METERING PUMP SKID	5.3110	5.3110		N/A		N/A	MM0-CFF-005	INDOOR	1	HP	480
0	1x100%	Low	AUXILIARY BOILER AMINE/AMMONIA METERING PUMP B	AUXILIARY BOILER AMINE/AMMONIA METERING PUMP SKID	5.3110	5.3110		N/A		N/A	MM0-CFF-005	INDOOR	1	HP	480
3	1x100%	Low	HRSG 3 HP/IP PHOSPHATE SKID		5.3110	5.8320		N/A		N/A	MM3-CFF-001	INDOOR	N/A	-	-
3	1x100%	Low	HRSG 3 HP PHOSPHATE PUMP	HRSG 3 HP/IP PHOSPHATE SKID	5.3110	5.3110		N/A		N/A	MM3-CFF-001	INDOOR	5	HP	480
3	1x100%	Low	HRSG 3 IP PHOSPHATE PUMP	HRSG 3 HP/IP PHOSPHATE SKID	5.3110	5.3110		N/A		N/A	MM3-CFF-001	INDOOR	5	HP	480
3	1x100%	Low	HRSG 3 HP/IP PHOSPHATE PUMP	HRSG 3 HP/IP PHOSPHATE SKID	5.3110	5.3110		N/A		N/A	MM3-CFF-001	INDOOR	5	HP	480
3	1x100%	Low	HRSG 3 KETTLE BOILER PHOSPHATE PUMP A	HRSG 3 HP/IP PHOSPHATE SKID	5.3110	5.3110		N/A		N/A	MISSING	INDOOR	5	HP	480
3	1x100%	Low	HRSG 3 KETTLE BOILER PHOSPHATE PUMP B	HRSG 3 HP/IP PHOSPHATE SKID	5.3110	5.3110		N/A		N/A	MISSING	INDOOR	5	HP	480
4	1x100%	Low	HRSG 4 HP/IP PHOSPHATE SKID		5.3110	5.8320		N/A		N/A	MM4-CFF-001	INDOOR	N/A	-	-
4	1x100%	Low	HRSG 4 HP PHOSPHATE PUMP	HRSG 4 HP/IP PHOSPHATE SKID	5.3110	5.3110		N/A		N/A	MM4-CFF-001	INDOOR	5	HP	480
4	1x100%	Low	HRSG 4 IP PHOSPHATE PUMP	HRSG 4 HP/IP PHOSPHATE SKID	5.3110	5.3110		N/A		N/A	MM4-CFF-001	INDOOR	5	HP	480
4	1x100%	Low	HRSG 4 HP/IP PHOSPHATE PUMP	HRSG 4 HP/IP PHOSPHATE SKID	5.3110	5.3110		N/A		N/A	MM4-CFF-001	INDOOR	5	HP	480
4	1x100%	Low	HRSG 4 KETTLE BOILER PHOSPHATE PUMP A	HRSG 4 HP/IP PHOSPHATE SKID	5.3110	5.3110		N/A		N/A	MISSING	INDOOR	5	HP	480
4	1x100%	Low	HRSG 4 KETTLE BOILER PHOSPHATE PUMP B	HRSG 4 HP/IP PHOSPHATE SKID	5.3110	5.3110		N/A		N/A	MISSING	INDOOR	5	HP	480
5	1x100%	Low	CONDENSATE AMMONIA CHEMICAL SKID		5.3110	5.8320		N/A		N/A	MM5-CFF-003	INDOOR	N/A	-	-
5	1x100%	Low	CONDENSATE AMMONIA FEED PUMP A	CONDENSATE AMMONIA CHEMICAL SKID	5.3110	5.3110		N/A		N/A	MM5-CFF-003	INDOOR	1	HP	480

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Unit	Redundancy	Risk	Equipment Name/Description	Parent Skid	Supply Contract	Install Contract	Insulation Contract	Insulation Thickness	Heat Trace Contract	Heat Trace Requirements	P&ID Drawing No.	Indoor / Outdoor	Motor Rating / Rated Load (nameplate) *see status*	Rating Unit (Hp, kW)	Rated Voltage
5	1x100%	Low	CONDENSATE AMMONIA FEED PUMP B	CONDENSATE AMMONIA CHEMICAL SKID	5.3110	5.3110		N/A		N/A	MM5-CFF-003	INDOOR	1	HP	480
0	1x100%	Low	COOLING TOWER CORROSION INHIBITOR TANK		5.3120	5.8320		N/A		N/A	MM5-CFF-002	INDOOR	N/A	-	-
0	1x100%	Low	COOLING TOWER ANTI-SCALANT/DISPERSANT STORAGE TANK		5.3120	5.8320		N/A		N/A	MM5-CFF-001	INDOOR	N/A	-	-
0	1x100%	Low	COOLING TOWER CHEMICAL FEED ENCLOSURE		5.3120	5.8320		N/A		N/A	N/A	OUTDOOR	N/A	-	-
0	4x25%	Low	COOLING TOWER CHEMICAL FEED ENCLOSURE ELECTRIC UNIT HEATERS (EUH)	COOLING TOWER CHEMICAL FEED ENCLOSURE	5.3120	5.3120		N/A		N/A	N/A	INDOOR	2	kW	120
0	2x50%	Low	COOLING TOWER CHEMICAL FEED ENCLOSURE FANS	COOLING TOWER CHEMICAL FEED ENCLOSURE	5.3120	5.3120		N/A		N/A	N/A	OUTDOOR	0.5	HP	120
0	2x50%	Low	COOLING TOWER CHEMICAL FEED ENCLOSURE LOUVERS	COOLING TOWER CHEMICAL FEED ENCLOSURE	5.3120	5.3120		N/A		N/A	N/A	INDOOR	N/A	-	-
0	1x100%		CIRCULATING WATER SAMPLE PANEL		5.3120	5.8320		N/A		N/A	MM0-SAM-001	INDOOR	N/A	-	-
0	1x100%	Low	COOLING TOWER ACID PUMP SKID		5.3120	5.8320		N/A		N/A	MM5-CFF-001	INDOOR	N/A	-	-
0	1x100%	Low	COOLING TOWER ACID PUMP A	COOLING TOWER ACID PUMP SKID	5.3120	5.3120		N/A		N/A	MM5-CFF-001	INDOOR	1	HP	480
0	1x100%	Low	COOLING TOWER ACID PUMP B	COOLING TOWER ACID PUMP SKID	5.3120	5.3120		N/A		N/A	MM5-CFF-001	INDOOR	1	HP	480
0	1x100%	Low	COOLING TOWER CORROSION INHIBITOR PUMP SKID		5.3120	5.8320		N/A		N/A	MM5-CFF-002	INDOOR	N/A	-	-
0	1x100%	Low	COOLING TOWER CORROSION INHIBITOR PUMP A	COOLING TOWER CORROSION INHIBITOR PUMP SKID	5.3120	5.3120		N/A		N/A	MM5-CFF-002	INDOOR	1	HP	480
0	1x100%	Low	COOLING TOWER CORROSION INHIBITOR PUMP B	COOLING TOWER CORROSION INHIBITOR PUMP SKID	5.3120	5.3120		N/A		N/A	MM5-CFF-002	INDOOR	1	HP	480
0	1x100%	Low	COOLING TOWER SODIUM BISULFITE PUMP SKID		5.3120	5.8320		N/A		N/A	MM5-CFF-001	INDOOR	N/A	-	-
0	1x100%	Low	COOLING TOWER SODIUM BISULFITE PUMP A	COOLING TOWER SODIUM BISULFITE PUMP SKID	5.3120	5.3120		N/A		N/A	MM5-CFF-001	INDOOR	1	HP	480
0	1x100%	Low	COOLING TOWER SODIUM BISULFITE PUMP B	COOLING TOWER SODIUM BISULFITE PUMP SKID	5.3120	5.3120		N/A		N/A	MM5-CFF-001	INDOOR	1	HP	480
0	1x100%	Low	COOLING TOWER ANTISCALANT/DISPERSANT PUMP SKID		5.3120	5.8320		N/A		N/A	MM5-CFF-001	INDOOR	N/A	-	-
0	1x100%	Low	COOLING TOWER ANTISCALANT/DISPERSANT PUMP A	COOLING TOWER ANTISCALANT/DISPERSANT PUMP SKID	5.3120	5.3120		N/A		N/A	MM5-CFF-001	INDOOR	1	HP	480
0	1x100%	Low	COOLING TOWER ANTISCALANT/DISPERSANT PUMP B	COOLING TOWER ANTISCALANT/DISPERSANT PUMP SKID	5.3120	5.3120		N/A		N/A	MM5-CFF-001	INDOOR	1	HP	480
0	1x100%	Low	COOLING TOWER SODIUM HYPOCHLORITE PUMP SKID		5.3120	5.8320		N/A		N/A	MM5-CFF-002	INDOOR	N/A	-	-
0	1x100%	Low	COOLING TOWER SODIUM HYPOCHLORITE PUMP A	COOLING TOWER SODIUM HYPOCHLORITE PUMP SKID	5.3120	5.3120		N/A		N/A	MM5-CFF-002	INDOOR	1	HP	480
0	1x100%	Low	COOLING TOWER SODIUM HYPOCHLORITE PUMP B	COOLING TOWER SODIUM HYPOCHLORITE PUMP SKID	5.3120	5.3120		N/A		N/A	MM5-CFF-002	INDOOR	1	HP	480
0	1x100%	Low	COOLING TOWER ACID STORAGE TANK		5.3120	5.8320		N/A		N/A	MM5-CFF-001	OUTDOOR	N/A	-	-
0	1x100%	Low	COOLING TOWER SODIUM HYPOCHLORITE STORAGE TANK		5.3120	5.8320		N/A		N/A	MM5-CFF-002	OUTDOOR	N/A	-	-
0	1x60%	Unit Derate	HIGH RATE CONTACT CLARIFIER A		5.3210	5.8320		N/A		N/A	MM0-WRW-002	OUTDOOR	1	HP	480
0	1x100%	Unit Derate	RAPID MIXER A	HIGH RATE CONTACT CLARIFIER A	5.3210	5.3210		N/A		N/A	MM0-WRW-002	OUTDOOR	1	HP	480

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Unit	Redundancy	Risk	Equipment Name/Description	Parent Skid	Supply Contract	Install Contract	Insulation Contract	Insulation Thickness	Heat Trace Contract	Heat Trace Requirements	P&ID Drawing No.	Indoor / Outdoor	Motor Rating / Rated Load (nameplate) *see status*	Rating Unit (Hp, kW)	Rated Voltage
0	1x100%	Unit Derate	SLOW MIXER A	HIGH RATE CONTACT CLARIFIER A	5.3210	5.3210		N/A		N/A	MM0-WRW-002	OUTDOOR	1	HP	480
0	1x100%	Unit Derate	FLOCCULATION TANK MIXER A	HIGH RATE CONTACT CLARIFIER A	5.3210	5.3210		N/A		N/A	MM0-WRW-002	OUTDOOR	1	HP	480
0	1x60%	Unit Derate	HIGH RATE CONTACT CLARIFIER B		5.3210	5.8320		N/A		N/A	MM0-WRW-002	OUTDOOR	1	HP	480
0	1x100%	Unit Derate	RAPID MIXER B	HIGH RATE CONTACT CLARIFIER A	5.3210	5.3210		N/A		N/A	MM0-WRW-002	OUTDOOR	1	HP	480
0	1x100%	Unit Derate	SLOW MIXER B	HIGH RATE CONTACT CLARIFIER A	5.3210	5.3210		N/A		N/A	MM0-WRW-002	OUTDOOR	1	HP	480
0	1x100%	Unit Derate	FLOCCULATION TANK MIXER A	HIGH RATE CONTACT CLARIFIER A	5.3210	5.3210		N/A		N/A	MM0-WRW-002	OUTDOOR	1	HP	480
0	1x100%	Low	CLARIFIER A SLUDGE RECYCLE PUMP SKID		5.3210	5.8320		N/A		N/A	MM0-GSG-001	INDOOR	N/A	-	-
0	1x100%	Low	CLARIFIER A SLUDGE RECYCLE PUMP A	CLARIFIER A SLUDGE RECYCLE PUMP SKID	5.3210	5.3210		N/A		N/A	MM0-GSG-001	INDOOR	3	HP	480
0	1x100%	Low	CLARIFIER A SLUDGE RECYCLE PUMP B	CLARIFIER A SLUDGE RECYCLE PUMP SKID	5.3210	5.3210		N/A		N/A	MM0-GSG-001	INDOOR	3	HP	480
0	1x100%	Low	CLARIFIER A SLUDGE WASTE PUMP SKID		5.3210	5.8320		N/A		N/A	MM0-GSG-001	INDOOR		-	-
0	1x100%	Low	CLARIFIER A SLUDGE WASTE PUMP A	CLARIFIER A SLUDGE WASTE PUMP SKID	5.3210	5.3210		N/A		N/A	MM0-GSG-001	INDOOR	5	HP	480
0	1x100%	Low	CLARIFIER A SLUDGE WASTE PUMP B	CLARIFIER A SLUDGE WASTE PUMP SKID	5.3210	5.3210		N/A		N/A	MM0-GSG-001	INDOOR	5	HP	480
0	1x100%	Low	CLARIFIER B SLUDGE RECYCLE PUMP SKID		5.3210	5.8320		N/A		N/A	MM0-GSG-001	INDOOR	N/A	-	-
0	1x50%	Low	CLARIFIER B SLUDGE RECYCLE PUMP A	CLARIFIER B SLUDGE RECYCLE PUMP SKID	5.3210	5.3210		N/A		N/A	MM0-GSG-001	INDOOR	3	HP	480
0	1x50%	Low	CLARIFIER B SLUDGE RECYCLE PUMP B	CLARIFIER B SLUDGE RECYCLE PUMP SKID	5.3210	5.3210		N/A		N/A	MM0-GSG-001	INDOOR	3	HP	480
0	1x100%	Low	CLARIFIER B SLUDGE WASTE PUMP SKID		5.3210	5.8320		N/A		N/A	MM0-GSG-001	INDOOR	N/A	-	-
0	1x100%	Low	CLARIFIER B SLUDGE WASTE PUMP A	CLARIFIER B SLUDGE WASTE PUMP SKID	5.3210	5.3210		N/A		N/A	MM0-GSG-001	INDOOR	5	HP	480
0	1x100%	Low	CLARIFIER B SLUDGE WASTE PUMP B	CLARIFIER B SLUDGE WASTE PUMP SKID	5.3210	5.3210		N/A		N/A	MM0-GSG-001	INDOOR	5	HP	480
0	1x100%	Unit Derate	CLARIFIER SLUDGE HOLDING TANK		5.3210	5.8320		N/A		N/A	MM0-GSG-002	OUTDOOR	N/A	-	-
0	1x100%	Unit Derate	CLARIFIER SLUDGE HOLDING TANK MIXER	CLARIFIER SLUDGE HOLDING TANK	5.3210	5.3210		N/A		N/A	MM0-GSG-002	OUTDOOR	5	HP	480
0	1x50%	Low	MULTIMEDIA FILTER (MMF) A		5.3210	5.8320		N/A		N/A	MM0-WRW-004	INDOOR	N/A	-	-
0	1x50%	Low	MULTIMEDIA FILTER (MMF) A FACE PIPING SKID		5.3210	5.8320		N/A		N/A	MM0-WRW-004	INDOOR	N/A	-	-
0	1x50%	Low	MULTIMEDIA FILTER (MMF) B		5.3210	5.8320		N/A		N/A	MM0-WRW-005	INDOOR	N/A	-	-
0	1x50%	Low	MULTIMEDIA FILTER (MMF) B FACE PIPING SKID		5.3210	5.8320		N/A		N/A	MM0-WRW-005	INDOOR	N/A	-	-
0	1x50%	Low	MULTIMEDIA FILTER (MMF) C		5.3210	5.8320		N/A		N/A	MM0-WRW-006	INDOOR	N/A	-	-
0	1x50%	Low	MULTIMEDIA FILTER (MMF) C FACE PIPING SKID		5.3210	5.8320		N/A		N/A	MM0-WRW-006	INDOOR	N/A	-	-
0	1x100%	Low	AIR SCOUR BLOWER SKID		5.3210	5.8320		N/A		N/A	MM0-WRW-008	OUTDOOR	N/A	-	-
0	1x100%	Low	AIR SCOUR BLOWER A	AIR SCOUR BLOWER SKID	5.3210	5.3210		N/A		N/A	MM0-WRW-008	OUTDOOR	25	HP	480
0	1x100%	Low	AIR SCOUR BLOWER B	AIR SCOUR BLOWER SKID	5.3210	5.3210		N/A		N/A	MM0-WRW-008	OUTDOOR	25	HP	480
0	1x100%	Low	AIR SCOUR SKID ENCLOSURE FAN	AIR SCOUR BLOWER SKID	5.3210	5.3210		N/A		N/A	MM0-WRW-008	OUTDOOR	0.25	HP	120
0	1x100%	Low	MMF BACKWASH PUMP SKID		5.3210	5.8320		N/A		N/A	MM0-WRW-007	INDOOR	N/A	-	-
0	1x100%	Low	MMF BACKWASH PUMP A	MMF BACKWASH PUMP SKID	5.3210	5.3210		N/A		N/A	MM0-WRW-007	INDOOR	10	HP	480
0	1x100%	Low	MMF BACKWASH PUMP A	MMF BACKWASH PUMP SKID	5.3210	5.3210		N/A		N/A	MM0-WRW-007	INDOOR	10	HP	480
0	1x100%	Low	FILTER PRESS FEED PUMP SKID		5.3210	5.8320		N/A		N/A	MM0-GSG-002	INDOOR	N/A	-	-

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Unit	Redundancy	Risk	Equipment Name/Description	Parent Skid	Supply Contract	Install Contract	Insulation Contract	Insulation Thickness	Heat Trace Contract	Heat Trace Requirements	P&ID Drawing No.	Indoor / Outdoor	Motor Rating / Rated Load (nameplate) *see status*	Rating Unit (Hp, kW)	Rated Voltage
0	1x50%	Low	FILTER PRESS FEED PUMP A	FILTER PRESS FEED PUMP SKID	5.3210	5.3210		N/A		N/A	MM0-GSG-002	INDOOR	7.5	HP	480
0	1x50%	Low	FILTER PRESS FEED PUMP B	FILTER PRESS FEED PUMP SKID	5.3210	5.3210		N/A		N/A	MM0-GSG-002	INDOOR	7.5	HP	480
0	1x50%	Low	FILTER PRESS FEED PUMP C	FILTER PRESS FEED PUMP SKID	5.3210	5.3210		N/A		N/A	MM0-GSG-002	INDOOR	7.5	HP	480
0	1x50%	Unit Derate	FILTER PRESS A		5.3210	5.8320		N/A		N/A	MM0-GSG-003	INDOOR	7.5	HP	480
0	1x50%	Unit Derate	FILTER PRESS B		5.3210	5.8320		N/A		N/A	MM0-GSG-003	INDOOR	7.5	HP	480
0	1x100%	Low	CLARIFIER POLYMER TOTE MIXER A		5.3210	5.8320		N/A		N/A	MISSING	INDOOR	5	HP	480
0	1x100%	Low	CLARIFIER POLYMER TOTE MIXER B		5.3210	5.8320		N/A		N/A	MISSING	INDOOR	5	HP	480
0	3x60%	Low	CLARIFIER POLYMER FEED PUMP SKID		5.3210	5.8320		N/A		N/A	MM0-CFF-003	INDOOR	N/A	-	-
0	1x60%	Low	CLARIFIER POLYMER FEED PUMP A	CLARIFIER POLYMER FEED PUMP SKID	5.3210	5.3210		N/A		N/A	MM0-CFF-003	INDOOR	1.5	kW	120
0	1x60%	Low	CLARIFIER POLYMER FEED PUMP B	CLARIFIER POLYMER FEED PUMP SKID	5.3210	5.3210		N/A		N/A	MM0-CFF-003	INDOOR	1.5	kW	120
0	1x60%	Low	CLARIFIER POLYMER FEED PUMP C	CLARIFIER POLYMER FEED PUMP SKID	5.3210	5.3210		N/A		N/A	MM0-CFF-003	INDOOR	1.5	kW	120
0	1x100%	Low	CLARIFIER A POLYMER BLENDING SYSTEM		5.3210	5.8320		N/A		N/A	MM0-CFF-003	INDOOR	N/A	-	-
0	1x100%	Low	FILTER PRESS FEED POLYMER TOTE MIXER		5.3210	5.8320		N/A		N/A	MM0-CFF-003	INDOOR	5	HP	480
0	2x100%	Low	FILTER PRESS FEED POLYMER FEED PUMP SKID		5.3210	5.8320		N/A		N/A	MM0-CFF-003	INDOOR	N/A	-	-
0	1x100%	Low	FILTER PRESS FEED POLYMER FEED PUMP A	FILTER PRESS FEED POLYMER FEED PUMP SKID	5.3210	5.3210		N/A		N/A	MM0-CFF-003	INDOOR	1.5	kW	120
0	1x100%	Low	FILTER PRESS FEED POLYMER FEED PUMP B	FILTER PRESS FEED POLYMER FEED PUMP SKID	5.3210	5.3210		N/A		N/A	MM0-CFF-003	INDOOR	1.5	kW	120
0	1x100%	Low	FILTER PRESS FEED POLYMER BLENDING SYSTEM		5.3210	5.8320		N/A		N/A	MM0-CFF-003	INDOOR	N/A	-	-
0	3x60%	Low	CLARIFIER COAGULANT FEED PUMP SKID		5.3210	5.8320		N/A		N/A	MM0-CFF-004	INDOOR	N/A	-	-
0	1x60%	Low	CLARIFIER COAGULANT FEED PUMP A	CLARIFIER COAGULANT FEED PUMP SKID	5.3210	5.3210		N/A		N/A	MM0-CFF-004	INDOOR	0.75	HP	480
0	1x60%	Low	CLARIFIER COAGULANT FEED PUMP B	CLARIFIER COAGULANT FEED PUMP SKID	5.3210	5.3210		N/A		N/A	MM0-CFF-004	INDOOR	0.75	HP	480
0	1x60%	Low	CLARIFIER COAGULANT FEED PUMP C	CLARIFIER COAGULANT FEED PUMP SKID	5.3210	5.3210		N/A		N/A	MM0-CFF-004	INDOOR	0.75	HP	480
0	3x60%	Low	CLARIFIER SODIUM HYPOCHLORITE FEED PUMP SKID		5.3210	5.8320		N/A		N/A	MM0-CFF-006	INDOOR	N/A	-	-
0	1x60%	Low	CLARIFIER SODIUM HYPOCHLORITE FEED PUMP A	CLARIFIER SODIUM HYPOCHLORITE FEED PUMP SKID	5.3210	5.3210		N/A		N/A	MM0-CFF-006	INDOOR	1	HP	480
0	1x60%	Low	CLARIFIER SODIUM HYPOCHLORITE FEED PUMP B	CLARIFIER SODIUM HYPOCHLORITE FEED PUMP SKID	5.3210	5.3210		N/A		N/A	MM0-CFF-006	INDOOR	1	HP	480
0	1x60%	Low	CLARIFIER SODIUM HYPOCHLORITE FEED PUMP C	CLARIFIER SODIUM HYPOCHLORITE FEED PUMP SKID	5.3210	5.3210		N/A		N/A	MM0-CFF-006	INDOOR	1	HP	480
0	2x100%	Low	SERVICE WATER SODIUM HYPOCHLORITE FEED PUMP SKID		5.3210	5.8320		N/A		N/A	MM0-CFF-006	INDOOR	N/A	-	-
0	1x100%	Low	SERVICE WATER SODIUM HYPOCHLORITE FEED PUMP A	SERVICE WATER SODIUM HYPOCHLORITE FEED PUMP SKID	5.3210	5.3210		N/A		N/A	MM0-CFF-006	INDOOR	1	HP	480
0	1x100%	Low	SERVICE WATER SODIUM HYPOCHLORITE FEED PUMP B	SERVICE WATER SODIUM HYPOCHLORITE FEED PUMP SKID	5.3210	5.3210		N/A		N/A	MM0-CFF-006	INDOOR	1	HP	480
0	2x100%	Low	UF SODIUM HYPOCHLORITE FEED PUMP SKID		5.3210	5.8320		N/A		N/A	MM0-CFF-006	INDOOR	N/A	-	-
0	1x100%	Low	UF SODIUM HYPOCHLORITE FEED PUMP A	UF SODIUM HYPOCHLORITE FEED PUMP SKID	5.3210	5.3210		N/A		N/A	MM0-CFF-006	INDOOR	1	HP	480

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Unit	Redundancy	Risk	Equipment Name/Description	Parent Skid	Supply Contract	Install Contract	Insulation Contract	Insulation Thickness	Heat Trace Contract	Heat Trace Requirements	P&ID Drawing No.	Indoor / Outdoor	Motor Rating / Rated Load (nameplate) *see status*	Rating Unit (Hp, kW)	Rated Voltage
0	1x100%	Low	UF SODIUM HYPOCHLORITE FEED PUMP B	UF SODIUM HYPOCHLORITE FEED PUMP SKID	5.3210	5.3210		N/A		N/A	MM0-CFF-006	INDOOR	1	HP	480
0	1x100%	Low	UF CARTRIDGE FILTER SKID		5.3220	5.8320		N/A		N/A	MM0-WSW-002	INDOOR	N/A	-	-
0	1x50%	Low	UF CARTRIDGE FILTER A	UF CARTRIDGE FILTER SKID	5.3220	5.3220		N/A		N/A	MM0-WSW-002	INDOOR	N/A	-	-
0	1x50%	Low	UF CARTRIDGE FILTER B	UF CARTRIDGE FILTER SKID	5.3220	5.3220		N/A		N/A	MM0-WSW-002	INDOOR	N/A	-	-
0	1x50%	Low	UF CARTRIDGE FILTER C	UF CARTRIDGE FILTER SKID	5.3220	5.3220		N/A		N/A	MM0-WSW-002	INDOOR	N/A	-	-
0	1x100%	Unit Derate	SOLDIUM HYPOCHLORITE STORAGE TANK		5.3210	5.8320		N/A		N/A	MM0-CFF-006	INDOOR	N/A	-	-
0	1x100%	Unit Derate	CLARIFIER COAGULANT STORAGE TANK		5.3210	5.8320		N/A		N/A	MM0-CFF-004	INDOOR	N/A	-	-
0	1x100%	Low	ULTRAFILTRATION (UF) FEED PUMP SKID		5.3220	5.8320		N/A		N/A	MM0-WSW-002	INDOOR	N/A	-	-
0	1x100%	Low	UF FEED PUMP A	ULTRAFILTRATION (UF) FEED PUMP SKID	5.3220	5.3220		N/A		N/A	MM0-WSW-002	INDOOR	15	HP	480
0	1x100%	Low	UF FEED PUMP B	ULTRAFILTRATION (UF) FEED PUMP SKID	5.3220	5.3220		N/A		N/A	MM0-WSW-002	INDOOR	15	HP	480
0	1x50%	Unit Derate	UF TRAIN A		5.3220	5.8320		N/A		N/A	MM0-WSW-002	INDOOR	N/A	-	-
0	1x50%	Unit Derate	UF TRAIN B		5.3220	5.8320		N/A		N/A	MM0-WSW-002	INDOOR	N/A	-	-
0	2x100%	Low	ULTRAFILTRATION (UF) FORWARDING PUMP SKID		5.3220	5.8320		N/A		N/A	MM0-BMU-001	INDOOR	N/A	-	-
0	1x100%	Low	UF FORWARDING PUMP A	ULTRAFILTRATION (UF) FORWARDING PUMP SKID	5.3220	5.3220		N/A		N/A	MM0-BMU-001	INDOOR	15	HP	480
0	1x100%	Low	UF FORWARDING PUMP B	ULTRAFILTRATION (UF) FORWARDING PUMP SKID	5.3220	5.3220		N/A		N/A	MM0-BMU-001	INDOOR	15	HP	480
0	2x100%	Low	ULTRAFILTRATION (UF) BACKWASH PUMP SKID		5.3220	5.8320		N/A		N/A	MM0-BMU-001	INDOOR	N/A	-	-
0	1x100%	Low	UF BACKWASH PUMP A	ULTRAFILTRATION (UF) BACKWASH PUMP SKID	5.3220	5.3220		N/A		N/A	MM0-BMU-001	INDOOR	15	HP	480
0	1x100%	Low	UF BACKWASH PUMP B	ULTRAFILTRATION (UF) BACKWASH PUMP SKID	5.3220	5.3220		N/A		N/A	MM0-BMU-001	INDOOR	15	HP	480
0	1x100%	Low	UF PERMEATE TANK		5.3220	5.8320		N/A		N/A	MM0-BMU-001	INDOOR	N/A	-	-
0	1x50%	Unit Derate	REVERSE OSMOSIS (RO) TRAIN A		5.3220	5.8320		N/A		N/A	MM0-BMU-002	INDOOR	N/A	-	-
0	1x50%	Unit Derate	1ST PASS RO FILTER A		5.3220	5.8320		N/A		N/A	MM0-BMU-002	INDOOR	N/A	-	-
0	1x50%	Unit Derate	1ST PASS RO BOOSTER PUMP A		5.3220	5.8320		N/A		N/A	MM0-BMU-002	INDOOR	40	HP	480
0	1x50%	Unit Derate	2ND PASS RO FILTER A		5.3220	5.8320		N/A		N/A	MM0-BMU-002	INDOOR	N/A	-	-
0	1x50%	Unit Derate	2ND PASS RO BOOSTER PUMP A		5.3220	5.8320		N/A		N/A	MM0-BMU-002	INDOOR	40	HP	480
0	1x50%	Unit Derate	RO CARTRIDGE FILTER A		5.3220	5.8320		N/A		N/A	MM0-BMU-002	INDOOR	N/A	-	-
0	1x50%	Unit Derate	REVERSE OSMOSIS (RO) TRAIN B		5.3220	5.8320		N/A		N/A	MM0-BMU-003	INDOOR	N/A	-	-
0	1x50%	Unit Derate	1ST PASS RO FILTER B		5.3220	5.8320		N/A		N/A	MM0-BMU-003	INDOOR	N/A	-	-
0	1x50%	Unit Derate	1ST PASS RO BOOSTER PUMP B		5.3220	5.8320		N/A		N/A	MM0-BMU-003	INDOOR	40	HP	480
0	1x50%	Unit Derate	2ND PASS RO FILTER B		5.3220	5.8320		N/A		N/A	MM0-BMU-003	INDOOR	N/A	-	-
0	1x50%	Unit Derate	2ND PASS RO BOOSTER PUMP B		5.3220	5.8320		N/A		N/A	MM0-BMU-003	INDOOR	40	HP	480
0	1x50%	Unit Derate	RO CARTRIDGE FILTER B		5.3220	5.8320		N/A		N/A	MM0-BMU-003	INDOOR	N/A	-	-
0	1x100%	Low	RO PERMEATE TANK		5.3220	5.8320		N/A		N/A	MM0-BMU-004	INDOOR	N/A	-	-
0	2x100%	Low	RO FORWARDING PUMP SKID		5.3220	5.8320		N/A		N/A	MM0-BMU-004	INDOOR	N/A	-	-
0	1x100%	Low	RO FORWARDING PUMP A	RO FORWARDING PUMP SKID	5.3220	5.3220		N/A		N/A	MM0-BMU-004	INDOOR	40	HP	480
0	1x100%	Low	RO FORWARDING PUMP B	RO FORWARDING PUMP SKID	5.3220	5.3220		N/A		N/A	MM0-BMU-004	INDOOR	40	HP	480
0	1x100%	Low	NEUTRALIZATION TANK		5.3220	5.8320		N/A		N/A	MM0-WSW-003	INDOOR	N/A	-	-
0	1x100%	Low	NEUTRALIZATION PUMP SKID		5.3220	5.8320		N/A		N/A	MM0-WSW-003	INDOOR	N/A	-	-
0	1x100%	Low	NEUTRALIZATION PUMP A	NEUTRALIZATION PUMP SKID	5.3220	5.3220		N/A		N/A	MM0-WSW-003	INDOOR	5	HP	480
0	1x100%	Low	NEUTRALIZATION PUMP B	NEUTRALIZATION PUMP SKID	5.3220	5.3220		N/A		N/A	MM0-WSW-003	INDOOR	5	HP	480
0	1x100%		SERVICE DEIONIZATION (SDI) MANIFOLD		5.3220	5.8320		N/A		N/A	MM0-BMU-005	INDOOR	N/A	-	-
0	1x100%	Low	CLEAN IN PLACE (CIP) SKID		5.3220	5.8320		N/A		N/A	MM0-BMU-004	INDOOR	N/A	-	-
0	1x100%	Low	UF/RO CIP CARTRIDGE FILTER	CLEAN IN PLACE (CIP) SKID	5.3220	5.3220		N/A		N/A	MM0-BMU-004	INDOOR	N/A	-	-

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Unit	Redundancy	Risk	Equipment Name/Description	Parent Skid	Supply Contract	Install Contract	Insulation Contract	Insulation Thickness	Heat Trace Contract	Heat Trace Requirements	P&ID Drawing No.	Indoor / Outdoor	Motor Rating / Rated Load (nameplate) *see status*	Rating Unit (Hp, kW)	Rated Voltage
0	1x100%	Low	UF/RO CIP TANK	CLEAN IN PLACE (CIP) SKID	5.3220	5.3220		TBD		N/A	MM0-BMU-004	INDOOR	N/A	-	-
0	1x100%	Low	UF/RO CIP TANK HEATER	CLEAN IN PLACE (CIP) SKID	5.3220	5.3220		N/A		N/A	MM0-BMU-004	INDOOR	48	kW	480
0	1x100%	Low	UF/RO CIP FORWARDING PUMP	CLEAN IN PLACE (CIP) SKID	5.3220	5.3220		N/A		N/A	MM0-BMU-004	INDOOR	10	HP	480
0	3x50%	Low	RO SODIUM BISULFITE FEED PUMP SKID		5.3220	5.8320		N/A		N/A	MM0-CFF-007	INDOOR	N/A	-	-
0	1x50%	Low	RO SODIUM BISULFITE FEED PUMP A	RO SODIUM BISULFITE FEED PUMP SKID	5.3220	5.3220		N/A		N/A	MM0-CFF-007	INDOOR	2	HP	480
0	1x50%	Low	RO SODIUM BISULFITE FEED PUMP B	RO SODIUM BISULFITE FEED PUMP SKID	5.3220	5.3220		N/A		N/A	MM0-CFF-007	INDOOR	2	HP	480
0	1x50%	Low	RO SODIUM BISULFITE FEED PUMP C	RO SODIUM BISULFITE FEED PUMP SKID	5.3220	5.3220		N/A		N/A	MM0-CFF-007	INDOOR	2	HP	480
0	3x50%	Low	RO ANTI-SCALANT FEED PUMP SKID		5.3220	5.8320		N/A		N/A	MM0-CFF-008	INDOOR	N/A	-	-
0	1x50%	Low	RO ANTI-SCALANT FEED PUMP A	RO ANTI-SCALANT FEED PUMP SKID	5.3220	5.3220		N/A		N/A	MM0-CFF-008	INDOOR	2	HP	480
0	1x50%	Low	RO ANTI-SCALANT FEED PUMP B	RO ANTI-SCALANT FEED PUMP SKID	5.3220	5.3220		N/A		N/A	MM0-CFF-008	INDOOR	2	HP	480
0	1x50%	Low	RO ANTI-SCALANT FEED PUMP C	RO ANTI-SCALANT FEED PUMP SKID	5.3220	5.3220		N/A		N/A	MM0-CFF-008	INDOOR	2	HP	480
0	1x100%	Unit Derate	SODIUM HYDROXIDE STORAGE TANK		5.3220	5.8320	5.8330	2"		60 F	MM0-CFF-002	OUTDOOR	N/A	-	-
0	1x100%	Unit Derate	SODIUM HYDROXIDE STORAGE TANK IMMERSION HEATER		5.3220	5.8320		N/A		N/A	MM0-CFF-002	OUTDOOR	50	kW	480
0	3x60%	Low	CLARIFIER SODIUM HYDROXIDE FEED PUMP SKID		5.3220	5.8320	5.8330	2"		60 F	MM0-CFF-002	INDOOR	N/A	-	-
0	1x60%	Low	CLARIFIER SODIUM HYDROXIDE FEED PUMP A	CLARIFIER SODIUM HYDROXIDE FEED PUMP SKID	5.3220	5.3220		2"		60 F	MM0-CFF-002	INDOOR	2	HP	480
0	1x60%	Low	CLARIFIER SODIUM HYDROXIDE FEED PUMP B	CLARIFIER SODIUM HYDROXIDE FEED PUMP SKID	5.3220	5.3220		2"		60 F	MM0-CFF-002	INDOOR	2	HP	480
0	1x60%	Low	CLARIFIER SODIUM HYDROXIDE FEED PUMP C	CLARIFIER SODIUM HYDROXIDE FEED PUMP SKID	5.3220	5.3220		2"		60 F	MM0-CFF-002	INDOOR	2	HP	480
0	2x100%	Low	UF SODIUM HYDROXIDE FEED PUMP SKID		5.3220	5.8320	5.8330	2"		60 F	MM0-CFF-002	INDOOR	N/A	-	-
0	1x100%	Low	UF SODIUM HYDROXIDE FEED PUMP A	UF SODIUM HYDROXIDE FEED PUMP SKID	5.3220	5.3220		2"		60 F	MM0-CFF-002	INDOOR	2	HP	480
0	1x100%	Low	UF SODIUM HYDROXIDE FEED PUMP B	UF SODIUM HYDROXIDE FEED PUMP SKID	5.3220	5.3220		2"		60 F	MM0-CFF-002	INDOOR	2	HP	480
0	2x100%	Low	NEUTRALIZATION SYSTEM SODIUM HYDROXIDE FEED PUMP SKID		5.3220	5.8320	5.8330	2"		60 F	MM0-CFF-002	INDOOR	N/A	-	-
0	1x100%	Low	NEUTRALIZATION SYSTEM SODIUM HYDROXIDE FEED PUMP A	NEUTRALIZATION SYSTEM SODIUM HYDROXIDE FEED PUMP SKID	5.3220	5.3220		2"		60 F	MM0-CFF-002	INDOOR	2	HP	480
0	1x100%	Low	NEUTRALIZATION SYSTEM SODIUM HYDROXIDE FEED PUMP B	NEUTRALIZATION SYSTEM SODIUM HYDROXIDE FEED PUMP SKID	5.3220	5.3220		2"		60 F	MM0-CFF-002	INDOOR	2	HP	480
0	3x50%	Low	RO SODIUM HYDROXIDE FEED PUMP SKID		5.3220	5.8320	5.8330	2"		60 F	MM0-CFF-002	INDOOR	N/A	-	-
0	1x50%	Low	RO SODIUM HYDROXIDE FEED PUMP A	RO SODIUM HYDROXIDE FEED PUMP SKID	5.3220	5.3220		2"		60 F	MM0-CFF-002	INDOOR	2	HP	480
0	1x50%	Low	RO SODIUM HYDROXIDE FEED PUMP B	RO SODIUM HYDROXIDE FEED PUMP SKID	5.3220	5.3220		2"		60 F	MM0-CFF-002	INDOOR	2	HP	480
0	1x50%	Low	RO SODIUM HYDROXIDE FEED PUMP C	RO SODIUM HYDROXIDE FEED PUMP SKID	5.3220	5.3220		2"		60 F	MM0-CFF-002	INDOOR	2	HP	480
0	1x100%	Low	SULFURIC ACID STORAGE TANK		5.3220	5.8320		N/A		N/A	MM0-CFF-001	OUTDOOR	N/A	-	-
0	2x100%	Low	NEUTRALIZATION SYSTEM ACID FEED PUMP SKID		5.3220	5.8320		N/A		N/A	MM0-CFF-001	INDOOR	N/A	-	-

157787 - COOPER 2x1 CCGT EQUIPMENT LIST

Unit	Redundancy	Risk	Equipment Name/Description	Parent Skid	Supply Contract	Install Contract	Insulation Contract	Insulation Thickness	Heat Trace Contract	Heat Trace Requirements	P&ID Drawing No.	Indoor / Outdoor	Motor Rating / Rated Load (nameplate) *see status*	Rating Unit (Hp, kW)	Rated Voltage
0	1x100%	Low	NEUTRALIZATION SYSTEM ACID FEED PUMP A	NEUTRALIZATION SYSTEM ACID FEED PUMP SKID	5.3220	5.3220		N/A		N/A	MM0-CFF-001	INDOOR	2	HP	480
0	1x100%	Low	NEUTRALIZATION SYSTEM ACID FEED PUMP B	NEUTRALIZATION SYSTEM ACID FEED PUMP SKID	5.3220	5.3220		N/A		N/A	MM0-CFF-001	INDOOR	2	HP	480
0	2x100%	Low	UF SULFURIC ACID FEED PUMP SKID		5.3220	5.8320		N/A		N/A	MM0-CFF-001	INDOOR	N/A	-	-
0	1x100%	Low	UF SULFURIC ACID FEED PUMP A	UF SULFURIC ACID FEED PUMP SKID	5.3220	5.3220		N/A		N/A	MM0-CFF-001	INDOOR	2	HP	480
0	1x100%	Low	UF SULFURIC ACID FEED PUMP B	UF SULFURIC ACID FEED PUMP SKID	5.3220	5.3220		N/A		N/A	MM0-CFF-001	INDOOR	2	HP	480
0	3x50%	Low	RO SULFURIC ACID FEED PUMP SKID		5.3220	5.8320		N/A		N/A	MM0-CFF-001	INDOOR	N/A	-	-
0	1x50%	Low	RO SULFURIC ACID FEED PUMP A	RO SULFURIC ACID FEED PUMP SKID	5.3220	5.3220		N/A		N/A	MM0-CFF-001	INDOOR	2	HP	480
0	1x50%	Low	RO SULFURIC ACID FEED PUMP B	RO SULFURIC ACID FEED PUMP SKID	5.3220	5.3220		N/A		N/A	MM0-CFF-001	INDOOR	2	HP	480
0	1x50%	Low	RO SULFURIC ACID FEED PUMP C	RO SULFURIC ACID FEED PUMP SKID	5.3220	5.3220		N/A		N/A	MM0-CFF-001	INDOOR	2	HP	480
0	1x100%	Unit Derate	SAMPLE ANALYSIS COOLER		5.3310	5.8320		N/A		N/A	MISSING	INDOOR	30	kW	480
0	1x100%	Low	SAMPLE ANALYSIS PANEL		5.3310	5.8320		N/A		N/A	MM3-SAM-001 MM4-SAM-001	INDOOR	3	kW	480
0	1x100%	Low	CONDENSER SAMPLE PANEL		5.3310	5.8320		N/A		N/A	MM0-SAM-001	INDOOR	N/A	-	-
0	1x100%	Low	CONDENSER AIR REMOVAL SAMPLE PANEL		5.3310	5.8320		N/A		N/A	MM0-SAM-001	INDOOR	N/A	-	-
0	1x100%	Low	GTG BUILDING CRANE		5.4210	5.8320		N/A		N/A	N/A	INDOOR	85	kW	480
0	1x100%	Low	STG BUILDING CRANE		5.4210	5.8320		N/A		N/A	N/A	INDOOR	85	kW	480
0	1x100%	Low	HRSG ELEVATOR		5.4320	5.8320		N/A		N/A	N/A	INDOOR	15	kW	480
3	1x100%	Unit Outage	GTG3 GENERATOR STEP-UP (GSU) TRANSFORMER		5.5110	5.8410		N/A		N/A	N/A	OUTDOOR			
4	1x100%	Unit Outage	GTG4 GENERATOR STEP-UP (GSU) TRANSFORMER		5.5110	5.8410		N/A		N/A	N/A	OUTDOOR			
5	1x100%	Unit Outage	STG GENERATOR STEP-UP (GSU) TRANSFORMER		5.5110	5.8410		N/A		N/A	N/A	OUTDOOR			
3	1x100%	Unit Outage	GTG3 AUXILIARY TRANSFORMER		5.5120	5.8410		N/A		N/A	N/A	OUTDOOR			
4	1x100%	Unit Outage	GTG4 AUXILIARY TRANSFORMER		5.5120	5.8410		N/A		N/A	N/A	OUTDOOR			
5	1x100%	Unit Outage	STG EXCITER TRANSFORMER		5.5120	5.8410		N/A		N/A	N/A	OUTDOOR			
5	1x100%	Unit Outage	STG EXCITATION COMPARTMENT		5.5120	5.8410		N/A		N/A	N/A	OUTDOOR			
3	1x100%	Unit Outage	GTG3 GENERATOR BREAKER		5.5210	5.8410		N/A		N/A	N/A	OUTDOOR			
4	1x100%	Unit Outage	GTG4 GENERATOR BREAKER		5.5210	5.8410		N/A		N/A	N/A	OUTDOOR			
5	1x100%	Unit Outage	STG GENERATOR BREAKER		5.5210	5.8410		N/A		N/A	N/A	OUTDOOR			
3	1x100%	Unit Outage	GTG3 ISOPHASE BUS DUCT		5.5220	5.8410		N/A		N/A	N/A	INDOOR/ OUTDOOR			
4	1x100%	Unit Outage	GTG4 ISOPHASE BUS DUCT		5.5220	5.8410		N/A		N/A	N/A	INDOOR/ OUTDOOR			
5	1x100%	Unit Outage	STG ISOPHASE BUS DUCT		5.5220	5.8410		N/A		N/A	N/A	INDOOR/ OUTDOOR			
0	1x100%	Low	EMERGENCY DIESEL GENERATOR		5.5240	5.8410		N/A		N/A	MM0-FOL-003	OUTDOOR	1000	kW	480
0	1x100%	Unit Derate	4160V SWGR A		5.5310	5.8410		N/A		N/A	N/A	INDOOR			
0	1x100%	Unit Derate	4160V SWGR B		5.5310	5.8410		N/A		N/A	N/A	INDOOR			
0	1x100%	Unit Derate	BOP MCC 1		5.5310	5.8410		N/A		N/A	N/A	INDOOR			
0	1x100%	Unit Derate	BOP MCC 2		5.5310	5.8410		N/A		N/A	N/A	INDOOR			
0	1x100%	Unit Derate	BOP MCC 3		5.5310	5.8410		N/A		N/A	N/A	INDOOR			
0	1x100%	Unit Derate	BOP MCC 4		5.5310	5.8410		N/A		N/A	N/A	INDOOR			
0	1x100%	Unit Derate	ESS 480V SWGR A		5.5310	5.8410		N/A		N/A	N/A	INDOOR			
0	1x100%	Unit Derate	ESS STATION SERVICE TRANSFORMER		5.5310	5.8410		N/A		N/A	N/A	OUTDOOR			
0	1x100%	Unit Derate	BOP 480V SWGR B		5.5310	5.8410		N/A		N/A	N/A	INDOOR			
0	1x100%	Unit Derate	BOP STATION SERVICE TRANSFORMER		5.5310	5.8410		N/A		N/A	N/A	OUTDOOR			
0	1x100%	Unit Derate	BOP 480V SWGR C		5.5310	5.8410		N/A		N/A	N/A	INDOOR			
0	1x100%	Unit Derate	BOP STATION SERVICE TRANSFORMER		5.5310	5.8410		N/A		N/A	N/A	OUTDOOR			

157787 - COOPER 2x1 CCGT EQUIPMENT LIST

Unit	Redundancy	Risk	Equipment Name/Description	Parent Skid	Supply Contract	Install Contract	Insulation Contract	Insulation Thickness	Heat Trace Contract	Heat Trace Requirements	P&ID Drawing No.	Indoor / Outdoor	Motor Rating / Rated Load (nameplate) *see status*	Rating Unit (Hp, kW)	Rated Voltage
0	1x100%	Unit Derate	BOP 480V SWGR D		5.5310	5.8410		N/A		N/A	N/A	INDOOR			
0	1x100%	Unit Derate	BOP STATION SERVICE TRANSFORMER		5.5310	5.8410		N/A		N/A	N/A	OUTDOOR			
0	1x100%	Unit Derate	WT 480V SWGR A		5.5310	5.8410		N/A		N/A	N/A	INDOOR			
0	1x100%	Unit Derate	WT STATION SERVICE TRANSFORMER		5.5310	5.8410		N/A		N/A	N/A	OUTDOOR			
0	1x100%	Unit Derate	WT 480V SWGR B		5.5310	5.8410		N/A		N/A	N/A	INDOOR			
0	1x100%	Unit Derate	WT STATION SERVICE TRANSFORMER		5.5310	5.8410		N/A		N/A	N/A	OUTDOOR			
0	1x100%	Unit Derate	ESSENTIAL MCC		5.5310	5.8410		N/A		N/A	N/A	INDOOR			
0	1x100%	Unit Derate	UPS AND 125VDC SYSTEM		5.5310	5.8410		N/A		N/A	N/A	INDOOR			
0	1x100%	Unit Derate	WATER TREATMENT MCC		5.5310	5.8410		N/A		N/A	N/A	INDOOR			
3	1x100%	Unit Derate	GTG3 ESSENTIAL MCC		5.5310	5.8410		N/A		N/A	N/A	INDOOR			
3	1x100%	Unit Derate	GTG3 MCC		5.5310	5.8410		N/A		N/A	N/A	INDOOR			
3	1x100%	Unit Derate	HRSG3 MCC		5.5310	5.8410		N/A		N/A	N/A	INDOOR			
4	1x100%	Unit Derate	GTG4 ESSENTIAL MCC		5.5310	5.8410		N/A		N/A	N/A	INDOOR			
4	1x100%	Unit Derate	GTG4 MCC		5.5310	5.8410		N/A		N/A	N/A	INDOOR			
4	1x100%	Unit Derate	HRSG4 MCC		5.5310	5.8410		N/A		N/A	N/A	INDOOR			
5	1x100%	Unit Derate	CT STATION SERVICE TRANSFORMER		5.5310	5.8410		N/A		N/A	N/A	OUTDOOR			
5	1x100%	Unit Derate	CT STATION SERVICE TRANSFORMER		5.5310	5.8410		N/A		N/A	N/A	OUTDOOR			
5	1x100%	Unit Derate	STG 480V SWGR		5.5310	5.8410		N/A		N/A	N/A	INDOOR			
5	1x100%	Unit Derate	STG STATION SERVICE TRANSFORMER		5.5310	5.8410		N/A		N/A	N/A	OUTDOOR			
5	1x100%	Unit Derate	STG 480V SWGR		5.5310	5.8410		N/A		N/A	N/A	INDOOR			
5	1x100%	Unit Derate	STG STATION SERVICE TRANSFORMER		5.5310	5.8410		N/A		N/A	N/A	OUTDOOR			
5	1x100%	Unit Derate	STG 480V SWGR		5.5310	5.8410		N/A		N/A	N/A	INDOOR			
5	1x100%	Unit Derate	STG STATION SERVICE TRANSFORMER		5.5310	5.8410		N/A		N/A	N/A	OUTDOOR			
5	1x100%	Unit Derate	STG 480V SWGR		5.5310	5.8410		N/A		N/A	N/A	INDOOR			
5	1x100%	Unit Derate	STG STATION SERVICE TRANSFORMER		5.5310	5.8410		N/A		N/A	N/A	OUTDOOR			
5	1x100%	Unit Derate	STG MCC		5.5310	5.8410		N/A		N/A	N/A	INDOOR			
0	1x100%	Low	PLANT COMMUNICATIONS EQUIPMENT (GAITRONICS)		5.5670	5.8410		N/A		N/A	N/A	INDOOR			
0	1x100%	Unit Outage	DCS (BOP)		5.6110	5.8410		N/A		N/A	N/A	INDOOR	N/A	-	-
0	1x100%	Low	FUEL GAS CHROMATOGRAPH		5.1120	5.8320		N/A		N/A	MM0-FGS-001	OUTDOOR	50	W	30VDC
0	6x17%	Low	WATER TREATMENT BUILDING ELECTRIC UNIT HEATERS (EUH)		5.8340	5.8340		N/A		N/A	N/A	INDOOR	25	kW	480
0	12x8.3%	Low	WATER TREATMENT BUILDING FANS		5.8340	5.8340		N/A		N/A	N/A	OUTDOOR	2	HP	480
0	12x8.3%	Low	WATER TREATMENT BUILDING LOUVERS		5.8340	5.8340		N/A		N/A	N/A	INDOOR	N/A	-	-
0	1x100%	Low	WATER TREATMENT BUILDING SELF-CONTAINED AIR-CONDITIONING UNITS (SAU)		5.8340	5.8340		N/A		N/A	N/A	OUTDOOR	10	kW	480
0	1x100%	Low	ADMINISTRATION BUILDING AIR TERMINAL UNITS (VAV)		5.8340	5.8340		N/A		N/A	N/A	INDOOR	6	kW	480
0	6x17%	Low	ADMINISTRATION BUILDING FANS		5.8340	5.8340		N/A		N/A	N/A	OUTDOOR	22.38	kW	480
0	2x50%	Low	ADMINISTRATION BUILDING ROOF TOP UNITS (RTU)		5.8340	5.8340		N/A		N/A	N/A	OUTDOOR	54	kW	480
0	4x25%	Low	MAINTENANCE SHOP FANS		5.8340	5.8340		N/A		N/A	N/A	OUTDOOR	22.38	kW	480
0	4x25%	Low	MAINTENANCE SHOP GAS UNIT HEATERS (GUH)		5.8340	5.8340		N/A		N/A	N/A	INDOOR	0.75	kW	480
0	4x25%	Low	MAINTENANCE SHOP LOUVERS		5.8340	5.8340		N/A		N/A	N/A	INDOOR	N/A	-	-
0	1x100%	Low	MAINTENANCE SHOP/I&C FAB SHOP MAKE-UP AIR UNIT (MAU)		5.8340	5.8340		N/A		N/A	N/A	OUTDOOR	3	kW	480
0	4x25%	Low	I&C FAB SHOP FANS		5.8340	5.8340		N/A		N/A	N/A	OUTDOOR	22.38	kW	480
0	4x25%	Low	I&C FAB SHOP GAS UNIT HEATERS (GUH)		5.8340	5.8340		N/A		N/A	N/A	INDOOR	0.75	kW	480
0	4x25%	Low	I&C FAB SHOP LOUVERS		5.8340	5.8340		N/A		N/A	N/A	INDOOR	N/A	-	-
3	1x100%	Low	GT3 GSU TRANSFORMER DELUGE VALVE SHED		5.8360	5.8360		N/A		N/A	N/A	OUTDOOR	3	kW	480
4	1x100%	Low	GT4 GSU TRANSFORMER DELUGE VALVE SHED		5.8360	5.8360		N/A		N/A	N/A	OUTDOOR	3	kW	480
5	1x100%	Low	STG GSU TRANSFORMER DELUGE VALVE SHED		5.8360	5.8360		N/A		N/A	N/A	OUTDOOR	3	kW	480
0	1x100%	Low	DEMINERALIZED WATER STORAGE TANK		5.8570	5.8570		N/A		N/A	MM0-WDM-001	OUTDOOR	N/A	-	-
0	1x100%	Low	SERVICE/FIRE WATER STORAGE TANK		5.8570	5.8570		TBD		N/A	MM0-WSW-001	OUTDOOR	N/A	-	-
0	2X50%	Low	SERVICE/FIRE WATER STORAGE TANK HEATERS		5.8570	5.8570		N/A		N/A	MM0-WSW-001	OUTDOOR	20	kW	480
0	1x100%	Low	CLARIFIED WATER STORAGE TANK		5.8570	5.8570		N/A		N/A	MM0-WRW-003	OUTDOOR	N/A	-	-
0	1x100%	Low	WASTEWATER STORAGE TANK		5.8570	5.8570		N/A		N/A	MM0-WWT-001	OUTDOOR	N/A	-	-
0	1X50%	Low	FUEL OIL STORAGE TANK A		5.8570	5.8570		N/A		N/A	MM0-FOL-002	OUTDOOR	N/A	-	-
0	1X50%	Low	FUEL OIL STORAGE TANK B		5.8570	5.8570		N/A		N/A	MM0-FOL-002	OUTDOOR	N/A	-	-
0	3x50%	Low	SDI BOTTLES		OWNER	5.8320		N/A		N/A	MM0-BMU-005	INDOOR	N/A	-	-
0	1x100%	Low	TEMPORARY DEMIN TRAILER 1		OWNER	OWNER		N/A		N/A	MM0-WDM-001	OUTDOOR	N/A	-	-
0	1x100%	Low	TEMPORARY DEMIN TRAILER 2		OWNER	OWNER		N/A		N/A	MM0-WDM-001	OUTDOOR	N/A	-	-

Appendix E - PRELIMINARY PROJECT SCOPING DRAWINGS

PARTIAL PLAN
SEE UPPER LEFT FOR
CONTINUATION

PRELIMINARY - NOT FOR CONSTRUCTION

no.	date	by	ckd	description
E	01/17/24	CWR	-	PRELIMINARY
D	12/12/23	CWR	-	PRELIMINARY
C	12/01/23	CWR	-	PRELIMINARY
B	11/20/23	CWR	-	PRELIMINARY
A	10/16/23	WRL	-	PRELIMINARY

no.	date	by	ckd	description
K	08/08/24	TLB	-	ISSUED WITH PROJECT SCOPING REPORT
J	05/28/24	CWR	-	ISSUED WITH PROJECT SCOPING REPORT
H	05/02/24	CWR	-	ISSUED WITH PROJECT SCOPING REPORT
G	03/15/24	CWR	-	PRELIMINARY
F	02/19/24	CWR	-	PRELIMINARY

OVERALL SITE PLAN

0 100' 200'
SCALE IN FEET

NORTH

BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Engineering Company, Inc.
FIRM LICENSE NO.

designed
detailed W. LESNIAK

EAST KENTUCKY POWER COOPERATIVE

PULASKI COUNTY, KENTUCKY

COOPER POWER PLANT
2 x1 CCGT PLANT
OVERALL SITE PLAN NEW COOLING TOWER
BASED ON SIEMENS GTG's

project 157787
contract
drawing **GA200** – rev. **K**
sheet of sheets
file 157787_2X1-SIEMENS-COOPER-GA200.DWG

Z:\CLIENTS\ENR\EKPC\156007_NEWCCGT\2_DESIGN\MECH\DWGS\GNRL_ARRANGMNT\COOPER POWER PLANT\157787_2X1-SIEMENS-COOPER-GA200.DWG 8/8/2024 1:15 PM TBROSS

EQUIPMENT IDENTIFICATION AND LOCATION LIST	
DWG REF	DESCRIPTION NEW SITE EQUIPMENT
001	UNIT 3 GAS TURBINE (GT)
002	UNIT 3 HEAT RECOVERY STEAM GENERATOR (HRSG)
003	UNIT 4 GAS TURBINE (GT)
004	UNIT 4 HEAT RECOVERY STEAM GENERATOR (HRSG)
005	UNIT 5 STEAM TURBINE GENERATOR (STG)
006	COOLING TOWER (CT) (SEE GA-202)
007	BOILER FEEDWATER PUMP
008	GT FUEL GAS FILTER / SEPARATOR
009	GT FUEL OIL PUMP SKID
010	SCR LOADING ZONE
011	AMMONIA FLOW CONTROL UNIT
012	HRSG BLOWDOWN TANK
013	OIL WATER SEPARATOR
014	BLOWDOWN SUMP

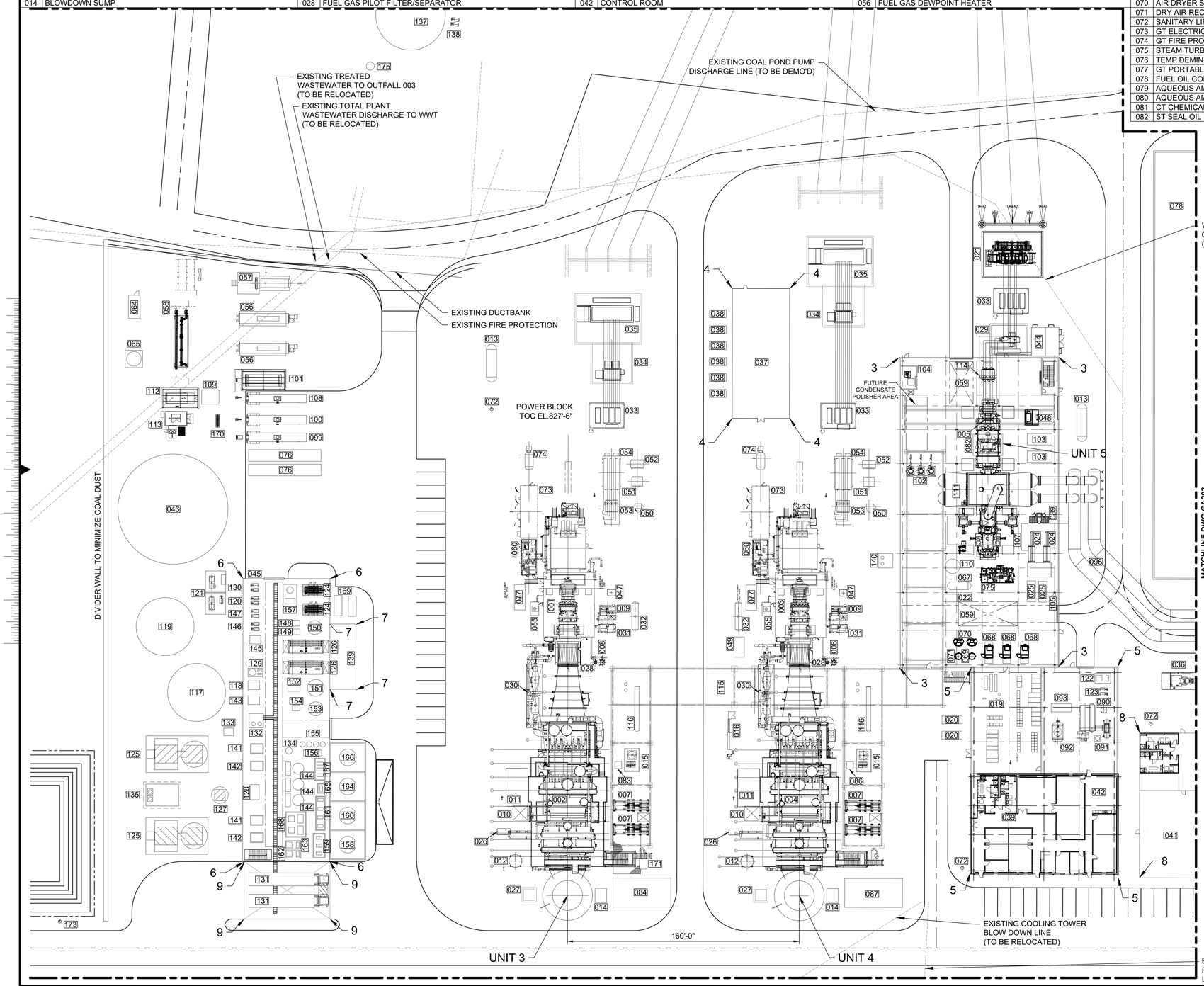
EQUIPMENT IDENTIFICATION AND LOCATION LIST	
DWG REF	DESCRIPTION NEW SITE EQUIPMENT
015	HRSG CHEMICAL FEED (PHOSPHATE)
016	SAMPLE PANEL
017	COOLING TOWER (CT) ELECTRICAL BUILDING (SEE GA-202)
018	CT SS TRANSFORMER (SEE GA-202)
019	STG ELECTRICAL ROOM
020	STG SS TRANSFORMERS
021	STG GSU TRANSFORMER
022	GLAND STEAM CONDENSER BLOWER SKID
023	NOT USED
024	CLOSED COOLING WATER HEAT EXCHANGER
025	CLOSED COOLING WATER PUMPS
026	LP ECONOMIZER RECIRCULATION PUMPS
027	CEMS
028	FUEL GAS PILOT FILTER/SEPARATOR

EQUIPMENT IDENTIFICATION AND LOCATION LIST	
DWG REF	DESCRIPTION NEW SITE EQUIPMENT
029	STG EXCITER TRANSFORMER
030	ROTOR AIR COOLER
031	GT WATER INJECTION PUMP SKID
032	WATER WASH/FALSE START DRAINS TANK
033	GENERATOR CIRCUIT BREAKER
034	GT AUXILIARY TRANSFORMER
035	GT GSU TRANSFORMER
036	EMERGENCY DIESEL GENERATOR (SEE GA-202)
037	MAIN GT ELECTRICAL BUILDING
038	MAIN GT ELECTRICAL BDLG SS TRANSFORMERS (TOTAL 4)
039	ADMINISTRATION ROOMS
040	I&C TECH SHOP (SEE GA-202)
041	MAINTENANCE SHOP (SEE GA-202)
042	CONTROL ROOM

EQUIPMENT IDENTIFICATION AND LOCATION LIST	
DWG REF	DESCRIPTION NEW SITE EQUIPMENT
043	AQUEOUS AMMONIA FORWARDING PUMPS (SEE GA-200)
044	STG EXCITATION COMPARTMENT
045	WATER TREATMENT BUILDING
046	DEMINERALIZED WATER STORAGE TANK
047	GT CONTROL OIL PACKAGE
048	STG BRIDGE CRANE
049	NOT USED
050	SFC CROSSOVER SWITCH CUBICLE
051	GT SEE TRANSFORMER
052	GT SFC TRANSFORMER
053	GT VT & SURGE CUBICLE WITH SFC SWITCH
054	GT SEE / SFC PACKAGE
055	GT AIR COMPRESSOR
056	FUEL GAS DEWPOINT HEATER

EQUIPMENT IDENTIFICATION AND LOCATION LIST	
DWG REF	DESCRIPTION NEW SITE EQUIPMENT
057	COALESCING FILTER SEPARATOR
058	FUEL GAS REGULATING/METERING STATION
059	LIFTING BAY
060	GT LUBE OIL PACKAGE
061	FUEL OIL STORAGE TANK (SEE GA-202)
062	FUEL OIL UNLOADING PUMPS (SEE GA-202)
063	FUEL OIL FORWARDING PUMPS (SEE GA-202)
064	RTU / DAC BUILDING
065	SUMP TANK
066	FUEL OIL HEATERS (SEE GA-202)
067	GLAND STEAM CONDENSER
068	AIR COMPRESSORS
069	WET AIR RECEIVER
070	AIR DRYER SKIDS
071	DRY AIR RECEIVER
072	SANITARY LIFT STATION
073	GT ELECTRICAL PACKAGE
074	GT FIRE PROTECTION PACKAGE
075	STEAM TURBINE LUBE OIL MODULE
076	TEMP DEMIN TRAILERS
077	GT PORTABLE COMPRESSOR WASHING UNIT
078	FUEL OIL CONTAINMENT (SEE GA-202)
079	AQUEOUS AMMONIA STORAGE TANK (SEE GA-200)
080	AQUEOUS AMMONIA CONTAINMENT (SEE GA-200)
081	CT CHEMICAL FEED ENCLOSURE (SEE GA-202)
082	ST SEAL OIL SKID

EQUIPMENT IDENTIFICATION AND LOCATION LIST	
DWG REF	DESCRIPTION NEW SITE EQUIPMENT
083	U3 CTG CEMS
084	U3 HRSG ELECTRICAL BUILDING
085	NOT USED
086	U4 CTG CEMS
087	U4 HRSG ELECTRICAL BUILDING
088	NOT USED
089	CLOSED COOLING WATER FILTERS
090	AUX BOILER BLOWDOWN TANK
091	AUX BOILER
092	DEAERATOR
093	AUX BOILER FUEL REGULATING SKID
094	CIRCULATING WATER PUMPS (SEE GA-202)
095	AUXILIARY CIRCULATING WATER PUMP (SEE GA-202)
096	CIRCULATING WATER PIPE
097	CT ACID STORAGE TANK (SEE GA-202)
098	CT SODIUM HYPOCHLORITE STORAGE TANK (SEE GA-202)
099	CO2 TUBE TRAILER
100	NITROGEN TUBE TRAILER
101	BULK H2 STORAGE TANKS
102	CONDENSATE PUMPS
103	VACUUM PUMP SKID
104	CHEMICAL FEED EQUIPMENT (AMINE/AMMONIA)
105	CLOSED COOLING WATER CHEMICAL POT FEEDER
106	CLOSED COOLING WATER HEAD TANK (MEZZANINE FLOOR)
107	SEAL STEAM SUPERHEATER (MEZZANINE FLOOR)
108	H2 TRUCK UNLOADING
109	EMERGENCY CO2 BOTTOM STORAGE
110	STG ATM DRAINS TANK
111	CONDENSER
112	BULK CO2 STORAGE
113	HYDROGEN GENERATOR
114	STG VT & SURGE CUBICLE
115	PIPE RACK
116	PERFORMANCE HEATER
117	CLARIFIED WATER STORAGE TANK
118	CLARIFIED WATER FORWARDING PUMPS
119	SERVICE/FIRE WATER STORAGE TANK
120	SERVICE WATER PUMPS
121	FIRE WATER PUMP ENCLOSURE (AS REQUIRED)
122	AUX BOILER CHEMICAL FEED SKID
123	AUX BOILER FEED WATER PUMPS
124	ULTRA FILTRATION (UF) SKID
125	WATER TREATMENT CLARIFIER
126	REVERSE OSMOSIS (RO) SKID
127	SLUDGE HOLDING TANK
128	FILTER PRESS FEED PUMP SKID
129	POTABLE WATER TANK AND BOOSTER PUMP SKID
130	DEMIN WATER PUMPS
131	WATER TREATMENT FILTER PRESS & UNLOADING BAY
132	WATER TREATMENT BLDG SUMP/PUMPS
133	MMF AIR BLOWER SKID
134	WATER TREATMENT BUILDING AIR RECEIVER
135	CLEARWELL SUMP PUMPS
136	WASTE WATER LIFT STATION (SEE GA-202)
137	WASTEWATER STORAGE TANK
138	WASTE WATER PUMPS
139	WATER TREATMENT ELECTRICAL ROOM
140	WASTE WATER SUMP PUMPS
141	CLARIFIER SLUDGE RECYCLE SKID
142	CLARIFIER SLUDGE WASTE SKID
143	COOLING TOWER MAKEUP PUMPS
144	MULTIMEDIA FILTER (MMF)
145	STRAINER SKID
146	MMF BACKWASH PUMPS
147	UF FEED PUMPS
148	UF FORWARDING PUMPS
149	UF BACKWASH PUMPS
150	UF PERMEATE TANK
151	NEUTRALIZATION TANK
152	NEUTRALIZATION PUMP SKID
153	RO PERMEATE TANK
154	RO FORWARDING PUMPS
155	SERVICE DEIONIZATION (SDI) BOTTLES
156	SDI MANIFOLD
157	CLEAN-IN-PLACE (CIP) TANK AND PUMP SKID
158	SULFURIC ACID STORAGE TANK
159	SULFURIC ACID METERING PUMPS
160	SODIUM HYDROXIDE STORAGE TANK
161	SODIUM HYDROXIDE METERING PUMPS
162	ANTISCALANT TOTE AND METERING PUMPS
163	SODIUM BISULFATE TOTE AND METERING PUMPS
164	COAGULANT STORAGE TANK
165	COAGULANT METERING PUMPS
166	SODIUM HYPOCHLORITE STORAGE TANK
167	SODIUM HYPOCHLORITE METERING PUMPS
168	POLYMER TOTE AND METERING PUMPS
169	WATER TREATMENT BLDG SS TRANSFORMERS
170	NITROGEN BOTTLE RACK
171	HRSG ELEVATOR
172	CLARIFIER MAKEUP PUMPS
173	COAL PILE RUNOFF POND LIFT STATION
174	LANDFILL LEACHATE POND LIFT STATION
175	UNIT 1 & 2 WWT DRAINS AND CLARIFIER LIFT STATION



BUILDING HEIGHTS

DESCRIPTION	TOS EAVE HEIGHT
STEAM TURBINE BLDG (3)	110'-0"
MAIN GT ELECTRICAL BUILDING (4)	30'-0"
ADMINISTRATION (5)	30'-0"
WATER TREATMENT BDLG (6)	25'-0"
WATER TREATMENT ELECT ROOM (7)	25'-0"
MAINTENANCE SHOP (8)	40'-0'
WATER TREATMENT MEZZANINE (9)	45'-0"

STACK COORDS

ITEM	NORTHING	EASTING	HEIGHT
UNIT 3	N: 1883903.276	E: 1979598.870	
UNIT 4	N: 1883806.802	E: 1979726.512	

EQUIPMENT COORDS

ITEM	NORTHING	EASTING	HEIGHT
DIESEL FIRE WATER PUMP	N: 1884284.000	E: 1979569.000	
AUX BOILER	N: 1883780.504	E: 1979953.892	
GAS DEWPOINT HEATER 1	N: 1884350.500	E: 1979667.500	
GAS DEWPOINT HEATER 2	N: 1884334.000	E: 1979655.250	

PRELIMINARY - NOT FOR CONSTRUCTION

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E	01/17/24	CWR	-	PRELIMINARY
D	12/12/23	CWR	-	PRELIMINARY
C	12/01/23	CWR	-	PRELIMINARY
B	11/20/23	CWR	-	PRELIMINARY
A	10/16/23	WRL	-	PRELIMINARY

no.	date	by	ckd	description
K	08/08/24	TLB	-	ISSUED WITH PROJECT SCOPING REPORT
J	05/28/24	CWR	-	ISSUED WITH PROJECT SCOPING REPORT
H	05/02/24	CWR	-	ISSUED WITH PROJECT SCOPING REPORT
G	02/19/24	CWR	-	PRELIMINARY
F	02/05/24	CWR	-	PRELIMINARY

SITE PLAN
0 30' 60'
SCALE IN FEET
NORTH

BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Engineering Company, Inc.
FIRM LICENSE NO.
designed
detailed W. LESNIAK

EAST KENTUCKY POWER COOPERATIVE
PULASKI COUNTY, KENTUCKY

COOPER POWER PLANT
2 x1 CCGT PLANT
ENLARGED PLAN - NEW COOLING TOWER
BASED ON SIEMENS GTG's

project 157787
contract
drawing **GA201** rev. **K**
sheet of sheets
file 157787_2X1-SIEMENS-COOPER-GA201.DWG

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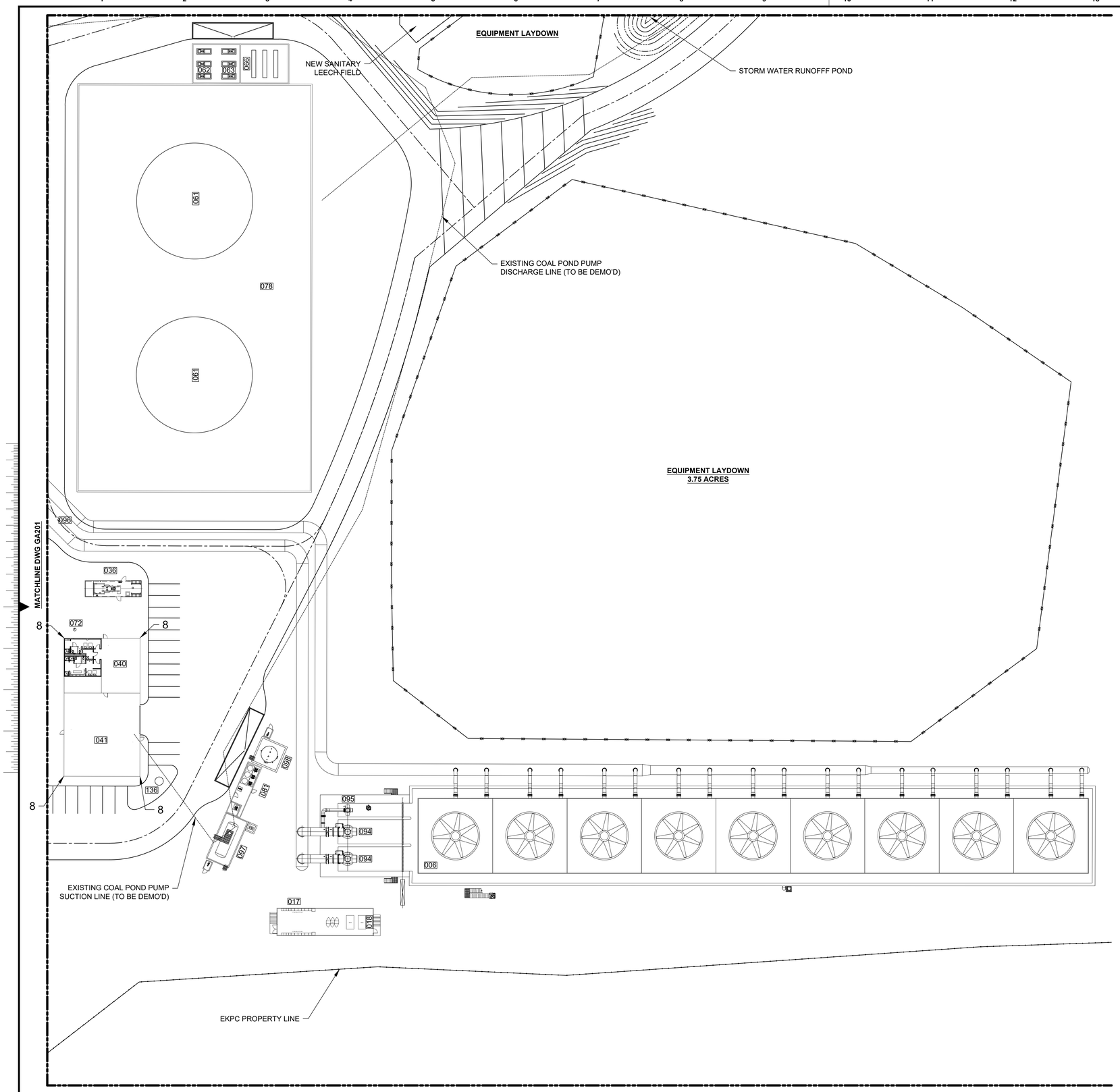

EQUIPMENT IDENTIFICATION AND LOCATION LIST	
DWG REF	DESCRIPTION NEW SITE EQUIPMENT
006	COOLING TOWER (CT)
017	COOLING TOWER ELECTRICAL BUILDING
018	COOLING TOWER SS TRANSFORMER
036	EMERGENCY DIESEL GENERATOR
040	I&C TECH SHOP
041	MAINTENANCE SHOP
061	FUEL OIL STORAGE TANK
062	FUEL OIL UNLOADING PUMPS
063	FUEL OIL FORWARDING PUMPS
066	FUEL OIL HEATERS
072	SANITARY LIFT STATION
078	FUEL OIL CONTAINMENT
081	COOLING TOWER CHEMICAL FEED ENCLOSURE
094	CIRCULATING WATER PUMPS
095	AUXILIARY CIRCULATING WATER PUMP
096	CIRCULATING WATER PIPE
097	COOLING TOWER ACID STORAGE TANK
098	COOLING TOWER SODIUM HYPOCHLORITE STORAGE TANK
136	WASTE WATER LIFT STATION

EQUIPMENT COORDS

ITEM	NORTHING	EASTING	HEIGHT
EMERGENCY GENERATOR	N: 1883762.000	E: 1980032.000	

BUILDING HEIGHTS

DESCRIPTION	HEIGHT
COOLING TOWER (CT)	65'-0"
CT CHEMICAL FEED ENCLOSURE	25'-0"
COOLING TOWER (CT) PCM	10'-0"
MAINTENANCE SHOP (8)	40'-0"

PRELIMINARY - NOT FOR CONSTRUCTION

no.	date	by	ckd	description
E	01/17/24	CWR	-	PRELIMINARY
D	12/12/23	CWR	-	PRELIMINARY
C	12/01/23	CWR	-	PRELIMINARY
B	11/20/23	CWR	-	PRELIMINARY
A	10/16/23	WRL	-	PRELIMINARY

no.	date	by	ckd	description
G	05/02/24	CWR	-	ISSUED WITH PROJECT SCOPING REPORT
F	02/19/24	CWR	-	PRELIMINARY

SITE PLAN
0 30' 60'
SCALE IN FEET
NORTH

BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Engineering Company, Inc.
FIRM LICENSE NO.

designed
detailed W. LESNIAK

EAST KENTUCKY POWER COOPERATIVE
PULASKI COUNTY, KENTUCKY

COOPER POWER PLANT
2 x1 CCGT PLANT
ENLARGED PLAN - NEW COOLING TOWER
BASED ON SIEMENS GTG's

project 157787
contract
drawing **GA202** – rev. **G**
sheet of sheets
file 157787_2X1-SIEMENS-COOPER-GA202.DWG

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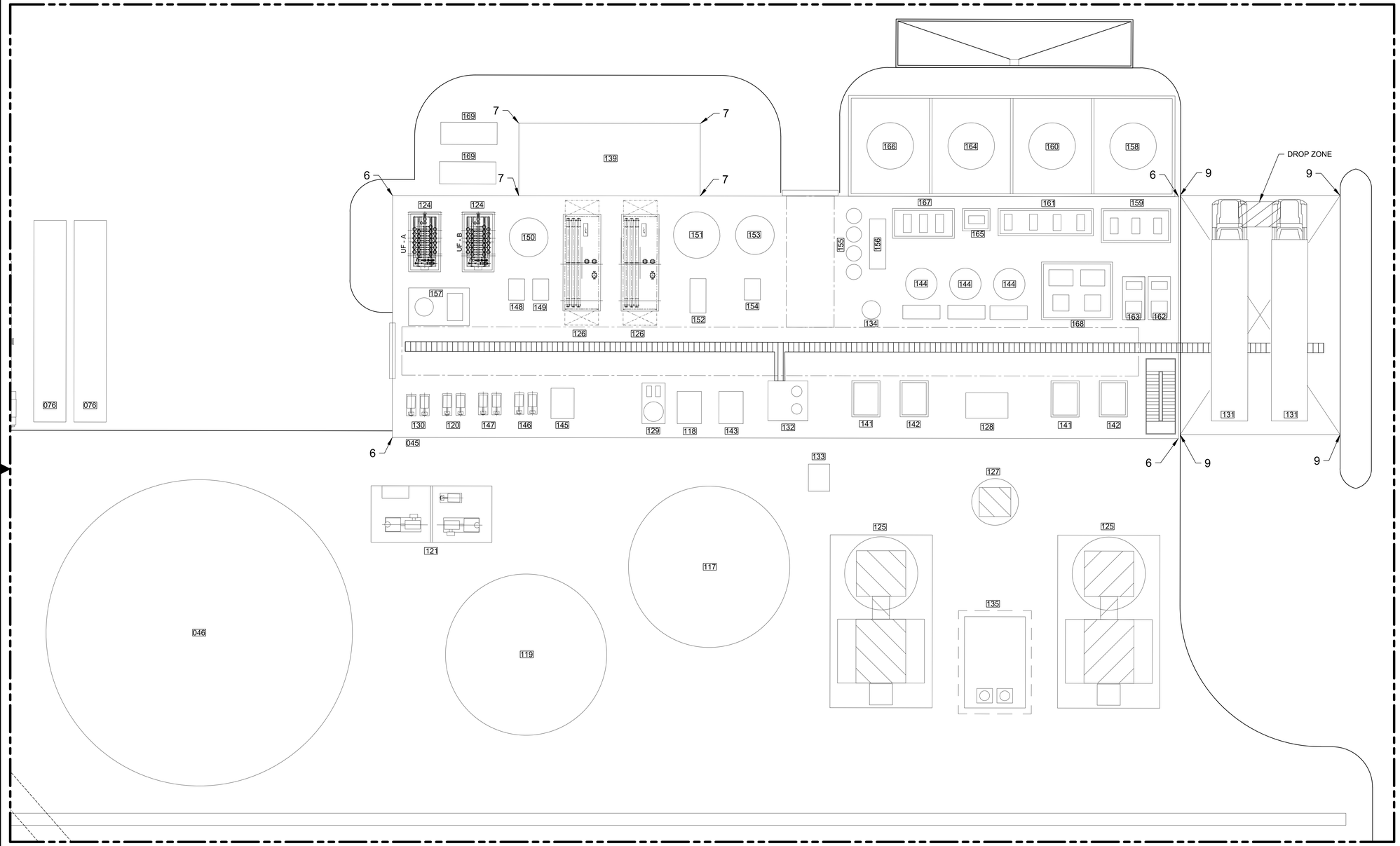

EQUIPMENT IDENTIFICATION AND LOCATION LIST	
DWG REF	DESCRIPTION NEW SITE EQUIPMENT
045	WATER TREATMENT BUILDING
046	DEMINERALIZED WATER STORAGE TANK
076	TEMP DEMIN TRAILERS
117	CLARIFIED WATER STORAGE TANK
118	CLARIFIED WATER FORWARDING PUMPS
119	SERVICE/FIRE WATER STORAGE TANK
120	SERVICE WATER PUMPS
121	FIRE WATER PUMP ENCLOSURE (AS REQUIRED)
124	ULTRA FILTRATION (UF) SKID
125	WATER TREATMENT CLARIFIER
126	REVERSE OSMOSIS (RO) SKID
127	SLUDGE HOLDING TANK
128	FILTER PRESS FEED PUMP SKID
129	POTABLE WATER TANK AND BOOSTER PUMP SKID
130	DEMIN WATER PUMPS
131	WATER TREATMENT FILTER PRESS & UNLOADING BAY
132	WATER TREATMENT BLDG SUMP/PUMPS
133	MMF AIR BLOWER SKID
134	WATER TREATMENT BUILDING AIR RECEIVER
135	CLEARWELL SUMP PUMPS
139	WATER TREATMENT ELECTRICAL ROOM
141	CLARIFIER SLUDGE RECYCLE SKID
142	CLARIFIER SLUDGE WASTE SKID
143	COOLING TOWER MAKEUP PUMPS
144	MULTIMEDIA FILTER (MMF)
145	STRAINER SKID
146	MMF BACKWASH PUMPS
147	UF FEED PUMPS
148	UF FORWARDING PUMPS
149	UF BACKWASH PUMPS
150	UF PERMEATE TANK
151	NEUTRALIZATION TANK
152	NEUTRALIZATION PUMP SKID
153	RO PERMEATE TANK
154	RO FORWARDING PUMPS
155	SERVICE DEIONIZATION (SDI) BOTTLES
156	SDI MANIFOLD
157	CLEAN-IN-PLACE (CIP) TANK AND PUMP SKID
158	SULFURIC ACID STORAGE TANK
159	SULFURIC ACID METERING PUMPS
160	SODIUM HYDROXIDE STORAGE TANK
161	SODIUM HYDROXIDE METERING PUMPS
162	ANTISCALANT TOTE AND METERING PUMPS
163	SODIUM BISULFATE TOTE AND METERING PUMPS
164	COAGULANT STORAGE TANK
165	COAGULANT METERING PUMPS
166	SODIUM HYPOCHLORITE STORAGE TANK
167	SODIUM HYPOCHLORITE METERING PUMPS
168	POLYMER TOTE AND METERING PUMPS
169	WATER TREATMENT BLDG SS TRANSFORMERS

BUILDING HEIGHTS

DESCRIPTION	TOS EAVE HEIGHT
WATER TREATMENT BDLG (6)	25'-0"
WATER TREATMENT ELECT ROOM (7)	25'-0"
WATER TREATMENT MEZZANINE (9)	45'-0"

PRELIMINARY - NOT FOR CONSTRUCTION

no.	date	by	ckd	description
D	05/02/24	CWR	-	ISSUED WITH PROJECT SCOPING REPORT
C	02/19/24	CWR	-	PRELIMINARY
B	01/17/24	CWR	-	PRELIMINARY
A	01/05/24	CWR	-	PRELIMINARY

no.	date	by	ckd	description

SITE PLAN

0 8' 16' 24'
SCALE IN FEET

NORTH

BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Engineering Company, Inc.
FIRM LICENSE NO.

designed
detailed W. LESNIAK

EAST KENTUCKY POWER COOPERATIVE

PULASKI COUNTY, KENTUCKY

COOPER POWER PLANT
2 x1 CCGT PLANT
ENLARGED PLAN - NEW COOLING TOWER
BASED ON SIEMENS GTG's

project 157787
contract
drawing **GA203** – rev. **D**
sheet of sheets
file 157787_2X1-SIEMENS-COOPER-GA203.DWG

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05.7 Site Access Plan

- MATERIAL LAYDOWN SPACE
- CRAFT & STAFF TRAILER AREAS
- WAREHOUSE/ LAYDOWN AREA
- CRAFT PARKING
- STAFF PARKING

SEE PARTIAL PLAN UPPER RIGHT FOR CONTINUATION

TRANSMISSION LINE EASEMENT, TYP.

CONSTRUCTION PARKING LOT (1.8 ACRES)

2 ac

2 ACRE LAYDOWN

4 ACRE LAYDOWN

EKPC 161kV - EXISTING

CONSTRUCTION TRAILOR SANITARY LEECH FIELD (EXISTING)

0.85 ac

CRAFT WALKWAY INTO SITE. ~10' WIDE.

KU - REMOVED

EKPC 69kV - REMOVED

EKPC 161kV - REMOVED

TRANSMISSION LINE EASEMENT, TYP.

EQUIPMENT LAYDOWN (5.0 ACRES)

CONSTRUCTION PARKING LOT (1.9 ACRES) (100 - 150 PEOPLE)

1 ac

EKPC 161kV - EXISTING

EKPC 69kV - EXISTING

1.14 ac

2.03 ac

CONSTRUCTION OFFICE AND PARKING (1.1 ACRES)

STAFF PARKING

SEE FIGURE 1 NEXT PAGE

1.3 ac

200'X150' WAREHOUSE. APPROXIMATE LOCATION

EKPC 161kV - NEW

EKPC 161kV - NEW

EKPC 161kV - NEW

EKPC 161kV - NEW

CONSTRUCTION OFFICE AREA (0.8 ACRES)

SEPTIC TANK/PUMPS

1.86 ac

6 BAY TURNSTYLE. (8.5'X81')

AQUEOUS AMMONIA STORAGE TANK (079)

60'x60' 5-Plex War Room

A FORWARDING PUMPS (043)

A CONTAINMENT (080)

EXISTING DUCTBANK

EQUIPMENT LAYDOWN 1.21 ACRES

1.2 ac

WASTE WATER TREATMENT OVERFLOW/RECIRC TO COAL POND (TO BE RELOCATED)

EKPC 161kV - NEW

SWITCHYARD 1.49 ACRES

188'x75' CRAFT TRAILER AREA

EXISTING LANDFILL LEACHATE POND DISCHARGE LINE (TO BE RELOCATED)

EQUIPMENT LAYDOWN 0.75 ACRES

EXISTING COAL POND PUMP DISCHARGE LINE (TO BE DEMO'D)

KU - REMOVED

KU - EXISTING

KU - NEW

EQUIPMENT LAYDOWN 1.00 ACRES

SEE GA202 FOR ENLARGED PLAN

EKPC 69kV - REMOVED

EKPC 161kV - REMOVED

NEW SANITARY LEECH FIELD

SPACE RESERVED 5.29 ac

EXISTING COOLING TOWER BLOW DOWN LINE (TO BE RELOCATED)

EXISTING COOLING TOWER CHEMICAL FEED BUILDING SUMP DISCHARGE LINE (TO BE RELOCATED)

EXISTING COAL POND PUMP SUCTION LINE (TO BE DEMO'D)

EKPC PROPERTY LINE

EXISTING TOTAL PLANT WASTE WATER DISCHARGE TO WWT (TO BE RELOCATED)

DIVIDER WALL NET

SEE GA203 FOR ENLARGED PLAN

SEE GA201 FOR ENLARGED PLAN

RELOCATED COAL POND

STORM WATER POND

EXISTING TREATED WASTE WATER TO OUTFALL 003 (TO BE RELOCATED)

EXISTING FIRE PROTECTION

NATURAL GAS METER AND REGULATION STATION

PARTIAL PLAN SEE UPPER LEFT FOR CONTINUATION

PREFERENCE 1 KEY

- MATERIAL LAYDOWN SPACE ~ 32 ACRES
- CRAFT & STAFF TRAILER AREAS ~2 ACRES
- WAREHOUSE AREA 150' X 200'
- CRAFT PARKING ~ 5 ACRES
- STAFF PARKING ~ 1 ACRE

PRELIMINARY - NOT FOR CONSTRUCTION

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B	11/20/23	CWR	-	PRELIMINARY
A	10/16/23	WRL	-	PRELIMINARY

OVERALL SITE PLAN

0 100' 200'
SCALE IN FEET

NORTH

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PULASKI COUNTY, KENTUCKY

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2 x1 CCGT PLANT
OVERALL SITE PLAN NEW COOLING TOWER BASED ON SIEMENS GTG's

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rev. E
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file 157787_2X1-SIEMENS-COOPER-GA200.DWG

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1. APPLICABLE CODES AND STANDARDS

ABBREVIATIONS	TITLE	EDITION
ASHRAE 90.1	ENERGY STANDARD FOR BUILDINGS	2013
IBC	KENTUCKY BUILDING CODE, IBC AMENDED	2015
IECC	COMMERCIAL ENERGY CONSERVATION CODE OF KENTUCKY, IECC AMENDED	2012
IFC	KENTUCKY FIRE CODE	2012
IMC	KENTUCKY MECHANICAL CODE, IMC AMENDED	2015
IPC	KENTUCKY PLUMBING CODE, IPC AMENDED	2015
NFPA 1	KENTUCKY FIRE CODE	2018
NFPA 10	STANDARD FOR PORTABLE FIRE EXTINGUISHERS	2018
NFPA 13	STANDARD FOR THE INSTALLATION OF SPRINKLER SYSTEMS	2013
NFPA 70	NATIONAL ELECTRICAL CODE	2017
NFPA 72	NATIONAL FIRE ALARM AND SIGNALING CODE	2013
NFPA 80A	RECOMMENDED PRACTICE FOR PROTECTION OF BUILDINGS FROM EXTERIOR FIRE EXPOSURES	2022
NFPA 101	NATIONAL LIFE SAFETY CODE	2018
NFPA 850	RECOMMENED PRACTICE FOR FIRE PROTECTION FOR ELECTRIC GENERATING PLANTS AND HIGH VOLTAGE DIRECT CURRENT CONVERTER STATIONS	2020

2. TYPE OF CONSTRUCTION (IBC 601)

BUILDING ELEMENT	TYPE OF CONSTRUCTION	FIRE RESISTANCE RATING
PRIMARY STRUCTURAL FRAME	IIB	0 HR
BEARING EXTERIOR WALL	IIB	0 HR
BEARING INTERIOR WALL	IIB	0 HR
NON-BEARING EXTERIOR WALL	IIB	0 HR
NON-BEARING INTERIOR WALL	IIB	0 HR
FLOOR CONSTRUCTION INCLUDING SUPPORTING BEAMS AND JOISTS	IIB	0 HR
ROOF CONSTRUCTION INCLUDING SUPPORTING BEAMS AND JOISTS	IIB	0 HR

3. CLASSIFICATION OF OCCUPANCY

AREAS	OCCUPANCY	IBC
ADMINISTRATION	BUSINNESS, B	304.1
MAINTENANCE BLDG	BUSINNESS, B	304.1
STEAM TURBINE BLDGS	INDUSTRIAL MODERATE-HAZARD, F-1	306.2
WATER TREATMENT BLDG	INDUSTRIAL LOW HAZARD, F-2	306.3
MAIN GT ELECTRICAL BLDG	MODERATE-HAZARD STORAGE, GROUP S-1	311.2

4. OCCUPANCY SEPARATION

AREA	FLOOR / OCCUPANCY	SEPARATION	FLOOR / OCCUPANCY	SEPARATION RATING	IBC
GT ELECTRICAL ROOM	F-2	NONSEPARATED	F-1	0 HR BARRIER	508.3.3
MAINTENANCE SHOP	B	NONSEPARATED	F-2	0 HR BARRIER	508.3.3

5. UNLIMITED AREA BUILDING (IBC 507)

BUILDING	OCCUPANCY	FLOORS	FRONTAGE	FIRE SUPPRESSION	IBC
STEAM TURBINE, ADMIN, ELECTRICAL & MAINTENANCE COMBINED	B, F-1, F-2	1 LEVEL	> 60 FT ON NORTH, SOUTH, EAST, & WEST SIDES	FULLY SPRINKLERED	507.4

6. MODIFIED ALLOWABLE AREA (TABLE 506.2)

AREA	OCCUPANCY	ALLOWABLE AREA (SF)	FRONTAGE INCREASE (SF)	SPRINKLER INCREASE (SF)	MODIFIED ALLOWABLE AREA (SF)
ADMINISTRATIVE	B	23,000	NOT REQUIRED	69,000	UNLIMITED AREA BLDG
ELECTRICAL & BOILER RM	F-2	23,000	NOT REQUIRED	69,000	UNLIMITED AREA BLDG
GT ELECTRICAL ROOM	F-2	23,000	NOT REQUIRED	69,000	UNLIMITED AREA BLDG
MAINTENANCE SHOP	F-2	23,000	NOT REQUIRED	69,000	UNLIMITED AREA BLDG
STEAM TURBINE	F-1	15,500	NOT REQUIRED	46,500	UNLIMITED AREA BLDG
WATER TREATMENT BLDG	F-2	23,000	NOT REQUIRED	NOT SPRINKLERED	23,000

7. BUILDING ALLOWABLE AREA (IBC 506)

AREA	OCCUPANCY	ACTUAL AREA (SF)	RESTRICTING MODIFIED ALLOWABLE AREA (SF)	RATIO (SUM < 1)
ADMINISTRATIVE	B	7,317	UNLIMITED	-
ELECTRICAL & BOILER RM	F-2	7,525	UNLIMITED	-
GT ELECTRICAL ROOM	F-2	3,600	UNLIMITED	-
MAINTENANCE SHOP	F-2	5,500	UNLIMITED	-
STEAM TURBINE	F-1	23,631	UNLIMITED	-
WATER TREATMENT BLDG	F-2	14.300	23,000	.59

8. MODIFIED ALLOWABLE HEIGHT (IBC 504)

AREA	OCCUPANCY	RESTRICTING ALLOWABLE HEIGHT (FT / STORY)	SPRINKLER INCREASE (FT / STORY)	MODIFIED ALLOWABLE HEIGHT (FT / STORY)	ACTUAL HEIGHT
GT ELECTRICAL ROOM	F-2	55 / 2	20 / 1	75 / 3	33'-3"
MAINTENANCE SHOP	F-2	55 / 2	20 / 1	75 / 3	43'-9"
STEAM TURBINE & ADMIN	F-1, B	EXEMPT PER 503.1.1	-	EXEMPT PER 503.1.1	116'-6"
WATER TREATMENT BLDG	F-2	55 / 2	20 / 1	75 / 3	49'-0"

9. INCIDENTAL USE AND OTHER PASSIVE FIRE PROTECTION

AREA	REQUIRED RATING	CODE
CORRIDOR	0 HOUR BARRIER	IBC 1020.1
BOILER ROOM	1 HR FIRE BARRIER	NFPA 101 SECTION 38.3.2.1
ELECTRICAL ROOM TRANSFORMER > 112 1/2 KVA	1 HR FIRE BARRIER	NFPA 70 450.21(B)

10. BUILDING SEPARATION (IBC TABLE 602)

AREA	OCCUPANCY	ELEVATION	RESTRICTIVE FIRE SEPARATION DISTANCE (FT)*	FIRE RESISTIVE RATING OF EXTERIOR WALL
GT ELECTRICAL ROOM	F-2	NORTH/SOUTH/WEST/EAST	10' SOUTH, >30' TYP	NO RATING
MAINTENANCE SHOP	B	NORTH/SOUTH/WEST/EAST	15' WEST, >30' TYP	NO RATING
STEAM TURBINE & ADMIN	B, F-1, F-2	NORTH/SOUTH/WEST/EAST	10' NORTH, 15' EAST, > 30' TYP	NO RATING
WATER TREATMENT BLDG	F-2	NORTH/SOUTH/WEST/EAST	> 30' TYP	NO RATING

11. OPENING PROTECTION FOR FIRE AND SMOKE RESISTIVE CONSTRUCTION

COMPONENT	FIRE DOOR / SHUTTER ASSEMBLIES	DUCT PENETRATIONS	OTHER PENETRATIONS	IBC
1 HR FIRE BARRIER	3/4 HR	1-1/2 HR FIRE DAMPER ONLY ON TRANSFER DUCTS	1 HR	716.1, 717.5.2

12. OCCUPANT LOAD CALCULATIONS (IBC 1004)

AREA	DESCRIPTION	FUNCTION OF SPACE	AREA (SF)	OCCUPANT LOAD FACTOR (SF/PERSON)	OCCUPANTS
ADMINISTRATIVE	OFFICES, BATHROOMS	BUSINESS AREAS	4,968	100	50
BUSINESS	CONFERENCE ROOMS	BUSINESS COLLABORATION	2,349	15	157
ELECTRICAL & BOILER ROOMS	BOILER ROOM,ELEC ROOM, STORAGE	INDUSTRIAL AREA	7,525	100	76
GT ELECTRICAL ROOM	ELECTRICAL ROOM	INDUSTRIAL AREA	3,600	100	36
MAINTENANCE SHOP	MAINTENANCE SHOP, I&C TECH SHOP	INDUSTRIAL AREA	5,500	100	55
STEAM TURBINES	STEAM TURBINE BLDGS	INDUSTRIAL AREA	23,631	100	237
WATER TREATMENT BLDG	WATER TREATMENT BLDG	INDUSTRIAL AREA	11,102	100	111
WATER TREATMENT BLDG	ELECTRICAL ROOM	INDUSTRIAL AREA	837	100	9

13. OCCUPANT LOAD SUMMARY AND MINIMUM EXITS FROM FLOOR

AREA	GROSS AREA (SF)	OCCUPANTS	REQUIRED EXITS (1006.3.1)	REQUIRED EXIT SEPARATION
ADMINISTRATIVE	4,968	50	2	1/3 DIAGONAL
ELECTRICAL & BOILER ROOMS	7,525	76	2	1/3 DIAGONAL
GT ELECTRICAL BLDG	3,600	36	2	1/3 DIAGONAL
MAINTENANCE SHOP	5,500	55	2	1/3 DIAGONAL
STEAM TURBINES	23,631	237	2	1/3 DIAGONAL
WATER TREATMENT BLDG	14,330	144	2	1/2 DIAGONAL

14. MINIMUM EXITS OR EXIT ACCESSES FROM A SPACE OR AREA

OCCUPANCY	CONDITION PERMITTING ONE EXIT	CONDITION REQUIRING TWO OR MORE EXITS	CODE SECTION
INDUSTRIAL F-1. F-2	LESS THAN 49 OCCUPANTS	>49 OCCUPANTS	TABLE 1006.2.1
BUSINESS. B	LESS THAN 49 OCCUPANTS	>49 OCCUPANTS	TABLE 1006.2.1

15. COMMON PATH, DEAD-END, AND TRAVEL DISTANCE LIMITS

OCCUPANCY	COMMON PATH LIMIT (FT) (IBC 1006.2.1)	DEAD END LIMIT (FT) (IBC 1020.4)	TRAVEL DISTANCE LIMIT (FT) (IBC 1017.2)
F-1	100	50	250
B	100	50	300
F-2	75	20	300

*NOTE: THE MAXIMUM EXIT ACCESS TRAVEL DISTANCE SHALL BE INCREASED TO 400' PER 1017.2.2 FOR F-1 & S-1 OCCUPANCIES

16. MINIMUM EGRESS WIDTHS

COMPONENT	REQUIREMENT	WIDTH (IN)	IBC
CORRIDOR SERVING LESS THAN 50 OCCUPANTS	MINIMUM	36	1020.2
CORRIDOR SERVING MORE THAN 50 OCCUPANTS	MINIMUM	44	1020.2
DOORS IN EGRESS ACCESS	PER COMPONENT	32	1010.1.1
NEW STAIR IN EGRESS ACCESS	MINIMUM	44	1011.2

17. MINIMUM INTERIOR FINISH RATINGS (IBC 803.11)

OCCUPANCY	EXIT STAIRWAYS, RAMPS & EXIT PASSAGEWAYS	EXIT ACCESS CORRIDORS	ROOMS & ENCLOSED SPACES
B	CLASS B	CLASS C	CLASS C
F-1	CLASS C	CLASS C	CLASS C
F-2	CLASS B	CLASS C	CLASS C

18. FIRE SUPPRESSION REQUIREMENTS

AREA	SPRINKLERS (IBC 903)	STANDPIPE (IBC 905)	FIRE EXTINGUISHERS (IBC 906)
ELECTRICAL & BOILER ROOM	SPRINKLERS ARE REQUIRED	NOT REQUIRED	FIRE EXTINGUISHERS PROVIDED THROUGHOUT THE BUILDING
GT ELECTRICAL ROOM	SPRINKLERS ARE NOT REQUIRED	NOT REQUIRED	FIRE EXTINGUISHERS PROVIDED THROUGHOUT THE BUILDING
MAINTENANCE SHOP	SPRINKLERS ARE REQUIRED	NOT REQUIRED	FIRE EXTINGUISHERS PROVIDED THROUGHOUT THE BUILDING
STEAM TURBINE	SPRINKLERS ARE REQUIRED	NOT REQUIRED	FIRE EXTINGUISHERS PROVIDED THROUGHOUT THE BUILDING
WATER TREATMENT BLDG	SPRINKLERS ARE NOT REQUIRED	NOT REQUIRED	FIRE EXTINGUISHERS PROVIDED THROUGHOUT THE BUILDING

19. FIRE ALARM REQUIREMENTS (IBC 907)

MANUAL INITIATION	AUTOMATIC INITIATION	OCCUPANT NOTIFICATION
MANUAL FIRE ALARM PULL STATIONS PROVIDED AT EXITS	FLOW AND TAMPER SWITCHES, SPOT SMOKE DETECTORS AT ALARM PANELS AND DUCT SMOKE DETECTORS PROVIDED	AUDIBLE AND VISUAL NOTIFICATION PROVIDED. VISUAL ONLY IN PUBLIC AND COMMON AREAS

20. SMOKE MANAGEMENT SYSTEMS

SMOKE CONTROL SYSTEM (IBC 909)	SMOKE AND HEAT VENTS (IBC 910)	PASSIVE SMOKE MANAGEMENT
NOT REQUIRED	NOT REQUIRED	NOT REQUIRED

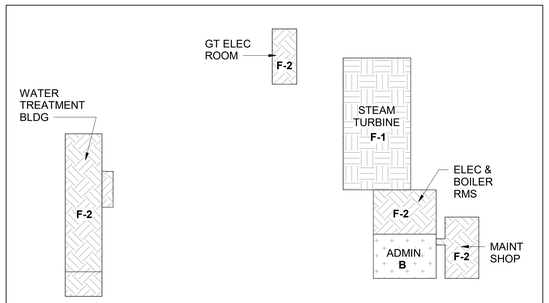
21. REQUIRED PLUMBING FIXTURES (IBC 2902)

BUILDING	OCCUPANCY	OCCUPANT LOAD	WATER CLOSETS	LAVATORIES	DRINKING FOUNTAINS
STEAM TURBINE	F-1	237	2 M 1 F	2 M 1 F	1
ELECTRICAL & BOILER ROOM	F-2	76	1 M 1 F	1 M 1 F	1
ADMINISTRATIVE	B	207	4 M 4 F	2 M 2 F	3
GT ELECTRICAL ROOM	F-2	36	1 M 1 F	1 M 1 F	1
MAINTENANCE SHOP	F-2	55	1 M 1 F	1 M 1 F	1
COMBINED BUILDING TOTAL		611	9 M 8 W	7 M 6 F	7
COMBINED ACTUAL FIXTURE COUNT			12 M 9 W	9 M 7 F	10
WATER TREATMENT BUILDING	F-2	144	1 M 1 F	1 M 1 F	1
WATER TREATMENT ACTUAL FIXTURE COUNT			1 M 1 F	1 M 1 F	1

22. ENERGY CODE SUMMARY (IECC 2012)

COUNTY, STATE , ZONE	BLDG COMPONENT	REQUIRED	PROVIDED - R VALUE
PULASKI, KY, ZONE 4A	ROOFS- METAL BUILDING (PEMB)	R-19+R-11 LS	R-19+R-11 LS
	ROOFS - ROOF INSULATION ABOVE DECK	R-25ci	R-25ci
	WALLS, ABOVE GRADE-METAL BUILDING (PEMB)	R-13 + R-13ci	R-13 + R-13ci
	WALLS, ABOVE GRADE-METAL FRAMED	R-13 + 7.5ci	R-13 + 7.5ci
	WALLS, BELOW GRADE	R-7.5ci	R-7.5ci
	SLAB-ON-GRADE FLOORS	R-10 FOR 24" BELOW	R-10 FOR 24" BELOW
	OPAQUE DOORS	ROLL-UP OR SLIDING R-4.75	R-4.75
	OPAQUE DOORS	SWINGING U-0.61	U-0.61

PROJECT ADDRESS:
COOPER POWER PLANT RD.
SOMERSET, KY 42501



KEY PLAN
SCALE: NTS

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designed Designer
detailed Checker

EAST KENTUCKY POWER COOPERATIVE
CLARK COUNTY, KENTUCKY

COOPER POWER PLANT
2 x1 CCGT PLANT
LIFE SAFETY CODE AND CRITERIA

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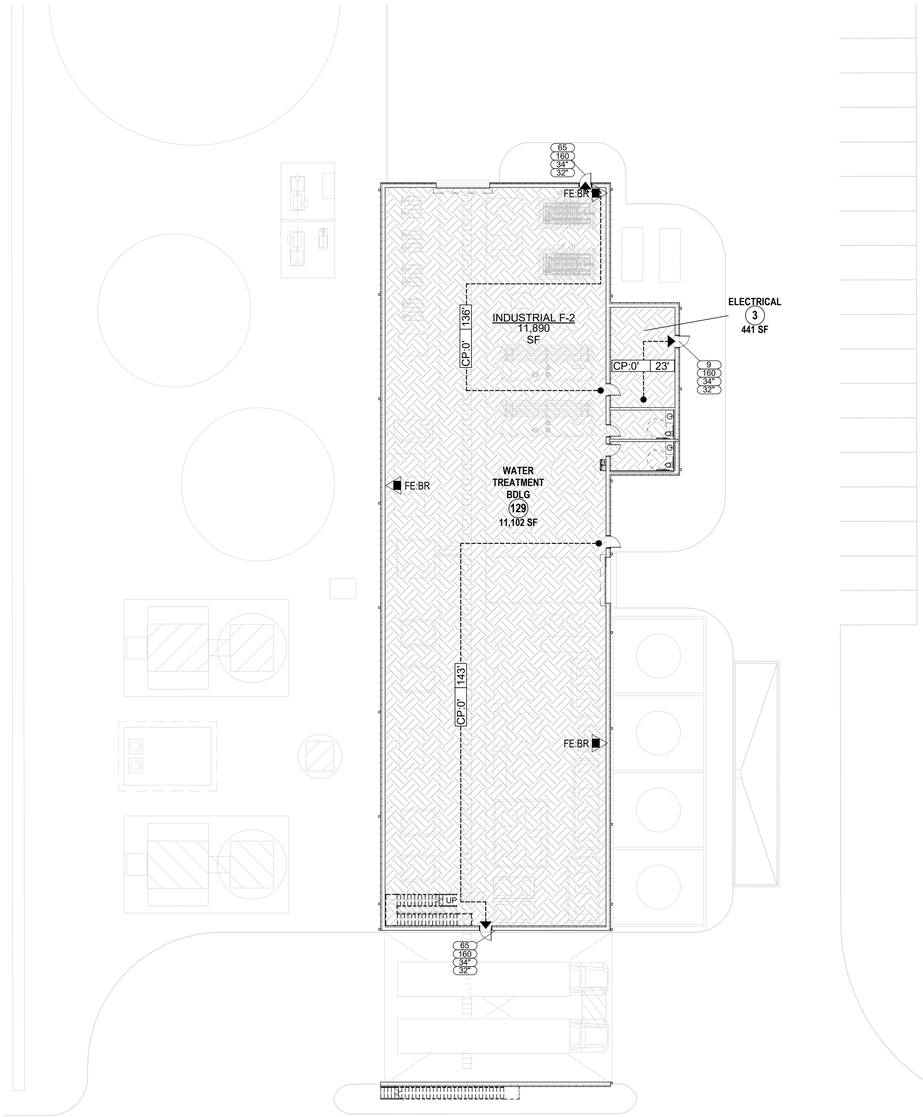
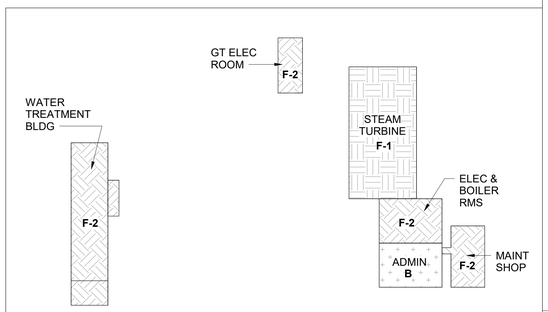
contract CONTRACT
drawing **F-001**
rev.
sheet of sheets
file 157787._A_CENTRAL



1 WATER TREATMENT BLDG
SCALE: 1/16" = 1'-0"

OCCUPANCY LEGEND

INDUSTRIAL F-2



KEY PLAN
SCALE: NTS

NOTES

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2. REFER TO F-001 FOR LIFE SAFETY NARRATIVE AND BUILDING CODE ANALYSIS.
3. REFER TO THE ELECTRICAL LIGHTING PLANS FOR LOCATION OF EXIT SIGNS AND EMERGENCY LIGHTING.
4. REFER TO THE FIRE SUPPRESSION AND ALARM PLANS FOR LOCATION OF FIRE PROTECTION DEVICES.
5. FINAL LOCATIONS OF FIRE EXTINGUISHERS AND HOSE REELS MUST BE APPROVED BY THE AHJ PRIOR TO INSTALLATION.

ACCESSIBLE PATH OF TRAVEL

EGRESS PATH

CP:66' 100' — CP — EGRESS PATH
TRAVEL DISTANCE
EXIT DOOR
COMMON PATH OF TRAVEL
COMMON PATH TERMINATION POINT

DEAD END CORRIDOR

100'
TERMINATION OF DEAD END CORRIDOR
DEAD END DISTANCE

DOOR EGRESS TAG

222 — OCCUPANTS SERVED
72 — EXIT CAPACITY
36" — CLEAR WIDTH
22" — REQUIRED WIDTH

STAIR EGRESS TAG

44
44
44"
44"

FIRE AND SMOKE RESISTIVE CONSTRUCTION

- SMOKE PARTITION
- 1/2 HR FIRE PARTITION
- 1 HR FIRE BARRIER
- 2 HR FIRE BARRIER
- 3 HR FIRE BARRIER
- 1 HR FIRE/SMOKE BARRIER
- 2 HR FIRE/SMOKE BARRIER
- 2 HR FIRE WALL
- 3 HR FIRE WALL
- 4 HR FIRE WALL

PORTABLE FIRE EXTINGUISHERS AND HOSE REELS

FE:SR — EXTINGUISHER / HOSE REEL TYPE — HR:SM
EXTINGUISHER / HOSE REEL MOUNTING

-FE: FIRE EXTINGUISHER
-SR: SEMI-RECESSED CABINET
-BR: BRACKET MOUNTED
-HR: HOSE REEL
-SM: SURFACE MOUNT CABINET
-FR: FULLY RECESSED CABINET

- A:B:C: TYPE DRY CHEMICAL 4A-20B-C
- B:C TYPE DRY CHEMICAL 40B:C
- CLEAN AGENT 2a:10B:C
- CO2 EXTINGUISHER 2A:10B:C
- WATER EXTINGUISHER 2A:10B
- WET-PIPE HOSE REEL
- DRY-PIPE HOSE REEL
- COMBINATION EXTINGUISHER HOSE REEL

ROOM OCCUPANCY TAG

NAME — ROOM NAME
XX — NUMBER OF OCCUPANTS
111SF — AREA

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designed Designer
detailed Checker

EAST KENTUCKY POWER COOPERATIVE
CLARK COUNTY, KENTUCKY

COOPER POWER PLANT
2 x1 CCGT PLANT
GROUND FLOOR LIFE SAFETY PLAN - WATER TREATMENT

project 157787
contract CONTRACT
drawing F-010
rev. —
sheet of sheets
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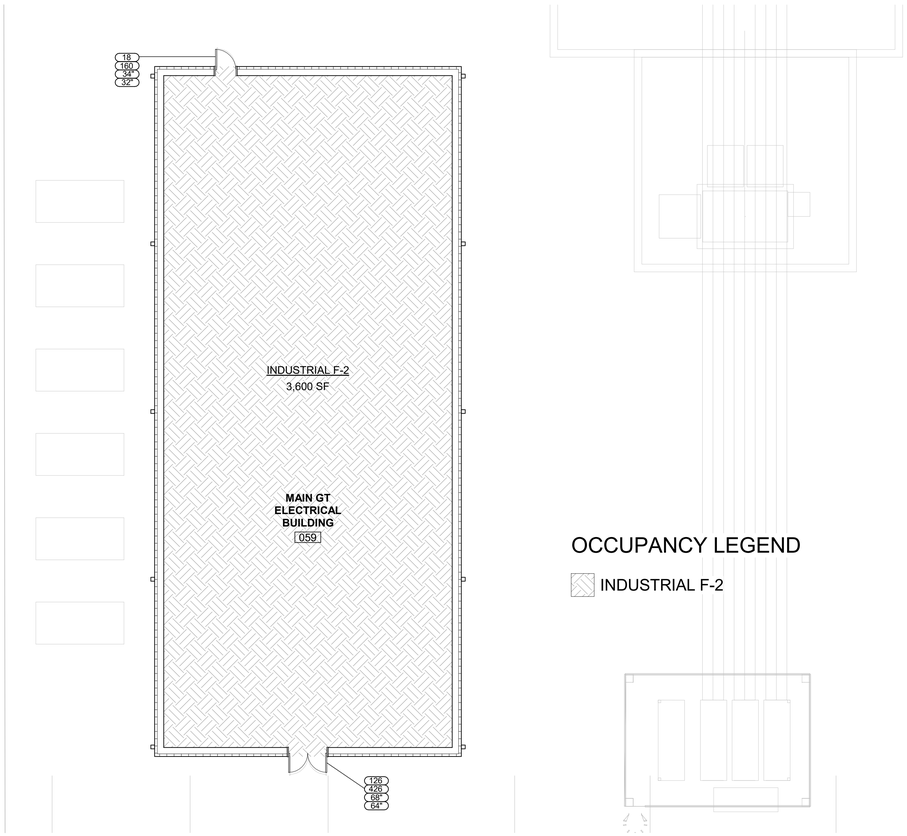
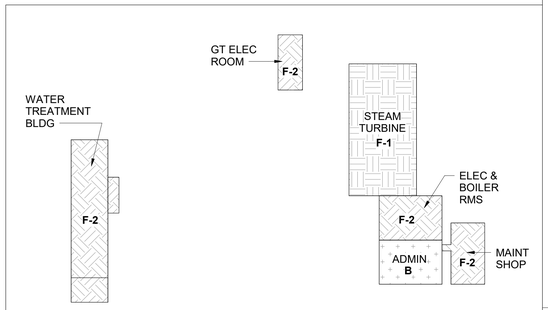


OCCUPANCY LEGEND

INDUSTRIAL F-2

1 MAIN GT ELECTRICAL BUILDING
SCALE: 1/8" = 1'-0"



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ACCESSIBLE PATH OF TRAVEL

EGRESS PATH

CP:66' 100' — CP — EGRESS PATH
TRAVEL DISTANCE
EXIT DOOR
COMMON PATH OF TRAVEL
COMMON PATH TERMINATION POINT

DEAD END CORRIDOR

100' — TERMINATION OF DEAD END CORRIDOR — DEAD END DISTANCE

DOOR EGRESS TAG **STAIR EGRESS TAG**

222 — OCCUPANTS SERVED — 44
22 — EXIT CAPACITY — 44
36" — CLEAR WIDTH — 44"
22" — REQUIRED WIDTH — 44"

FIRE AND SMOKE RESISTIVE CONSTRUCTION

- SMOKE PARTITION
- 1/2 HR FIRE PARTITION
- 1 HR FIRE BARRIER
- 2 HR FIRE BARRIER
- 3 HR FIRE BARRIER
- 1 HR FIRE/SMOKE BARRIER
- 2 HR FIRE/SMOKE BARRIER
- 2 HR FIRE WALL
- 3 HR FIRE WALL
- 4 HR FIRE WALL

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FE:SR — EXTINGUISHER / HOSE REEL TYPE — HR:SM
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- WET-PIPE HOSE REEL
- DRY-PIPE HOSE REEL
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ROOM OCCUPANCY TAG

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XX — NUMBER OF OCCUPANTS
111SF — AREA

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detailed: Checker

EAST KENTUCKY POWER COOPERATIVE
CLARK COUNTY, KENTUCKY

COOPER POWER PLANT
2 x1 CCGT PLANT
GROUND FLOOR LIFE SAFETY PLAN - GAS TURBINE AREA

project: 157787
contract: CONTRACT
drawing: F-011
rev.
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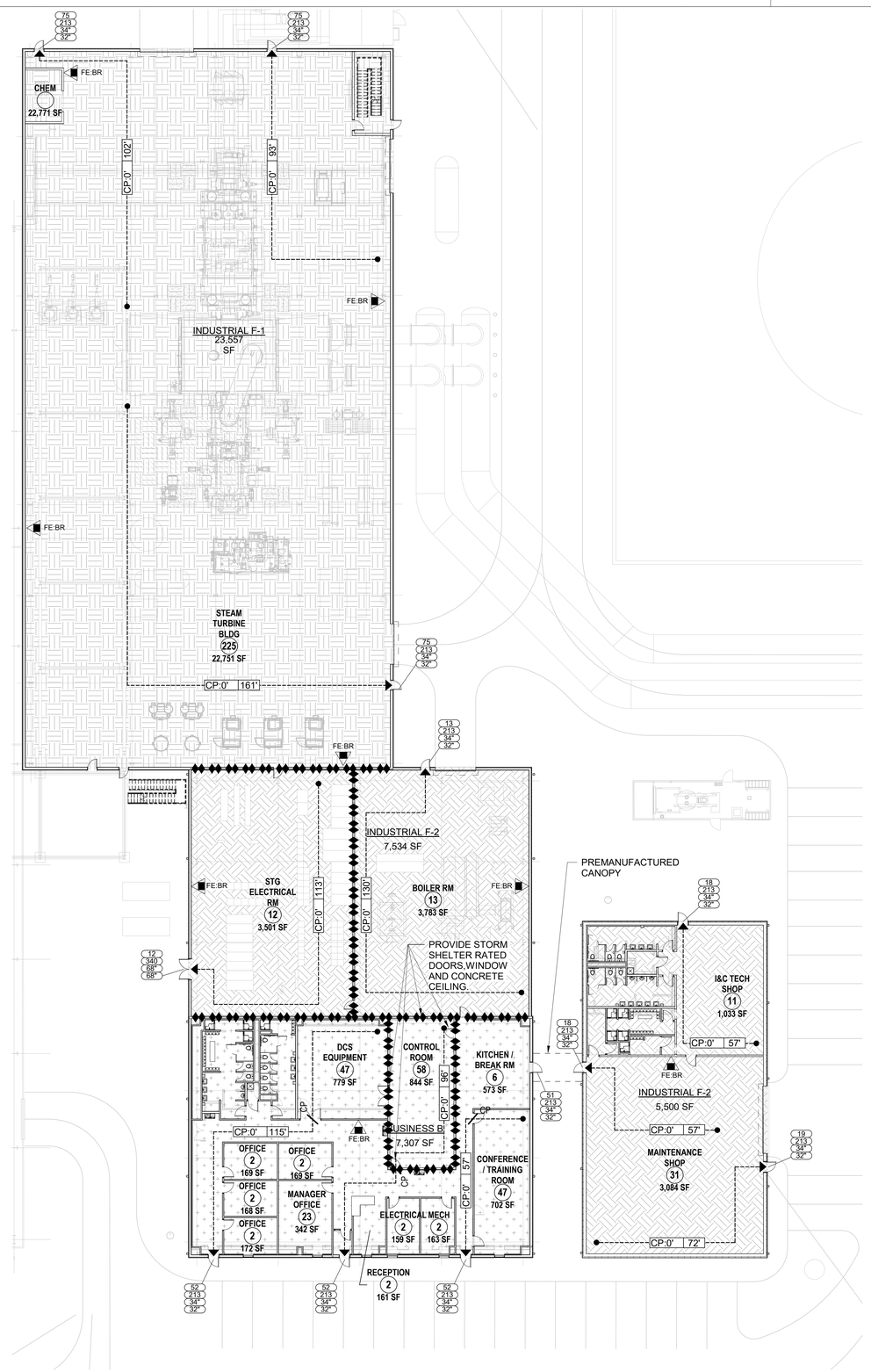
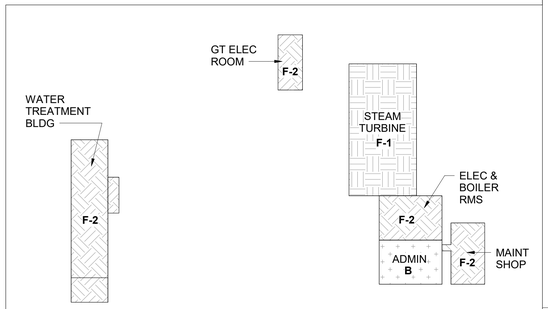


1 TURBINE & ADMINISTRATIVE BLDG
SCALE: 1/16" = 1'-0"

OCCUPANCY LEGEND

- BUSINESS B
- INDUSTRIAL F-1
- INDUSTRIAL F-2



KEY PLAN
SCALE: NTS

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ACCESSIBLE PATH OF TRAVEL

EGRESS PATH

CP:66' 100' — CP — EGRESS PATH
TRAVEL DISTANCE
EXIT DOOR
COMMON PATH OF TRAVEL
COMMON PATH TERMINATION POINT

DEAD END CORRIDOR

100'
TERMINATION OF DEAD END CORRIDOR
DEAD END DISTANCE

DOOR EGRESS TAG

222
222
36"
32"

OCCUPANTS SERVED
EXIT CAPACITY
CLEAR WIDTH
REQUIRED WIDTH

STAIR EGRESS TAG

44
44
44"
44"

FIRE AND SMOKE RESISTIVE CONSTRUCTION

- SMOKE PARTITION
- 1/2 HR FIRE PARTITION
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- 2 HR FIRE BARRIER
- 3 HR FIRE BARRIER
- 1 HR FIRE/SMOKE BARRIER
- 2 HR FIRE/SMOKE BARRIER
- 2 HR FIRE WALL
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- 4 HR FIRE WALL

PORTABLE FIRE EXTINGUISHERS AND HOSE REELS

FE:SR — EXTINGUISHER / HOSE REEL TYPE — HR:SM
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ROOM OCCUPANCY TAG

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111SF — AREA

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designed Designer
detailed Checker

EAST KENTUCKY POWER COOPERATIVE
CLARK COUNTY, KENTUCKY

COOPER POWER PLANT
2 x1 CCGT PLANT
GROUND FLOOR LIFE SAFETY PLAN - STEAM TURBINE, ELEC, BOILER & ADMIN

project 157787
contract CONTRACT
drawing **F-012**
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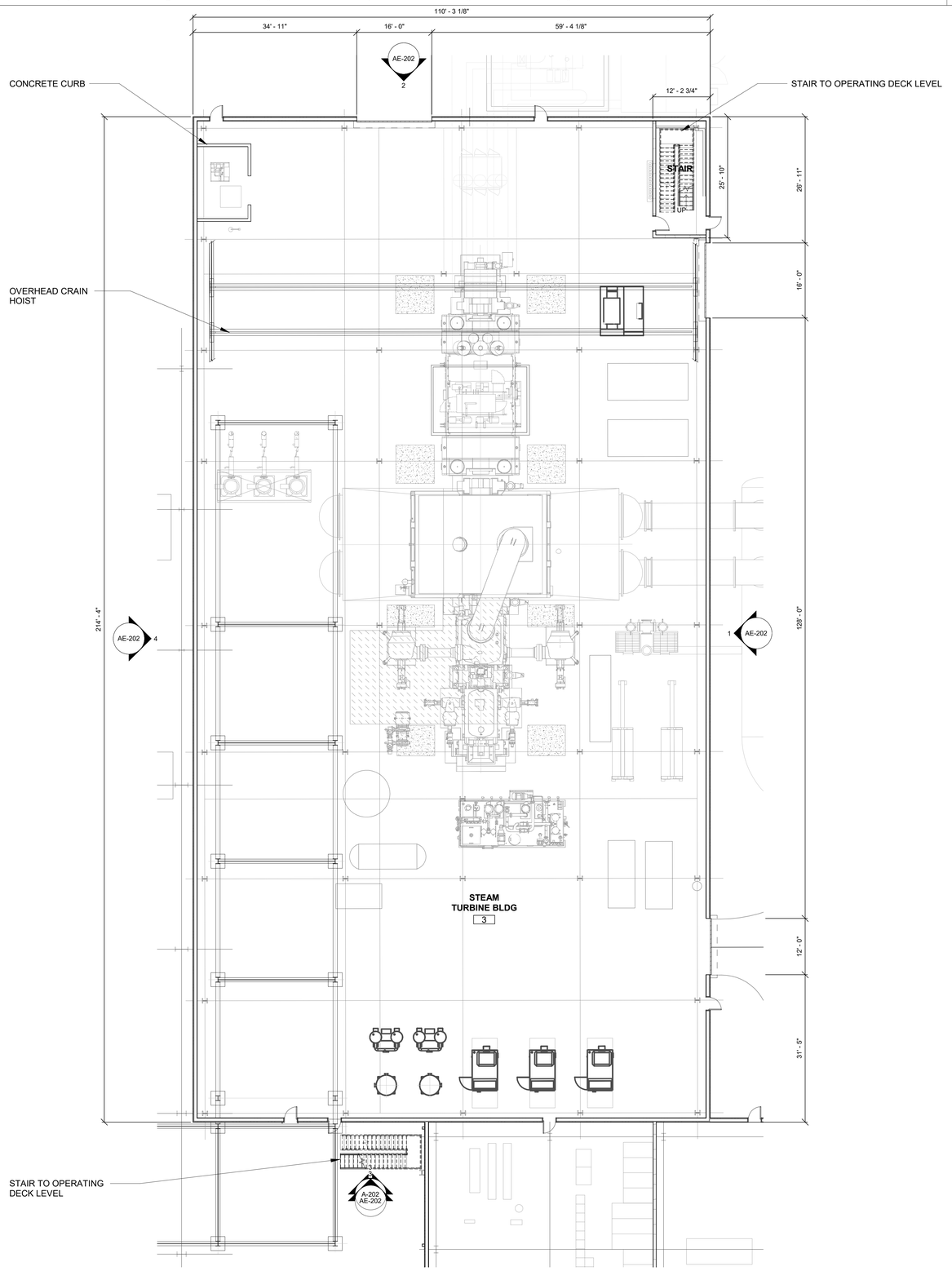

1 STEAM TURBINE BLDG FLOOR PLAN

SCALE: 3/32" = 1'-0"

PRELIMINARY - NOT FOR CONSTRUCTION

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KANSAS CITY, MO 64114
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detailed: Checker

EAST KENTUCKY POWER COOPERATIVE

CLARK COUNTY, KENTUCKY

COOPER POWER PLANT
2 x1 CCGT PLANT
STEAM TURBINE BLDG FLOOR PLAN

project: 157787
contract: CONTRACT
drawing: **A-102**
rev.
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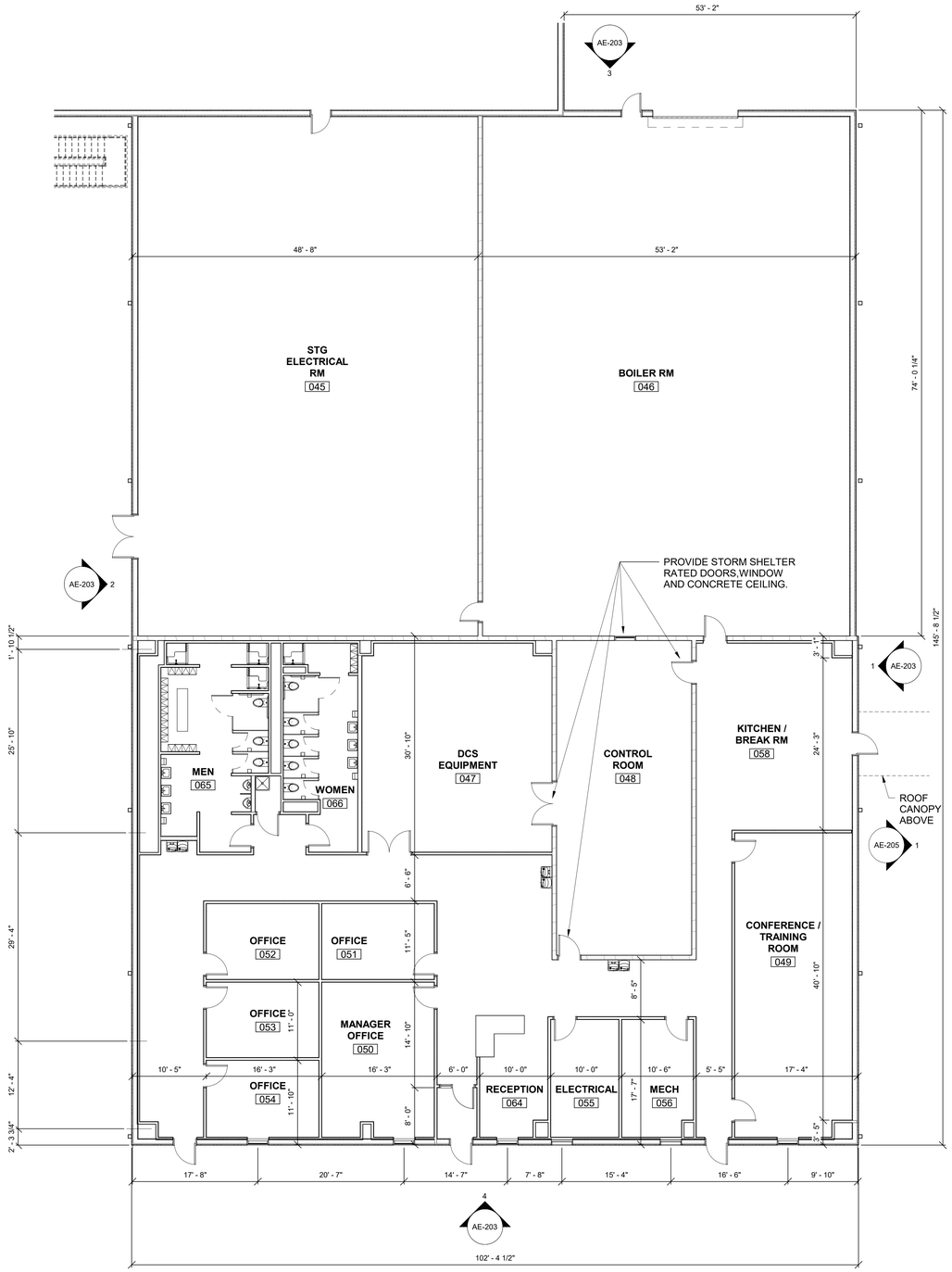
file 157787._A_CENTRAL

Scale For Microfilming
Millimeters
Inches



1 ADMINISTRATION BLDG FLOOR PLAN
SCALE: 1/8" = 1'-0"

PRELIMINARY - NOT
FOR CONSTRUCTION

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9400 WARD PARKWAY
KANSAS CITY, MO 64114
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Firm Reg. No. 1308-011

designed Designer
detailed Checker

EAST KENTUCKY POWER COOPERATIVE
CLARK COUNTY, KENTUCKY

COOPER POWER PLANT
2 x1 CCGT PLANT
ADMINISTRATION BLDG FLOOR PLAN

project 157787
contract CONTRACT
drawing **A-103**
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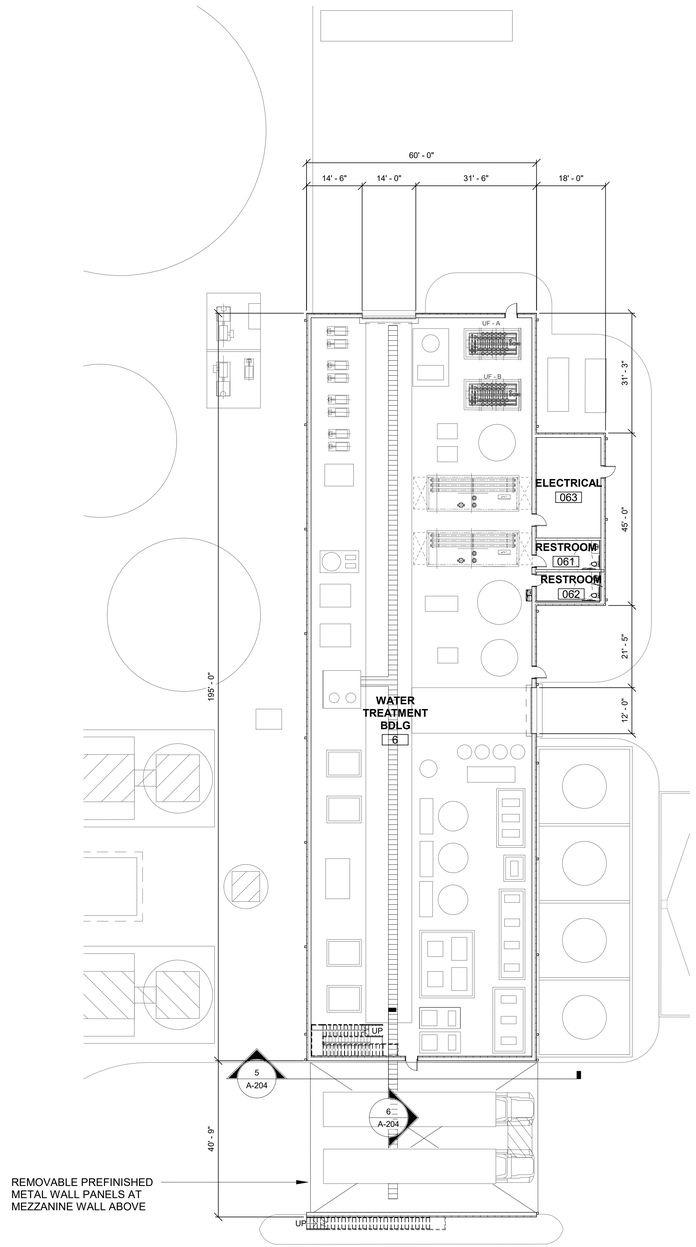

1 WATER TREATMENT BDLG FLOOR PLAN
SCALE: 1/16" = 1'-0"

PRELIMINARY - NOT FOR CONSTRUCTION

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CLARK COUNTY, KENTUCKY

COOPER POWER PLANT
2 x1 CCGT PLANT
WATER TREATMENT BDLG FLOOR PLAN

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contract: CONTRACT
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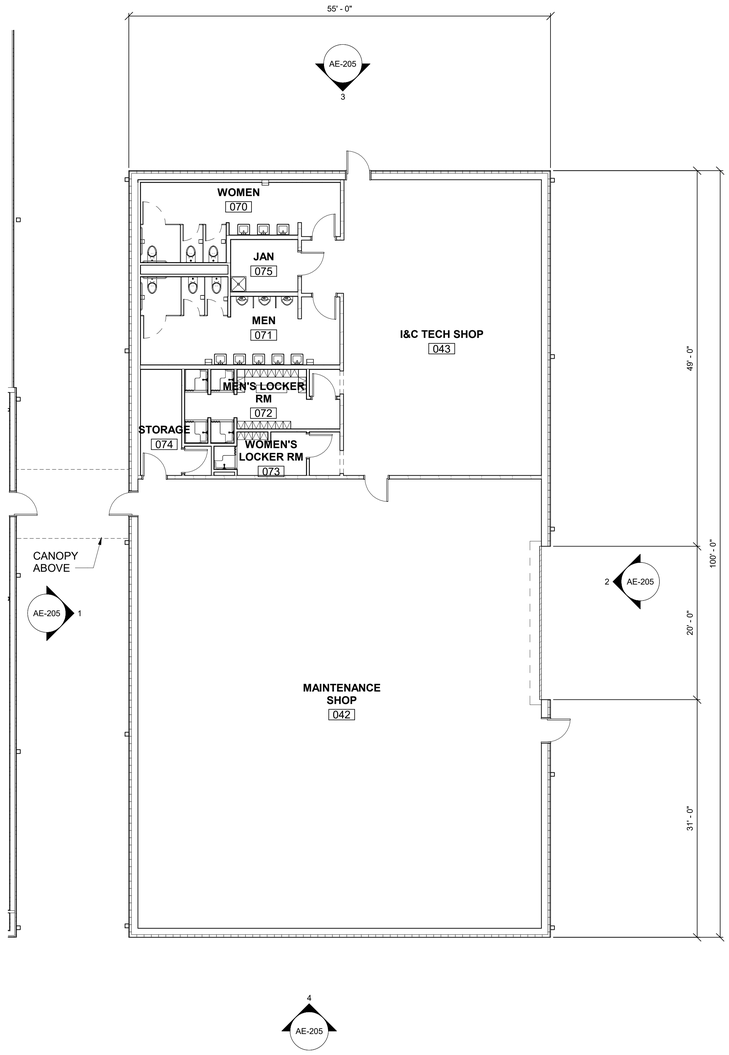
sheet of sheets
file 157787._A_CENTRAL



1 WAREHOUSE / FAB SHOP FLOOR PLAN
SCALE: 1/8" = 1'-0"

PRELIMINARY - NOT FOR CONSTRUCTION

no.	date	by	ckd	description

BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Enguneering Co. Inc
Firm Reg. No. 1308-011

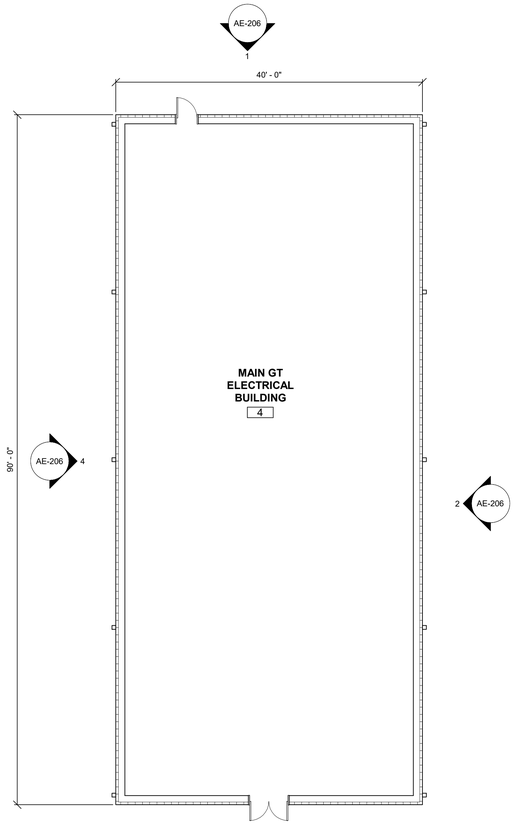
designed Designer
detailed Checker

EAST KENTUCKY POWER COOPERATIVE

CLARK COUNTY, KENTUCKY

COOPER POWER PLANT
2 x1 CCGT PLANT
WAREHOUSE / FAB SHOP FLOOR PLAN

project 157787
contract CONTRACT
drawing **A-105**
rev. —
sheet of sheets
file 157787._A_CENTRAL



1 MAIN GT ELECTRICAL BUILDING FLOOR PLAN
SCALE: 1/8" = 1'-0"

PRELIMINARY - NOT FOR CONSTRUCTION

no.	date	by	ckd	description

BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Enguneering Co. Inc
Firm Reg. No. 1308-011

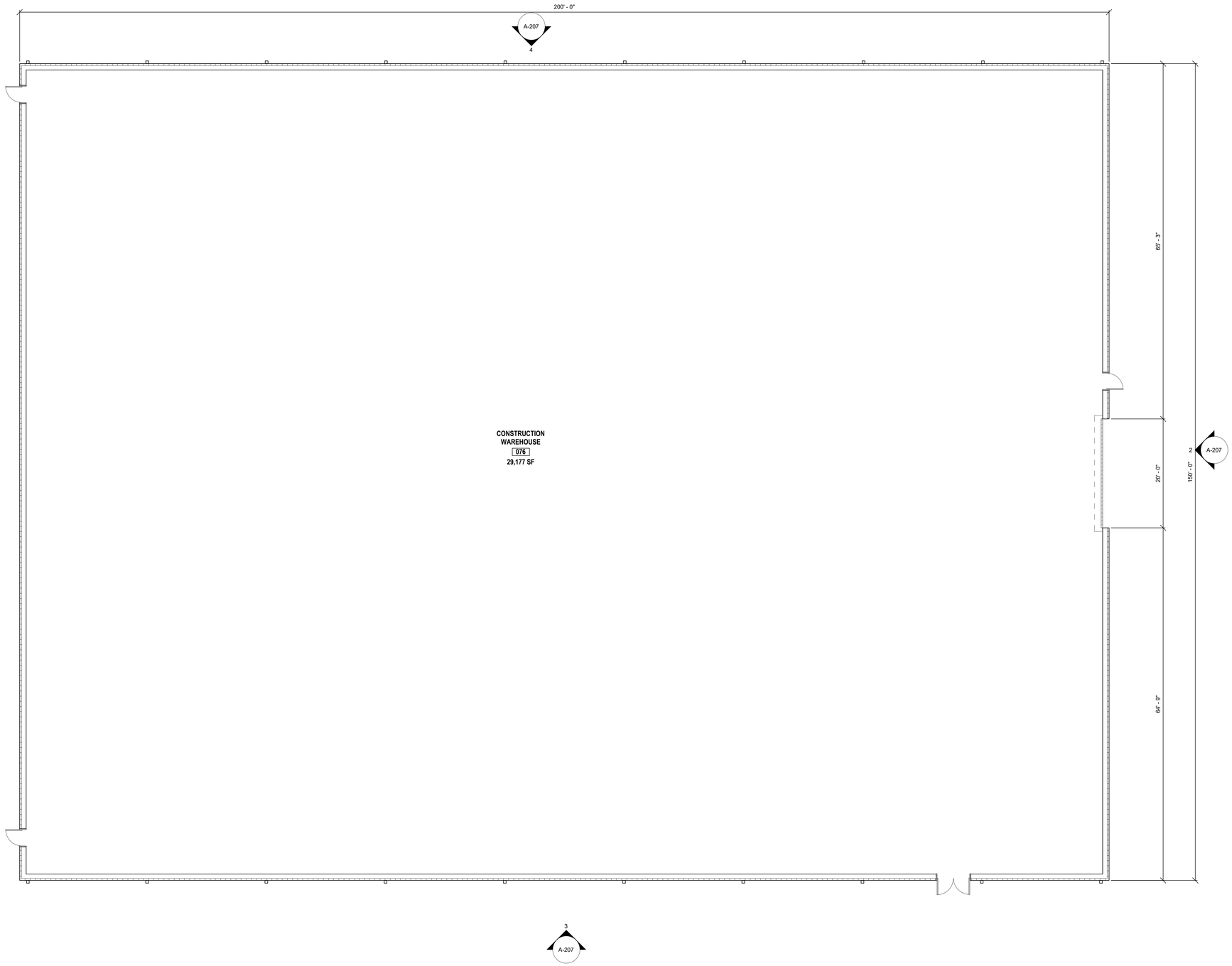
designed: Designer
detailed: Checker

EAST KENTUCKY POWER COOPERATIVE

CLARK COUNTY, KENTUCKY

COOPER POWER PLANT
2 x1 CCGT PLANT
MAIN GT ELECTRICAL BUILDING FLOOR PLAN

project: 157787
contract: CONTRACT
drawing: **A-106**
rev. —
sheet of sheets
file 157787._A_CENTRAL



1 CONSTRUCTION WAREHOUSE FLOOR PLAN
SCALE: 1/8" = 1'-0"

PRELIMINARY - NOT FOR CONSTRUCTION

no.	date	by	ckd	description

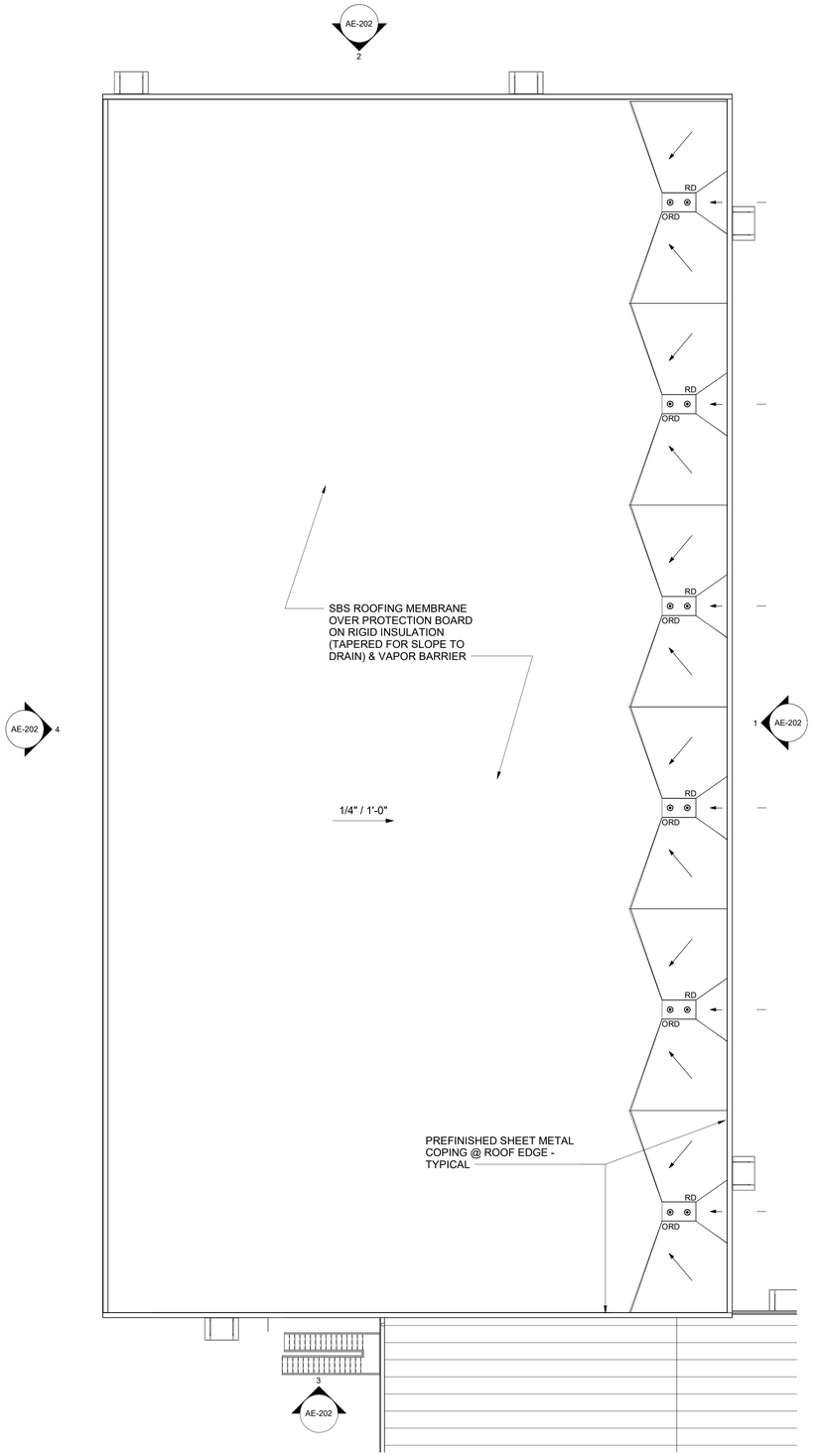
BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Enguneering Co. Inc
Firm Reg. No. 1308-011

designed: Designer
detailed: Checker

EAST KENTUCKY POWER COOPERATIVE
CLARK COUNTY, KENTUCKY

COOPER POWER PLANT
2 x1 CCGT PLANT
CONSTRUCTION WAREHOUSE FLOOR PLAN

project: 157787
contract: CONTRACT
drawing: **A-107**
rev.
sheet of sheets
file 157787._A_CENTRAL



1 STEAM TURBINE BLDG ROOF PLAN
SCALE: 3/32" = 1'-0"

PRELIMINARY - NOT FOR CONSTRUCTION

no.	date	by	ckd	description

BURNS McDONNELL
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816-333-9400
Burns & McDonnell Enguneering Co. Inc
Firm Reg. No. 1308-011

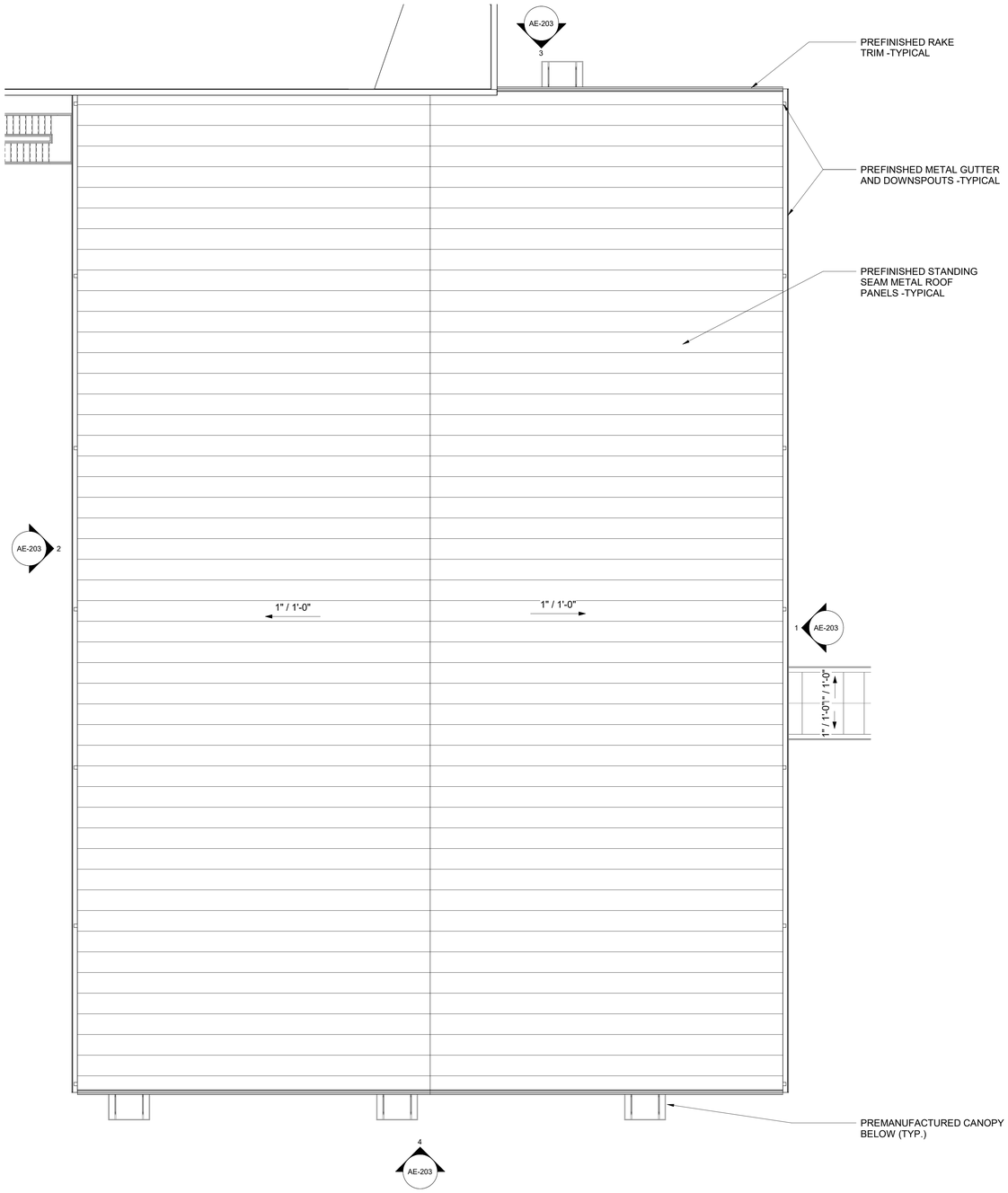
designed Designer
detailed Checker

EAST KENTUCKY POWER COOPERATIVE

CLARK COUNTY, KENTUCKY

COOPER POWER PLANT
2 x1 CCGT PLANT
STEAM TURBINE BLDG ROOF PLAN

project 157787
contract CONTRACT
drawing **A-122**
rev. —
sheet of sheets
file 157787._A_CENTRAL



1 ADMINISTRATION BLDG ROOF PLAN
SCALE: 1/8" = 1'-0"

PRELIMINARY - NOT FOR CONSTRUCTION

no.	date	by	ckd	description

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9400 WARD PARKWAY
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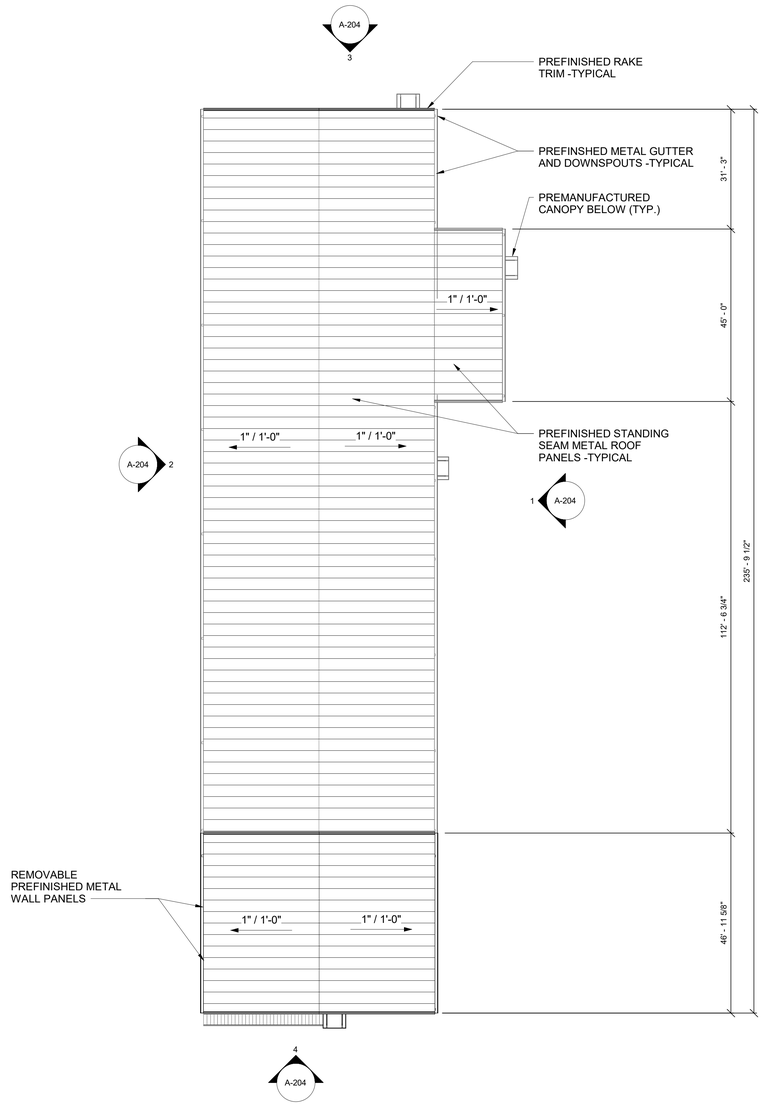
816-333-9400
Burns & McDonnell Enguneering Co. Inc
Firm Reg. No. 1308-011

designed Designer
detailed Checker

EAST KENTUCKY POWER COOPERATIVE
CLARK COUNTY, KENTUCKY

COOPER POWER PLANT
2 x1 CCGT PLANT
ADMINISTRATION BLDG ROOF PLAN

project 157787
contract CONTRACT
drawing **A-123**
rev. —
sheet of sheets
file 157787._A_CENTRAL



1 WATER TREATMENT BDLG ROOF PLAN
SCALE: 1/16" = 1'-0"

PRELIMINARY - NOT FOR CONSTRUCTION

no.	date	by	ckd	description

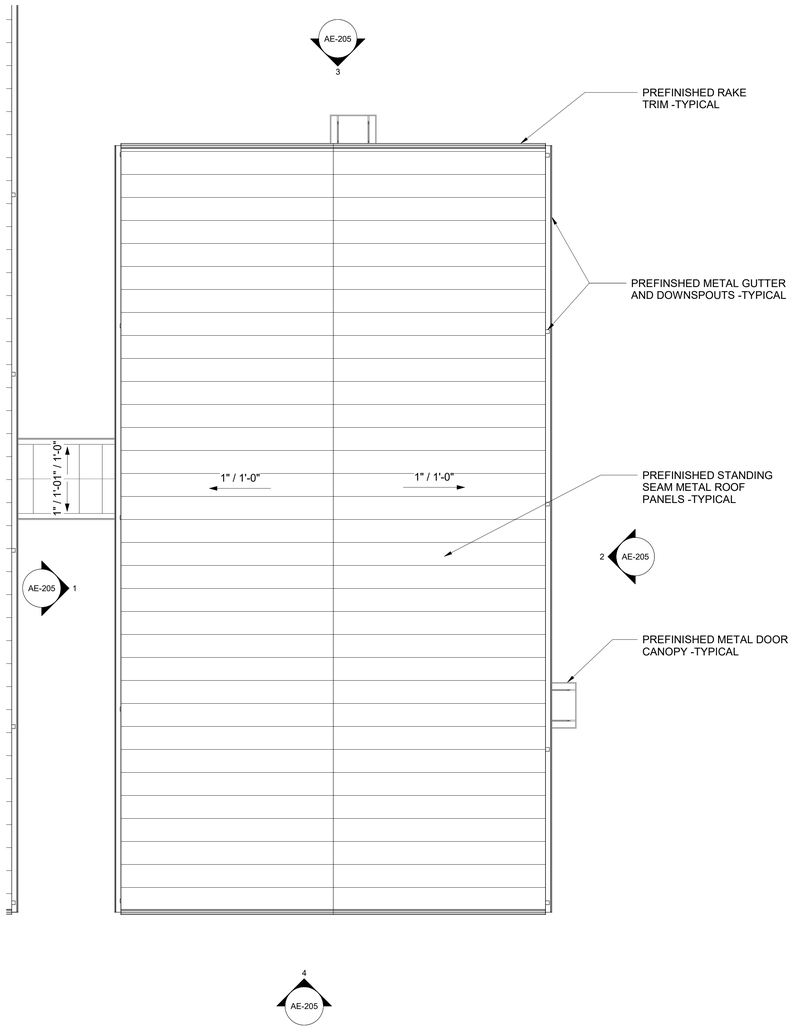
BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Enguneering Co. Inc
Firm Reg. No. 1308-011

designed: Designer
detailed: Checker

EAST KENTUCKY POWER COOPERATIVE
CLARK COUNTY, KENTUCKY

COOPER POWER PLANT
2 x1 CCGT PLANT
WATER TREATMENT BDLG ROOF PLAN

project: 157787
contract: CONTRACT
drawing: **A-124**
rev.
sheet of sheets
file 157787._A_CENTRAL



1 WAREHOUSE / FAB SHOP ROOF PLAN

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

PRELIMINARY - NOT FOR CONSTRUCTION

no.	date	by	ckd	description

BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Enguneering Co. Inc
Firm Reg. No. 1308-011

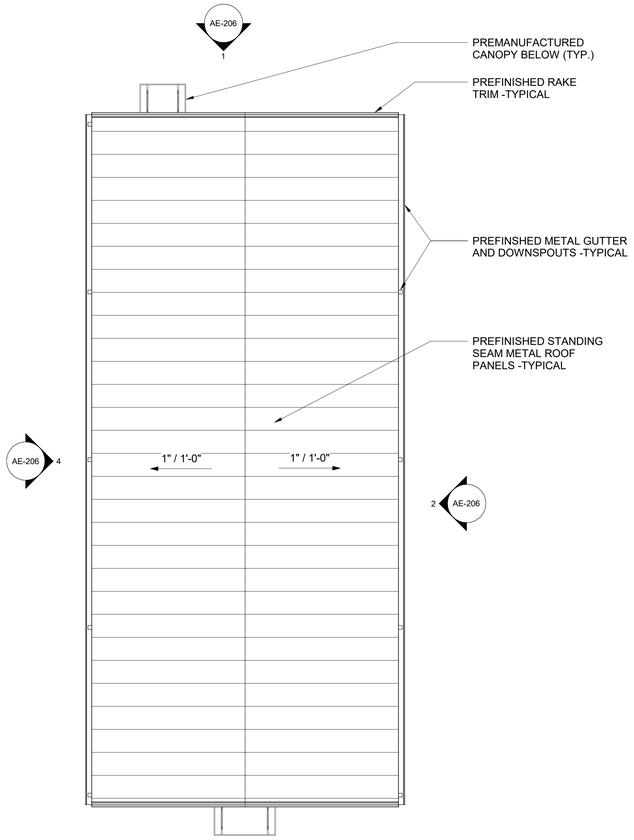
designed: Designer
detailed: Checker

EAST KENTUCKY POWER COOPERATIVE

CLARK COUNTY, KENTUCKY

COOPER POWER PLANT
2 x1 CCGT PLANT
WAREHOUSE / FAB SHOP ROOF PLAN

project: 157787
contract: CONTRACT
drawing: **A-125**
rev.
sheet of sheets
file 157787._A_CENTRAL



1 MAIN GT ELECTRICAL BUILDING ROOF PLAN
SCALE: 1/8" = 1'-0"

PRELIMINARY - NOT FOR CONSTRUCTION

no.	date	by	ckd	description

BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Enguneering Co. Inc
Firm Reg. No. 1308-011

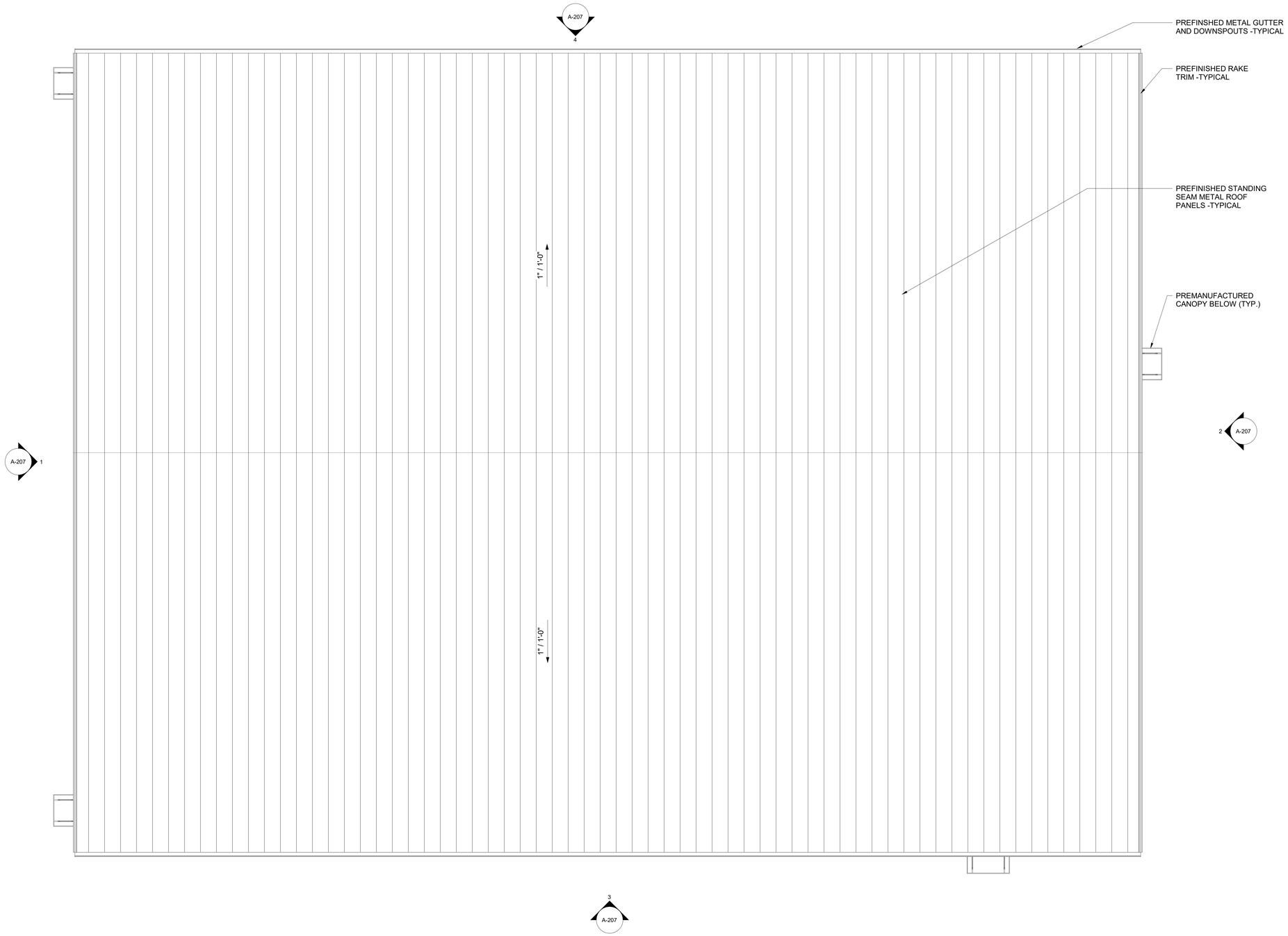
designed: Designer
detailed: Checker

EAST KENTUCKY POWER COOPERATIVE

CLARK COUNTY, KENTUCKY

COOPER POWER PLANT
2 x1 CCGT PLANT
MAIN GT ELECTRICAL BUILDING ROOF PLAN

project: 157787
contract: CONTRACT
drawing: **A-126**
rev.
sheet of sheets
file 157787._A_CENTRAL



1 CONSTRUCTION WAREHOUSE ROOF PLAN
SCALE: 1/8" = 1'-0"

PRELIMINARY - NOT FOR CONSTRUCTION

no.	date	by	ckd	description

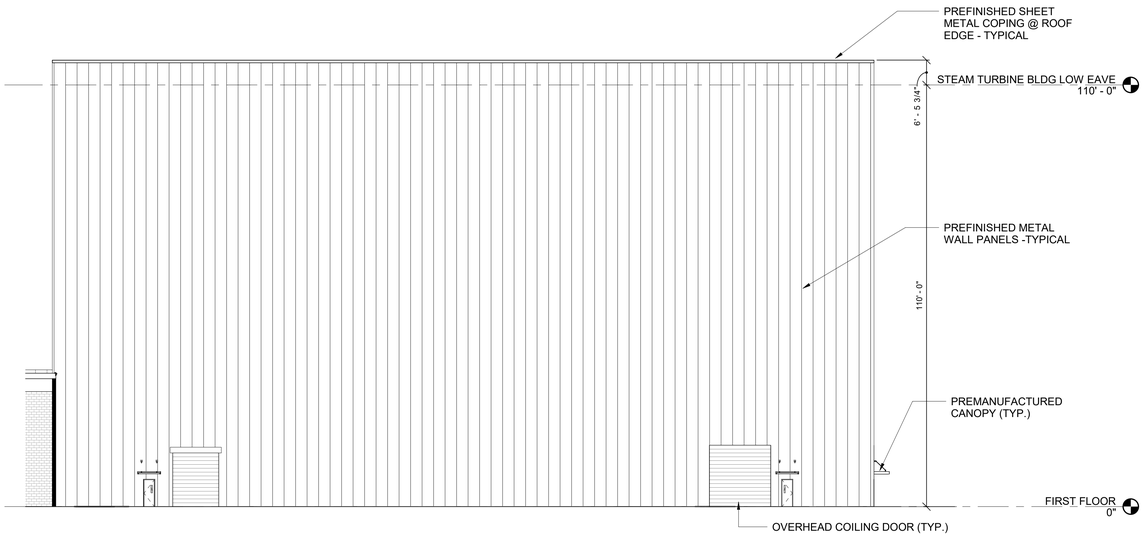
BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Enguneering Co. Inc
Firm Reg. No. 1308-011

designed Designer
detailed Checker

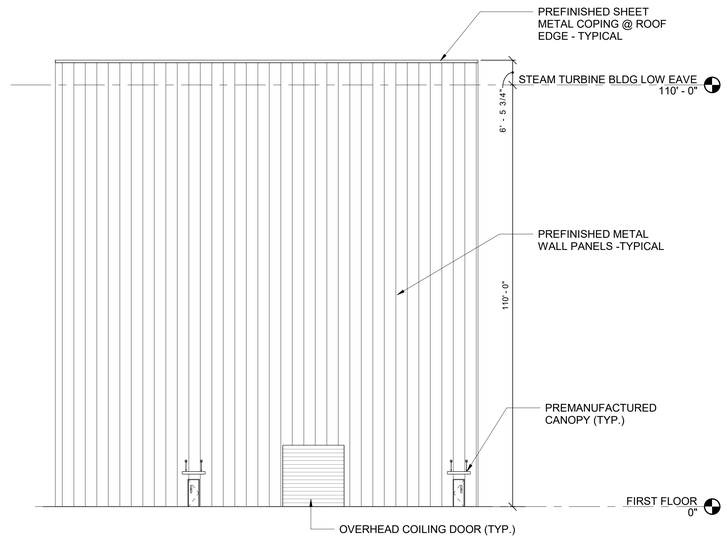
EAST KENTUCKY POWER COOPERATIVE
CLARK COUNTY, KENTUCKY

COOPER POWER PLANT
2 x1 CCGT PLANT
CONSTRUCTION WAREHOUSE ROOF PLAN

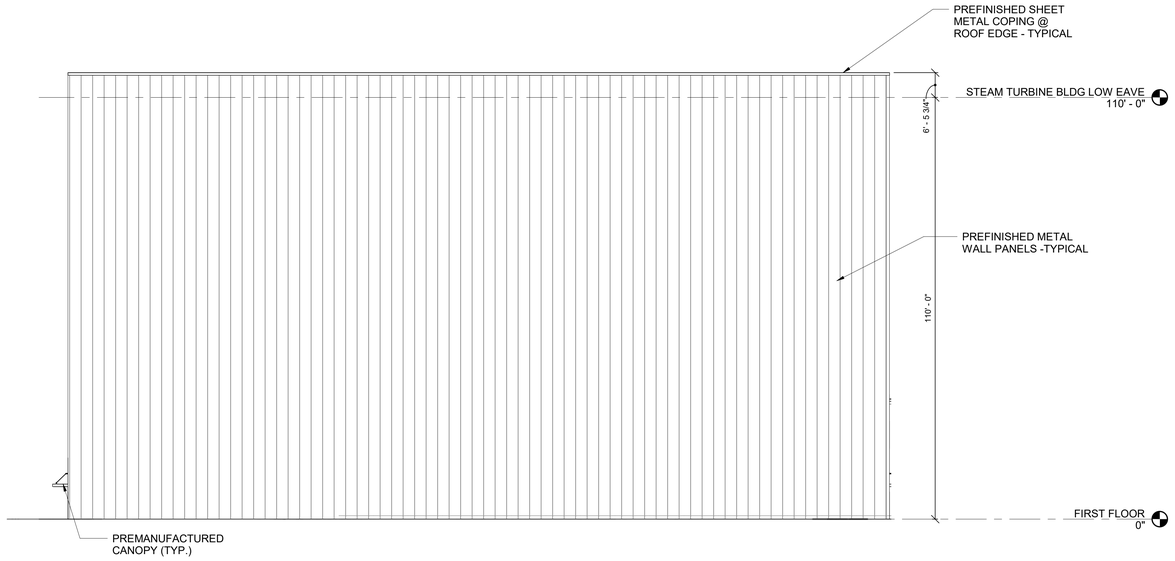
project 157787
contract CONTRACT
drawing **A-127**
rev. —
sheet of sheets
file 157787._A_CENTRAL



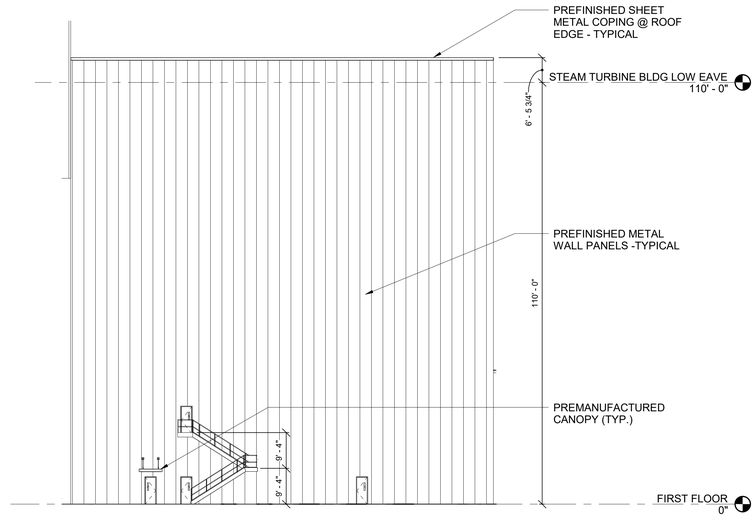
1 STEAM TURBINE BLDG - EAST ELEVATION
SCALE: 1/16" = 1'-0"



2 STEAM TURBINE BLDG - NORTH ELEVATION
SCALE: 1/16" = 1'-0"



4 STEAM TURBINE BLDG - WEST ELEVATION
SCALE: 1/16" = 1'-0"



3 STEAM TURBINE BLDG - SOUTH ELEVATION
SCALE: 1/16" = 1'-0"

PRELIMINARY - NOT FOR CONSTRUCTION

no.	date	by	ckd	description

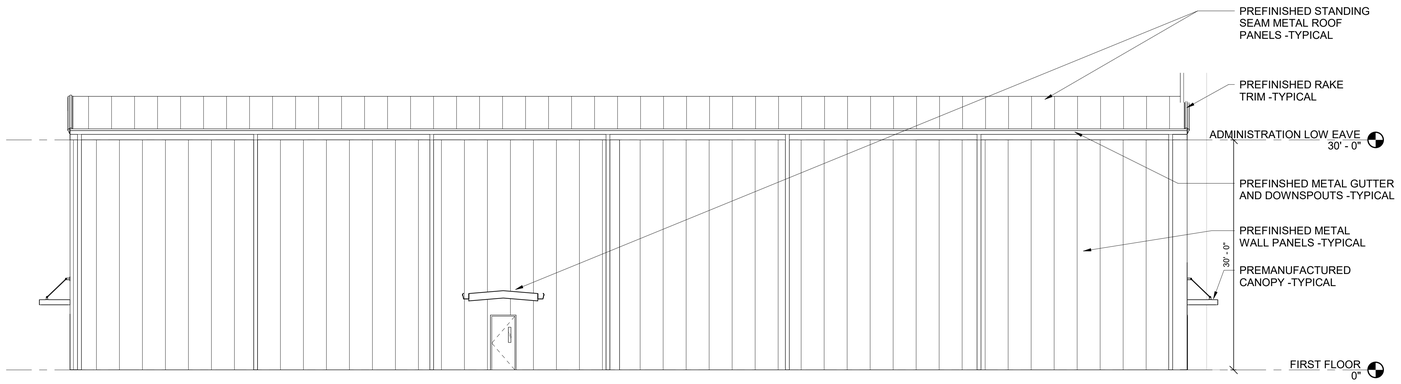
BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Enguneering Co. Inc
Firm Reg. No. 1308-011

designed: Designer
detailed: Checker

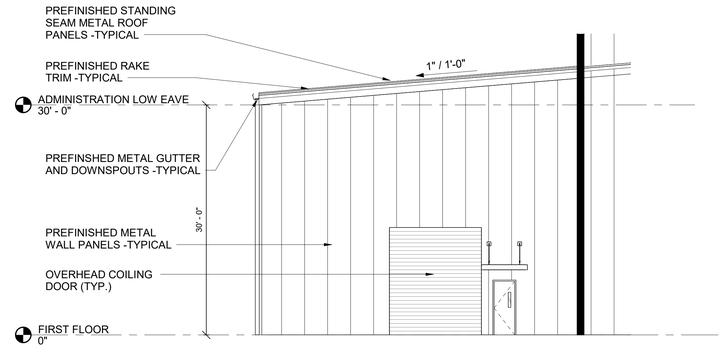
EAST KENTUCKY POWER COOPERATIVE
CLARK COUNTY, KENTUCKY

COOPER POWER PLANT
2 x1 CCGT PLANT
STEAM TURBINE BLDG EXTERIOR BUILDING ELEVATIONS

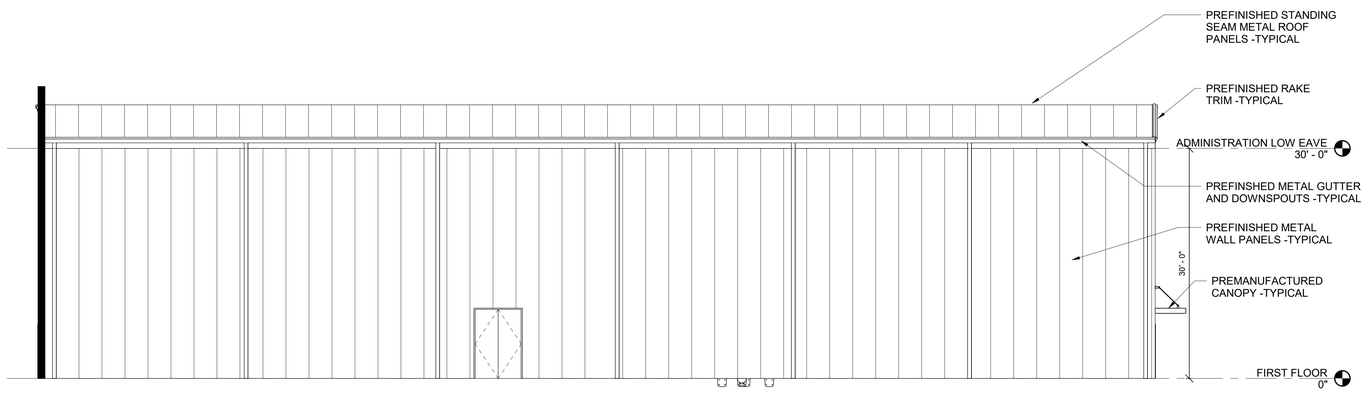
project: 157787
contract: CONTRACT
drawing: **A-202**
rev.
sheet of sheets
file 157787._A_CENTRAL



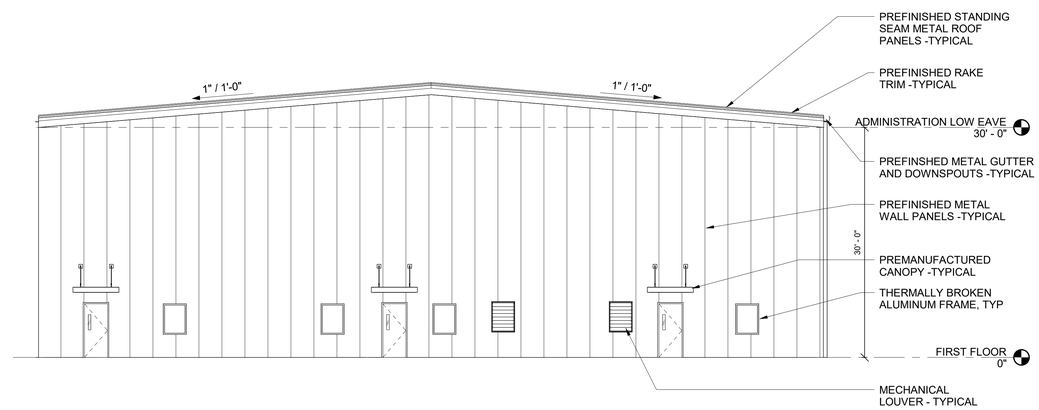
1 ADMINISTRATION BLDG - EAST ELEVATION
SCALE: 1/8" = 1'-0"



3 ADMINISTRATION BLDG - NORTH ELEVATION
SCALE: 1/8" = 1'-0"



2 ADMINISTRATION BLDG - WEST ELEVATION
SCALE: 1/8" = 1'-0"



4 ADMINISTRATION BLDG - SOUTH ELEVATION
SCALE: 1/8" = 1'-0"

PRELIMINARY - NOT FOR CONSTRUCTION

no.	date	by	ckd	description

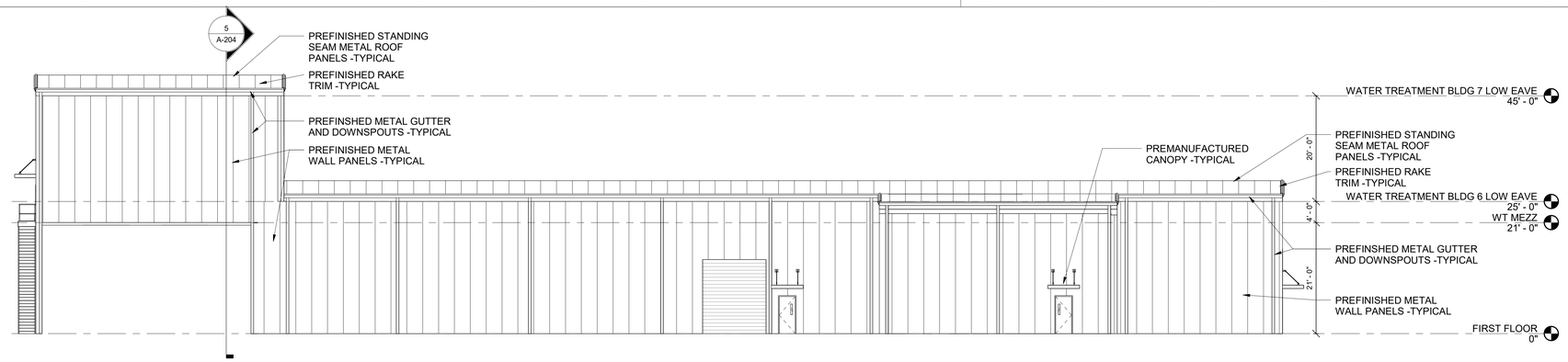
BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Enguneering Co. Inc
Firm Reg. No. 1308-011

designed: Designer
detailed: Checker

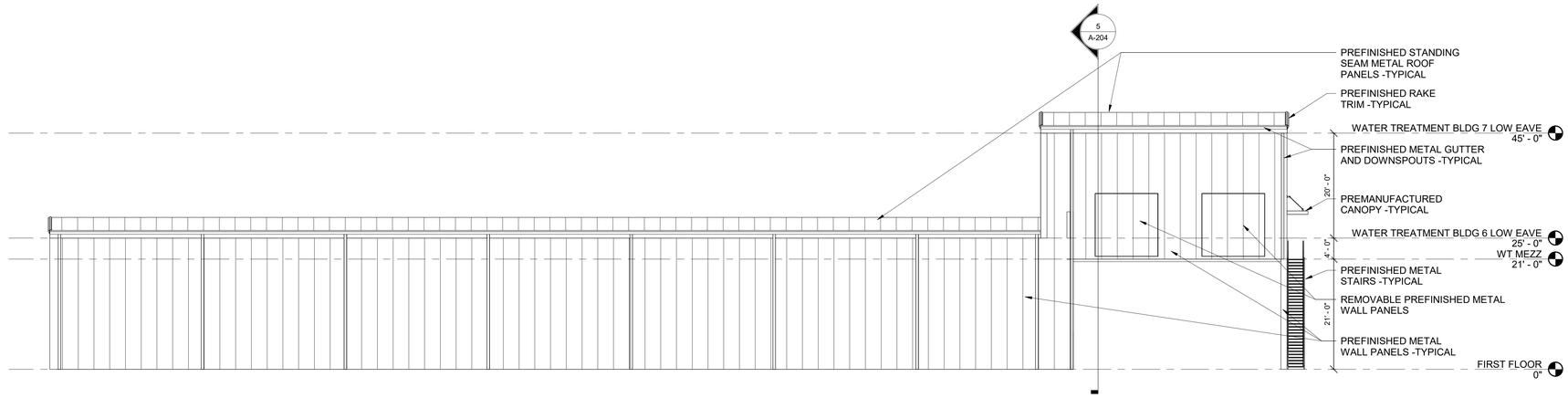
EAST KENTUCKY POWER COOPERATIVE
CLARK COUNTY, KENTUCKY

COOPER POWER PLANT
2 x1 CCGT PLANT
ADMINISTRATION BLDG EXTERIOR BUILDING ELEVATIONS

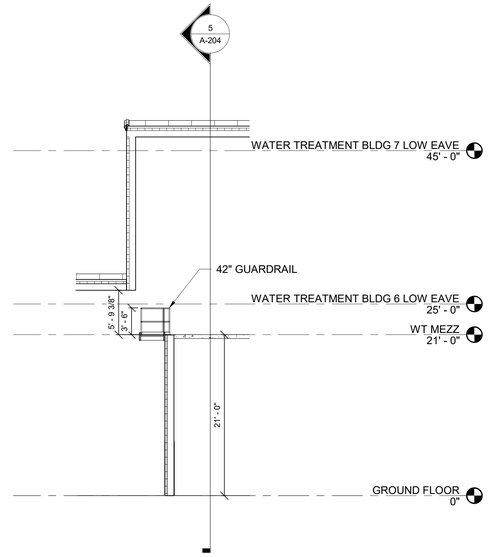
project: 157787
contract: CONTRACT
drawing: **A-203**
rev.
sheet of sheets
file 157787._A_CENTRAL



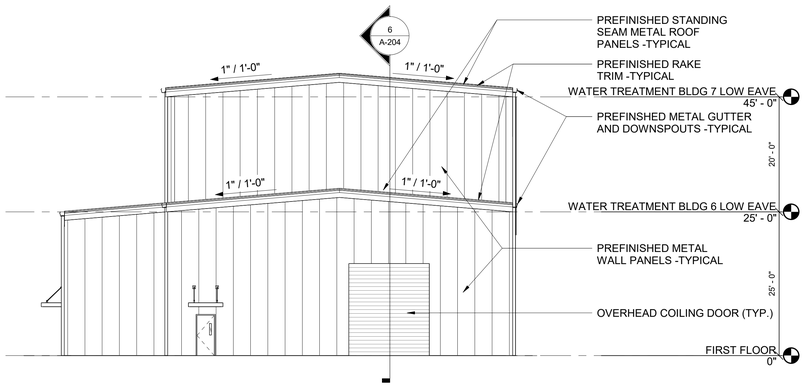
1 WATER TREATMENT BDLG - EAST ELEVATION
SCALE: 3/32" = 1'-0"



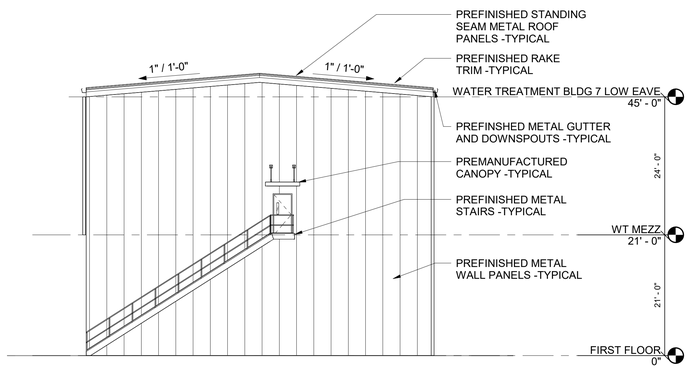
2 WATER TREATMENT BDLG - WEST ELEVATION
SCALE: 3/32" = 1'-0"



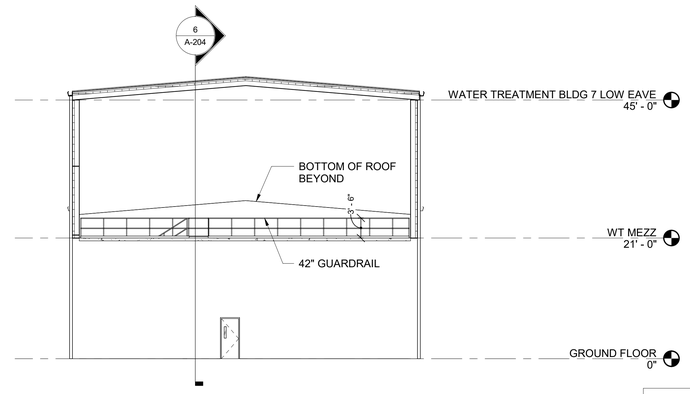
6 MEZZ SECTION WITH RAILING
SCALE: 1/8" = 1'-0"



3 WATER TREATMENT BDLG - NORTH ELEVATION
SCALE: 3/32" = 1'-0"



4 WATER TREATMENT BDLG - SOUTH ELEVATION
SCALE: 3/32" = 1'-0"



5 SECTION THRU WATER TREATMENT
SCALE: 3/32" = 1'-0"

PRELIMINARY - NOT FOR CONSTRUCTION

no.	date	by	ckd	description

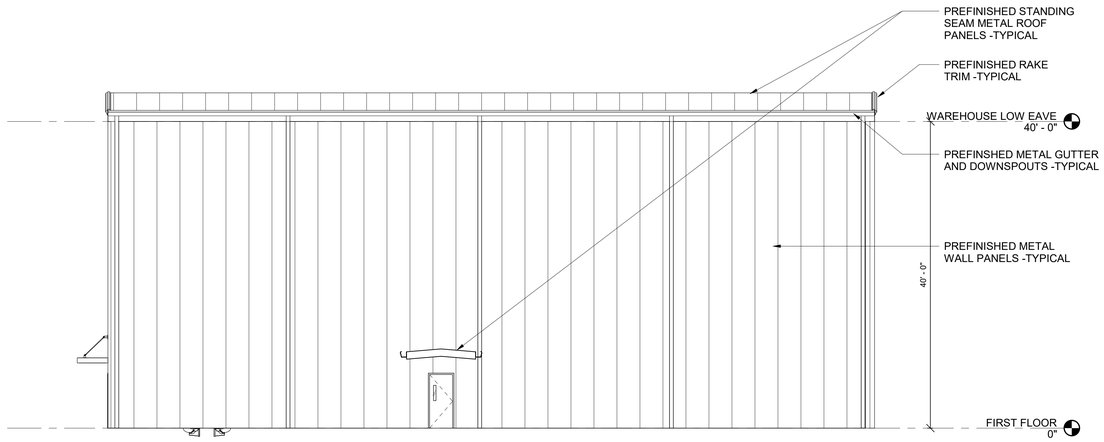
BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Enguneering Co. Inc
Firm Reg. No. 1308-011

designed: Designer
detailed: Checker

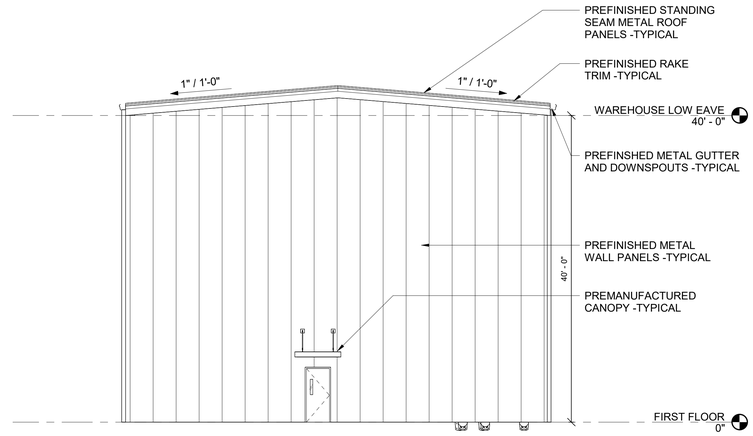
EAST KENTUCKY POWER COOPERATIVE
CLARK COUNTY, KENTUCKY

COOPER POWER PLANT
2 x1 CCGT PLANT
WATER TREATMENT BLDG EXTERIOR
BUILDING ELEVATIONS

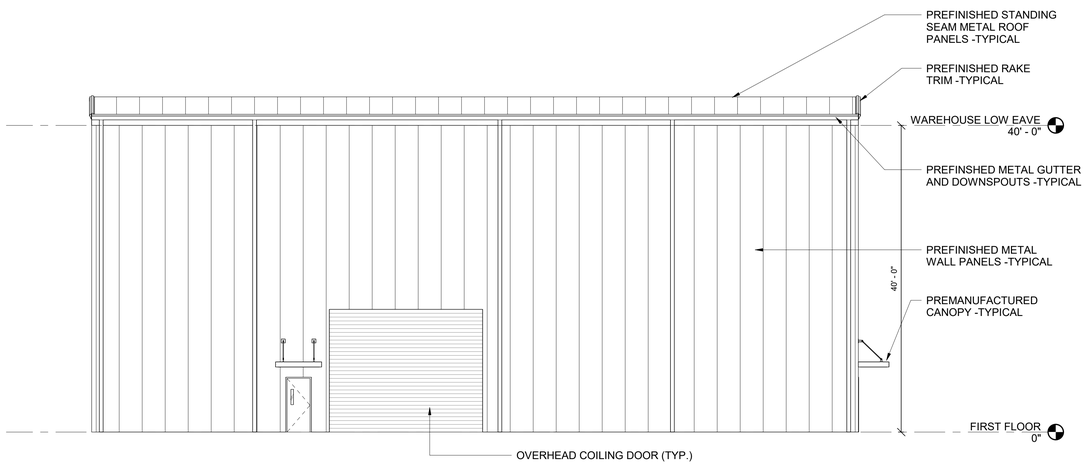
project: 157787
contract: CONTRACT
drawing: **A-204**
rev.
sheet of sheets
file 157787._A_CENTRAL



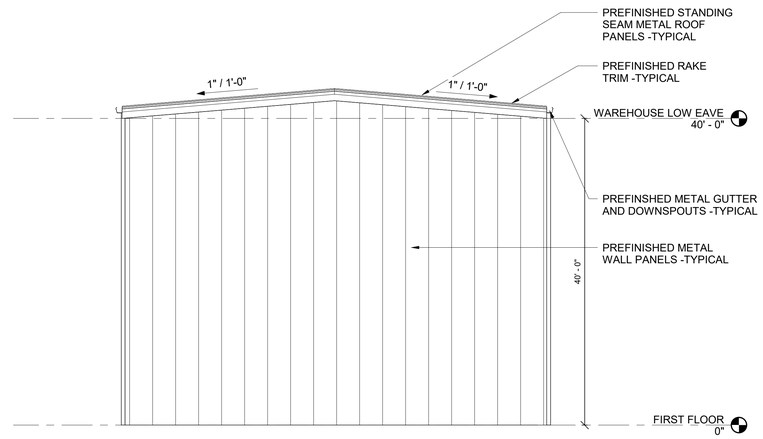
1 WAREHOUSE / FAB SHOP - NORTH ELEVATION
SCALE: 1/8" = 1'-0"



3 WAREHOUSE / FAB SHOP - EAST ELEVATION
SCALE: 1/8" = 1'-0"



2 WAREHOUSE / FAB SHOP - SOUTH ELEVATION
SCALE: 1/8" = 1'-0"



4 WAREHOUSE / FAB SHOP - WEST ELEVATION
SCALE: 1/8" = 1'-0"

PRELIMINARY - NOT FOR CONSTRUCTION

no.	date	by	ckd	description

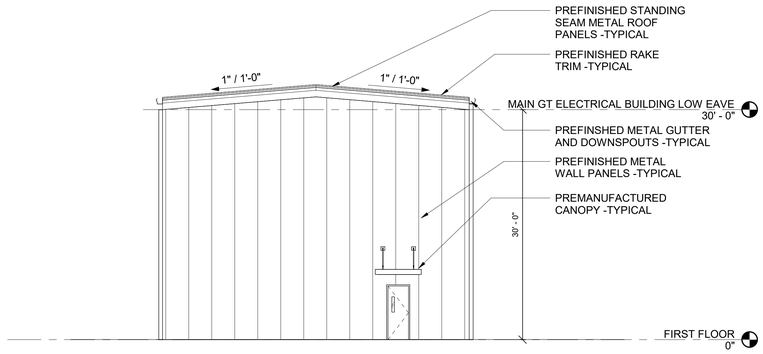
BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Enguneering Co. Inc
Firm Reg. No. 1308-011

designed: Designer
detailed: Checker

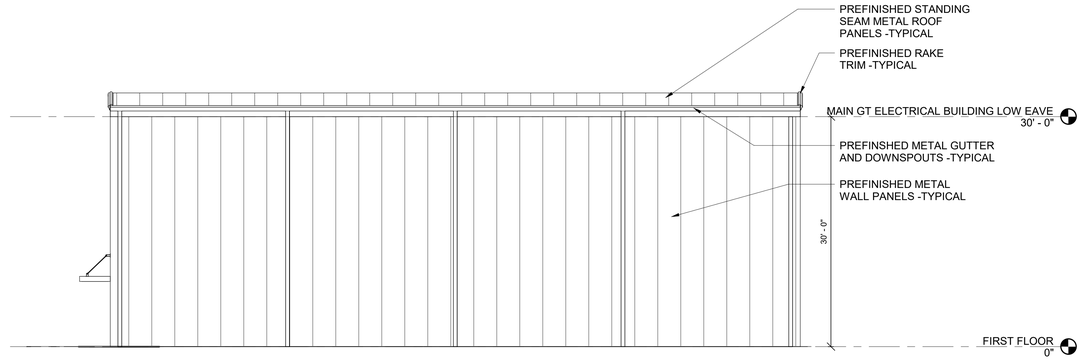
EAST KENTUCKY POWER COOPERATIVE
CLARK COUNTY, KENTUCKY

COOPER POWER PLANT
2 x1 CCGT PLANT
WAREHOUSE / FAB SHOP EXTERIOR BUILDING ELEVATIONS

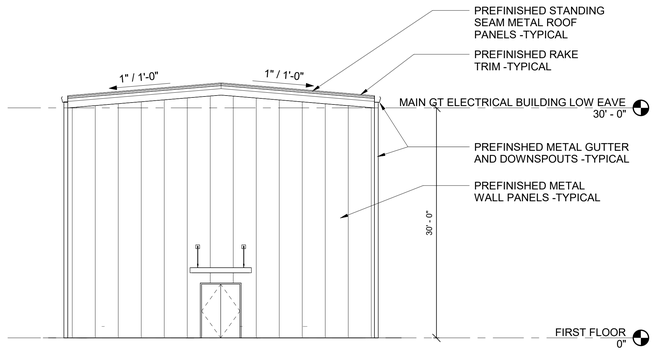
project: 157787
contract: CONTRACT
drawing: **A-205**
rev. —
sheet of sheets
file 157787._A_CENTRAL



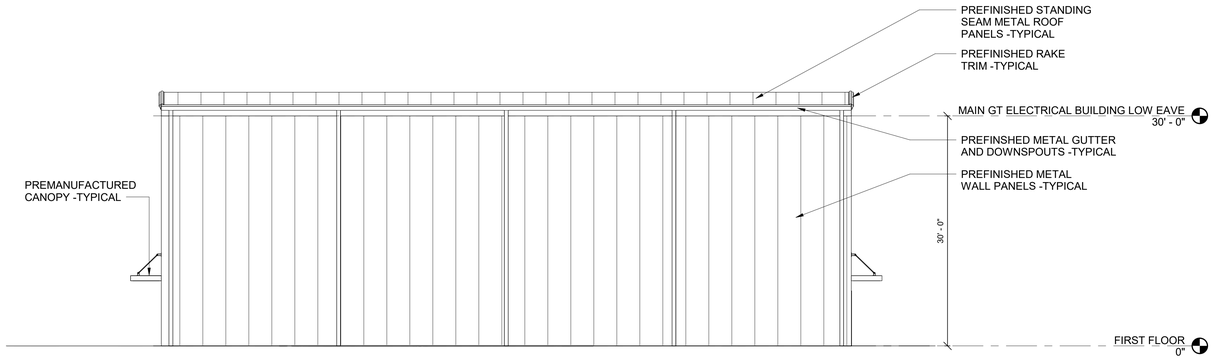
1 MAIN GT ELECTRICAL BUILDING - NORTH ELEVATION
SCALE: 1/8" = 1'-0"



2 MAIN GT ELECTRICAL BUILDING - EAST ELEVATION
SCALE: 1/8" = 1'-0"



3 MAIN GT ELECTRICAL BUILDING - SOUTH ELEVATION
SCALE: 1/8" = 1'-0"



4 MAIN GT ELECTRICAL BUILDING - WEST ELEVATION
SCALE: 1/8" = 1'-0"

PRELIMINARY - NOT FOR CONSTRUCTION

no.	date	by	ckd	description

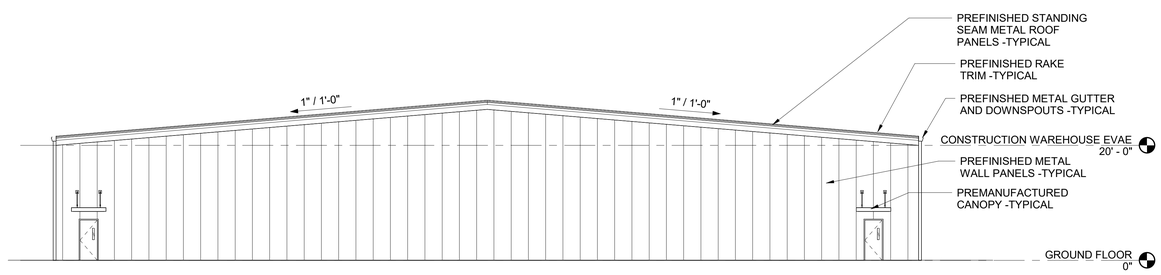
BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Enguneering Co. Inc
Firm Reg. No. 1308-011

designed: Designer
detailed: Checker

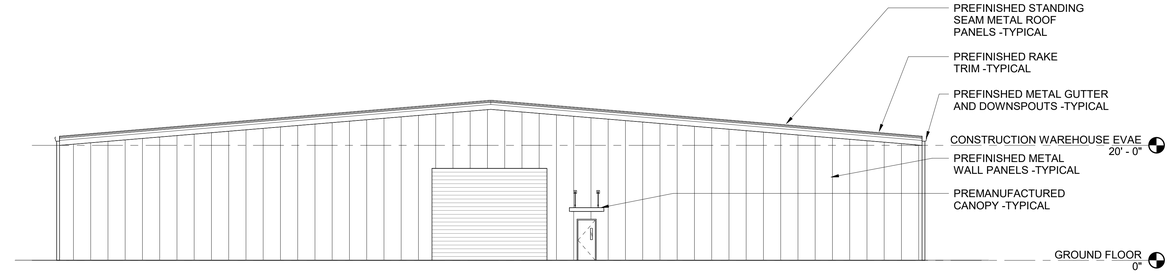
EAST KENTUCKY POWER COOPERATIVE
CLARK COUNTY, KENTUCKY

COOPER POWER PLANT
2 x1 CCGT PLANT
MAIN GT ELECTRICAL BUILDING EXTERIOR BUILDING ELEVATIONS

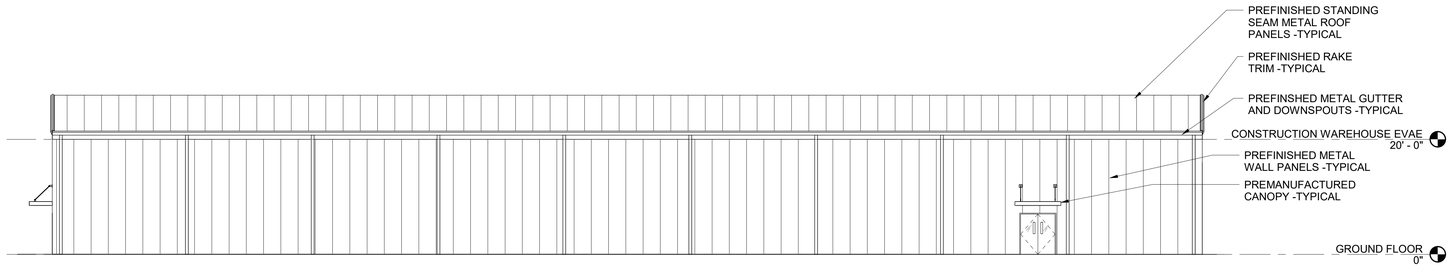
project: 157787
contract: CONTRACT
drawing: **A-206**
rev. —
sheet of sheets
file 157787._A_CENTRAL



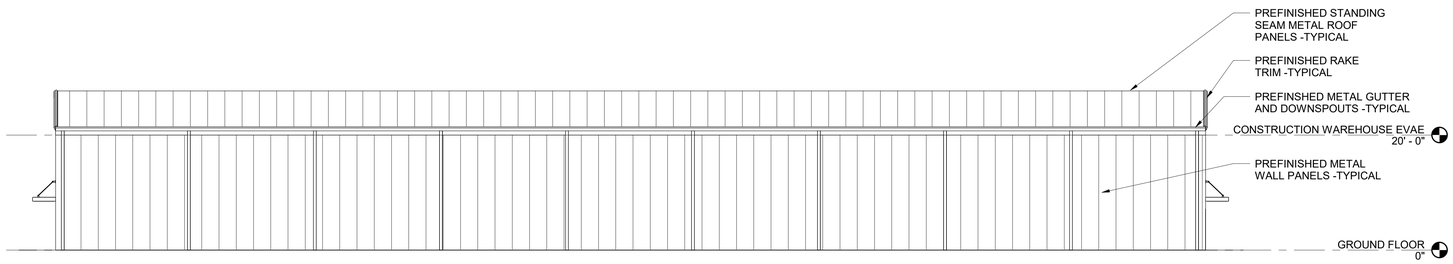
1 CONSTRUCTION WAREHOUSE - NORTH ELEVATION
SCALE: 3/32" = 1'-0"



2 CONSTRUCTION WAREHOUSE - SOUTH ELEVATION
SCALE: 3/32" = 1'-0"



3 CONSTRUCTION WAREHOUSE - EAST ELEVATION
SCALE: 3/32" = 1'-0"



4 CONSTRUCTION WAREHOUSE - WEST ELEVATION
SCALE: 3/32" = 1'-0"

PRELIMINARY - NOT FOR CONSTRUCTION

no.	date	by	ckd	description

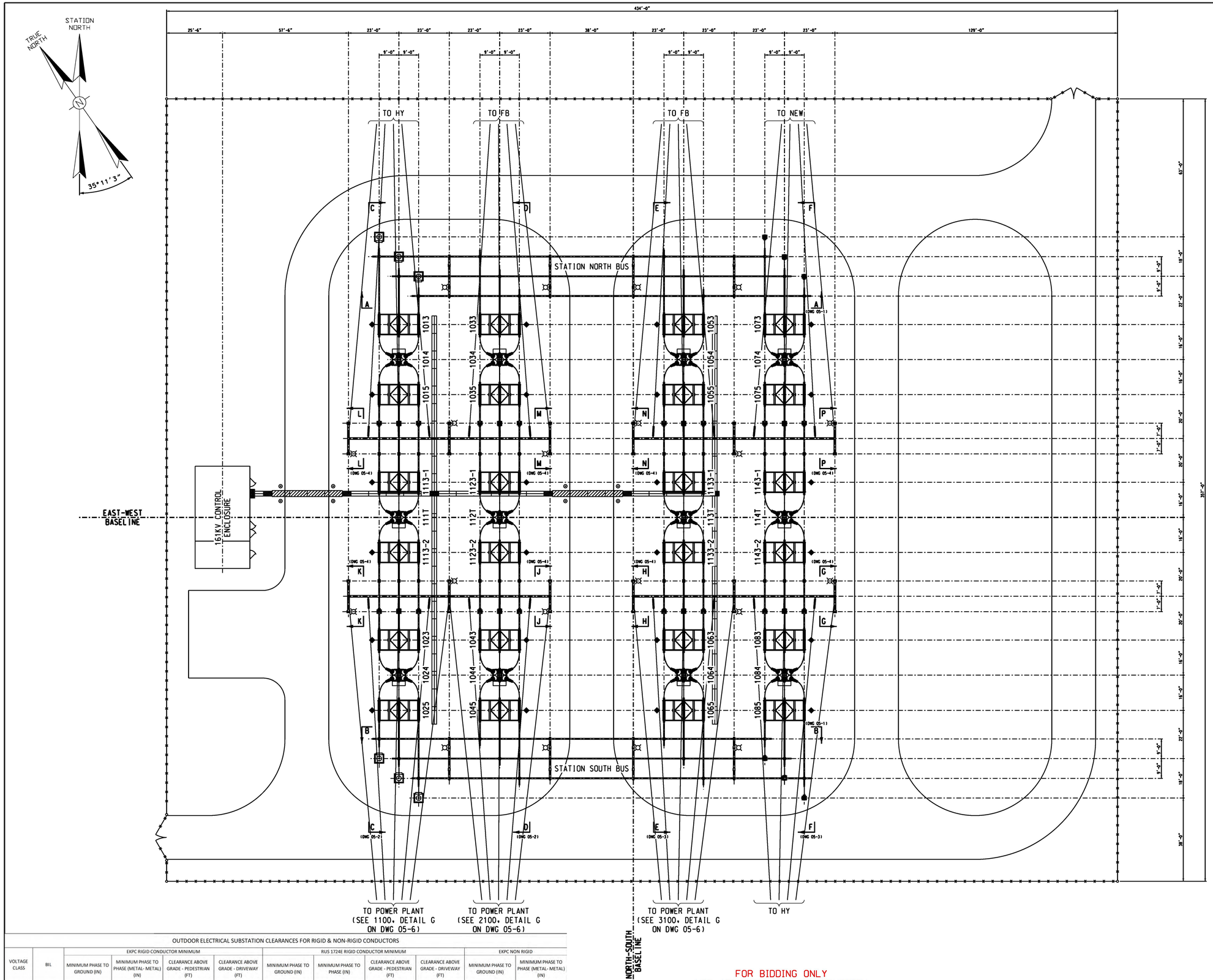
BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Enguneering Co. Inc
Firm Reg. No. 1308-011

designed: Designer
detailed: Checker

EAST KENTUCKY POWER COOPERATIVE
CLARK COUNTY, KENTUCKY

COOPER POWER PLANT
2 x1 CCGT PLANT
CONSTRUCTION WAREHOUSE BUILDING
EXTERIOR BUILDING ELEVATIONS

project: 157787
contract: CONTRACT
drawing: **A-207**
rev.
sheet of sheets
file 157787._A_CENTRAL



NOTES:

1.) INSTALL 954 KCMIL ACSR DAMPING CABLE INSIDE ALL HORIZONTAL RUNS OF 5" BUS.
2.) INSTALL 1/4" DIAMETER WEEP HOLE EVERY 5' IN ALL HORIZONTAL RUNS & IN THE CORONA PLUG OF ALL VERTICAL RUNS OF BUS.
3.) FOR SWITCHYARD CONNECTIONS TO COOPER POWER PLANT, SEE DETAIL G ON DWG 05-6.

LEGEND:

- DISCONNECT SWITCH OPERATOR MECHANISM
- YARD LIGHT
- BOLLARD
- PEDESTRIAN CABLE TRENCH
- PEDESTRIAN CABLE TRENCH (UNIVERSAL CHANNEL)
- PEDESTRIAN CABLE TRENCH (TRANSITION CHANNEL)
- HEAVY TRAFFIC CABLE TRENCH W/ POLYMER COVER (32,000 LB. SINGLE AXLE LOAD)

REFERENCE DRAWINGS:

COOP-05-1 - SECTIONS A-A & B-B
COOP-05-2 - SECTIONS C-C & D-D
COOP-05-3 - SECTIONS E-E & F-F
COOP-05-4 - SECTIONS G-G, H-H, J-J, K-K, L-L, M-M, N-N, & P-P
COOP-05-5 - SECTIONS R-R, S-S, T-T, & DETAILS
COOP-05-6 - SECTIONS U-U, V-V, & DETAILS
COOP-06-1 - BUS ARRANGEMENT PLAN
COOP-06-2 - BUS CUTTING PLAN
COOP-07-1 - FOUNDATION PLAN
COOP-07-3 - FENCE MATERIAL PLAN
COOP-09-1 - GROUNDING PLAN
COOP-11-1 - ELECTRICAL MATERIAL LISTS
COOP-13-1 - CONDUIT PLAN

OUTDOOR ELECTRICAL SUBSTATION CLEARANCES FOR RIGID & NON-RIGID CONDUCTORS

VOLTAGE CLASS	BIL	EXPC RIGID CONDUCTOR MINIMUM				RUS 1724E RIGID CONDUCTOR MINIMUM				EXPC NON RIGID	
		MINIMUM PHASE TO GROUND (IN)	MINIMUM PHASE TO PHASE (METAL- METAL) (IN)	CLEARANCE ABOVE GRADE - PEDESTRIAN (FT)	CLEARANCE ABOVE GRADE - DRIVEWAY (FT)	MINIMUM PHASE TO GROUND (IN)	MINIMUM PHASE TO PHASE (IN)	CLEARANCE ABOVE GRADE - PEDESTRIAN (FT)	CLEARANCE ABOVE GRADE - DRIVEWAY (FT)	MINIMUM PHASE TO GROUND (IN)	MINIMUM PHASE TO PHASE (METAL- METAL) (IN)
161	750	62	72	14	26	58	72	14	26	93	108

1.		X/X/XX	---	---	5.		X/X/XX	---	---	DRAWN	CAS-BMcD	2/12/24
2.		X/X/XX	---	---	6.		X/X/XX	---	---	DESIGNED	CAS-BMcD	2/12/24
3.		X/X/XX	---	---	7.		X/X/XX	---	---	CHECKED	DED-BMcD	2/12/24
4.		X/X/XX	---	---	8.		X/X/XX	---	---	APPROVED		
REVISIONS		DATE	DWN	APP	REVISIONS		DATE	DWN	APP			

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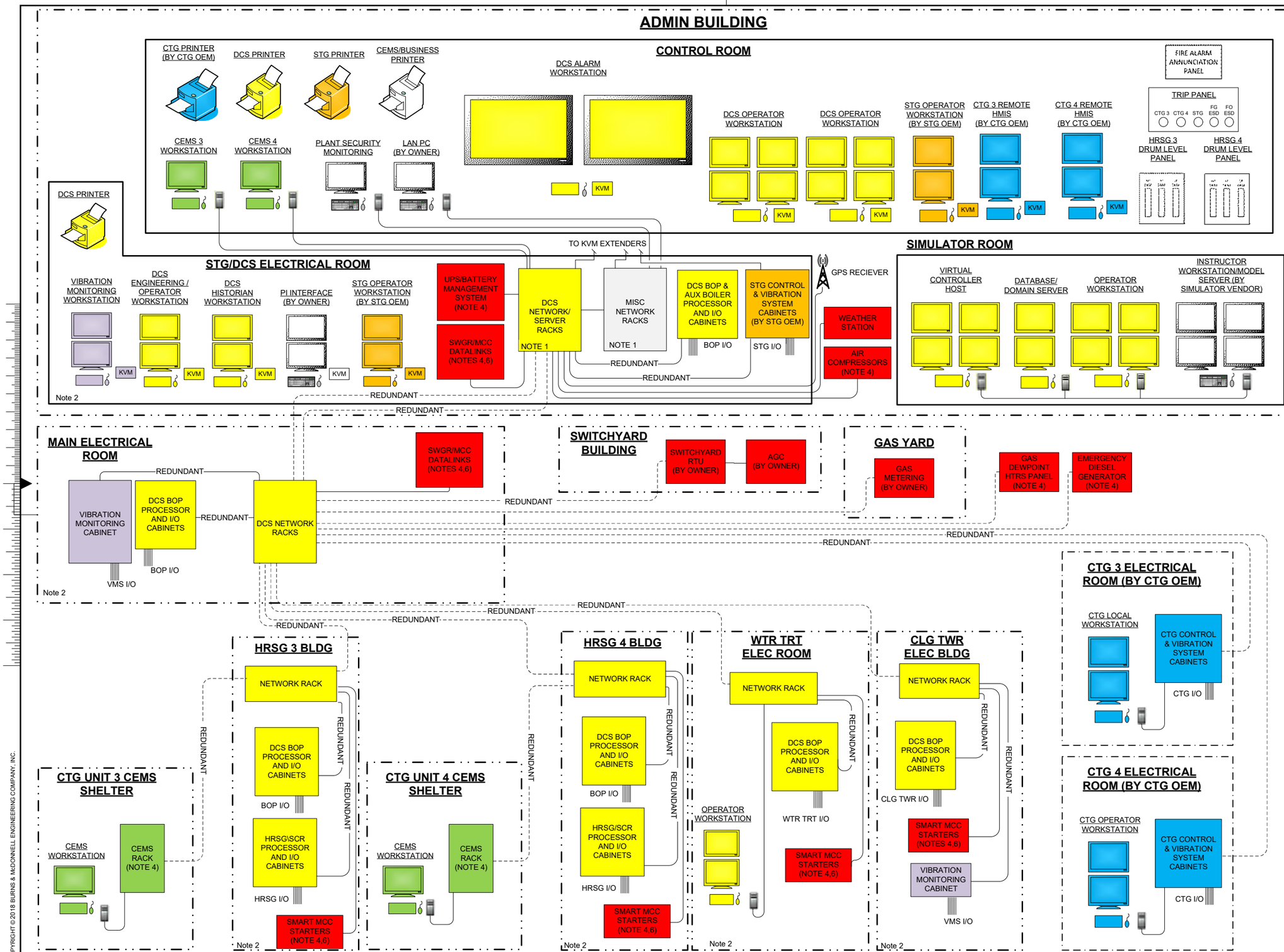
EAST KENTUCKY POWER COOPERATIVE
A Touchstone Energy Cooperative
4775 LEXINGTON RD., PO BOX 707
WINCHESTER, KY 40392

COOPER 161KV SWITCHING STATION
ELECTRICAL ARRANGEMENT PLAN

SCALE: 1" = 20'-0"

DWG NO	REV
COOP-04-1	Ø



no.	date	by	description
A	12/21/2023	BS	ISSUED FOR OWNER REVIEW
B	05/03/2024	BS	ISSUED WITH PROJECT SCOPING REPORT

PRELIMINARY - NOT FOR CONSTRUCTION

NOTES

1. INTERNAL CONNECTIONS FOR NETWORK AND SERVER CABINETS NOT SHOWN.
2. ACTUAL QUANTITY OF DCS CABINETS AND HARDWARE NOT REPRESENTED.
3. ITEMS FURNISHED BY EPC CONTRACTOR UNLESS OTHERWISE SPECIFIED
4. HARDWIRED SUPERVISORY I/O TO DCS AND MODBUS TCP INTERFACE FOR SELECT STATUS I/O.
5. ALL KVM BOXES SHALL HAVE INDEPENDENT ETHERNET CONNECTIONS TO THE COMPUTER CONSOLE CABINETS.
6. SWITCHGEAR PROTECTION RELAYS & SMART MCC STARTERS WILL COMMUNICATE VIA MODBUS TCP/IP THROUGH A COMMON NETWORK SWITCH.
7. FIBER PATCH PANELS SHALL BE PROVIDED FOR EACH LOCATION SHOWN WHERE FIBER OPTIC TERMINATIONS ARE REQUIRED.
8. ETHERNET TO FIBER OPTIC MEDIA CONVERTERS SHALL BE PROVIDED AS REQUIRED FOR A FULLY FUNCTIONAL DCS NETWORK

LEGEND

- MC — MEDIA CONVERTER
- PP — FIBER PATCH PANEL
- COPPER CABLE
- FIBER OPTIC CABLE
  - BOP DCS EQUIPMENT
  - GTCS EQUIPMENT
  - STCS EQUIPMENT
  - CEMS EQUIPMENT
  - VMS EQUIPMENT
  - FOREIGN DEVICE INTERFACE

BURNS McDONNELL

date	detailed
01/12/2024	B. SEMENOK
designed	checked
B. SEMENOK	A. DORSETT

EAST KENTUCKY POWER COOPERATIVE
EKPC 2X1 COMBINED CYCLE
KENTUCKY

2 X 1 COMBINED CYCLE
CONTROL SYSTEM ARCHITECTURE

project no.	contract no.
157787	-

drawing no. CSA001 — rev. A

sheet 1 of 1 sheets

file 157787_CSA001.VSDX

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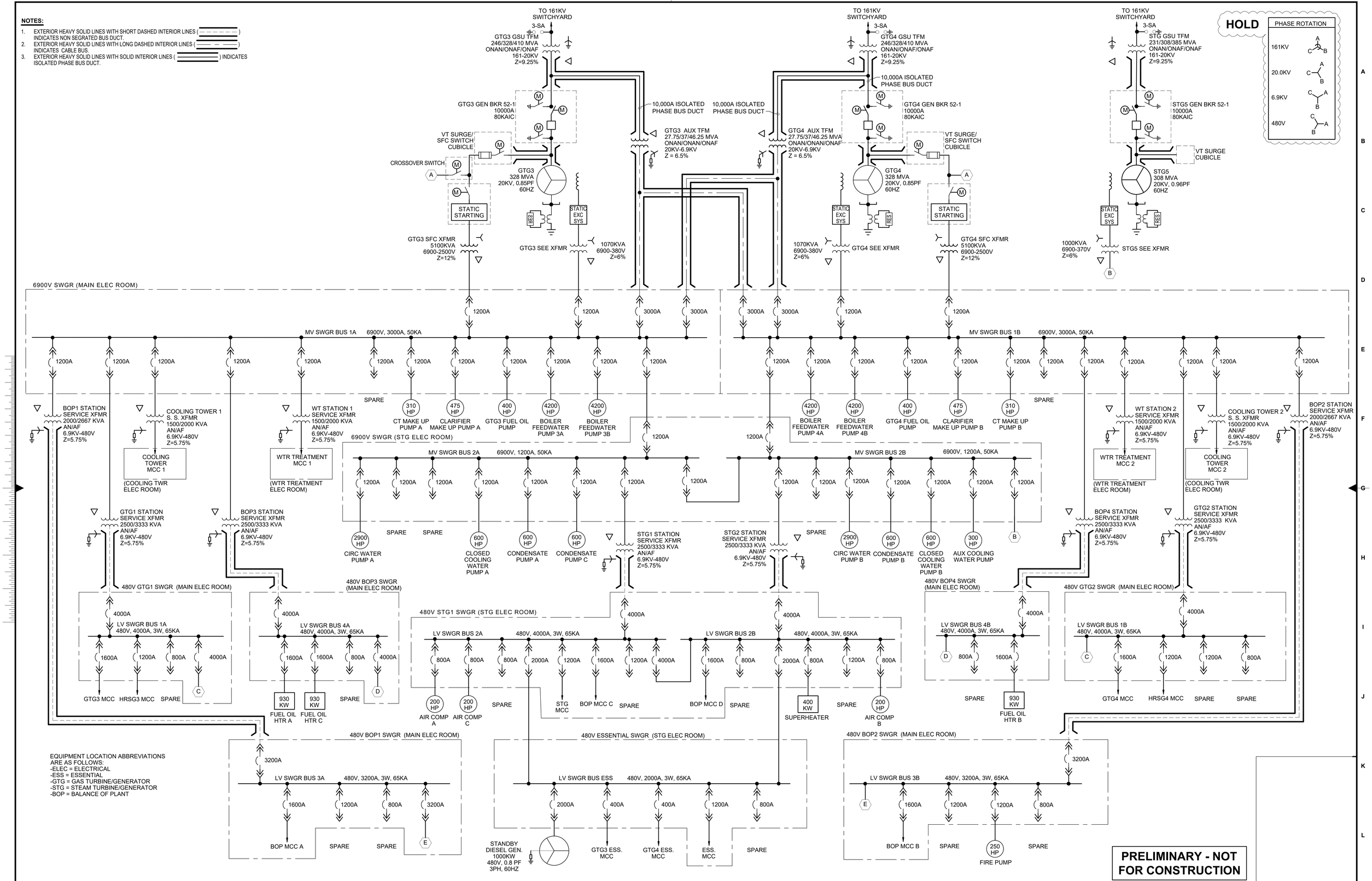
NOTES:

1. EXTERIOR HEAVY SOLID LINES WITH SHORT DASHED INTERIOR LINES ( ) INDICATES NON SEGRATED BUS DUCT.
2. EXTERIOR HEAVY SOLID LINES WITH LONG DASHED INTERIOR LINES ( ) INDICATES CABLE BUS.
3. EXTERIOR HEAVY SOLID LINES WITH SOLID INTERIOR LINES ( ) INDICATES ISOLATED PHASE BUS DUCT.



EQUIPMENT LOCATION ABBREVIATIONS ARE AS FOLLOWS:
-ELEC = ELECTRICAL
-ESS = ESSENTIAL
-GTG = GAS TURBINE/GENERATOR
-STG = STEAM TURBINE/GENERATOR
-BOP = BALANCE OF PLANT

PRELIMINARY - NOT FOR CONSTRUCTION

no.	date	by	ckd	description
B	4/19/24	CDM		ISSUED WITH PROJECT SCOPING REPORT
A	11/27/23	CDM	RJT	ISSUED FOR REVIEW

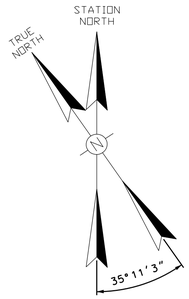
BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
FIRM REG NO. F-845

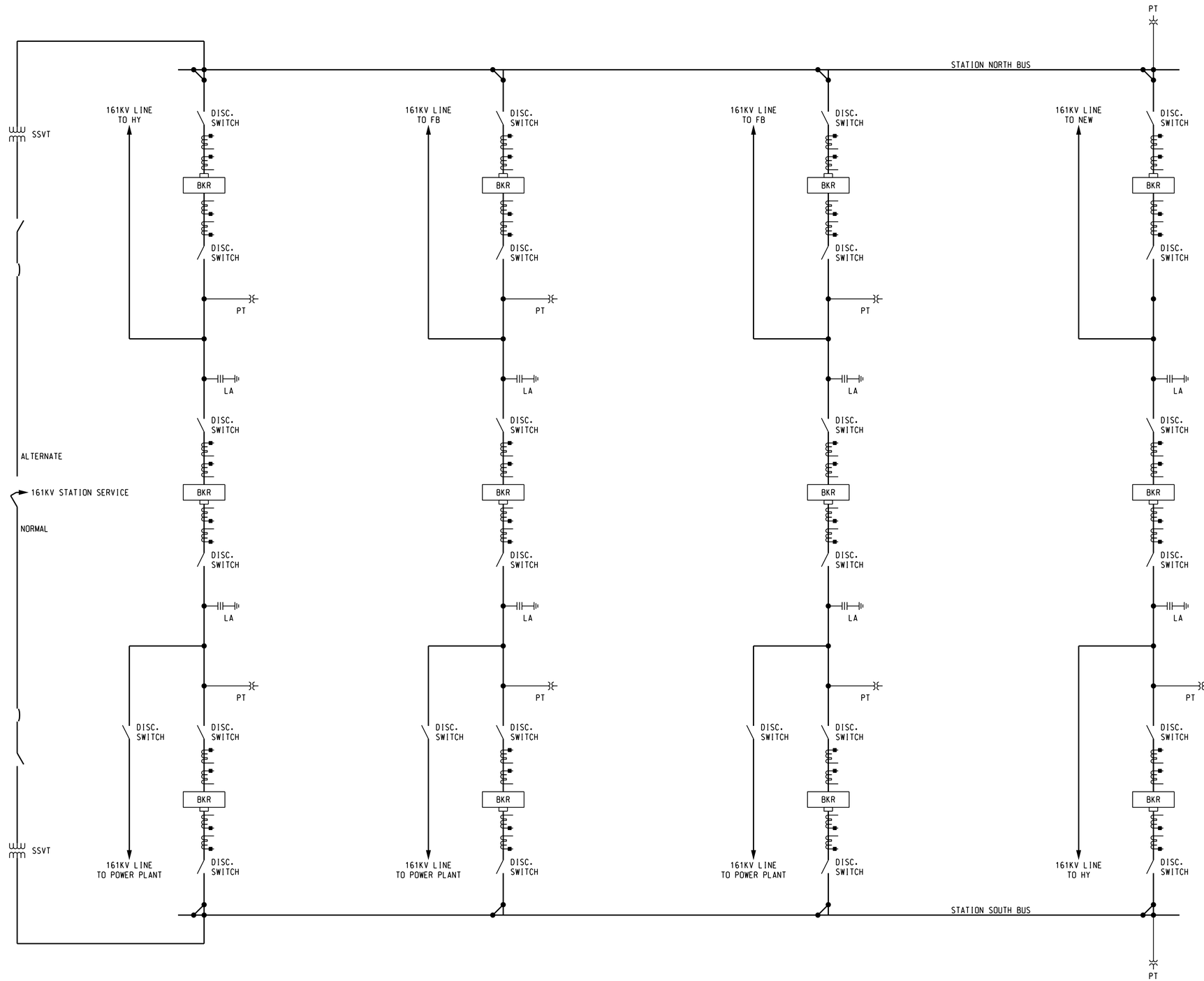
designed C. MCCLUSKEY
detailed C. MCCLUSKEY

EAST KENTUCKY POWER COOPERATIVE
CLARK COUNTY, KENTUCKY

COOPER POWER PLANT
2 x1 CCGT PLANT
OVERALL ONE-LINE DIAGRAM
BASED ON SIEMENS GTG'S

project 157787
contract
drawing **EE001**
rev. **B**
sheet 1 of 1 sheets
file 157787- EE001.DWG





REFERENCE DRAWINGS:
COOP-04-1 - ELECTRICAL ARRANGEMENT
COOP-07-1 - FOUNDATION PLAN
COOP-09-1 - GROUNDING PLAN
COOP-13-1 - CONDUIT PLAN

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NOT APPROVED FOR CONSTRUCTION

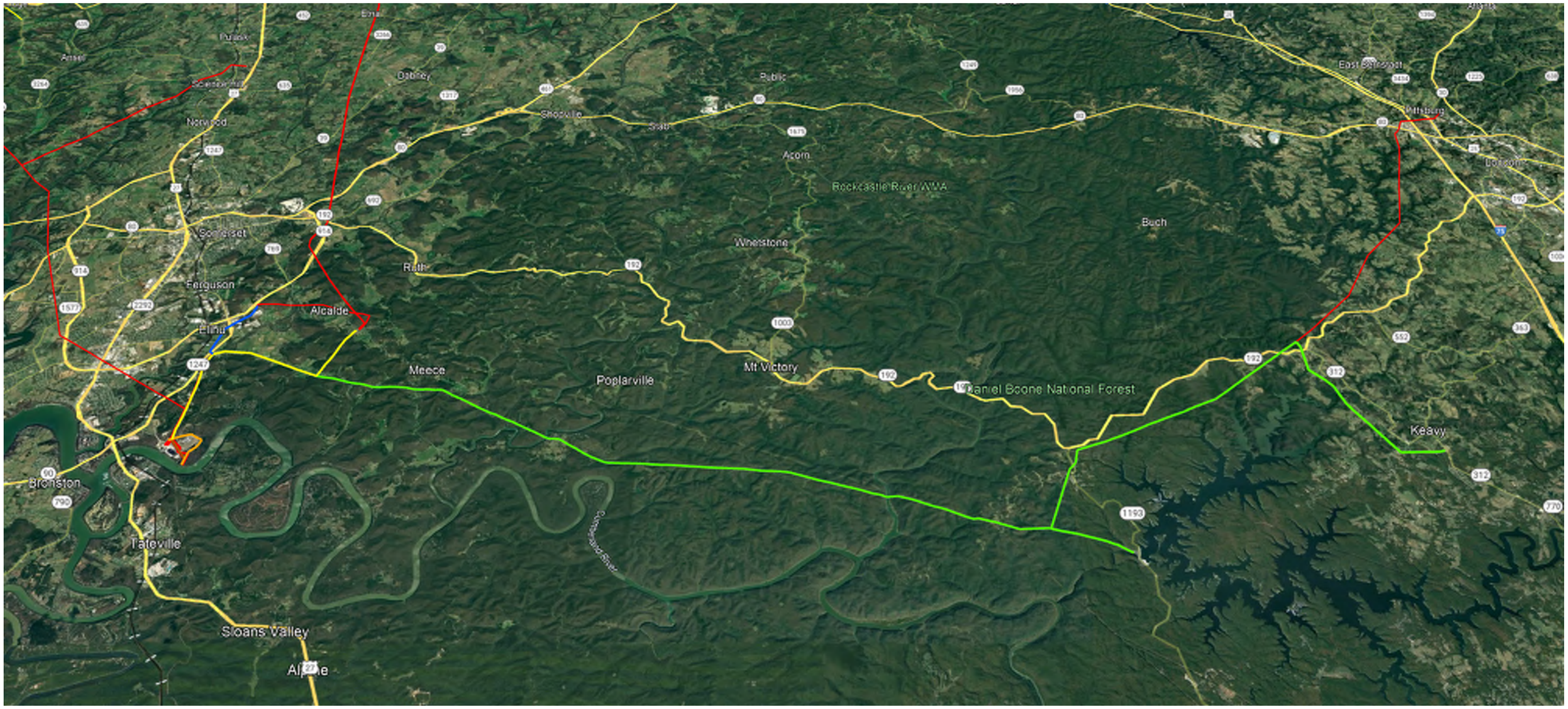
1.	X/X/XX	---	---	5.	X/X/XX	---	---	DRAWN	CAS-BMcD	2/12/24	
2.	X/X/XX	---	---	6.	X/X/XX	---	---	DESIGNED	XXX-BMcD	2/12/24	
3.	X/X/XX	---	---	7.	X/X/XX	---	---	CHECKED	XXX-BMcD	2/12/24	
4.	X/X/XX	---	---	8.	X/X/XX	---	---	APPROVED			
REVISIONS	DATE	DWN	APP	REVISIONS	DATE	DWN	APP				

EAST KENTUCKY POWER COOPERATIVE
A Touchstone Energy Cooperative
4775 LEXINGTON RD., PO BOX 707
WINCHESTER, KY 40392

COOPER 161KV SWITCHING STATION
ONE LINE DIAGRAM

SCALE:NONE
DWG NO COOP-03-1
REV Ø

COOPER 2X1 CCGT OFF-SITE TRANSMISSION SCOPE

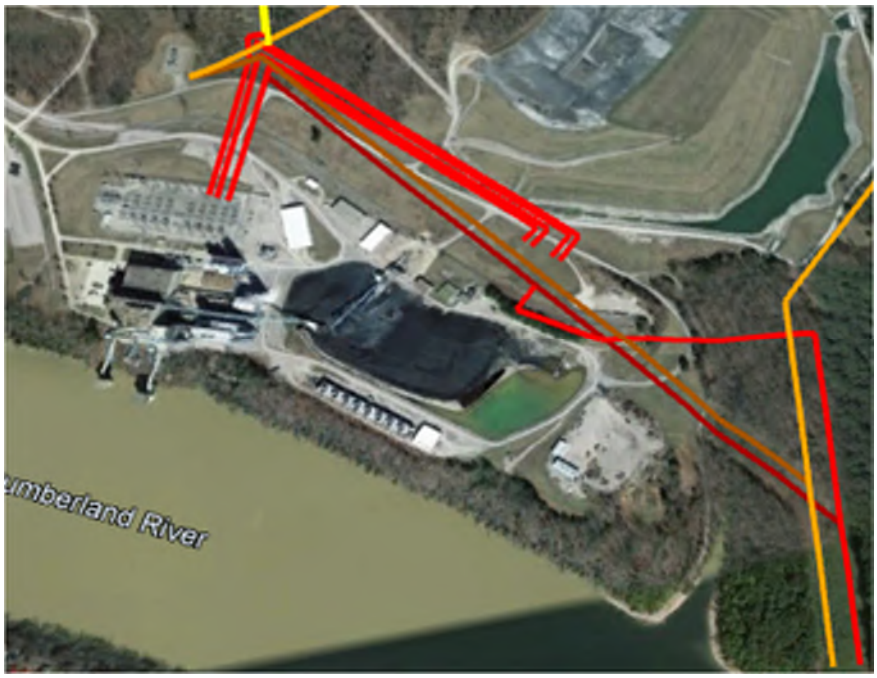


Off-Site Transmission Scope of Work Summary

This Project consists of providing all labor, equipment, materials including, but not limited to transmission direct embed foundations, steel pole erection, wire and optical ground wire stringing and splicing, existing line and structure removals, grounding, hardware and insulator erection, and services necessary for the construction of the facilities in accordance with the bid documents including the files in Exhibit A-2 Construction Specifications and Exhibit A-3 Drawings and KMZ files for the associated scope sections as described below:

Tie Ins

Reroute the existing 161kV lines at the existing Cooper Switching Station and the New Switching Station. Modified lines are indicated in red on the attached KMZ. Removal displayed in dark red. Line construction includes five (5) different circuits totaling about 2.7 miles of 954 kcmil ACSS conductor shielded by either 7 No. 7 Alumoweld or OPGW with four (4) splice boxes.



Modifications include additions / removals of structures listed below:

- Four (4) Double Circuit Braced Post Tangents
- Eleven (11) Engineered Steel Pole Deadends on Drilled Shaft Foundations
- Three (3) Single Pole Tangents
- Four (4) H-frame Tangents
- Three (3) Three Pole Guyed Deadends
- Removal of ten (10) structures and 0.63 miles of wires

New Line

Build a new 161kV line from Cooper Substation to Alcalde Substation. A portion the new line will be constructed double circuit with adjacent existing line. Entire route is approximately 6.2 miles with about 2.4 miles as double circuit. Displayed in yellow on the KMZ.

Modifications include additions / removals of structures listed below:

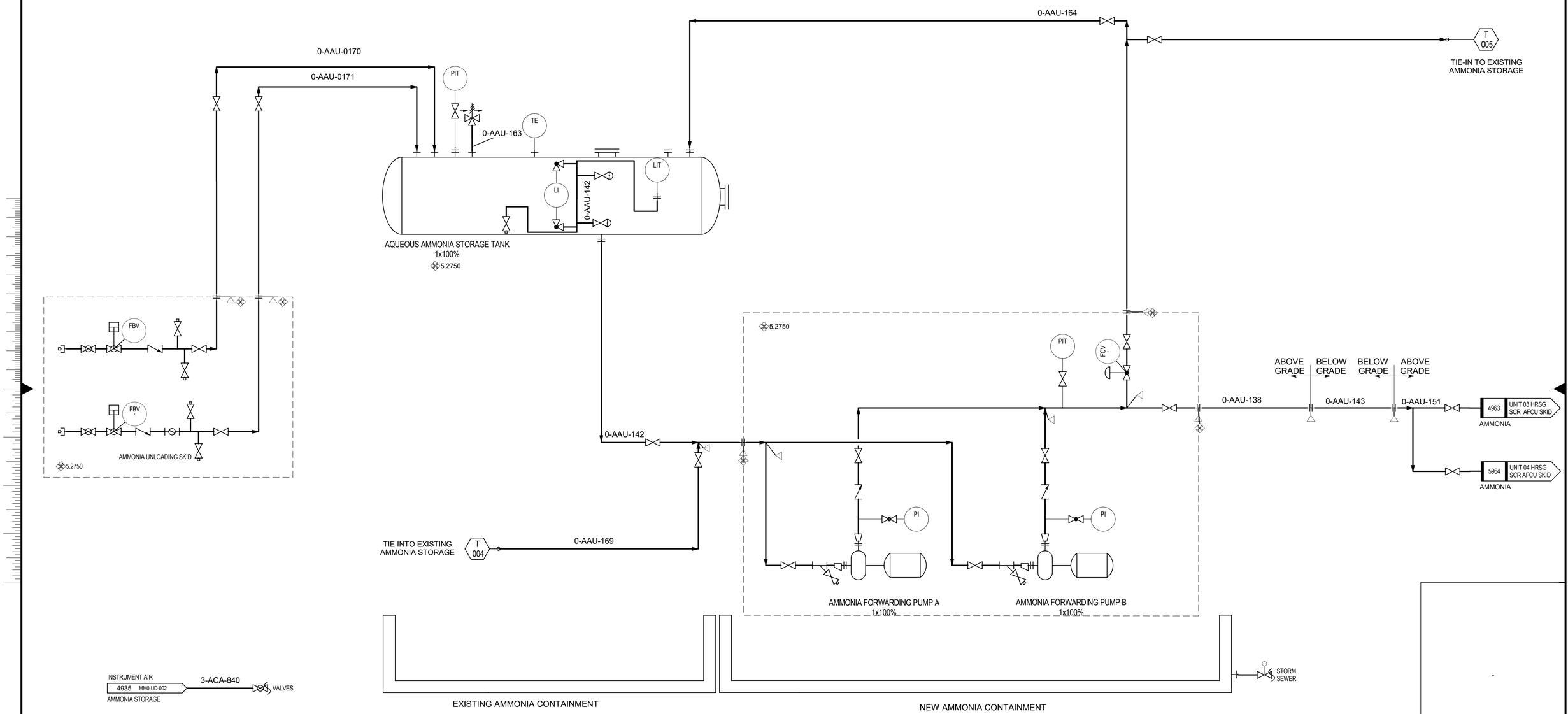
- Fifteen (15) Double Circuit Braced Post Tangents
- One (1) Engineered Steel Pole Deadends on Drilled Shaft Foundations
- Twenty-Nine (29) H-frame Tangents
- Four (4) Three Pole Guyed Deadends
- Four (4) Single Pole Guyed deadend
- Removal of wire on west side of structures from Cooper to Elihu Tap

69kV Reroute

Reroute the existing 69kV line to avoid the new substations. The reroute of the alignment is 1.4 miles of new line. Displayed in orange on the attached KMZ. Removal of the existing 69kV line is displayed in brown.

Modifications include additions / removals of structures listed below:

- Thirteen (13) H-frame Tangents
- Six (6) Three Pole Guyed Deadends
- Removal of seven (7) structures and 0.67 miles of wires



PRELIMINARY - NOT FOR CONSTRUCTION

no.	date	by	ckd	description
B	05/03/24	JSG	WKG	ISSUED WITH PROJECT SCOPING REPORT
A	12/04/23	CDM	BAN	ISSUED FOR OWNER REVIEW

no.	date	by	ckd	description

BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Engineering Co, Inc.

designed | detailed

EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
AMMONIA STORAGE TANK & PUMPS

project 157787 | contract

drawing **MM0-AAU-001** | rev. **B**

sheet of sheets

file MM0-AAU-001.pid

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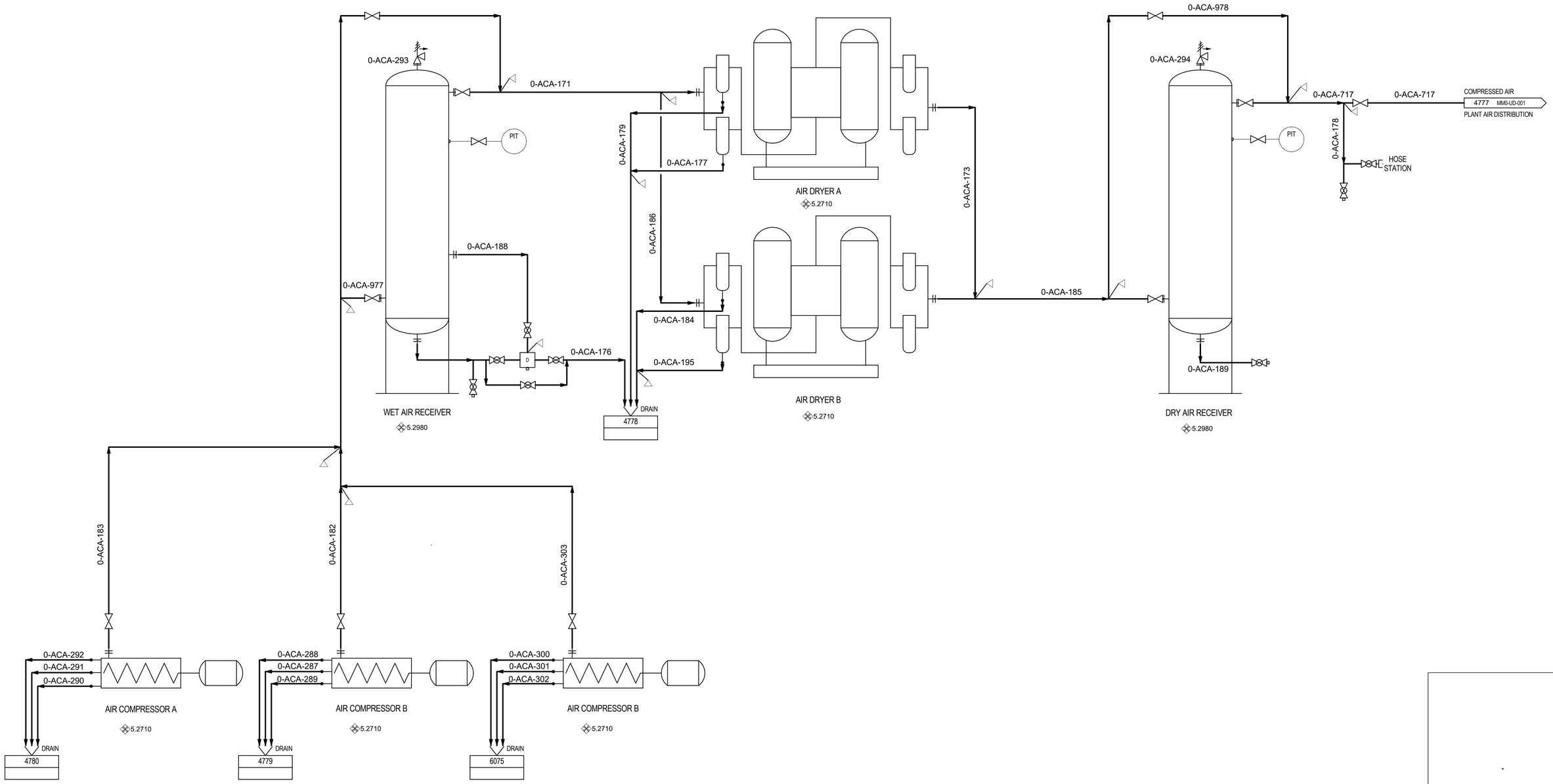

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B	05/03/24	JSG	WKG	ISSUED WITH PROJECT SCOPING REPORT
A	12/04/23	CDM	BAN	ISSUED FOR OWNER REVIEW

no.	date	by	ckd	description

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9400 WARD PARKWAY
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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
COMPRESSED AIR EQUIPMENT

project 157787 | contract

drawing **MM0-ACA-001** rev. **B**

sheet of sheets

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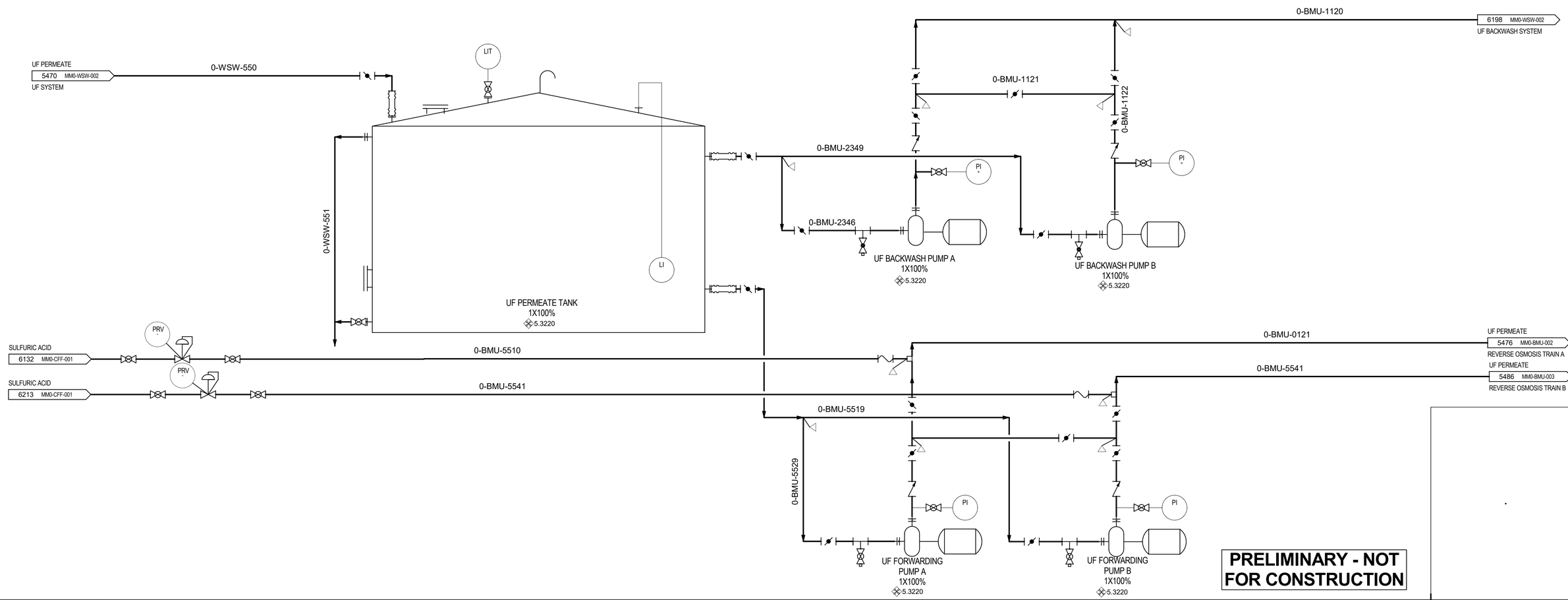

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B	05/03/24	JSG	WKG	ISSUED WITH PROJECT SCOPING REPORT
A	12/15/23	CDM	BAN	ISSUED FOR OWNER REVIEW

no.	date	by	ckd	description

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9400 WARD PARKWAY
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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
UF PERMEATE TANK & PUMPS

project 157787 | contract

drawing **MM0-BMU-001** rev. **B**

sheet of sheets

file MM0-BMU-001.pid

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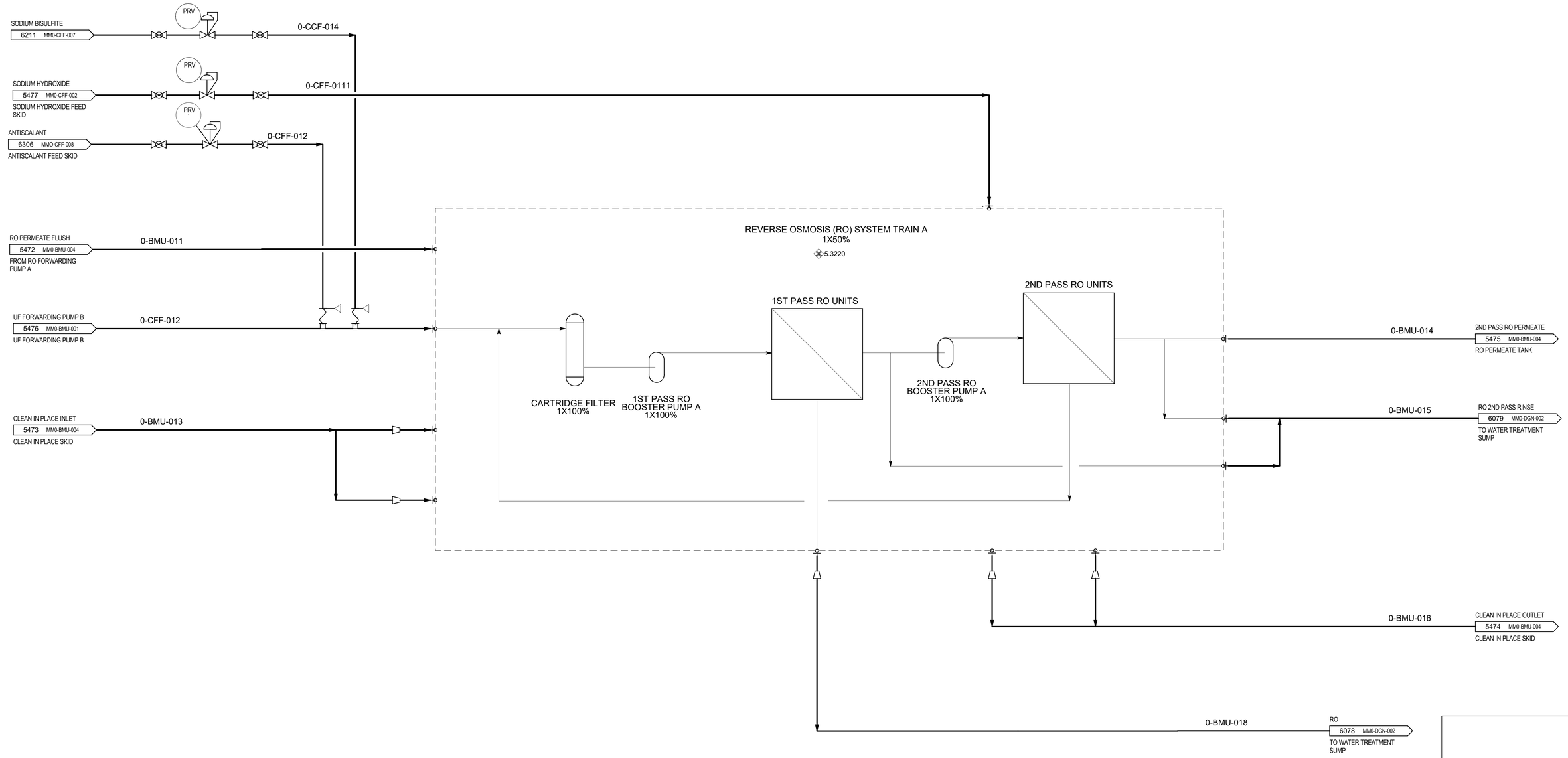

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A	12/15/23	CDM	BAN	ISSUED FOR OWNER REVIEW

no.	date	by	ckd	description

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9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
REVERSE OSMOSIS SYSTEM

project 157787 | contract

drawing **MM0-BMU-002** | rev. **— B**

sheet of sheets

file MM0-BMU-002.pid

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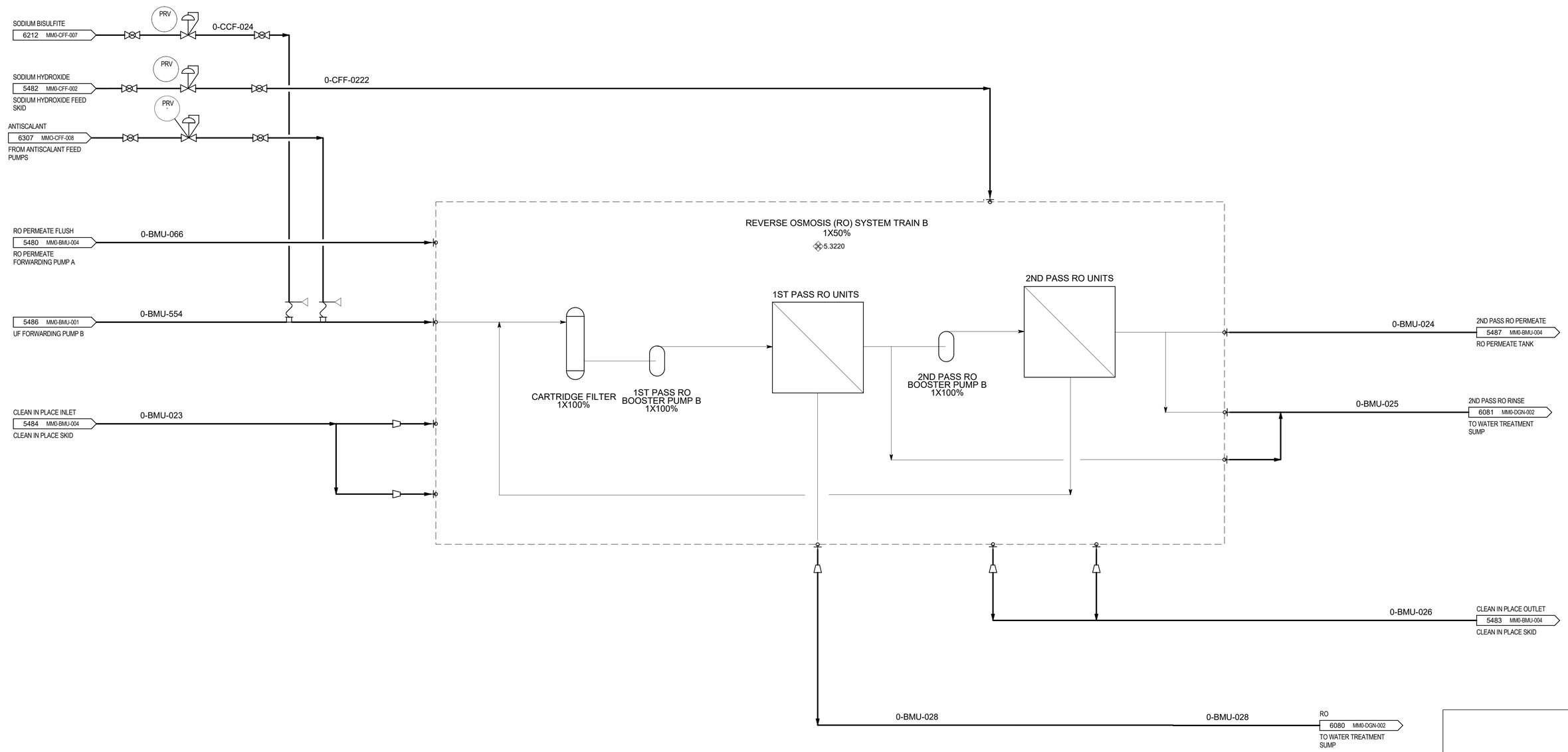

PRELIMINARY - NOT FOR CONSTRUCTION

no.	date	by	ckd	description
B	05/03/24	JSG	WKG	ISSUED WITH PROJECT SCOPING REPORT
A	12/15/23	CDM	BAN	ISSUED FOR OWNER REVIEW

no.	date	by	ckd	description

BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Engineering Co, Inc.

designed | detailed

EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
REVERSE OSMOSIS SYSTEM

project 157787 | contract

drawing **MM0-BMU-003** | rev. **— B**

sheet of sheets

file MM0-BMU-003.pid

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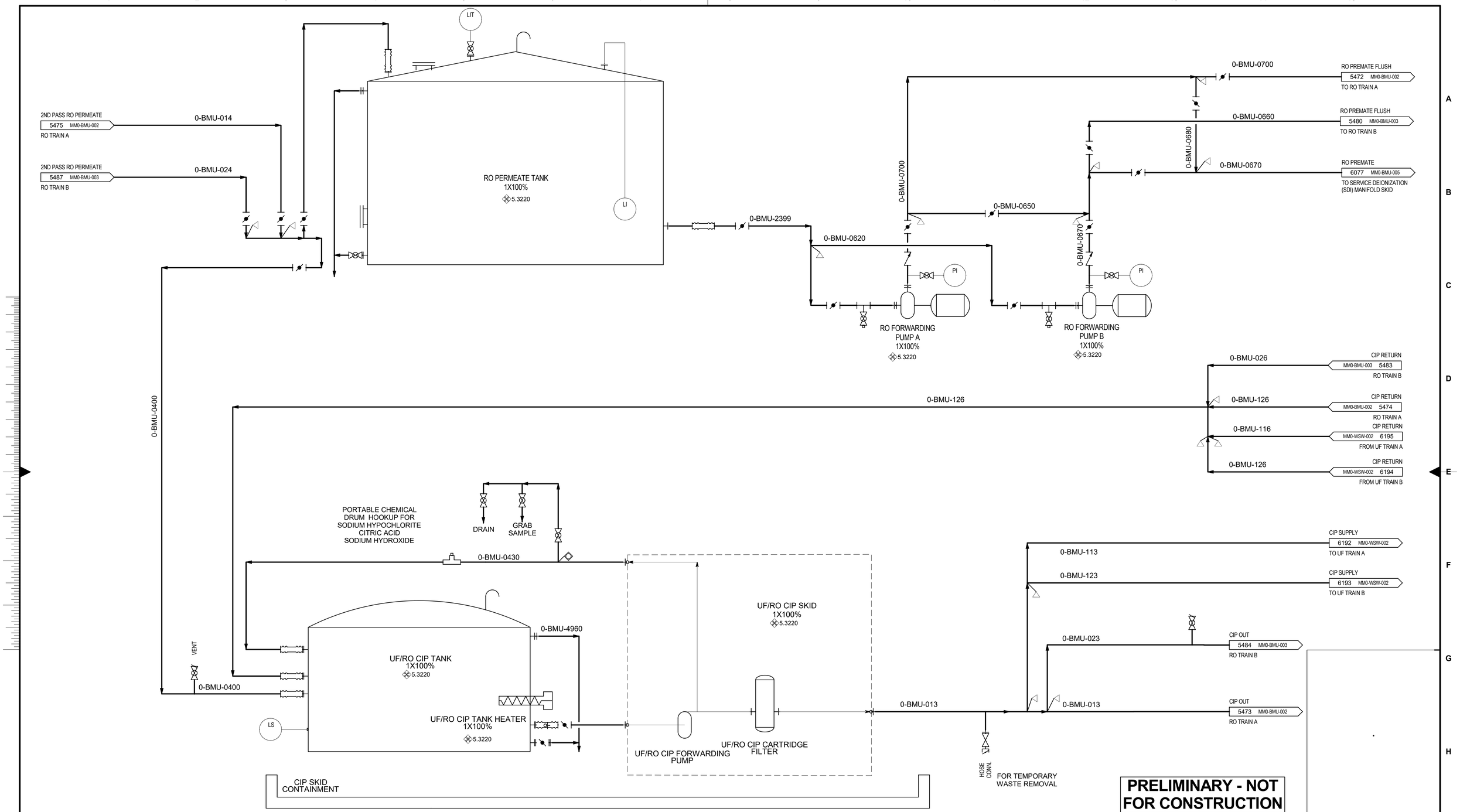

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A	12/15/23	CDM	BAN	ISSUED FOR OWNER REVIEW

no.	date	by	ckd	description

BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Engineering Co, Inc.

designed | detailed

EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
RO PERMEATE AND CIP SYSTEM

project 157787 | contract

drawing **MM0-BMU-004** | rev. **— B**

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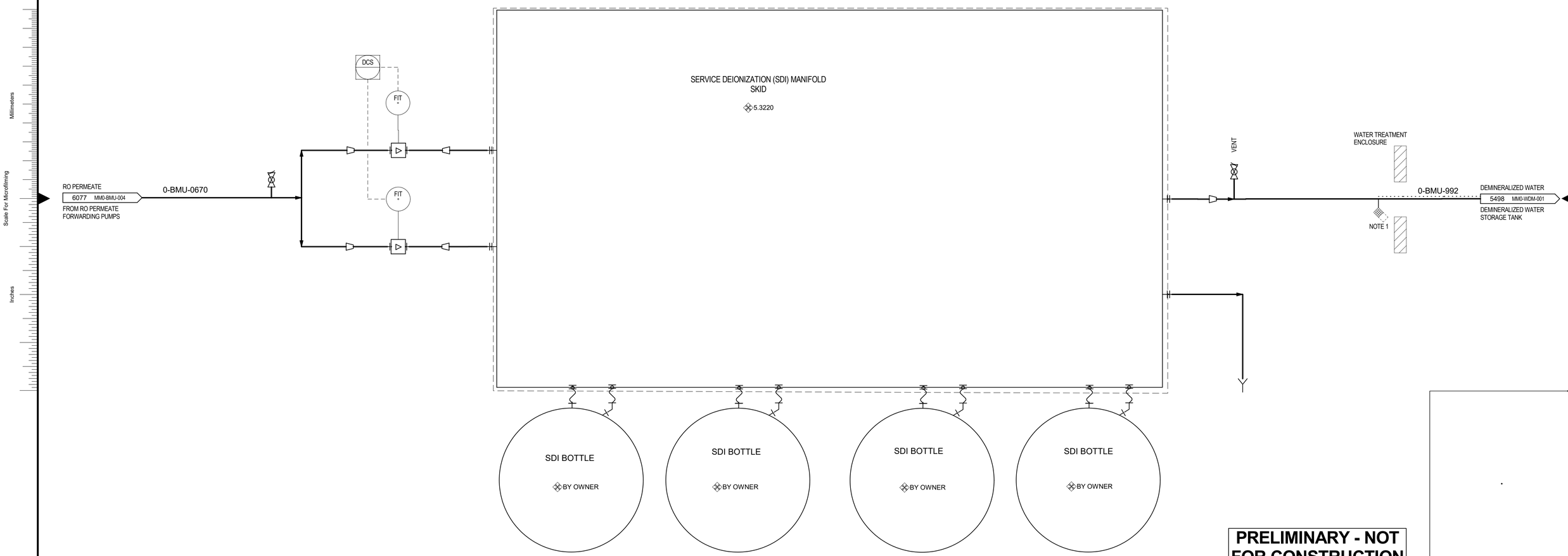

PRELIMINARY - NOT FOR CONSTRUCTION

no.	date	by	ckd	description
B	05/03/24	JSG	WKG	ISSUED WITH PROJECT SCOPING REPORT
A	12/15/23	CDM	BAN	ISSUED FOR OWNER REVIWE

no.	date	by	ckd	description

BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Engineering Co, Inc.

designed | detailed

EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
SERVICE DEIONIZATION (SDI) MANIFOLD SKID

project 157787 | contract

drawing **MM0-BMU-005** rev. **B**

sheet of sheets

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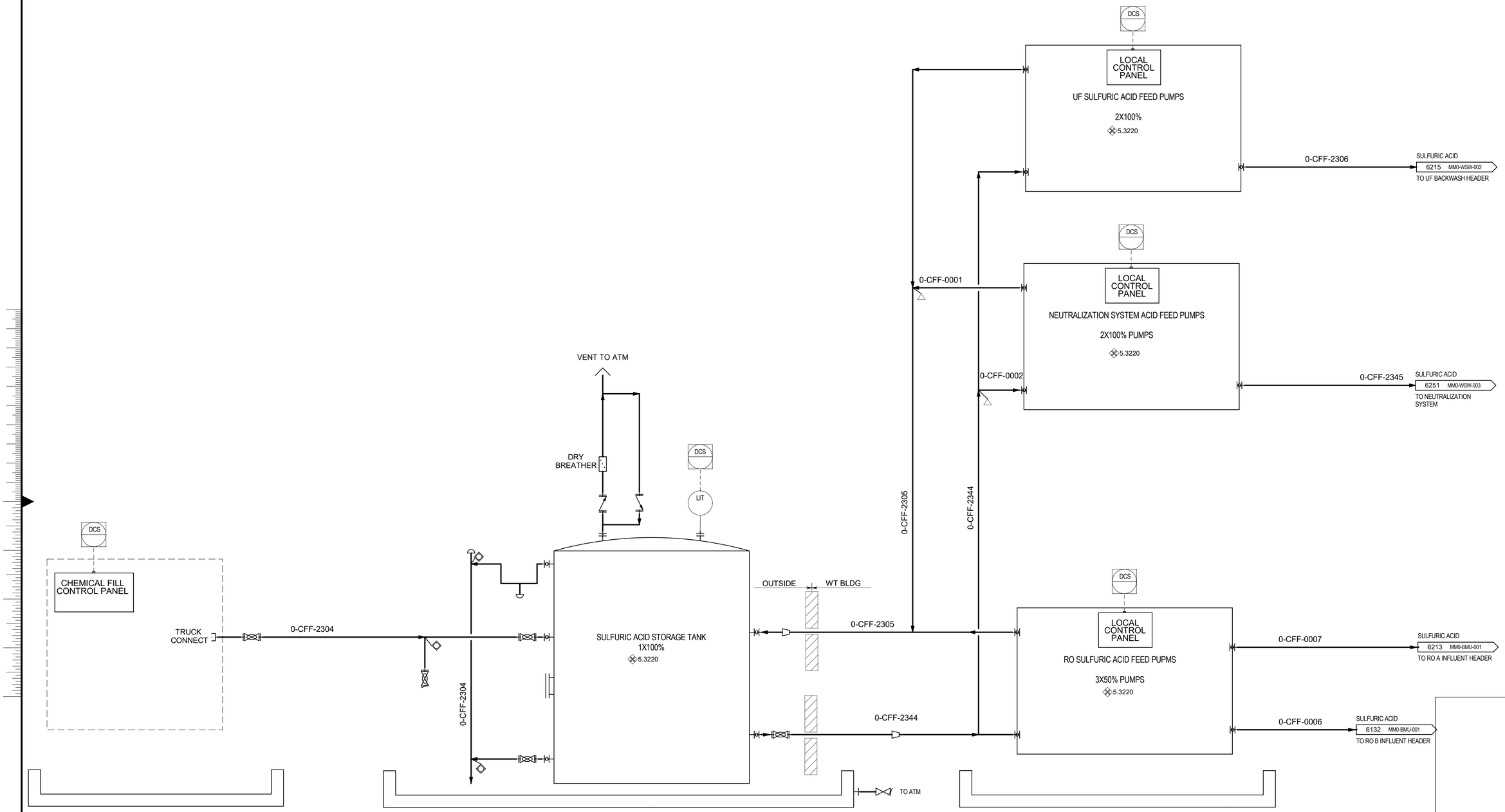

PRELIMINARY - NOT FOR CONSTRUCTION

no.	date	by	ckd	description
B	05/03/24	JSG	WKG	ISSUED WITH PROJECT SCOPING REPORT
A	12/15/23	CDM	BAN	ISSUED FOR OWNER REVIEW

no.	date	by	ckd	description

BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Engineering Co, Inc.

designed: CAMDEN MAYFIELD
detailed:

EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
SULFURIC ACID FEED SKID

project: 157787
contract:
drawing: **MM0-CFF-001**
rev.: **B**
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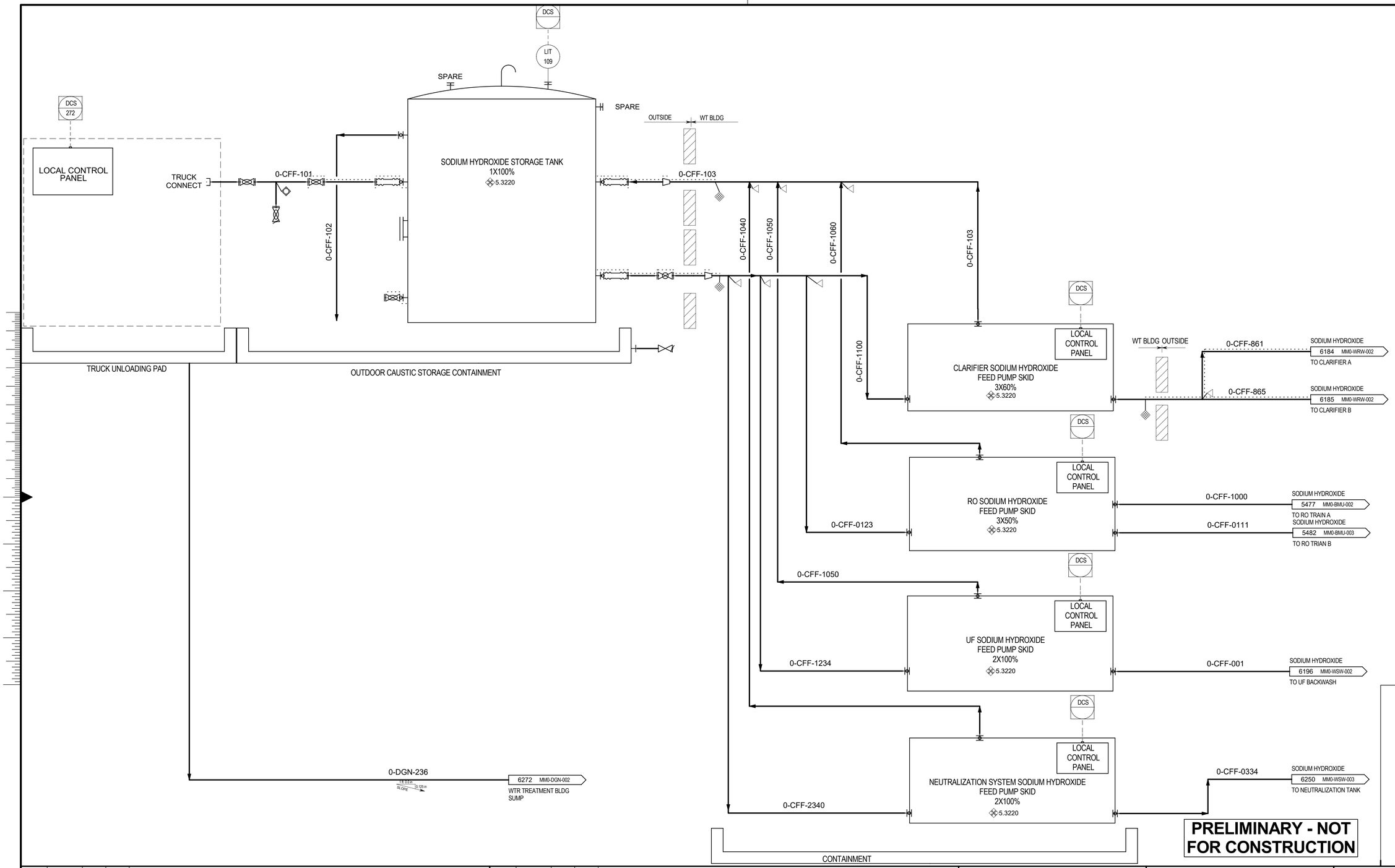

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no.	date	by	ckd	description
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A	12/15/23	CDM	BAN	ISSUED FOR OWNER REVIEW

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
SODIUM HYDROXIDE

project 157787 | contract

drawing **MM0-CFF-002** rev. **B**

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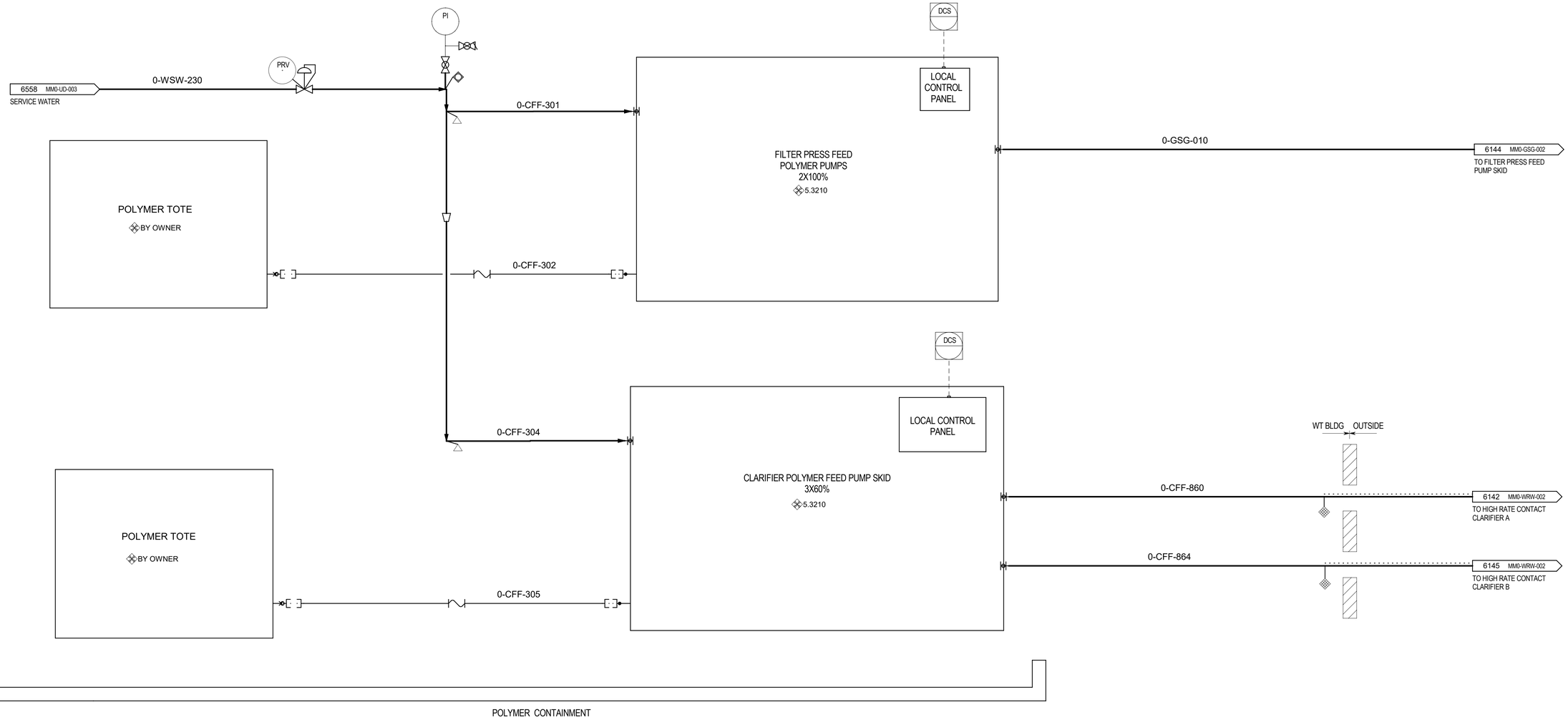

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
POLYMER FEED SKIDS

project 157787
contract

drawing **MM0-CFF-003**
rev. **B**

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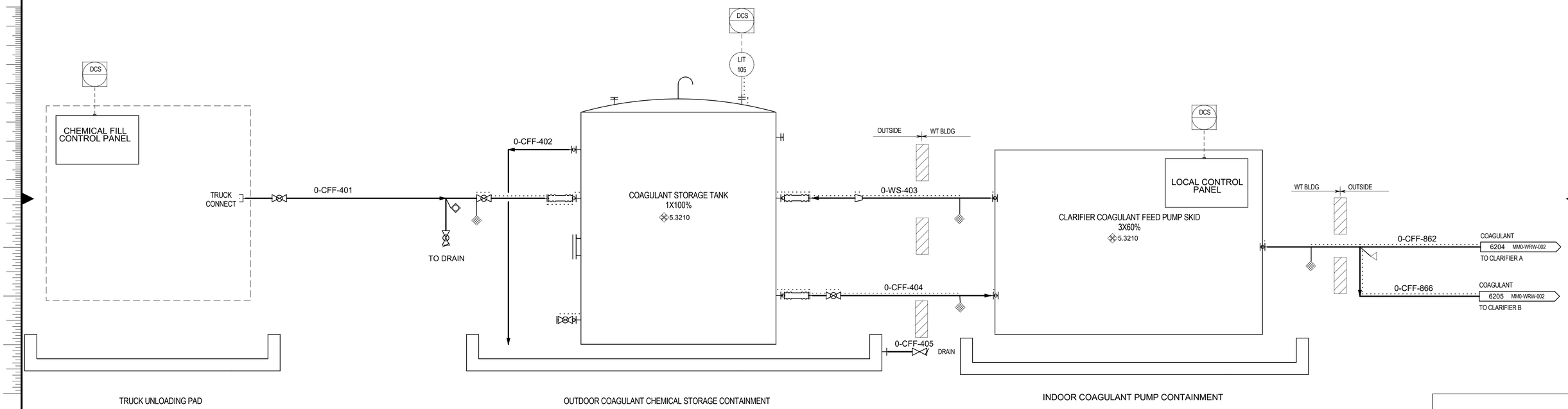

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
COAGULANT FEED SKID

project: 157787
contract:
drawing: **MM0-CFF-004**
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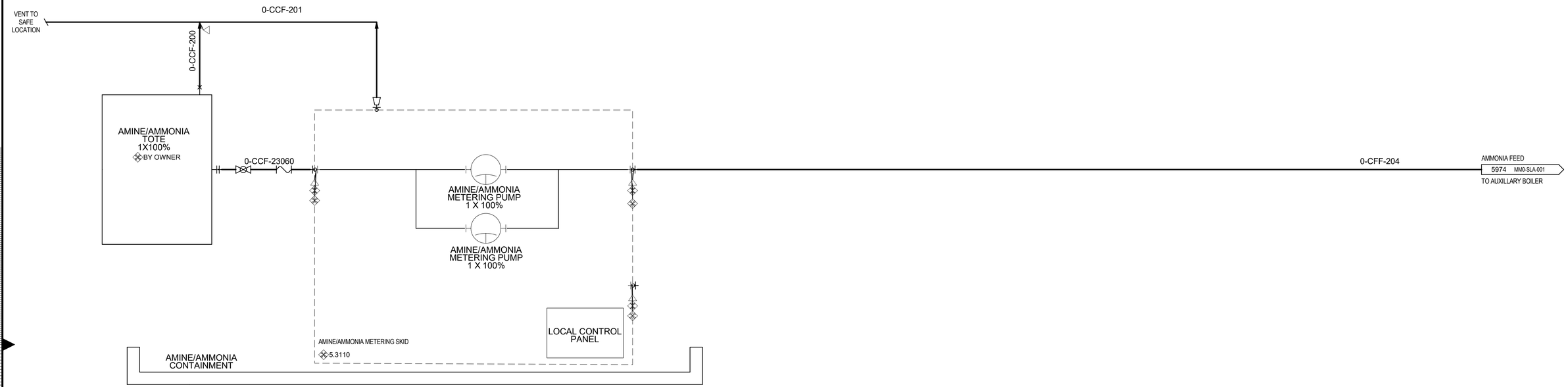

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EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
AUX BOILER CHEMICAL FEED SKID

project: 157787
contract:
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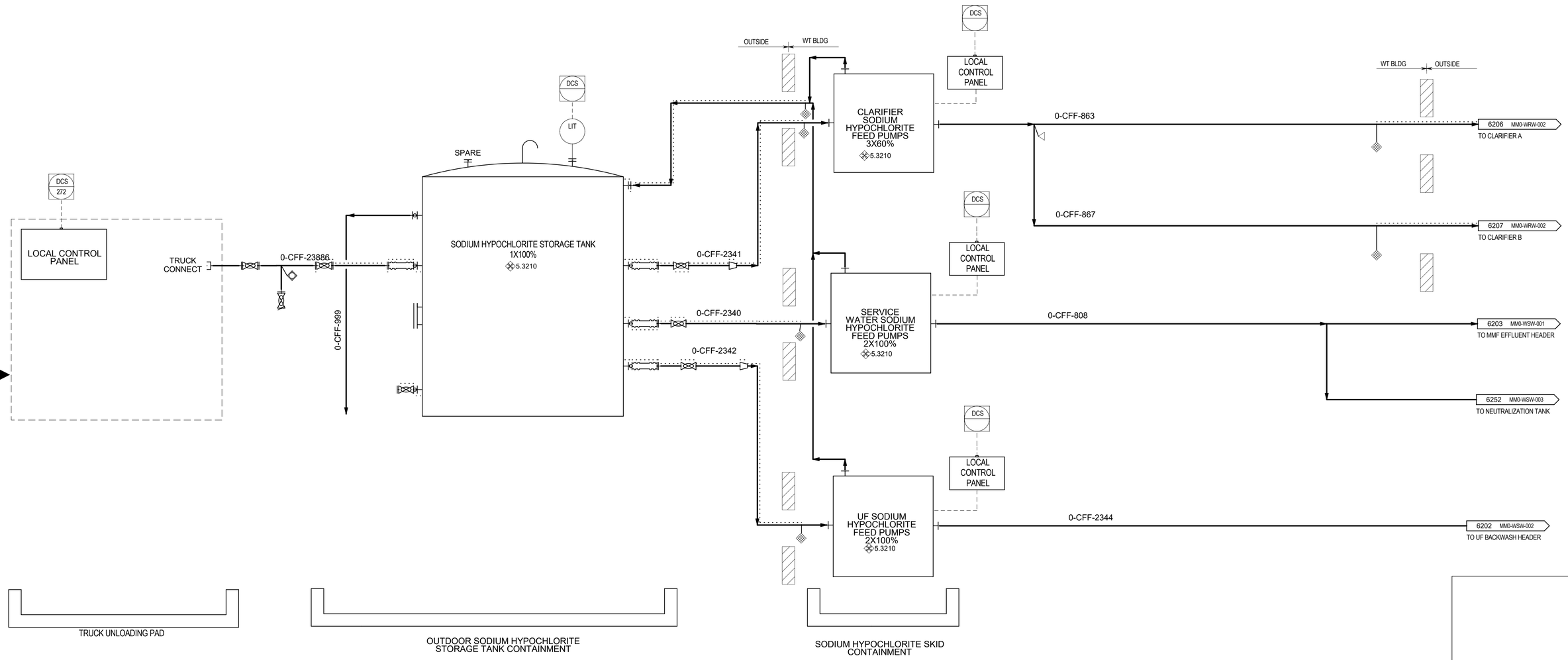

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
SODIUM HYPOCHLORITE FEED SKIDS

project: 157787
contract:
drawing: **MM0-CFF-006**
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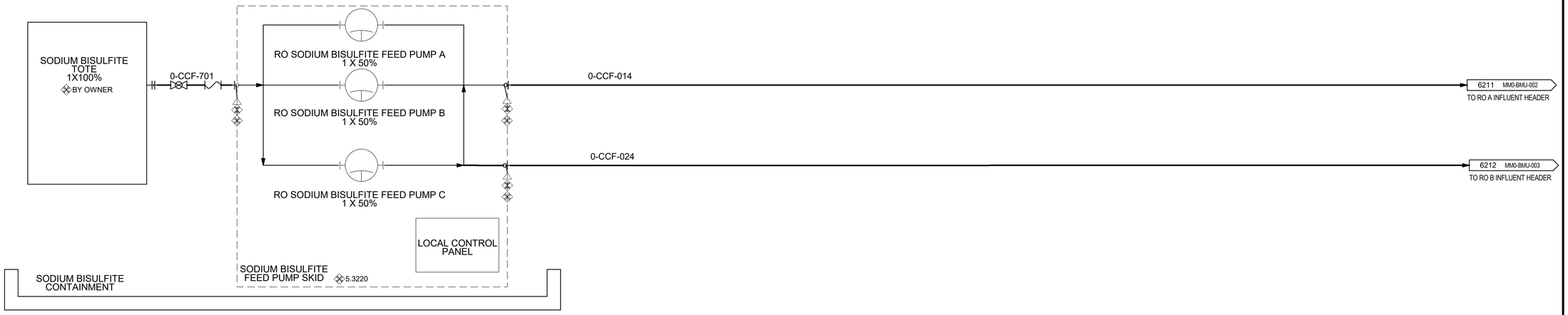

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
SODIUM BISULFITE FEED SKID

project: 157787
contract:
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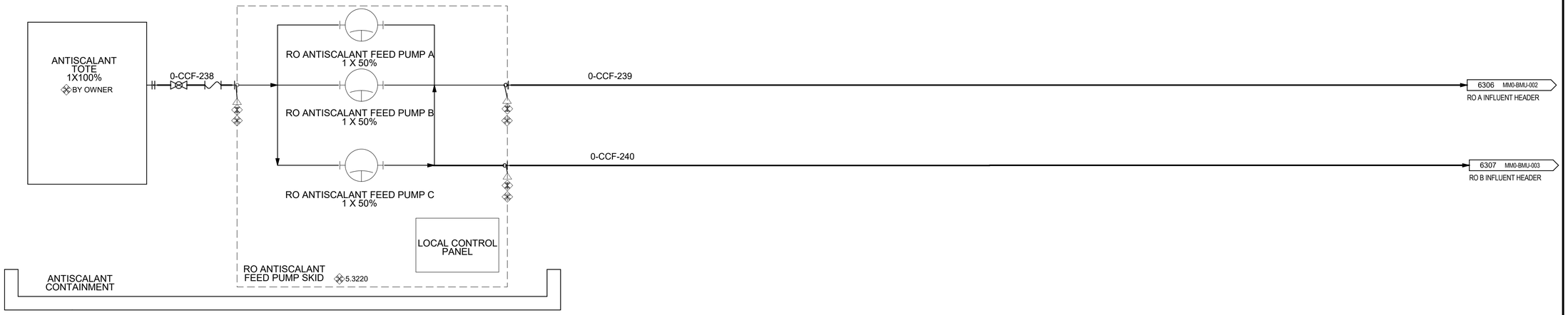

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EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
ANTISCALANT FEED SKID

project 157787 | contract

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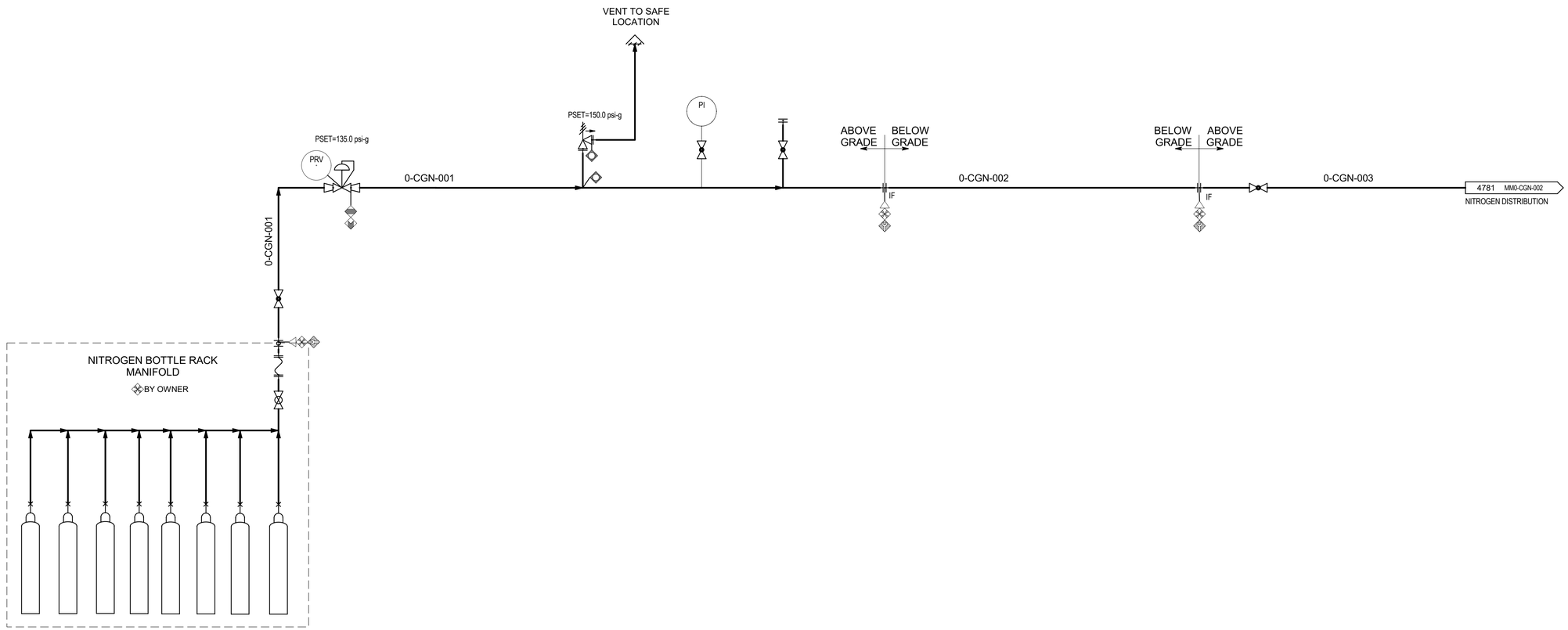

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EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
NITROGEN BOTTLE RACK

project 157787 | contract

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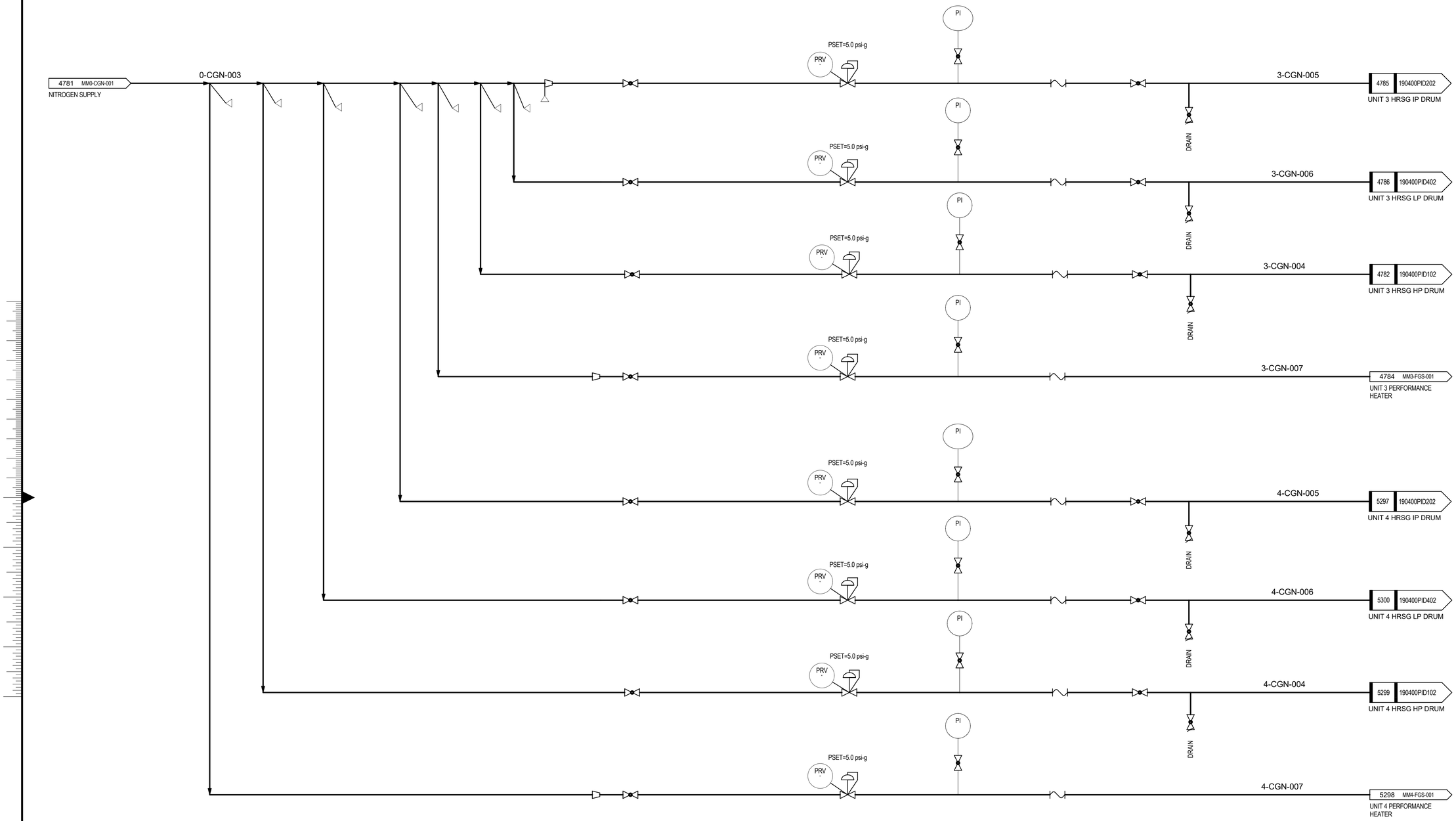

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EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
NITROGEN DISTRIBUTION HEADER

project 157787 | contract

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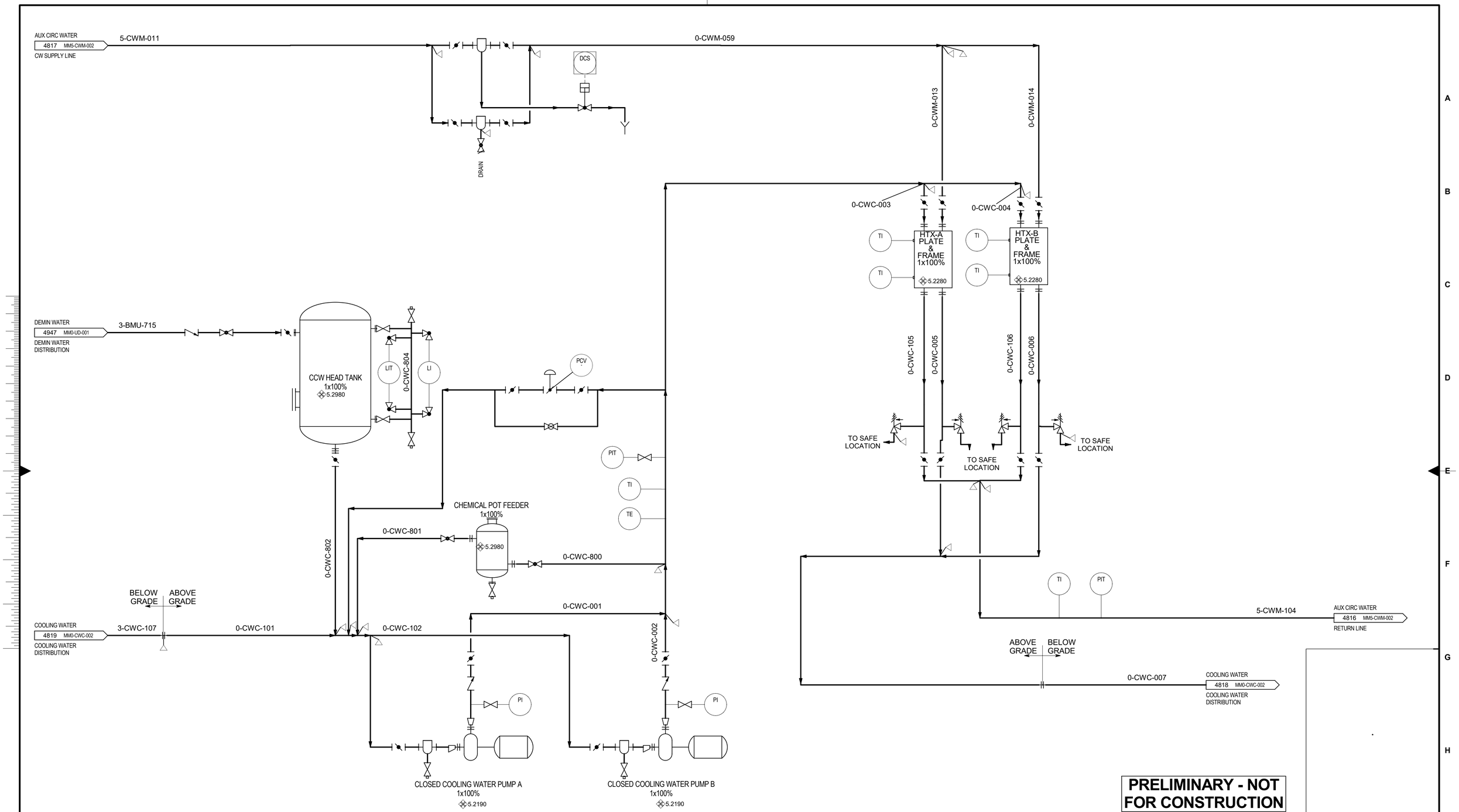

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
CLOSED COOLING WATER HEAT EXCHANGER

project 157787 | contract

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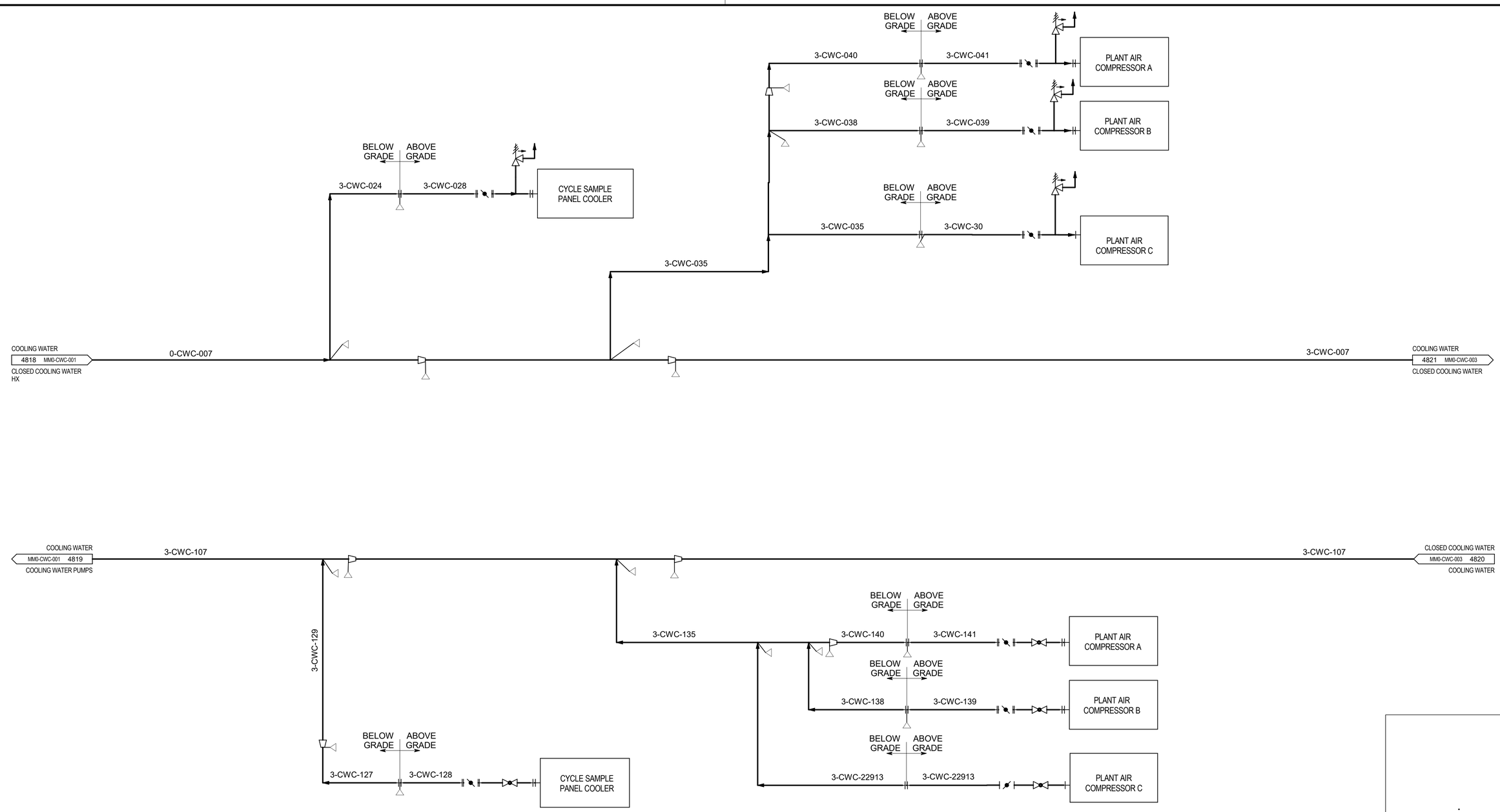

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
CLOSED COOLING WATER

project 157787 | contract

drawing **MM0-CWC-002** | rev. **B**

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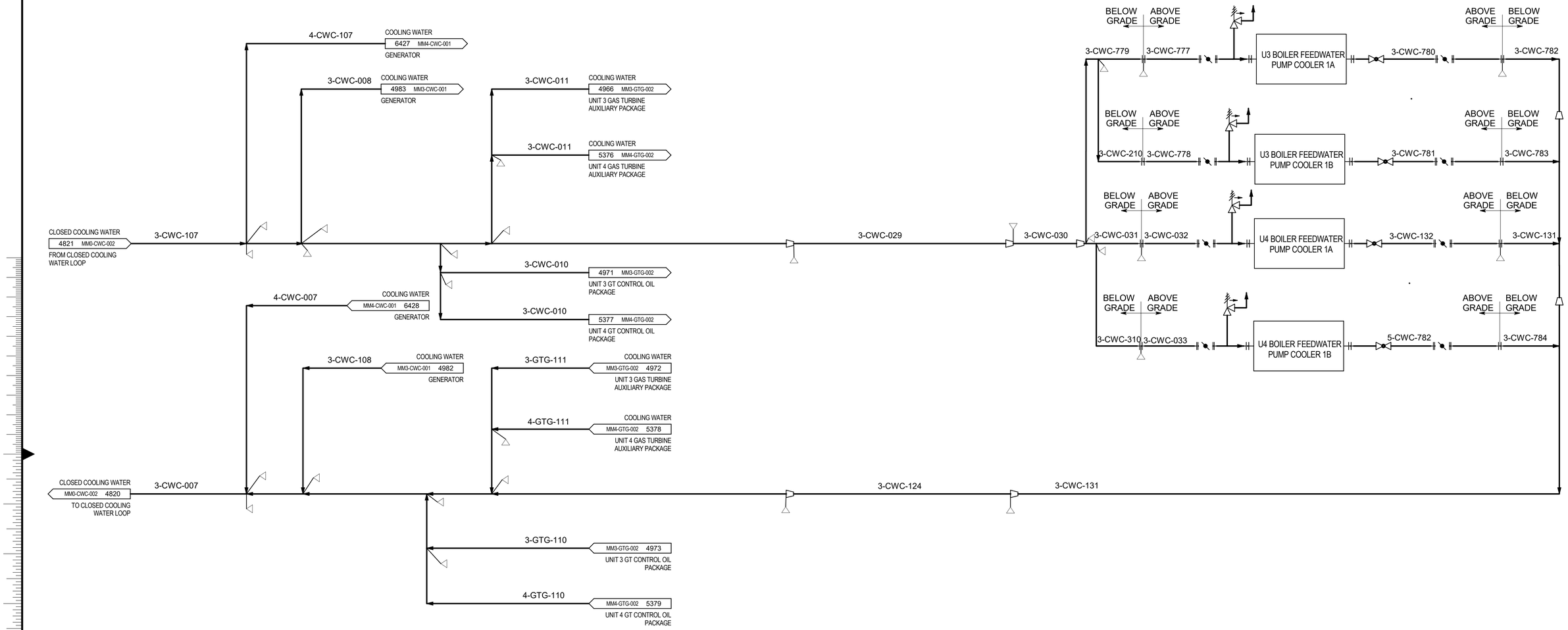

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EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
CLOSED COOLING WATER

project 157787
contract
drawing **MM0-CWC-003**
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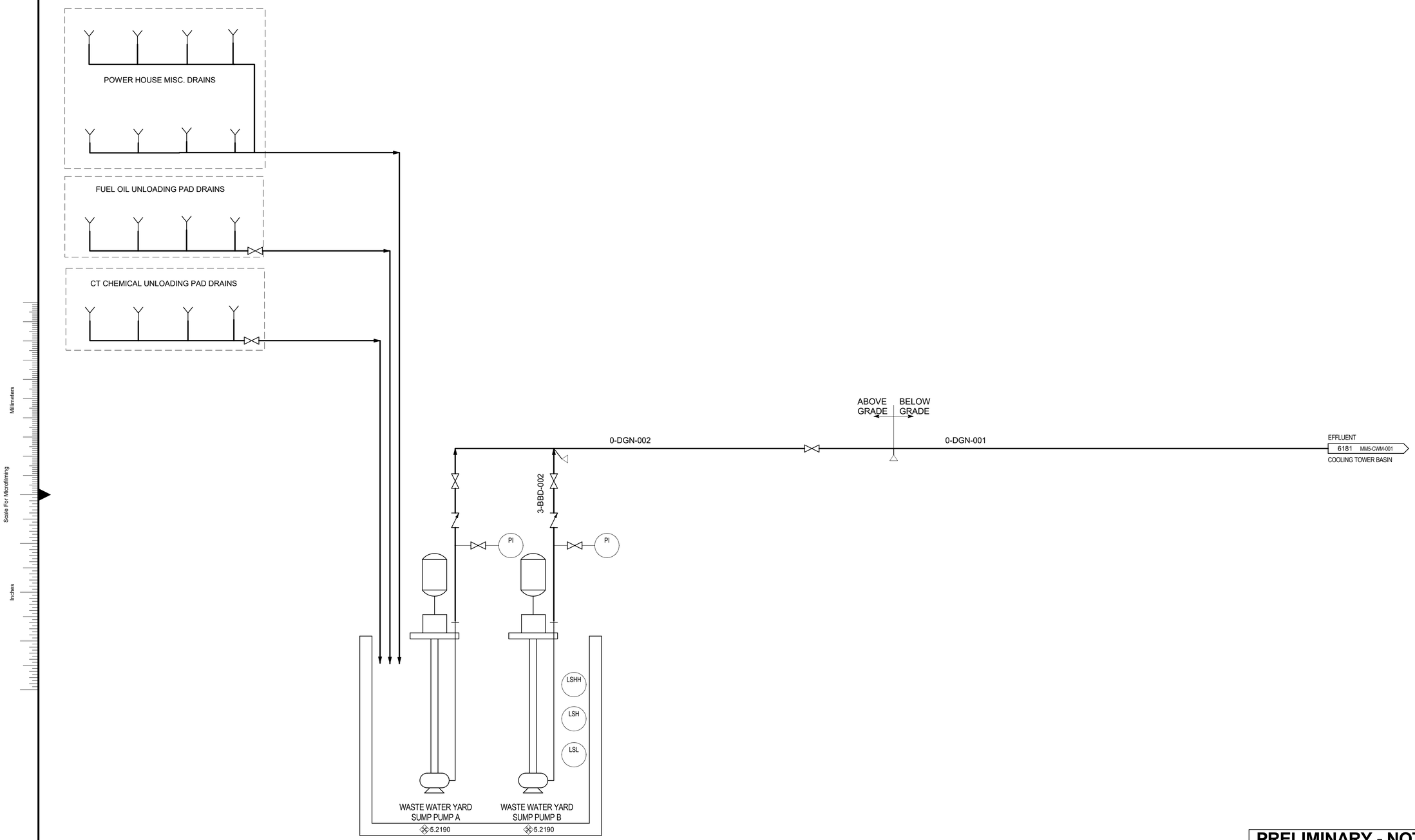

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
PLANT DRAINS

project 157787 | contract

drawing **MM0-DGN-001** | rev. **B**

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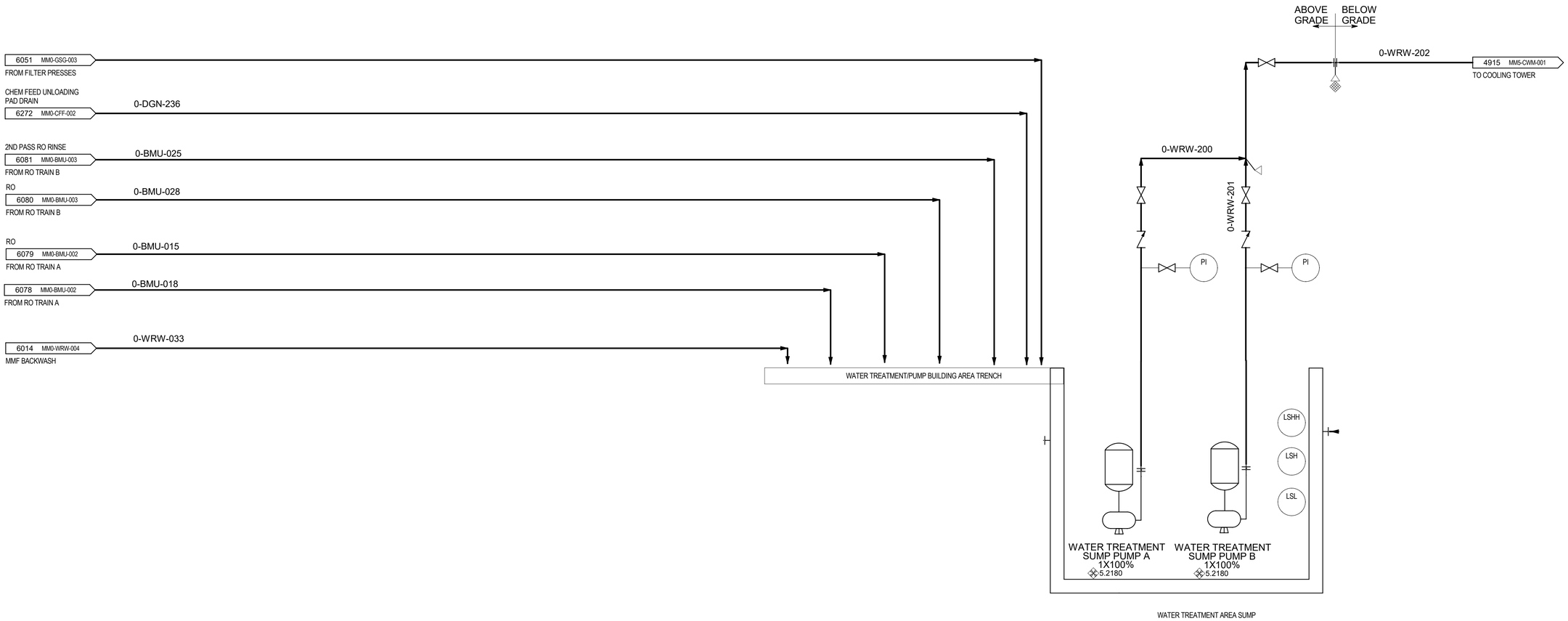

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
WATER TREATMENT SUMP

project 157787 | contract

drawing **MM0-DGN-002** rev. **B**

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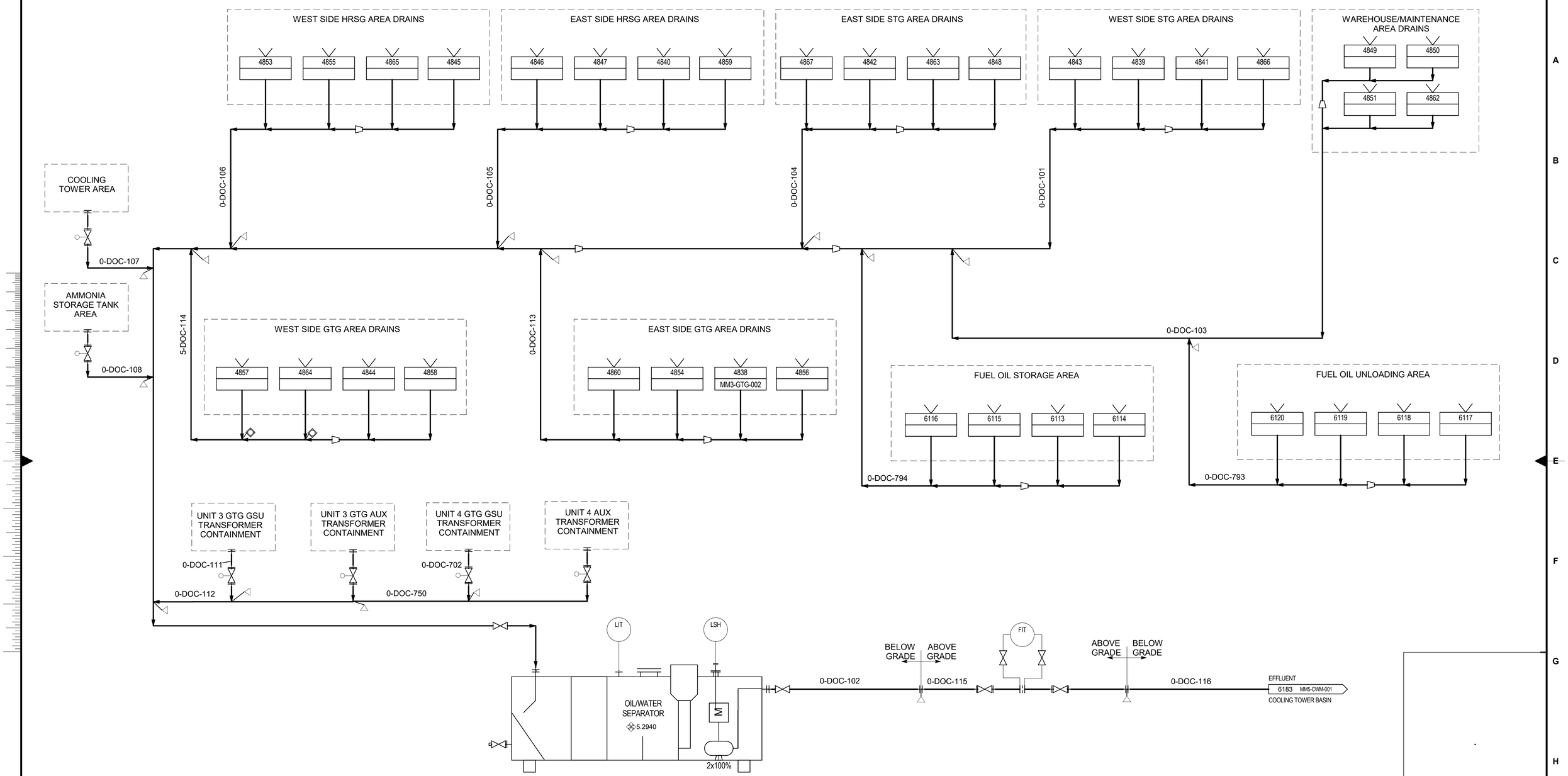

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no.	date	by	ckd	description

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
OILY DRAIN DISPOSAL

project 157787 | contract

drawing **MM0-DOC-001** | rev. **B**

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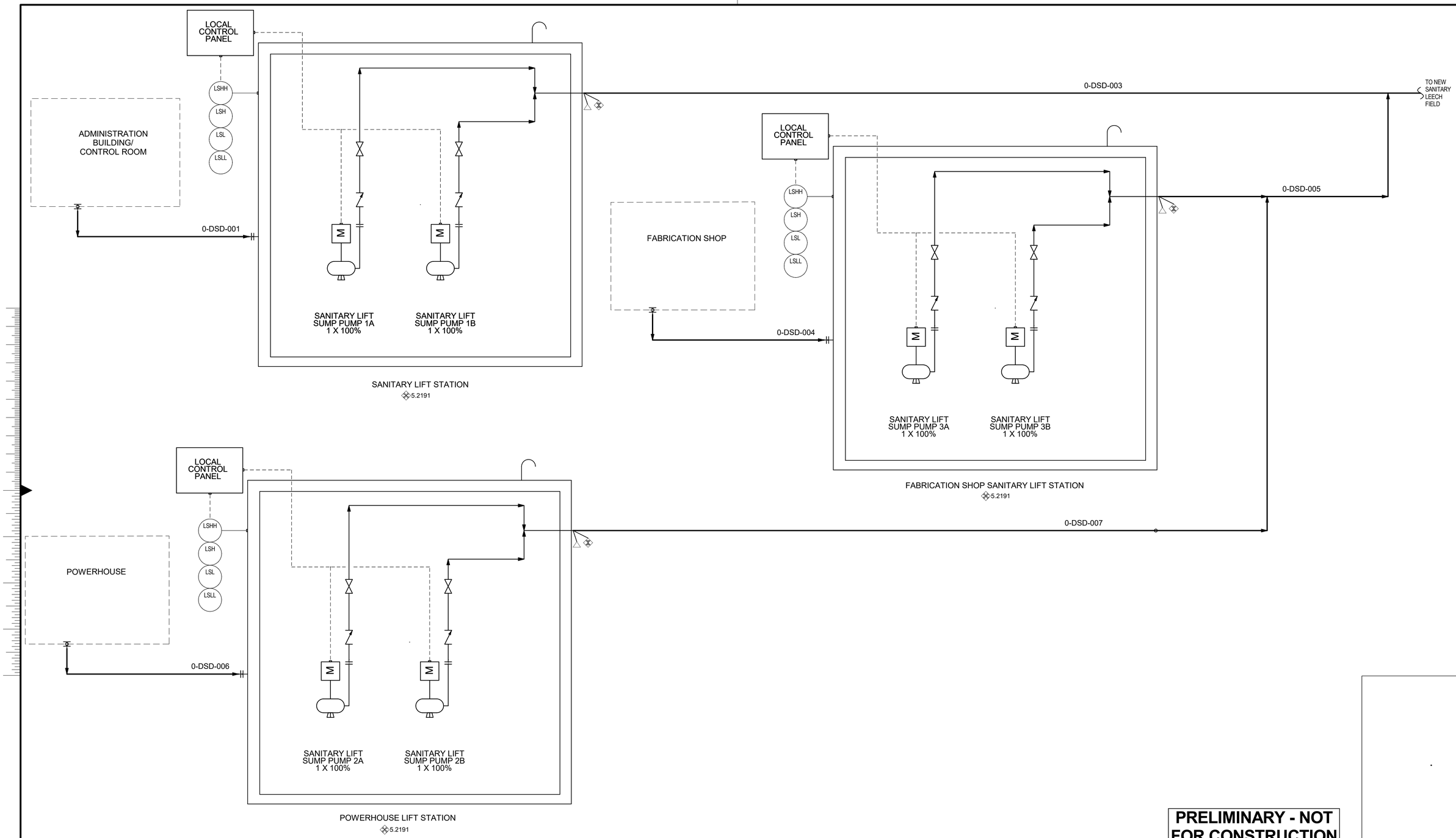

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
SANITARY DRAINS

project 157787 | contract

drawing **MM0-DSD-001** rev. **B**

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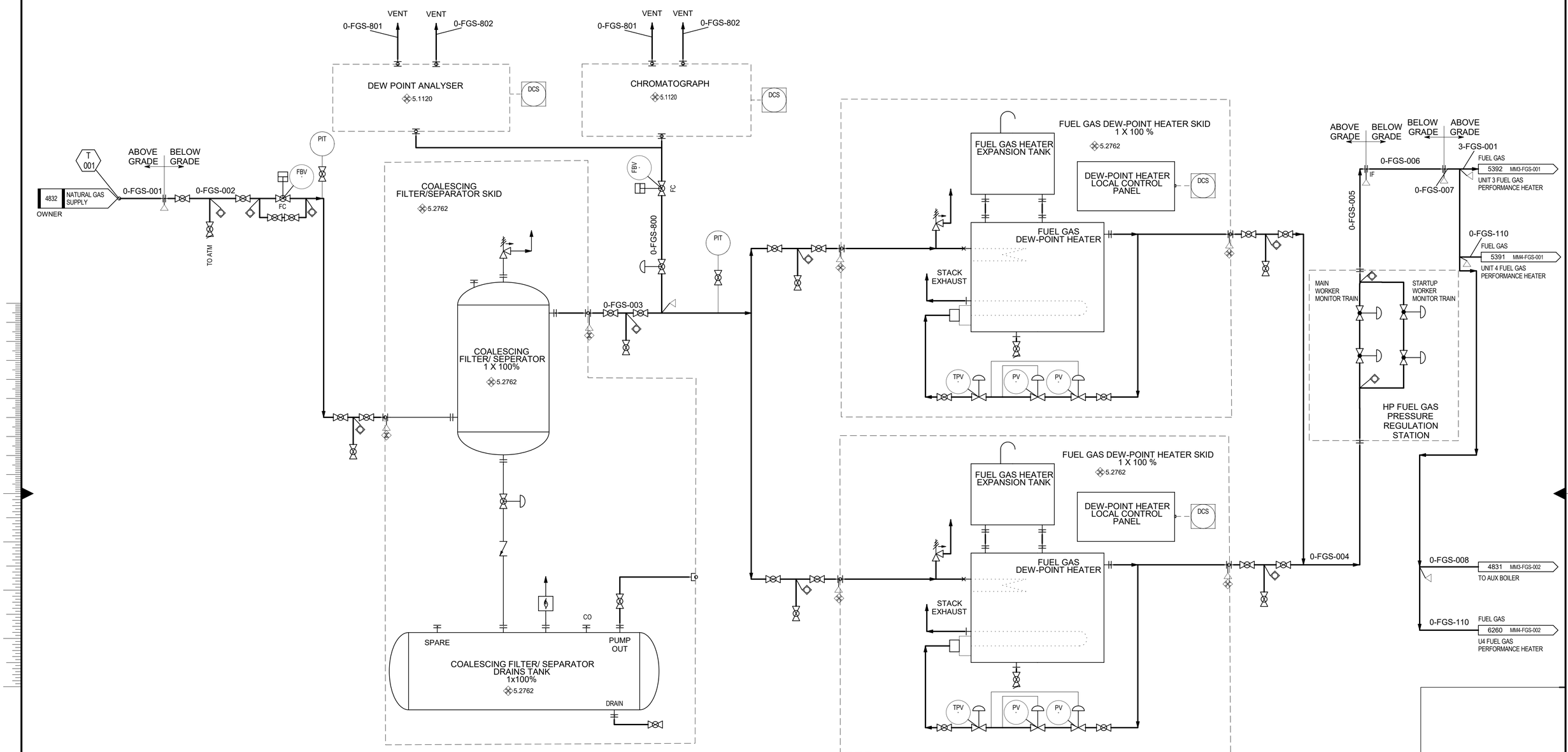

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A	12/01/23	ZRL	BAN	ISSUED FOR OWNER REVIEW

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
NATURAL GAS FILTERS, HEATERS, AND REGULATION

project 157787 | contract

drawing **MM0-FGS-001** rev. **B**

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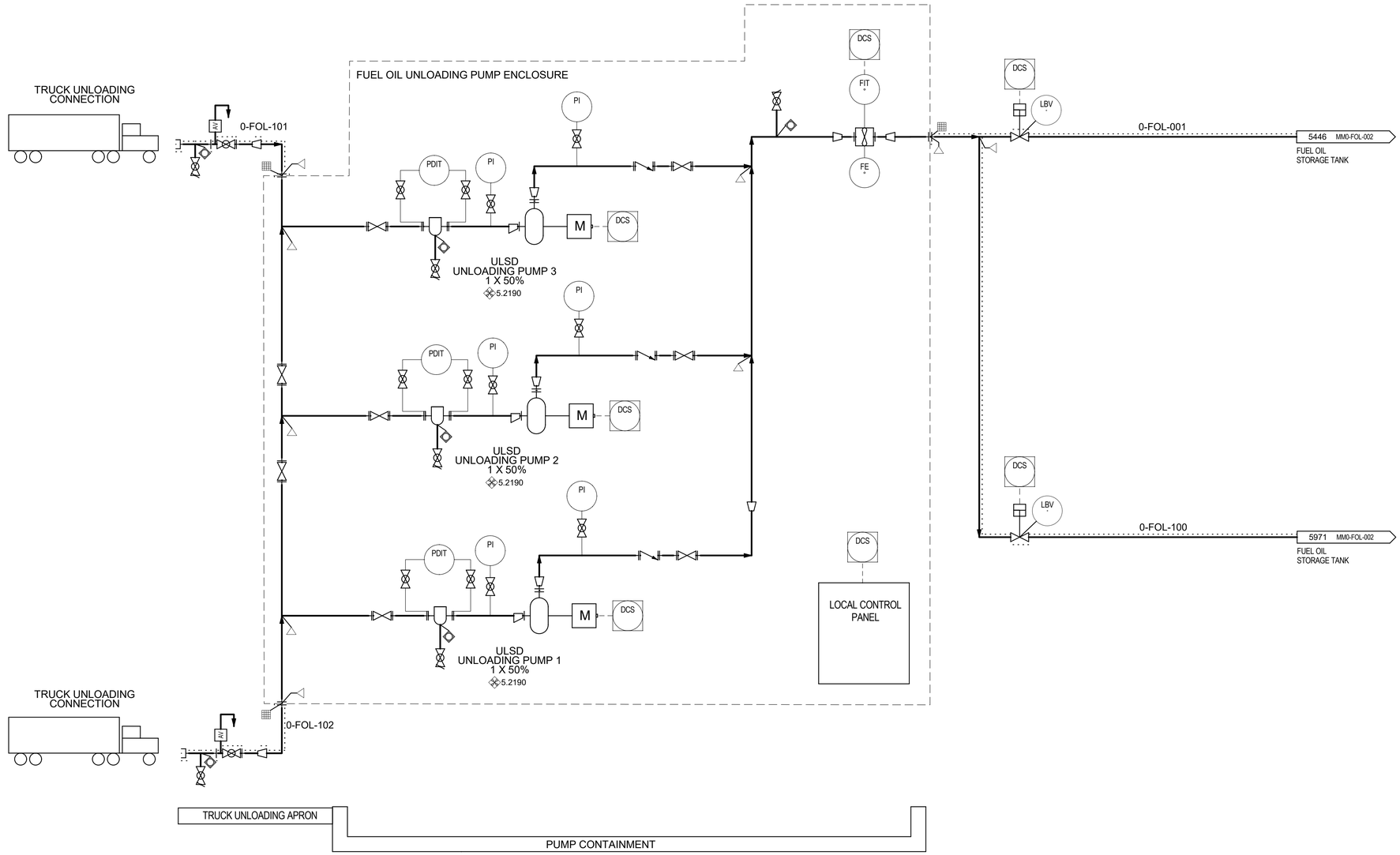

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A	12/01/23	ZRL	BAN	ISSUED FOR OWNER REVIEW

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
FUEL OIL UNLOADING PUMPS

project 157787 | contract

drawing **MM0-FOL-001** | rev. **B**

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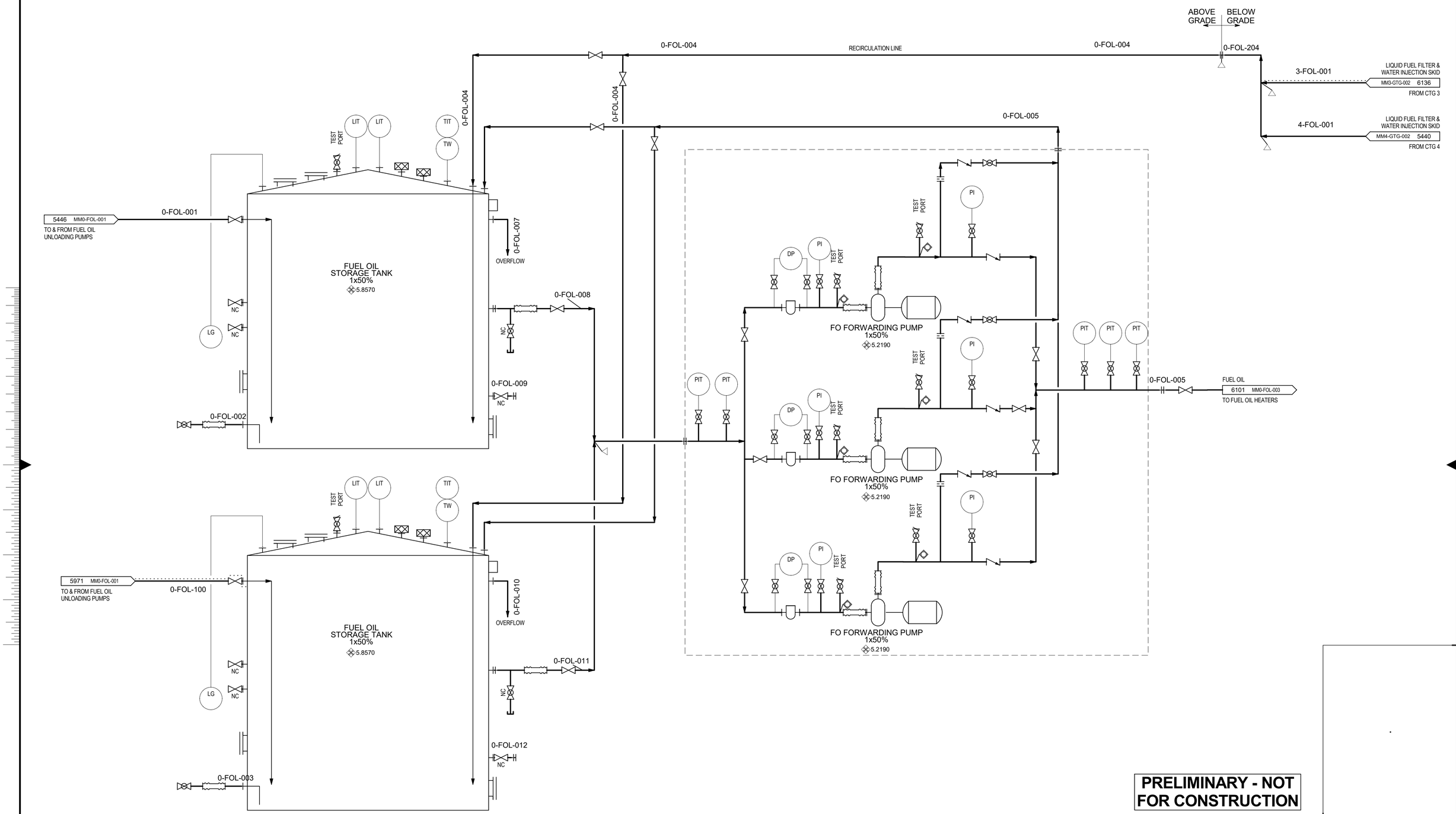

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
FUEL OIL STORAGE & FORWARDING PUMPS

project 157787 | contract

drawing **MM0-FOL-002** | rev. **B**

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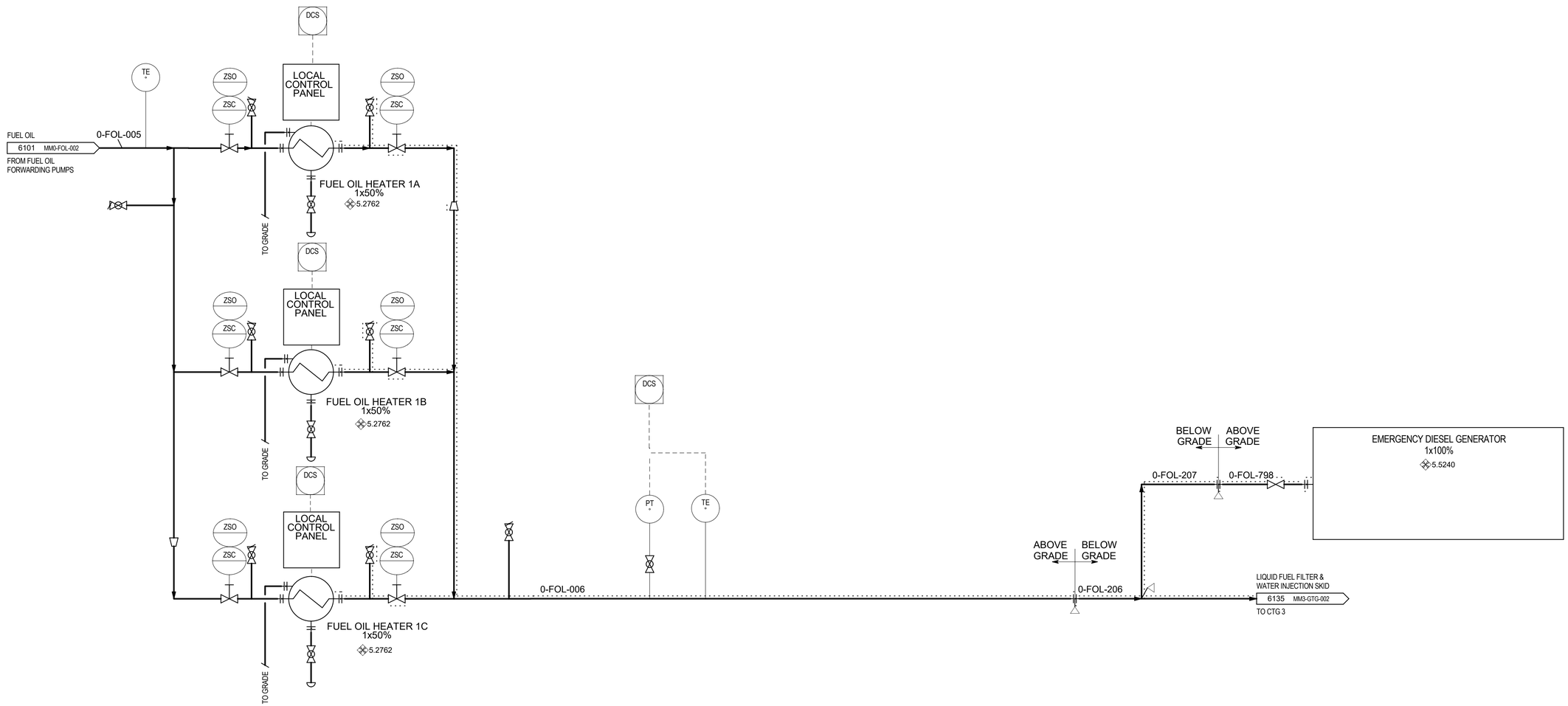

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
FUEL OIL HEATERS

project 157787 | contract

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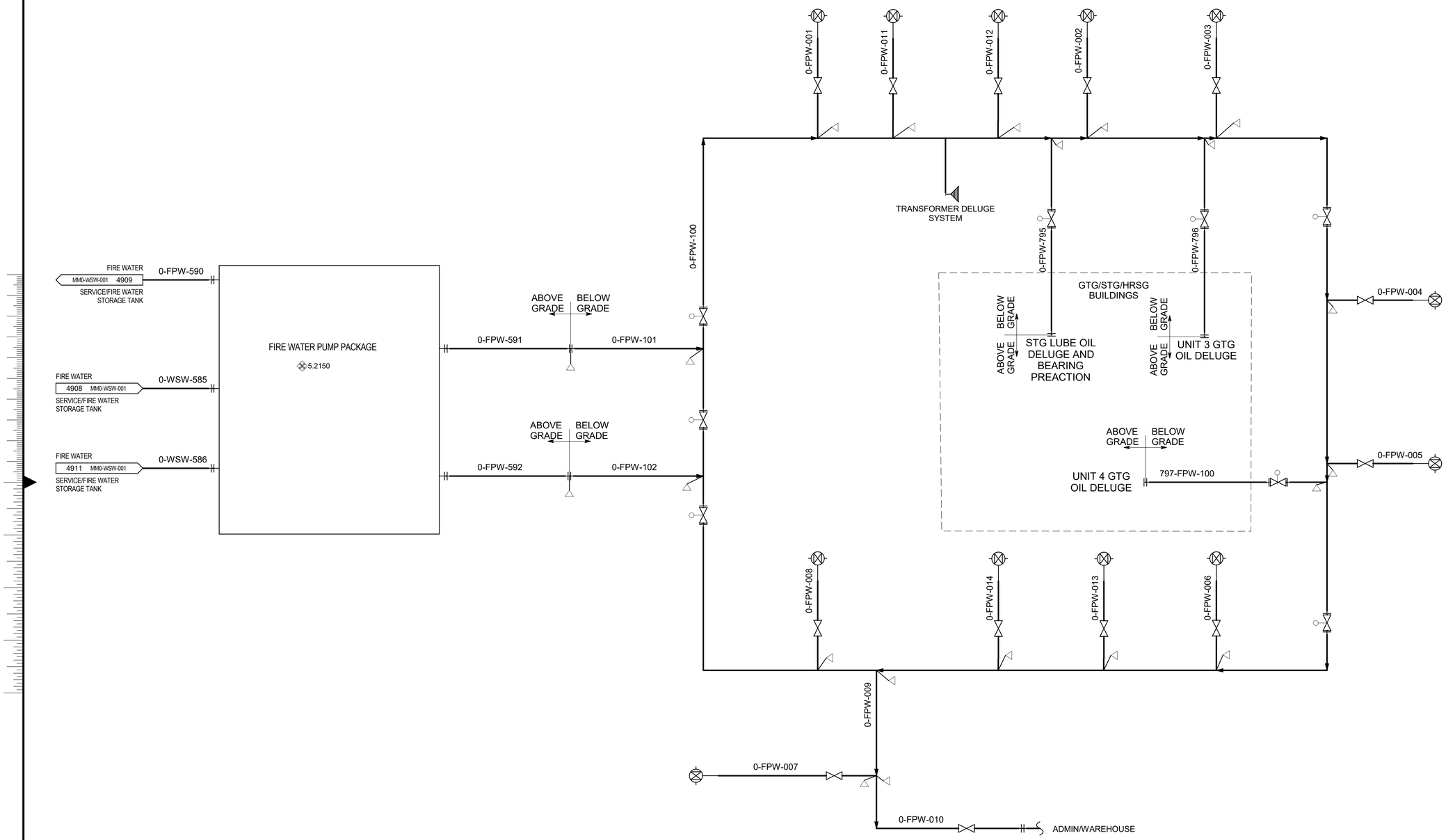

PRELIMINARY - NOT FOR CONSTRUCTION

no.	date	by	ckd	description
B	05/03/24	JSG	WKG	ISSUED WITH PROJECT SCOPING REPORT
A	12/04/23	CDM	BAN	ISSUED FOR OWNER REVIEW

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
FIRE PROTECTION

project 157787 | contract

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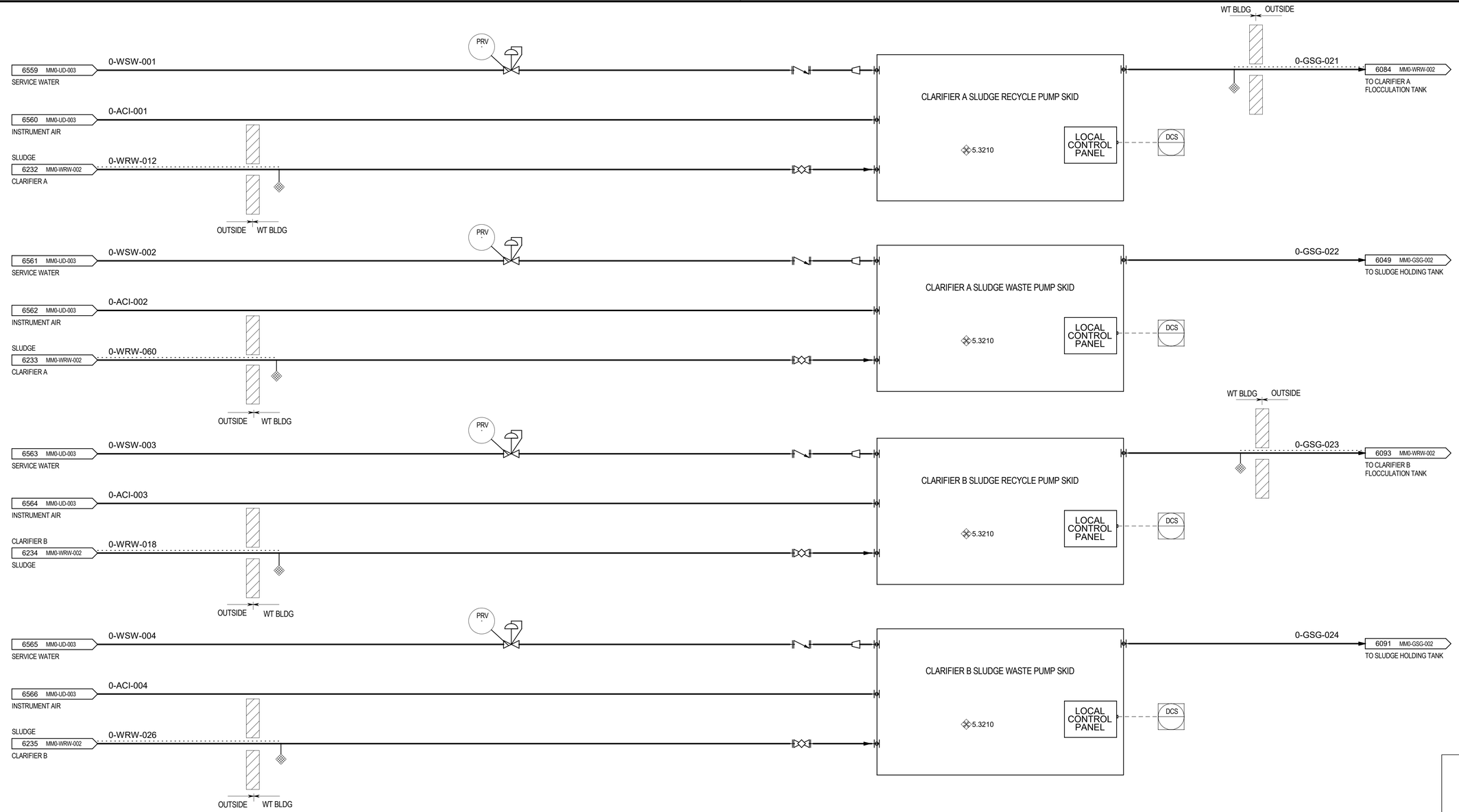

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no.	date	by	ckd	description

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EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
CLARIFIER SLUDGE PUMP SKID

project 157787 | contract

drawing **MM0-GSG-001** | rev. **B**

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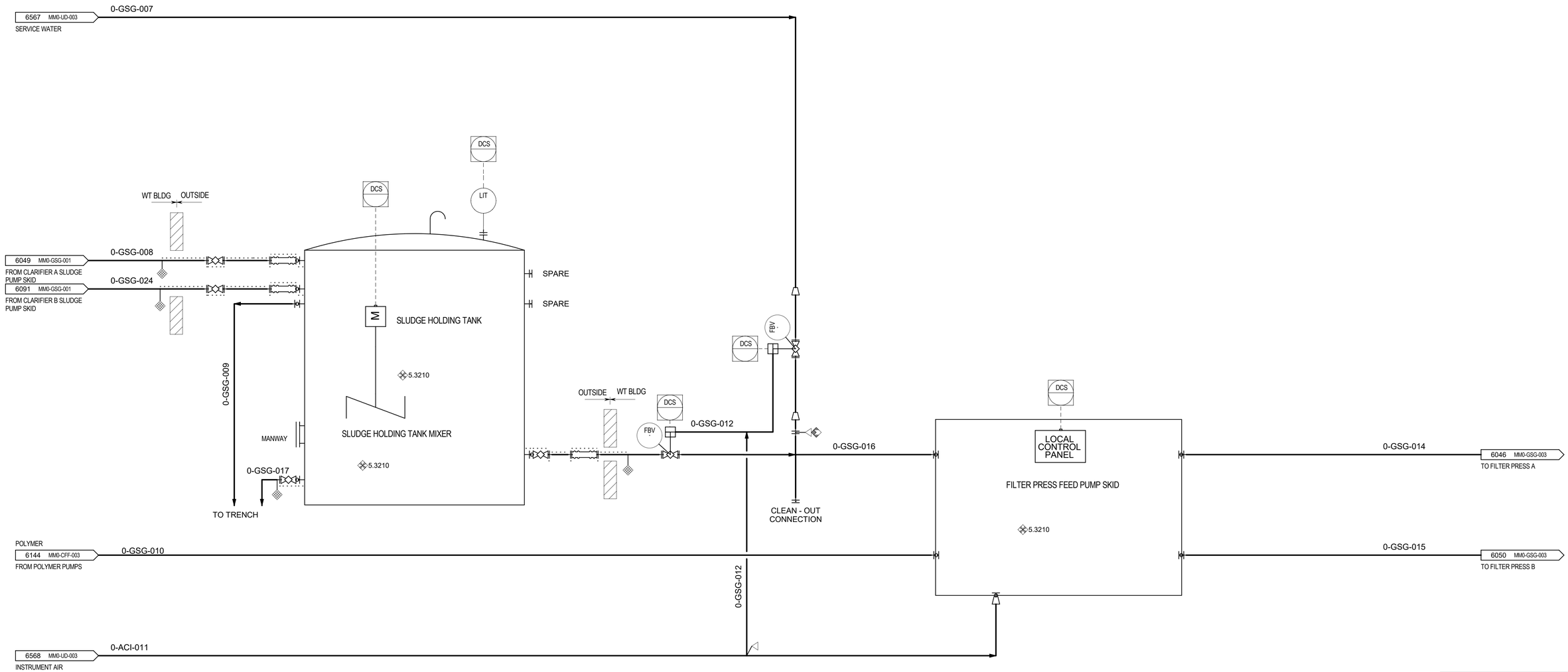

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EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
SLUDGE HOLDING TANK & FILTER

project 157787 | contract

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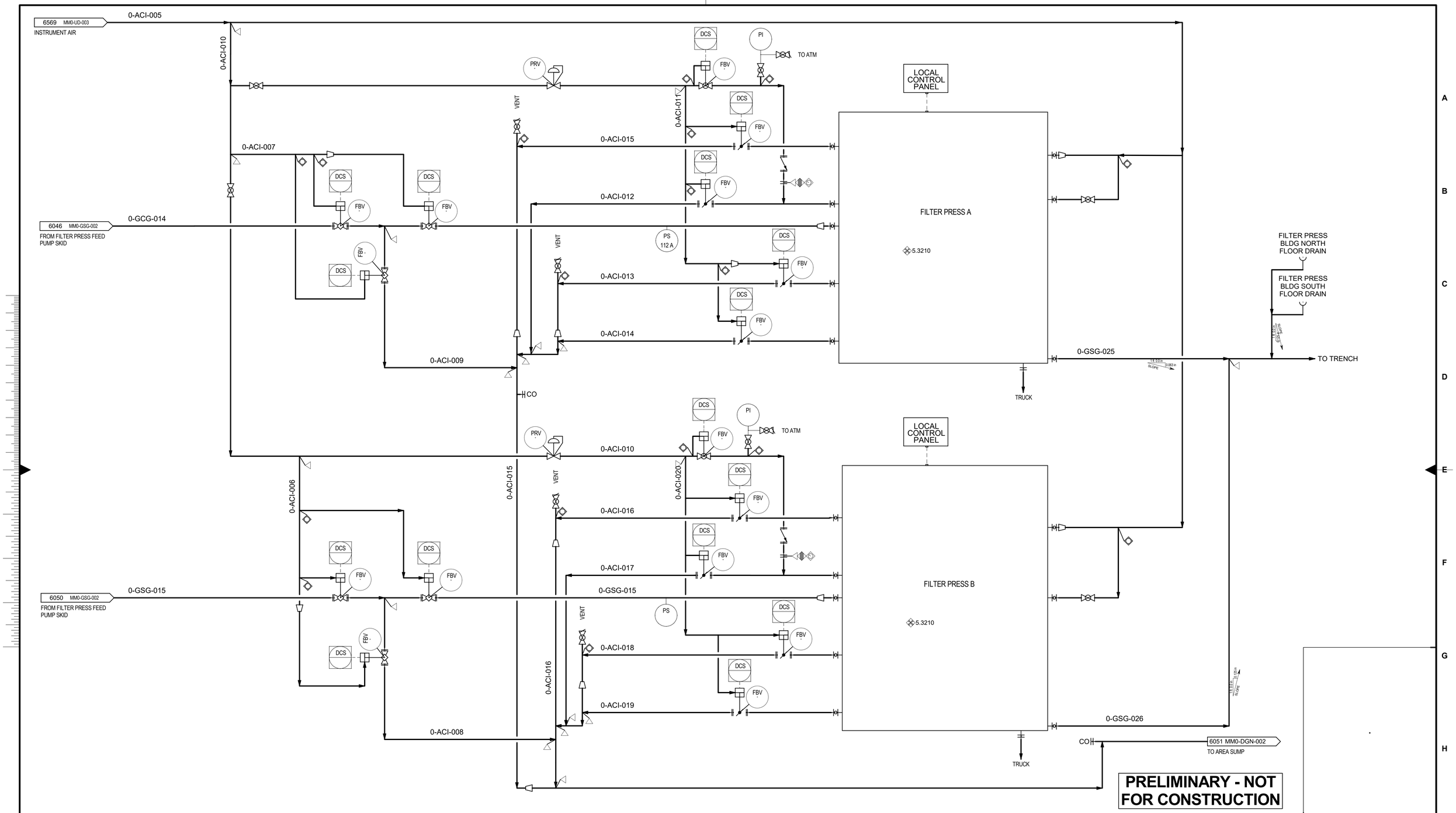

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
FILTER PRESSES

project 157787 | contract

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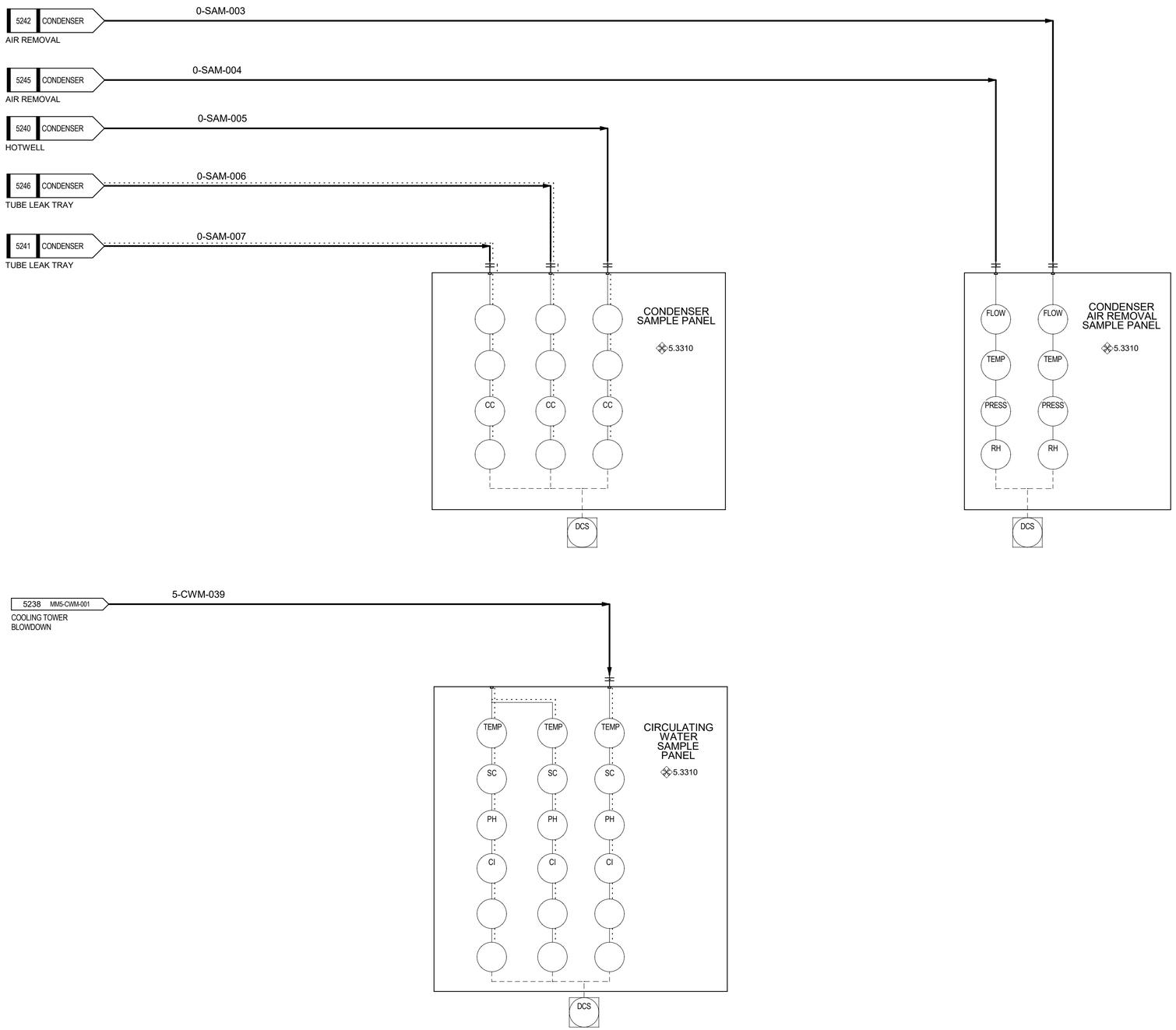

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EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
PROCESS SAMPLING

project 157787 | contract

drawing **MM0-SAM-001** | rev. **— B**

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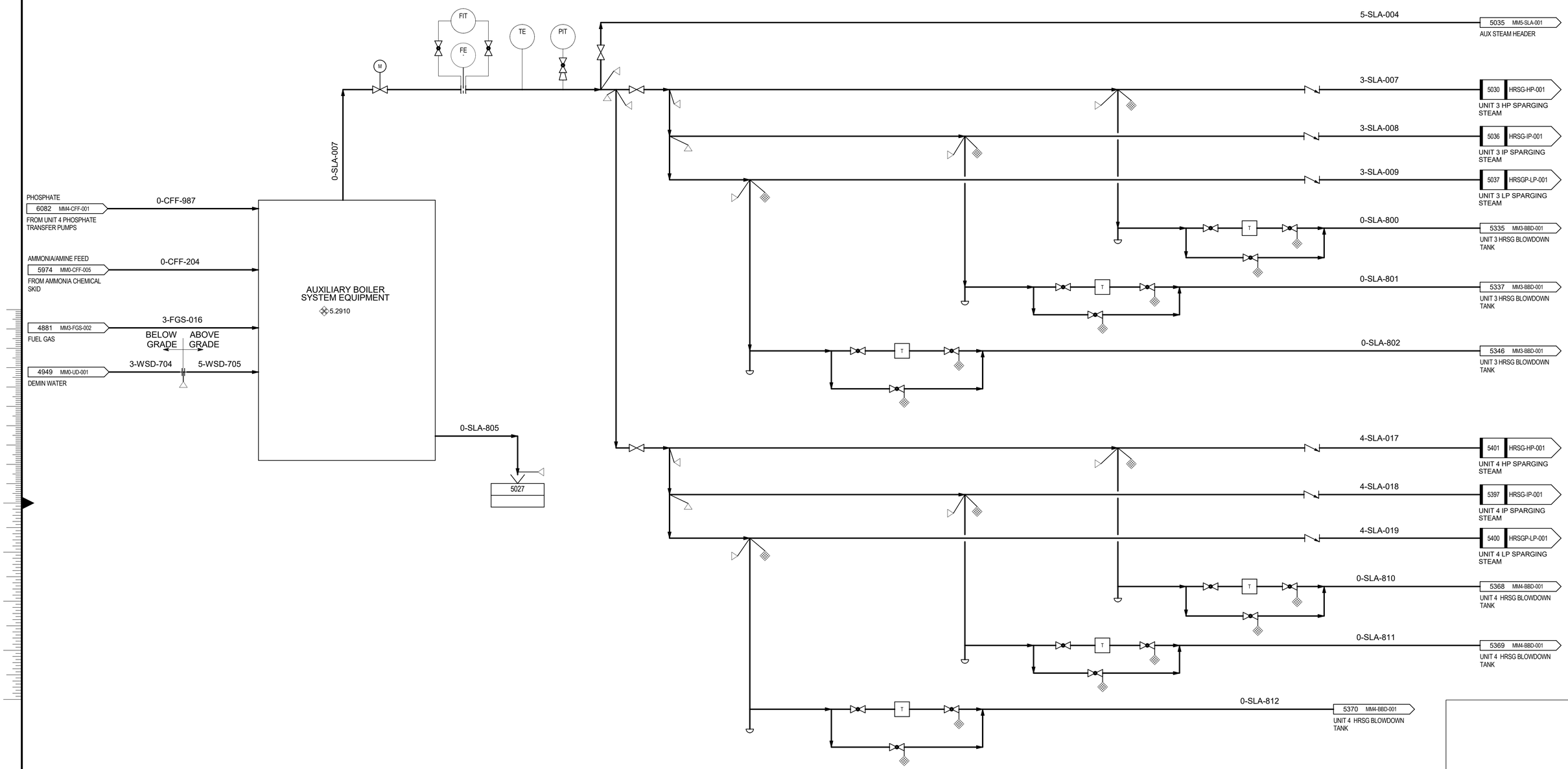

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EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
AUXILIARY STEAM

project 157787 | contract

drawing **MM0-SLA-001** rev. **B**

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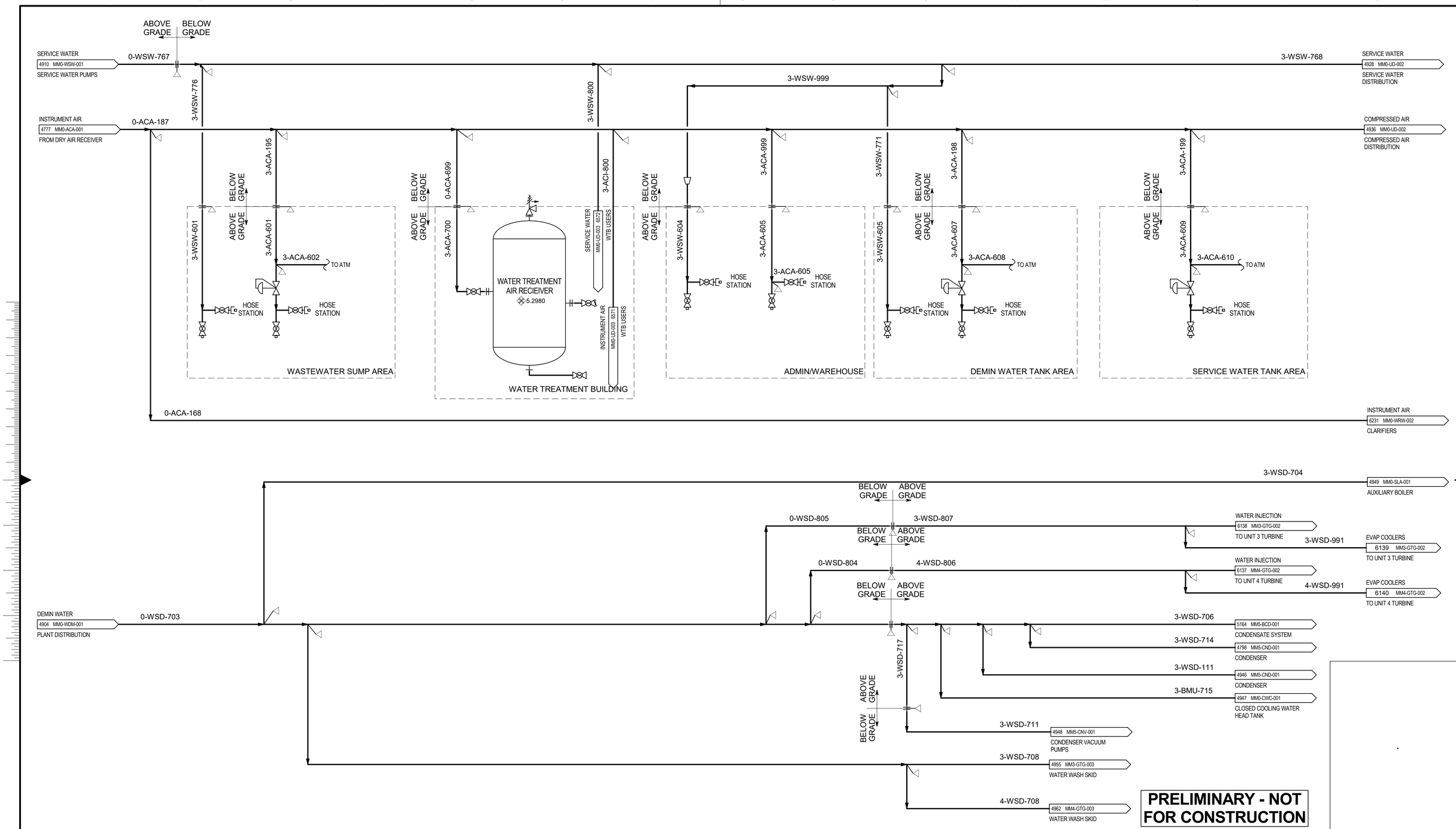

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B	05/03/24	JSG	WKG	ISSUED WITH PROJECT SCOPING REPORT
A	12/04/23	CDM	BAN	ISSUED FOR OWNER REVIEW

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
UTILITY DISTRIBUTION

project 157787 | contract

drawing **MM0-UD-001** rev. **C**

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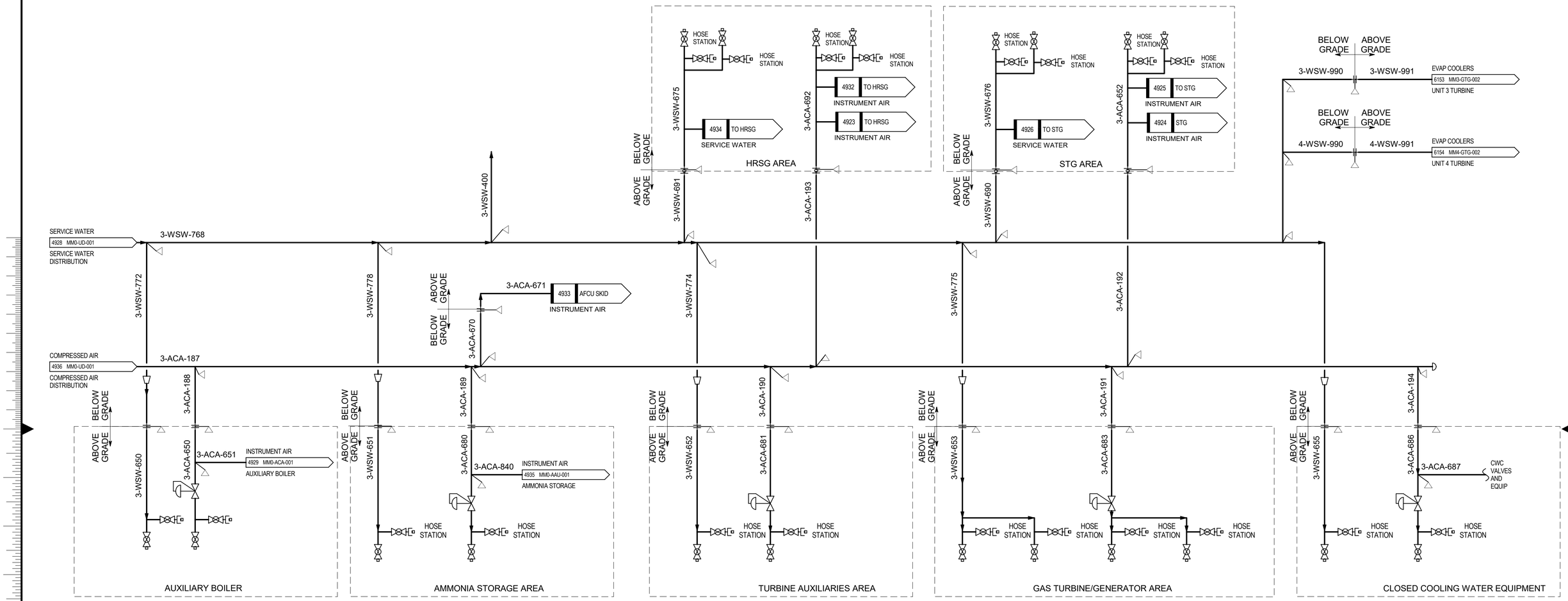

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B	05/03/24	JSG	WKG	ISSUED WITH PROJECT SCOPING REPORT
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detailed:

EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
UTILITY DISTRIBUTION

project: 157787
contract:
drawing: **MM0-UD-002**
rev.: **C**
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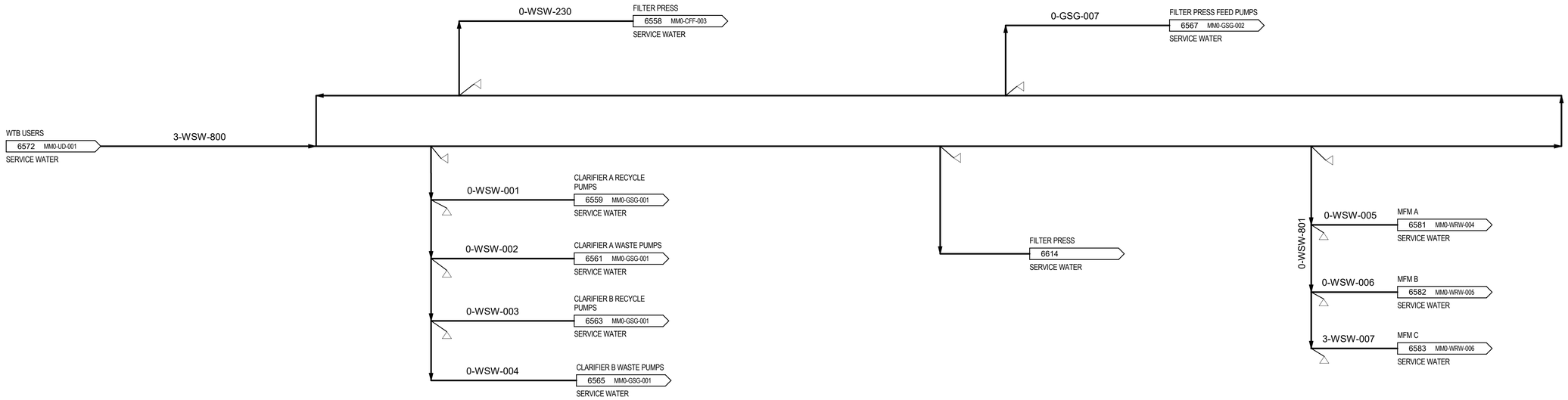

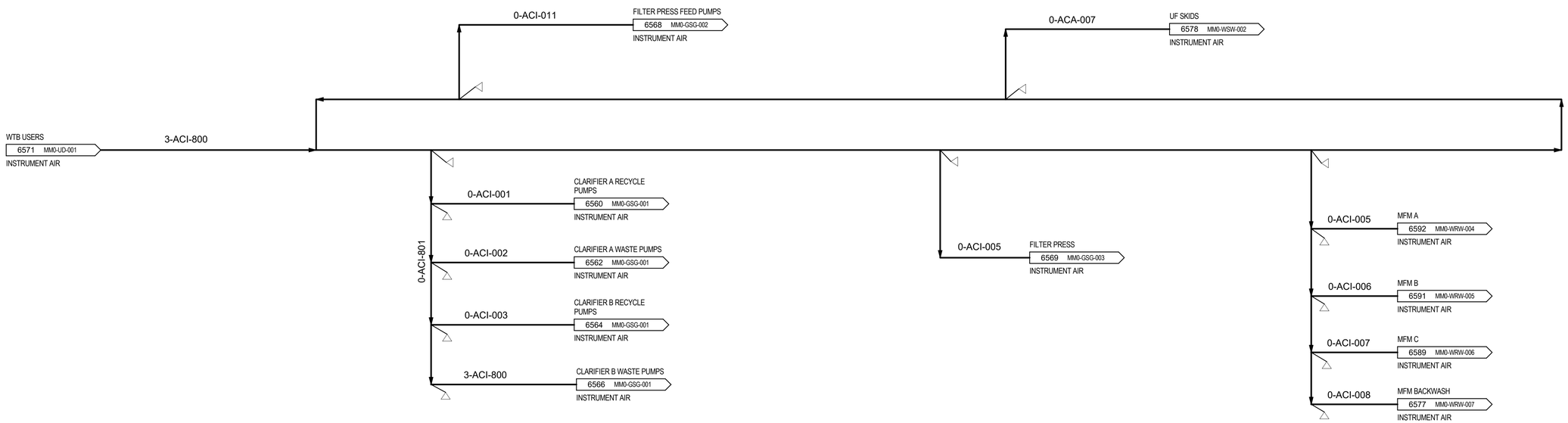

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EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
WATER TREATMENT AREA

project 157787 | contract

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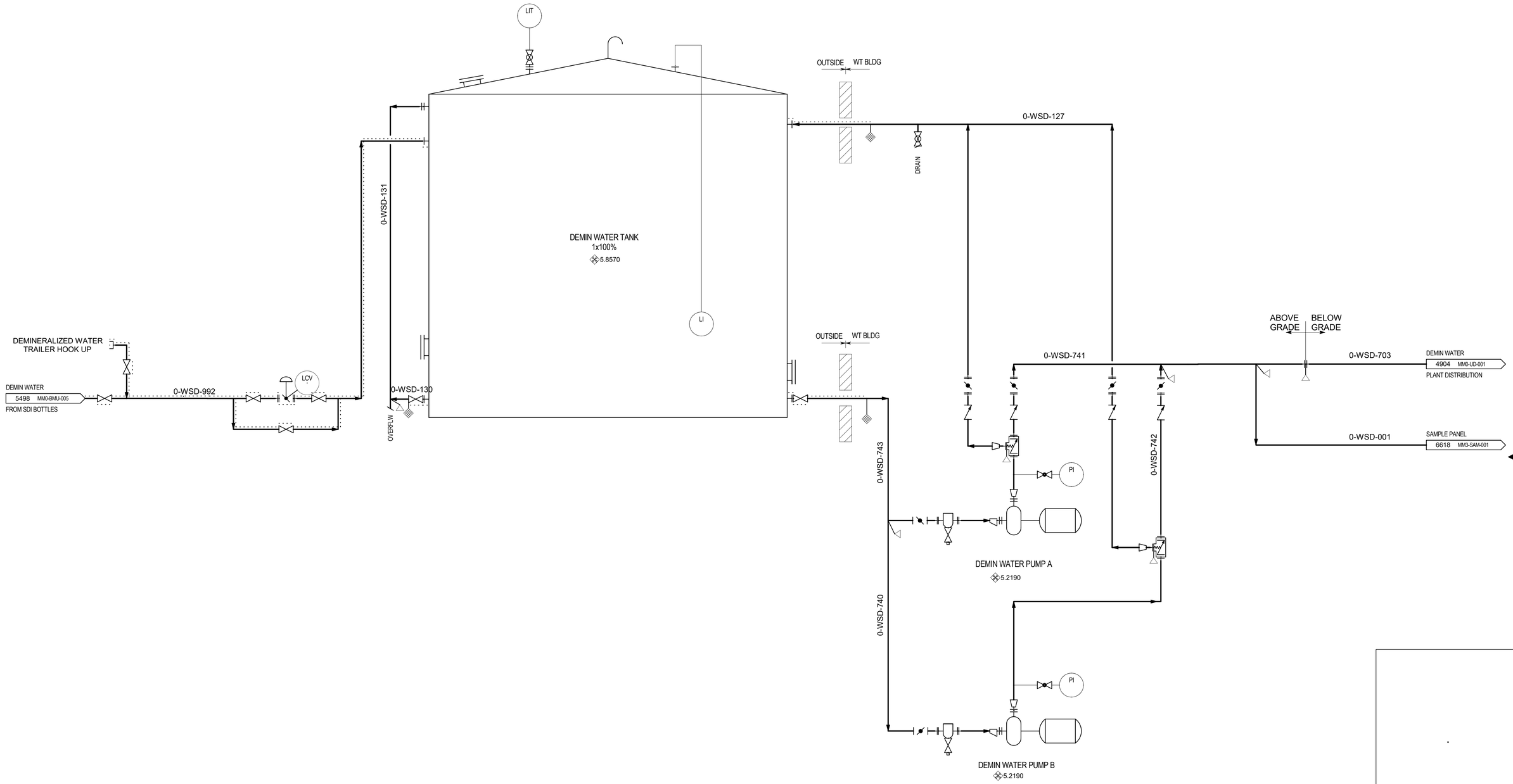

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A	12/15/23	VJB	ZB	ISSUED FOR OWNER REVIEW

no.	date	by	ckd	description

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
DEMIN WATER TANK

project 157787 | contract

drawing **MM0-WDM-001** rev. **B**

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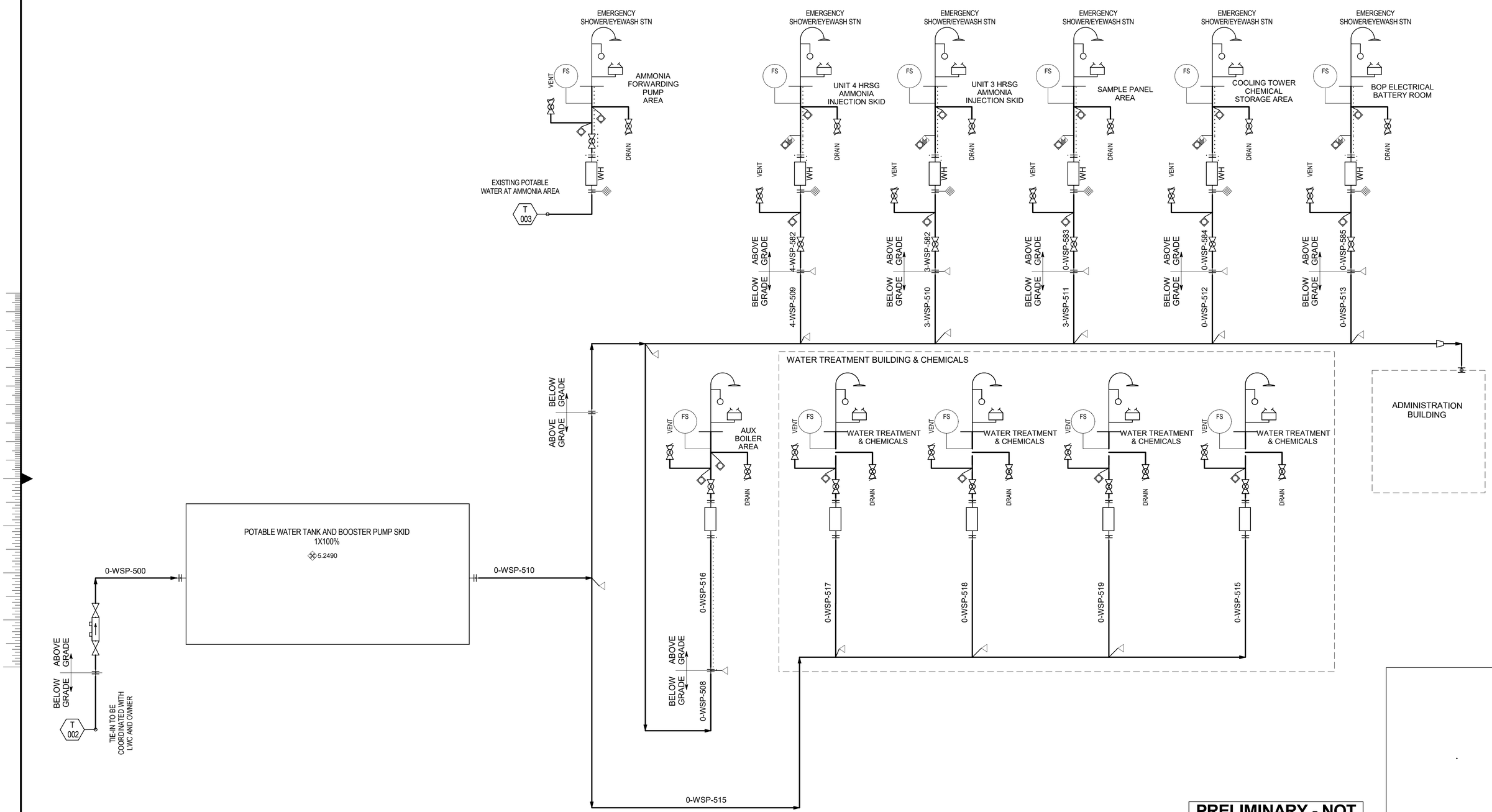

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no.	date	by	ckd	description

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
POTABLE WATER

project 157787 | contract

drawing **MM0-WPO-001** | rev. **B**

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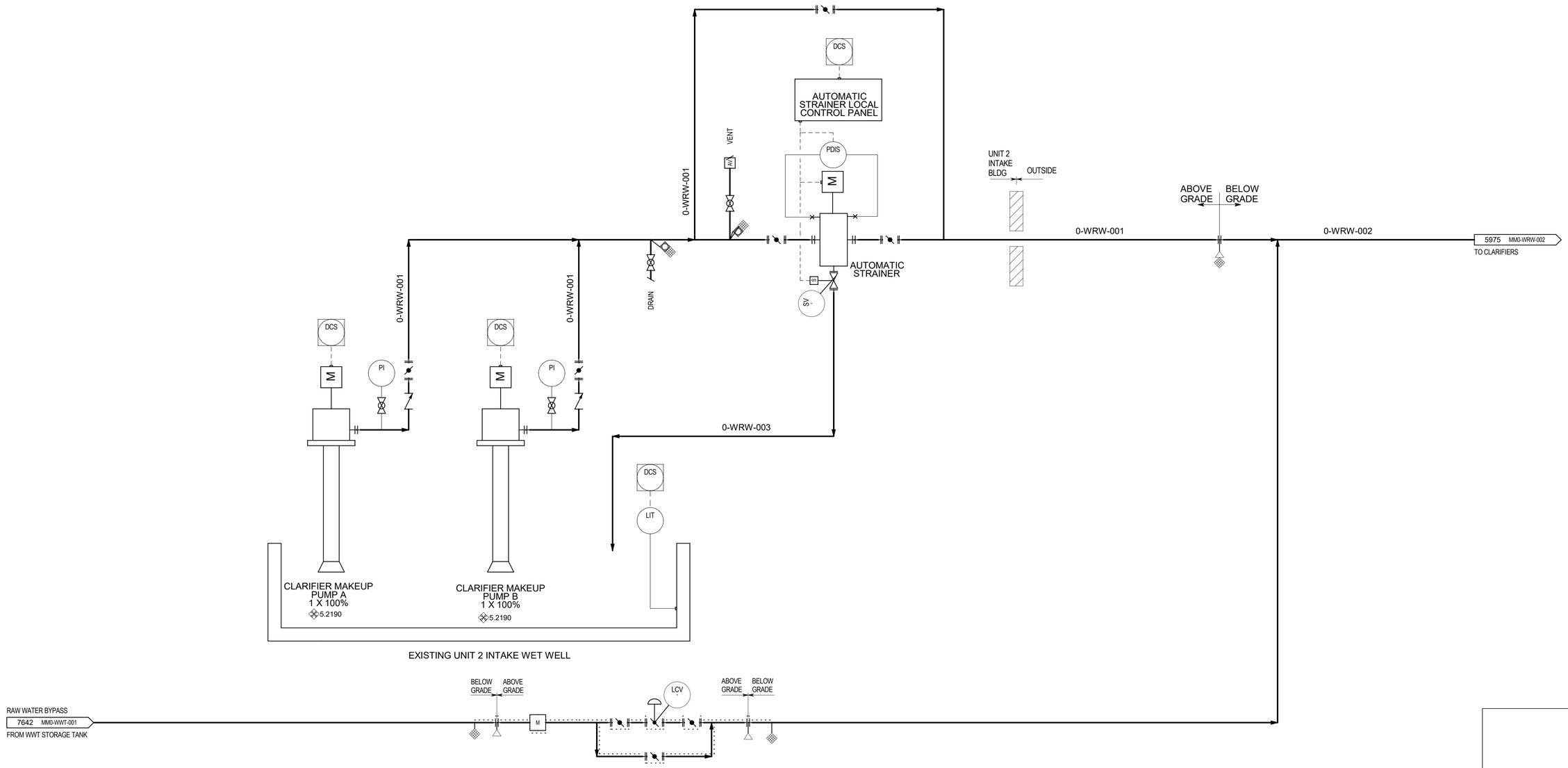

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no.	date	by	ckd	description

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
RAW WATER SUPPLY

project 157787 | contract

drawing **MM0-WRW-001** | rev. **B**

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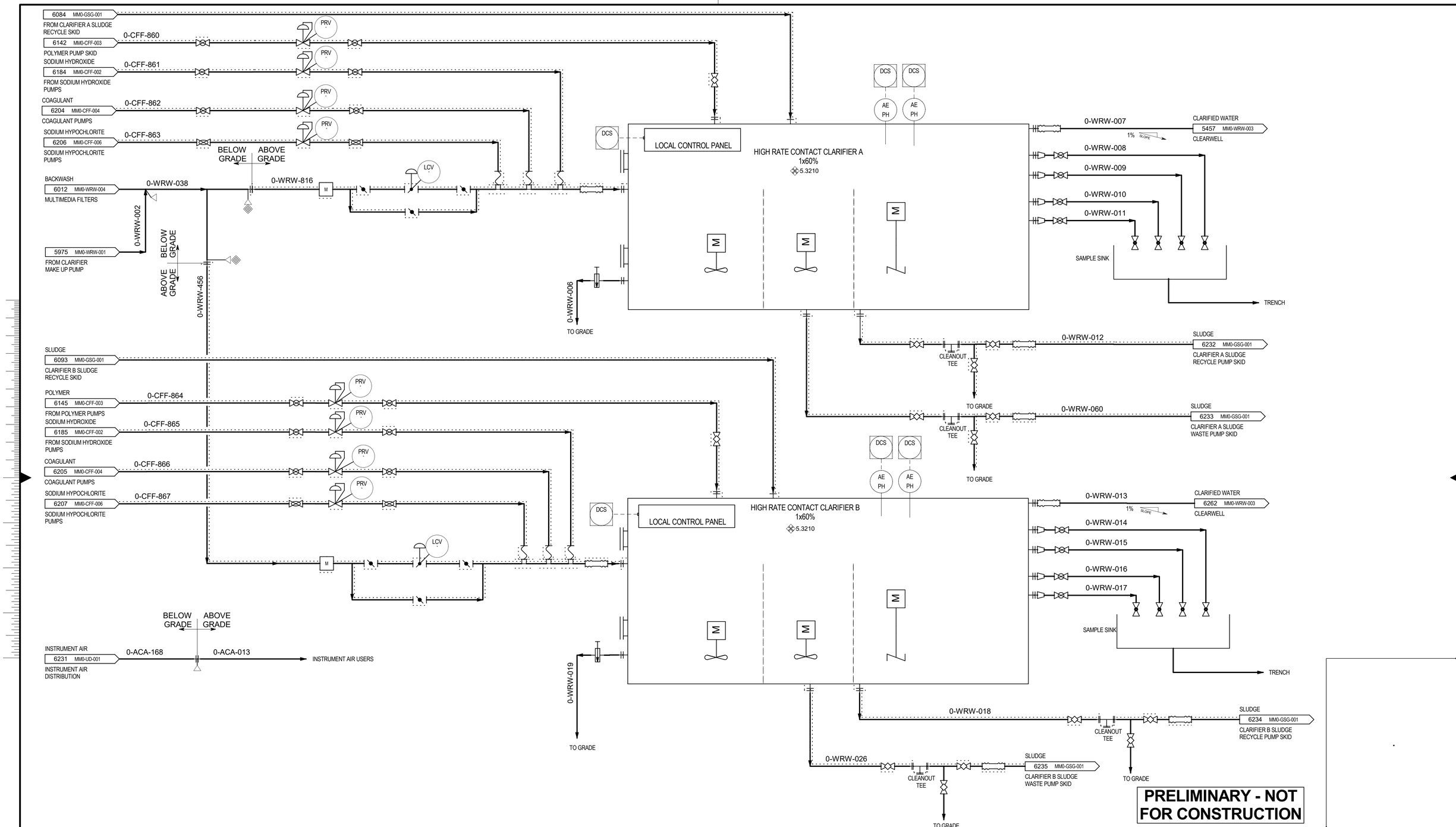

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
HIGH RATE CONTACT CLARIFIERS

project 157787
contract
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rev. **B**
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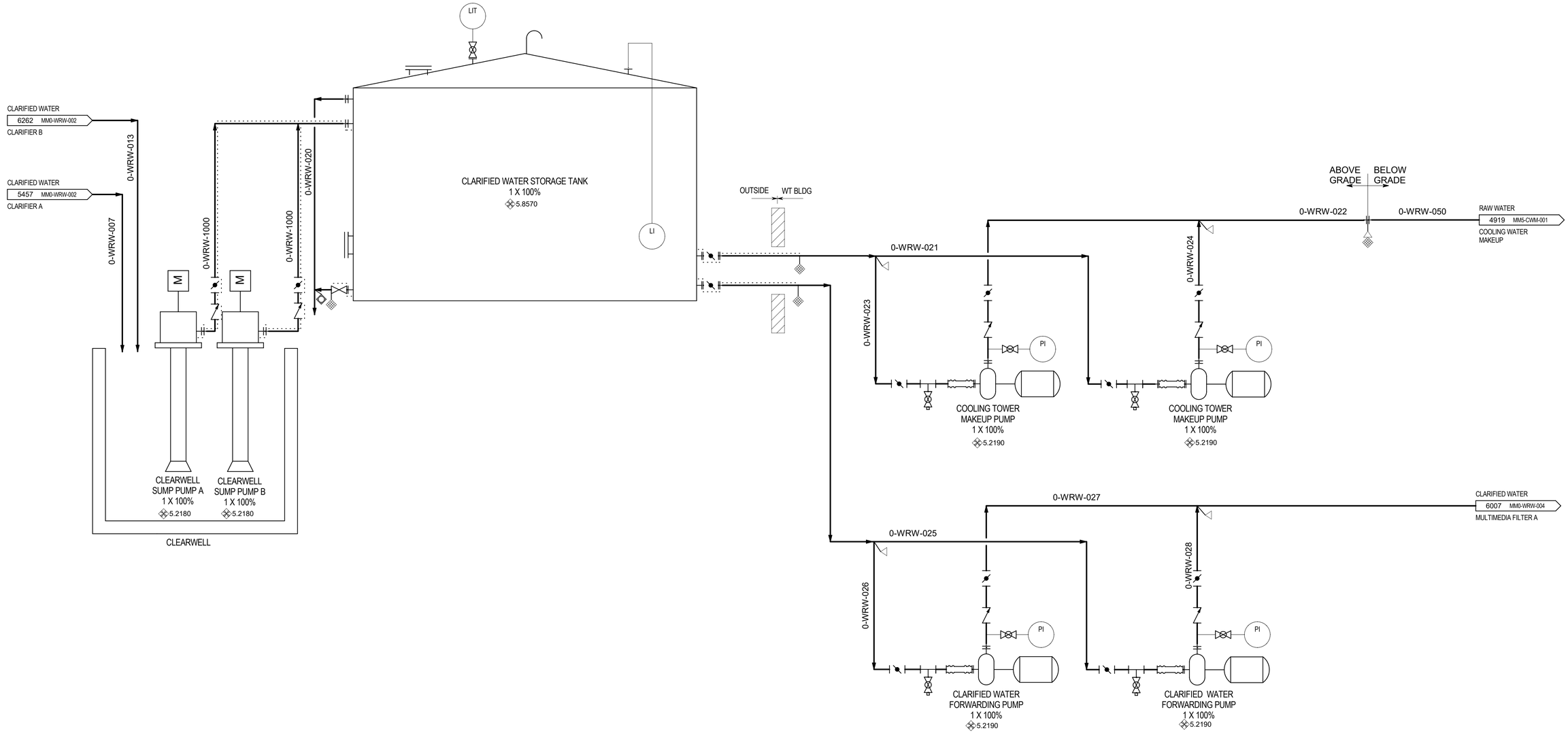

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
CLARIFIED WATER TANK

project 157787 | contract

drawing **MM0-WRW-003** | rev. **— B**

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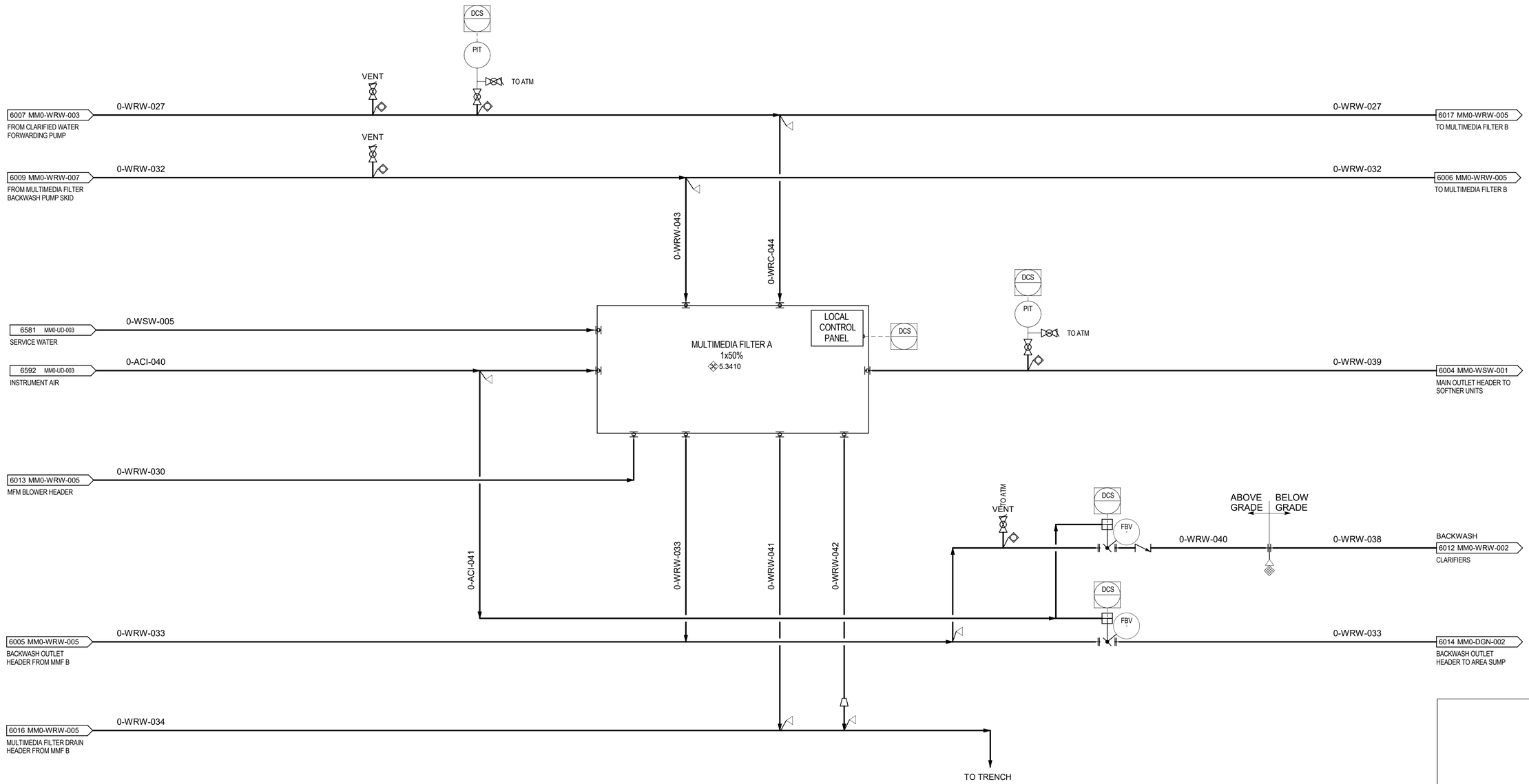

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
MULTIMEDIA FILTER

project 157787 | contract

drawing **MM0-WRW-004** rev. **— B**

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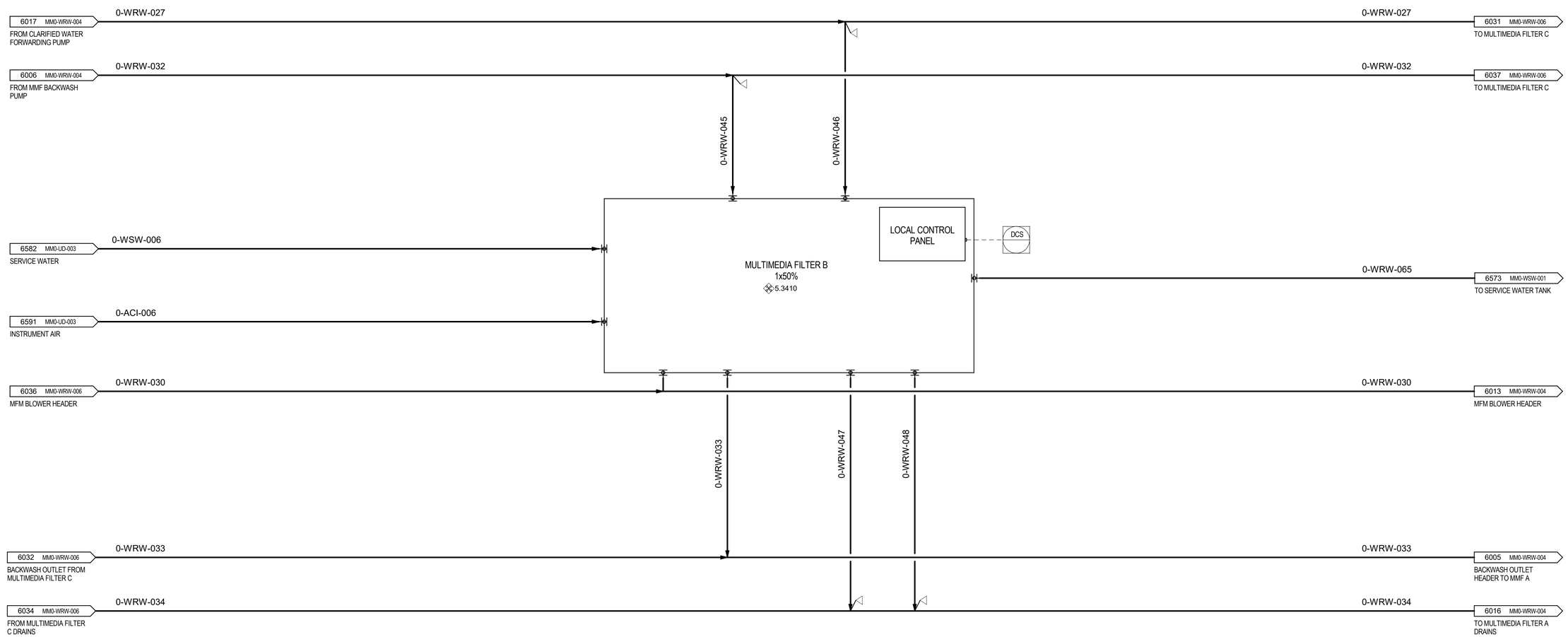

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
MULTIMEDIA FILTER

project 157787 | contract

drawing **MM0-WRW-005** rev. **B**

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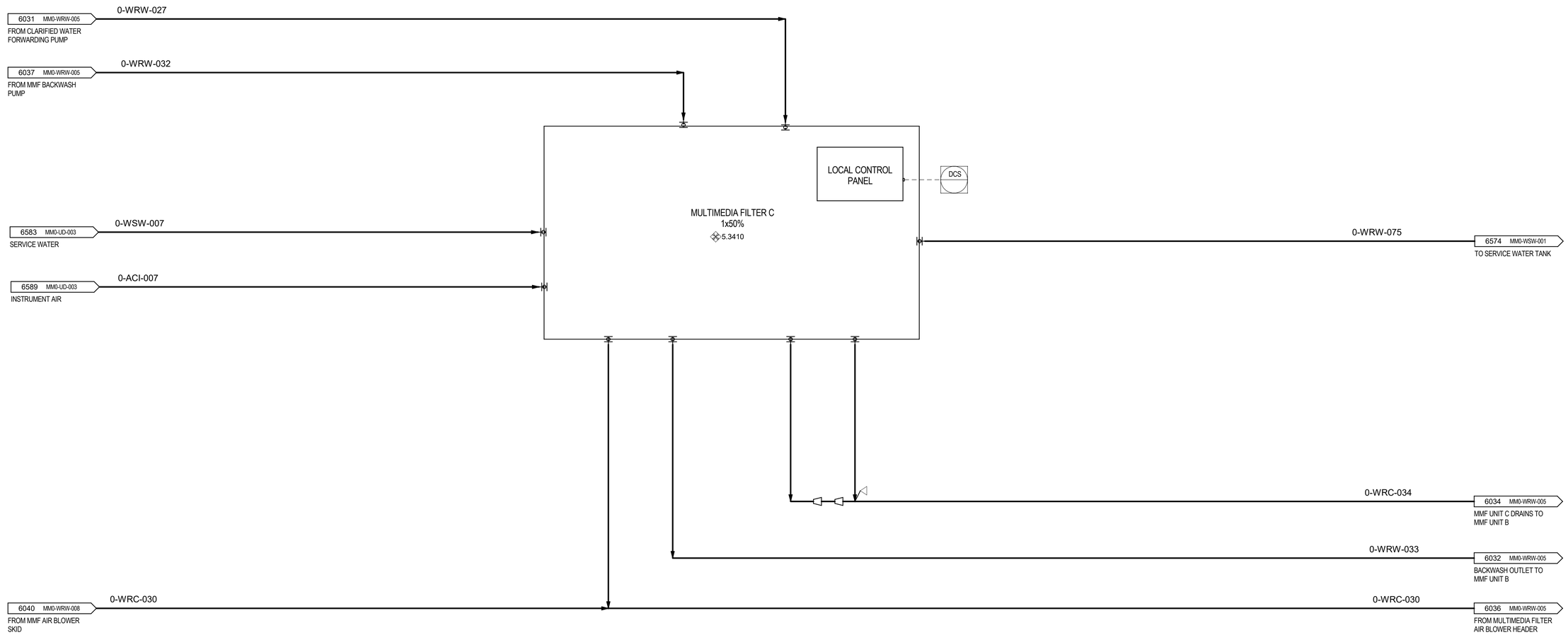

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
MULTIMEDIA FILTER

project 157787 | contract

drawing **MM0-WRW-006** | rev. **B**

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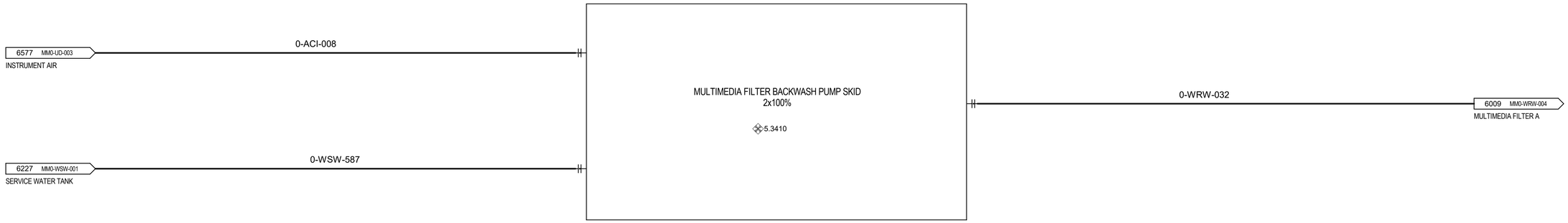

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no.	date	by	ckd	description

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
MMF BACKWASH SKID

project 157787 | contract

drawing **MM0-WRW-007** | rev. **B**

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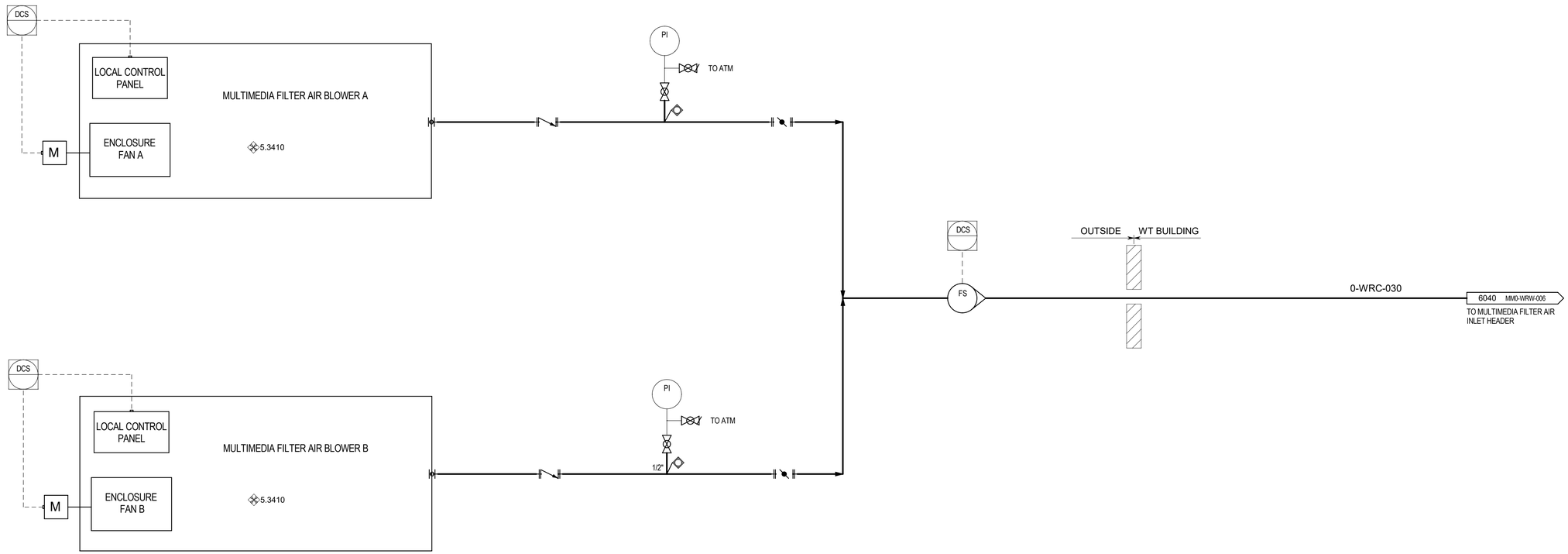

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no.	date	by	ckd	description

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
MULTIMEDIA FILTER AIR BLOWER

project 157787 | contract

drawing **MM0-WRW-008** | rev. **— B**

sheet of sheets

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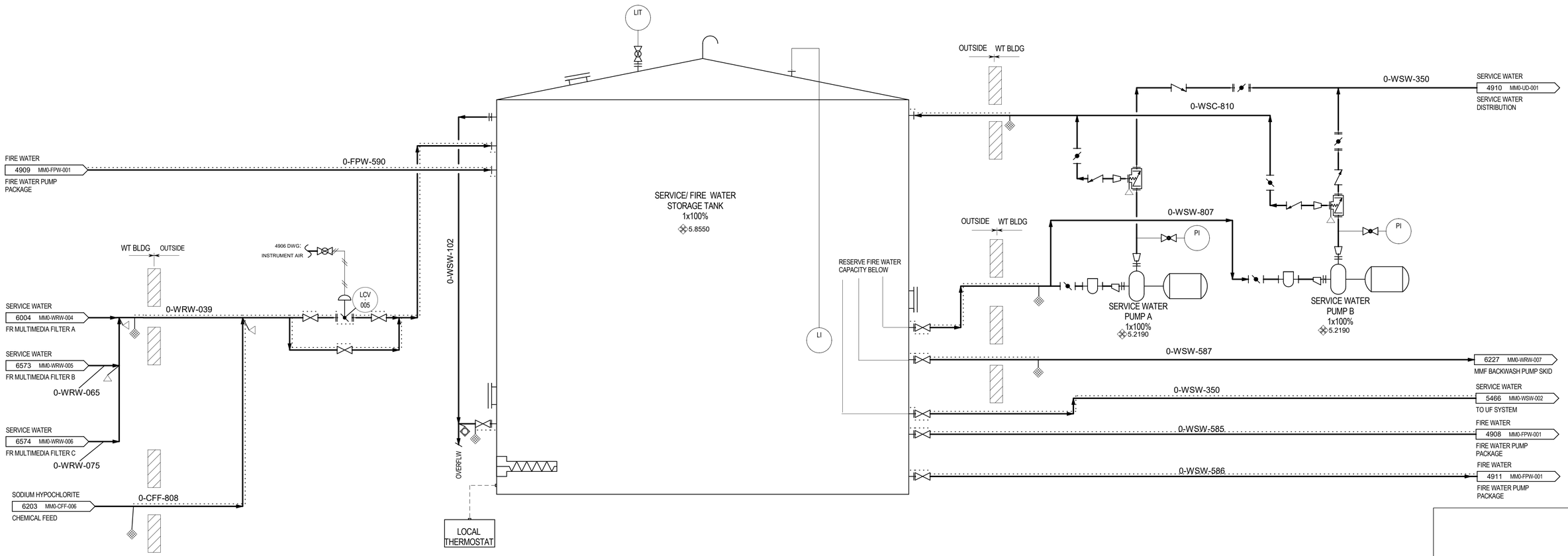

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no.	date	by	ckd	description

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
SERVICE WATER TANK

project 157787 | contract

drawing **MM0-WSW-001** | rev. **B**

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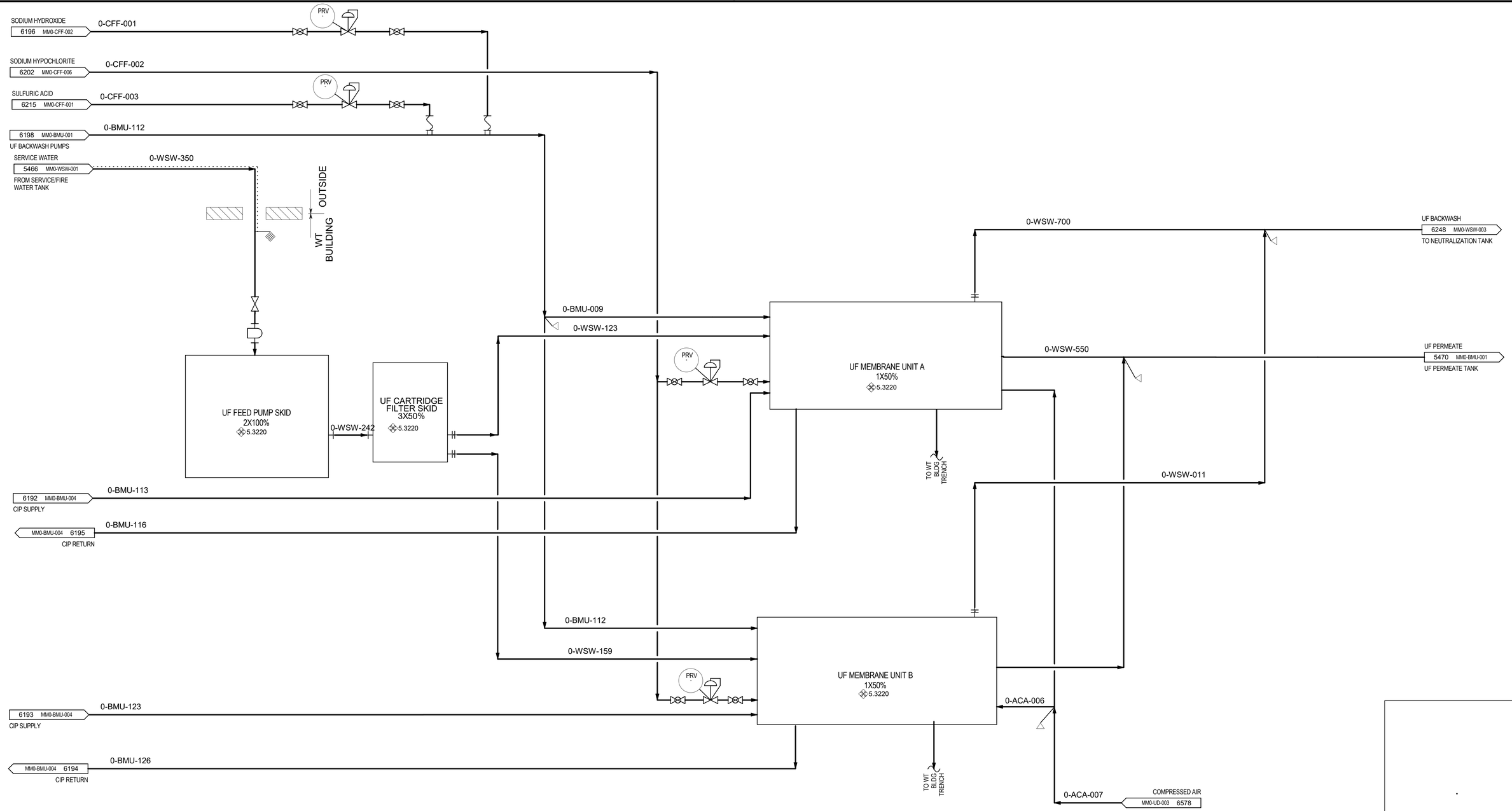

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
ULTRAFILTRATION SYSTEM

project 157787 | contract

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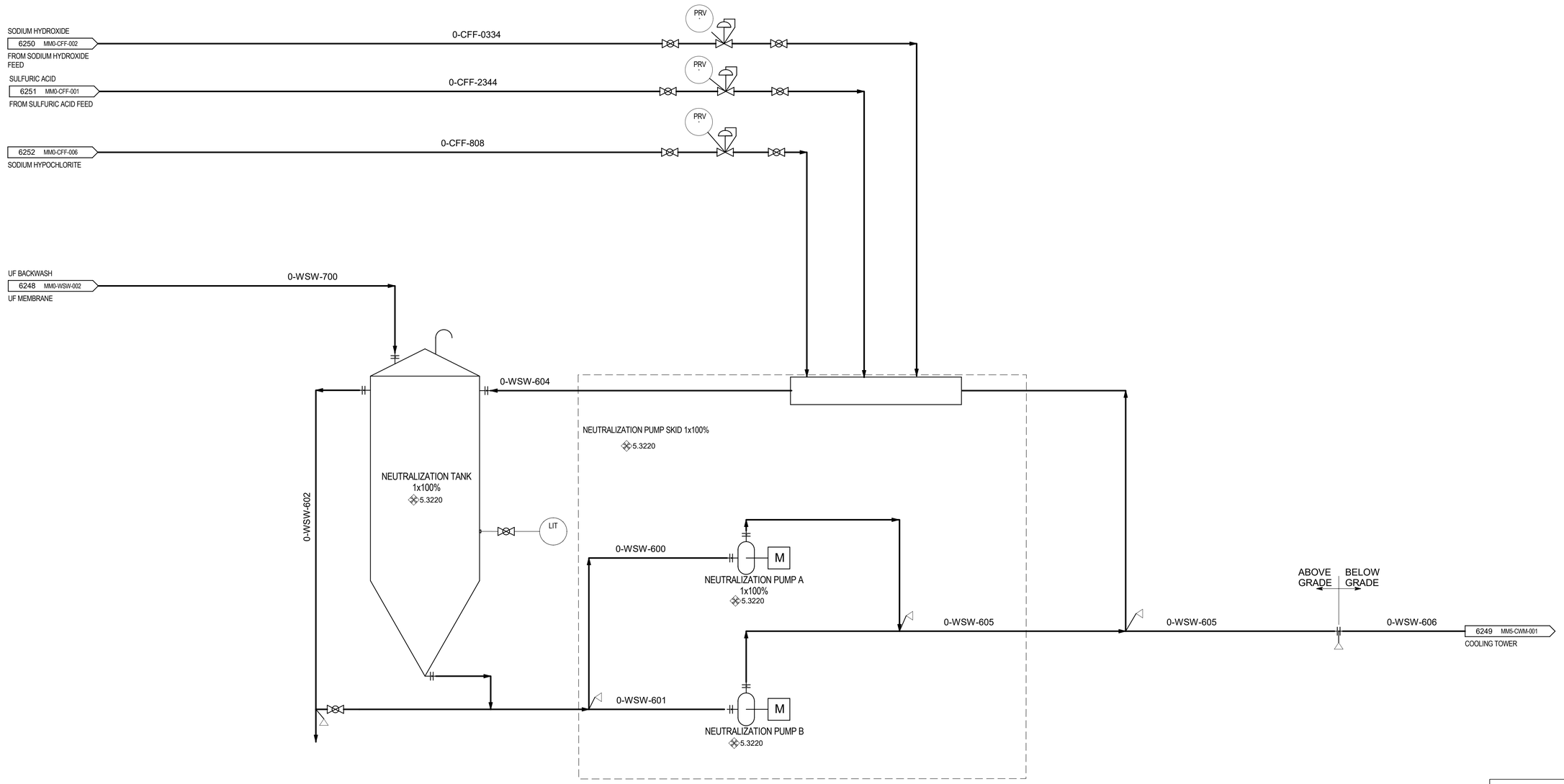

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EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
ULTRAFILTRATION SYSTEM

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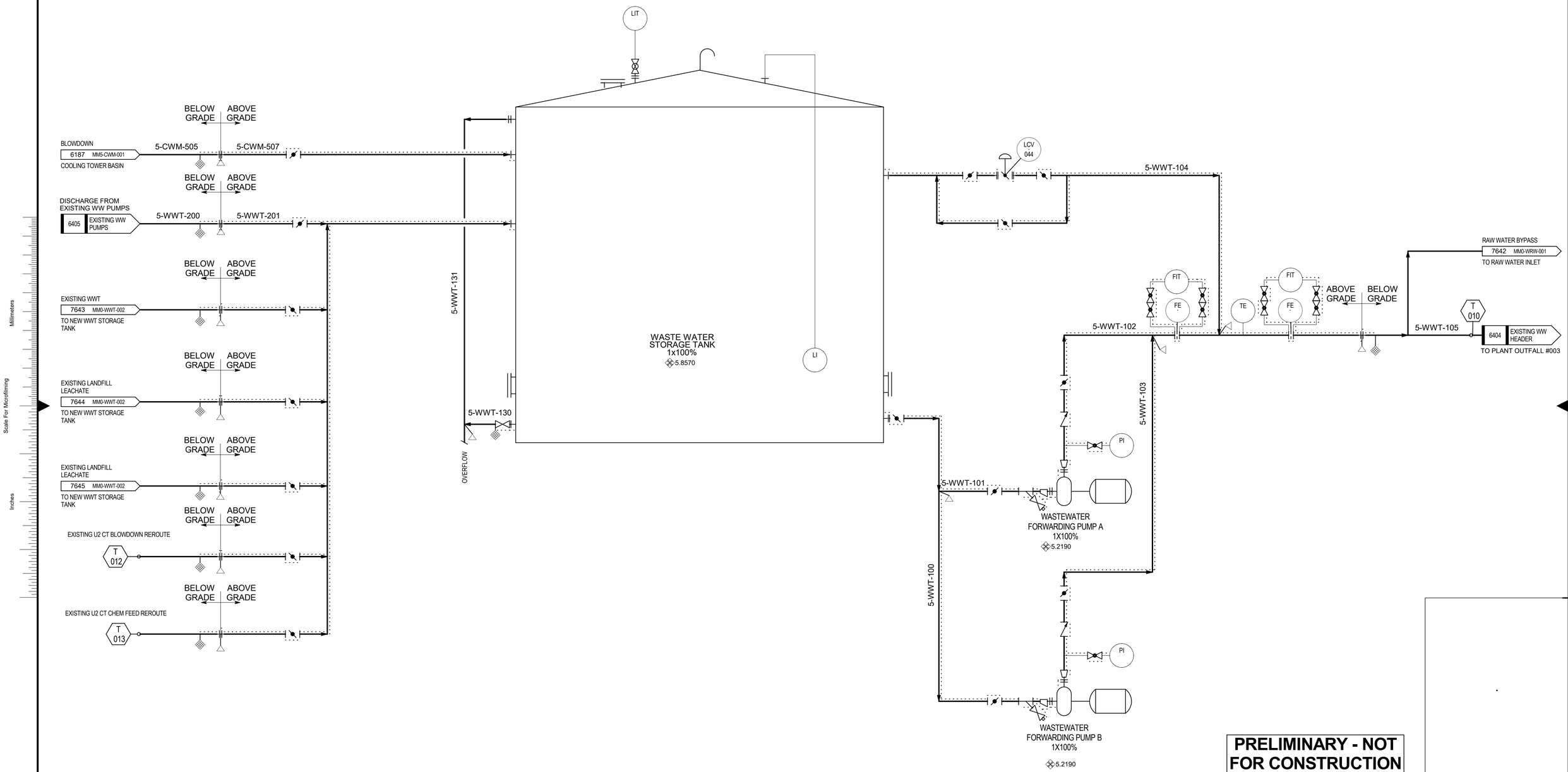

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EKPC 2X1 COMBINED CYCLE

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Piping & Instrumentation Diagram
WASTE WATER STORAGE AND DISPOSAL

project 157787 | contract

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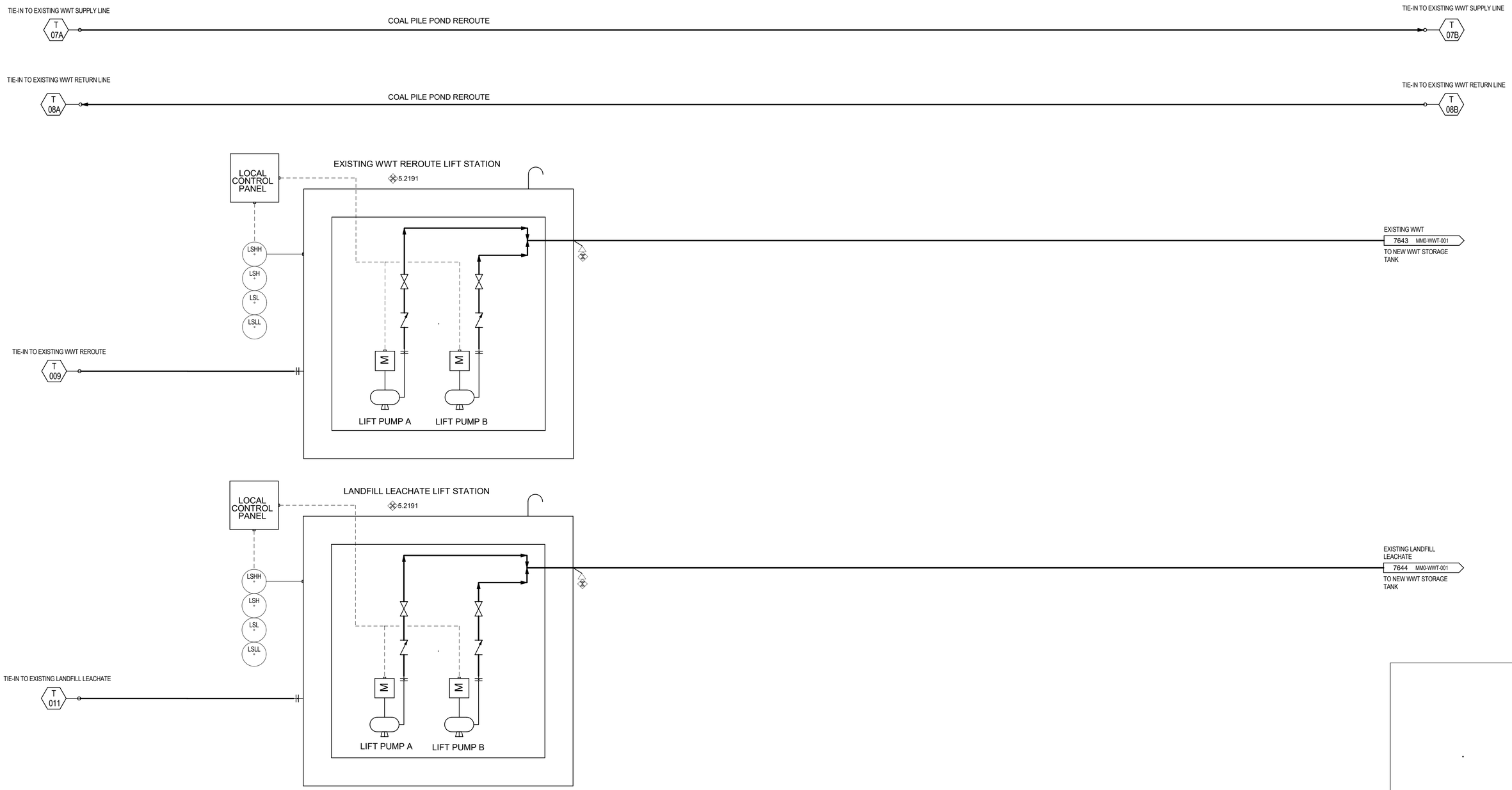

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KENTUCKY

Piping & Instrumentation Diagram
WASTE WATER STORAGE AND DISPOSAL

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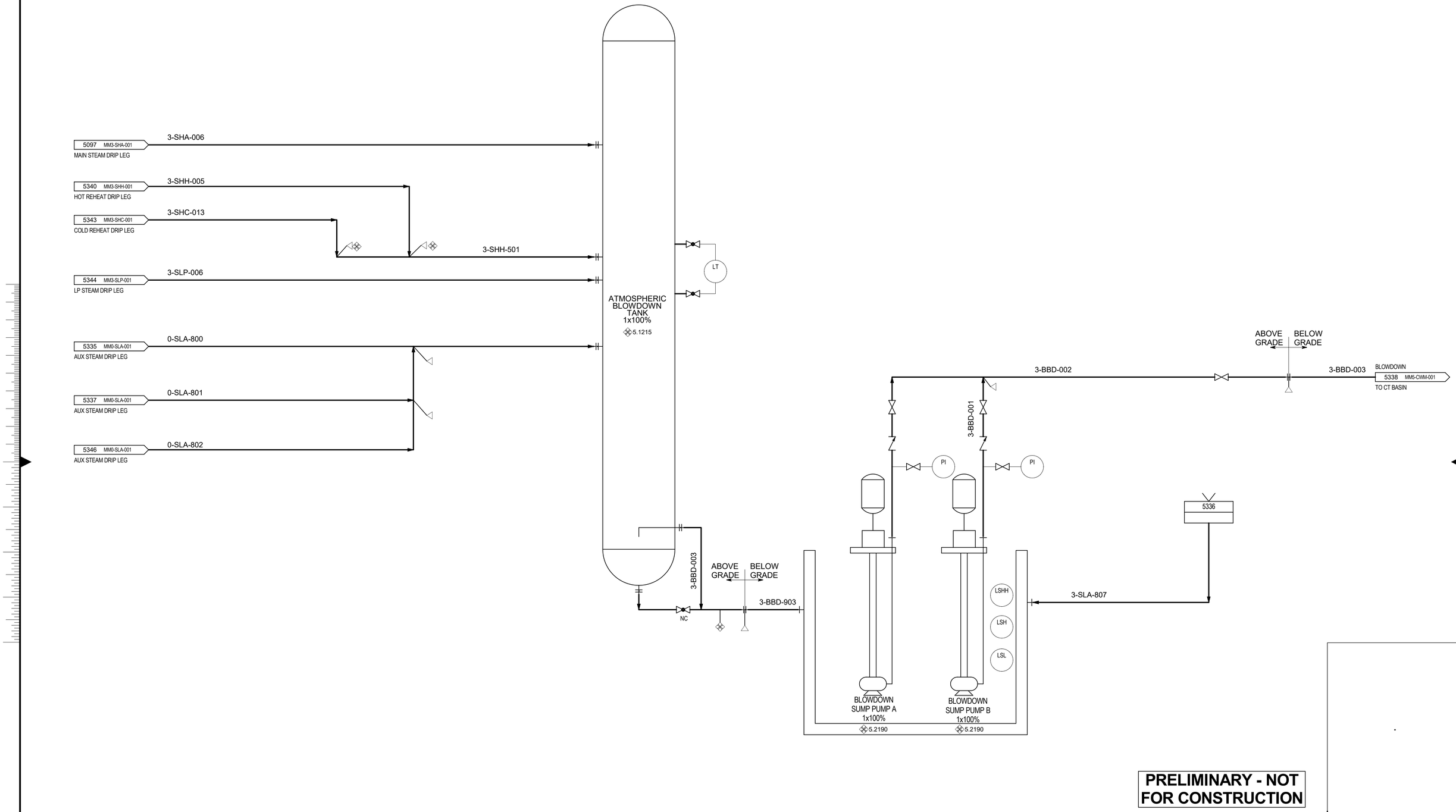

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EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
HRSG BLOWDOWN TANK

project 157787 | contract

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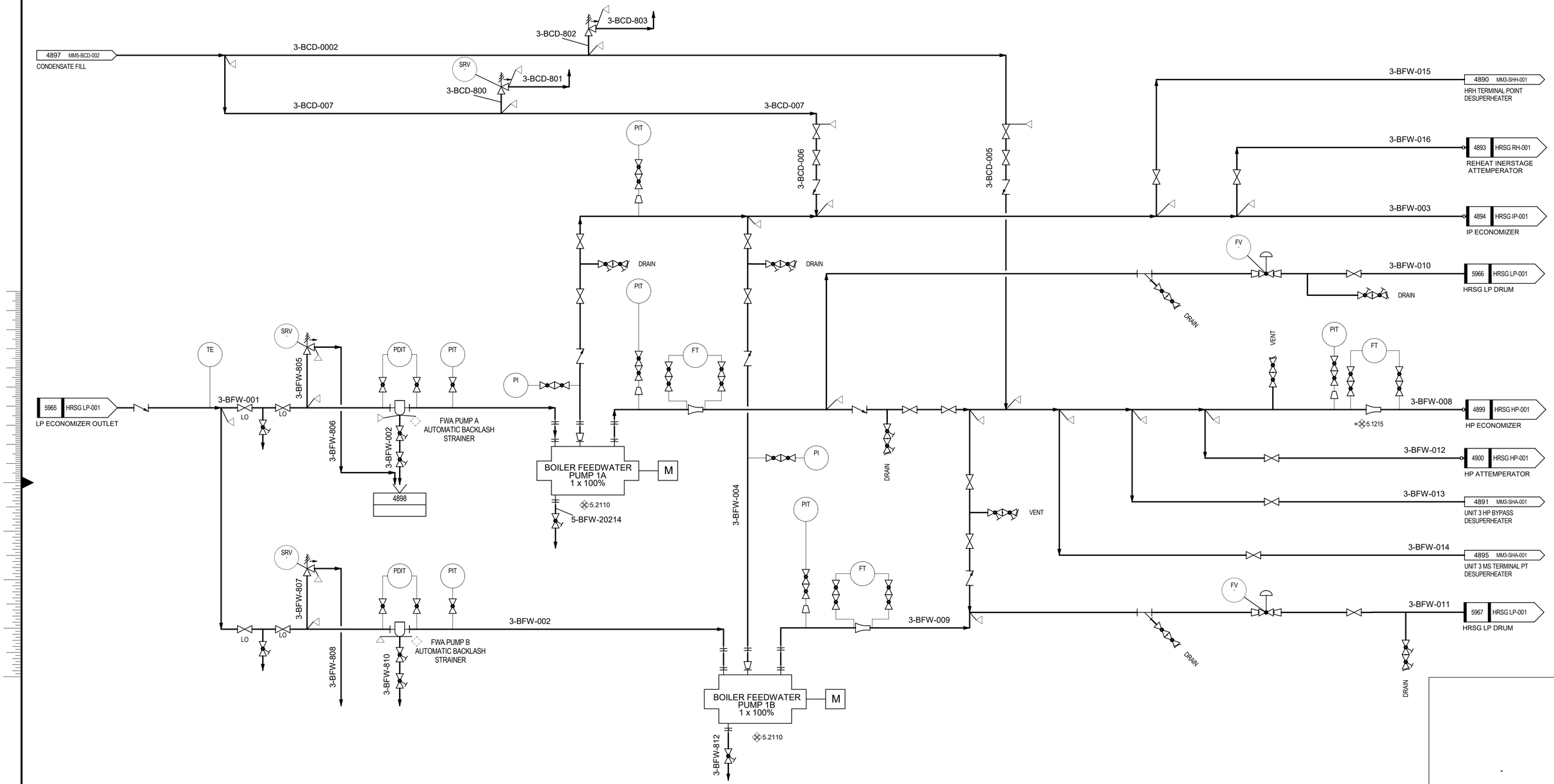

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Piping & Instrumentation Diagram
BOILER FEEDWATER

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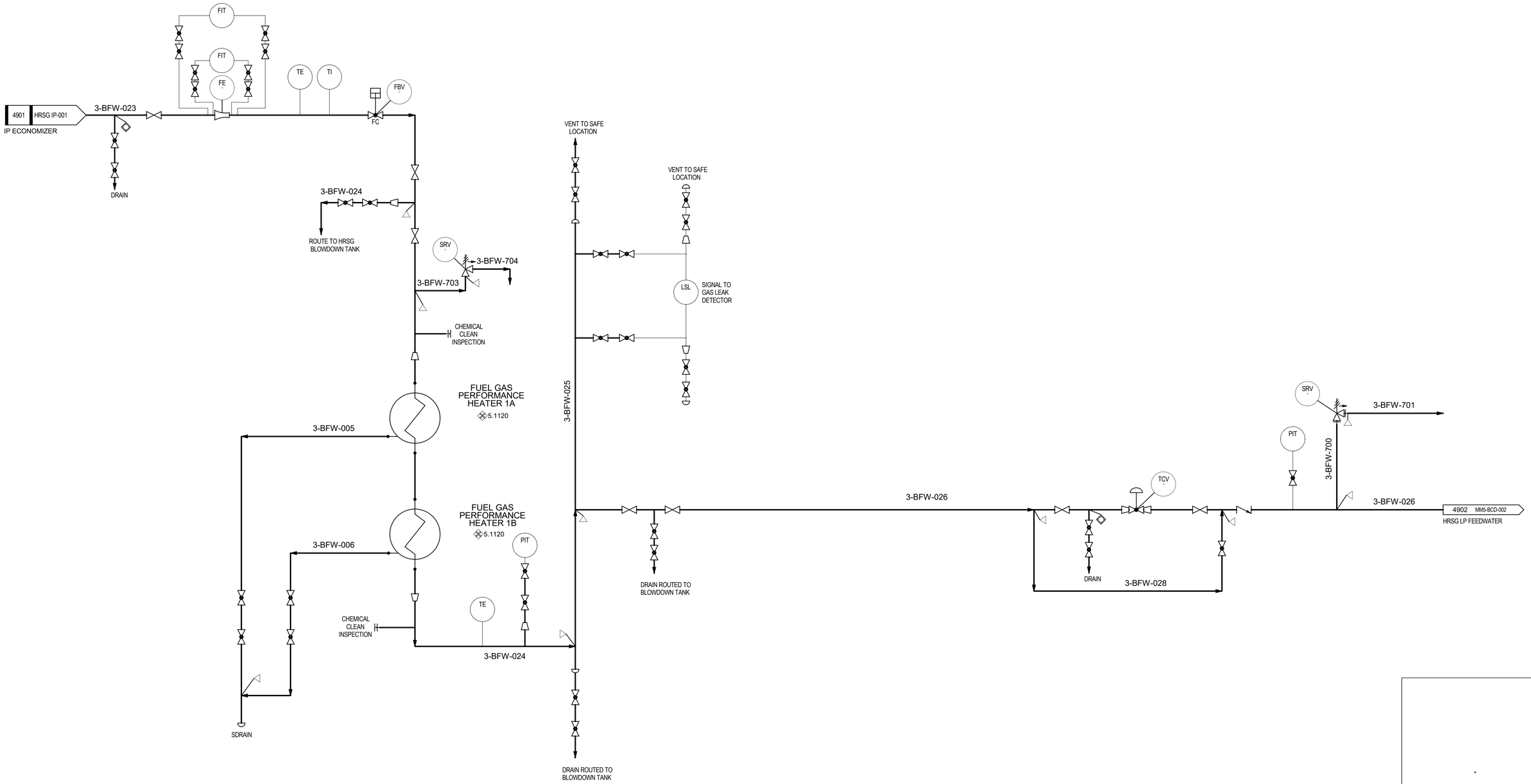

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EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
BOILER FEEDWATER

project 157787 | contract

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EKPC 2X1 COMBINED CYCLE

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Piping & Instrumentation Diagram
HRSG PHOSPHATE FEED SKID

project 157787 | contract

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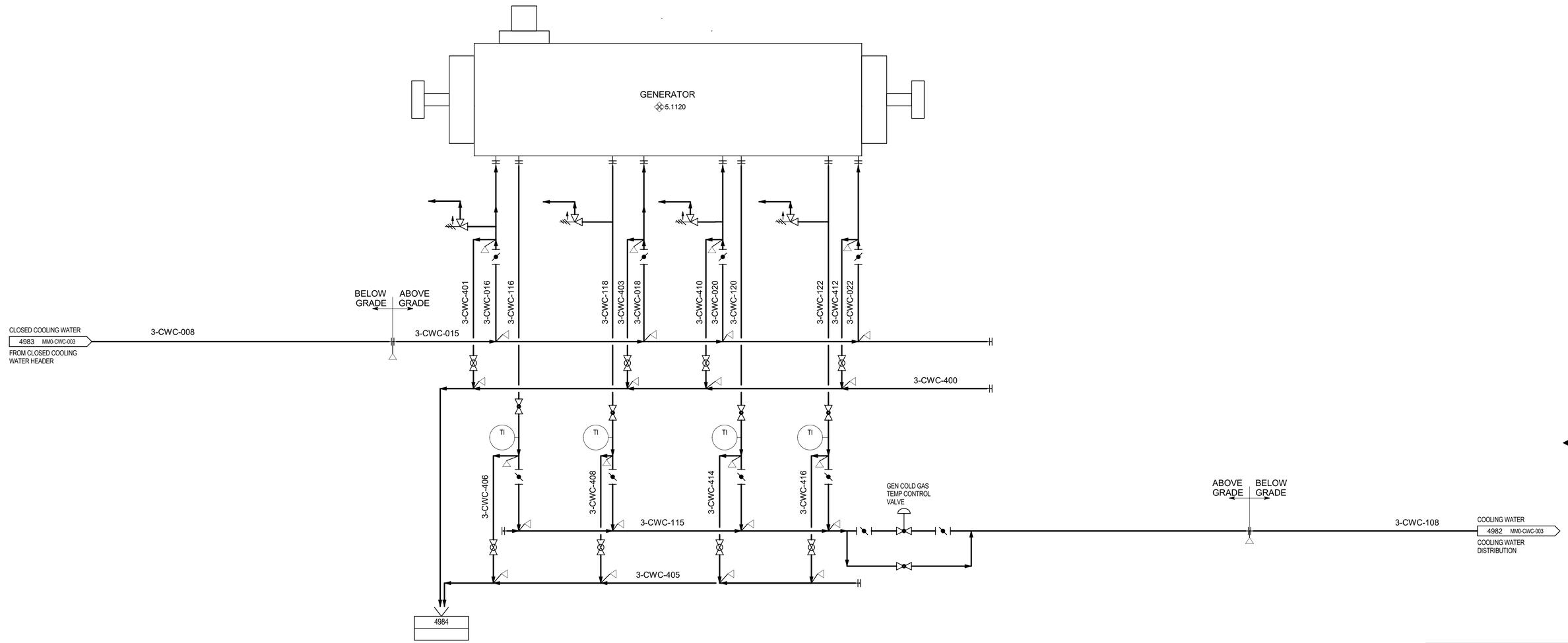

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EKPC 2X1 COMBINED CYCLE

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Piping & Instrumentation Diagram
GENERATOR COOLING

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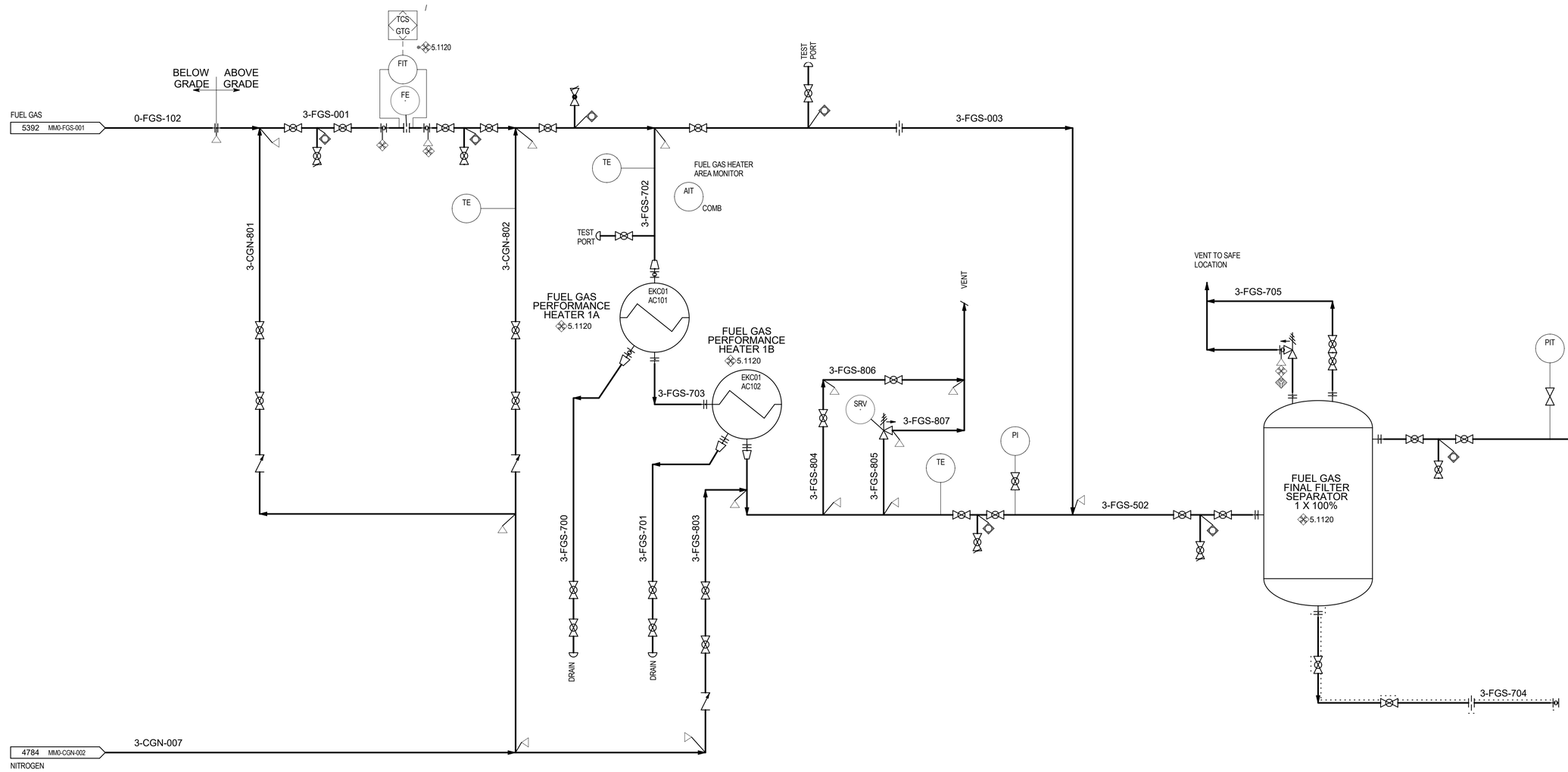

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
NATURAL GAS

project 157787 | contract

drawing **MM3-FGS-001** rev. **B**

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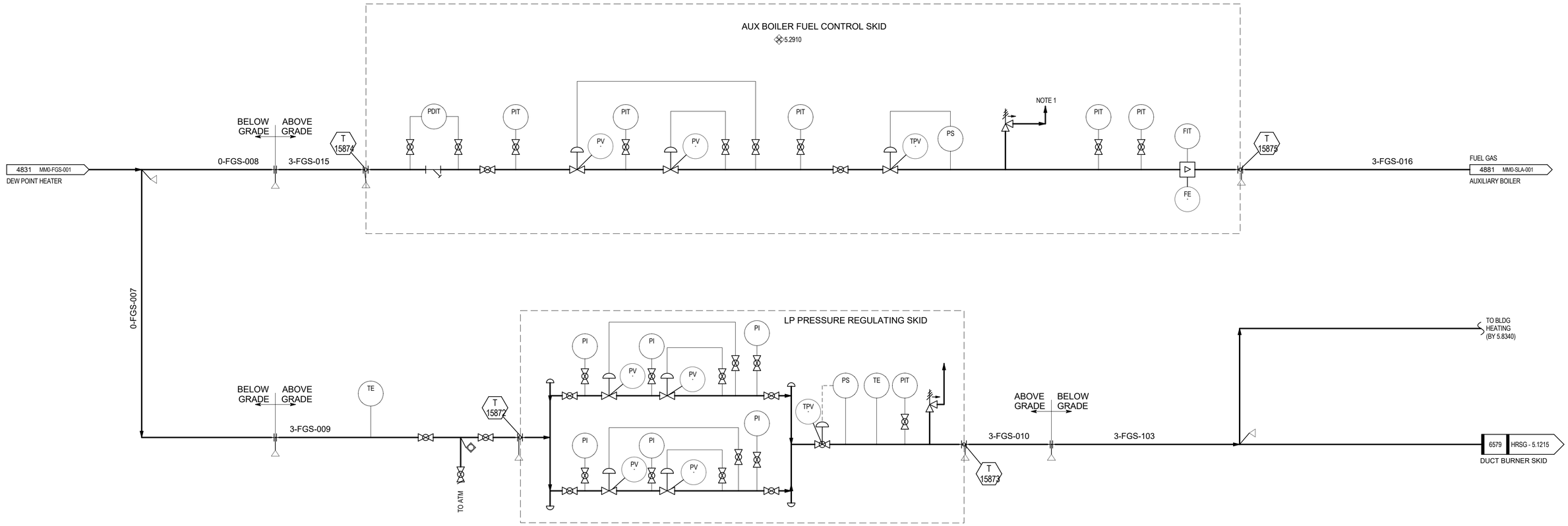
NOTES:
1. VENT TO SAFE LOCATION.



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EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
NATURAL GAS

project 157787 | contract

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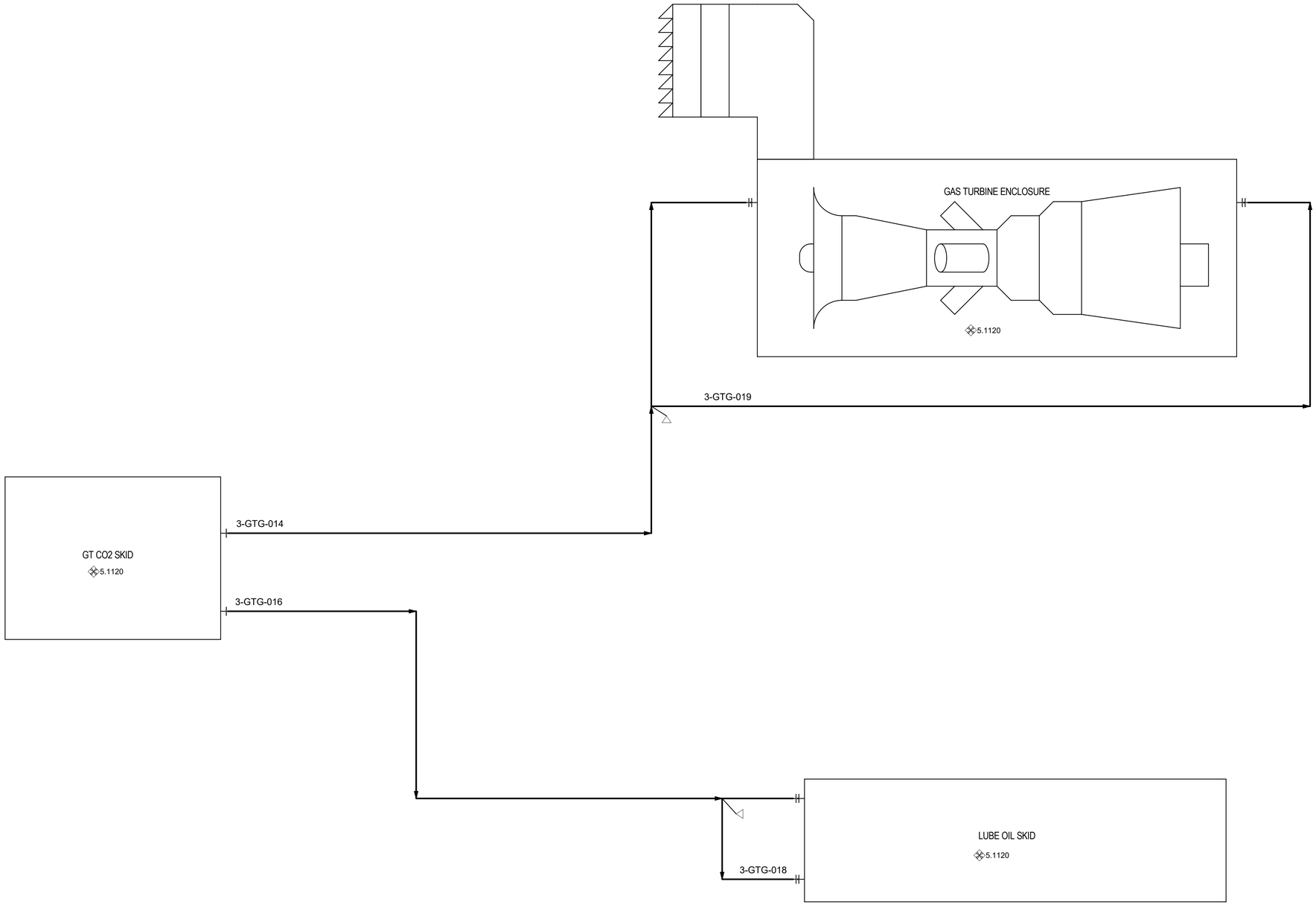

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EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
GT CO2 FIRE PROTECTION

project 157787 | contract

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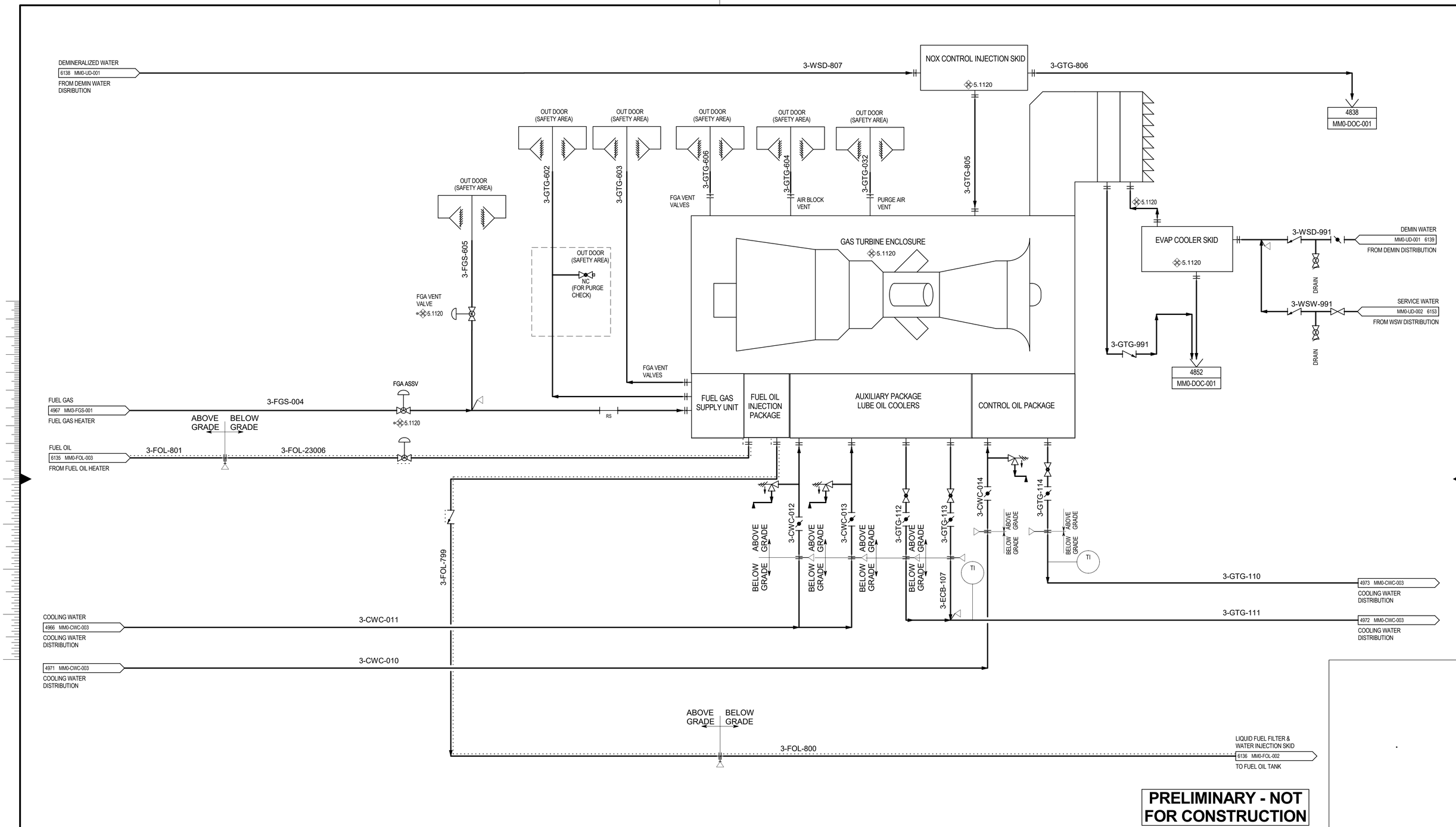

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A	12/01/23	CDM	BAN	ISSUED FOR OWNER REVIEW

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
COMBUSTION TURBINE UTILITIES

project 157787 | contract

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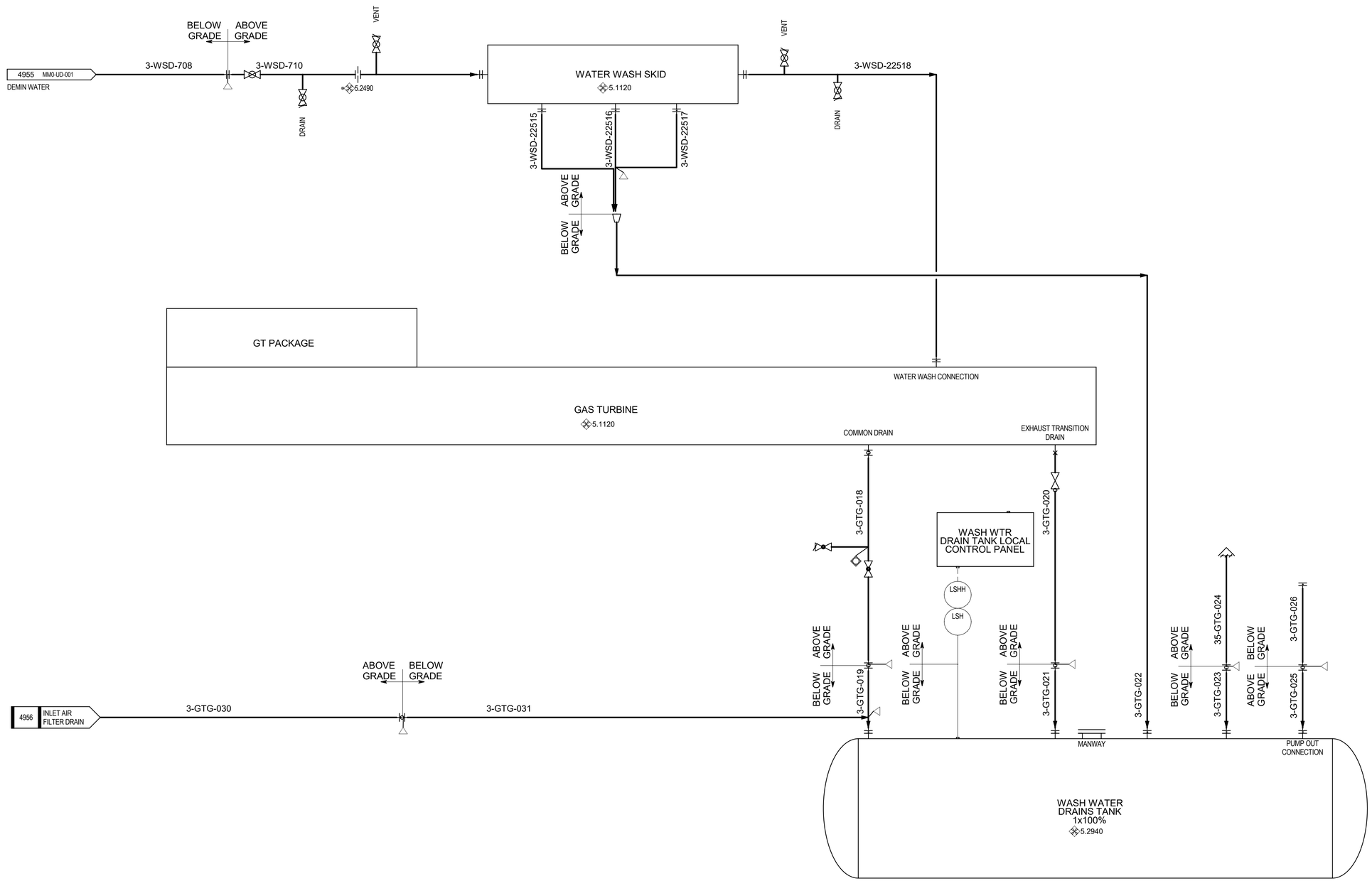

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EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
COMBUSTION TURBINE UTILITIES

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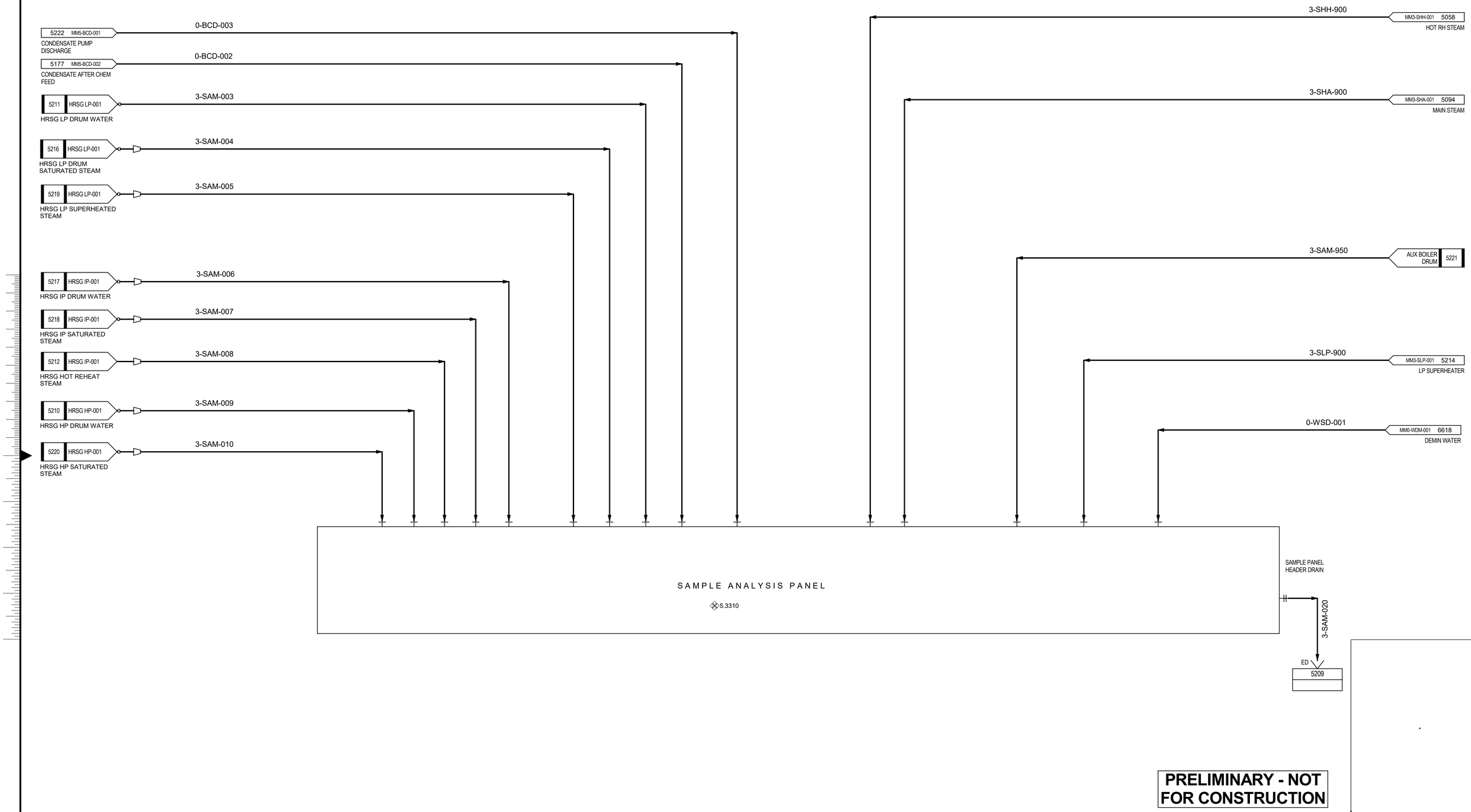

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EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
SAMPLE PANEL

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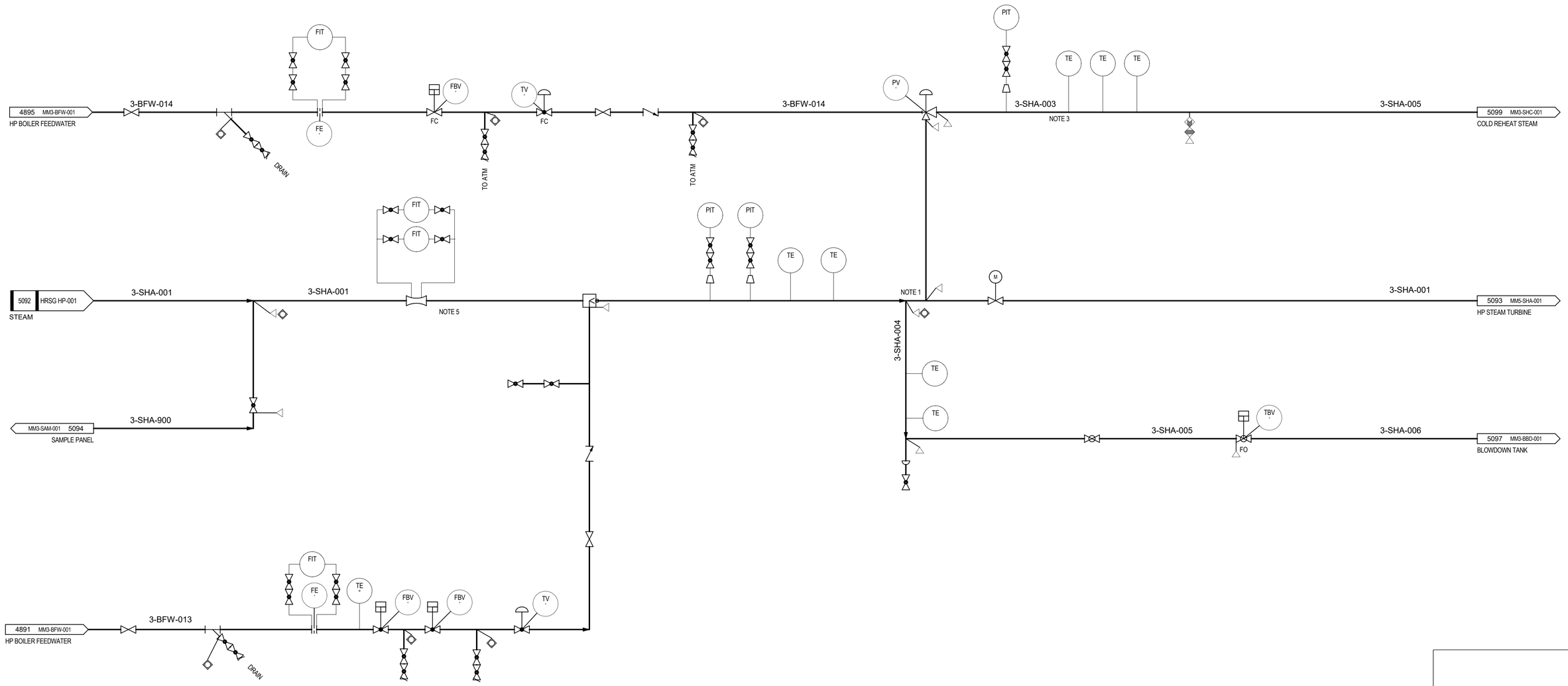
NOTES:
1. HP STEAM BYPASS SHALL BE LOCATED AS CLOSE AS POSSIBLE FLOW BLOCK VALVE.
2. INSTALL #2500 CARBON STEEL GATE VALVES, CUT OFF AFTER HYDROTEST IS COMPLETE. CAP NIPPLE ON BOTTOM OF DRIP LEG.



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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
MAIN STEAM

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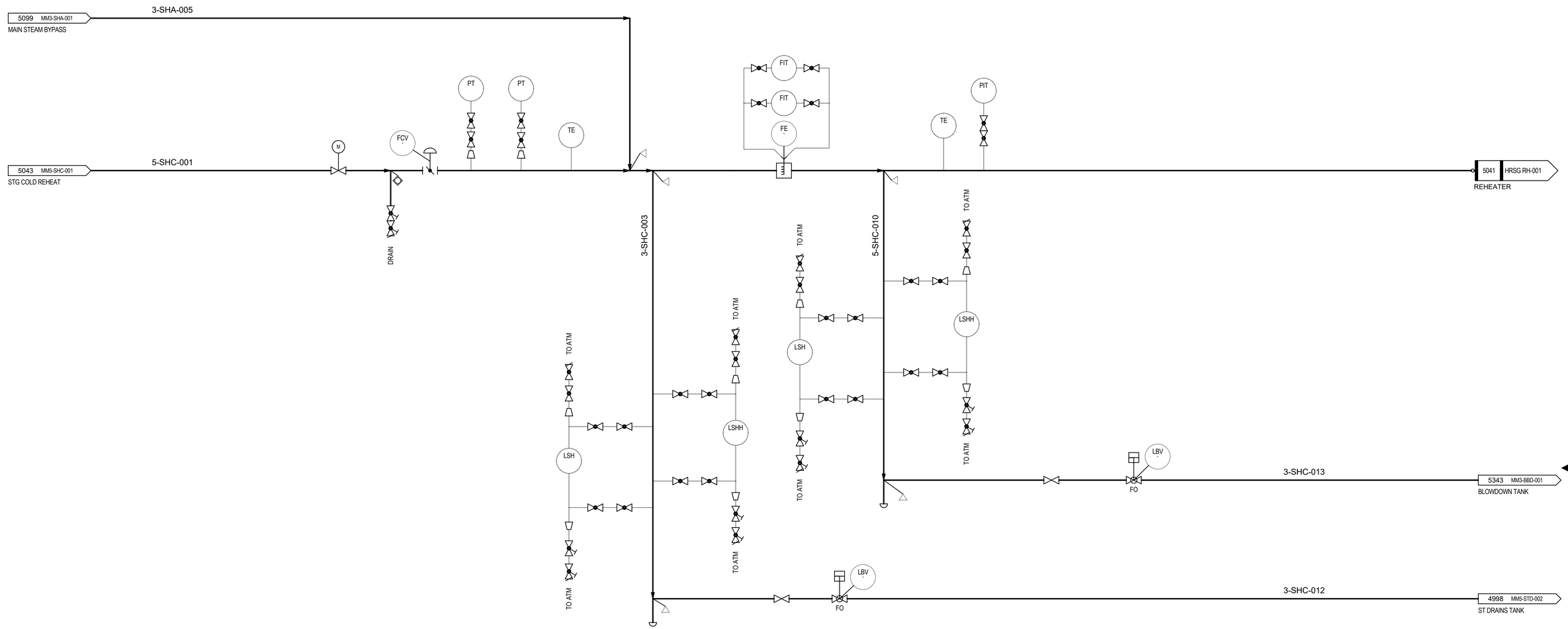

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
COLD REHEAT STEAM

project 157787 | contract

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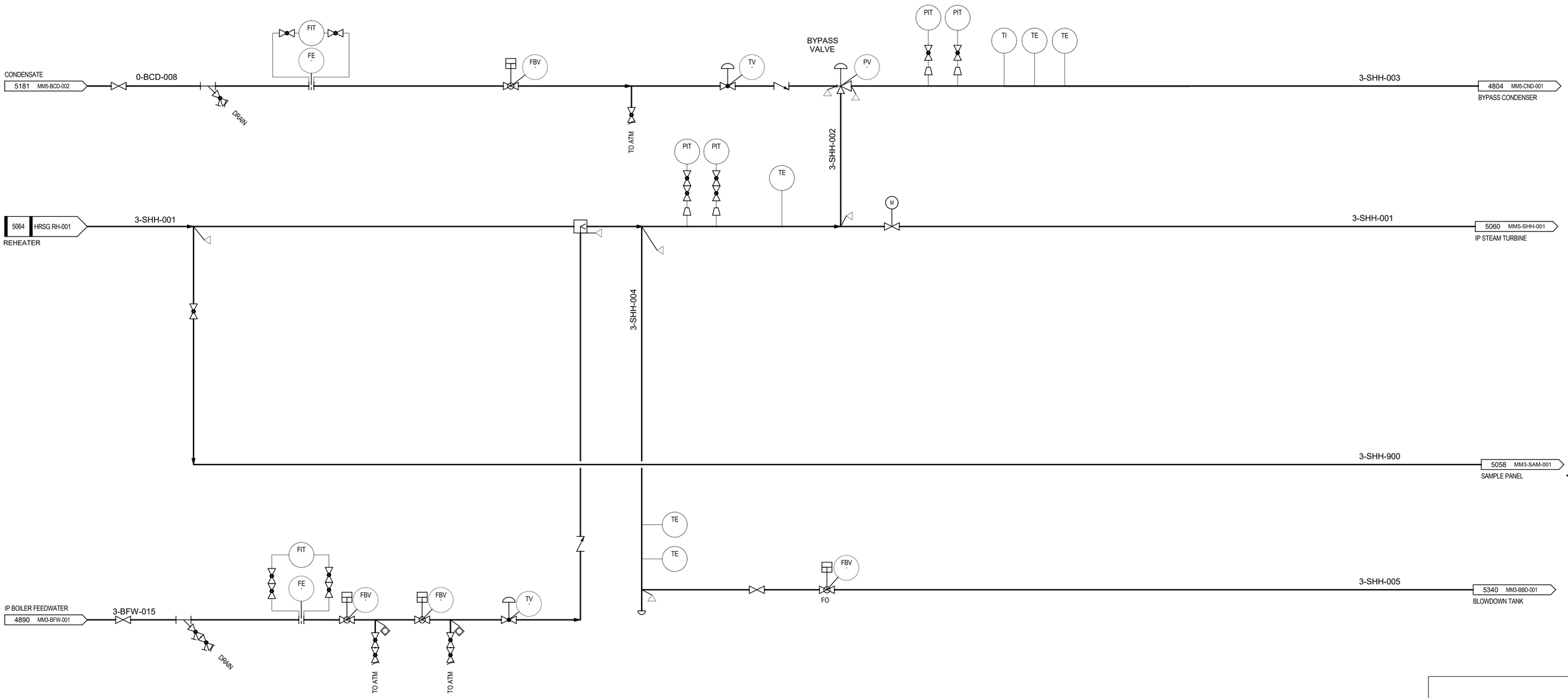

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
HOT REHEAT STEAM

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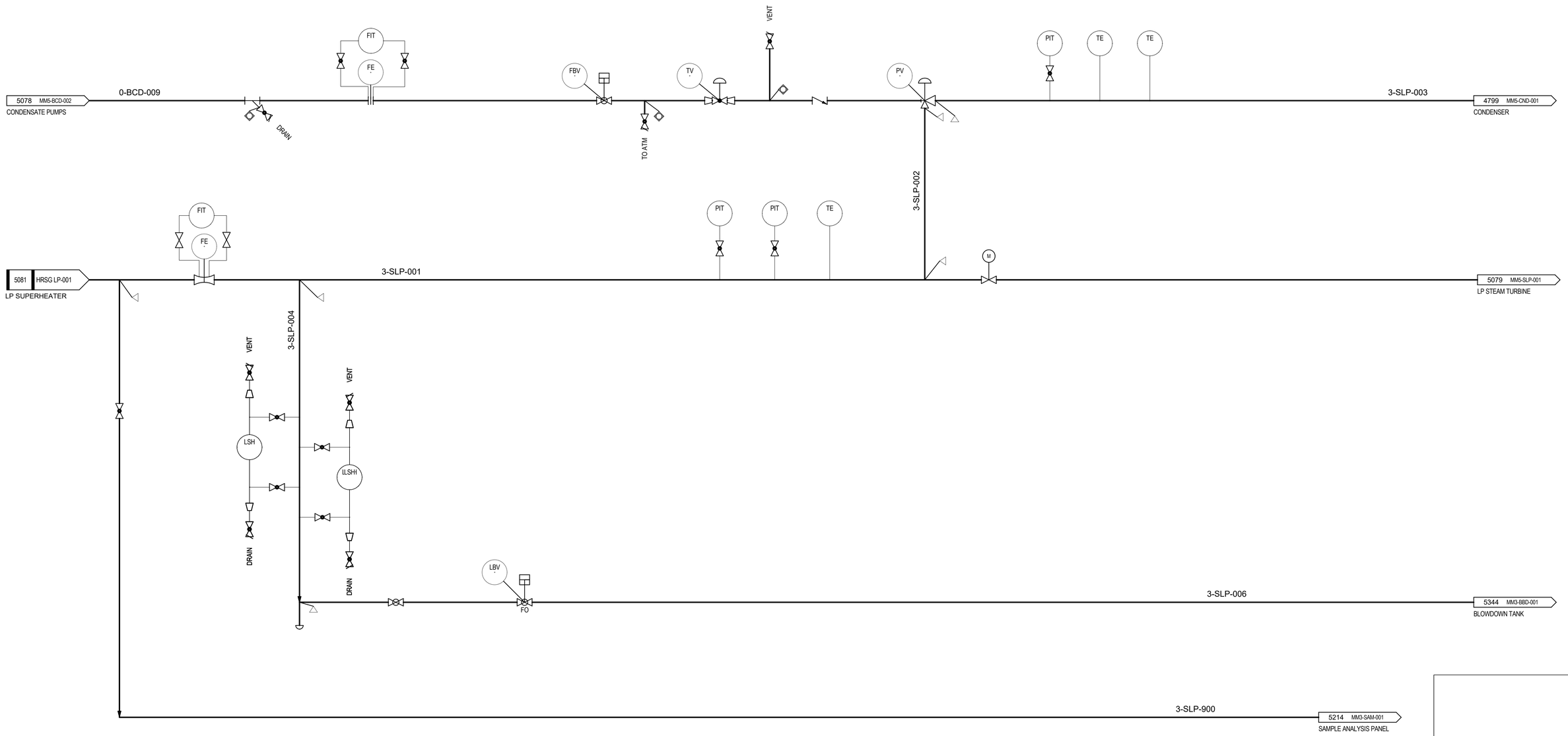

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
LOW PRESSURE STEAM

project 157787 | contract

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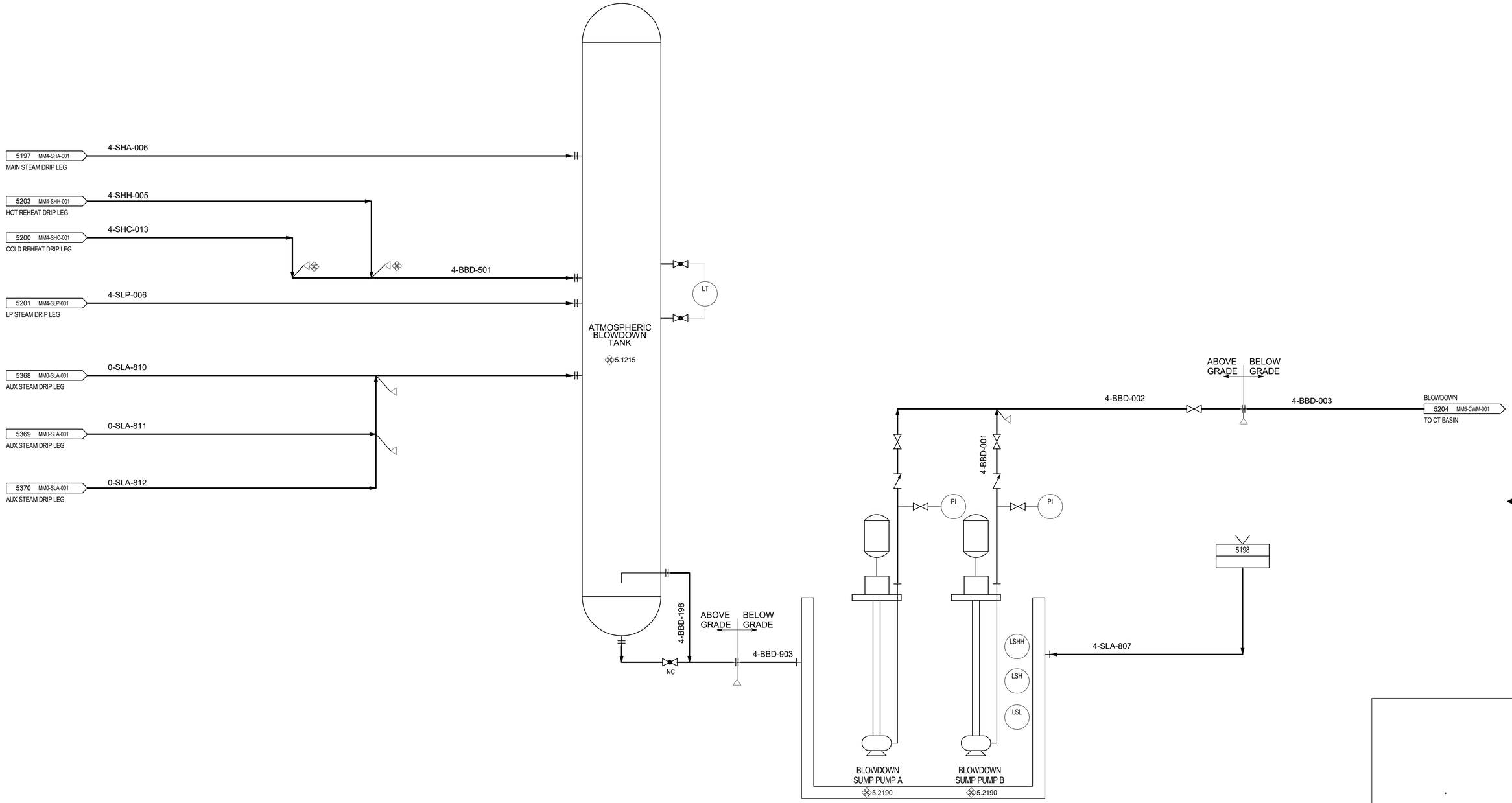

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
HRSG BLOWDOWN TANK

project 157787 | contract

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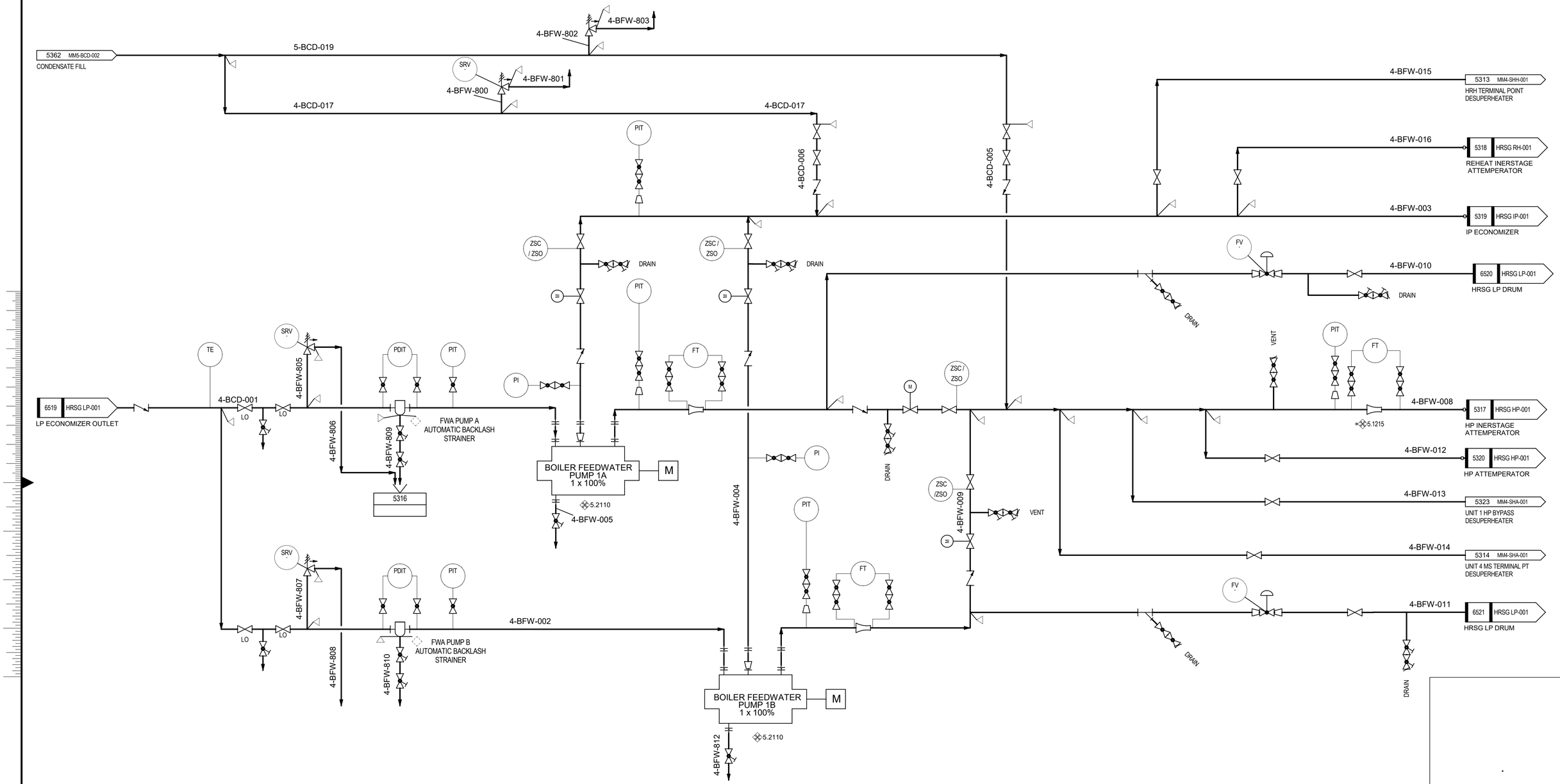

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B	05/03/24	JSG	WKG	ISSUED WITH PROJECT SCOPING REPORT
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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
BOILER FEEDWATER

project 157787 | contract

drawing **MM4-BFW-001** | rev. **B**

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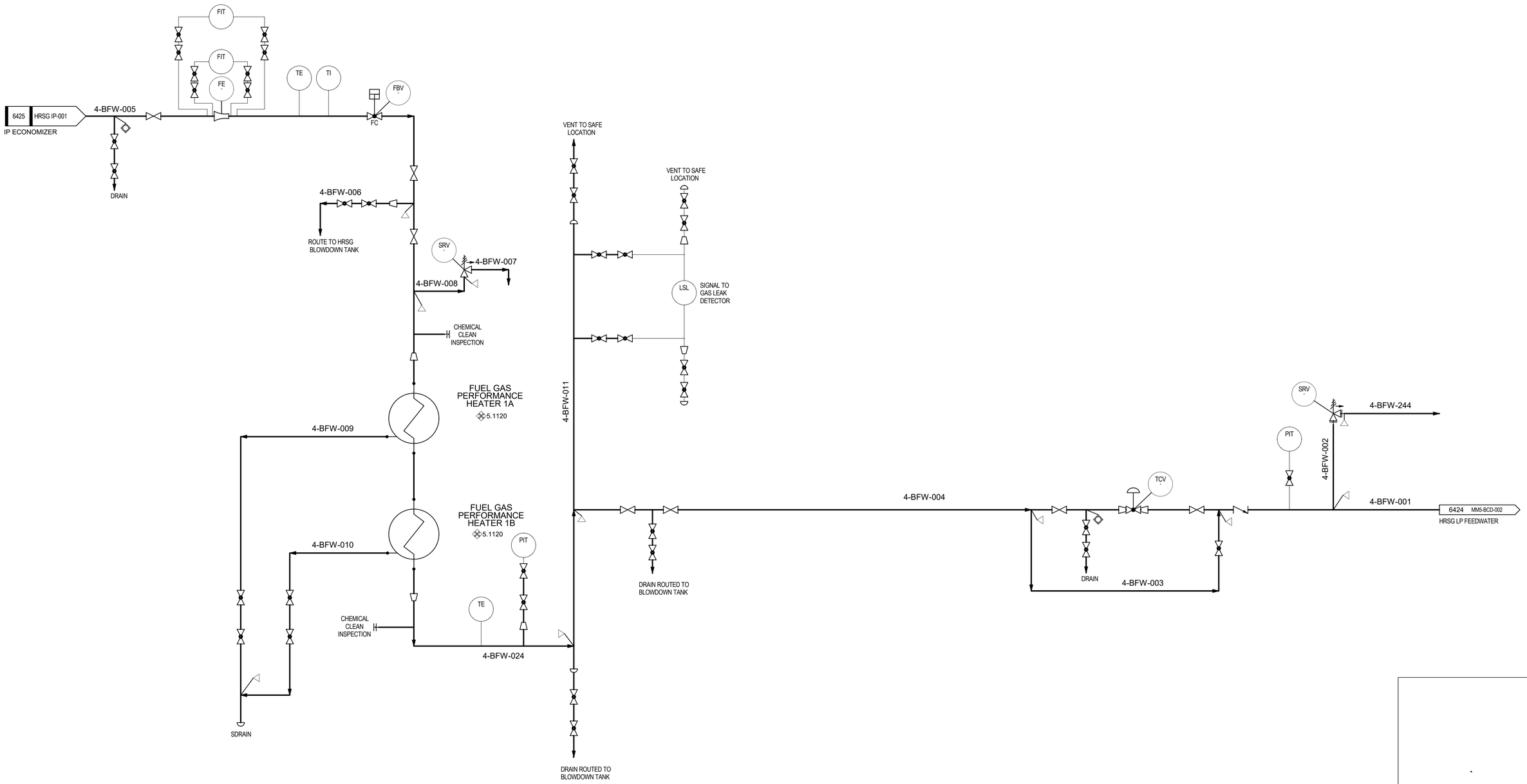

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KENTUCKY

Piping & Instrumentation Diagram
BOILER FEED WATER

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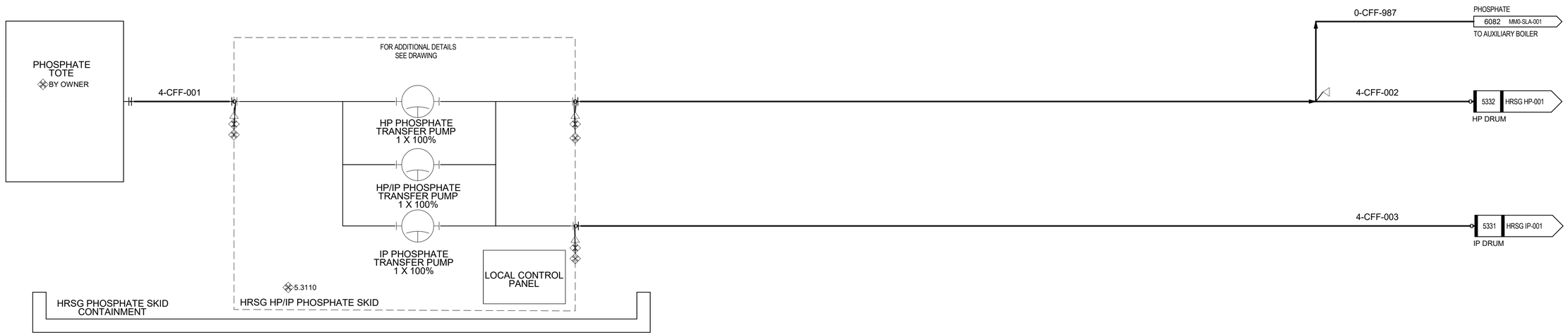

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EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
HRSG PHOSPHATE FEED SKID

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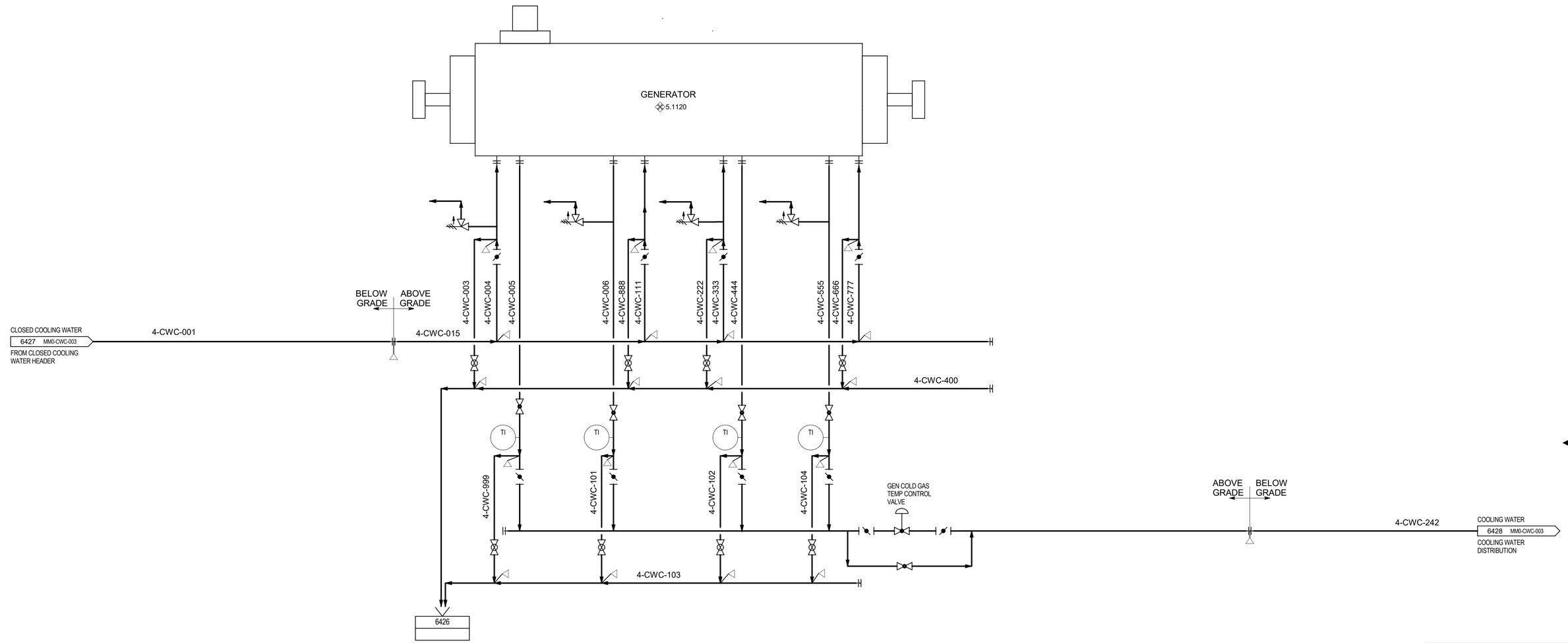

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EKPC 2X1 COMBINED CYCLE

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Piping & Instrumentation Diagram
GENERATOR COOLING

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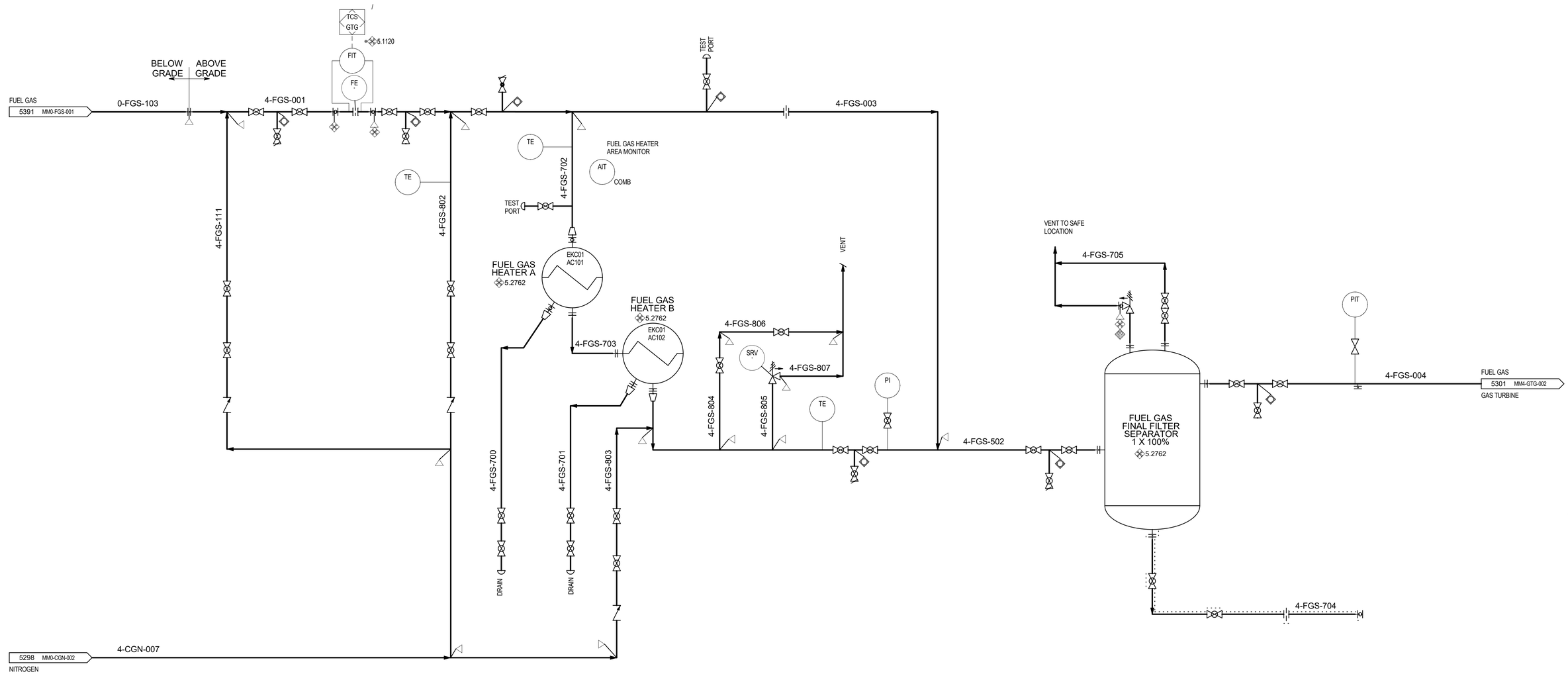

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EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
NATURAL GAS

project 157787 | contract

drawing **MM4-FGS-001** rev. **B**

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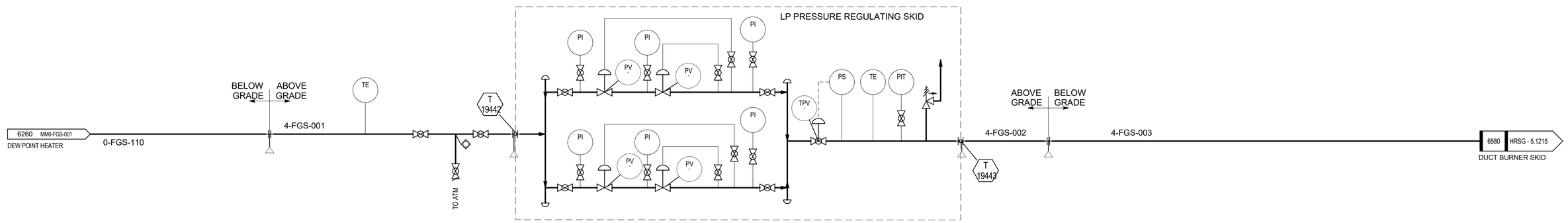
NOTES:
1. VENT TO SAFE LOCATION.



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EKPC 2X1 COMBINED CYCLE

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NATURAL GAS

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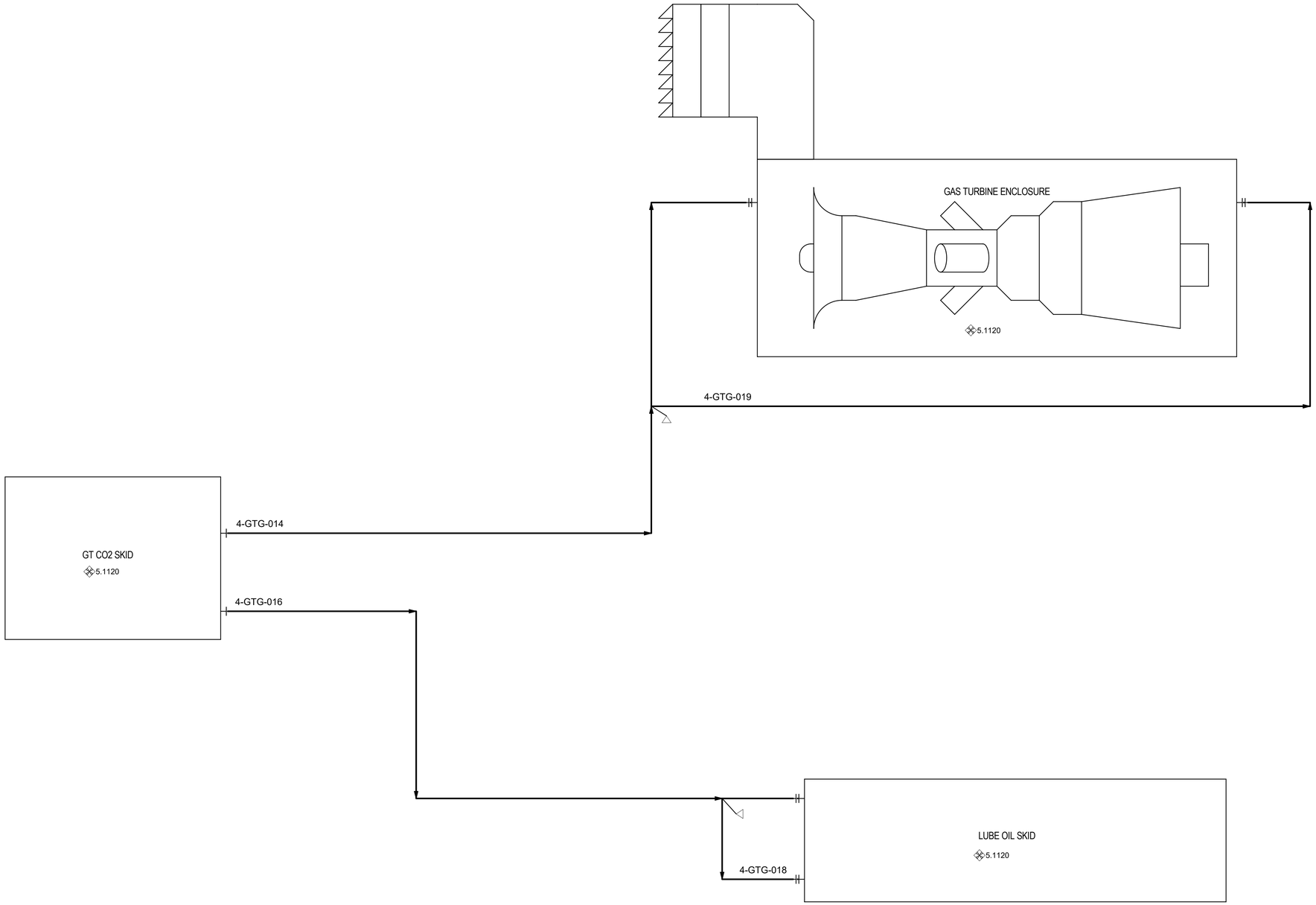

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EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
GT CO2 FIRE PROTECTION

project 157787 | contract

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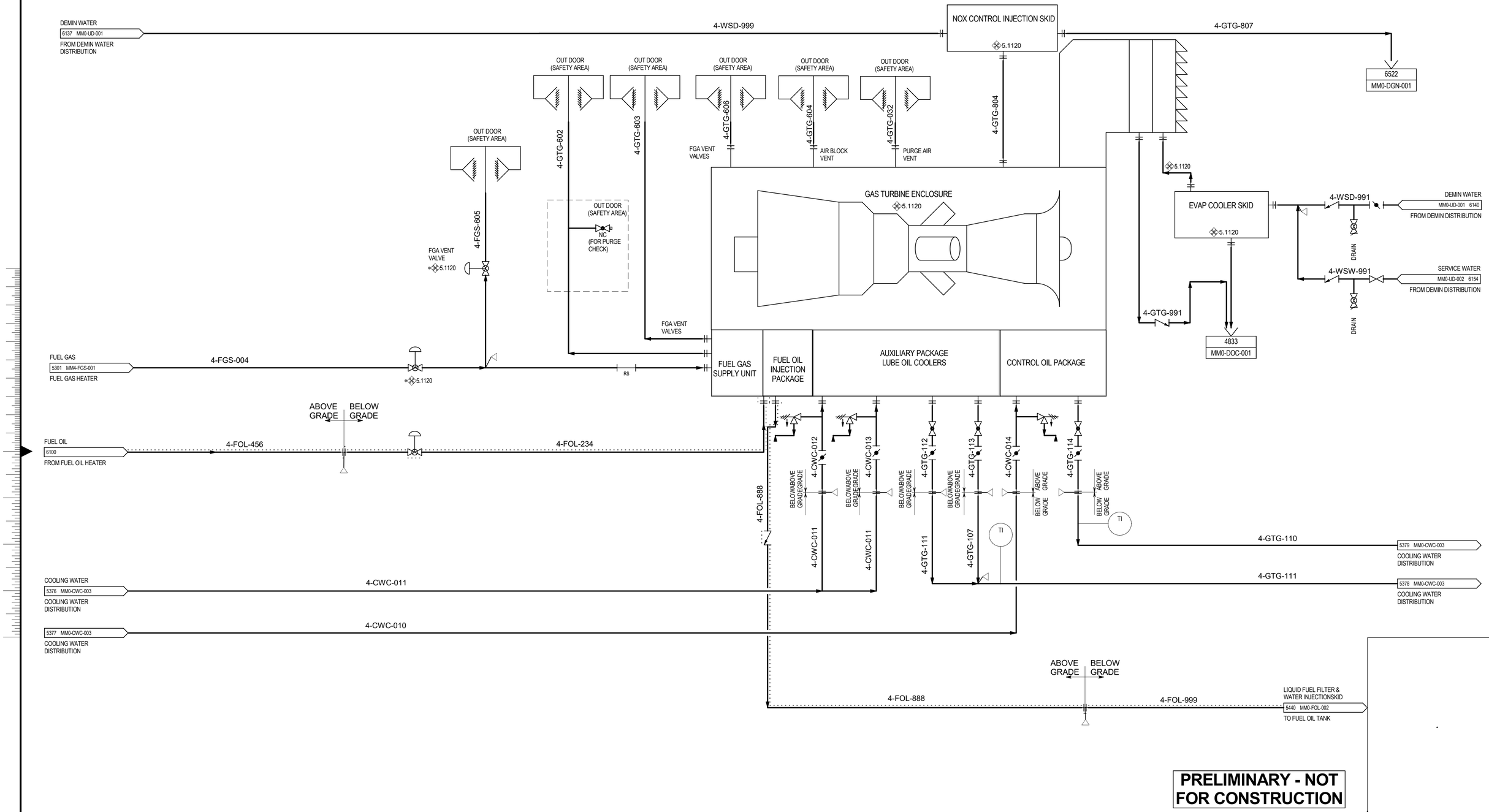

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EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
COMBUSTION TURBINE UTILITIES

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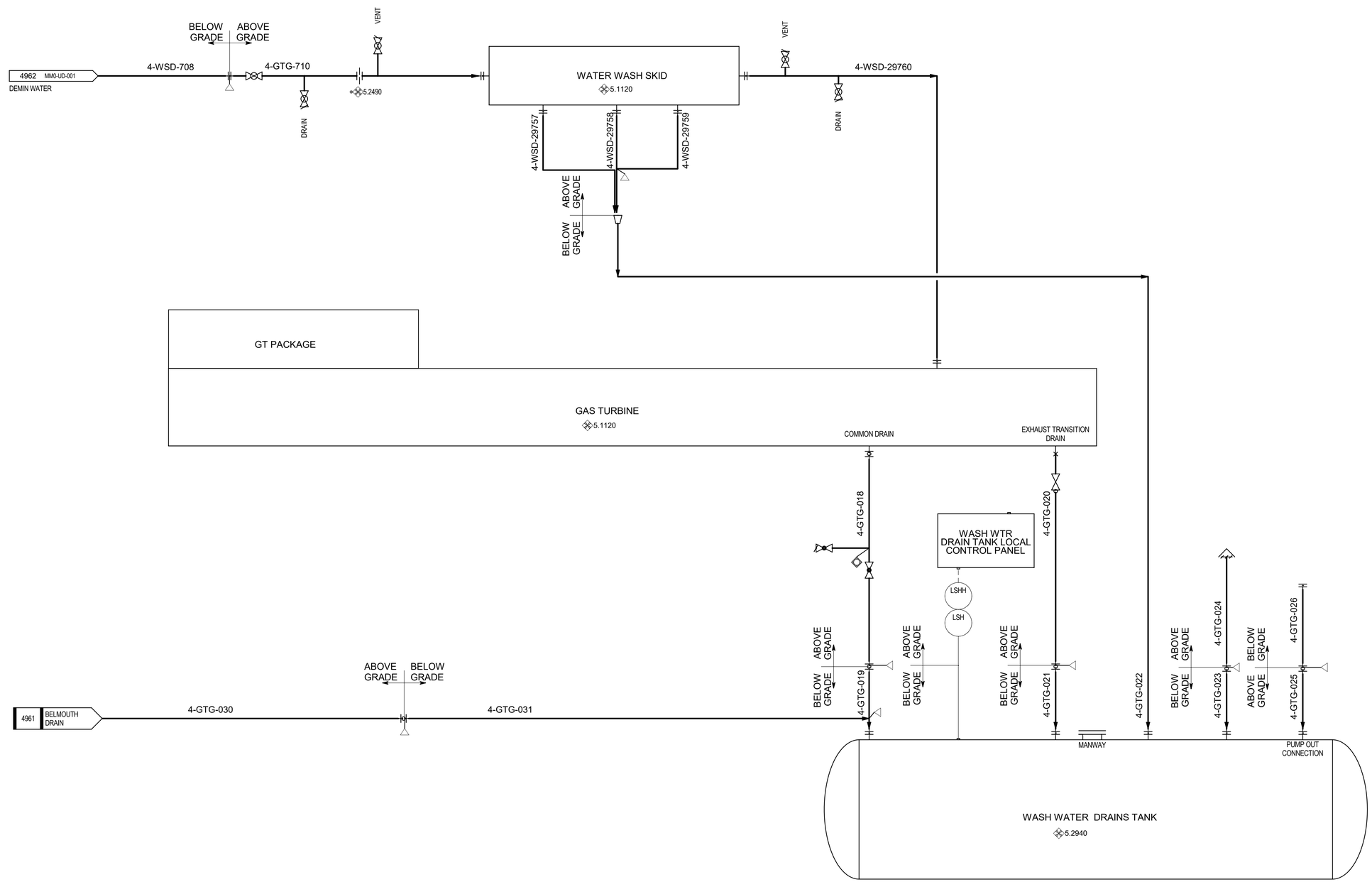

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
COMBUSTION TURBINE UTILITIES

project 157787
contract
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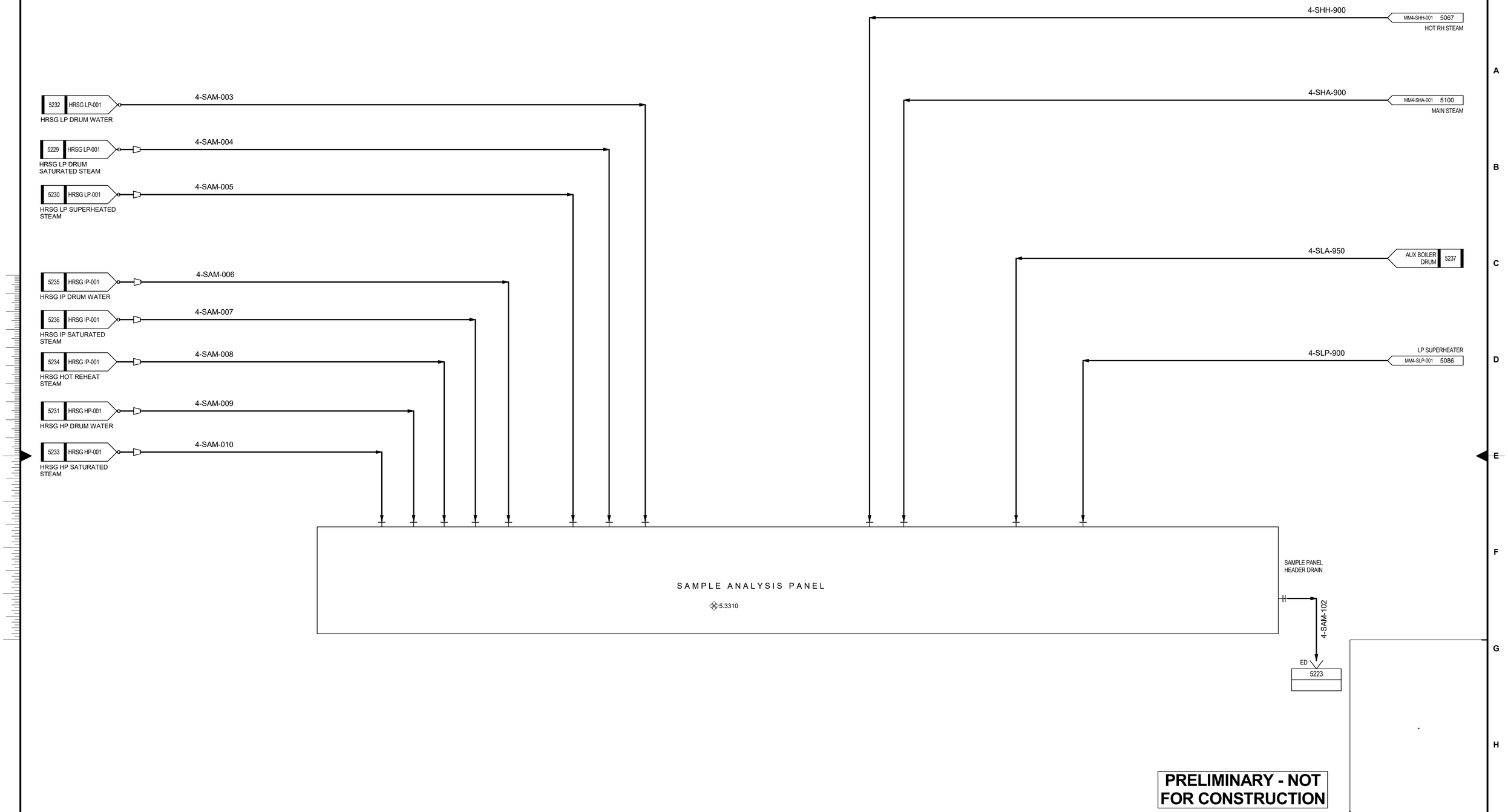

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EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
SAMPLE PANEL

project 157787 | contract

drawing **MM4-SAM-001** | rev. **B**

sheet of sheets

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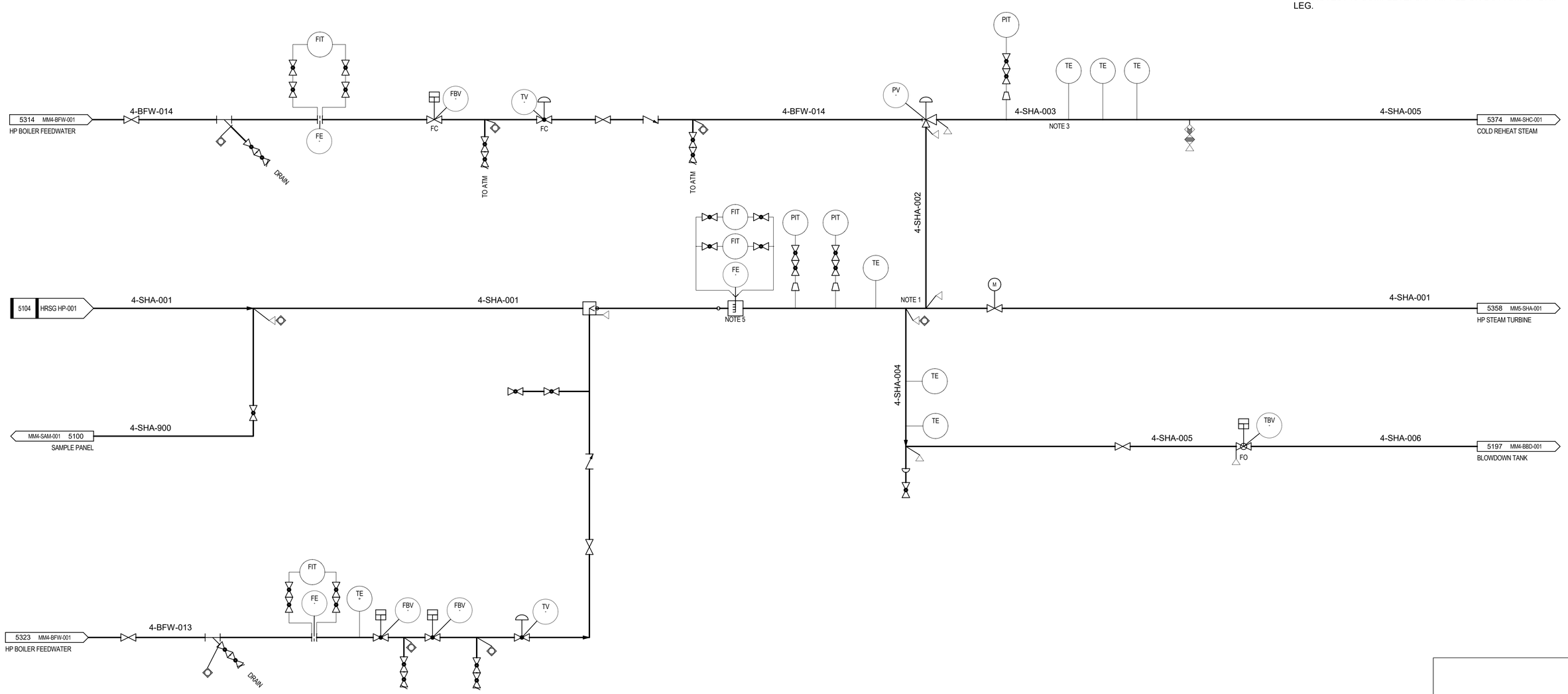
NOTES:
1. HP STEAM BYPASS SHALL BE LOCATED AS CLOSE AS POSSIBLE FLOW BLOCK VALVE.
2. INSTALL #2500 CARBON STEEL GATE VALVES, CUT OFF AFTER HYDROTEST IS COMPLETE. CAP NIPPLE ON BOTTOM OF DRIP LEG.



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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
MAIN STEAM

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drawing **MM4-SHA-001** | rev. **B**

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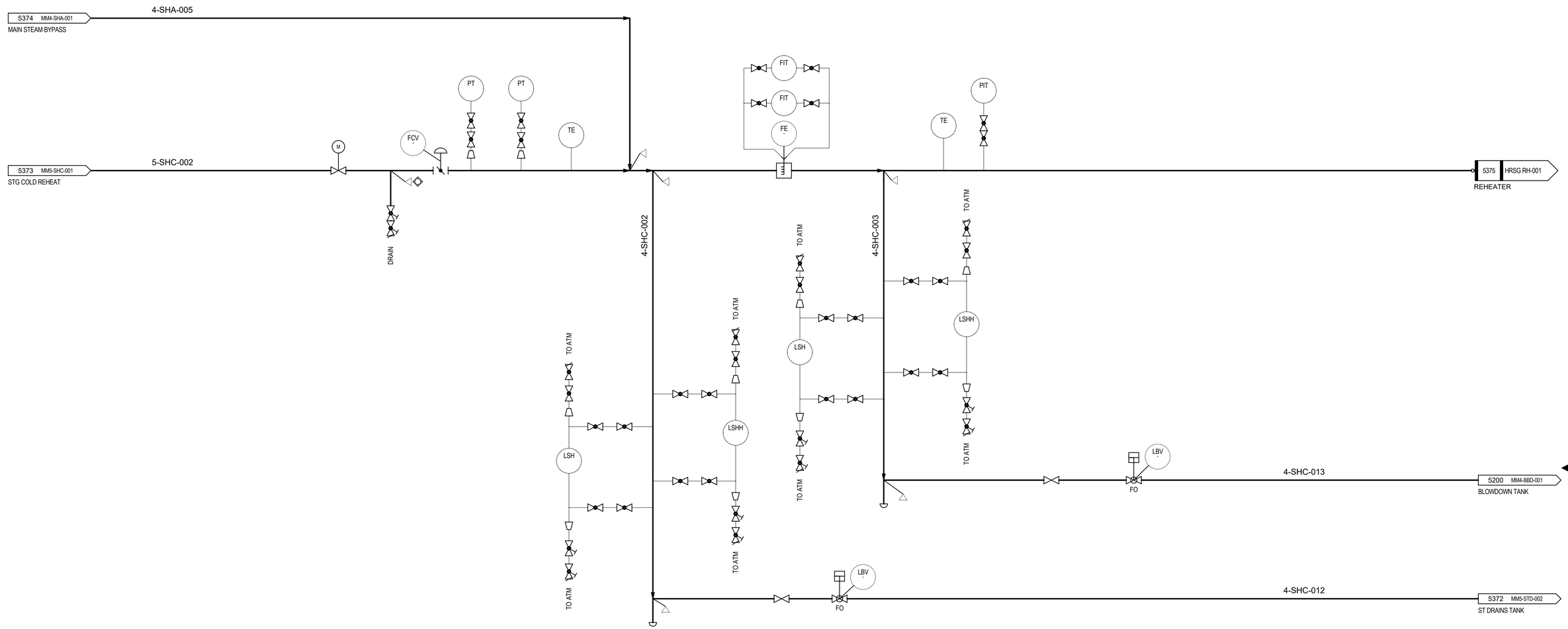

Scale For Microfilming
Millimeters
Inches

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
COLD REHEAT STEAM

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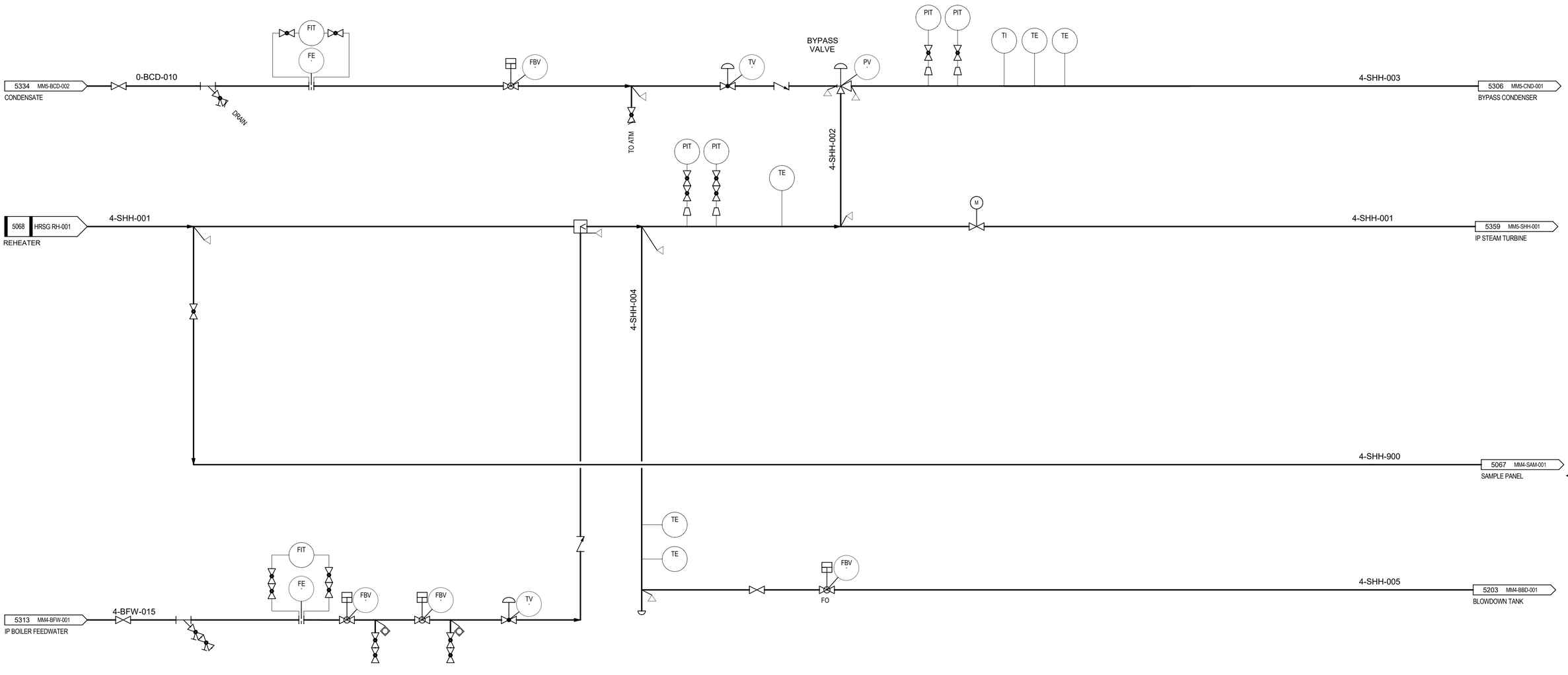

Scale For Microfilming
Millimeters
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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
HOT REHEAT STEAM

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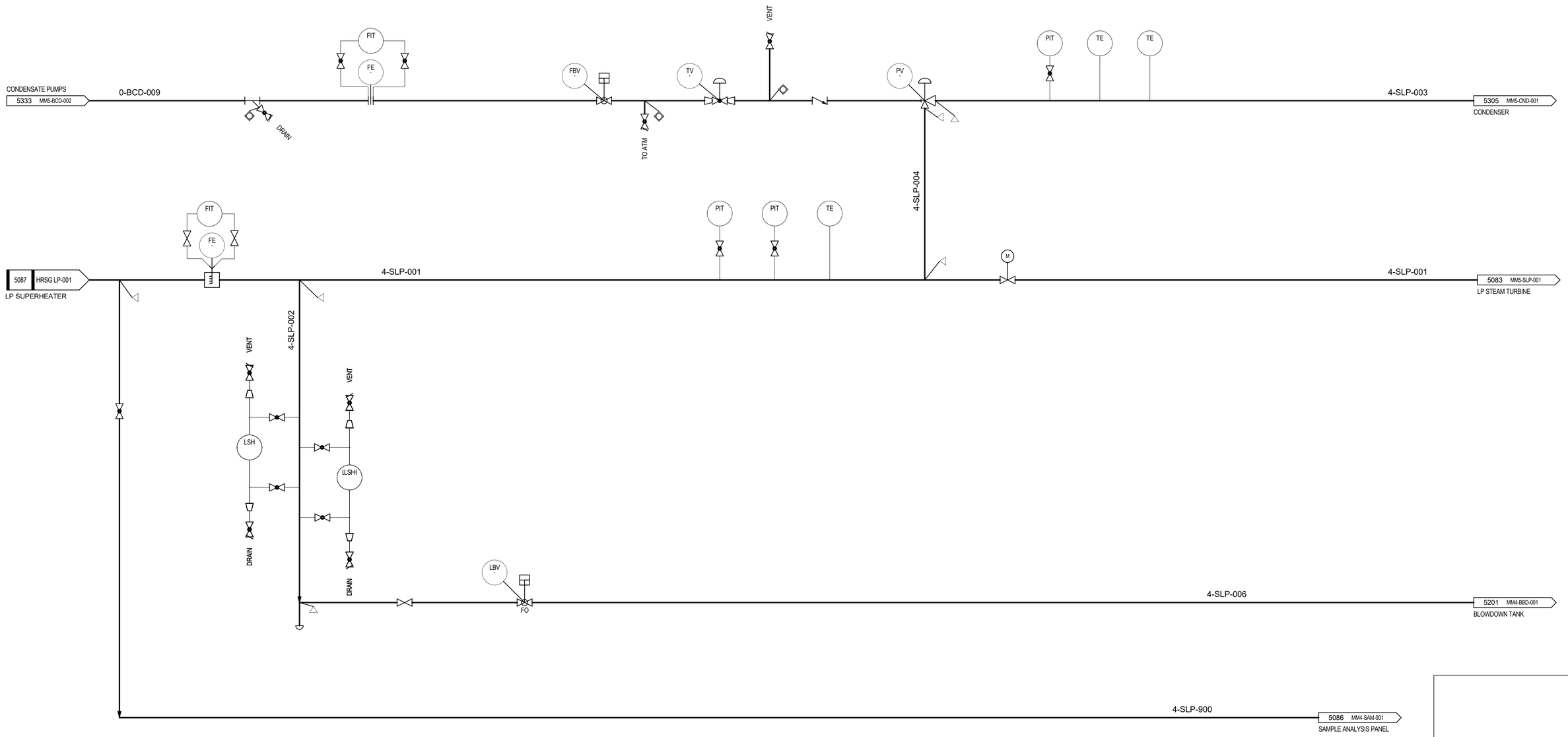

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EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
LOW PRESSURE STEAM

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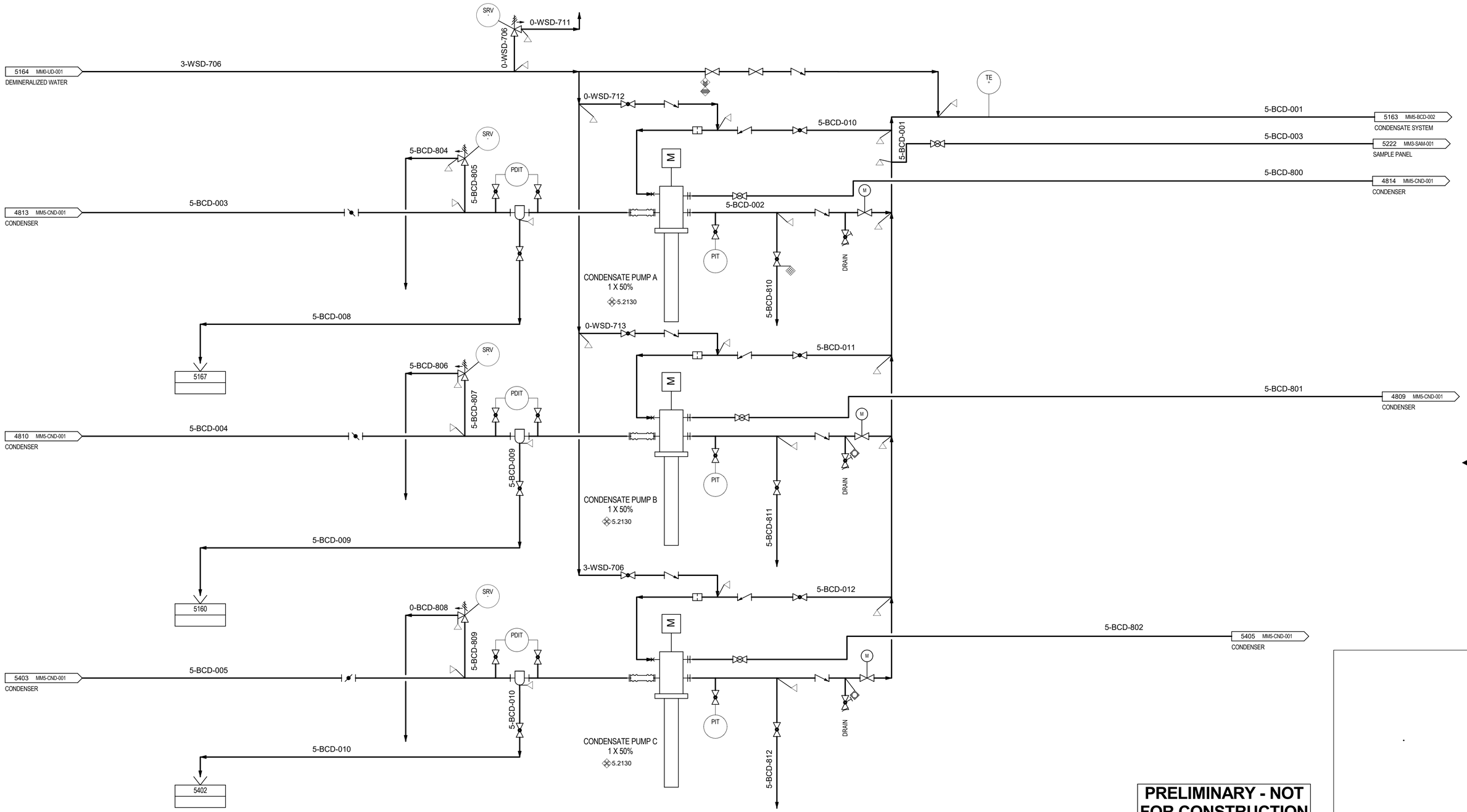

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
CONDENSATE PUMPS

project 157787 | contract

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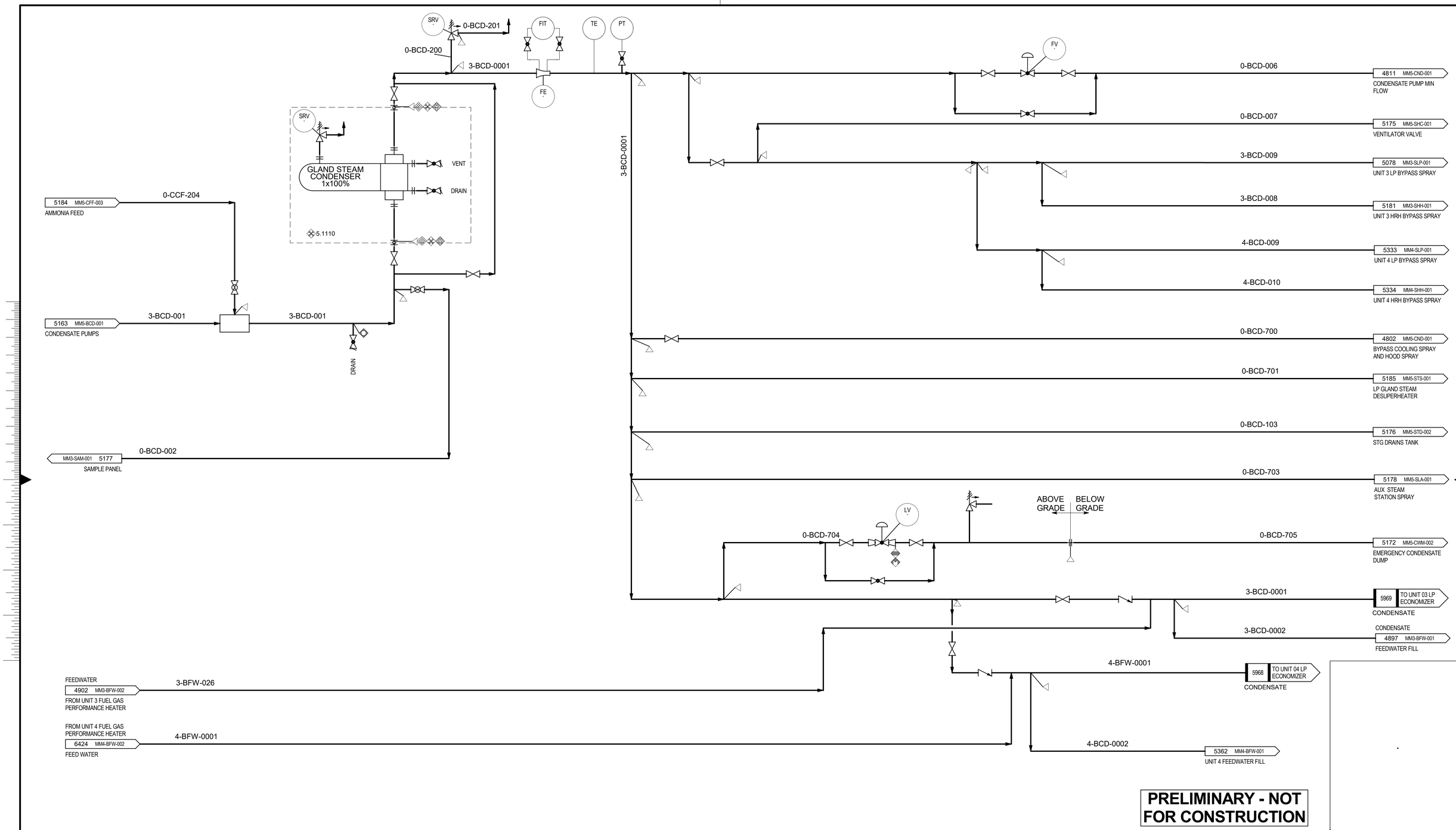

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
CONDENSATE DISTRIBUTION HEADER

project 157787 | contract

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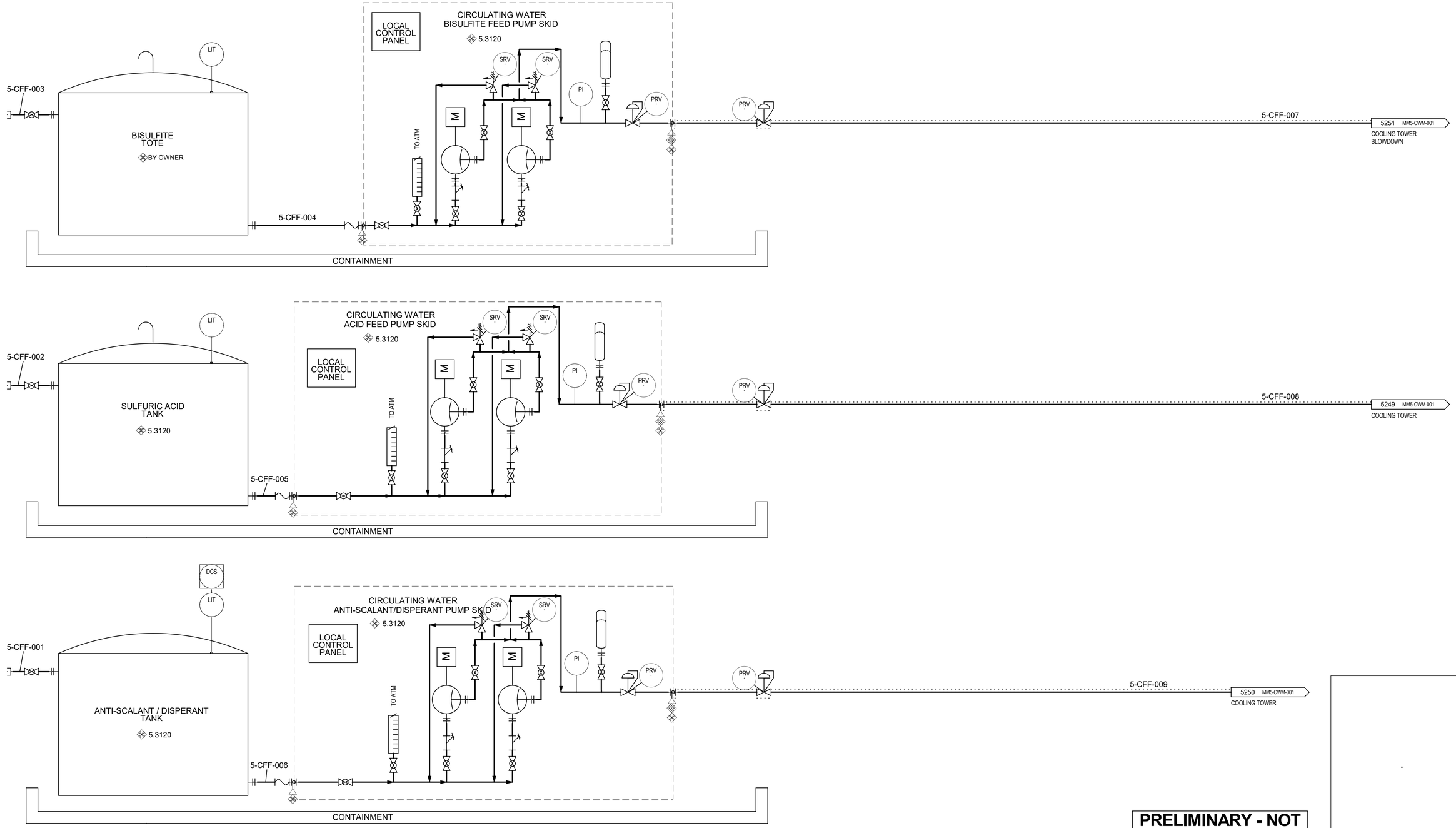

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
CHEMICAL FEED CIRCULATING WATER

project 157787 | contract

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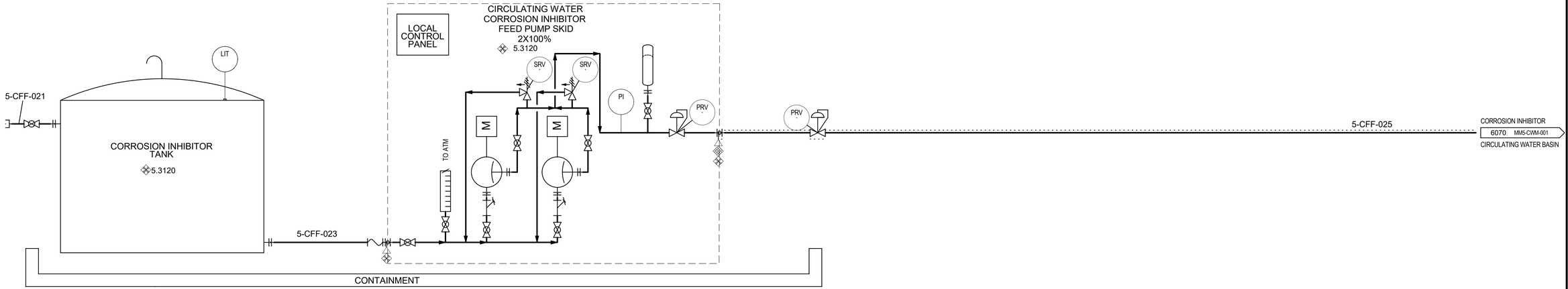

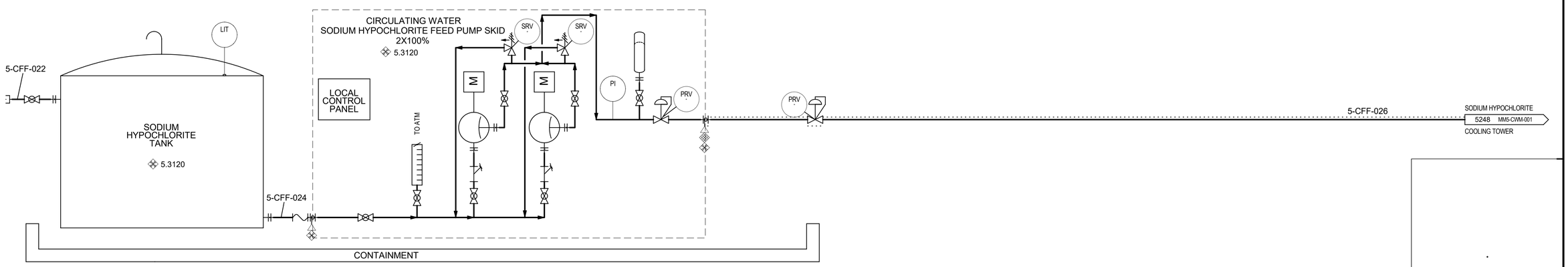

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
CHEMICAL FEED CIRCULATING WATER

project 157787 | contract

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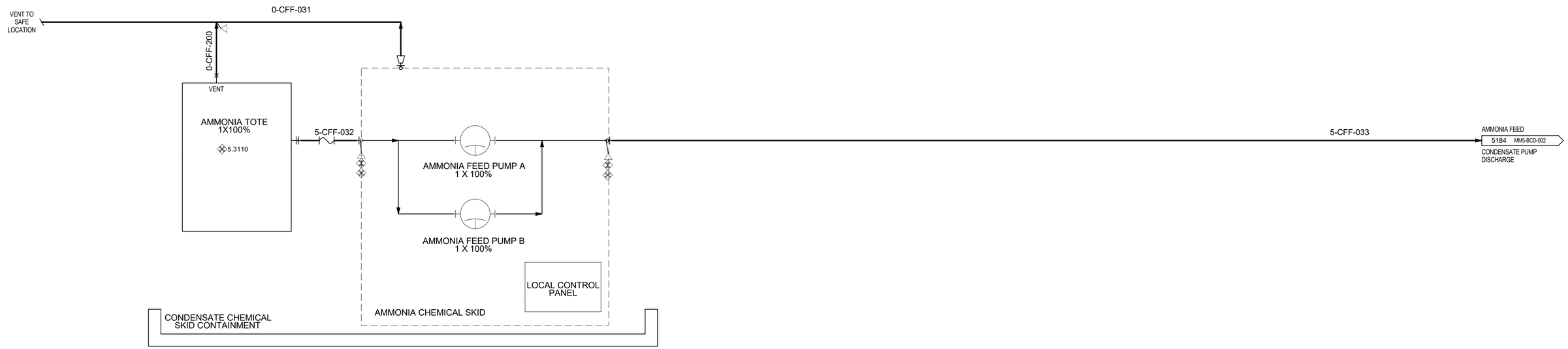

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
CONDENSATE AMMONIA FEED SKID

project 157787 | contract

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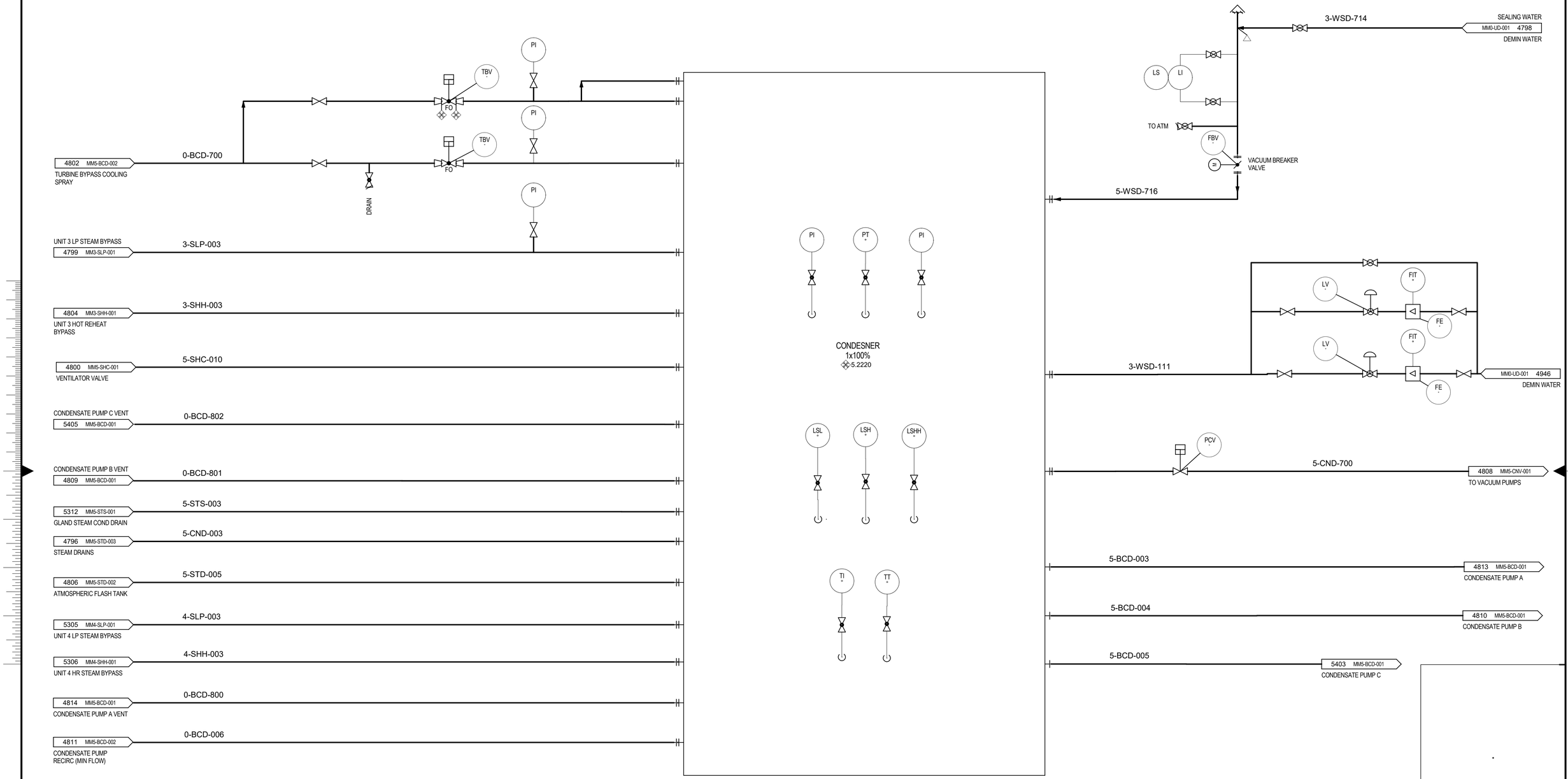

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
CONDENSER

project 157787 | contract

drawing **MM5-CND-001** | rev. **B**

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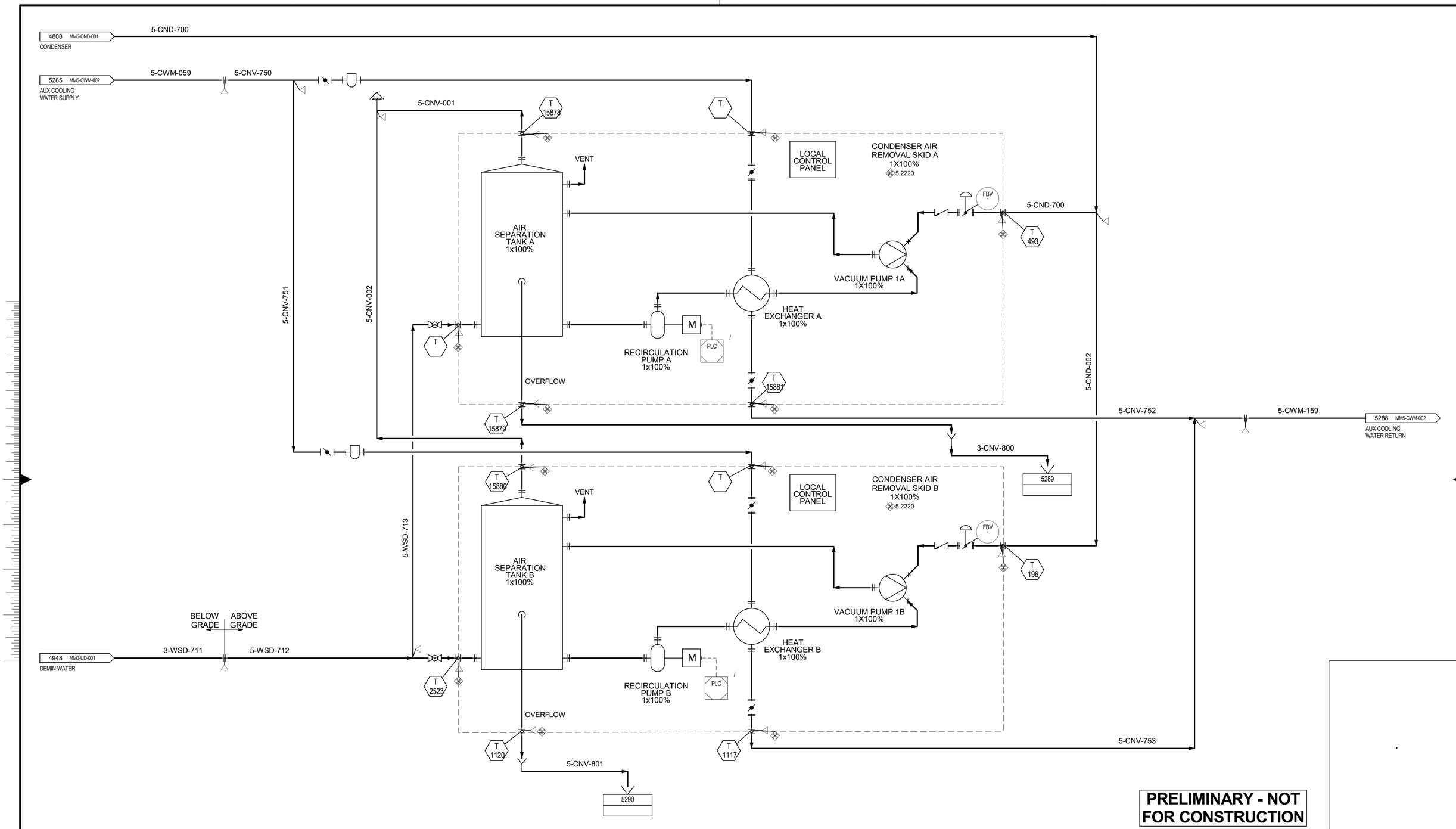

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A	12/01/23	CDM	BAN	ISSUED FOR OWNER REVIEW

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
CONDENSER VACUUM

project 157787 | contract

drawing **MM5-CNV-001** | rev. **B**

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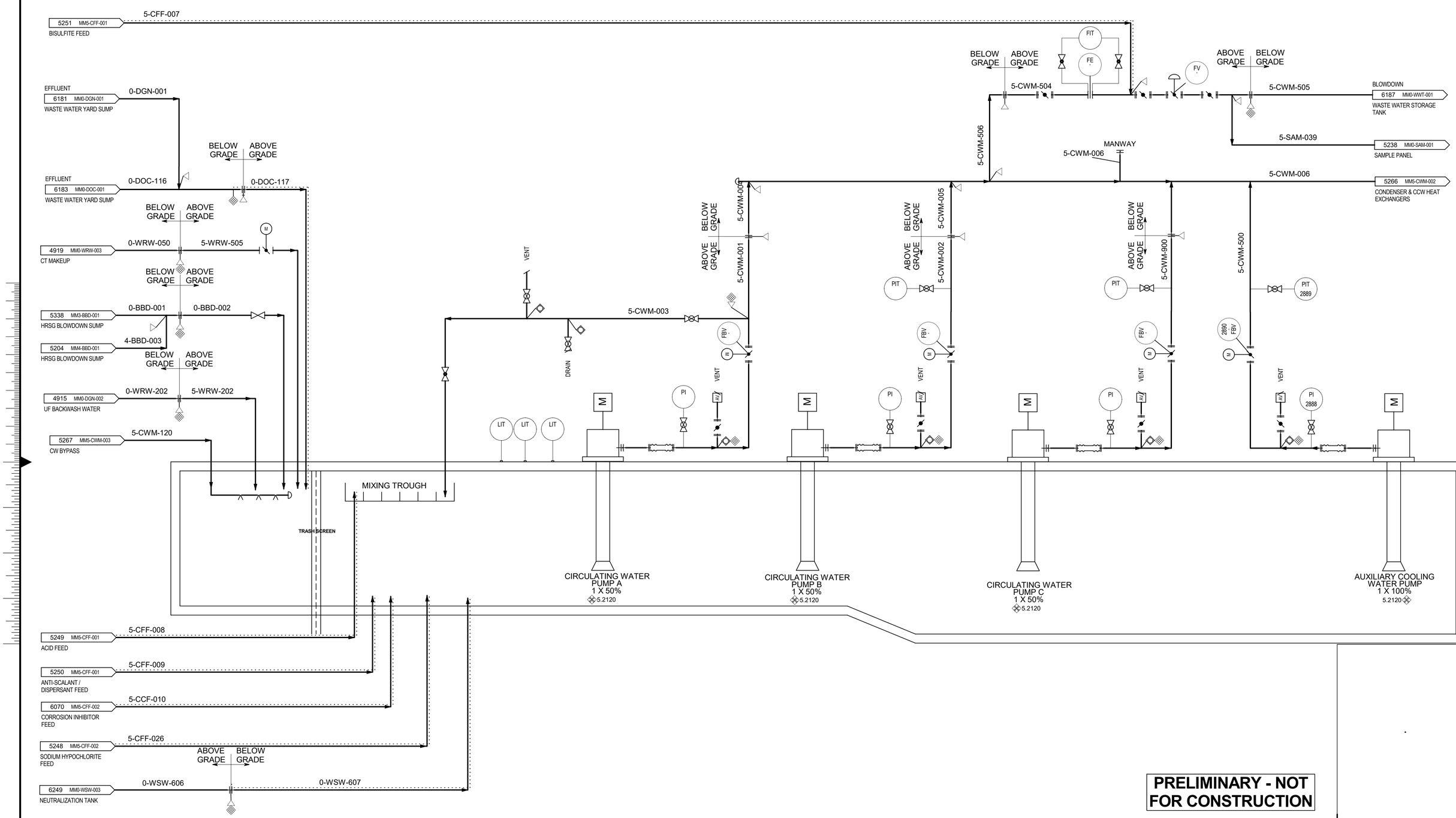

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EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
CIRCULATING WATER PUMPS

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drawing **MM5-CWM-001** | rev. **B**

sheet of sheets

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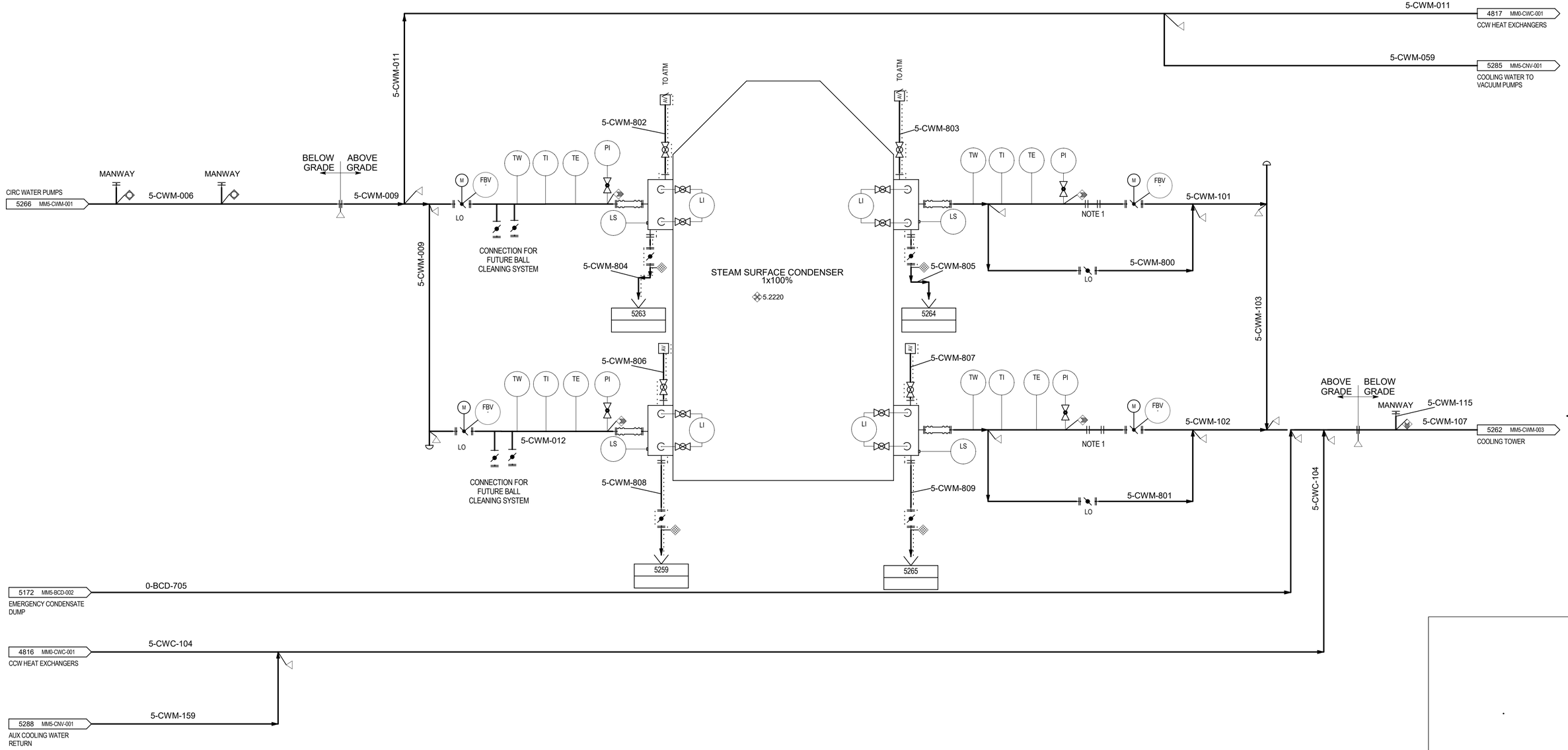
NOTE 1:
1.REMOVABLE SPOOL SIZED FOR LENGTH OF FUTURE BALL CLEANING STRAINER.



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EKPC 2X1 COMBINED CYCLE

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Piping & Instrumentation Diagram
CIRCULATING WATER

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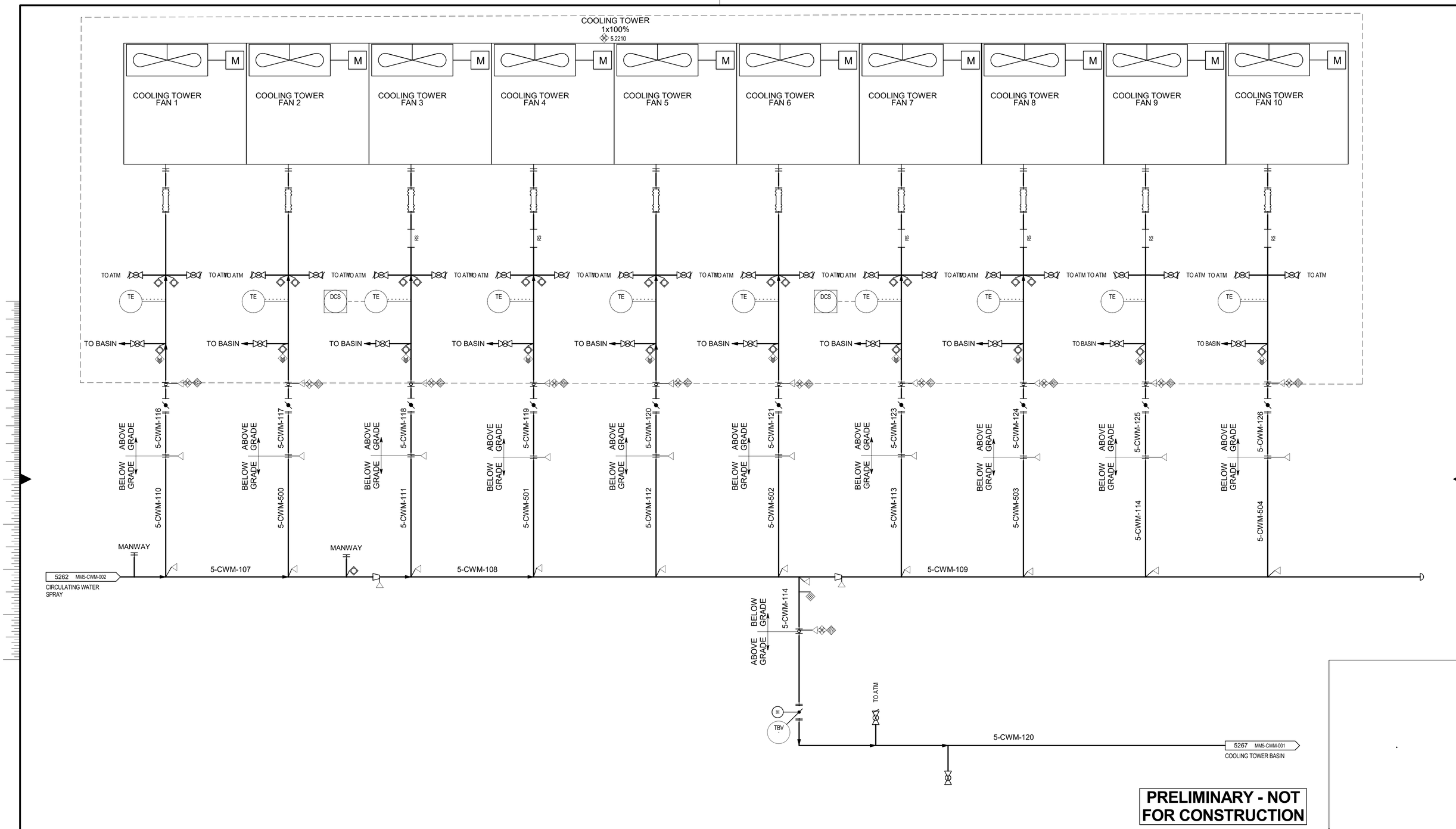

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EKPC 2X1 COMBINED CYCLE

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Piping & Instrumentation Diagram
CIRCULATING WATER

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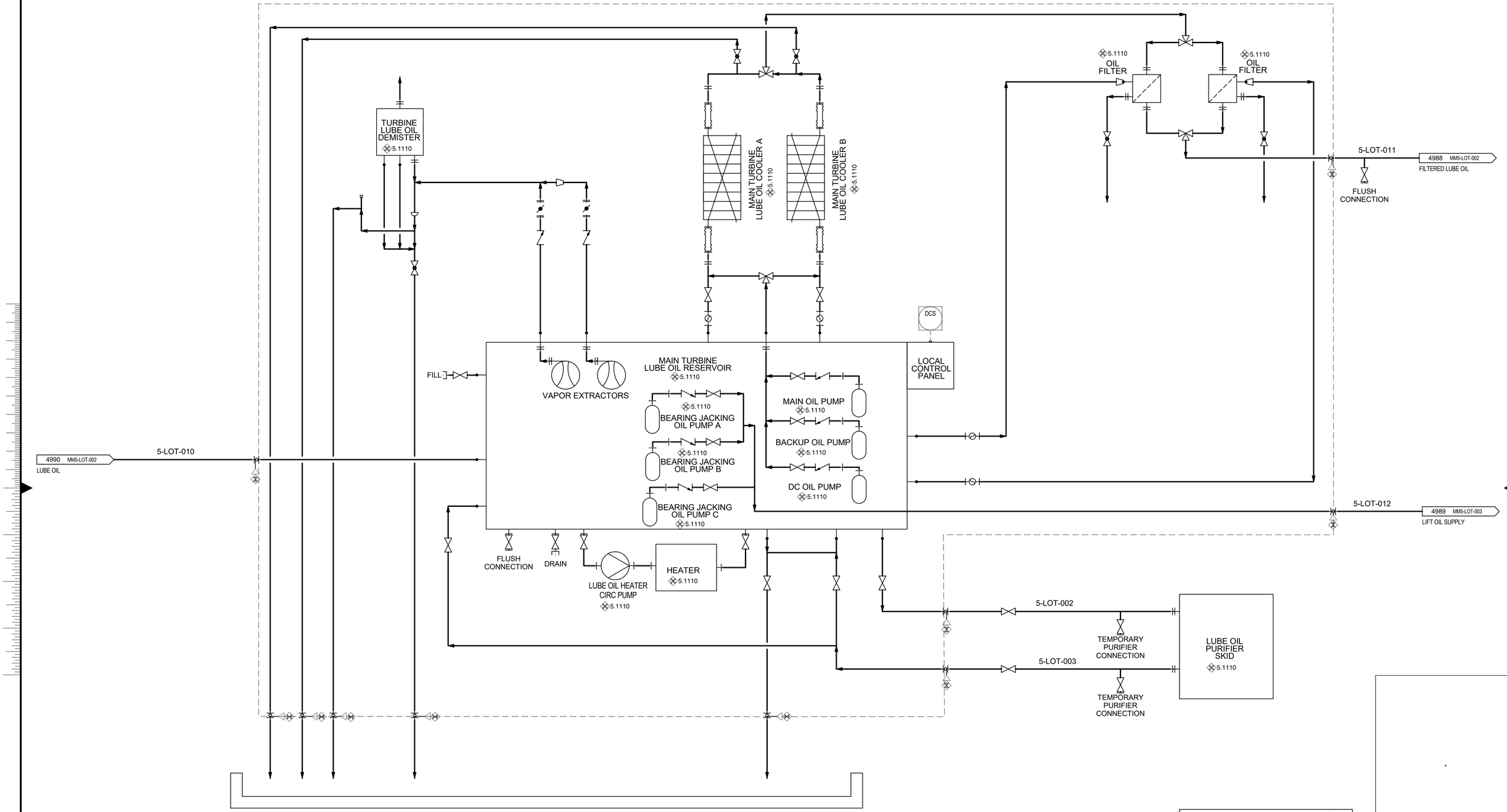

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EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
TURBINE LUBE OIL

project 157787 | contract

drawing **MM5-LOT-001** | rev. **B**

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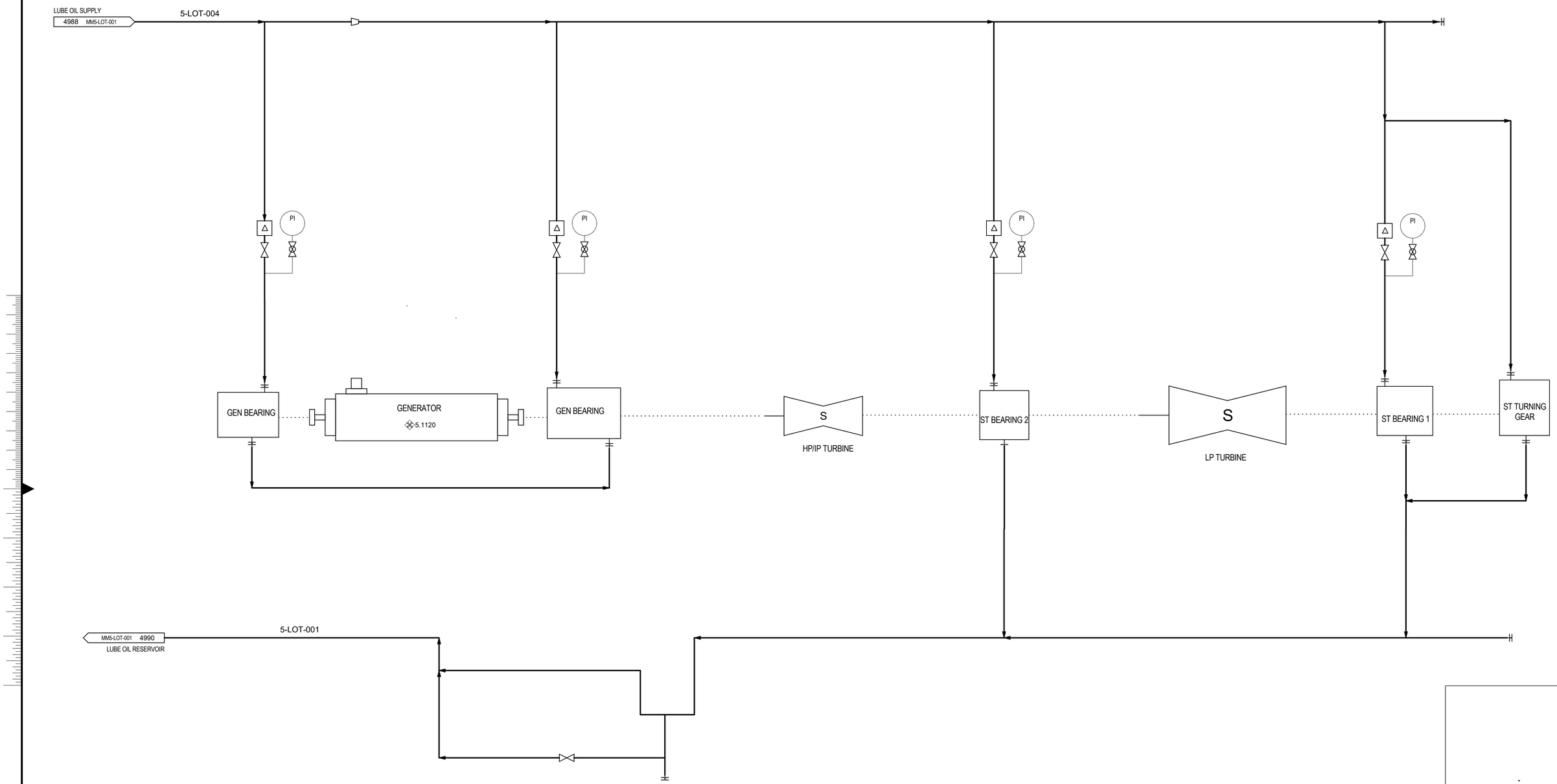

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
TURBINE LUBE OIL

project 157787 | contract

drawing **MM5-LOT-002** rev. **— B**

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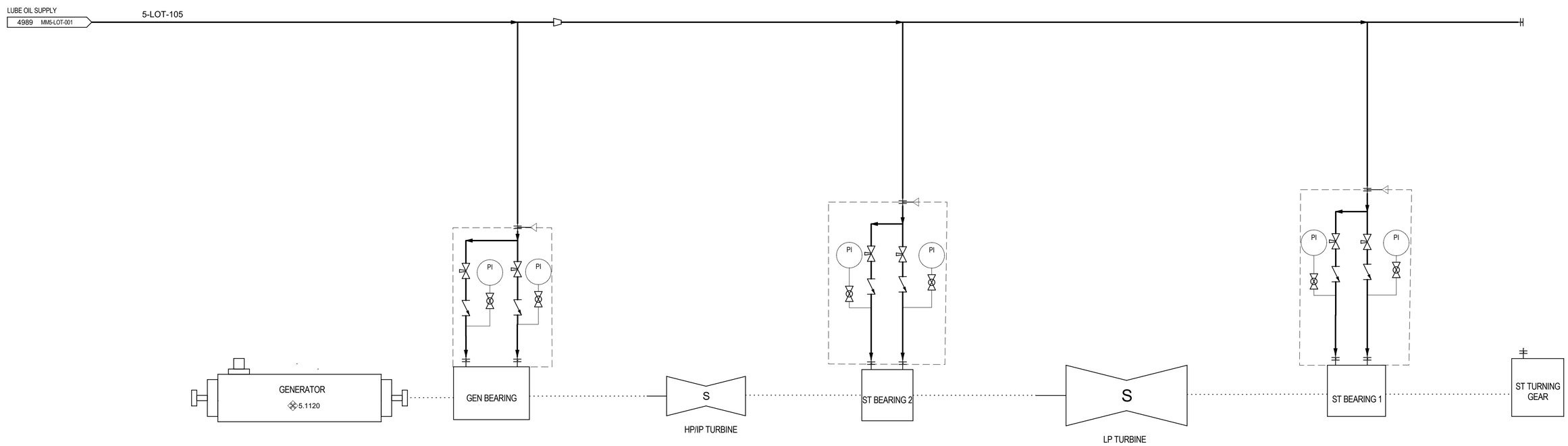

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
POWERTRAIN LIFT OIL

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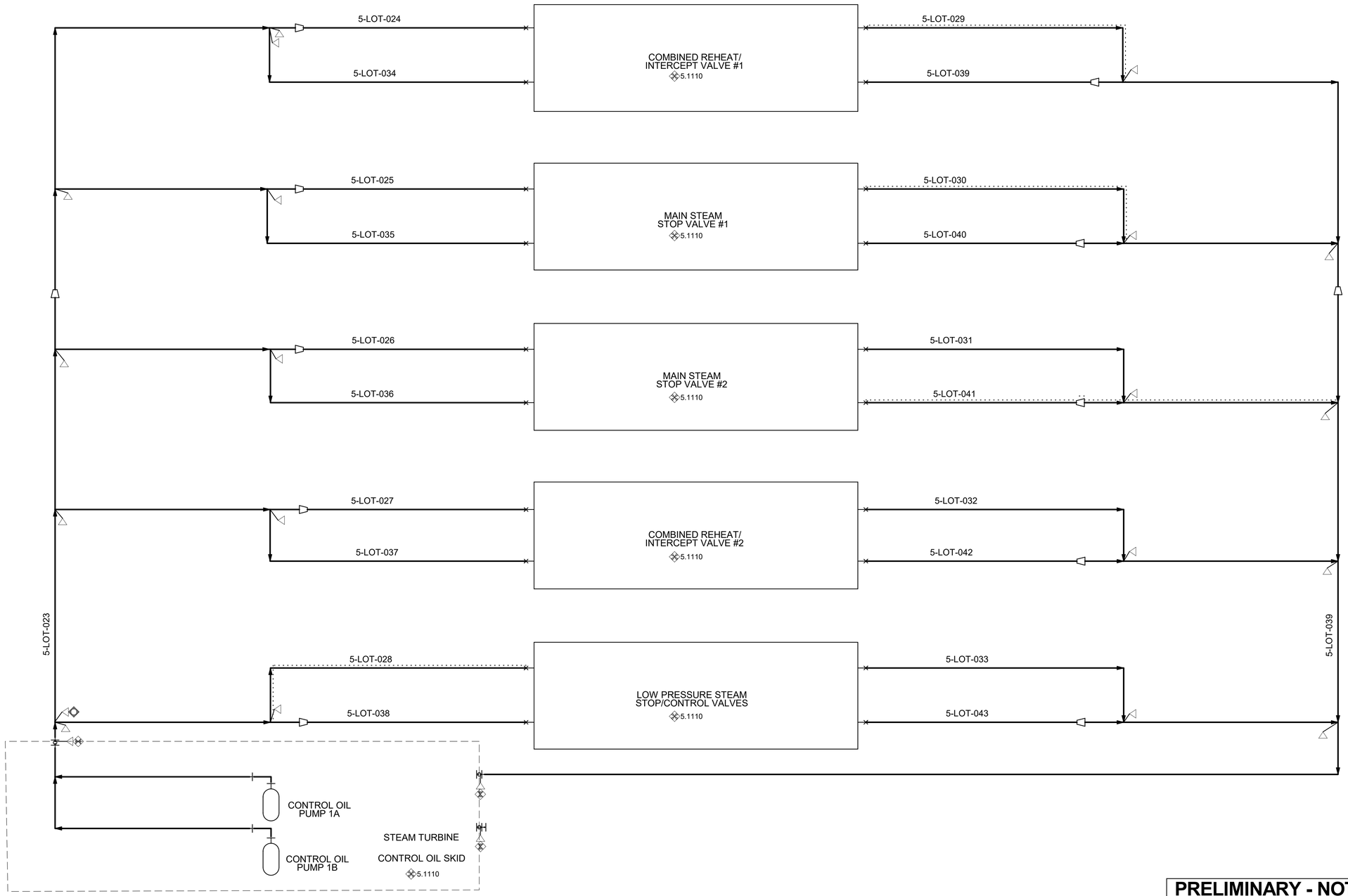

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
STG HYDRAULIC/CONTROL OIL

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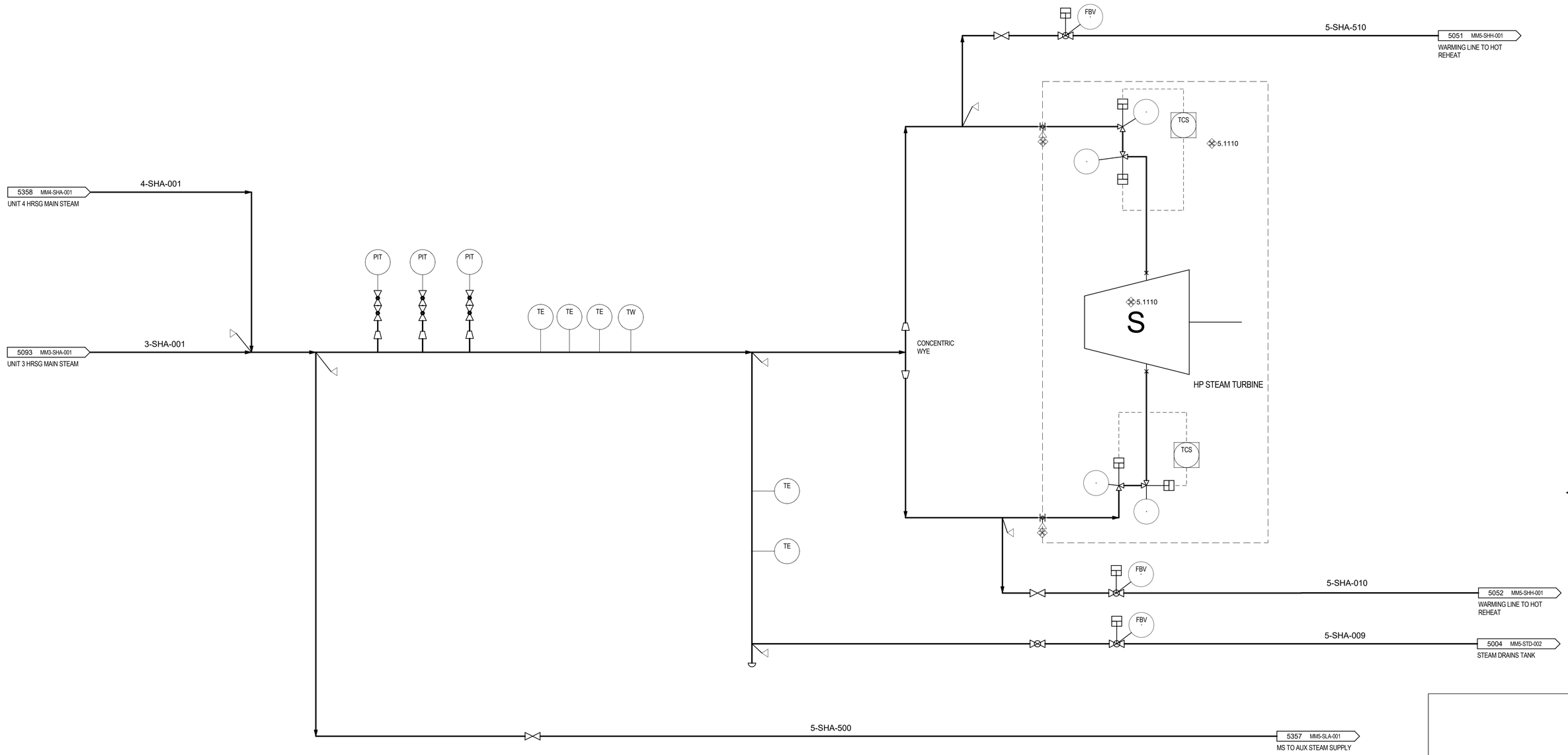

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
MAIN STEAM

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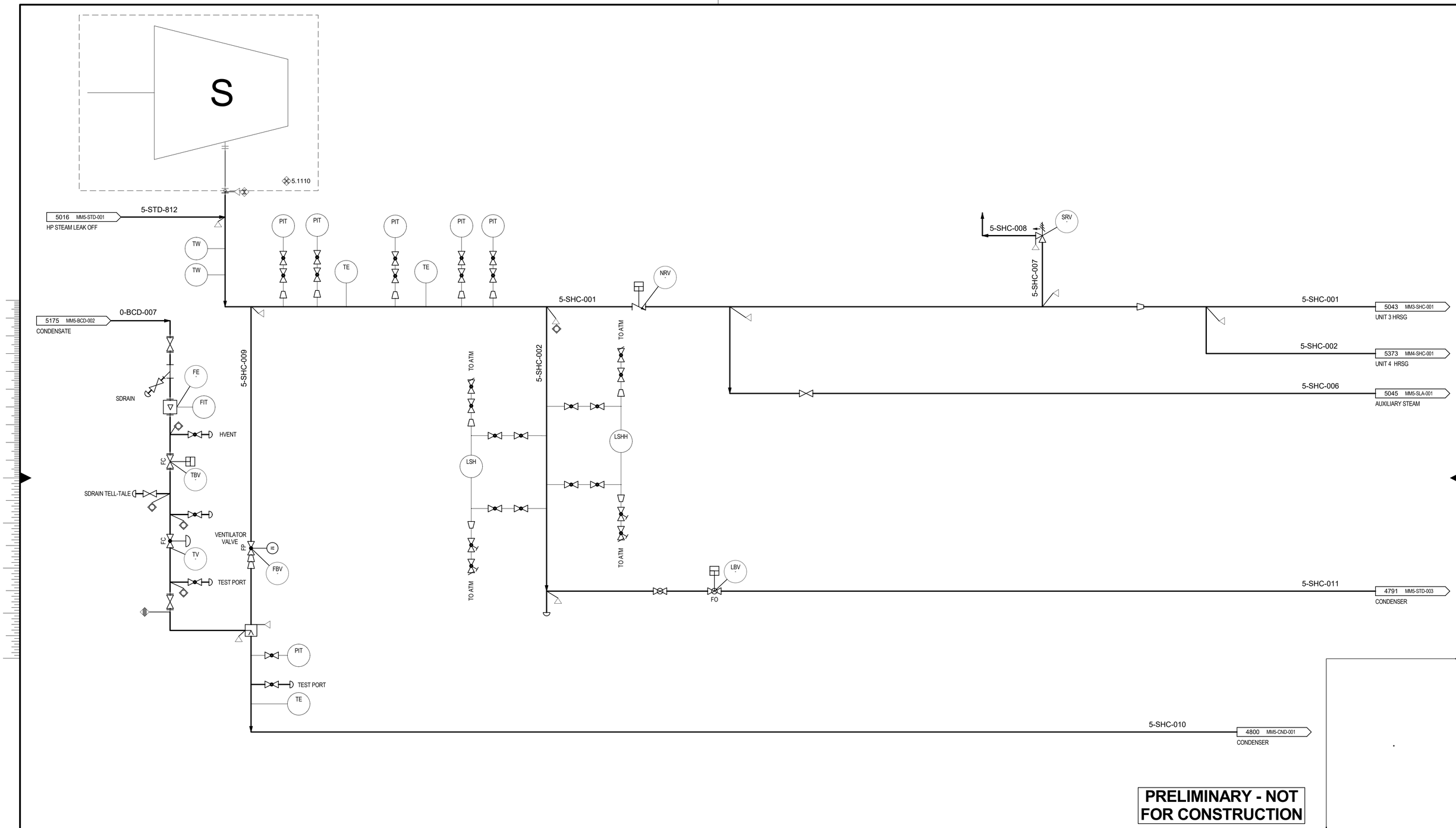

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
COLD REHEAT STEAM

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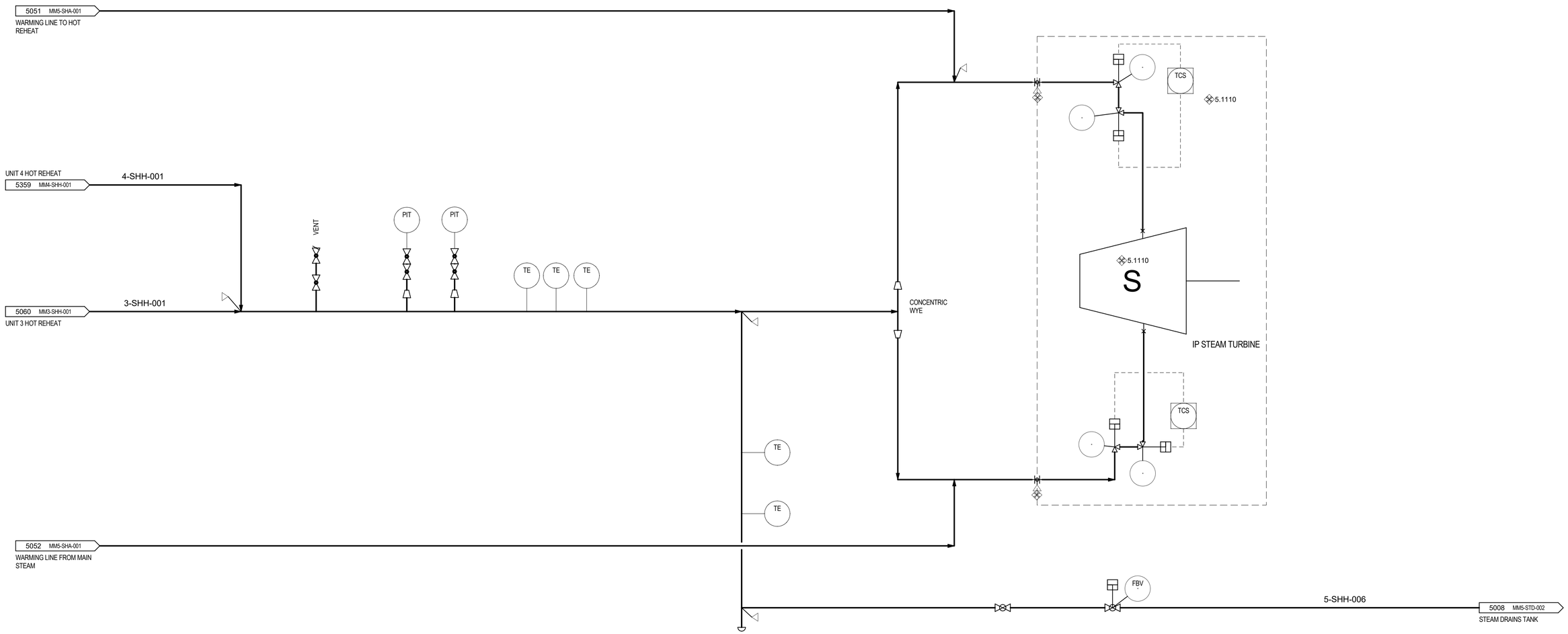

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
HOT REHEAT STEAM

project 157787
contract

drawing **MM5-SHH-001** rev. **B**

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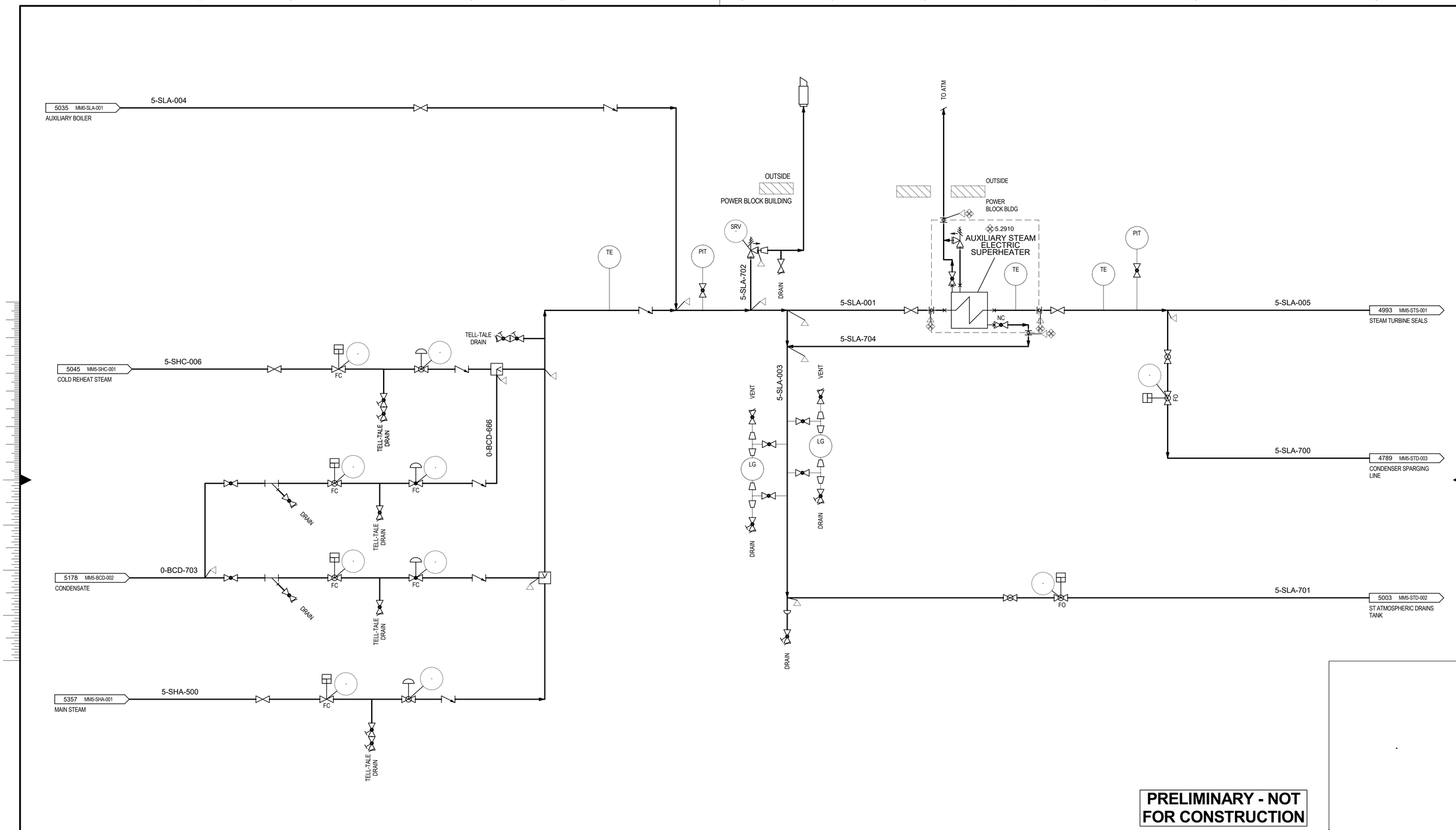

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
AUXILIARY STEAM

project 157787 | contract

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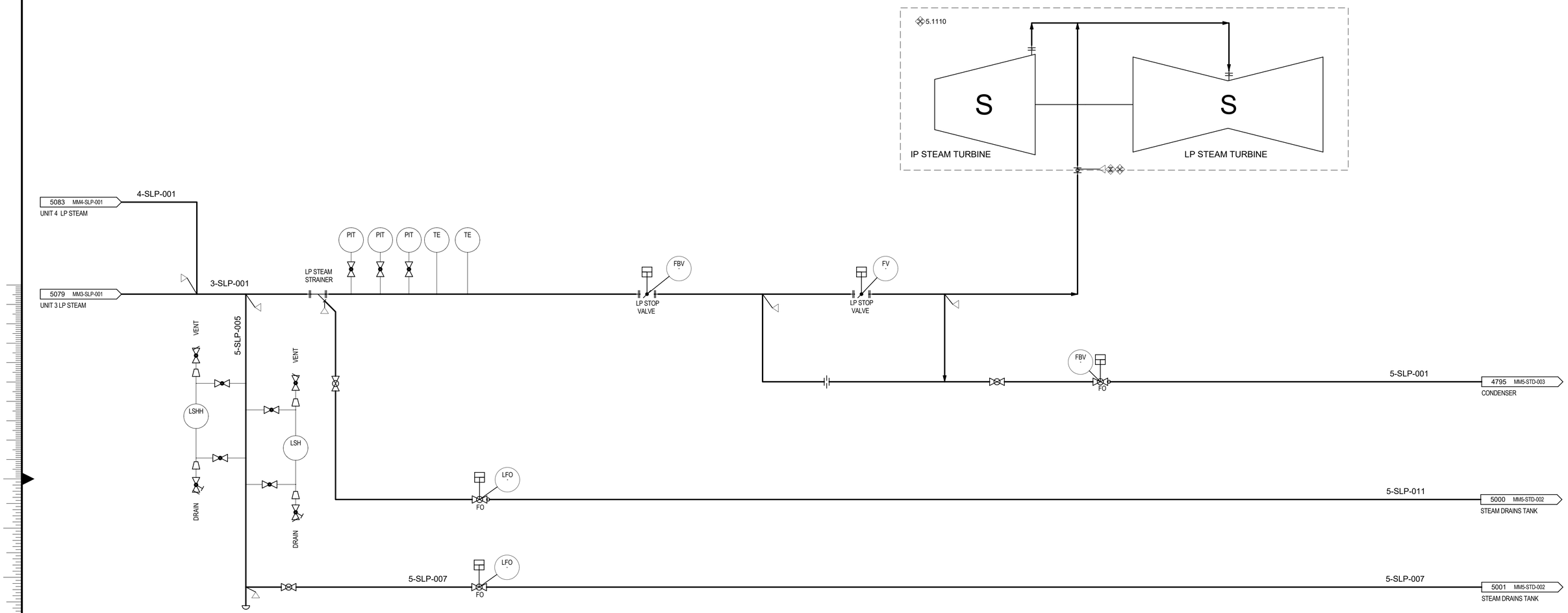

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
LOW PRESSURE STEAM

project 157787 | contract

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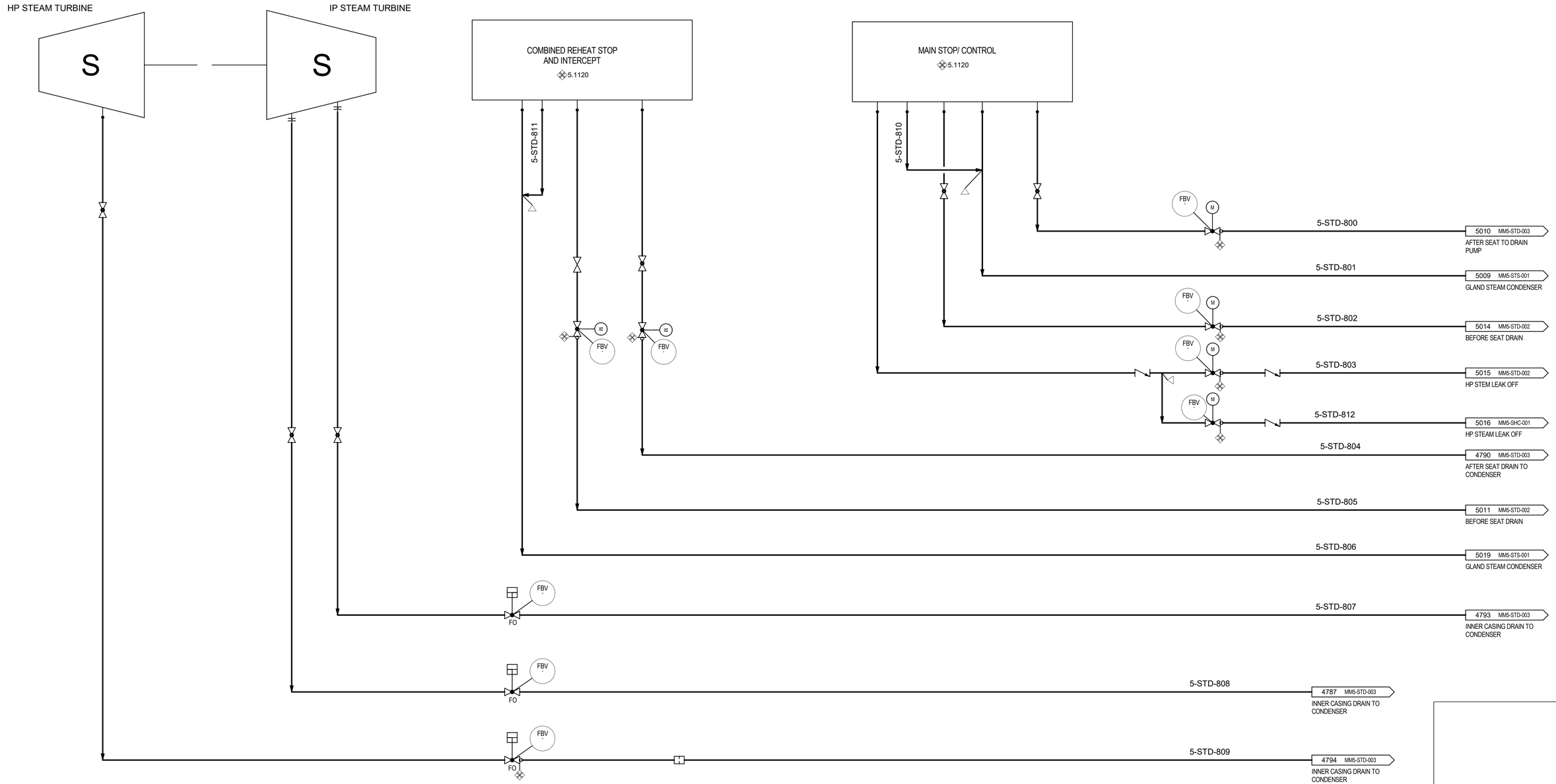

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
STEAM TURBINE DRAINS

project 157787 | contract

drawing **MM5-STD-001** rev. **B**

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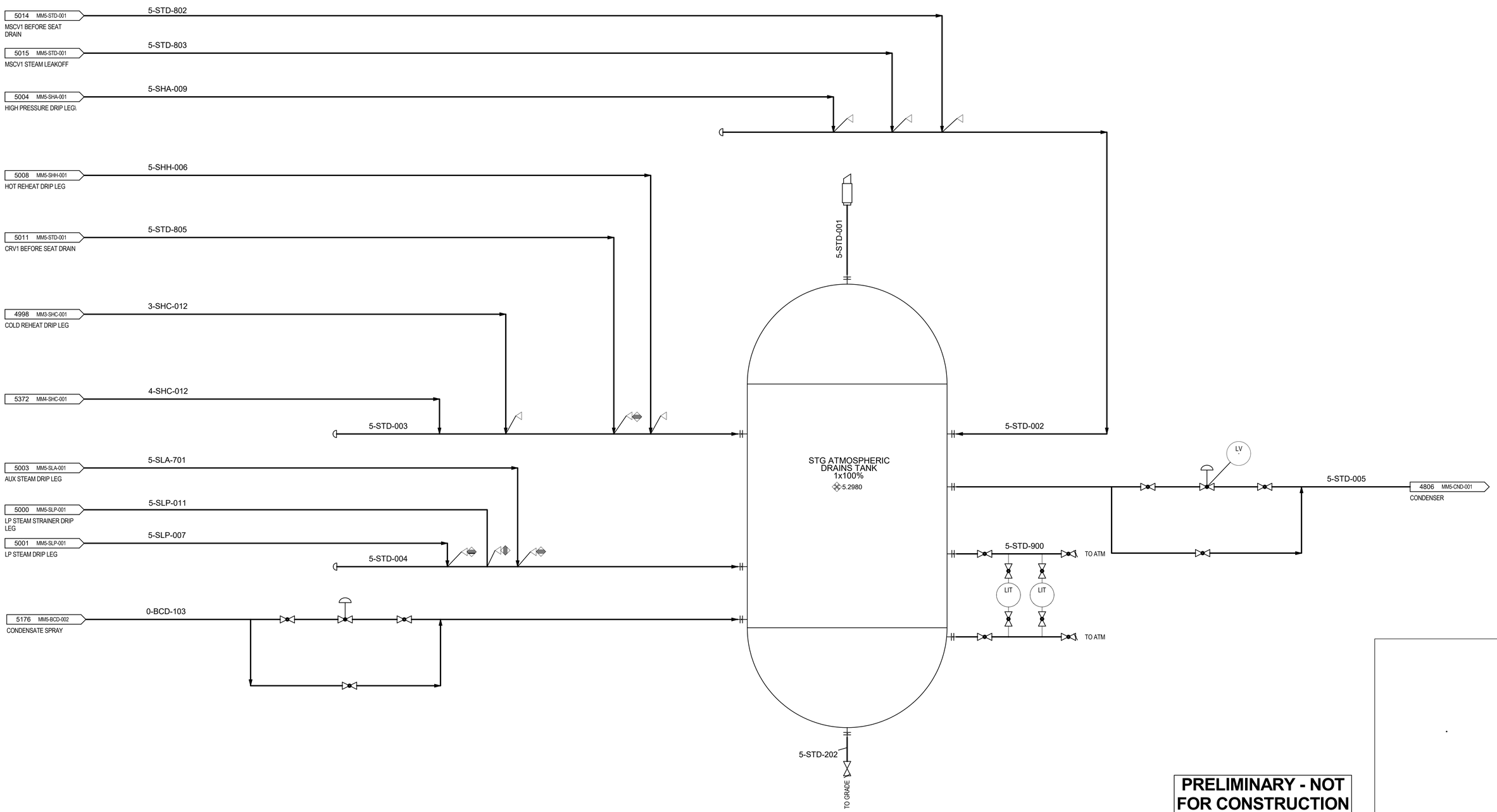

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
STEAM TURBINE DRAINS

project 157787 | contract

drawing **MM5-STD-002** rev. **B**

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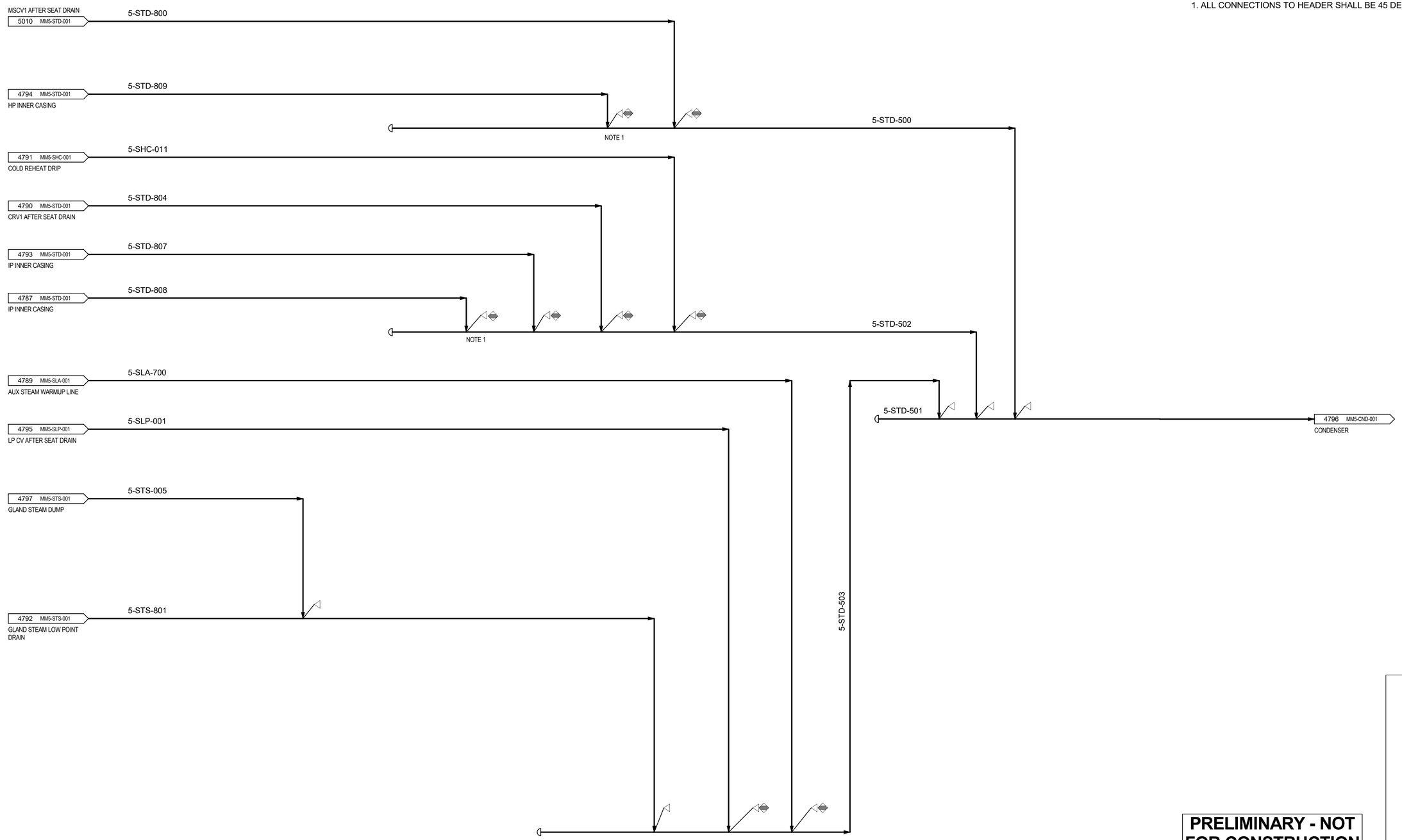
NOTES:
1. ALL CONNECTIONS TO HEADER SHALL BE 45 DEGREE LATERALS.



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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
STEAM TURBINE DRAINS

project 157787
contract

drawing **MM5-STD-003**
rev. **— B**

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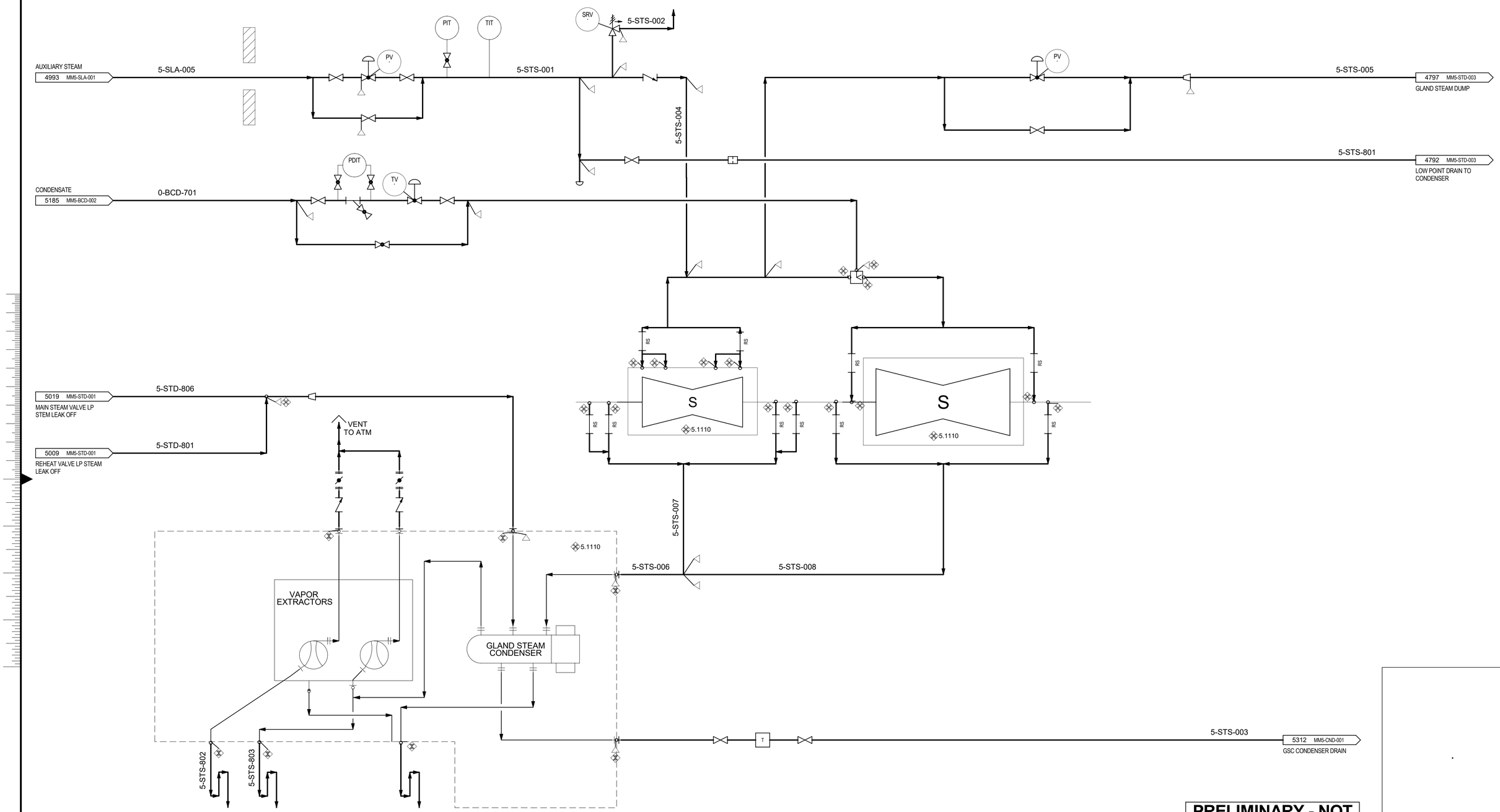

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EAST KENTUCKY POWER COOPERATIVE

EKPC 2X1 COMBINED CYCLE

KENTUCKY

Piping & Instrumentation Diagram
STEAM TURBINE SEALS

project 157787 | contract

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sheet of sheets

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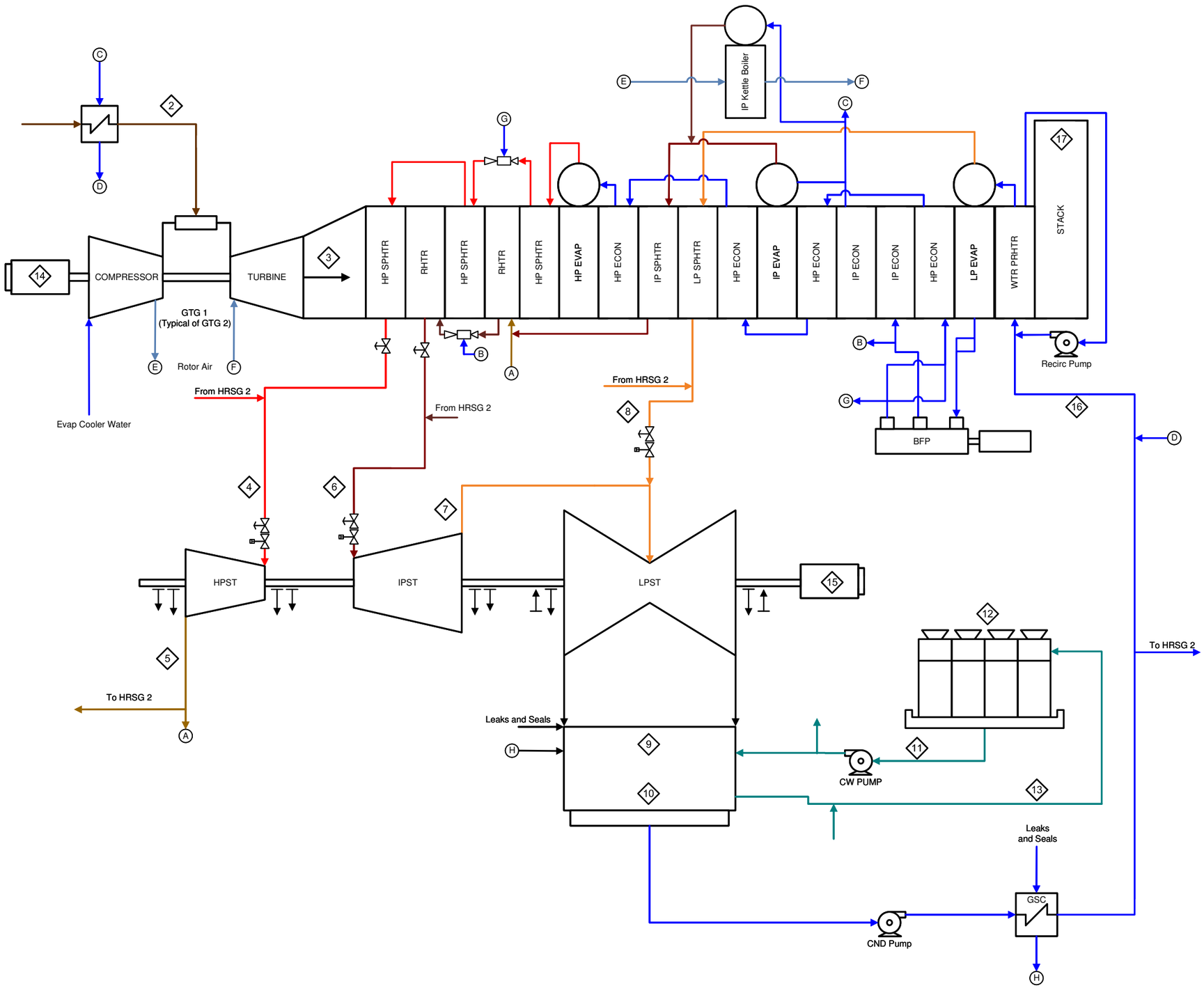
Appendix F – HEAT BALANCE DIAGRAMS

PRELIMINARY, NOT FOR GUARANTEE

Diagram is for graphical representation purposes only. Actual equipment arrangement may vary. Not to be used for construction.



PERFORMANCE SUMMARY

DRY BULB TEMPERATURE, °F	1
WET BULB TEMPERATURE, °F	
RELATIVE HUMIDITY, %	
ELEVATION, ft	
AMBIENT PRESSURE, psia	
EVAPORATIVE COOLER STATUS, (ON/OFF)	
GTG1 GROSS OUTPUT, kW	
GTG2 GROSS OUTPUT, kW	
GTG1 GROSS LHV HEAT Rate, Btu/kWh	
GTG2 GROSS LHV HEAT Rate, Btu/kWh	
STG GROSS OUTPUT, kW	
GTG1 LHV HEAT CONSUMPTION, MMBtu/h	1
GTG2 LHV HEAT CONSUMPTION, MMBtu/h	
PLANT LHV HEAT CONSUMPTION, MMBtu/h	
AUXILIARY LOAD, kW	
NET PLANT OUTPUT, kW	
NET PLANT LHV HEAT RATE, Btu/kWh	
NET PLANT HHV HEAT RATE, Btu/kWh	
NET LHV CYCLE EFFICIENCY, %	
NET HHV CYCLE EFFICIENCY, %	

NOTES:

1. Steam properties are based on IAPWS-IF97 steam tables.

REV.	NOTES:	DATE
-	Initial Release	11/27/2023
1	Added Case	02/02/2024
2	Updated Fuel Oil Cases to w/H2O Injection	06/13/2024
3	Added Evaporative Cooler	10/16/2024
4	Updated Fuel Oil Cases	10/30/2024

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EAST KENTUCKY POWER COOPERATIVE

Date 10/30/2024	Detailed B. Kitchen
Designed B. Kitchen	Checked A. CERRA

BURNS McDONNELL

HEAT BALANCE DIAGRAM

Project 157787

Drawing Rev 4

Cooper Unfired 5000F 2 x 1 Combined Cycle

Revision 4

Sheet 2

Date: 10/30/24

PRELIMINARY NOT FOR GUARANTEE

EKPC

Cooper Unfired 5000F 2x1 Combined Cycle

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PERFORMANCE SUMMARY	Units	Heat Balance State Point	2x100% -7.6°F NG	2x100% 56.2°F NG	2x100% 59°F NG	2x100% 71.9°F NG w/Evap Cooler	2x100% 71.9°F NG	2x100% 86.6°F NG w/Evap Cooler	2x100% 86.6°F NG	2x100% 104.7°F NG w/Evap Cooler	2x100% 104.7°F NG	2x36.1% - 7.6°F NG	2x32% 56.2°F NG	2x40.2% 104.7°F NG	1x100% - 7.6°F NG	1x100% 56.2°F NG	1x100% 104.7°F NG	1x36.1% - 7.6°F NG	1x32% 56.2°F NG	1x40.2% 104.7°F NG	2x100% - 7.6°F FO	2x100% 56.2°F FO	2x100% 71.9°F FO w/Evap Cooler
Dry Bulb Temperature	°F	1	-7.6	56.2	59.0	71.9	71.9	86.6	86.6	104.7	104.7	-7.6	56.2	104.7	-7.6	56.2	104.7	-7.6	56.2	104.7	-7.6	56.2	71.9
Wet Bulb Temperature	°F		-9.1	51.4	51.4	66.4	66.4	76.1	76.1	82.5	82.5	-9.1	51.4	82.5	-9.1	51.4	82.5	-9.1	51.4	82.5	-9.1	51.4	66.4
Relative Humidity	%		38%	73%	60%	76%	76%	63%	63%	40%	40%	38%	73%	40%	38%	73%	40%	38%	73%	40%	38%	73%	76%
Elevation	ft		820.0	820.0	820.0	820.0	820.0	820.0	820.0	820.0	820.0	820.0	820.0	820.0	820.0	820.0	820.0	820.0	820.0	820.0	820.0	820.0	820.0
Ambient Pressure	psia		14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3
Evaporative Cooler Status	On/Off		Off	Off	Off	On	Off	On	Off	On	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
GTG1 Gross Output	kW		265,600	265,500	265,500	259,700	254,700	249,400	238,300	240,900	211,500	96,000	85,000	85,000	265,600	265,500	211,500	96,000	85,000	85,000	232,000	243,500	235,700
GTG2 Gross Output	kW		265,600	265,500	265,500	259,700	254,700	249,400	238,300	240,900	211,500	96,000	85,000	85,000	0	0	0	0	0	0	232,000	243,500	235,700
GTG1 Gross LHV Heat Rate	Btu/kWh		8,390	8,429	8,450	8,509	8,542	8,600	8,695	8,684	8,978	12,321	12,773	12,652	8,390	8,429	8,978	12,321	12,773	12,652	9,353	8,904	9,000
GTG2 Gross LHV Heat Rate	Btu/kWh		8,390	8,429	8,450	8,509	8,542	8,600	8,695	8,684	8,978	12,321	12,773	12,652	0	0	0	0	0	0	9,353	8,904	9,000
STG Gross Output	kW		239,900	259,400	261,000	259,200	257,300	253,600	249,700	248,700	236,100	155,800	155,800	154,000	119,900	128,400	113,000	73,800	72,500	70,500	220,800	226,000	223,200
GTG1 LHV Heat Consumption	MMBtu/hr		2,228	2,238	2,243	2,210	2,176	2,145	2,072	2,092	1,899	1,183	1,086	1,075	2,228	2,238	1,899	1,183	1,086	1,075	2,170	2,168	2,122
GTG2 LHV Heat Consumption	MMBtu/hr		2,228	2,238	2,243	2,210	2,176	2,145	2,072	2,092	1,899	1,183	1,086	1,075	0	0	0	0	0	0	2,170	2,168	2,122
Plant LHV Heat Consumption	MMBtu/hr		4,456	4,475	4,487	4,420	4,351	4,289	4,145	4,183	3,798	2,366	2,171	2,151	2,228	2,238	1,899	1,183	1,086	1,075	4,340	4,337	4,244
Auxiliary Load	kW		16,400	17,900	18,000	18,000	17,800	17,800	17,500	17,600	16,800	11,900	13,600	13,700	10,800	11,900	12,400	9,300	9,300	11,100	17,000	18,400	18,300
Net Plant Output	kW		754,600	772,400	774,000	760,700	748,800	734,700	708,800	712,800	642,200	335,900	312,200	310,400	374,600	382,000	312,100	160,500	148,100	144,400	667,900	694,700	676,400
Net Plant LHV Heat Rate	Btu/kWh		5,906	5,794	5,797	5,810	5,810	5,839	5,847	5,869	5,913	7,043	6,955	6,930	5,948	5,858	6,084	7,369	7,329	7,445	6,482	6,243	6,274
Net Plant HHV Heat Rate	Btu/kWh		6,540	6,417	6,420	6,434	6,435	6,466	6,475	6,499	6,549	7,800	7,702	7,675	6,587	6,488	6,738	8,160	8,116	8,245	6,915	6,659	6,692
Net LHV Cycle Efficiency	%		57.8%	58.9%	58.9%	58.7%	58.7%	58.4%	58.4%	58.1%	57.7%	48.4%	49.1%	49.2%	57.4%	58.2%	56.1%	46.3%	46.6%	45.8%	52.6%	54.7%	54.4%
Net HHV Cycle Efficiency	%		52.2%	53.2%	53.1%	53.0%	53.0%	52.8%	52.7%	52.5%	52.1%	43.7%	44.3%	44.5%	51.8%	52.6%	50.6%	41.8%	42.0%	41.4%	49.3%	51.2%	51.0%
GAS TURBINE																							
Fuel Gas/Fuel Oil Conditions		2																					
GTG Fuel Gas/Fuel Oil Inlet Temperature	°F		440	440	440	440	440	440	440	440	440	407	404	408	413	417	408	366	363	365	80	80	80
Exhaust Gas Conditions		3																					
GTG Exhaust Flow	lb/hr		4,548,326	4,643,844	4,674,249	4,606,137	4,553,599	4,465,412	4,344,503	4,344,832	4,031,885	2,820,933	2,583,981	2,594,028	4,548,326	4,643,844	4,031,885	2,820,933	2,583,981	2,594,028	4,746,811	4,808,632	4,679,457
GTG Exhaust Temperature	°F		1,094	1,124	1,124	1,132	1,135	1,144	1,153	1,155	1,175	1,111	1,175	1,198	1,094	1,124	1,175	1,111	1,175	1,198	1,026	1,030	1,040
Gas Turbine Generator		14																					
GTG Gross Output	kW		265,600	265,500	265,500	259,700	254,700	249,400	238,300	240,900	211,500	96,000	85,000	85,000	265,600	265,500	211,500	96,000	85,000	85,000	232,000	243,500	235,700
STEAM TURBINE																							
HPST Throttle Steam		4																					
HPST Throttle Steam Flow	lb/hr		999,982	1,070,074	1,076,228	1,087,617	1,068,293	1,074,547	1,045,619	1,063,806	996,610	658,155	648,226	669,744	526,698	556,614	516,740	339,061	332,018	343,026	920,224	940,398	944,999
HPST Throttle Steam Pressure	psia		2,216	2,387	2,400	2,404	2,384	2,377	2,337	2,355	2,234	1,492	1,473	1,522	1,212	1,289	1,200	1,100	1,100	1,100	1,999	2,043	2,044
HPST Throttle Steam Temperature	°F		1,028	1,050	1,050	1,050	1,050	1,050	1,050	1,050	1,050	1,050	1,050	1,050	1,032	1,050	1,050	1,050	1,050	1,050	971	973	982
HPST Throttle Steam Enthalpy	Btu/lb		1,486	1,495	1,495	1,495	1,495	1,495	1,497	1,496	1,500	1,521	1,522	1,520	1,518	1,527	1,529	1,532	1,532	1,532	1,456	1,456	1,462
HPST Exhaust		5																					
HPST Exhaust Flow	lb/hr		938,007	1,003,721	1,009,421	1,019,282	1,001,729	1,006,803	980,156	996,572	933,934	617,592	607,471	627,287	488,075	515,728	478,245	312,920	305,998	316,123	861,233	879,889	883,742
HPST Exhaust Pressure	psia		567	612	616	633	614	628	605	624	582	366	369	387	354	380	357	229	228	238	531	546	557
HPST Exhaust Temperature	°F		658	675	675	681	676	683	678	683	680	673	678	681	702	719	722	708	711	714	622	624	636
HPST Exhaust Enthalpy	Btu/lb		1,328	1,335	1,335	1,338	1,336	1,339	1,338	1,340	1,341	1,350	1,353	1,353	1,367	1,374	1,377	1,377	1,378	1,379	1,309	1,310	1,316
IPST Throttle Steam / Hot Reheat		6																					
IPST Throttle Flow	lb/hr		1,150,231	1,232,005	1,240,508	1,244,522	1,238,771	1,237,015	1,222,830	1,230,087	1,176,515	731,865	743,581	781,210	582,596	625,083	593,586	374,440	378,971	397,007	1,099,337	1,128,913	1,122,419
IPST Throttle Pressure	psia		507	546	550	566	549	562	542	559	522	326	331	347	258	278	264	167	169	177	475	488	498
IPST Throttle Temperature	°F		1,029	1,050	1,050	1,051	1,050	1,050	1,050	1,050	1,050	1,050	1,050	1,050	1,036	1,050	1,050	1,050	1,050	1,050	973	974	980
IPST Throttle Enthalpy	Btu/lb		1,536	1,547	1,547	1,547	1,547	1,546	1,547	1,546	1,547	1,553	1,552	1,552	1,547	1,554	1,554	1,557	1,557	1,556	1,507	1,507	1,510
IPST Exhaust		7																					
IPST Exhaust Flow	lb/hr		1,148,900	1,230,583	1,239,076	1,243,055	1,237,343	1,235,560	1,221,427	1,228,644	1,175,175	731,052	742,769	780,355	581,956	624,395	592,944	374,085	378,619	396,626	1,098,027	1,127,568	1,121,056
IPST Exhaust Pressure	psia		83	89	90	92	90	91	88	91	84	52	52	55	42	45	42	26	26	28	80	83	84
IPST Exhaust Temperature	°F		559	574	573	573	573	572	572	571	571	571	567	567	564	573	571	569	565	567	524	525	527
IPST Exhaust Enthalpy	Btu/lb		1,310	1,317	1,317	1,316	1,317	1,316	1,316	1,316	1,316	1,319	1,317	1,316	1,316	1,320	1,319	1,320	1,317	1,318	1,293	1,293	1,294
LP Admission Steam		8																					
LP Admission Steam Flow	lb/hr		170,899	178,559	179,875	180,319	177,664	175,801	168,854	171,425	153,528	90,947	78,245	80,779	73,172	74,634	64,722	35,618	28,397	33,343	201,067	206,175	201,696
LP Admission Steam Pressure	psia		83	89	90	92	90	91	88	91	84	52	52	55	42	45	42	26	26	28	80	83	84
LP Admission Steam Temperature	°F		597	600	601	602	599	601	598	600	596	566	567	569	557	563	556	541	542	540	580	581	583
LP Admission Steam Enthalpy	Btu/lb		1,329	1,330	1,330	1,331	1,330	1,331	1,329	1,330	1,329	1,316	1,317	1,317	1,312	1,315	1,312	1,306	1,306	1,305	1,321	1,321	1,322
LPST Exhaust		9																					
LPST Exhaust Flow	lb/hr		1,381,778	1,475,322	1,485,568	1,491,459	1,481,388	1,478,880	1,455,609	1,467,099	1,391,357	862,157	861,364	903,230	693,180	739,402	695,601	434,994	432,184	456,050	1,358,141	1,394,271	1,383,998
LPST Exhaust Pressure	psia		0.51	0.87	0.87	1.11	1.11	1.32	1.30	1.48	1.42	0.54	0.54	1.10	0.49	0.58	0.97	0.48	0.53	0.84	0.54	0.81	1.04
LPST Exhaust Pressure	inHg		1.05	1.76	1.78	2.27	2.26	2.68	2.65	3.01	2.90	1.10	1.10	2.23	1.01	1.18	1.98	0.97	1.08	1.71	1.10	1.65	2.11
LPST Exhaust ELEP Enthalpy	Btu/lb		986	1,009	1,009	1,019	1,021	1,028	1,029	1,034	1,036	1,015	1,014	1,045	1,021	1,027	1,055	1,045	1,049	1,069	983	1,000	1,011
LPST Exhaust UEEP Enthalpy	Btu/lb		1,016	1,020	1,020	1,025	1,026	1,033	1,034	1,040	1,042	1,023	1,023	1,055	1,027	1,032	1,070	1,053	1,061	1,101	1,009	1,010	1,016
Steam Turbine Generator		15																					
STG Gross Output	kW		239,900	259,400	261,000	259,200	257,300	253,600	249,700	248,700	236,100	155,800	155,800	154,000	119,900	128,400	113,000	73,800	72,500	70,500	220,800	226,000	223,200
HEAT REJECTION																							
Condenser		10																					
Condenser Duty	MMBtu/hr		1,337	1,410	1,419	1,420	1,413	1,411	1,392	1,404	1,336	839	838	887	679	725	697	438	437	473	1,302	1,321	1,309
Circulating Water Supply		11																					
Circulating Water Supply Flow	lb/hr		82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173
Circulating Water Supply Temperature	°F		57	74	74	82	82	88	88	93	92	68	68	90	68	72	89	71	74	88	59	73	81
Cooling Tower		12																					
Cooling Tower Duty	MMBtu/hr		1,386	1,458	1,467	1,469	1,461	1,460	1,440	1,453	1,385	887	886	936	728	773	745	486	485	521	1,351	1,369	1,357
Circulating Water Return		13																					
Circulating Water Return Flow	lb/hr		82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173
Circulating Water Return Temperature	°F		74	91	91	100	100	106	106	110	109	79	79	102	77	81	98	77	80	95	76	89	98
HRSG																							
HRSG Condensate Inlet		16																					
Condensate Inlet Flow	lb/hr		755,690	800,852	805,995	809,195	801,976	801,128	786,388	793,772	750,004	551,688	551,290	572,223	814,391	860,604	816,803	556,199	553,388	577,253	799,697	817,798	812,686
Condensate Inlet Temperature	°F		85	99	100	107	107	113	112	116	115	136	137	154	105	109	127	127	131	141	140	150	157
Condensate Inlet Enthalpy	Btu/lb		54	68	68	76	75	81	81	85	84	104	106	122	74	77	96	96	100	110	109	119	125
HRSG Stack		17																					
Stack Temperature	°F		185	190	190	194	191	194	190	194	187	178	172	183	175	175	175	170	170	170	209	216	219

Revision 4
Sheet 3
Date: 10/30/24

PRELIMINARY NOT FOR GUARANTEE

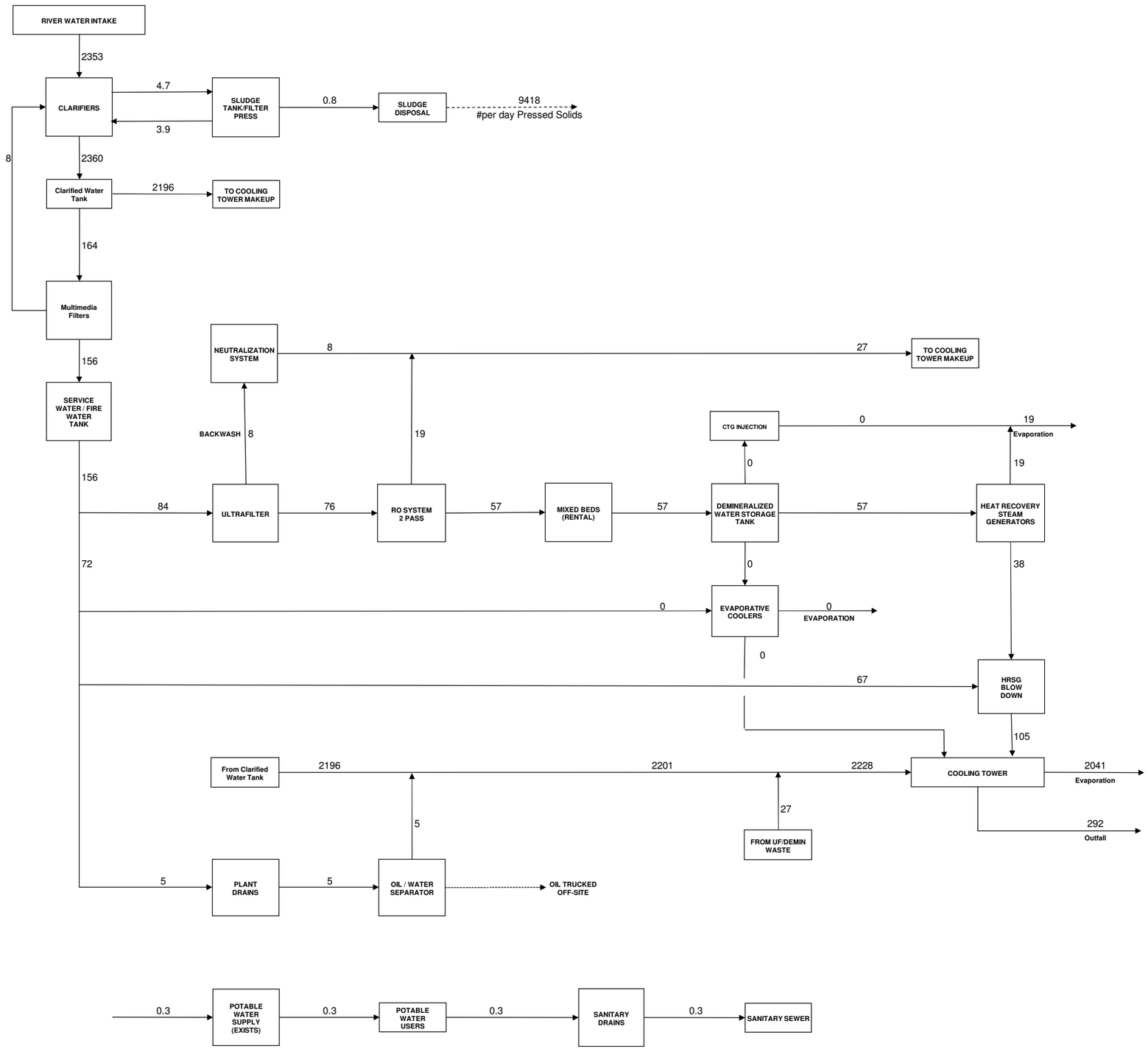
EKPC

Cooper Unfired 5000F 2x1 Combined Cycle

BURNS McDONNELL

PERFORMANCE SUMMARY	Units	Heat Balance State Point	2x100% 71.9°F FO	2x100% 104.7°F FO w/Evap Cooler	2x100% 104.7°F FO	1x49.4% - 7.6°F FO	1x49.4% 56.2°F FO	1x49.2% 104.7°F FO
Dry Bulb Temperature	°F	1	71.9	104.7	104.7	-7.6	56.2	104.7
Wet Bulb Temperature	°F		66.4	82.5	82.5	-9.1	51.4	82.5
Relative Humidity	%		76%	40%	40%	38%	73%	40%
Elevation	ft		820.0	820.0	820.0	820.0	820.0	820.0
Ambient Pressure	psia		14.3	14.3	14.3	14.3	14.3	14.3
Evaporative Cooler Status	On/Off		Off	Off	Off	Off	Off	Off
GTG1 Gross Output	kW		231,300	219,300	192,900	114,600	120,400	94,900
GTG2 Gross Output	kW		231,300	219,300	192,900	0	0	0
GTG1 Gross LHV Heat Rate	Btu/kWh		9,057	9,251	9,620	11,791	11,076	12,307
GTG2 Gross LHV Heat Rate	Btu/kWh		9,057	9,251	9,620	0	0	0
STG Gross Output	kW		222,600	216,700	210,900	80,100	81,200	73,200
GTG1 LHV Heat Consumption	MMBtu/hr		2,095	2,028	1,856	1,352	1,334	1,168
GTG2 LHV Heat Consumption	MMBtu/hr		2,095	2,028	1,856	0	0	0
Plant LHV Heat Consumption	MMBtu/hr		4,189	4,057	3,712	1,352	1,334	1,168
Auxiliary Load	kW		18,200	18,200	17,800	10,300	10,400	12,000
Net Plant Output	kW		666,900	637,000	579,000	184,500	191,200	156,100
Net Plant LHV Heat Rate	Btu/kWh		6,281	6,368	6,411	7,326	6,977	7,486
Net Plant HHV Heat Rate	Btu/kWh		6,700	6,793	6,839	7,815	7,443	7,986
Net LHV Cycle Efficiency	%		54.3%	53.6%	53.2%	46.6%	48.9%	45.6%
Net HHV Cycle Efficiency	%		50.9%	50.2%	49.9%	43.7%	45.8%	42.7%
GAS TURBINE								
Fuel Gas/Fuel Oil Conditions		2						
GTG Fuel Gas/Fuel Oil Inlet Temperature	°F		80	80	80	80	80	80
Exhaust Gas Conditions		3						
GTG Exhaust Flow	lb/hr		4,629,503	4,431,349	4,113,875	3,220,227	3,229,765	2,884,290
GTG Exhaust Temperature	°F		1,043	1,061	1,087	1,087	1,089	1,140
Gas Turbine Generator		14						
GTG Gross Output	kW		231,300	219,300	192,900	114,600	120,400	94,900
STEAM TURBINE								
HPST Throttle Steam		4						
HPST Throttle Steam Flow	lb/hr		936,484	942,296	910,473	369,377	373,324	357,141
HPST Throttle Steam Pressure	psia		2,046	2,054	2,024	1,100	1,100	1,100
HPST Throttle Steam Temperature	°F		985	1,000	1,024	1,035	1,036	1,050
HPST Throttle Steam Enthalpy	Btu/lb		1,464	1,473	1,490	1,523	1,524	1,532
HPST Exhaust		5						
HPST Exhaust Flow	lb/hr		876,662	881,903	853,551	341,064	344,691	329,505
HPST Exhaust Pressure	psia		542	553	522	250	254	245
HPST Exhaust Temperature	°F		632	648	658	699	701	713
HPST Exhaust Enthalpy	Btu/lb		1,315	1,324	1,332	1,371	1,372	1,378
IPST Throttle Steam / Hot Reheat		6						
IPST Throttle Flow	lb/hr		1,116,215	1,106,451	1,058,269	411,149	417,049	404,263
IPST Throttle Pressure	psia		484	495	466	183	185	180
IPST Throttle Temperature	°F		986	997	1,023	1,035	1,036	1,050
IPST Throttle Enthalpy	Btu/lb		1,514	1,520	1,535	1,548	1,549	1,556
IPST Exhaust		7						
IPST Exhaust Flow	lb/hr		1,114,892	1,105,119	1,057,038	410,732	416,624	403,862
IPST Exhaust Pressure	psia		82	82	77	29	30	29
IPST Exhaust Temperature	°F		532	538	557	563	564	571
IPST Exhaust Enthalpy	Btu/lb		1,297	1,300	1,310	1,316	1,317	1,320
LP Admission Steam		8						
LP Admission Steam Flow	lb/hr		196,589	188,343	165,373	50,050	50,682	43,089
LP Admission Steam Pressure	psia		82	82	77	29	30	29
LP Admission Steam Temperature	°F		582	585	585	538	538	538
LP Admission Steam Enthalpy	Btu/lb		1,322	1,323	1,323	1,304	1,304	1,304
LPST Exhaust		9						
LPST Exhaust Flow	lb/hr		1,371,356	1,353,887	1,279,336	488,302	495,154	473,785
LPST Exhaust Pressure	psia		1.03	1.39	1.34	0.57	0.58	0.85
LPST Exhaust Pressure	inHg		2.09	2.83	2.73	1.16	1.18	1.73
LPST Exhaust ELEP Enthalpy	Btu/lb		1,013	1,028	1,034	1,045	1,046	1,069
LPST Exhaust UEEP Enthalpy	Btu/lb		1,019	1,035	1,041	1,055	1,056	1,099
Steam Turbine Generator		15						
STG Gross Output	kW		222,600	216,700	210,900	80,100	81,200	73,200
HEAT REJECTION								
Condenser		10						
Condenser Duty	MMBtu/hr		1,300	1,292	1,230	490	497	490
Circulating Water Supply		11						
Circulating Water Supply Flow	lb/hr		82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173
Circulating Water Supply Temperature	°F		81	92	92	75	76	88
Cooling Tower		12						
Cooling Tower Duty	MMBtu/hr		1,348	1,340	1,278	538	545	538
Circulating Water Return		13						
Circulating Water Return Flow	lb/hr		82,326,173	82,326,173	82,326,173	82,326,173	82,326,173	82,326,173
Circulating Water Return Temperature	°F		98	108	107	82	83	95
HRSG								
HRSG Condensate Inlet		16						
Condensate Inlet Flow	lb/hr		806,313	797,594	760,282	609,512	616,364	594,988
Condensate Inlet Temperature	°F		157	166	167	145	145	156
Condensate Inlet Enthalpy	Btu/lb		126	134	136	114	114	124
HRSG Stack		17						
Stack Temperature	°F		218	222	217	180	180	182

Appendix G – WATER BALANCE DIAGRAMS



No.	Date	By	CKD	Description
A	10/23/23	DKM	BDH	Conceptual Model

NOTES:
1. FLOWS ARE SHOWN IN GALLONS PER MINUTE.

DESIGN CRITERIA:

LOAD FACTOR	100%
GAS TURBINE	5000F
DRY BULB TEMPERATURE (°F)	56.2
RELATIVE HUMIDITY (%)	72.9%
CONDENSER	Cooling Tower
STEAM CYCLE MAKEUP	2.0%
FUEL	Natural Gas
NOX INJECTION	NO
COOLING TOWER CYCLES	8
CASE #	7

NOT FOR CONSTRUCTION

BURNS McDONNELL

Date 10/23/2024	Detailed D. MCBRIDE
Designed D. MCBRIDE	Checked B. HANSEN

EAST KENTUCKY POWER COOPERATIVE

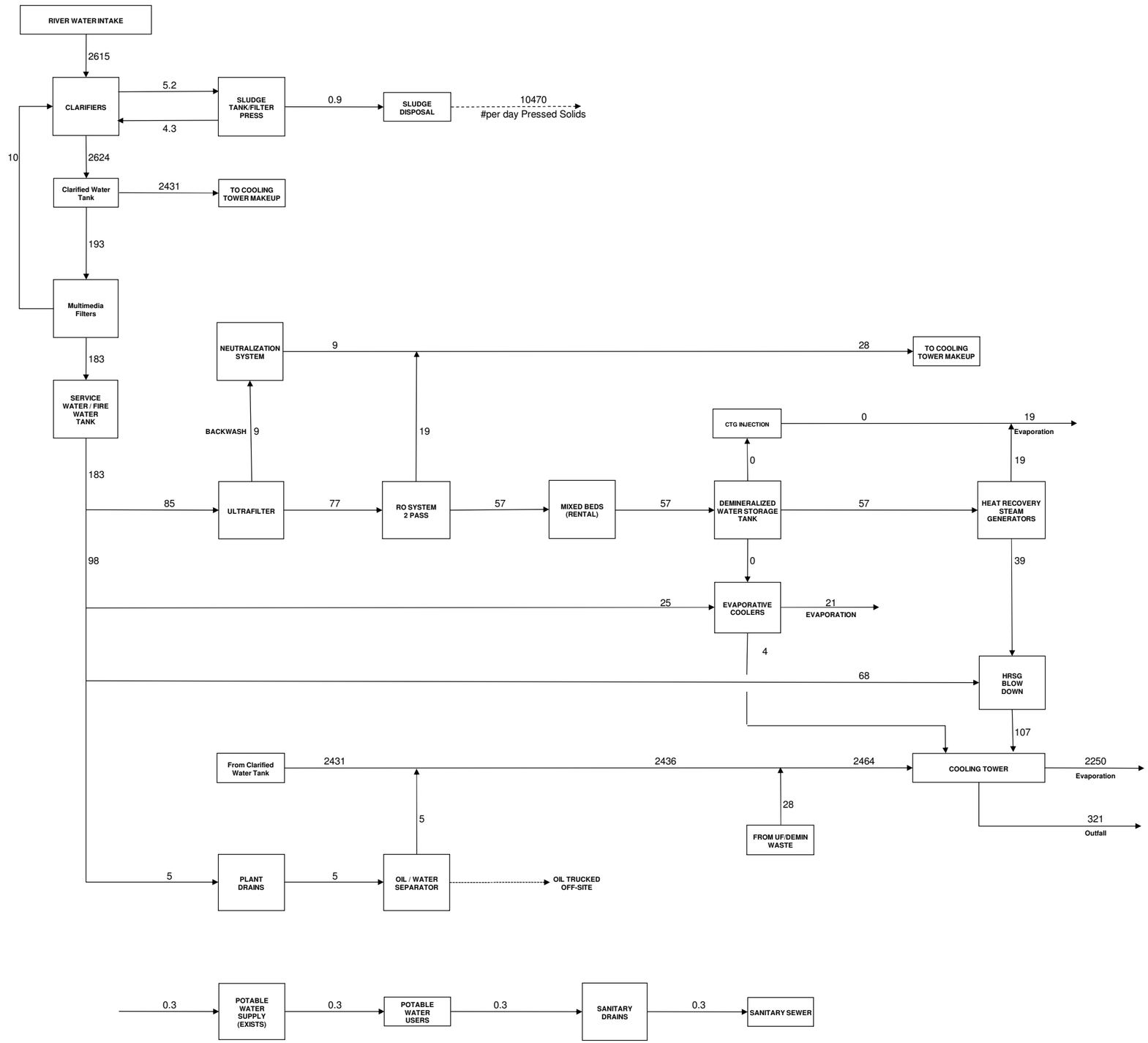
2 x 1 COMBINED CYCLE
WATER MASS BALANCE

2x100% Annual Average - Natural Gas

Project # 157787	Contract
Drawing	Rev. # A

sheet 1 of 1 sheets

File



No.	Date	By	CKD	Description
A	10/23/23	DKM	BDH	Conceptual Model

NOTES:
1. FLOWS ARE SHOWN IN GALLONS PER MINUTE.

DESIGN CRITERIA:

LOAD FACTOR	100%
GAS TURBINE	5000F
DRY BULB TEMPERATURE (°F)	71.9
RELATIVE HUMIDITY (%)	75.5%
CONDENSER	Cooling Tower
STEAM CYCLE MAKEUP	2.0%
FUEL	Natural Gas
NOX INJECTION	NO
COOLING TOWER CYCLES	8
CASE #	296

NOT FOR CONSTRUCTION

BURNS McDONNELL

Date	Detailed
10/23/2024	D. MCBRIDE
Designed	Checked
D. MCBRIDE	B. HANSEN

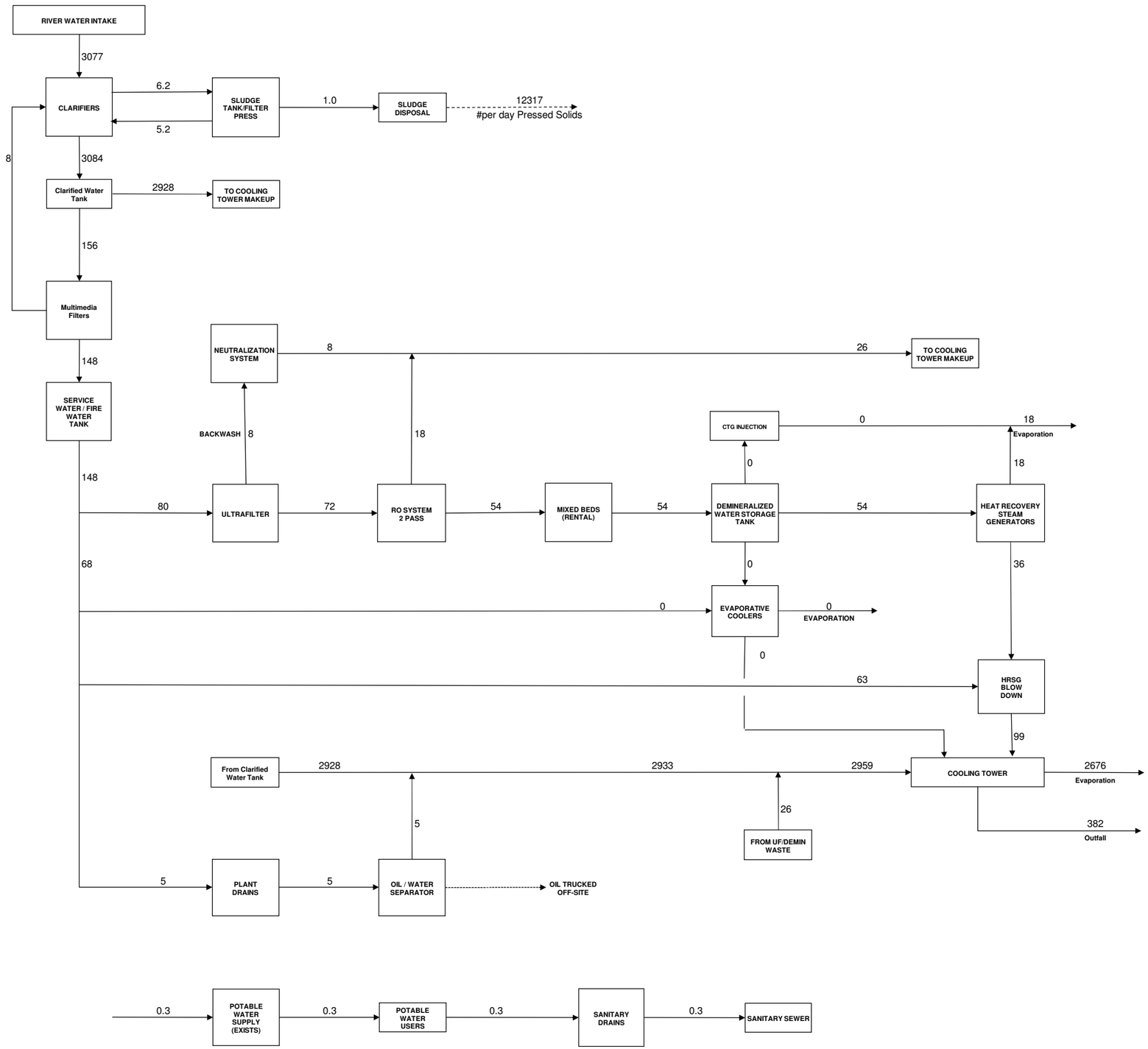
EAST KENTUCKY POWER COOPERATIVE
A Touchstone Energy Cooperative

2 x 1 COMBINED CYCLE
WATER MASS BALANCE
2x100% Summer Average - Natural Gas
Evap Cooler On

Project #	Contract
157787	
Drawing	Rev. #
	A

sheet 1 of 1 sheets

File



No.	Date	By	CKD	Description
A	10/23/23	DKM	BDH	Conceptual Model

NOTES:
1. FLOWS ARE SHOWN IN GALLONS PER MINUTE.

DESIGN CRITERIA:

LOAD FACTOR	100%
GAS TURBINE	5000F
DRY BULB TEMPERATURE (°F)	104.7
RELATIVE HUMIDITY (%)	40.0%
CONDENSER	Cooling Tower
STEAM CYCLE MAKEUP	2.0%
FUEL	Natural Gas
NOX INJECTION	NO
COOLING TOWER CYCLES	8
CASE #	12

NOT FOR CONSTRUCTION

BURNS McDONNELL

Date 10/23/2024	Detailed D. MCBRIDE
Designed D. MCBRIDE	Checked B. HANSEN

EAST KENTUCKY POWER COOPERATIVE

2 x 1 COMBINED CYCLE
WATER MASS BALANCE
2x100% 20 Yr Maximum - Natural Gas - Evap Cooler Off

Project # 157787	Contract
Drawing	Rev. # A

sheet 1 of 1 sheets

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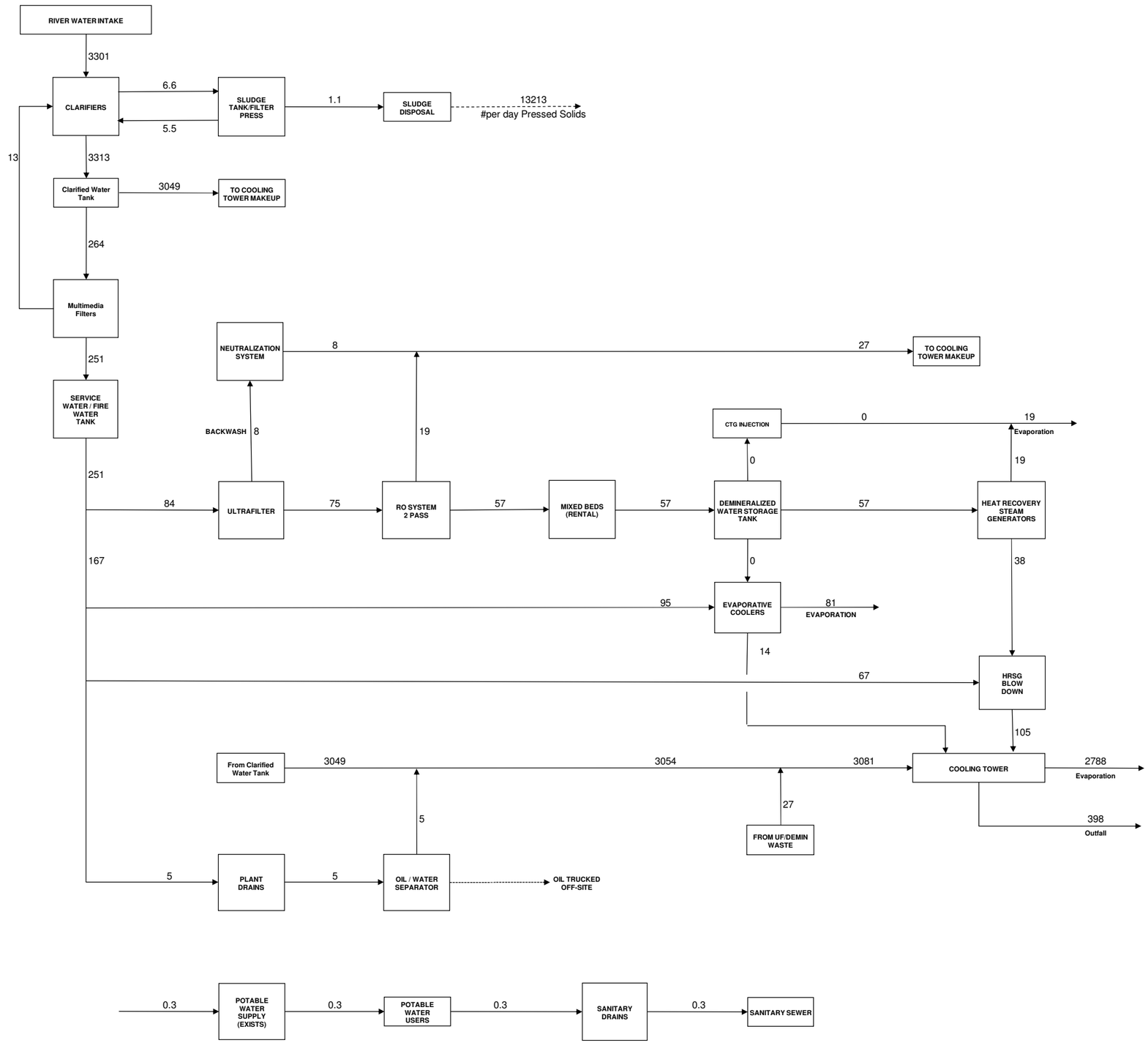


No.	Date	By	CKD	Description
A	10/23/23	DKM	BDH	Conceptual Model

NOTES:
1. FLOWS ARE SHOWN IN GALLONS PER MINUTE.

DESIGN CRITERIA:

LOAD FACTOR	100%
GAS TURBINE	5000F
DRY BULB TEMPERATURE (°F)	104.7
RELATIVE HUMIDITY (%)	40.0%
CONDENSER	Cooling Tower
STEAM CYCLE MAKEUP	2.0%
FUEL	Natural Gas
NOX INJECTION	NO
COOLING TOWER CYCLES	8
CASE #	299

NOT FOR CONSTRUCTION

BURNS McDONNELL

Date 10/23/2024	Detailed D. MCBRIDE
Designed D. MCBRIDE	Checked B. HANSEN

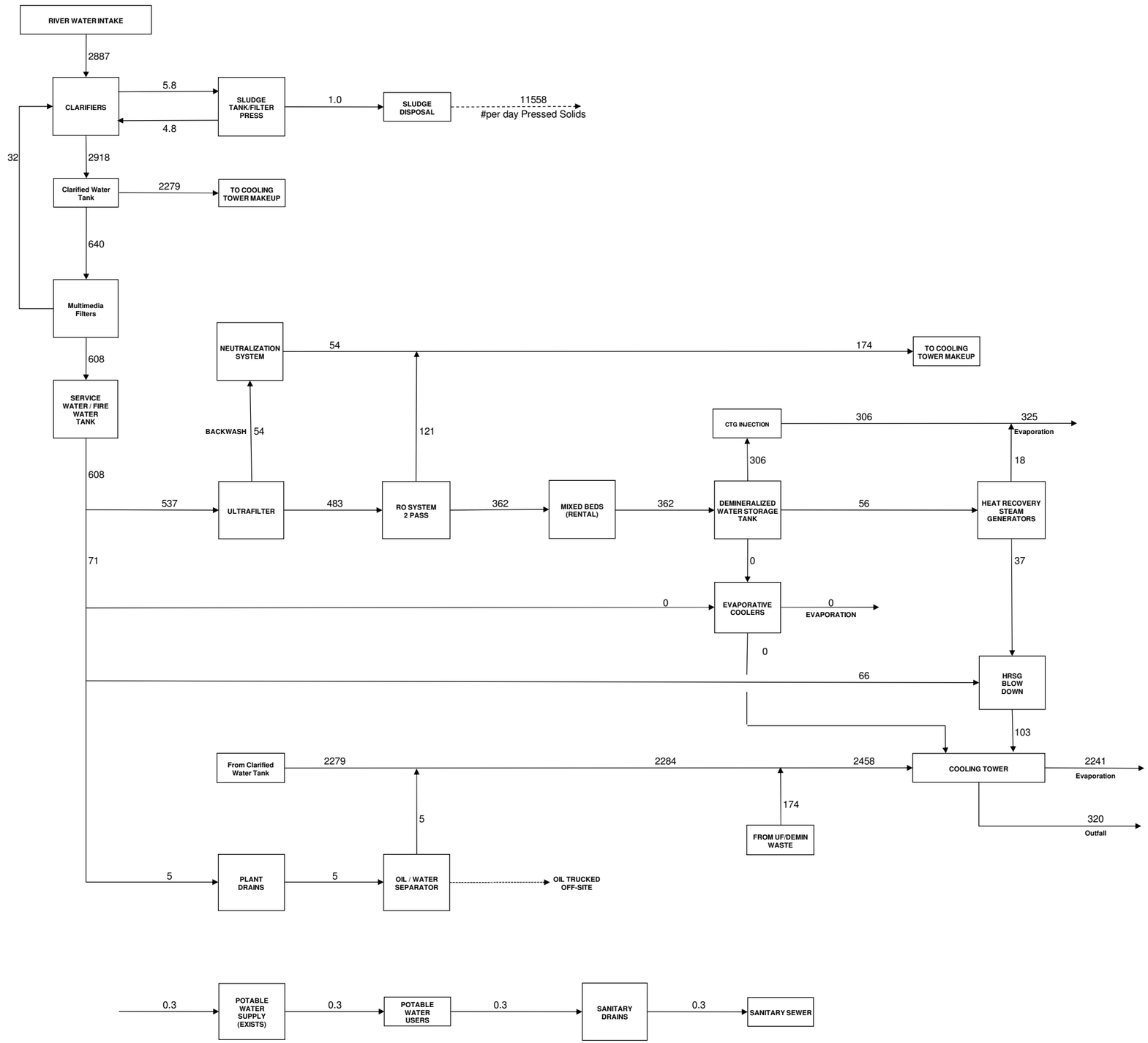
EAST KENTUCKY POWER COOPERATIVE

2 x 1 COMBINED CYCLE
WATER MASS BALANCE
2x100% 20 Yr Max - Natural Gas - Evap Cooler On

Project # 157787	Contract
Drawing	Rev. # A

sheet 1 of 1 sheets

File



No.	Date	By	CKD	Description
A	10/23/23	DKM	BDH	Conceptual Model

NOTES:
1. FLOWS ARE SHOWN IN GALLONS PER MINUTE.

DESIGN CRITERIA:

LOAD FACTOR	100%
GAS TURBINE	5000F
DRY BULB TEMPERATURE (°F)	86.6
RELATIVE HUMIDITY (%)	62.6%
CONDENSER	Cooling Tower
STEAM CYCLE MAKEUP	2.0%
FUEL	Fuel Oil
NOX INJECTION	YES
COOLING TOWER CYCLES	8
CASE #	210

NOT FOR CONSTRUCTION

BURNS McDONNELL

Date 10/23/2024	Detailed D. MCBRIDE
Designed D. MCBRIDE	Checked B. HANSEN

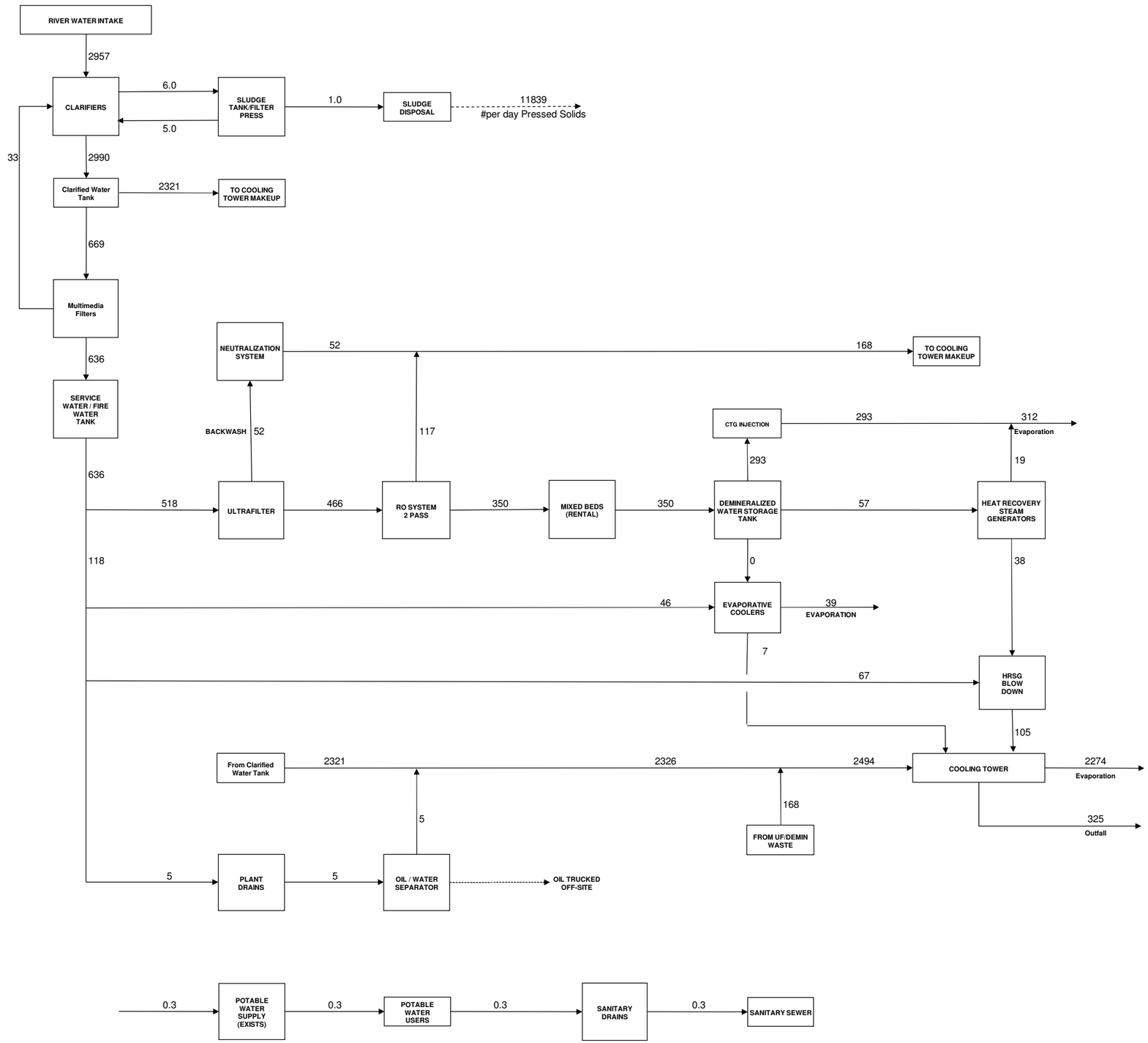
EAST KENTUCKY POWER COOPERATIVE

2 x 1 COMBINED CYCLE
WATER MASS BALANCE
2x100% 1% Wet Bulb - Fuel Oil - Evap Cooler Off

Project # 157787	Contract
Drawing	Rev. # A

sheet 1 of 1 sheets

File



No.	Date	By	CKD	Description
A	10/23/23	DKM	BDH	Conceptual Model

NOTES:
1. FLOWS ARE SHOWN IN GALLONS PER MINUTE.

DESIGN CRITERIA:

LOAD FACTOR	100%
GAS TURBINE	5000F
DRY BULB TEMPERATURE (°F)	86.6
RELATIVE HUMIDITY (%)	62.6%
CONDENSER	Cooling Tower
STEAM CYCLE MAKEUP	2.0%
FUEL	Fuel Oil
NOX INJECTION	YES
COOLING TOWER CYCLES	8
CASE #	294

NOT FOR CONSTRUCTION

BURNS McDONNELL

Date 10/23/2024	Detailed D. MCBRIDE
Designed D. MCBRIDE	Checked B. HANSEN

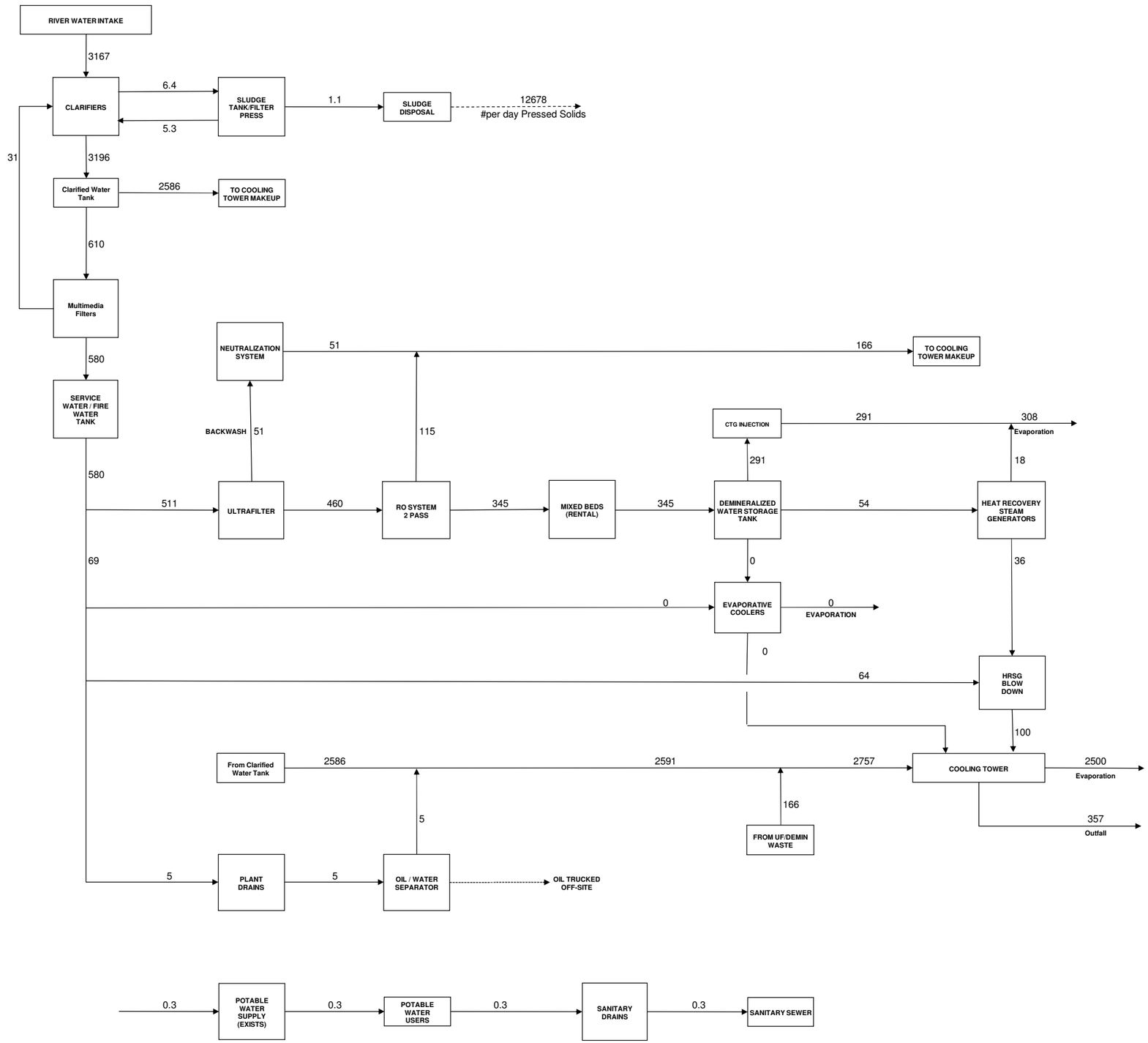
EAST KENTUCKY POWER COOPERATIVE

2 x 1 COMBINED CYCLE
WATER MASS BALANCE
2x100% 1% Wet Bulb - Fuel Oil - Evap Cooler On

Project # 157787	Contract
Drawing	Rev. # A

sheet 1 of 1 sheets

File



No.	Date	By	CKD	Description
A	10/23/23	DKM	BDH	Conceptual Model

NOTES:
1. FLOWS ARE SHOWN IN GALLONS PER MINUTE.

DESIGN CRITERIA:

LOAD FACTOR	100%
GAS TURBINE	5000F
DRY BULB TEMPERATURE (°F)	104.7
RELATIVE HUMIDITY (%)	40.0%
CONDENSER	Cooling Tower
STEAM CYCLE MAKEUP	2.0%
FUEL	Fuel Oil
NOX INJECTION	YES
COOLING TOWER CYCLES	8
CASE #	211

NOT FOR CONSTRUCTION

BURNS McDONNELL

Date 10/23/2024	Detailed D. MCBRIDE
Designed D. MCBRIDE	Checked B. HANSEN

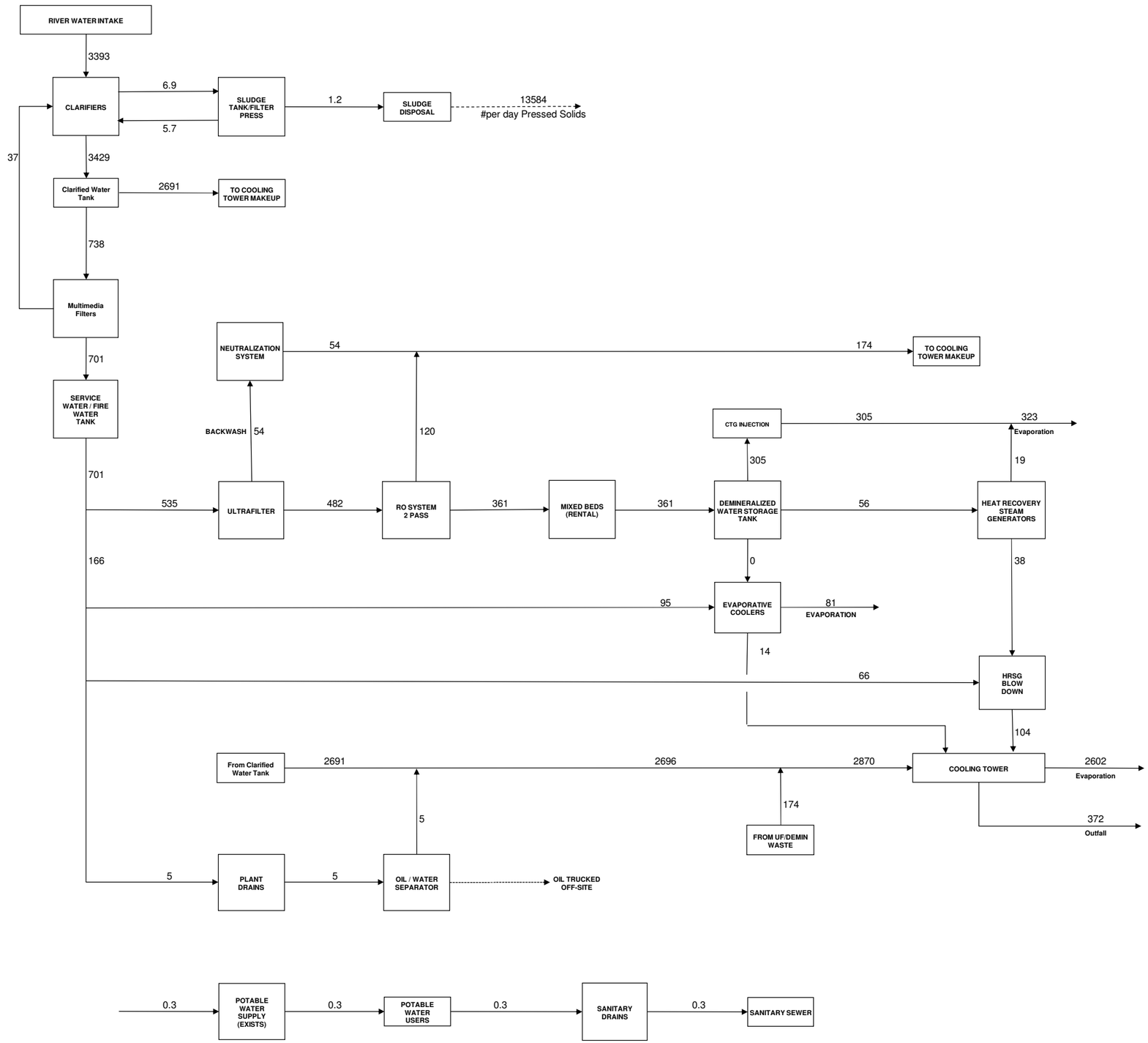
EAST KENTUCKY POWER COOPERATIVE

2 x 1 COMBINED CYCLE
WATER MASS BALANCE
2x100% 20 Yr Max - Fuel Oil - Evap Cooler Off

Project # 157787	Contract
Drawing	Rev. # A

sheet 1 of 1 sheets

File



No.	Date	By	CKD	Description
A	10/23/23	DKM	BDH	Conceptual Model

NOTES:
1. FLOWS ARE SHOWN IN GALLONS PER MINUTE.

DESIGN CRITERIA:

LOAD FACTOR	100%
GAS TURBINE	5000F
DRY BULB TEMPERATURE (°F)	104.7
RELATIVE HUMIDITY (%)	40.0%
CONDENSER	Cooling Tower
STEAM CYCLE MAKEUP	2.0%
FUEL	Fuel Oil
NOX INJECTION	YES
COOLING TOWER CYCLES	8
CASE #	295

NOT FOR CONSTRUCTION

BURNS McDONNELL

Date 10/23/2024	Detailed D. MCBRIDE
Designed D. MCBRIDE	Checked B. HANSEN

EAST KENTUCKY POWER COOPERATIVE

2 x 1 COMBINED CYCLE
WATER MASS BALANCE
2x100% 20 Yr Max - Fuel Oil - Evap Cooler On

Project # 157787	Contract
Drawing	Rev. # A

sheet 1 of 1 sheets

File

Appendix H – PRELIMINARY SUBSURFACE INVESTIGATION

Report of Geotechnical Exploration, Rev. 1
Cooper Power Plant
Somerset, Pulaski County, Kentucky
S&ME Project No. 23360111

PREPARED FOR:

East Kentucky Power Cooperative
4775 Lexington Road
Winchester, KY 40391

PREPARED BY:

S&ME, Inc.
1913 Unruh Court
New Albany, IN 47150

September 11, 2024

September 11, 2024

East Kentucky Power Cooperative
4775 Lexington Road
Winchester, Kentucky 404391

Attention: Mr. Donovan Ward, EIT

Reference: **Preliminary Report of Geotechnical Exploration, Rev. 1**
Proposed Combined Cycle Power Plant – Cooper Station
Somerset, Pulaski County, Kentucky
S&ME Project No. 23360111

Dear Mr. Ward:

S&ME, Inc. (S&ME) has completed our geotechnical exploration for the planned Combined Cycle Combustion Turbine Power Plant at Cooper Generating Station located in Somerset, Pulaski County, Kentucky. This exploration was performed in general accordance with S&ME, Inc. Proposal No. 23360111 dated December 15, 2023, which was authorized by East Kentucky Power Cooperative (EKPC) via Limited Notice to Proceed, dated December 20, 2023. The purpose of this exploration was to obtain preliminary geotechnical data at multiple sites within the existing Cooper Power Generating Station to support the construction of a potential new Combined Cycle Combustion Turbine Power Plant.

This report explains our understanding of the project, documents our findings, and presents our conclusions and geotechnical engineering recommendations. An earlier version of this report was delivered on May 3, 2024. Subsequently, S&ME received comments from EKPC on June 12, 2024. This revised version of the report (designated Rev. 1) fully supersedes the May 3 version and incorporates the comments received from EKPC and Burns & McDonnell (BMcD).

Sincerely,

S&ME, Inc.

STATE OF KENTUCKY
NICHOLAS R. JONES
29828
LICENSED
PROFESSIONAL ENGINEER

Nicholas R. Jones, P.E.
Senior Engineer

Michael G. Rowland, P.E.
Office Principal

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Appendix I – Site Location Plan / Field Exploration Plan
Appendix II – Soil Log Legend / Boring Logs / Rock Core Photo Logs
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Report at a Glance

Key geotechnical findings based on our current understanding of the proposed project are presented below. These findings are presented as an overview and should not be used in place of the more detailed recommendations presented in the remainder of this report.

Category	Key Geotechnical Finding
Site Development Challenges	Specific geotechnical issues identified on this site that should be considered include: • Moderate to High plasticity clays. • Presence of pinnacled bedrock/probable karst. • Shallow bedrock exhibiting high unconfined compressive strength. • Large fills required to achieve site grade.
Subsurface Conditions	Residual soils derived from weathering of rock (i.e., residuum). Predominately medium-stiff to very stiff, lean (CL) to fat (CH) clays. Karst zones noted in the majority of the site borings, competent bedrock depths range from about 10 feet to 50 feet below existing grade.
Seismic Considerations	Generally, SPT N-values in conjunction with the presence of relatively shallow bedrock yield Site Class C with the exception of B-3 (soft soils encountered between 8.0 and 17.0 feet) and B-8 (embankment fill).
Foundation Type	Combination of mat/shallow foundations and drilled shafts/micropiles
Slab Support	Slab-on-grade construction may require additional drainage and subgrade preparation due to moderate to high plasticity site soils.
Use of Site Soil as Fill	Site soils are suitable for use as structural fill. More clayey soils with Unified Soil Classifications of CH should be restricted to depths of 3 ft or more below final grade. Moisture conditioning will likely be needed to achieve proper compaction. Chemical stabilization may also be needed.
Construction Dewatering	Construction dewatering may be required for local perched water and surface water infiltration.
Previous Development Impacts	The site is currently an active coal power plant. The planned project areas encompass the existing coal stockpile and portions of the transmission line.

1.0 Introduction

S&ME, Inc. (S&ME) has completed our geotechnical exploration for the planned Combined Cycle Combustion Turbine Power Plant at Cooper Generating Station located in Somerset, Pulaski County, Kentucky. This exploration was performed in general accordance with S&ME, Inc. Proposal No. 23360111 dated December 15, 2023, which was authorized by East Kentucky Power Cooperative (EKPC) via Limited Notice to Proceed, dated December 20, 2023. The purpose of this exploration was to obtain preliminary geotechnical data at multiple sites within the existing Cooper Power Generating Station to support the construction of one new Combined Cycle Combustion Turbine Power Plant.

This report explains our understanding of the project, documents our findings, and presents our conclusions and geotechnical engineering recommendations.

2.0 Project Information

Project information was provided in an email from Mr. Donovan Ward of EKPC to Mr. Andy Fiehler, P.E. of S&ME, containing EKPC 157787 Cooper_CC Geotech SOW_20231206.pdf. This Geotechnical Engineering Services Investigation and Report Checklist, dated 12/5/2023, was prepared by Burns & McDonnell (BMC) to outline the project information and Statement of Work. It is understood that the purpose of the geotechnical investigation is to provide information for the development of a high-level feasibility study and cost estimate for the project. If the project is advanced to final design, it is envisioned that a follow up investigation will be completed.

The document designates boring and geophysical testing locations and a general site layout. Based on the provided information we understand EKPC is considering the construction of a new combined cycle combustion turbine plant consisting of two (2) combustion turbine generators firing natural gas or fuel oil, two (2) heat recovery steam generators (HRSG), one (1) condensing steam turbine generator, and a cooling tower. Additional structures will include three (3) transformers, switchyards, new transmission structures, and support out buildings.

Structural loading is not available at the time of this proposal; however, the project is anticipated to be supported on a combination of shallow and deep foundations and construction may also include trenchless pipe installation.

The site is located on the grounds of an active coal power plant. The planned project areas encompass the existing coal stockpile, coal stockpile runoff pond, and portions of the transmission line. Site elevation varies from El. 811 to El. 848 with a planned final grade of approximately El. 827.5. During a recent site visit S&ME performed a reconnaissance of the project footprint to help identify potential conflicts with the drilling schedule and ERT lines. S&ME observed shallow rock outcroppings and identified potential ERT paths to avoid existing structures and stockpiles. Figure 2 in Appendix I summarizes the exploration locations provided by EKPC, including conventional soil borings and geophysical work.

Prior to mobilization of drilling equipment, and at the request of EKPC, S&ME walked the sites with EKPC Project engineering personnel on January 2, 2024, to discuss access, identify site conditions that may delay drilling, identify potential utility conflicts, and marking boring locations for utility clearance and hydrovacuum excavations. Boring and field geophysical locations and data are also presented in Appendix II.

Table 2.1 – Field Exploration Location summary

Location ID	Surface Elevation (ft)	Latitude	Longitude
B-01	816	36.99636	-84.58846
B-02	820	36.99647	-84.58722
B-03	822	36.99688	-84.58675
B-04	829	36.99738	-84.58745
B-05	811	36.99742	-84.58874
B-06	812	36.99683	-84.58928
B-07	817	36.99649	-84.58619
B-08	816	36.99571	-84.58698
B-09	826	36.99500	-84.58640
B-10	823	36.99468	-84.58588
B-11	847	36.99817	-84.58639
B-12	839	36.99783	-84.58576
B-13	845	36.99787	-84.58626
B-14	848	36.99790	-84.58663
B-15	839	36.99756	-84.58602
ER-1	811 to 839	36.99695	-84.58948
ER-2	812 to 816	36.99615	-84.58796
ER-3	817 to 822	36.99691	-84.58677
ER-4	824 to 832	36.99750	-84.58778
ER-5	822 to 826	36.99446	-84.58551
ER-6	845	36.99787	-84.58626

The following report sections provide foundation discussions for the expected bearing conditions.

3.0 Available Information

S&ME is very familiar with Cooper Station and has completed past work including inspection of the landfill in accordance with the Federal CCR rules and completion of a geotechnical exploration report (March 4, 2016, Entitled Report of Geotechnical Services EKPC CCR Siting Exploration – Cooper Station) which included borings along the toe of the landfill slopes. S&ME also has a copy of the Annual CCR Groundwater Monitoring & Corrective Action Report dated January 31, 2024. This report includes a geological cross-section through the coal pile, referred to as Cross Section B-B'.

4.0 Regional Geology

According to *Geologic Map of the Burnside Quadrangle, South-Central Kentucky*, dated 1975, the site is located in the Mississippian Plateaus Physiographic Region of Kentucky and underlain St. Genevieve Limestone, reported to consist of medium to light-gray limestone and chert described as oolitic, sandy, and silty and commonly cross bedded with 2- to 4-inch-thick shale beds and fossiliferous regions. This formation is also known to form ledges and karst features. Immediately below the St. Genevieve Limestone is the St. Louis Limestone which is similar to the St. Genevieve but also includes interbeds of claystone and siltstone.

Bedrock was encountered in each of our borings at depths ranging from 0.4 feet to 35.0 feet with elevations ranging from about El. 790 to El. 823, excluding possible karst areas identified in locations B-01, B-02, B-04, B-06, B-08, B-09, B-10, B-11, B-13, and B-15. Bedrock geology encountered is consistent with the reported information for the area.

4.1 Karst

A review of online karst information for the site and vicinity through the Kentucky Geologic survey, including *Mapped Karst Groundwater Basins in the Harrodsburg 30 x 60 Minute Quadrangle*, indicates the site is underlain by bedrock with a high potential for karst development and have identified several known karst features, including springs and sinkholes, in similar bedrock formations within the immediate area. Karst mapping for the project area is shown in Figure 4.1. The landfill groundwater monitoring program includes sampling 6 springs located along Lake Cumberland, including one location (S-13) located along the riverbank adjacent to the coal yard. Boring locations and details are presented in Appendix I and Appendix II.

Figure 4.1 – Karst Mapping

4.2 Review of Flood Hazards

A review of the FEMA National Flood Hazard Layer Map (https://www.fema.gov/flood-maps/national-flood-hazard-layer) indicates that each of the borings are located in FEMA Zone X, areas subject to minimal flood hazards and outside the 500-year flood or protected from 100-year flood by levee.

5.0 Exploration and Testing

The procedures used by S&ME for field and laboratory sampling and testing are in general accordance with ASTM procedures and established engineering practice. Appendix II and Appendix III contain brief descriptions of the procedures used in this exploration.

5.1 Site Surface Conditions

The site conditions for our locations consisted of grass covered areas adjacent to existing station structures (B-11, B-12, B-13, B-14, and B-15), within gravel areas (B-07, B-09, and B-10), adjacent to the coal pile (B-01, B-02, B-03, B-04, B-05, and B-06), or in an existing roadway embankment (B-8). Site images presented in Appendix II depict the site conditions at the time of drilling.

Existing site elevations within the project footprint range from approximately El. 811 to El. 848.

5.2 Field Exploration

A total of 15 soil borings (labeled B-01 through B-15) were performed for this geotechnical exploration. Borings were field located using sub-meter handheld GPS equipment based on the locations provided by EKPC. As-drilled locations shown in Appendix I and on the logs in Appendix II were obtained with survey-grade GPS equipment.

The borings were performed with either of two (2) all-terrain Dietrich D-50 drill rigs using 3-1/4 inch hollow stem augers within the soil. Rock coring was performed with NQ-sized rock coring techniques through the hollow stem augers. Soil samples were obtained using a split-barrel sampler driven by an automatic hammer system in general accordance with ASTM D1586 (140-pound hammer falling 30-inches) and thin-walled undisturbed samples (Shelby Tubes) in general accordance with ASTM D1587. A general description of our field procedures, a test boring log legend, Boring Logs, photographs of our recovered rock cores, and field geophysical testing results are provided in Appendix II of this report.

Boring coordinates were obtained by survey-grade GPS and were summarized previously in Table 2.1. The approximate locations of the borings are shown on the Field Exploration Plan (Figure 3) in Appendix I. Boring elevations were estimated from available topographic information.

Each boring was advanced to auger refusal. As specified, each boring location scheduled for rock coring was advanced a minimum of 15 to 30 feet within bedrock. The borings were advanced through residual soil overburden consisting of Lean Clays (CL), Fat Clays (CH), and Clayey Sands (SC). Auger refusal was encountered in each of our borings. The refusal depths ranged from 0.4 to 35.0 feet. A summary of the bedrock depths, auger

refusal depths, rock core depths, and boring termination depths is presented in Table 5.1. A more detailed description of the soil and rock strata can be found in Section 5 and on the individual logs in Appendix II.

Table 5.1 – Auger Refusal Summary

Boring Location	Surface Elevation (ft)	Top of Rock		Auger Refusal Depth (ft)	Rock Core Depth (ft)
		Depth (ft)	Elevation (ft)		
B-01	816	27.6	788.4	27.6	27.6-48.0
B-02	820	9.5	810.5	9.5	9.5-39.1
B-03	822	17.5	804.5	17.5	17.5-38.1
B-04	829	25.2	803.8	25.2	25.2-44.2
B-05	811	17.7	793.3	17.7	17.7-47.7
B-06	812	35.0	777.0	35.0	35.0-54.6
B-07	817	22.0	795.0	22.0	22.0-52.9
B-08	816	21.8	794.2	21.8	21.8-42.4
B-09	826	11.0	815.0	11.0	11.0-51.0
B-10	823	26.2	796.8	26.2	26.2-49.5
B-11	847	22.5	824.5	22.5	22.5-39.5
B-12	839	2.0	837.0	2.0	-
B-13	845	0.4	844.6	0.4	0.4-35.4
B-14	848	9.0	839.0	9.0	-
B-15	839	2.4	836.6	2.4	2.4-24.9

5.3 Groundwater

Water level measurements were made during drilling, and within the hollow-stem auger prior to grouting or the introduction of coring water. Groundwater and/or seepage was encountered in four (4) of the fifteen (15) borings during the time of drilling or after soil drilling and prior to rock coring. Table 5.2 summarizes our groundwater findings at both sites.

Table 5.2 – Groundwater Summary

Boring No.	Depth During Drilling (ft)	Depth at Completion (ft)	Top of Boring Elevation (ft)	Water Elevation (ft)
B-01	Not encountered	Dry at completion prior to rock core	816.0	-
B-02	Not encountered	Dry at completion prior to rock core	820.0	-
B-03	Not encountered	Dry at completion prior to rock core	822.0	-
B-04	Not encountered	Dry at completion prior to rock core	829.0	-
B-05	Not encountered	Dry at completion prior to rock core	811.0	-
B-06	Not encountered	16.3	812.0	795.7
B-07	Not encountered	8.8	817.0	808.2
B-08	Not encountered	1.8	816.0	814.2
B-09	Not encountered	Dry at completion prior to rock core	826.0	-
B-10	Not encountered	Dry at completion prior to rock core	823.0	-
B-11	Not encountered	10.0	847.0	837.0
B-12	Not encountered	Dry at completion prior to rock core	839.0	-
B-13	Not encountered	Dry at completion prior to rock core	845.0	-
B-14	Not encountered	Dry at completion prior to rock core	848.0	-
B-15	Not encountered	Dry at completion prior to rock core	839.0	-

Seasonal and periodic variations in precipitation can also affect the observed water level conditions. Long-term static groundwater readings can be obtained with the installation and periodic monitoring of piezometers.

In addition to water measurement within our borings, the general location of the proposed combined cycle plant falls within the landfill groundwater monitoring program. While no wells are located directly within the proposed footprint, significant groundwater data, including water levels, groundwater flow and water quality is available within the annual reports.

5.4 Laboratory Testing

5.4.1 Classification and Other

Soil and rock core samples collected during the field exploration were transferred to our soil laboratory, where a geotechnical engineer or geologist visually examined each sample to estimate the distribution of grain-sizes, plasticity, organic content, moisture condition, color, presence of lenses and seams and apparent geological origin. The soil samples were classified according to the Unified Soil Classification System (ASTM D2487). The results of the classifications, as well as the field test results, are presented on the individual Boring Logs in Appendix II. Similar soils were grouped into strata on the logs and summarized in Section 5.2.

Selected spilt-spoon and undisturbed samples were assigned laboratory testing including:

- Natural Moisture Content (ASTM D2216)
- Atterberg Limits and Hydrometer Analysis (ASTM D4318 and D422)
- Specific Gravity (ASTM D854 Method B)
- Unconsolidated Undrained (UU) Triaxial Shear (ASTM D2850)
- Standard Moisture-Density (ASTM D 698 Method A)
- Uniaxial Compressive Strength of Rock (ASTM D7012, Method C)
- pH (AASHTO T 289)
- Sulfate (SW9056A)
- Chloride (SW9056A)
- Oxidation Reduction Potential (ASTM G200-9)
- Miller Box Electrical Resistivity (ASTM G57)

The laboratory testing results are summarized in Tables III-1, III-2, and the Summary of Laboratory Test Data in Appendix III. Individual data sheets are also available in Appendix III.

5.4.2 Resistivity, pH, and Chemical Testing

Four (4) representative soil specimens (borings B-02, B-05, B-09, and B-13) were selected for chemical testing, including for soluble sulfates, sulfides, chloride ion, oxidation reduction (redox) potential. Chemical testing has been summarized in Table III-3 and Table III-4 in Appendix III along with individual chemical testing results and a table of recommended cement types for foundations. S&ME recommends consulting with a qualified corrosion engineer.

The test results for resistivity, pH and chemical analysis are included in the Summary of Laboratory Test Data and on data sheets in Appendix III.

5.5 Electrical Resistivity

Electrical resistivity is a geophysical method that can be used to determine the ability of earth materials to oppose the flow of electric current. The electrical resistivity of earth materials can vary over several orders of magnitude and is primarily controlled by the materials' porosity, permeability, and pore fluid content, making electrical resistivity an effective method for subsurface characterization efforts. In general, moist and/or clay-rich soils exhibit lower resistivity values, while bedrock, chert, sands, and gravels exhibit greater resistivity values. The resistivity of air is many orders of magnitude greater than typical earth materials, whereby air-filled fractures or voids within bedrock have the propensity to produce high resistivity anomalies. In contrast, fractures or voids containing water or clay-rich soil tend to produce low-resistivity anomalies. Figure 4.1 illustrates the resistivity and conductivity of various materials that may be encountered during geophysical surveys. Source: *Gunn DA et al. Moisture monitoring in clay embankments using electrical resistivity tomography. Construction and Building Materials (2014).*

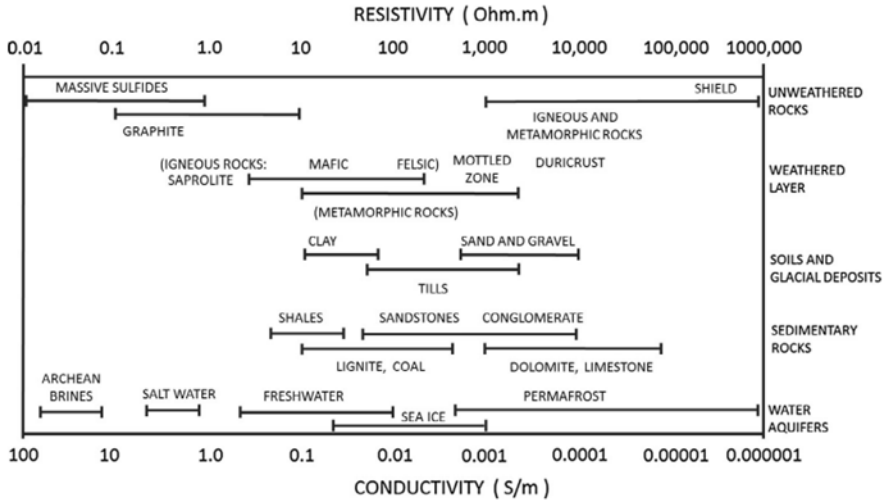

Figure 5.1 – Electrical Resistivity Ranges for Common Earth Materials

5.5.1 Methodology(s)

5.5.1.1 Electrical Resistivity Tomography (ERT)

Electrical Resistivity Tomography (ERT), also known as Electrical Resistivity Imaging (ERI), is a technique able to detect lateral and vertical changes in subsurface materials along linear paths by producing 2D resistivity profiles. The ERT method introduces a known magnitude of direct current into the ground via a linear array of electrodes connected to a resistivity meter. Apparent resistivities for material volumes centered at varying depths and positions along the electrode array are calculated by measuring the response to the injected current. The maximum depth and the resolution of the measurements are controlled by the electrode array length and the electrode spacing, respectively. Shorter electrode spacings result in enhanced resolution, while longer electrode array lengths result in increased maximum depth. Because a tradeoff must exist between measurement depth and resolution, electrode array geometry considerations are dependent on the objective of the geophysical survey. Calculated apparent resistivities are transformed to 2D true resistivity profiles through an iterative inversion process after the data acquisition is completed.

The ERT method introduces a known amount of direct current into the ground and measures the corresponding response to identify variations in subsurface electrical potentials. By introducing a known amount of current into the ground, the measured voltage potential at the surface is used to calculate the resistivity of subsurface material. In general, shale and clay-rich soils exhibit lower resistivity (higher conductivity) values, while sands, gravels, chert, and limestone/dolomite exhibit higher resistivity values.

A series of stainless-steel electrodes are inserted into the ground along a linear array and attached to data cables, which are connected to a transmitter/recording instrument (resistivity meter). The resistivity meter generates an induced current at two of the electrodes (current electrodes), and then measurements are acquired from the voltage potential difference between two other electrodes (potential electrodes). Material included between the potential electrodes is essentially averaged, so the depth and resolution of the measurements are dependent

upon the distance between these electrodes. Therefore, limitations of this method exist depending on the necessary resolution of data acquisition versus the depth of a target/feature. It is important to also note that actual ground resistivity is not measured during a resistivity survey. The survey is used to measure the apparent resistivity of a volume of material, while actual resistivities are calculated later through a data inversion process. In addition, ERT data is acquired using various software array configurations (Dipole-Dipole, Wenner, etc.). Array considerations are dependent on the objectives of the survey (e.g., soil and bedrock profiling, karst exploration, etc.).

5.5.1.2 Field Electrical Resistivity (ER)

Four-electrode field electrical resistivity testing is a technique for performing a vertical electrical sounding (VES), which detects electrical resistivity variation with depth at the test location. The four-electrode technique determines the apparent resistivity of a volume of earth material by connecting four electrodes to a resistivity meter and inserting them into the ground surface along a linear path while maintaining an equal spacing between each pair of adjacent electrodes. The resistivity is calculated for each measurement by passing a direct current of a known magnitude between the outer electrodes, then measuring the change in voltage between the inner electrodes. The maximum depth of the material volume being measured increases with the electrode spacing.

5.5.2 Field Efforts and Data Processing

5.5.2.1 Electrical Resistivity Tomography (ERT)

Between January 30, 2024, and February 1, 2024, five (5) ERT profiles ranging from 300 feet to 490 feet in length were acquired at the John Sherman Cooper Station. The data was acquired using an Advanced Geosciences, Inc. (AGI) SuperSting™ R8/IP resistivity system configured with up to 56 electrodes in general accordance with ASTM D6431 "Using DC Resistivity for Subsurface Investigations." Based on our understanding of the underlying conditions and site constraints, a combination of the Dipole-Dipole and Strong Gradient array configurations were used, and electrodes were spaced at 10 feet.

Figure 5.2 – Electrical Resistivity Tomography equipment configuration along ERT-3 at the John Sherman Cooper Station.

ERT data was processed using AGI's EarthImager software and Golden Software's Surfer® program was used to produce our contoured two-dimensional (2D) models. Elevations for our 2D models were derived from a digital elevation model (DEM) sourced from the Kentucky Geography Network rather than actual field survey measurements performed by a licensed surveyor and should be considered approximate.

5.5.2.2 Field Electrical Resistivity (ER)

On January 30, 2024, we performed field resistivity testing at the requested location in general accordance with ANSI IEEE STD81 "IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System" and ASTM G57 "Standard Test Method for Field Measurement of Soil Resistivity using the Wenner Four-Electrode Method." Testing was performed with an Advanced Geosciences Incorporated, Inc. (AGI) SuperSting™ R8/IP resistivity meter, which is calibrated annually by the manufacturer.

The electrical resistivity testing used a Wenner configuration and consisted of two (2) linear arrays at the ER-1 test location. The arrays intersected at a high angle and were oriented approximately west-east (ER-1A) and northwest-southeast (ER-1B). Resistivity was determined at increasing depths using the following electrode spacings: 2, 5, 10, 20, 50, 70, 100, and 150 feet. Stainless steel stakes were used as electrodes, and depending on the "a" spacing, they were inserted from 2 to 12 inches into the ground. Soil conditions were noted at each testing location and listed in the data sheets.

5.5.3 Results

5.5.3.1 Electrical Resistivity Tomography (ERT)

The following summarizes the results of the ERT survey. Representative ERT profiles are located in Appendix I:

ERT-1

- Approximate locations of any resistivity anomalies, S&ME borings, and interpreted subsurface horizons are presented on the ERT-1 profile in Figure 4.
- The ERT results indicate a varying resistivity contrast across the ERT-1 profile with values that range from 4.3 ohmmeters (ohm-m) to 3735.9 ohm-m. Ninety-eight percent (98%) of the ERT-1 data values are between 19.0 ohm-m and 3050.8 ohm-m.
- The presented depths of ERT profiles are a function of array length and the inversion process, which are about 65 feet below ground surface (bgs) for ERT-1.
- Based on the relatively adjacent geotechnical boring (B-05; S&ME 2024), geophysical data, and available geologic information, we interpreted the elevation of the top of bedrock across the ERT-1 profile. The interpreted depth to the top of bedrock is variable along the profile, ranging from approximately 15 feet to 25 feet.
- An above-average degree of noise appears to be present in the data past approximately 255 feet along the profile and in its upper 20 feet. The resistivity values in this region should not be considered accurate.

ERT-2

- Approximate locations of S&ME borings, and interpreted subsurface horizons are presented on the ERT-2 profile in Figure 5.
- The ERT results indicate a varying resistivity contrast across the ERT-2 profile with values that range from 18.2 ohmmeters (ohm-m) to 505.1 ohm-m. Ninety-eight percent (98%) of the ERT-2 data values are between 23.6 ohm-m and 472.1 ohm-m.
- The presented depths of ERT profiles are a function of array length and the inversion process, which are about 100 feet bgs for ERT-2.
- Based on the relatively adjacent geotechnical borings (B-01, B-06; S&ME 2024), geophysical data, and available geologic information, we interpreted the elevation of the top of bedrock across the ERT-2 profile. The interpreted depth to the top of bedrock is variable along the profile, ranging from approximately 10 feet to 35 feet.

ERT-3

- Approximate locations of any resistivity anomalies, S&ME borings, and interpreted subsurface horizons are presented on the ERT-3 profile in Figure 6.
- The ERT results indicate a varying resistivity contrast across the ERT-3 profile with values that range from 6.8 ohmmeters (ohm-m) to 6635.5 ohm-m. Ninety-eight percent (98%) of the ERT-3 data values are between 11.5 ohm-m and 3047.3 ohm-m.
- The depths of the ERT profiles presented are a function of array length and the inversion process, and they are about 100 feet bgs for ERT-3.
- Based on the relatively adjacent geotechnical borings (B-02, B-03; S&ME 2024), geophysical data, and available geologic information, we interpreted the elevation of the top of bedrock across the ERT-3

profile. The interpreted depth to the top of bedrock is variable along the profile, ranging from approximately 5 feet to 15 feet.

- The ERT-3 data set identified a low resistivity anomaly. The anomaly is beneath the interpreted top of the bedrock horizon and is relatively continuous across most of the profile.
- High resistivity anomalies were identified in the ERT-3 data set. The anomaly is beneath the interpreted top of bedrock horizon, located approximately from 295 feet to 360 feet along the profile and from 10 feet to 25 feet bgs.

ERT-4

- Approximate locations of any resistivity anomalies, S&ME borings, and interpreted subsurface horizons are presented on the ERT-4 profile in Figure 7.
- The ERT results indicate a varying resistivity contrast across the ERT-4 profile with values that range from 1.0 ohmmeters (ohm-m) to 2291.5 ohm-m. Ninety-eight percent (98%) of the ERT-2 data values are between 1.1 ohm-m and 1141.9 ohm-m.
- The presented depths of ERT profiles are a function of array length and the inversion process, which are about 100 feet bgs for ERT-4.
- Based on the relatively adjacent geotechnical boring (B-04; S&ME 2024), geophysical data, and available geologic information, we interpreted the elevation of the top of bedrock across the ERT-4 profile. The interpreted depth to the top of bedrock is variable along the profile, ranging from approximately 5 feet to 30 feet.
- A low resistivity anomaly was identified in the ERT-4 data set. The anomaly is located beneath the top of bedrock horizon, approximately located between 145 feet and 215 feet along the profile and deeper than 35 feet bgs.
- Much of the data between 0 feet and 100 feet along the ERT-4 profile is characterized by a high degree of noise. The resistivity values in this region should not be considered accurate.

ERT-5

- Approximate locations of any resistivity anomalies, S&ME borings, and interpreted subsurface horizons are presented on the ERT-5 profile in Figure 8.
- The ERT results indicate a varying resistivity contrast across the ERT-5 profile with values that range from 26.1 ohmmeters (ohm-m) to 724.3 ohm-m. Ninety-eight percent (98%) of the ERT-2 data values are between 30.4 ohm-m and 710.8 ohm-m.
- The presented depths of ERT profiles are a function of array length and the inversion process, which are about 100 feet bgs for ERT-5.
- Based on the relatively adjacent geotechnical borings (B-09, B-10; S&ME 2024), geophysical data, and available geologic information, we interpreted the elevation of the top of bedrock across the ERT-5 profile. The interpreted depth to the top of bedrock is variable along the profile, ranging from approximately 10 feet to 25 feet.
- A low resistivity anomaly was identified in the ERT-5 data set. The anomaly is located within and at the top of bedrock layer, approximately located between 0 feet and 225 feet along the profile and between 5 feet and 35 feet bgs.

5.5.3.2 Field Electrical Resistivity (ER)

The results of the field electrical resistivity testing are provided in the attached table "*23360111_Field Electrical Resistivity Data Sheet,*" which presents the electrode spacings (feet), electrode depths (inches), array naming scheme, and associated calculated resistances (ohms).

5.5.4 Discussion and Conclusions

Interpreted resistivity cross-sections can be found in Appendix I. Most of the ERT data can be represented by a simplified three-layer model in which high-resistivity limestone bedrock (Layer 3) is overlain by a low-resistivity clay-rich layer (Layer 2). Layer 2 is overlain by a higher-resistivity layer of coal-rich material (Layer 1). The following summarizes the interpretations of each ERT profile:

ERT-1

- The three-layer model well represents the ERT-1 profile. High-resistivity limestone bedrock is overlain by a low-resistivity clay-rich layer approximately 5 feet to 10 feet thick. The clay layer is overlain by a higher-resistivity layer of coal-rich material.
- The thickness of each layer in the model is interpreted to be fairly uniform.
- The high-noise data is interpreted to be the result of buried metallic materials near the northeast end of the profile interfering with the survey. These materials may be related to infrastructure such as water, natural gas, or electrical conduits.

ERT-2

- The ERT-2 profile is well represented by the three-layer model. However, Layer 1 is very thin across most of the profile, typically on the order of 1 foot to 3 feet thick.
- The thickness of Layer 2 is interpreted to be variable, alternating between thin zones (approximately 10 feet thick) and thick zones (approximately 25 feet thick).

ERT-3

- The ERT-3 profile can be modeled as shallow bedrock overlain by clay-rich and/or coal-rich material. The coal-rich material exhibits greater resistivity than the clay-rich material. Neither Layer 1 nor Layer 2 are well defined across the entire profile length.
  - Between approximately 100 and 375 distal (measured from the center point of the array) feet along the profile, bedrock is interpreted to be approximately 5 feet to 10 feet deep. Resistivities above bedrock in this interval are relatively high, suggesting a greater quantity of coal-rich material relative to clay-rich material. The geophysical signature of Layer 2 is largely absent during this interval.
  - From approximately 0 to 100 distal feet and 375 to 450 distal feet, the depth to bedrock is greater, ranging from 10 feet to 20 feet bgs. The resistivity above bedrock in these intervals is lower, indicating a greater quantity of clay-rich material. The geophysical signature of Layer 2 is much more apparent in these intervals.
- The relatively continuous low-resistivity anomaly between approximately 25 and 375 distal feet along the profile is interpreted to be a shale or clay-rich layer within the predominantly limestone bedrock and may be a zone influenced by solution weathering.
- The high-resistivity anomaly between approximately 295 to 360 distal feet along the profile is interpreted to be a zone characterized by less porosity or more isolated pore space than the surrounding bedrock;

however, there exists a possibility that this anomaly may be produced by the presence of unsaturated (i.e., air-filled) vuggy porosity.

ERT-4

- The ERT-4 profile can be modeled as shallow bedrock overlain by clay-rich and/or coal-rich material. The coal-rich material exhibits greater resistivity than the clay-rich material. Neither Layer 1 nor Layer 2 is clearly defined across the entire profile.
- The high-noise data zone is interpreted to result from possible buried metallic materials near the northwest end of the profile interfering with the survey. These materials are likely to be infrastructure such as water, natural gas, or electrical conduits.
- From 0 to 150 distal feet along the profile, interpreting the top of bedrock horizon is complicated by the zone of high-noise data; however, the geophysical and geotechnical (B-04) data indicate that it is up to 25 feet bgs.
- The overburden thickness is interpreted to be relatively uniform beyond approximately 150 distal feet along the profile, typically ranging from approximately 5 feet to 10 feet bgs.
- The low-resistivity anomaly between approximately 145 and 215 distal feet along the profile is interpreted to be a zone of increased fracturing and/or porosity which has been partially filled with clay-rich material. This zone may be influenced by solution weathering.

ERT-5

- The ERT-5 profile can be modeled as shallow bedrock (Layer 3) overlain by clay-rich or sandy clay material (Layer 2). The resistivity of bedrock is generally greater than the resistivity of the overlying material. Layer 1 is absent because of its location away from the coal storage pile.
- Layer 2 thickness is interpreted to be fairly uniform, typically ranging from approximately 10 feet to 15 feet bgs.
- The relatively continuous low-resistivity anomaly between approximately 0 and 225 distal feet along the profile is interpreted to be a zone of enhanced weathering, fracturing, and/or porosity, and may be a zone influenced by solution weathering.

The resistivity profiles close to the coal pile (ERT-1, ERT-2, ERT-3, and ERT-4) are well represented by a three-layer model in which a higher-resistivity coal-rich fill layer (Layer 1) overlies a lower-resistivity clay-rich layer (Layer 2). The thicknesses of Layer 1 and Layer 2 are not uniform across these profiles. The ERT-5 profile, located away from the coal pile, does not appear to include the higher-resistivity coal-rich Layer 1.

Beneath Layer 2 lies higher-resistivity bedrock (Layer 3) that is predominantly limestone. Resistivity anomalies in the bedrock are interpreted to be produced by changes in either lithology, the amount of porosity, or the connectivity of the porosity. Low-resistivity anomalies are likely to indicate bedrock volumes that are more heavily influenced by solution weathering.

5.5.5 Geophysical Methodology Limitations

Regardless of the thoroughness of a geophysical survey, there is always a possibility that actual conditions may not match the interpretations. The results should be considered accurate only to the degree implied by the methods used and the method's limitations and data coverage. Accordingly, the possibility exists that not all

features at a project site will be located due to either subsurface conditions or the occurrence of features outside the lateral limits and below the depth of penetration of the methods used. As with most surface geophysical methods, resolution of the subsurface also decreases with depth. As such, the size and/or contrast of geologic layers and/or features compared to the imaged subsurface media must be significant enough to produce the anticipated response.

6.0 Subsurface Conditions

The following is a brief and general description of subsurface conditions encountered in the borings. Detailed information is provided on the individual Boring Logs included in Appendix II. Fence diagrams are also included in Appendix II.

6.1 Surface Materials

The majority of boring locations were either located in grassy areas or gravel covered laydown areas, however some borings were located within and around the existing coal stockpile.

6.2 Residual Soils Deposits

Underlying the surficial topsoil, coal, asphalt, or crushed stone in each of our borings, residual soils from the weathering of limestone bedrock were encountered and consisted of Lean Clay (CL), Fat Clay (CH), and Clayey Sand (SC).

6.2.1 Lean Clays (CL) and Fat Clays (CH)

Moderate to high plasticity, Lean Clays (CL) to Fat Clays (CH), with varying amounts of limestone fragments were the most predominant soils encountered in the borings. These soils were encountered in each of the borings with the exception of borings B-02 and B-10, from below the surficial materials and extending to auger refusal at depths ranging from 0.4 feet to 35.0 feet. These clays were varying shades of red or brown in color. Standard Penetration Test (SPT) N-values recorded typically ranged from 0 blows per foot (bpf) to over 50 bpf, indicating a very soft to hard consistency. Generally, CH soils encountered ranged from stiff to very stiff. Laboratory testing indicated these clays have moderate to high plasticity with liquid limits of 31 percent to 74 percent. Natural moisture contents ranged from 8.0 percent to 42.4 percent. Layers of soft to very soft clays were encountered approximately 5 feet to 7 feet above the soil-bedrock interface in borings B-01, B-04, B-05, and B-07. B-6 encountered soft zones from 8.5 feet to 13.5 feet and 27 feet to 32 feet. Clay soils encountered beneath ledges were visually classified from auger cuttings and recovered material from core barrels.

6.2.2 Clayey Sands (SC)

Clayey Sands (SC) were encountered in borings B-02 and B-10 from below the surficial materials and extending to auger refusal at depths ranging from 9.5 feet to 26.2 feet. These sands were varying shades of light red brown to red in color. SPT N-values recorded typically ranged from 12 bpf to over 50 bpf indicating a medium dense to very dense relative density. Natural moisture contents ranged from 7.0 percent to 29.3 percent.

6.3 Bedrock

Bedrock was encountered in each of our borings at depths ranging from 0.4 feet to 35.0 feet with elevations ranging from El. 777.0 to El. 844.6, excluding possible karst areas identified in locations B-01, B-02, B-04, B-06, B-08, B-09, B-10, B-11, B-13, and B-15. The limestone encountered was previously identified as belonging to the St. Genevieve Limestone formation and may extend into St. Louis Limestone. A summary of encountered bedrock depths and elevations is presented in Table 5.1. Table 6.1 presents a summary of rock coring data. More information about bedrock and bedrock laboratory results can be found in the boring logs in Appendix II and laboratory results in Appendix III.

Table 6.1 – Rock Core Summary

Boring No.	Sample	Depth (ft)	Elevation (ft)	Core Length (ft)	Recovery (%)	RQD (%)	Rock type	Uniaxial Compressive Strength (psi)
B-01	RC-1	27.6	788.4	1.9	79	79	Limestone	-
B-01	RC-2	29.5	786.5	5.0	100	95	Limestone	35,268
B-01	RC-3	34.5	781.5	5.0	100	86	Limestone	-
B-01	RC-4	39.5	776.5	5.0	100	94	Limestone	-
B-01	RC-5	44.5	771.5	3.5	100	91	Limestone	-
B-02	RC-1	9.5	810.5	4.6	93	71	Limestone	-
B-02	RC-2	14.1	805.9	5.0	72	70	Limestone	-
B-02	RC-3	19.1	800.9	5.0	98	96	Limestone	24,470
B-02	RC-4	24.1	795.9	5.0	100	100	Limestone	-
B-02	RC-5	29.1	790.9	5.0	98	90	Limestone	-
B-02	RC-6	34.1	785.9	5.0	100	84	Limestone	-
B-03	RC-1	17.5	804.5	2.1	100	48	Limestone	-
B-03	RC-2	19.6	802.4	5.0	100	75	Limestone	-
B-03	RC-3	24.6	797.4	5.0	100	96	Limestone	-
B-03	RC-4	29.6	792.4	5.0	100	90	Limestone	-
B-03	RC-5	34.6	787.4	3.5	94	89	Limestone	28,462
B-04	RC-1	25.2	803.8	4.2	48	24	Limestone	-
B-04	RC-2	29.4	799.6	5.0	14	0	Weathered Limestone [1]	-
B-04	RC-3	34.4	794.6	4.8	100	99	Limestone	-
B-04	RC-4	39.2	789.8	5.0	98	86	Limestone	-
B-05	RC-1	17.7	793.3	2.0	100	75	Limestone	-
B-05	RC-2	19.7	791.3	5.0	98	62	Limestone	-

Boring No.	Sample	Depth (ft)	Elevation (ft)	Core Length (ft)	Recovery (%)	RQD (%)	Rock type	Uniaxial Compressive Strength (psi)
B-05	RC-3	24.7	786.3	5.0	98	78	Limestone	-
B-05	RC-4	29.7	781.3	5.0	100	90	Limestone	24,542
B-05	RC-5	34.7	776.3	5.0	100	68	Limestone	-
B-05	RC-6	39.7	771.3	5.0	100	92	Limestone	-
B-05	RC-7	44.7	766.3	3.0	33	33	Weathered Shale and Limestone [2]	-
B-06	RC-1	35.0	777.0	4.6	100	89	Limestone	-
B-06	RC-2	39.6	772.4	5.0	88	82	Limestone	-
B-06	RC-3	44.6	767.4	5.0	100	62	Limestone	11,865
B-06	RC-4	49.6	762.4	5.0	80	45	Limestone	-
B-07	RC-1	22.0	795.0	4.0	90	69	Limestone	-
B-07	RC-2	26.0	791.0	5.0	100	92	Limestone	-
B-07	RC-3	31.0	786.0	5.0	86	58	Limestone	23,223
B-07	RC-4	36.0	781.0	2.5	90	16	Limestone	-
B-07	RC-5	38.5	778.5	2.7	100	96	Limestone	-
B-07	RC-6	41.2	775.8	5.0	98	88	Limestone	-
B-07	RC-7	46.2	770.8	4.0	100	91	Limestone	-
B-07	RC-8	50.2	766.8	2.7	100	95	Limestone	-
B-08	RC-1	6.1	809.9	3.3	18	0	Weathered Limestone [1]	-
B-08	RC-2	9.4	806.6	5.0	28	8		-
B-08	RC-3	14.4	801.6	5.0	22	0		-
B-08	RC-4	19.4	796.6	5.0	90	68	Limestone	-
B-08	RC-5	24.4	791.6	5.0	100	74	Limestone	-
B-08	RC-6	29.4	786.6	5.0	96	82	Limestone	-
B-08	RC-7	34.4	781.6	5.0	96	98	Limestone	-
B-08	RC-8	39.4	776.6	3.0	100	77	Limestone	-
B-09	RC-1	11.0	815.0	5.0	20	0	Weathered Limestone [1]	-
B-09	RC-2	16.0	810.0	5.0	4	0		-
B-09	RC-3	21.0	805.0	5.0	32	8		-
B-09	RC-4	26.0	800.0	5.0	18	0		-
B-09	RC-5	31.0	795.0	5.0	100	82	Limestone	-
B-09	RC-6	36.0	790.0	5.0	98	85	Limestone	-

Boring No.	Sample	Depth (ft)	Elevation (ft)	Core Length (ft)	Recovery (%)	RQD (%)	Rock type	Uniaxial Compressive Strength (psi)
B-09	RC-7	41.0	785.0	5.0	88	62	Limestone	-
B-09	RC-8	46.0	780.0	5.0	100	82	Limestone	-
B-10	RC-1	26.2	796.8	3.3	100	73	Limestone	-
B-10	RC-2	29.5	793.5	5.0	68	6	Limestone and Clay [3]	-
B-10	RC-3	34.5	788.5	5.0	100	98	Limestone	-
B-10	RC-4	39.5	783.5	5.0	98	92	Limestone	-
B-10	RC-5	44.5	778.5	5.0	100	82	Limestone	29,239
B-11	RC-1	22.5	824.5	2.0	95	72	Limestone	-
B-11	RC-2	24.5	822.5	5.0	60	29	Limestone	-
B-11	RC-3	29.5	817.5	5.0	58	22	Limestone	-
B-11	RC-4	34.5	812.5	5.0	98	52	Limestone	19,705
B-13	RC-1	0.4	844.6	5.0	34	2	Weathered Limestone [1]	-
B-13	RC-2	5.4	839.6	5.0	10	0		-
B-13	RC-3	10.4	834.6	5.0	28	4		-
B-13	RC-4	15.4	829.6	5.0	10	0		-
B-13	RC-5	20.4	824.6	5.0	96	54	Limestone	-
B-13	RC-6	25.4	819.6	5.0	86	58	Limestone	-
B-13	RC-7	30.4	814.6	5.0	98	46	Limestone	-
B-15	RC-1	2.4	836.6	2.5	28	0	Limestone	-
B-15	RC-2	4.9	834.1	5.0	8	0	Limestone	-
B-15	RC-3	9.9	829.1	5.0	100	93	Limestone	10,794
B-15	RC-4	14.9	824.1	5.0	100	97	Limestone	-
B-15	RC-5	19.9	819.1	5.0	98	92	Limestone	-

Notes:

1. Auger refusal encountered, boring was advanced using rock coring through ledges, boulders, and residual soils using rock coring equipment.
2. Low recovery through weathered shale/clay seam. Boring terminated in limestone.
3. Recovery includes decomposed limestone sampled as fat clay (CH).

7.0 Discussion and Recommendations

Based on the conditions encountered and the expected foundation types based on our experience with other combined cycle power plants, S&ME is of the opinion that the plant can be constructed at the planned site,

however several significant issues of concern have been identified that will need to be taken into account during design and that will add significant costs over and above what might be assumed for sites without these issues.

7.1 Construction Concerns

7.1.1 Possible Karst Areas

As mentioned in Section 3, the surrounding areas contain abundant natural karst features. Borings B-01, B-04, B-06, B-08, B-09, B-10, B-11, B-13, and B-15, through rock coring methods, encountered bedrock ledges, voids, or zones of intense fracturing with interstitial residual clays, which could be evidence of a potential, and previously unknown, karst feature. Additionally, as described in Section 4, ERT data indicates regions of low resistivity below the top of bedrock in ERT-3, ERT-4, and ERT-5, potentially indicating areas of soft, weathered, or otherwise previously unknown karst features not encountered through rock coring methods. Unknown karst features can cause catastrophic failures beneath buildings and structures. We recommend further exploration of potential construction footprints through the use of rock soundings/corings, geophysical methods (e.g., MASW or ERT), or both to assist in delineating potential karst hazards. Table 7.1 summarizes the potential karst and bedrock depths encountered through either rock coring or ERT explorations.

Table 7.1 – Potential Karst and Bedrock Depths

Location ID	Surface Elevation (ft)	Limestone Bedrock		Potential Karst (low resistivity) Zones	
		Depth in Boring (Elevation) (ft)	Depth from ERT (Elevation) (ft)	Depth in Boring (Elevation) (ft)	Depth from ERT (Elevation) (ft)
Power Block					
B-01	816	28 (788)	26 (790)	-	-
B-02 [1]	820	10 (810)	70 (750)	-	35 (785) to 70 (750)
B-04 [2]	829	35 (794)	35 (794)	Above 35 (794)	Above 35 (794)
B-06	812	35 (788)	35 (788)	-	Above 35 (794)
B-07	817	22 (795)	-		
B-08	816	22 (794)	-		
Cooling Unit					
B-09	826	32 (794)	-		
B-10	823	34 (789)	38 (785)	30 (793) to 35 (788)	30 (793) to 38 (785)
Switchyard and Transmission Structures					
B-11	847	35 (812)	-	28 (819) to 30 (817)	-
B-13	845	20 (825)	-	Above 20 (825)	-
B-15	839	10 (829)	-	-	-

Notes:

1. B-2 terminated in shale, ERT results show lower resistivity material between El. 785 and El. 750 possibly indicating weathered shale continuing or a karst feature.
2. ERT results indicate lower resistivity materials to the east and west of the boring extending to approximately El. 725 or lower.

7.1.2 Large Fills

Based on the preliminary grading plan and an anticipated planned grade near El. 827.5, the existing site grade will experience cuts of about 2 feet (B-04) and fills ranging from about 2 feet (B-09) to 26 feet (B-05) as summarized in Table 7.2. Large fills can lead to excessive and differential settlements, downdrag, and construction staging delays.

Table 7.2 – Approximate Cut/Fill at Each Boring Location

Location ID	Surface Elevation (ft)	Approximate Cut/Fill (ft)	Approximate Soil Overburden Thickness (ft)
B-01	816	12	27.6
B-02	820	8	9.5
B-03	822	6	17.5
B-04	829	-2	25.2
B-05	811	26 [1]	17.7
B-06	812	16	35
B-07	817	11	22
B-08	816	12	21.8
B-09	826	2	11
B-10	823	5	26.2
B-11	847	-	22.5
B-12	839	-	2
B-13	845	-	0.4
B-14	848	-	9
B-15	839	-	2.4

Note: 1. Boring B-05 was advanced through approximately 9 feet of stockpiled coal. Planned grade is approximately 17 feet higher than existing elevation.

7.1.3 High Plasticity Clays

Moderate (CL) to High plasticity (CH) clays (LL > 30) were encountered throughout the site. These soils are more susceptible to swelling and shrinking with changes in ground moisture as well as losing strength if exposed to construction traffic during wet weather. Typical site solutions include removal, capping, or chemical treatment.

7.2 Site Preparation

7.2.1 Stripping

Initial site preparation should include stripping of topsoil, root balls, and other vegetation. Any unstable-near surface soils revealed during stripping may also require in place remediation or removal. Soft soils were not encountered in the near surface soils of our borings; however, some stripping should be expected in areas of utilities.

7.2.2 Encountered Karst Features

As discussed previously, a portion of the explorations encountered potential karst features, which is consistent with the expected geology. Given this, during site preparation or excavation additional features may be encountered. These features will have a large impact on construction costs and potential damage to structures. Remediation of encountered karst features will vary depending on size, depth, and proximity to planned structures and fills, and will be determined by the designer. Remediation efforts may include, but are not limited to, compaction grout, structural or clay capping, or inverted filters.

7.2.3 Moderate to High Plasticity Clays

Liquid limits ranging from 31 to 74 percent were encountered onsite. Chemical treatment of these soils may be necessary to prevent swelling and/or shrinking within the construction footprint and/or to achieve proper compaction.

7.2.4 Proofrolling/Subgrade Repair Methods

Following stripping, undercutting of any unstable surface soils, and/or necessary excavation to obtain the design subgrades, the exposed subgrade should be proofrolled with a heavily loaded tandem-axle dump truck or similar rubber-tired equipment under the observation of the Geotechnical Engineer. The proofrolling will help reveal the presence of unstable or otherwise unsuitable surface materials through pumping and rutting. Areas that are unstable should be undercut as recommended by the Geotechnical Engineer. Further evaluation with hand auger borings and/or backhoe excavated test pits could also be required if unexpected conditions are encountered or for areas not accessible to proofrolling equipment.

The exposed subgrade soil of both excavation and fill areas can deteriorate when exposed to construction activity and environmental changes such as freezing, erosion, softening from ponded rainwater, and rutting from construction equipment. We recommend the exposed subgrade surfaces that have deteriorated be properly repaired by one of the following methods:

- scarifying, aerating, and recompacting.
- over excavating and replacing with compacted suitable fill.
- using a geogrid on top of the subgrade in connection with granular base; or,
- using chemical stabilization techniques.

The determination of which of the four methods is appropriate for remediation of weak portions of the subgrade could be best determined by an S&ME representative witnessing a prooffroll.

7.3 Excavation

Excavation of near surface on-site soils will primarily consist of medium stiff to very stiff cohesive soils (Lean Clay – CL, Fat Clay – CH). Sloughing and caving should be anticipated when excavations extend into/through granular or weaker (i.e., very soft to soft) cohesive seams and layers. All excavations should be laid back or braced in accordance with the most recent OSHA excavation rules and regulations.

Excavation into weathered bedrock and boulders may be required if determined by the final grading plans. If weathered rock is encountered above planned final grade, the contractor should be prepared to break up and remove the rock, if necessary. Where bedrock may be shallower, it may be beneficial for the contractor to perform additional exploratory test pits to better verify the competency of the bedrock and the depth to which excavations can be performed using conventional methods. **It should be emphasized that a direct correlation should not be made between the performance of the drilling rig and the ability of construction equipment to excavate the bedrock at this site.** Depending on final design invert elevations, the contractor should be prepared to use other rock excavation techniques (i.e., hydraulic splitting, pneumatic, blasting, or other) should they become necessary.

7.3.1 Trenchless Pipe Installation

S&ME is not currently aware of the size, direction, depth, or location of planned trenchless pipe installations. Based on the conditions encountered, further exploration is recommended along the planned alignments to avoid limestone ledges, boulders, or pinnacles or bearing on soft soils.

7.3.2 Groundwater Considerations

Groundwater or seepage was not encountered in our borings at the time of drilling; however, groundwater was measured in borings B-06, B-07, B-08, and B-10 at the completion of drilling at depths ranging between 1.8 feet and 16.3 feet. Depending on the time of year or weather conditions during construction it should be anticipated that a limited amount of groundwater seepage and/or surface water runoff may be encountered during excavations or soil augering. We anticipate groundwater, if encountered, will most likely be present at or near the bedrock interface. The presence of water in excavations, coupled with construction activity, will soften and weaken cohesive soils present at the bottom of the excavations, and these affected materials may cause settlement beneath a structure following backfilling. Therefore, the bottom of the excavations and shafts should be kept free of standing water, and any softened, weakened, or disturbed materials should be removed and replaced with select granular backfill or flowable fill.

If pumping from a system of sumps and pumps cannot sufficiently maintain the water level below plan bearing elevations, then more extensive dewatering techniques, such as wells or a well-point system may be necessary for dewatering.

S&ME recommends that construction dewatering and the release of pumped groundwater be performed in accordance with all applicable Federal, State, and Local requirements. It is further recommended that the firm or

firms responsible for preparing the landfill groundwater monitoring plan and sampling be consulted on the development of the groundwater dewatering specification.

7.3.3 Excavation Regulations

All excavations, as a minimum, should be sloped or shored in accordance with local, state, and federal regulations, including OSHA (29 CFR Part 1926) excavation trench safety standards. The contractor is solely responsible for site safety. This information is provided only as a service and under no circumstances should S&ME be assumed to be responsible for construction site safety.

The near surface clays (residual soils to bedrock) typically classify as Type B soils according to the OSHA guidelines, provided the soil is not subjected to vibration and remains dry. The soil slopes for short term excavations during construction for Type B soils can be cut to a maximum of 1H:1V (horizontal to vertical) to the existing ground surface. Flatter slopes are allowed, but the excavated slopes should not be steeper than the OSHA guidelines. As excavations are made, the competent person in charge of operations should evaluate the soils to determine the appropriate benching or shoring methods required per OSHA guidelines. Granular soils (e.g., sand and gravel) should be excavated/shored according to the OSHA guidelines.

7.3.4 Structural Fill Placement

Undercut areas and/or areas requiring structural fill, should be raised to the design subgrade elevation with materials with the following minimum requirements:

- Fill should be free of deleterious materials and rock fragments greater than 4 inches in diameter.
- Uniformly spread in 6- to 8-inch-thick loose lifts.
- Clay soil used as fill should be compacted to at least 95 percent of the soil's maximum dry density, as determined by a laboratory Modified Proctor compaction test (ASTM D-1557). See Appendix III for our laboratory results.
- If a clean granular soil (sand) is used as fill, it may not be possible to determine a maximum unit weight using ASTM D-698. In this case, soils should be tested in accordance with ASTM D-4254, and a minimum relative density of 85% should be achieved or compaction should be controlled by test strips performed in the field at the time of placement.
- The moisture content should be controlled to within +/- 2 percent of optimum moisture content, depending on the moisture-density curve of the specific soil being placed.
- Fill placement should be monitored by a qualified Materials Technician working under the direction of the Geotechnical Engineer. In addition to this visual evaluation, the Technician should perform a sufficient amount of in-place field density tests to confirm that the required degree of compaction is being attained.
- Settlement plates may also be warranted due to the planned fill heights. The final determination of whether settlement plates and monitoring are needed should be determined after final grades are established. At that time, the final geotechnical exploration and design should include the number of settlement plates and locations, if warranted.

Based on the planned maximum slope of 3:1 (H:V) slope stability analyses have not been performed at this time.

7.3.5 Use of Excavated Soils as Fill

Based on the results of our exploration and laboratory testing, the on-site soils are typically adequate for use as structural soil fill. However, high plasticity soils (i.e., Fat Clay – CH) should be at least 3 feet below the planned surface or structural component or chemically stabilized. Additionally, in-situ moisture content of these soils was measured to typically be well above (>+3%) the optimum moisture content for compaction at the time the exploration was performed. The moisture content of these soils will fluctuate with prevailing weather conditions prior to and at the time of grading. If the soils are stockpiled, it should be protected from precipitation. Some moisture adjustment (wetting or drying) could be required to achieve the recommended degree of compaction at the time of placement. Table 7.3 summarizes the results of bulk sample laboratory testing.

Table 7.3 – Summary of Bulk Sample Laboratory Testing

Boring	Sampled Depth (ft)	Soil Type	Standard Proctor Maximum Dry Density (pcf)	Optimum Moisture	Natural Moisture	Plasticity Index
B-09	3.0-8.0	LEAN CLAY (CL)	112.0	15.6	27.4	17
B-14	3.0-8.0	FAT CLAY (CH)	98.6	23.4	26.5	51

Prior to use as fill, both natural soil and existing soil fill should be evaluated by the Geotechnical Engineer to assess the adequacy for use.

Soils containing organic matter should not be used in structural fill areas. Organic laden soils should be wasted off-site or placed in any nonstructural "green" areas.

7.3.6 Use of Off-Site Borrow Materials as Fill

Imported fill used for site grading should consist of a clean (free of organics and debris), low plasticity soil (Liquid Limit less than 50, Plasticity Index less than 15) with moist (total) unit weight of at least 100 pcf and be evaluated by a Geotechnical Engineer prior to use. Depending on subgrade stability and the amount of borrow material needed, crushed stone, such as DGA, could be required.

7.4 Foundation Recommendations

Based on our experience with combined cycle plants, in conjunction with the significant karst present at the site, we would expect that the main plant features, including the gas turbines, HRTs and steam turbines to be supported on extended foundations supported within the bedrock. Lightly loaded features, such as office structures, storage and maintenance buildings and certain switchyard equipment may be supported on shallow foundations. More specific recommendations can be provided once the planned locations of these features are finalized, foundation loading known, and any historic documentation of karst issues at the site are provided. Shallow foundations planned in areas where our exploration indicate potential karst zones or where karst features are uncovered during construction should be evaluated by an engineer for site remediation.

7.4.1 Shallow Foundations

7.4.1.1 Shallow Foundation Support

Based on the preliminary grading information, S&ME anticipates shallow foundations will bear on newly placed properly compacted fill soils. Shallow spread foundations bearing on new fill will typically be sized based on sliding/overturning or settlement and can typically achieve a bearing resistance of 2ksf or greater. However, actual bearing resistance is dependent on the aforementioned conditions and locations. Shallow foundations should not partially bear on zones of bedrock or weathered bedrock to reduce the risk of differential settlement.

7.4.1.2 Slabs-on-Grade

Slabs on grade should be evaluated individually based on dimensions of the planned floor area, expected deformation, and final grade elevation. Based on the soils encountered onsite, we recommend slabs on grade bear on a compacted granular aggregate overlying native, or newly placed and compacted, lean clays. Fat clays underlying slabs should be chemically stabilized.

7.4.1.3 Mat Foundations

Mat foundation bearing on either new fill or native soils are anticipated to be settlement controlled. Mats should bear on relatively uniform subgrade soils free of voids, bedrock pinnacles, or other potential karst features. Construction of mat foundations may require mass rock or soil excavations and fill.

Where karst is encountered at the locations of mat foundations, care will need to be taken to create reasonably uniform bearing conditions. To this end, if it is desired to use large mat foundations for critical elements, it is strongly recommended that a large number of closely spaced borings or full depth excavation be performed at the mat locations during final design and prior to construction. Furthermore, it is recommended that a certain percentage of unsupported areas be assumed during the structural design of the mat to account for karst. These areas spanning karst features may necessitate additional reinforcement, grade beams, drilled shafts, micropile foundations, or a combination thereof.

7.4.2 Deep Foundation Considerations

7.4.2.1 Drilled Shaft Foundations

Based on our experience in the area and understanding of the project, we anticipate drilled shafts extending into competent bedrock and through potential karst zones can be utilized for deep foundation support at the site. Consistent with common practice in potential karst, small diameter probe holes or cores should be utilized to inspect the shaft locations for previously unknown karst features and continuity. Drilled shafts are large diameter, reinforced, low displacement grout-in-place foundations. Typical installation requires either the installation and advancement of temporary, or permanent, casing or the use of slurry to advance drilling tools through soil overburden into bedrock. The casing is then tremie grouted and reinforced with a rebar cage to provide lateral support to the shaft. Drilled shafts will develop axial capacity from a combination of skin friction along the length of the pile and end bearing at the tip. If drilled shaft foundations are planned to extend below the extent of our investigations, we recommend further exploration for karst potential.

7.4.2.2 *Micropile Foundations*

Based on our experience in the area and understanding of the project, we anticipate micropiles extending into bedrock and through potential karst zones can be utilized for deep foundation support at the site. Micropiles are small (typically less than 12-inch) diameter, reinforced, low displacement grout-in-place piles. Typical installation of micropiles requires the installation and advancement of temporary, or permanent, casing and drilling tools through soil overburden to rock or through weaker soil strata to bearing depth. The casing is then tremie grouted and reinforced with a rebar cage or single large diameter steel bar to provide lateral support to the pile. The pile is then typically grouted under pressure and the casing is retracted forming a grout to ground bond zone, depending on the type and use of the micropile, the casing may be plunged into the grout zone for additional lateral reinforcement. Pile support is primarily achieved by the frictional grout to ground resistance along the uncased portion of the pile to the adjacent soil. Due to the installation method, tip resistance is typically a small percentage of the total load carrying capacity. Additionally, significantly more downward movement of the pile is required to mobilize the tip resistance in comparison to the side shear resistance. As such, it is recommended that only the side shear resistance of the pile be used to estimate the required depth of the pile.

Drilled Shaft and Micropile Foundations Considerations

Design parameters for foundations was beyond the scope of work for this exploration, however we recommend drilled shaft or micropile foundations for the planned structures should extend through the site fills, native lean-to fat clays, and weathered rock/ledges strata to bear within the hard underlying limestone bedrock and below known or suspected karst regions. Table 7.1 summarizes the potential karst regions identified in the field. Additional rock coring or other explorations for the final design of deep foundations should extend below the planned bearing elevation to help identify unknown karst features that may exist below the limits of this exploration.

7.4.2.3 Auger Cast-In-Place Piles

Auger Cast-In-Place piles are not believed to be feasible given the presence of rock ledges, boulders, weathered and unweathered zones, and underlying karst zones.

8.0 Limitations of Report

This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The conclusions and recommendations contained in this report are based upon applicable standards of our practice in this geographic area at the time this report was prepared. No other representation or warranty, either express or implied, is made.

We relied on project information given to us to develop our conclusions and recommendations. If project information described in this report is not accurate, or if it changes during project development, we should be notified of the changes so that we can modify our recommendations based on this additional information if necessary.

Our conclusions and recommendations are based on limited data from a field exploration program. Subsurface conditions can vary widely between explored areas. Some variations may not become evident until construction.

conditions are encountered which appear different than those described in our report, we should be notified. This report should not be construed to represent subsurface conditions for the entire site.

S&ME should be retained to perform a final geotechnical exploration and to review the final plans and specifications to confirm that earthwork and other recommendations are properly interpreted and implemented.

For more information on the use and limitations of this report, please read the Geoprofessional Business Association (GBA) document that follows this page.

Important Information About Your
Geotechnical Engineering Report

Variations in subsurface conditions can be a principal cause of construction delays, cost overruns and claims. The following information is provided to assist you in understanding and managing the risk of these variations.

Geotechnical Findings Are Professional Opinions

Geotechnical engineers cannot specify material properties as other design engineers do. Geotechnical material properties have a far broader range on a given site than any manufactured construction material, and some geotechnical material properties may change over time because of exposure to air and water, or human activity.

Site exploration identifies subsurface conditions at the time of exploration and only at the points where subsurface tests are performed or samples obtained. Geotechnical engineers review field and laboratory data and then apply their judgment to render professional opinions about site subsurface conditions. Their recommendations rely upon these professional opinions. Variations in the vertical and lateral extent of subsurface materials may be encountered during construction that significantly impact construction schedules, methods and material volumes. While higher levels of subsurface exploration can mitigate the risk of encountering unanticipated subsurface conditions, no level of subsurface exploration can eliminate this risk.

Geotechnical Findings Are Professional Opinions

Professional geotechnical engineering judgment is required to develop a geotechnical exploration scope to obtain information necessary to support design and construction. A number of unique project factors are considered in developing the scope of geotechnical services, such as the exploration objective; the location, type, size and weight of the proposed structure; proposed site grades and improvements; the construction schedule and sequence; and the site geology.

Geotechnical engineers apply their experience with construction methods, subsurface conditions and exploration methods to develop the exploration scope. The scope of each exploration is unique based on available project and site information. Incomplete project information or constraints on the scope of exploration increases the risk of variations in subsurface conditions not being identified and addressed in the geotechnical report.

Services Are Performed for Specific Projects

Because the scope of each geotechnical exploration is unique, each geotechnical report is unique. Subsurface conditions are explored and recommendations are made for a specific project.

Subsurface information and recommendations may not be adequate for other uses. Changes in a proposed structure location, foundation loads, grades, schedule, etc. may require additional geotechnical exploration, analyses, and consultation. The geotechnical engineer should be consulted to determine if additional services are required in response to changes in proposed construction, location, loads, grades, schedule, etc.

Geo-Environmental Issues

The equipment, techniques, and personnel used to perform a geo-environmental study differ significantly from those used for a geotechnical exploration. Indications of environmental contamination may be encountered incidental to performance of a geotechnical exploration but go unrecognized. Determination of the presence, type or extent of environmental contamination is beyond the scope of a geotechnical exploration.

Geotechnical Recommendations Are Not Final

Recommendations are developed based on the geotechnical engineer's understanding of the proposed construction and professional opinion of site subsurface conditions. Observations and tests must be performed during construction to confirm subsurface conditions exposed by construction excavations are consistent with those assumed in development of recommendations. It is advisable to retain the geotechnical engineer that performed the exploration and developed the geotechnical recommendations to conduct tests and observations during construction. This may reduce the risk that variations in subsurface conditions will not be addressed as recommended in the geotechnical report.

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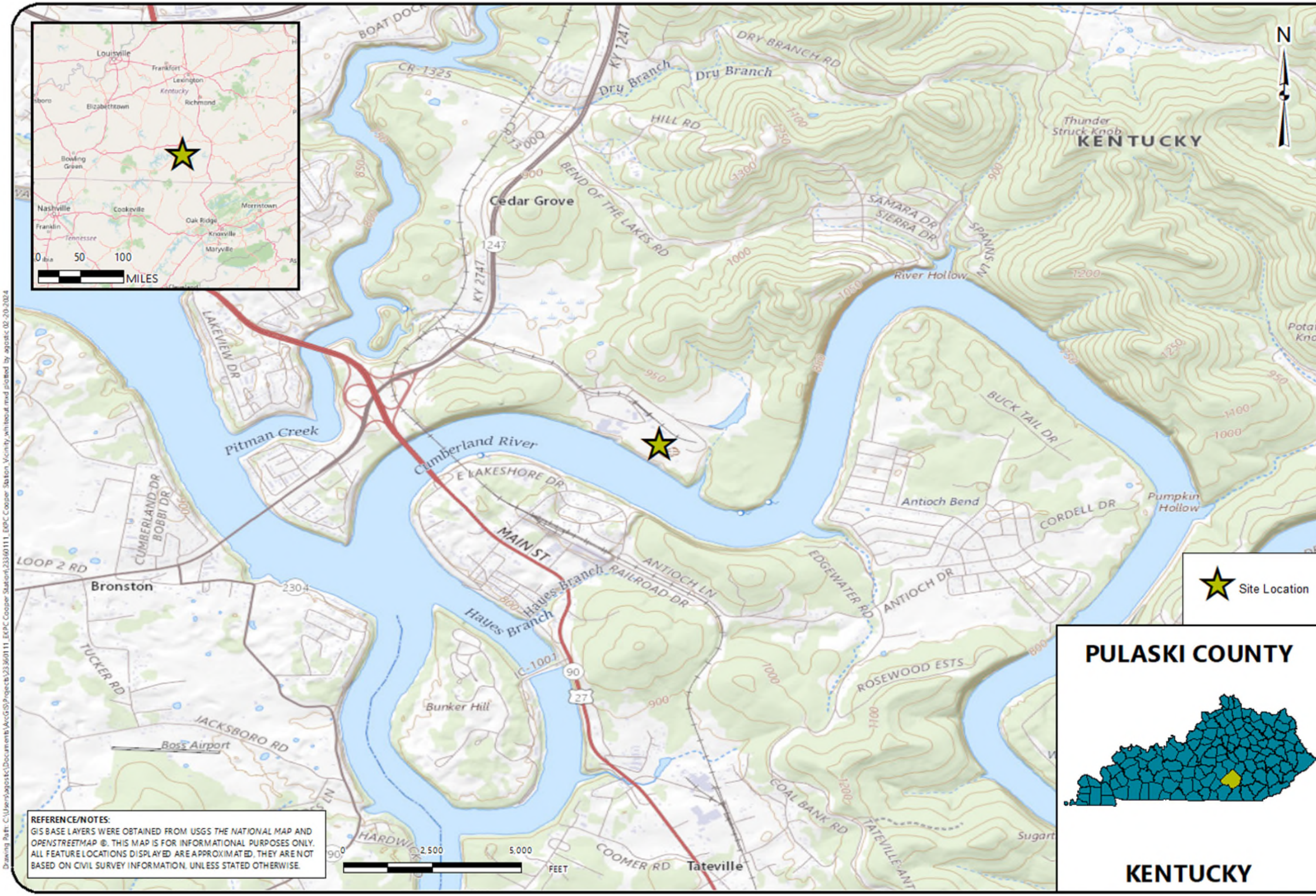
Appendices

Appendix I – Site Location Plan / Field Exploration Plan



REFERENCE/NOTES:
GIS BASE LAYERS WERE OBTAINED FROM USGS *THE NATIONAL MAP* AND *OPENSTREETMAP* ®. THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED, THEY ARE NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.

Drawing Path: C:\Users\ajostic\Documents\ArcGIS\Projects\23360111_EKPC Cooper Station\23360111_EKPC Cooper Station Vicinity_whitesout.mxd plotted by ajostic 02-20-2024

VICINITY MAP

EAST KENTUCKY POWER COOPERATIVE
COOPER POWER PLANT COMBINED CYCLE
SOMERSET, PULASKI COUNTY, KENTUCKY

SCALE:	1" = 2500'
DATE:	10/24/2024
PROJECT NUMBER	23360111
FIGURE NO.	1

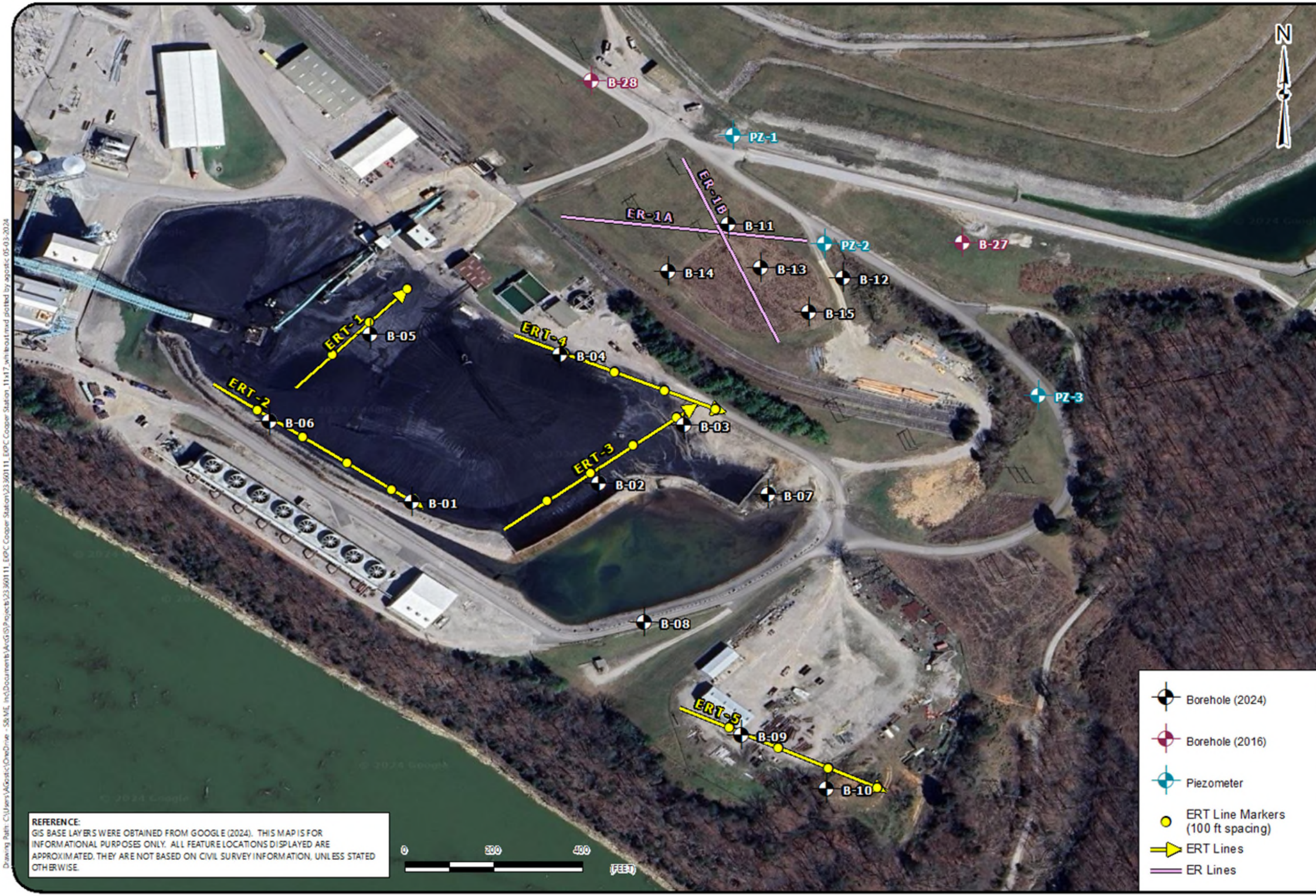
REFERENCE:
GIS BASE LAYERS WERE OBTAINED FROM GOOGLE (2024). THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED. THEY ARE NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.

COOPER STATION SITE FEATURES

EAST KENTUCKY POWER COOPERATIVE
COOPER POWER PLANT COMBINED CYCLE
SOMERSET, PULASKI COUNTY, KENTUCKY

SCALE:	1" = 400'
DATE:	10/24/2024
PROJECT NUMBER	23360111
FIGURE NO.	2

Drawing Path: C:\Users\AGostic\OneDrive - S&ME, Inc\Documents\ArcGIS\Projects\23360111_EKPC Cooper Station\23360111_EKPC Cooper Station_siteplan_11x17_whitecut.mxd plotted by agostic 05-03-2024



REFERENCE:
GIS BASE LAYERS WERE OBTAINED FROM GOOGLE (2024). THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED. THEY ARE NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.

Drawing Path: C:\Users\AGrotic\OneDrive - S&ME, Inc\Documents\ArcGIS\Projects\23360111_EKPC Cooper Station\23360111_EKPC Cooper Station_11x17_wn-trout.mxd plotted by agrotic 05-03-2024

FIELD EXPLORATION PLAN

EAST KENTUCKY POWER COOPERATIVE
COOPER POWER PLANT COMBINED CYCLE
SOMERSET, PULASKI COUNTY, KENTUCKY

SCALE:	1" = 200'
DATE:	10/24/2024
PROJECT NUMBER	23360111
FIGURE NO.	3

Appendix II – Soil Log Legend / Boring Logs / Rock Core Photo Logs

SOIL LOG LEGEND

SOIL PROPERTY SYMBOLS

N - Standard Penetration, bpf
NMC - Natural Moisture Content, %
F - Fines Content, %
LL - Liquid Limit, %
PL - Plastic Limit, %
PI - Plasticity Index, %
PPV - Pocket Penetrometer Value, tsf
Qu - Unconfined Compressive Strength
Yd - Dry Unit Weight, pcf

The STANDARD PENETRATION TEST (SPT) as defined by ASTM D1586 (or AASHTO T206) is a method to obtain a disturbed soil sample for examination and testing and to obtain relative density and consistency information. A standard 1.4-inch I.D./2-inch O.D. split-barrel sampler is driven three 6-inch increments with a 140 lb. hammer freely falling 30 inches. The hammer can either be of a trip, free-fall design, or actuated by a rope and cathead. The SPT N Value is determined by adding the number of blows from the 2nd and 3rd 6-inch increments. A normalized blowcount (N_{60}) may be determined by the following equation: N_{60} = [Rig Energy Ratio (%) / 60] * N.

SPT

SHELBY TUBE (ST) samples are obtained by hydraulically pushing a thin-walled tube (typically 3-inches in diameter) to obtain a relatively undisturbed sample for testing of fine-grained soils to determine engineering properties such as strength, compressibility, permeability, and density. Shelby tubes are sampled in general accordance with ASTM D1587 (AASHTO T207).

ST

Descriptive Order of Soil Strata: Geologic Disposition (i.e., Fill, Colluvium, Alluvium, etc.), ASTM Group Name (ASTM Group Symbol), quantified/qualified soil constituents, misc. constituents, consistency/density, color, organic description, moisture. ASTM group classifications is determined per ASTM D2487 where lab testing has been performed and ASTM D2488 where lab testing has not been performed.

ASTM GROUP NAME (SYMBOL) AND GRAPHIC

- WELL GRADED GRAVEL (GW)
- POORLY GRADED GRAVEL (GP)
- WELL GRADED GRAVEL WITH SILT (GW-GM)
- WELL GRADED GRAVEL WITH CLAY (GW-GC)
- POORLY GRADED GRAVEL WITH SILT (GP-GM)
- POORLY GRADED GRAVEL WITH CLAY (GP-GC)
- SILTY GRAVEL (GM)
- CLAYEY GRAVEL (GC)
- CLAYEY GRAVEL WITH SILT (GC-GM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- WELL GRADED SAND WITH SILT (SW-SM)
- WELL GRADED SAND WITH CLAY (SW-SC)
- POORLY GRADED SAND WITH SILT (SP-SM)
- POORLY GRADED SAND WITH CLAY (SP-SC)
- SILTY SAND (SM)
- CLAYEY SAND (SC)
- CLAYEY SAND WITH SILT (SC-SM)
- LEAN CLAY (CL)
- SILTY CLAY (CL-ML)
- SILT (ML)
- FAT CLAY (CH)
- ELASTIC SILT (MH)
- ORGANIC LOW PLASTICITY SILT OR CLAY (OL)
- ORGANIC HIGH PLASTICITY SILT OR CLAY (OH)
- PEAT (PT)
- TOPSOIL
- ASPHALT
- BASE - CEMENT MODIFIED
- BASE - CEMENT STABILIZED AGGREGATE
- BASE - GRAVEL
- CONCRETE
- VOID / NO RECOVERY
- IGM / PWR

FINE-GRAINED SOIL (Relative Consistency)

	N	PPV
Very Soft	< 2 bpf	< 0.25 tsf
Soft	2 - 4 bpf	> 0.25 - 0.5 tsf
Firm	5 - 8 bpf	> 0.5 - 1.0 tsf
Stiff	9 - 15 bpf	> 1.0 - 2.0 tsf
Very Stiff	16 - 30 bpf	> 2.0 - 4.0 tsf
Hard	> 30 bpf	> 4.0 tsf

COARSE-GRAINED SOIL (Relative Density)

	N
Very Loose	< 5 bpf
Loose	5 - 10 bpf
Medium Dense	11 - 30 bpf
Dense	31 - 50 bpf
Very Dense	> 50 bpf

MINOR CONSTITUENTS (% By Weight)

	Percentage
Trace	0% - 10%
Little	11% - 20%
Some	21% - 35%
"And"	≥ 36%

ORGANIC CONTENT OF SOIL (Determined by ASTM D2974 or AASHTO T267)

Classification	Percentage
With Organic Matter	4% - 15%
Organic Soil	16% - 30%
Peat	> 30%

MOISTURE CONDITION

Dry	Absense of moisture, dusty, dry to touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

At Time of Drilling (ATD) — Groundwater observation made anytime during the drilling process. Depending on time of reading and drilling methodologies, this value may be influenced by the drilling process.

End of Drilling — Groundwater measurement soon after the drilling processes are complete, and the borehole is at final depth. Drilling fluids, if introduced during drilling, may influence this measurement.

After Drilling — Groundwater measurements made in a borehole hours to days after drilling is complete. Depending on subsurface conditions, elapsed time, drilling process, etc. this observation may reflect a stabilized level.

REFERENCES:

FHWA NHI-16-072, Geotechnical Engineering Circular No. 5 "Geotechnical Site Characterization"
ASTM Specifications D2487 and D2488
DOT Specifications & Design Manuals from NC, SC, OH, MI, IN, PA, VA.

ROCK CORE LOG LEGEND

ROCK CORE RECOVERY

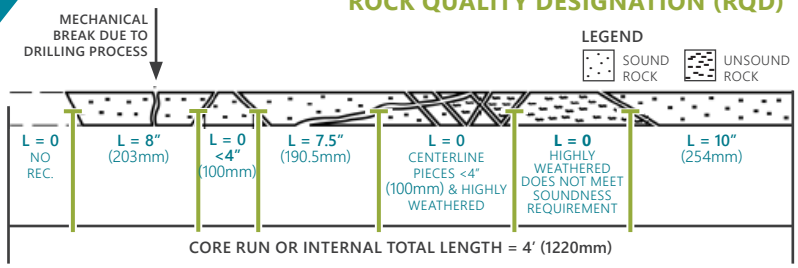
Core Diameter (I.D.)	Inches
BQ	1-7/16
NQ	1-7/8
HQ	2-1/2

Rock Core Sample

$$\text{REC} = \frac{\text{Length of Rock Core Recovered}}{\text{Length of Core Run}} \times 100$$

(Recovery)

ROCK QUALITY DESIGNATION (RQD)



$$\text{RQD} = \left(\frac{\sum \text{Sound Core with Length (L)} \geq 4'' \text{ (100mm)}}{\text{Core Run or Interval Total Length}}\right) \times 100$$

(Equation)

$$\text{RQD} = \left(\frac{8'' + 7.5'' + 10''}{48''}\right) \times 100 = 53\%$$

(Example) (FAIR)

ROCK QUALITY

Percent	Quality
>90–100	Excellent
>75–90	Good
>50–75	Fair
>25–50	Poor
0–25	Very Poor

(ASTM D6032)

GRAIN SIZE

Very Fine-Grained	<0.003 in. (<0.075 mm)
Fine-Grained	0.003 – 0.02 in. (0.075 – 0.425 mm)
Medium-Grained	0.02 – 0.8 in. (0.425 – 2 mm)
Coarse-Grained	0.8 – 2 in. (2 – 4.75 mm)
Very Coarse-Grained	>2 in. (>4.75 mm)

BEDDING

Very Thickly Bedded	>3 ft.
Thickly Bedded	3 ft. – 18 in.
Thinly Bedded	18 in. – 2 in.
Very Thinly Bedded	2 in. – 0.4 in.
Laminated	0.4 in. – 0.1 in.
Thinly Laminated	<0.1 in.

FRACTURE RATE / SPACING

Unfractured	>10 ft.
Intact	10 ft. – 3 ft.
Slightly Fractured	3 ft. – 1 ft.
Moderately Fractured	12 in. – 4 in.
Fractured	4 in. – 2 in.
Highly Fractured	< 2 in.

SURFACE ROUGHNESS

Very Rough	Near vertical steps and ridges occur on the discontinuity surface.
Slightly Rough	Asperities on the discontinuity surface are distinguishable and can be felt.
Smooth	Surface appears smooth and feels so to the touch.
Slickensided	Surface has a smooth, glassy finish with visual evidence of striation.

WEATHERING

Fresh	No visible sign of rock material weathering; slight discoloration on major discontinuity surfaces is possible.
Slightly Weathered	Discoloration indicates weathering of rock material and discontinuity surfaces. All rock material may be discolored by weathering and the external surface may be somewhat weaker than in its fresh condition.
Moderately Weathered	Less than half of the rock material is decomposed and/or disintegrated to a soil. Fresh or discolored rock is present either as a discontinuous framework or as corestones. A minimum 2 in. diameter sample cannot be broken readily by hand.
Highly Weathered	More than half the rock is decomposed or disintegrated to soil. Fresh or discolored rock is present either as a discontinuous framework or as corestones. A minimum 2 in. diameter sample can be broken readily by hand across the rock fabric.
Completely Weathered	All rock material is decomposed and/or disintegrated to soil. The original mass structure is largely still intact. Material can by granulated by hand.
Residual Soil	All rock material is converted to soil. Material can be easily broken apart by hand.

STRENGTH

		APPROX. UNCONFINED COMPRESSIVE STRENGTH (PSI)
Extremely Strong Rock	Specimen can only be chipped with firm blows from the hammer end of a geological hammer.	> 36,250
Very Strong Rock	Specimen requires many firm blows from the hammer end of a geological hammer to fracture.	36,250 – 14,500
Strong Rock	Specimen requires more than one firm blow of the point of a geological hammer to fracture.	14,500 – 7,250
Medium Strong Rock	Specimen cannot be scraped or cut with a pocket knife. Specimen can be fractured with a single firm blow with a geological hammer point.	7,250 – 3,500
Weak Rock	Shallow cuts or scrapes can be made in a specimen with a pocket knife. A firm blow with a geological hammer creates shallow indents.	3,500 – 725
Very Weak Rock	Specimen crumbles under sharp blow with point of geological hammer and can be peeled with a pocket knife.	725 – 150
Extremely Weak Rock	Specimen can be indented by thumbnail.	150 – 35

HARDNESS

Very Hard	Cannot be scratched with a pocket knife; leaves knife steel marks on surface.
Hard	Can be scratched by a pocket knife with difficulty; scratch produces little powder and is only faintly visible; trace of knife's steel may be visible.
Moderately Hard	Can be readily scratched by a pocket knife; scratch leaves a heavy trace of dust and scratch is readily visible after the powder has been blown away.
Low Hardness	Can be gouged deeply or carved with a pocket knife.
Friable	Easily crumbled by hand, pulverized or reduced to powder sand is too soft to be cut by a pocket knife.
Soft	Very weak plastic material.

REFERENCES:

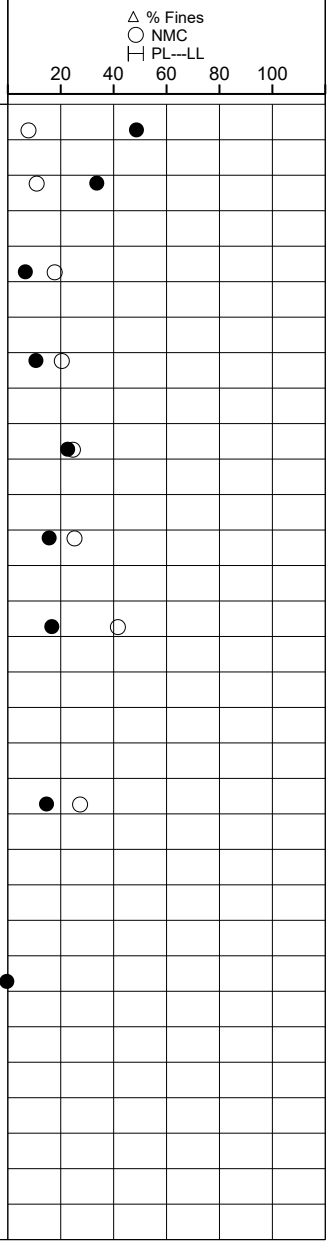
FHWA NHI-16-072, GEOTECHNICAL ENGINEERING CIRCULAR NO. 5 "GEOTECHNICAL SITE CHARACTERIZATION"
DOT SPECIFICATIONS & DESIGN MANUALS FROM NC, SC, OH, MI, IN, PA.

PROJECT:	EKPC Cooper Power Plant Pulaski County, Kentucky S&ME Project No. 23360111	BORING LOG: B-01 *Sheet 1 of 2*

DATE DRILLED: 02/06/2024	**ELEVATION:** 817 ft	**NOTES:**
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: Michael Burnash	**BORING DEPTH:** 48.0 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** Bryan Roberts	**LATITUDE:** 36.996405 **LONGITUDE:** -84.588409
SAMPLING METHOD: SS, RC	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	ELEVATION
0		Fill		SS-1 (15 in) SS-2 (12 in)	CRUSHED GRAVEL, (35 INCHES)	6-23-26 N = 49 18-19-15 N = 34	
2.9		Residuum		SS-3 (8 in) SS-4 (18 in)	FAT CLAY (CH), firm to stiff, red, moist, with chert and limestone fragments	3-4-3 N = 7 2-4-7 N = 11	813
8.5		Residuum		SS-5 (18 in) SS-6 (18 in) SS-7 (18 in) SS-8 (7 in)	FAT CLAY (CH), very stiff to stiff, red, moist, with chert and limestone fragments	6-10-13 N = 23 4-7-9 N = 16 6-8-9 N = 17 4-8-7 N = 15	808 803 798
22.0		Residuum		SS-9 (0 in)	FAT CLAY (CH), very soft, red, moist, with chert and limestone fragments	0-0-0 N = WOH	793
27.6	Auger refusal at 27.6 feet Qu = 35,268 psi	Rock		RC-1 REC-79% RQD-79%	LIMESTONE, light gray, very thinly bedded, very fine grained, dry, slightly weathered, hard		788

STANDARD PENETRATION TEST DATA



GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	02/06/2024		Not encountered
END OF DRILLING	▼	02/06/2024		Not measured due to use of drilling fluid.
AFTER DRILLING	▼	02/08/2024		collapsed at surface
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal, IGM = Intermediate Geomaterial

PROJECT:	EKPC Cooper Power Plant Pulaski County, Kentucky S&ME Project No. 23360111	BORING LOG: B-01 *Sheet 2 of 2*

DATE DRILLED: 02/06/2024	**ELEVATION:** 817 ft	**NOTES:**
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: Michael Burnash	**BORING DEPTH:** 48.0 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** Bryan Roberts	**LATITUDE:** 36.996405 **LONGITUDE:** -84.588409
SAMPLING METHOD: SS, RC	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢⊣ PL---LL; 20 40 60 80 100)	ELEVATION
		Rock		RC-2 REC-100% RQD-95%	LIMESTONE, light gray, very thinly bedded, very fine grained, dry, slightly weathered, hard			
35								783
				RC-3 REC-100% RQD-86%				
	38.6				CALCAREOUS SHALE, gray, very fine grained, dry, highly weathered, soft			778
40	39.1				LIMESTONE, gray, thinly bedded, very fine grained, dry, slightly weathered, hard			
	40.8			RC-4 REC-100% RQD-94%	FOSSILIFEROUS LIMESTONE, light gray and gray, coarse, dry, slightly weathered, hard			
	43.2							773
45	44.6 44.8				LIMESTONE, light gray, thinly bedded, medium, dry, slightly weathered, hard			
				RC-5 REC-100% RQD-91%	CARBONACEOUS SHALE, gray, very fine grained, dry, moderately weathered to highly weathered, soft			
	48.0				FOSSILIFEROUS LIMESTONE, light gray and gray, thinly bedded, very fine grained, dry, slightly weathered, hard			768
50					Borehole terminated at 48.0 feet			
								763
55								
								758
60								

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	02/06/2024		Not encountered
END OF DRILLING	▼	02/06/2024		Not measured due to use of drilling fluid.
AFTER DRILLING	▼	02/08/2024		collapsed at surface
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
AR = Auger Refusal, IGM = Intermediate Geomaterial

PROJECT:	EKPC Cooper Power Plant Pulaski County, Kentucky S&ME Project No. 23360111	BORING LOG: B-02 *Sheet 1 of 2*

DATE DRILLED: 02/05/2024	**ELEVATION:** 818 ft	**NOTES:**
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: Michael Burnash	**BORING DEPTH:** 39.1 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** Bryan Roberts	**LATITUDE:** 36.996519 **LONGITUDE:** -84.587255
SAMPLING METHOD: RC, SS, UD	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢ PL---LL; 20 40 60 80 100)	ELEVATION
0				SS-1 (12 in) SS-2 (11 in)	COAL FRAGMENTS, with crushed limestone and sand (34 INCHES)	12-13-14 N = 27 13-12-8 N = 20		
2.8		Residuum			CLAYEY SAND (SC), medium dense, red, slightly moist, with chert and limestone fragments			
5	pH = 6.7			ST-1 REC-65% SS-3 (18 in)		4-15-13 N = 28		813
	Auger refusal at 9.5 feet							
10	9.5	Rock		RC-1 REC-93% RQD-71%	LIMESTONE, light gray and gray, very thinly bedded, medium grained, dry, slightly weathered to moderately weathered, hard			808
15	14.8 15.3			RC-2 REC-72% RQD-70%	LIMESTONE, light yellow, medium bedded, very fine grained, dry, slightly weathered, hard LIMESTONE AND FOSSILIFEROUS LIMESTONE, light gray and gray, thinly bedded, medium grained, dry, slightly weathered, hard			803
20	Qu = 24,470 ps			RC-3 REC-98% RQD-96%				798
25				RC-4 REC-100% RQD-100%				793
30	29.7 29.9				CALCAREOUS SHALE, brown, dry, highly weathered, soft LIMESTONE, light gray, very thinly bedded, very fine grained, dry, slightly weathered, hard			788

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	02/05/2024		Not encountered
END OF DRILLING	▼	02/05/2024		Not measured due to use of drilling fluid.
AFTER DRILLING	▼	02/08/2024	6.0	
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal, IGM = Intermediate Geomaterial

PROJECT:	EKPC Cooper Power Plant Pulaski County, Kentucky S&ME Project No. 23360111	BORING LOG: B-02 *Sheet 2 of 2*

DATE DRILLED: 02/05/2024	**ELEVATION:** 818 ft	**NOTES:**
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: Michael Burnash	**BORING DEPTH:** 39.1 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** Bryan Roberts	**LATITUDE:** 36.996519 **LONGITUDE:** -84.587255
SAMPLING METHOD: RC, SS, UD	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢ PL---LL; 20 40 60 80 100)	ELEVATION
		Rock		RC-5 REC-98% RQD-90%	LIMESTONE, light gray, very thinly bedded, very fine grained, dry, slightly weathered, hard			
35								783
				RC-6 REC-100% RQD-84%				
	38.0				CALCAREOUS SHALE, brown, dry, highly weathered, soft			
	39.1				Borehole terminated at 39.1 feet			
40								778
45								773
50								768
55								763
60								758

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	02/05/2024		Not encountered
END OF DRILLING	▼	02/05/2024		Not measured due to use of drilling fluid.
AFTER DRILLING	▼	02/08/2024	6.0	
AFTER DRILLING	▼			

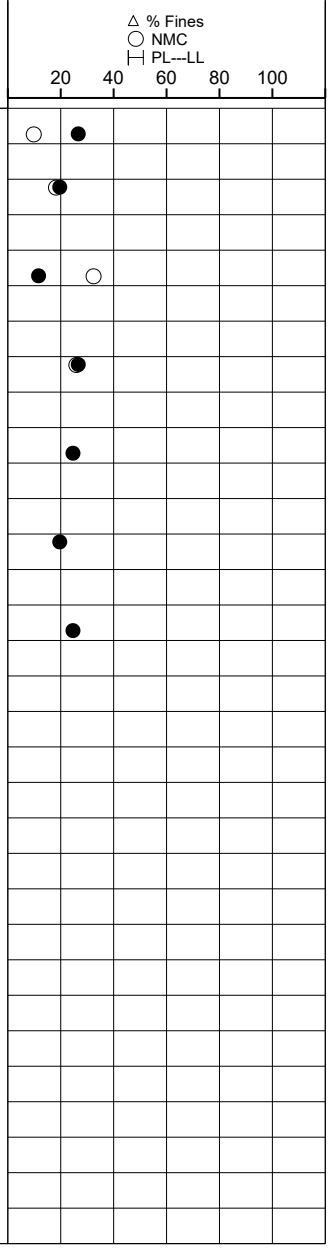
GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal, IGM = Intermediate Geomaterial

PROJECT:	EKPC Cooper Power Plant Pulaski County, Kentucky S&ME Project No. 23360111	BORING LOG: B-03 *Sheet 1 of 2*

DATE DRILLED: 01/30/2024	**ELEVATION:** 819 ft	**NOTES:**
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: Michael Burnash	**BORING DEPTH:** 38.1 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** Bryan Roberts	**LATITUDE:** 36.996876 **LONGITUDE:** -84.586731
SAMPLING METHOD: SS, RC	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	ELEVATION
0	0.3	Residuum		SS-1 (18 in)	COAL FRAGMENTS (4 INCHES)	16-14-13 N = 27	
				SS-2 (14 in)	FAT CLAY (CH), very stiff to stiff, red, slightly moist, with chert and limestone fragments	10-12-8 N = 20	
5				SS-3 (14 in)		5-6-6 N = 12	815
				SS-4 (17 in)		2-7-20 N = 27	
10				SS-5 (14 in)		10-12-13 N = 25	810
				SS-6 (18 in)		8-9-11 N = 20	
15	Auger refusal at 17.5 feet			SS-7 (7 in)		6-21-4 N = 25	805
	17.5	Rock		RC-1 REC-100% RQD-48%	LIMESTONE, light gray, very thinly bedded, very fine grained, dry, moderately weathered to slightly weathered, hard		800
20				RC-2 REC-100% RQD-75%			
25				RC-3 REC-100% RQD-96%			795
30							790

STANDARD PENETRATION TEST DATA



GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/30/2024		Not encountered
END OF DRILLING	▼	01/30/2024		Not measured due to use of drilling fluid.
AFTER DRILLING	▼	02/08/2024		collapsed at surface
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
AR = Auger Refusal, IGM = Intermediate Geomaterial

PROJECT:	EKPC Cooper Power Plant Pulaski County, Kentucky S&ME Project No. 23360111	BORING LOG: B-03 *Sheet 2 of 2*

DATE DRILLED: 01/30/2024	**ELEVATION:** 819 ft	**NOTES:**
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: Michael Burnash	**BORING DEPTH:** 38.1 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** Bryan Roberts	**LATITUDE:** 36.996876 **LONGITUDE:** -84.586731
SAMPLING METHOD: SS, RC	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢⊣ PL---LL; 20 40 60 80 100)	ELEVATION
		Rock		RC-4 REC-100% RQD-90%	LIMESTONE, light gray, very thinly bedded, very fine grained, dry, moderately weathered to slightly weathered, hard			785
35								
	Qu = 28,642 ps			RC-5 REC-94% RQD-89%				
	38.1				Borehole terminated at 38.1 feet			780
40								
								775
45								
								770
50								
								765
55								
								760
60								

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/30/2024		Not encountered
END OF DRILLING	▼	01/30/2024		Not measured due to use of drilling fluid.
AFTER DRILLING	▼	02/08/2024		collapsed at surface
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
AR = Auger Refusal, IGM = Intermediate Geomaterial

PROJECT:	EKPC Cooper Power Plant Pulaski County, Kentucky S&ME Project No. 23360111	BORING LOG: B-04 *Sheet 1 of 2*

DATE DRILLED: 01/31/2024	**ELEVATION:** 824 ft	**NOTES:**
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: Michael Burnash	**BORING DEPTH:** 44.2 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** Bryan Roberts	**LATITUDE:** 36.997312 **LONGITUDE:** -84.587496
SAMPLING METHOD: SS, RC	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	ELEVATION
0		Residuum		SS-1 (6 in)	FAT CLAY (CH), hard, red, with crushed coal and limestone fragment	13-50/5" N = 50/5"	
1.0				SS-2 (12 in)	FAT CLAY (CH), firm to stiff, red, slightly moist, with crushed coal and limestone fragments	10-4-4 N = 8	
5				SS-3 (0 in)		10-5-6 N = 11	819
6.0				SS-4 (12 in)	FAT CLAY (CH), very stiff, red, slightly moist, with chert and limestone fragments	0-10-13 N = 23	
10				SS-5 (14 in)		12-13-14 N = 27	814
				SS-6 (16 in)		19-10-10 N = 20	
15				SS-7 (6 in)		10-12-7 N = 19	809
17.0					FAT CLAY (CH), soft, red, slightly moist, with chert and limestone fragments		
20				SS-8 (12 in)		1-1-2 N = 3	804
24.0	Auger refusal at 25.2 feet			SS-9 (1 in)	Partly similar to highly weathered limestone	50/2" N = 50/2"	
25							799
25.2				RC-1 REC-48% RQD-24%	Partly similar to highly weathered limestone		
30							794
29.4		Rock			LIMESTONE, light gray, very thinly bedded, very fine grained, dry, slightly weathered, hard		

STANDARD PENETRATION TEST DATA

△ % Fines
○ NMC
⊢⊣ PL---LL

20 40 60 80 100

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/31/2024		Not encountered
END OF DRILLING	▼	01/31/2024		Not measured due to use of drilling fluid.
AFTER DRILLING	▼	02/08/2024		collapsed at surface
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
AR = Auger Refusal, IGM = Intermediate Geomaterial

PROJECT:	EKPC Cooper Power Plant Pulaski County, Kentucky S&ME Project No. 23360111	BORING LOG: B-04 *Sheet 2 of 2*

DATE DRILLED: 01/31/2024	**ELEVATION:** 824 ft	**NOTES:**
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: Michael Burnash	**BORING DEPTH:** 44.2 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** Bryan Roberts	**LATITUDE:** 36.997312 **LONGITUDE:** -84.587496
SAMPLING METHOD: SS, RC	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢ PL---LL; 20 40 60 80 100)	ELEVATION
		Rock		RC-2 REC-14% RQD-0%	LIMESTONE, light gray, very thinly bedded, very fine grained, dry, slightly weathered, hard			
35								789
				RC-3 REC-100% RQD-99%				
40								784
				RC-4 REC-98% RQD-86%				
	42.2				CALCAREOUS SHALE, dark gray, dry, highly weathered, soft, mud seam			
	44.2				Borehole terminated at 44.2 feet			
45								779
50								774
55								769
60								764

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/31/2024		Not encountered
END OF DRILLING	▼	01/31/2024		Not measured due to use of drilling fluid.
AFTER DRILLING	▼	02/08/2024		collapsed at surface
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal, IGM = Intermediate Geomaterial

PROJECT:	EKPC Cooper Power Plant Pulaski County, Kentucky S&ME Project No. 23360111	BORING LOG: B-05 *Sheet 1 of 2*

DATE DRILLED: 02/07/2024	**ELEVATION:** 834 ft	**NOTES:**
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: Michael Burnash	**BORING DEPTH:** 47.7 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** Bryan Roberts	**LATITUDE:** 36.997434 **LONGITUDE:** -84.588669
SAMPLING METHOD: SS, RC, UD	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	ELEVATION
0				SS-1 (6 in) SS-2 (7 in)	COAL FRAGMENTS (109 INCHES)	20-43-50/5" N = 50/5" 30-50/4" N = 50/4"	
5				SS-3 (10 in)		29-50/5" N = 50/5"	829
				SS-4 (15 in)		9-16-19 N = 35	
9.1							
10	pH = 4.5	Residuum		SS-5 (18 in) ST-1 REC-100%	FAT CLAY (CH), very stiff, red, slightly moist, with chert and limestone fragments	9-10-11 N = 21	824
12.5					FAT CLAY (CH), soft, red, slightly moist, with chert and limestone fragments		
15				SS-6 (10 in)		1-1-1 N = 2	819
	Auger refusal at 17.7 feet						
17.7		Rock		RC-1 REC-100% RQD-75%	LIMESTONE, light gray and gray, very thinly bedded, very fine grained, dry, slightly weathered to moderately weathered, hard, with dissolution structures		814
20				RC-2 REC-98% RQD-62%			
25				RC-3 REC-98% RQD-78%			809
30							804

STANDARD PENETRATION TEST DATA

△ % Fines
○ NMC
⊢⊣ PL---LL

20 40 60 80 100

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	02/07/2024		Not encountered
END OF DRILLING	▼	02/07/2024		Not measured due to use of drilling fluid.
AFTER DRILLING	▼	02/08/2024		collapsed at surface
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
AR = Auger Refusal, IGM = Intermediate Geomaterial

PROJECT:	EKPC Cooper Power Plant Pulaski County, Kentucky S&ME Project No. 23360111	BORING LOG: B-05 *Sheet 2 of 2*

DATE DRILLED: 02/07/2024	**ELEVATION:** 834 ft	**NOTES:**
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: Michael Burnash	**BORING DEPTH:** 47.7 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** Bryan Roberts	**LATITUDE:** 36.997434 **LONGITUDE:** -84.588669
SAMPLING METHOD: SS, RC, UD	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢⊣ PL---LL; 20 40 60 80 100)	ELEVATION
	Qu = 24,542 psi	Rock		RC-4 REC-100% RQD-90%	LIMESTONE, light gray and gray, very thinly bedded, very fine grained, dry, slightly weathered to moderately weathered, hard, with dissolution structures			
35	35.0				CALCAREOUS SHALE, gray, dry, highly weathered, soft			799
	35.5			RC-5 REC-100% RQD-68%	LIMESTONE AND CALCAREOUS SHALE, gray, very thinly bedded, very fine grained, dry, slightly weathered to moderately weathered, hard			
40								794
				RC-6 REC-100% RQD-92%				
45	45.4			RC-7 REC-33% RQD-33%	SHALE, highly weathered			789
	47.1				LIMESTONE, light gray, thinly bedded, very fine grained, slightly weathered, hard			
	47.7				Borehole terminated at 47.7 feet			
50								784
55								779
60								774

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	02/07/2024		Not encountered
END OF DRILLING	▼	02/07/2024		Not measured due to use of drilling fluid.
AFTER DRILLING	▼	02/08/2024		collapsed at surface
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal, IGM = Intermediate Geomaterial

PROJECT:	EKPC Cooper Power Plant Pulaski County, Kentucky S&ME Project No. 23360111	BORING LOG: B-06 *Sheet 1 of 2*

DATE DRILLED: 02/07/2024	**ELEVATION:** 823 ft	**NOTES:**
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: Michael Burnash	**BORING DEPTH:** 54.6 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** Bryan Roberts	**LATITUDE:** 36.996899 **LONGITUDE:** -84.589292
SAMPLING METHOD: SS, UD, RC	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	ELEVATION
0				SS-1 (12 in)	COAL FRAGMENTS (30 INCHES)	6-13-15 N = 28	
				SS-2 (16 in)		14-8-9 N = 17	
	2.5	Residuum		ST-1 REC-89%	LEAN CLAY (CL), stiff to very stiff, red, slightly moist, with chert and limestone fragments		
5				SS-3 (6 in)		9-5-5 N = 10	819
				SS-4 (7 in)		40-15-12 N = 27	
	8.5			SS-5 (4 in)	LEAN CLAY (CL), soft, red, slightly moist, with chert and limestone fragments	1-2-2 N = 4	814
10				SS-6 (2 in)		3-1-2 N = 3	
	13.5			SS-7 (12 in)	LEAN CLAY (CL), very stiff to stiff, red, slightly moist, with chert and limestone fragments	6-9-7 N = 16	809
15							
20				SS-8 (10 in)		6-9-10 N = 19	804
25				SS-9 (1 in)		6-6-7 N = 13	799
	27.0				LEAN CLAY (CL), soft, red, slightly moist, with chert and limestone fragments		
30				SS-10 (2 in)		3-2-2 N = 4	794

STANDARD PENETRATION TEST DATA

△ % Fines
○ NMC
⊢⊣ PL---LL

20 40 60 80 100

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	02/07/2024		Not encountered
END OF DRILLING	▼	02/07/2024		Not measured due to use of drilling fluid.
AFTER DRILLING	▼	02/08/2024	16.3	
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
AR = Auger Refusal, IGM = Intermediate Geomaterial

PROJECT:	EKPC Cooper Power Plant Pulaski County, Kentucky S&ME Project No. 23360111	BORING LOG: B-06 *Sheet 2 of 2*

DATE DRILLED: 02/07/2024	**ELEVATION:** 823 ft	**NOTES:**
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: Michael Burnash	**BORING DEPTH:** 54.6 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** Bryan Roberts	**LATITUDE:** 36.996899 **LONGITUDE:** -84.589292
SAMPLING METHOD: SS, UD, RC	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢ PL---LL; 20 40 60 80 100)	ELEVATION
32.0		Residuum			LEAN CLAY (CL), hard, red, slightly moist, with chert and limestone fragments			
	Auger refusal at 35.0 feet			SS-11 (14 in)		1-5-50/3" N = 50/3"		789
35								
35.0		Rock			LIMESTONE, light gray, very thinly bedded, very fine grained, dry, slightly weathered to moderately weathered, hard			
				RC-1 REC-100% RQD-89%				
								784
40								
				RC-2 REC-88% RQD-82%				
								779
45								
44.9					Clay seam			
45.6					LIMESTONE, gray, very thinly bedded, very fine grained, dry, moderately weathered to slightly weathered, hard			
	Qu = 11,865 psi			RC-3 REC-100% RQD-62%				
								774
50								
49.6					CALCAREOUS SHALE, light gray and gray, dry, highly weathered, soft			
51.0					LIMESTONE, light gray to gray, very thinly bedded, very fine grained, dry, moderately weathered, hard			
				RC-4 REC-80% RQD-45%				
								769
55								
54.6					Borehole terminated at 54.6 feet			
								764
60								

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	02/07/2024		Not encountered
END OF DRILLING	▼	02/07/2024		Not measured due to use of drilling fluid.
AFTER DRILLING	▼	02/08/2024	16.3	
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
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AR = Auger Refusal, IGM = Intermediate Geomaterial

PROJECT:	EKPC Cooper Power Plant Pulaski County, Kentucky S&ME Project No. 23360111	BORING LOG: B-07 *Sheet 1 of 2*

DATE DRILLED: 01/24/2024	**ELEVATION:** 814 ft	**NOTES:**
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: Michael Burnash	**BORING DEPTH:** 52.9 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** Bryan Roberts	**LATITUDE:** 36.996451 **LONGITUDE:** -84.586213
SAMPLING METHOD: SS, RC	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	ELEVATION
0				SS-1 (14 in) SS-2 (14 in)	COAL FRAGMENTS with sand and limestone fragments (48 INCHES)	5-5-8 N = 13 3-6-8 N = 14	
4.0		Residuum		SS-3 (12 in) SS-4 (18 in)	FAT CLAY (CH), firm, brown, slightly moist, with limestone fragments	3-3-3 N = 6 3-3-4 N = 7	810
8.5 ▼				SS-5 (18 in) SS-6 (18 in) SS-7 (16 in)	FAT CLAY (CH), very stiff to stiff, brown, slightly moist, with limestone fragments	6-10-8 N = 18 5-7-9 N = 16 7-7-8 N = 15	805 800
17.0				SS-8 (16 in)	FAT CLAY (CH), soft, brown, slightly moist, with limestone fragments	2-1-2 N = 3	795
22.0	Auger refusal at 22.0 feet	Rock		RC-1 REC-90% RQD-69% RC-2 REC-100% RQD-92%	LIMESTONE, brown to grayish brown, thinly bedded, very fine grained, dry, highly weathered to moderately weathered, soft		790
29.3	Qu = 23,223 psi				CALCAREOUS SHALE, gray, dry, slightly weathered, soft, with chert breccia		785
29.5					LIMESTONE, light gray, very thinly bedded, very fine grained, dry, slightly weathered, hard		

STANDARD PENETRATION TEST DATA

△ % Fines
○ NMC
⊢ PL---LL

20 40 60 80 100

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/24/2024		Not encountered
END OF DRILLING	▼	01/24/2024		Not measured due to use of drilling fluid.
AFTER DRILLING	▼	02/08/2024	8.8	
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal, IGM = Intermediate Geomaterial

PROJECT:	EKPC Cooper Power Plant Pulaski County, Kentucky S&ME Project No. 23360111	BORING LOG: B-07 *Sheet 2 of 2*

DATE DRILLED: 01/24/2024	**ELEVATION:** 814 ft	**NOTES:**
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: Michael Burnash	**BORING DEPTH:** 52.9 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** Bryan Roberts	**LATITUDE:** 36.996451 **LONGITUDE:** -84.586213
SAMPLING METHOD: SS, RC	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢⊣ PL---LL; 20 40 60 80 100)	ELEVATION
35		Rock		RC-3 REC-86% RQD-58%	LIMESTONE, light gray, very thinly bedded, very fine grained, dry, slightly weathered, hard			780
	37.3			RC-4 REC-90% RQD-16%	CALCAREOUS SHALE, light gray, highly weathered, soft			
	38.5				LIMESTONE, gray, very thinly bedded, very fine grained, dry, slightly weathered, hard			775
40				RC-5 REC-100% RQD-96%				
				RC-6 REC-98% RQD-88%				770
45	44.6				LIMESTONE, light gray, thinly bedded, very fine grained, dry, moderately weathered, hard			
	46.5 47.0				CALCAREOUS SHALE, light gray, dry, highly weathered, soft			
				RC-7 REC-100% RQD-91%	LIMESTONE, light gray and gray, very thinly bedded, very fine grained, dry, slightly weathered, hard			765
50				RC-8 REC-100% RQD-95%				
	52.9				Borehole terminated at 52.9 feet			760
55								755
60								

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/24/2024		Not encountered
END OF DRILLING	▼	01/24/2024		Not measured due to use of drilling fluid.
AFTER DRILLING	▼	02/08/2024	8.8	
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal, IGM = Intermediate Geomaterial

PROJECT:	EKPC Cooper Power Plant Pulaski County, Kentucky S&ME Project No. 23360111	BORING LOG: B-08 *Sheet 1 of 2*

DATE DRILLED: 02/08/2024	**ELEVATION:** 819 ft	**NOTES:**
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: Michael Burnash	**BORING DEPTH:** 42.4 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** Bryan Roberts	**LATITUDE:** 36.995660 **LONGITUDE:** -84.586975
SAMPLING METHOD: RC, SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢ PL---LL; 20 40 60 80 100)	ELEVATION
0					ASPHALT, (6 INCHES)			
0.5		Fill			AGGREGATE BASE, (19 INCHES)			
2.1		Residuum		SS-1 (15 in)	FAT CLAY (CH), firm to stiff, red, slightly moist, with chert and limestone fragments, POSSIBLE FILL underlying road.	7-3-4 N = 7	● ○	
5				SS-2 (4 in)		2-5-10 N = 15	● ○	815
6.1				SS-3 (1 in) RC-1 REC-18% RQD-0%	LIMESTONE, gray, dry, completely weathered, soft	50/4" N = 50/4"	●	
9.4		Residuum		RC-2 REC-28% RQD-8%	FAT CLAY (CH), red, slightly moist, with chert and limestone boulders.			810
10								
15				RC-3 REC-22% RQD-0%				805
20	Auger refusal at 21.8 feet							800
21.8		Rock		RC-4 REC-90% RQD-68%	LIMESTONE, gray and brown, very thinly bedded, very fine grained, dry, highly weathered to completely weathered, soft, Swelling clay			795
25				RC-5 REC-100% RQD-74%				
28.3					LIMESTONE, light gray, very thinly bedded, very fine grained, dry, slightly weathered, hard			790
30								

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	02/08/2024		Not encountered
END OF DRILLING	▼	02/08/2024		Not measured due to use of drilling fluid.
AFTER DRILLING	▼	02/08/2024	1.8	
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal, IGM = Intermediate Geomaterial

PROJECT:	EKPC Cooper Power Plant Pulaski County, Kentucky S&ME Project No. 23360111	BORING LOG: B-08 *Sheet 2 of 2*

DATE DRILLED: 02/08/2024	**ELEVATION:** 819 ft	**NOTES:**
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: Michael Burnash	**BORING DEPTH:** 42.4 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** Bryan Roberts	**LATITUDE:** 36.995660 **LONGITUDE:** -84.586975
SAMPLING METHOD: RC, SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢⊣ PL---LL; 20 40 60 80 100)	ELEVATION
		Rock		RC-6 REC-96% RQD-82%	LIMESTONE, light gray, very thinly bedded, very fine grained, dry, slightly weathered, hard			785
35				RC-7 REC-98% RQD-98%				780
40				RC-8 REC-100% RQD-77%				
41.8					CALCAREOUS SHALE, gray, very fine grained, dry, highly weathered, soft, Swelling clay			775
42.4					Borehole terminated at 42.4 feet			
45								770
50								765
55								760
60								

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	02/08/2024		Not encountered
END OF DRILLING	▼	02/08/2024		Not measured due to use of drilling fluid.
AFTER DRILLING	▼	02/08/2024	1.8	
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal, IGM = Intermediate Geomaterial

PROJECT:	EKPC Cooper Power Plant Pulaski County, Kentucky S&ME Project No. 23360111	BORING LOG: B-09 *Sheet 1 of 2*

DATE DRILLED: 01/23/2024	**ELEVATION:** 824 ft	**NOTES:**
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: Michael Burnash	**BORING DEPTH:** 51.0 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** Bryan Roberts	**LATITUDE:** 36.994964 **LONGITUDE:** -84.586377
SAMPLING METHOD: AU, SS, RC	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	

DEPTH (feet)	NOTES		Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	ELEVATION
0	Bulk sample obtained at 3.0'.		Fill		SS-1 (6 in)	CRUSHED GRAVEL (36 INCHES)	12-50/3" N = 50/3"	
	pH = 7.6	3.0	Residuum		SS-2 (12 in)	LEAN CLAY (CL), stiff, red brown, slightly moist, with limestone fragments	3-4-6 N = 10	
5								819
		7.0				LEAN CLAY (CL), hard, red brown, slightly moist, with limestone fragments		
10	Auger refusal at 11.0 feet				SS-3 (10 in)		3-14-50/5" N = 50/5"	814
		11.0	Rock			LIMESTONE, light gray, very fine grained, dry, highly weathered, medium hard		
		12.3	Residuum		RC-1 REC-20% RQD-0%	Partly similar to highly weathered limestone		
15								809
20					RC-2 REC-4% RQD-0%			804
		21.0	Rock		RC-3 REC-32% RQD-8%	LIMESTONE, gray, very fine grained, dry, moderately weathered, medium hard		
25								799
		26.0			RC-4 REC-18% RQD-0%	LIMESTONE, brown, damp, completely weathered, soft		
30								794

STANDARD PENETRATION TEST DATA

△ % Fines
○ NMC
⊢ PL---LL

20 40 60 80 100

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/23/2024		Not encountered
END OF DRILLING	▼	01/23/2024		Not measured due to use of drilling fluid.
AFTER DRILLING	▼	02/08/2024		collapsed at surface
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal, IGM = Intermediate Geomaterial

PROJECT:	EKPC Cooper Power Plant Pulaski County, Kentucky S&ME Project No. 23360111	BORING LOG: B-09 *Sheet 2 of 2*

DATE DRILLED: 01/23/2024	**ELEVATION:** 824 ft	**NOTES:**
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: Michael Burnash	**BORING DEPTH:** 51.0 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** Bryan Roberts	**LATITUDE:** 36.994964 **LONGITUDE:** -84.586377
SAMPLING METHOD: AU, SS, RC	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢⊣ PL---LL; 20 40 60 80 100)	ELEVATION
	32.3	Rock		RC-5 REC-100% RQD-82%	LIMESTONE, brown, damp, completely weathered, soft LIMESTONE, gray, very thinly bedded, very fine grained, dry, slightly weathered, hard			
35								789
				RC-6 REC-98% RQD-85%				
40								784
				RC-7 REC-88% RQD-62%				
45								779
	48.5 48.8			RC-8 REC-100% RQD-82%	CALCAREOUS SHALE, gray, dry, highly weathered, soft LIMESTONE, light gray, damp, slightly weathered to moderately weathered, hard			
50								774
	51.0				Borehole terminated at 51.0 feet			
55								769
60								764

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/23/2024		Not encountered
END OF DRILLING	▼	01/23/2024		Not measured due to use of drilling fluid.
AFTER DRILLING	▼	02/08/2024		collapsed at surface
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
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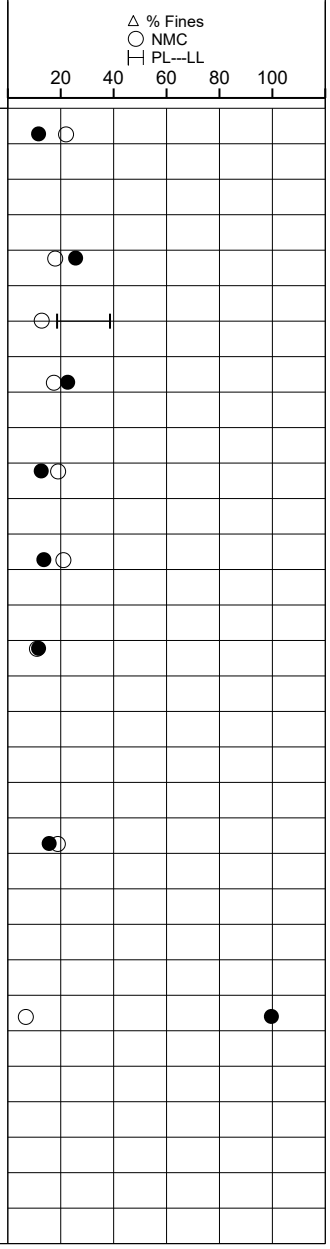
PROJECT:	EKPC Cooper Power Plant Pulaski County, Kentucky S&ME Project No. 23360111	BORING LOG: B-10 *Sheet 1 of 2*

DATE DRILLED: 01/24/2024	**ELEVATION:** 820 ft	**NOTES:**
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: Michael Burnash	**BORING DEPTH:** 49.5 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** Bryan Roberts	**LATITUDE:** 36.994584 **LONGITUDE:** -84.586513
SAMPLING METHOD: SS, UD, RC	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	ELEVATION
0		Residuum					
				SS-1 (14 in)	CLAYEY SAND (SC), medium dense, light red brown, slightly moist	6-6-6 N = 12	
1.0	Hole Cave at 2.9 feet				CLAYEY SAND (SC), medium dense, red, slightly moist		
				SS-2 (18 in)		5-11-15 N = 26	816
5				ST-1 REC-100%			
7.0				SS-3 (18 in)	CLAYEY SAND (SC), dense to medium dense, red	12-12-11 N = 23	
10				SS-4 (18 in)		5-7-6 N = 13	811
				SS-5 (12 in)		5-6-8 N = 14	
15				SS-6 (10 in)		4-5-7 N = 12	806
20				SS-7 (18 in)		3-7-9 N = 16	801
23.0					CLAYEY SAND (SC), very dense, red, slightly moist, with limestone fragments		796
25	Auger refusal at 26.2 feet			SS-8 (14 in)		3-33-50/3" N = 50/3"	
26.2		Rock		RC-1 REC-100% RQD-73%	LIMESTONE, light gray to gray, dry, moderately weathered to highly weathered, hard		791
30							
30.3					FAT CLAY (CH), red		

STANDARD PENETRATION TEST DATA



GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/24/2024		Not encountered
END OF DRILLING	▼	01/24/2024		Not measured due to use of drilling fluid.
AFTER DRILLING	▼	02/08/2024		
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
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AR = Auger Refusal, IGM = Intermediate Geomaterial

PROJECT:	EKPC Cooper Power Plant Pulaski County, Kentucky S&ME Project No. 23360111	BORING LOG: B-10 *Sheet 2 of 2*

DATE DRILLED: 01/24/2024	**ELEVATION:** 820 ft	**NOTES:**
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: Michael Burnash	**BORING DEPTH:** 49.5 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** Bryan Roberts	**LATITUDE:** 36.994584 **LONGITUDE:** -84.586513
SAMPLING METHOD: SS, UD, RC	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢⊣ PL---LL; 20 40 60 80 100)	ELEVATION
				RC-2 REC-68% RQD-6%	FAT CLAY (CH), red			
35	34.5	Rock			LIMESTONE, gray, very fine grained, dry, slightly weathered, hard			786
				RC-3 REC-100% RQD-98%				
40								781
				RC-4 REC-98% RQD-92%				
	Qu = 29,239 psi							776
45	45.4 45.8				CALCAREOUS SHALE, gray, dry, highly weathered, soft			
				RC-5 REC-100% RQD-82%	LIMESTONE, light gray, very fine grained, dry, slightly weathered, hard			
								771
50	49.5				Borehole terminated at 49.5 feet			
55								766
								761
60								

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/24/2024		Not encountered
END OF DRILLING	▼	01/24/2024		Not measured due to use of drilling fluid.
AFTER DRILLING	▼	02/08/2024		
AFTER DRILLING	▼			

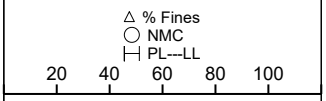
GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal, IGM = Intermediate Geomaterial

PROJECT:	EKPC Cooper Power Plant Pulaski County, Kentucky S&ME Project No. 23360111	BORING LOG: B-11 *Sheet 1 of 2*

DATE DRILLED: 01/10/2024	**ELEVATION:** 846 ft	**NOTES:**
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: Michael Burnash	**BORING DEPTH:** 39.5 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** Bryan Roberts	**LATITUDE:** 36.998118 **LONGITUDE:** -84.586458
SAMPLING METHOD: SS, RC, AU	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	

DEPTH (feet)	NOTES		Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	ELEVATION
0	LOI = 2.8%	0.3	Residuum		SS-1 (14 in)	TOPSOIL, (4 INCHES) LEAN CLAY (CL), hard, brown, slightly moist, with weathered limestone fragments	4-25-9 N = 34	
	UU = 7,740 psf - obtained from offset Undisturbed Sample.	3.1			SS-2 (18 in)	LEAN CLAY (CL), stiff to very stiff, red brown, homogeneous, slightly moist, with weathered limestone fragments	4-6-9 N = 15	
5					SS-3 (18 in)		5-8-9 N = 17	841
10					SS-4 (17 in)		5-7-10 N = 17	836
					SS-5 (18 in)		6-8-13 N = 21	
15		15.0			SS-6 (18 in)	LEAN CLAY (CL), very stiff, red brown, slightly moist, with weathered limestone fragments	5-8-8 N = 16	831
20	Auger refusal at 22.5 feet				SS-7 (18 in)		10-9-9 N = 18	826
		22.5	Rock		RC-1 REC-95% RQD-72%	LIMESTONE, gray, very fine grained, dry, moderately weathered, medium hard		
25					RC-2 REC-60% RQD-29%			821
		27.5				VOID. No recovery, possible clay seam or weathered shale.		
30		29.5				LIMESTONE, gray, very fine grained, dry, moderately weathered to highly weathered, medium hard		816

STANDARD PENETRATION TEST DATA



GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/10/2024		Not encountered
END OF DRILLING	▼	01/10/2024		Not measured due to use of drilling fluid.
AFTER DRILLING	▼	02/08/2024	10.0	
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
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PROJECT:	EKPC Cooper Power Plant Pulaski County, Kentucky S&ME Project No. 23360111	BORING LOG: B-11 *Sheet 2 of 2*

DATE DRILLED: 01/10/2024	**ELEVATION:** 846 ft	**NOTES:**
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: Michael Burnash	**BORING DEPTH:** 39.5 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** Bryan Roberts	**LATITUDE:** 36.998118 **LONGITUDE:** -84.586458
SAMPLING METHOD: SS, RC, AU	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢⊣ PL---LL; 20 40 60 80 100)	ELEVATION
35	Qu = 19,705 psi	Rock		RC-3 REC-58% RQD-22% RC-4 REC-98% RQD-52%	LIMESTONE, gray, very fine grained, dry, moderately weathered to highly weathered, medium hard			811
40	39.5				Borehole terminated at 39.5 feet			806
45								801
50								796
55								791
60								786

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/10/2024		Not encountered
END OF DRILLING	▼	01/10/2024		Not measured due to use of drilling fluid.
AFTER DRILLING	▼	02/08/2024	10.0	
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
AR = Auger Refusal, IGM = Intermediate Geomaterial

PROJECT:	EKPC Cooper Power Plant Pulaski County, Kentucky S&ME Project No. 23360111	BORING LOG: B-12 *Sheet 1 of 1*

DATE DRILLED: 01/10/2024	**ELEVATION:** 837 ft	**NOTES:** Soil only
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: Michael Burnash	**BORING DEPTH:** 2.0 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Cuttings	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** Bryan Roberts	**LATITUDE:** 36.997783 **LONGITUDE:** -84.585749
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢⊣ PL---LL; 20 40 60 80 100)	ELEVATION
0	Auger refusal at 2.0 feet	Residuum		SS-1 (12 in)	FAT CLAY (CH), hard, red brown, slightly moist	5-5-50/1" N = 50/1"		
2.0					Borehole terminated at 2.0 feet			
5								833
10								828
15								823
20								818
25								813
30								808

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/10/2024		Not encountered
END OF DRILLING	▼			
AFTER DRILLING	▼	02/08/2024		collapsed at surface
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
AR = Auger Refusal, IGM = Intermediate Geomaterial

PROJECT:	EKPC Cooper Power Plant Pulaski County, Kentucky S&ME Project No. 23360111	BORING LOG: B-13 *Sheet 1 of 2*

DATE DRILLED: 01/09/2024	**ELEVATION:** 843 ft	**NOTES:**
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: Michael Burnash	**BORING DEPTH:** 35.4 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** Bryan Roberts	**LATITUDE:** 36.997846 **LONGITUDE:** -84.586257
SAMPLING METHOD: RC, SS, AU	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢ PL---LL; 20 40 60 80 100)	ELEVATION
0	Auger refusal at 0.4 feet 0.4 pH = 6.4	Residuum		SS-1 (4 in) RC-1 REC-34% RQD-2% RC-2 REC-10% RQD-0% RC-3 REC-28% RQD-4% RC-4 REC-10% RQD-0%	FAT CLAY (CH), hard, brown, slightly moist, with limestone fragments Partly similar to highly weathered limestone	50/4" N = 50/4"		839 834 829 824
20	20.0	Rock		RC-5 REC-96% RQD-54%	LIMESTONE, gray, interbedded, very fine grained, dry, highly weathered, medium hard			819
25	27.0			RC-6 REC-86% RQD-58%	LIMESTONE, light gray, medium crossbedded, very fine grained, dry, slightly weathered to moderately weathered, hard			814
30								

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/09/2024		Not encountered
END OF DRILLING	▼	01/09/2024		Not measured due to use of drilling fluid.
AFTER DRILLING	▼	02/08/2024		collapsed at surface
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal, IGM = Intermediate Geomaterial

PROJECT:	EKPC Cooper Power Plant Pulaski County, Kentucky S&ME Project No. 23360111	BORING LOG: B-13 *Sheet 2 of 2*

DATE DRILLED: 01/09/2024	**ELEVATION:** 843 ft	**NOTES:**
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: Michael Burnash	**BORING DEPTH:** 35.4 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** Bryan Roberts	**LATITUDE:** 36.997846 **LONGITUDE:** -84.586257
SAMPLING METHOD: RC, SS, AU	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢⊣ PL---LL; 20 40 60 80 100)	ELEVATION
		Rock		RC-7 REC-98% RQD-46%	LIMESTONE, light gray, medium crossbedded, very fine grained, dry, slightly weathered to moderately weathered, hard			
35								809
	35.4				Borehole terminated at 35.4 feet			
40								804
45								799
50								794
55								789
60								784

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/09/2024		Not encountered
END OF DRILLING	▼	01/09/2024		Not measured due to use of drilling fluid.
AFTER DRILLING	▼	02/08/2024		collapsed at surface
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
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PROJECT:	EKPC Cooper Power Plant Pulaski County, Kentucky S&ME Project No. 23360111	BORING LOG: B-14 *Sheet 1 of 1*

DATE DRILLED: 01/10/2024	**ELEVATION:** 846 ft	**NOTES:** Soil only
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: Michael Burnash	**BORING DEPTH:** 9.0 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Cuttings	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** Bryan Roberts	**LATITUDE:** 36.997824 **LONGITUDE:** -84.586826
SAMPLING METHOD: AU, SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢ PL---LL; 20 40 60 80 100)	ELEVATION
0		Topsoil			TOPSOIL, (12 INCHES)			
	Bulk sample obtained at 3.0'	Residuum		SS-1 (14 in)	FAT CLAY (CH), stiff to very stiff, red brown, slightly moist	5-7-9 N = 16		
1.0				SS-2 (18 in)		3-4-5 N = 9		
5				SS-3 (18 in)		4-7-10 N = 17		842
	Auger refusal at 9.0 feet							
9.0					Borehole terminated at 9.0 feet			837
10								
15								832
20								827
25								822
30								817

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/10/2024		Not encountered
END OF DRILLING	▼			
AFTER DRILLING	▼	02/08/2024		collapsed at surface
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
AR = Auger Refusal, IGM = Intermediate Geomaterial

PROJECT:	EKPC Cooper Power Plant Pulaski County, Kentucky S&ME Project No. 23360111	BORING LOG: B-15 *Sheet 1 of 1*

DATE DRILLED: 01/10/2024	**ELEVATION:** 838 ft	**NOTES:**
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: Michael Burnash	**BORING DEPTH:** 24.9 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** Bryan Roberts	**LATITUDE:** 36.997575 **LONGITUDE:** -84.585957
SAMPLING METHOD: RC, SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢ PL---LL; 20 40 60 80 100)	ELEVATION
0		Residuum						
	Auger refusal at 2.4 feet			SS-1 (10 in)	FAT CLAY (CH), very stiff, red brown, homogeneous, moist	8-11-17 N = 28		
0.5					FAT CLAY WITH GRAVEL (CH), very stiff, red brown with gray, slightly moist, with limestone fragments			
2.4				RC-1 REC-28% RQD-0%	LIMESTONE, gray, very fine grained, dry, highly weathered, medium hard			
5				RC-2 REC-8% RQD-0%				833
10								828
9.9		Rock			LIMESTONE, gray, thickly bedded, very fine grained, dry, slightly weathered to moderately weathered, medium hard			
	Qu = 10,794 psi			RC-3 REC-100% RQD-93%				
15								823
				RC-4 REC-100% RQD-97%				
20								818
				RC-5 REC-98% RQD-92%				
25								813
24.9					Borehole terminated at 24.9 feet			
30								808

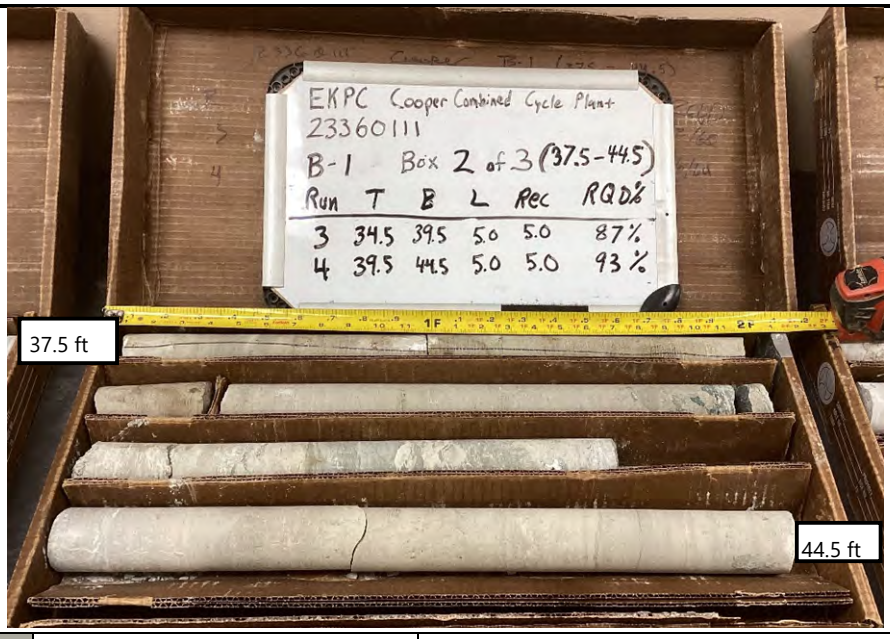
GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/10/2024		Not encountered
END OF DRILLING	▼	01/10/2024		Not measured due to use of drilling fluid.
AFTER DRILLING	▼	02/08/2024		collapsed at surface
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
AR = Auger Refusal, IGM = Intermediate Geomaterial

Date: 2/15/2024

Photographer: Kevin Roberts

1	**Location / Orientation**	B-1 (27.6 – 37.5 ft)
	Remarks	Box: 1 of 3



Date: 2/15/2024

Photographer: Kevin Roberts

2	**Location / Orientation**	B-1 (37.5 – 44.5 ft)
	Remarks	Box: 2 of 3

Date: 2/15/2024

Photographer: Kevin Roberts

3	**Location / Orientation**	B-1 (44.5 – 48.0 ft)
	Remarks	Box: 3 of 3

Date: 2/15/2024

Photographer: Kevin Roberts

1	**Location / Orientation**	B-2 (9.5 – 21.6 ft)
	Remarks	Box: 1 of 3

Date: 2/15/2024

Photographer: Kevin Roberts

2	**Location / Orientation**	B-2 (21.6 – 29.1 ft)
	Remarks	Box: 2 of 3

Date: 2/15/2024

Photographer: Kevin Roberts

3	**Location / Orientation**	B-2 (29.1 – 39.1 ft)
	Remarks	Box: 3 of 3

Date: 2/15/2024

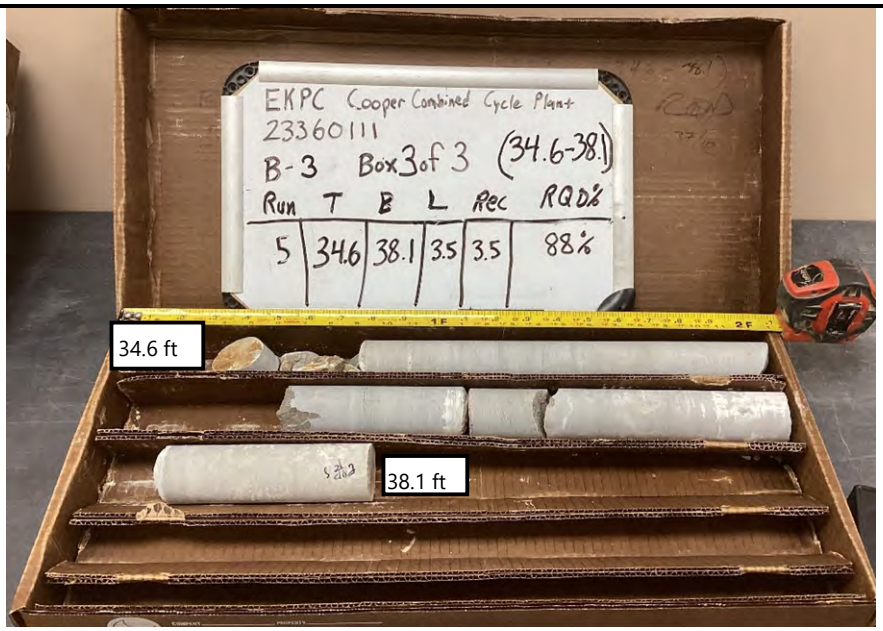
Photographer: Kevin Roberts

1	**Location / Orientation**	B-3 (17.5 – 27.2 ft)
	Remarks	Box: 1 of 3

Date: 2/15/2024

Photographer: Kevin Roberts

2	**Location / Orientation**	B-3 (27.2 – 34.6 ft)
	Remarks	Box: 2 of 3



Date: 2/15/2024

Photographer: Kevin Roberts

3	**Location / Orientation**	B-3 (34.6 – 38.1 ft)
	Remarks	Box: 3 of 3

Date: 2/15/2024

Photographer: Kevin Roberts

1	**Location / Orientation**	B-4 (25.2 – 39.2 ft)
	Remarks	Box: 1 of 2

Date: 2/15/2024

Photographer: Kevin Roberts

2	**Location / Orientation**	B-4 (39.2 – 44.2 ft)
	Remarks	Box: 2 of 2

Date: 2/15/2024

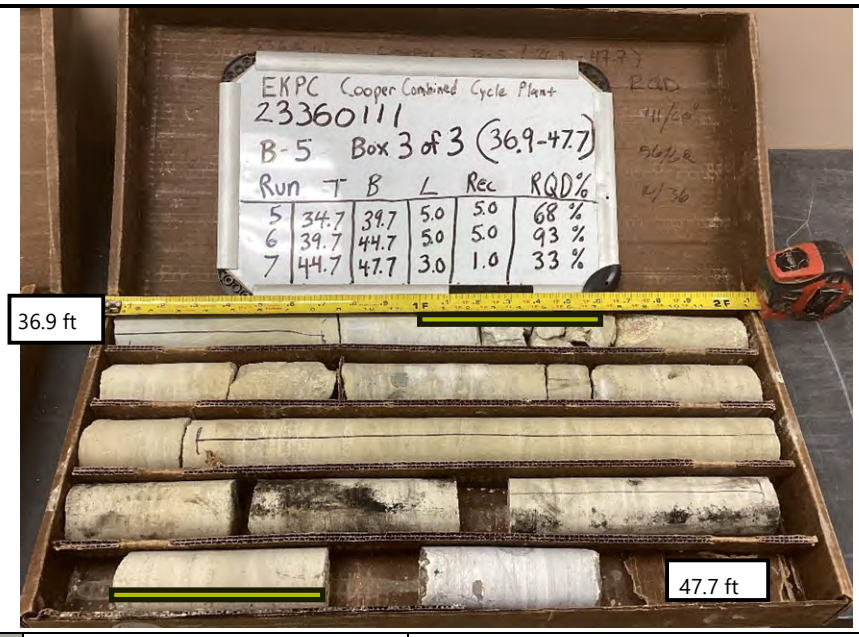
Photographer: Kevin Roberts

1	**Location / Orientation**	B-5 (17.7 – 27.3 ft)
	Remarks	Box: 1 of 3

Date: 2/15/2024

Photographer: Kevin Roberts

2	**Location / Orientation**	B-5 (27.3 – 36.9 ft)
	Remarks	Box: 2 of 3



Date: 2/15/2024

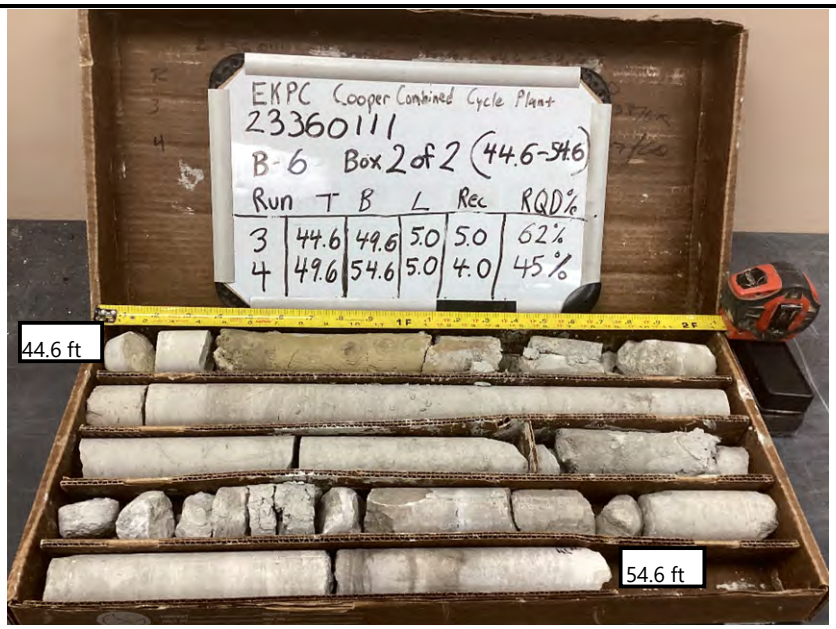
Photographer: Kevin Roberts

3	**Location / Orientation**	B-5 (36.9 – 47.7 ft)
	Remarks	Box: 3 of 3

Date: 2/15/2024

Photographer: Kevin Roberts

1	**Location / Orientation**	B-6 (35.0 – 44.6 ft)
	Remarks	Box: 1 of 2



Date: 2/15/2024

Photographer: Kevin Roberts

2	**Location / Orientation**	B-6 (44.6 – 54.6 ft)
	Remarks	Box: 2 of 2

Date: 2/15/2024

Photographer: Kevin Roberts

1	**Location / Orientation**	B-7 (22.0 – 31.0 ft)
	Remarks	Box: 1 of 4

Date: 2/15/2024

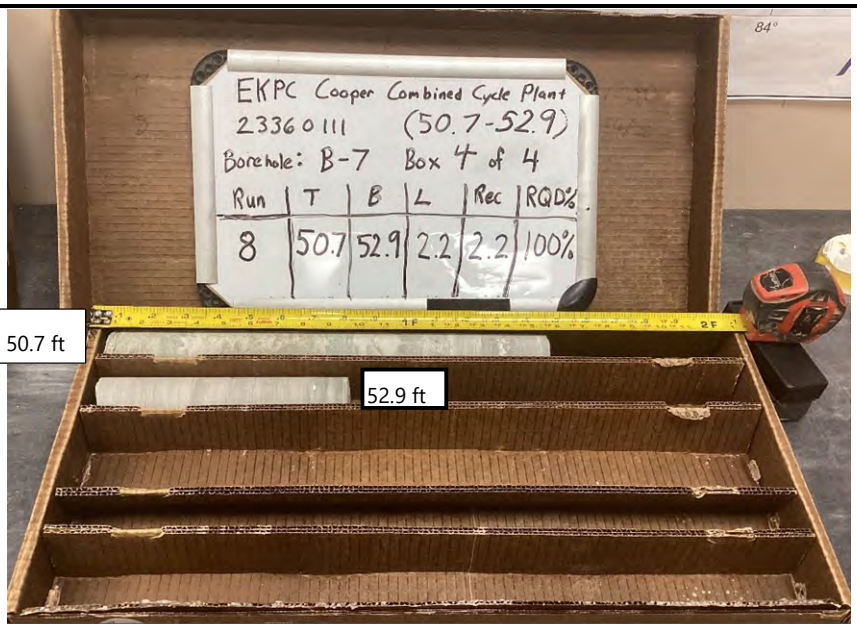
Photographer: Kevin Roberts

2	**Location / Orientation**	B-7 (31.0 – 41.2 ft)
	Remarks	Box: 2 of 4

Date: 2/15/2024

Photographer: Kevin Roberts

3	**Location / Orientation**	B-7 (41.2 – 50.7 ft)
	Remarks	Box: 3 of 4



Date: 2/15/2024

Photographer: Kevin Roberts

4	**Location / Orientation**	B-7 (50.7 – 52.9 ft)
	Remarks	Box: 4 of 4

Date: 2/15/2024

Photographer: Kevin Roberts

1	**Location / Orientation**	B-8 (6.1 – 26.4 ft)
	Remarks	Box: 1 of 3

Date: 2/15/2024

Photographer: Kevin Roberts

2	**Location / Orientation**	B-8 (26.4 – 36.2 ft)
	Remarks	Box: 2 of 3

Date: 2/15/2024

Photographer: Kevin Roberts

3	**Location / Orientation**	B-8 (36.2 – 42.4 ft)
	Remarks	Box: 3 of 3

Date: 2/15/2024

Photographer: Kevin Roberts

1	**Location / Orientation**	B-9 (11.0 – 34.3 ft)
	Remarks	Box: 1 of 3

Date: 2/15/2024

Photographer: Kevin Roberts

2	**Location / Orientation**	B-9 (34.3 – 43.9 ft)
	Remarks	Box: 2 of 3

Date: 2/15/2024

Photographer: Kevin Roberts

3	**Location / Orientation**	B-9 (43.9 – 51.0 ft)
	Remarks	Box: 3 of 3

Date: 2/15/2024

Photographer: Kevin Roberts

1	**Location / Orientation**	B-10 (26.2 – 37.3 ft)
	Remarks	Box: 1 of 3

Date: 2/15/2024

Photographer: Kevin Roberts

2	**Location / Orientation**	B-10 (37.3 – 44.5 ft)
	Remarks	Box: 2 of 3

Date: 2/15/2024

Photographer: Kevin Roberts

3	**Location / Orientation**	B-10 (44.5 – 49.5 ft)
	Remarks	Box: 3 of 3

Date: 1/15/2024

Photographer: Daniel Draper

1	**Location / Orientation**	B-11 (22.5 – 34.5 ft)
	Remarks	Box: 1 of 2

Date: 1/15/2024

Photographer: Daniel Draper

2	**Location / Orientation**	B-11 (34.5 – 39.5 ft)
	Remarks	Box: 2 of 2

Date: 1/15/2024

Photographer: Daniel Draper

1	**Location / Orientation**	B-13 (0.4 – 25.4 ft)
	Remarks	Box: 1 of 2

Date: 1/15/2024

Photographer: Daniel Draper

2	**Location / Orientation**	B-13 (25.4 – 35.4 ft)
	Remarks	Box: 2 of 2

Date: 1/12/2024

Photographer: Daniel Draper

1	**Location / Orientation**	B-15 (2.4 – 14.9 ft)
	Remarks	Box: 1 of 3

Date: 1/12/2024

Photographer: Daniel Draper

2	**Location / Orientation**	B-15 (14.9 – 19.9 ft)
	Remarks	Box: 2 of 3

Date: 1/12/2024

Photographer: Daniel Draper

3	**Location / Orientation**	B-15 (19.9 – 24.9 ft)
	Remarks	Box: 3 of 3

Soil Resistivity Data Sheet
Wenner Four-Electrode Method

Project: Cooper Power Plant **Project #:** 23360111

Project Location: Pulaski County **Date:** 1/30/2024

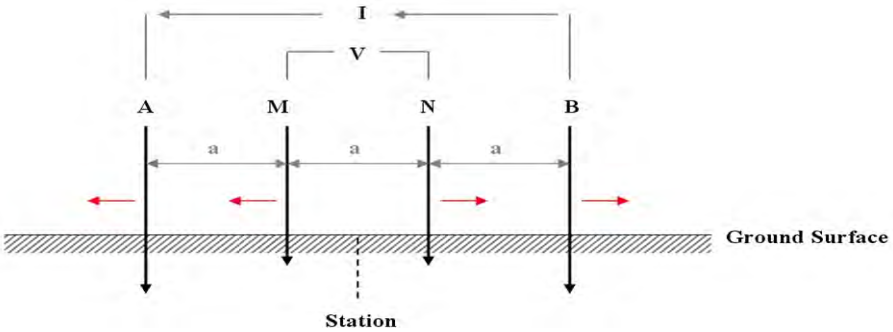
Soil Conditions: Moist clay **Time:**

Weather & Temperature: 31° Partly cloudy

Performed By (Name of Tester): Amber Lacy, Adam Gostic

Additional Notes:

$\rho = 2\pi \cdot a \cdot R$



"a" Spacing (feet)	Electrode Depth (Inches)	"A" Resistance (Ω)	"B" Resistance (Ω)	"A" Apparent Resistivity, ρ (Ω·ft)	"B" Apparent Resistivity, ρ (Ω·ft)	Comments
2.5	2	18.65	22.87	292.95	359.24	
5	6	12.24	9.52	384.53	299.11	
10	12	6.36	4.97	399.67	312.53	
20	12	6.56	4.22	824.10	529.67	
50	12	4.84	3.73	1521.79	1170.87	
70	12	3.96	3.20	1742.58	1408.76	
100	12	3.60	2.87	2263.21	1803.91	
150	12	2.88	1.47	2709.63	1388.27	

Layer 1 – Layer 2 Contact

Interpreted Top of Rock (Layer 3)

High-noise Data

Low Resistivity Anomaly

High Resistivity Anomaly

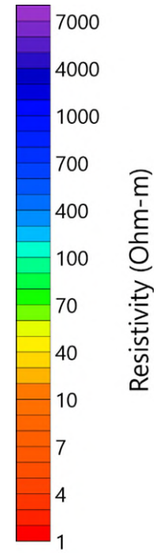
Borehole Position

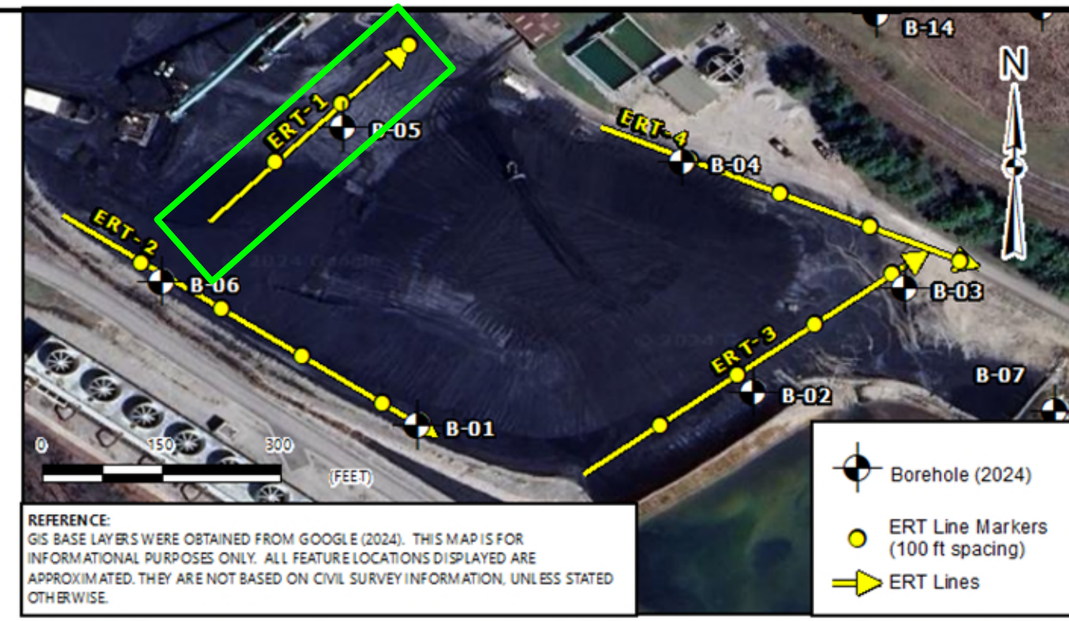
Coal

Fill

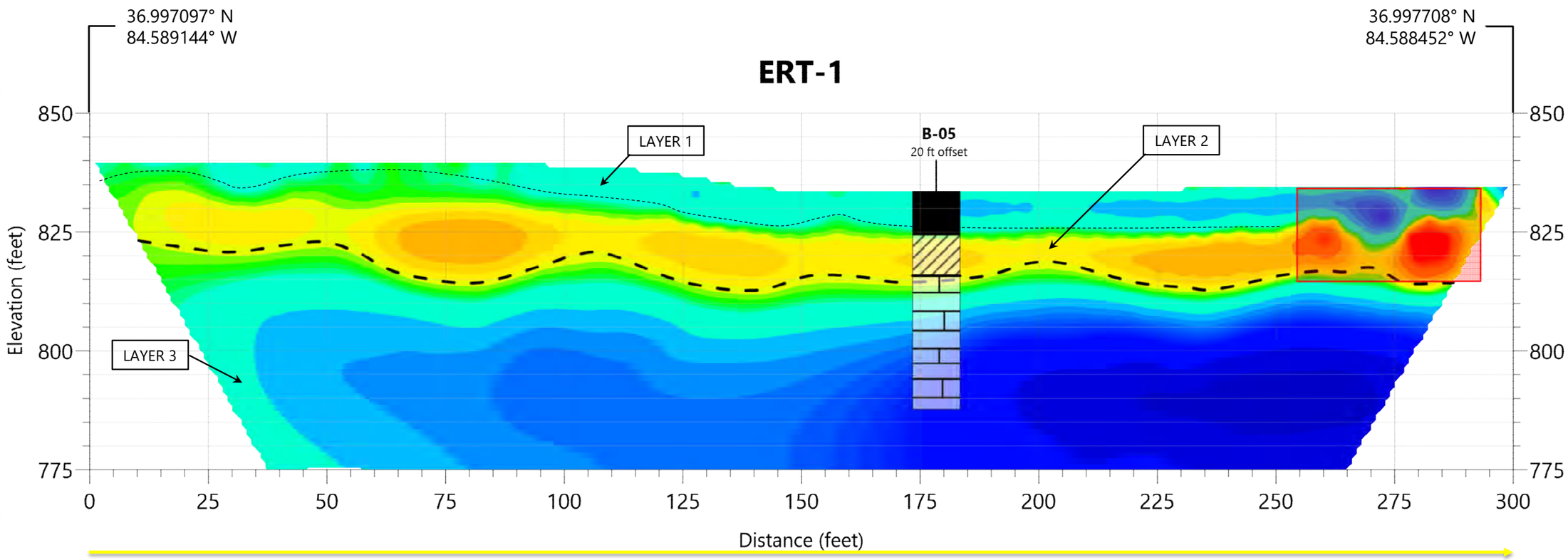
Clay

Limestone





REFERENCE:
GIS BASE LAYERS WERE OBTAINED FROM GOOGLE (2024). THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED. THEY ARE NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.



Iteration = 4 RMS = 4.26% L2 = 0.73 Electrode Spacing = 10 ft

ELECTRICAL RESISTIVITY TOMOGRAPHY (ERT) DATA PROFILE
ERT-1

EAST KENTUCKY POWER COOPERATIVE
COOPER POWER PLANT COMBINED CYCLE
SOMERSET, PULASKI COUNTY, KENTUCKY

SCALE:
AS SHOWN

DATE:
10/24/2024

PROJECT NUMBER
23360111

FIGURE NO.
4

Drawing Path: C:\Users\AGostic\OneDrive - S&ME, Inc\Documents\ArcGIS\Projects\23360111_EKPC Cooper Station\23360111_EKPC Cooper Station_11x17_whitetout_inset_14.mxd plotted by agostic 05-03-2024

Layer 1 – Layer 2 Contact

Interpreted Top of Rock (Layer 3)

High-noise Data

Low Resistivity Anomaly

High Resistivity Anomaly

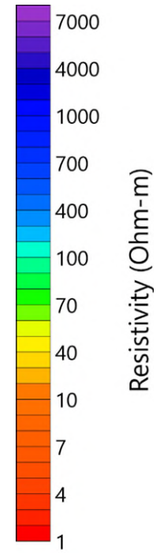
Borehole Position

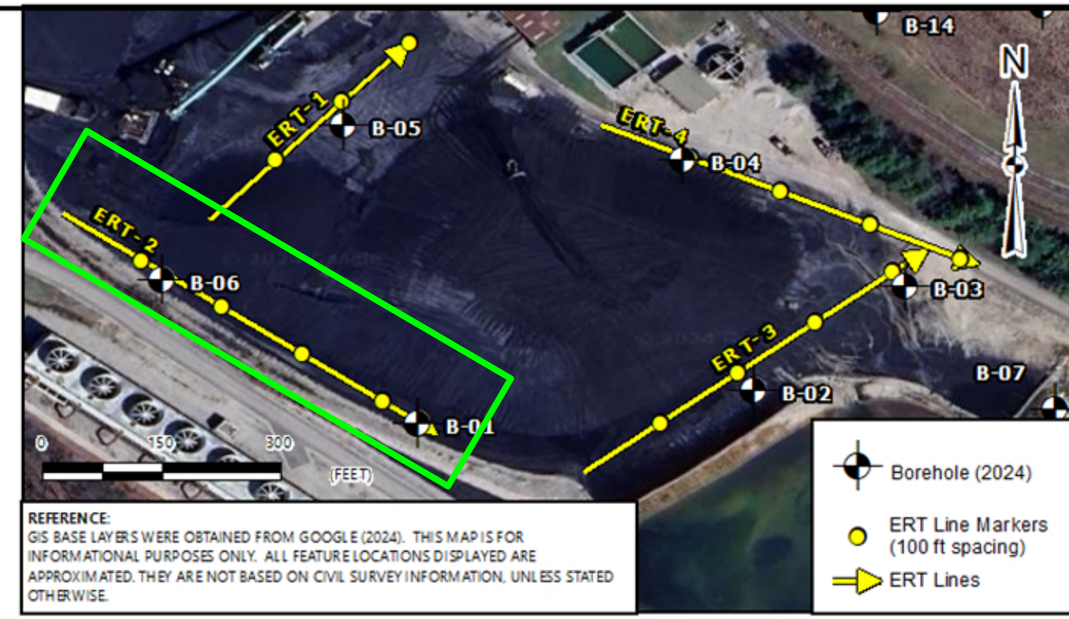
Coal

Fill

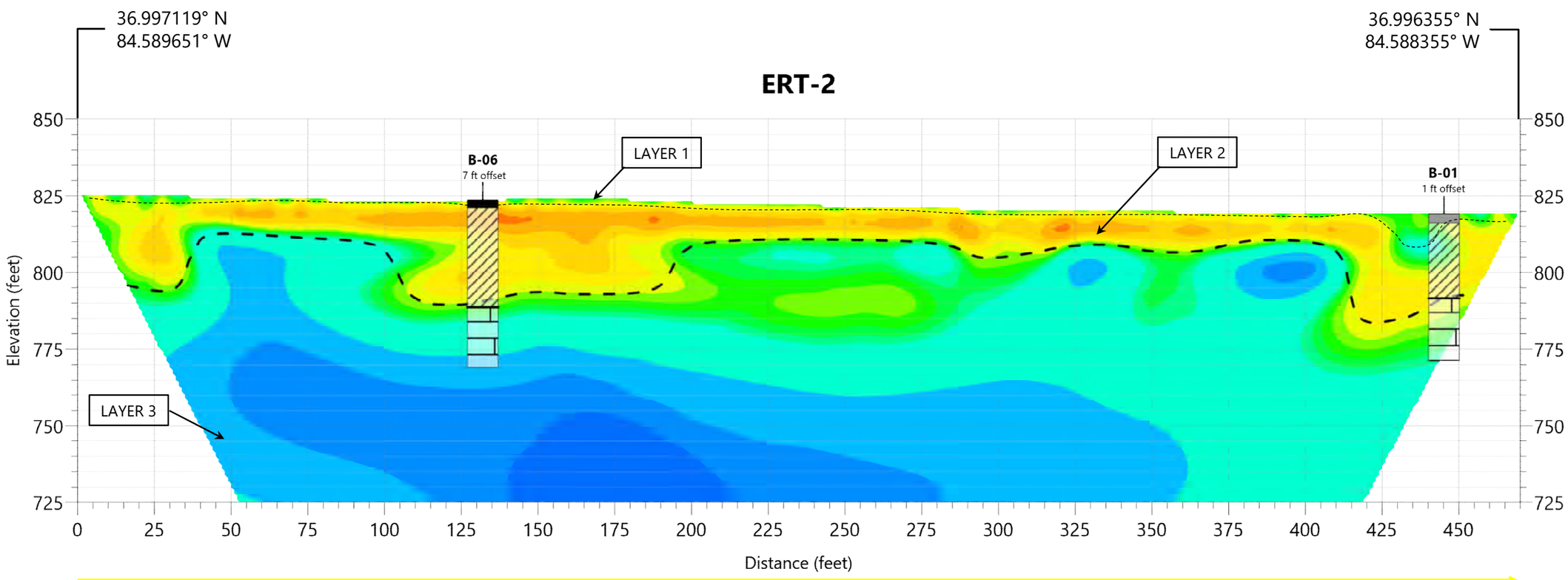
Clay

Limestone





REFERENCE:
GIS BASE LAYERS WERE OBTAINED FROM GOOGLE (2024). THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED. THEY ARE NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.



Iteration = 3 RMS = 4.47% L2 = 0.80 Electrode Spacing = 10 ft

ELECTRICAL RESISTIVITY TOMOGRAPHY (ERT) DATA PROFILE ERT-2

EAST KENTUCKY POWER COOPERATIVE
COOPER POWER PLANT COMBINED CYCLE
SOMERSET, PULASKI COUNTY, KENTUCKY

SCALE:
AS SHOWN

DATE:
10/24/2024

PROJECT NUMBER
23360111

FIGURE NO.
5

Drawing Path: C:\Users\AGostic\OneDrive - S&ME, Inc\Documents\ArcGIS\Projects\23360111_EKPC Cooper Station\23360111_EKPC Cooper Station_11x17_whiteout_inset_14.mxd plotted by agostic 05-03-2024

Layer 1 – Layer 2 Contact

Interpreted Top of Rock (Layer 3)

High-noise Data

Low Resistivity Anomaly

High Resistivity Anomaly

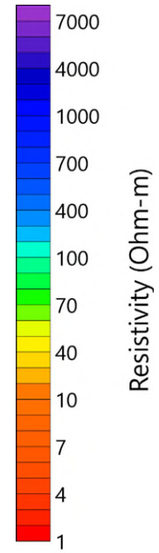
Borehole Position

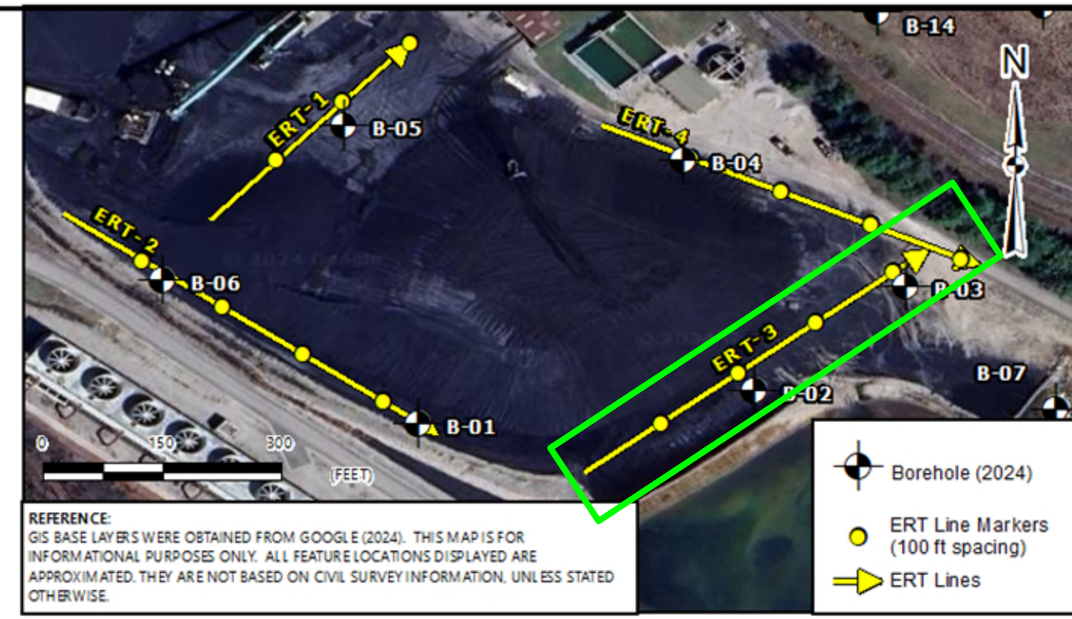
Coal

Fill

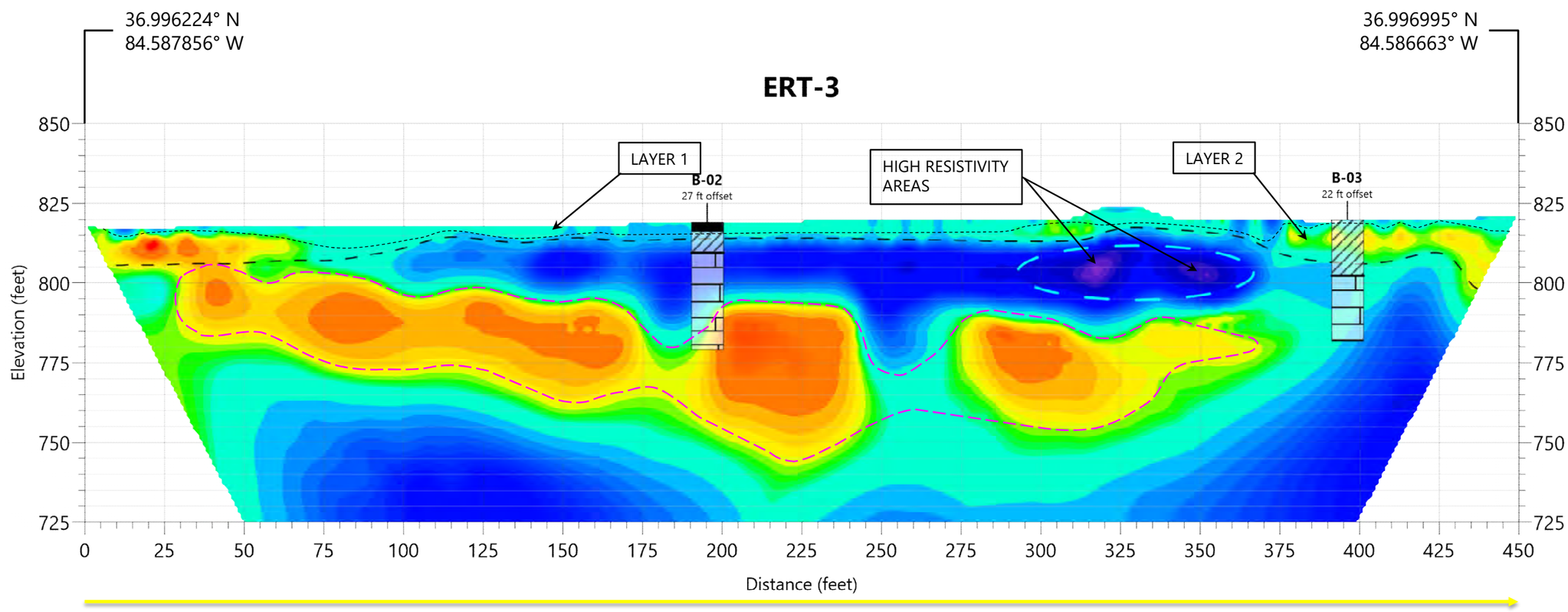
Clay

Limestone





REFERENCE:
GIS BASE LAYERS WERE OBTAINED FROM GOOGLE (2024). THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED. THEY ARE NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.



Iteration = 5 RMS = 8.30% L2 = 2.73 Electrode Spacing = 10 ft

ELECTRICAL RESISTIVITY TOMOGRAPHY (ERT) DATA PROFILE
ERT-3

EAST KENTUCKY POWER COOPERATIVE
COOPER POWER PLANT COMBINED CYCLE
SOMERSET, PULASKI COUNTY, KENTUCKY

SCALE:
AS SHOWN

DATE:
10/24/2024

PROJECT NUMBER
23360111

FIGURE NO.
6

Drawing Path: C:\Users\AGostic\OneDrive - S&ME, Inc\Documents\ArcGIS\Projects\23360111_EKPC Cooper Station\23360111_EKPC Cooper Station_11x17_whitetrout_inset_14.mxd plotted by agostic 05-03-2024

Layer 1 – Layer 2 Contact

Interpreted Top of Rock (Layer 3)

High-noise Data

Low Resistivity Anomaly

High Resistivity Anomaly

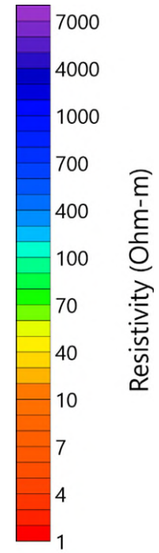
Borehole Position

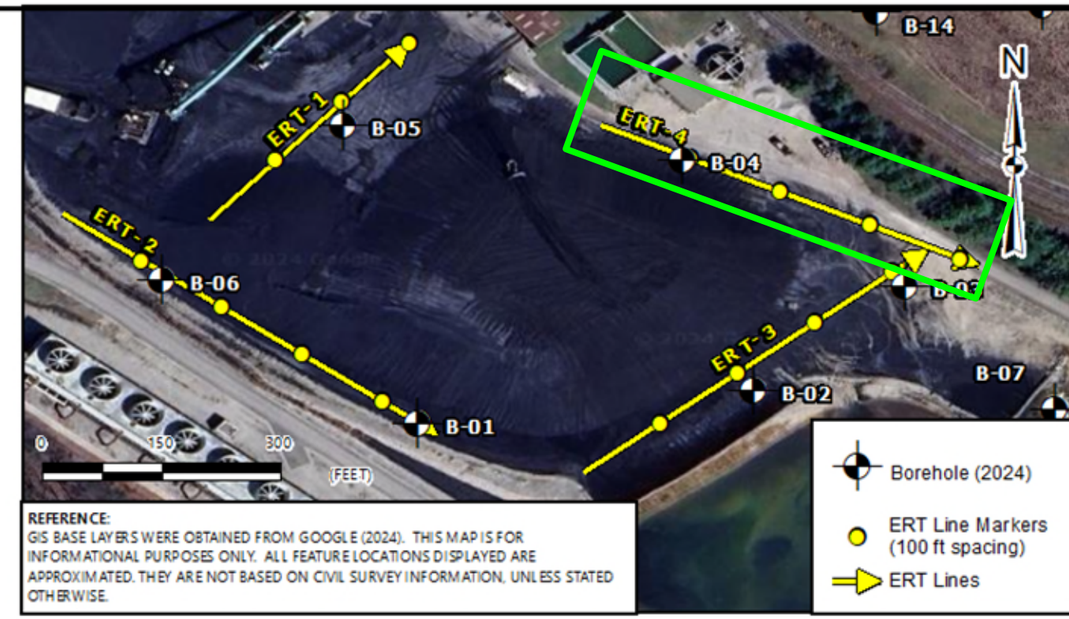
Coal

Fill

Clay

Limestone





REFERENCE:
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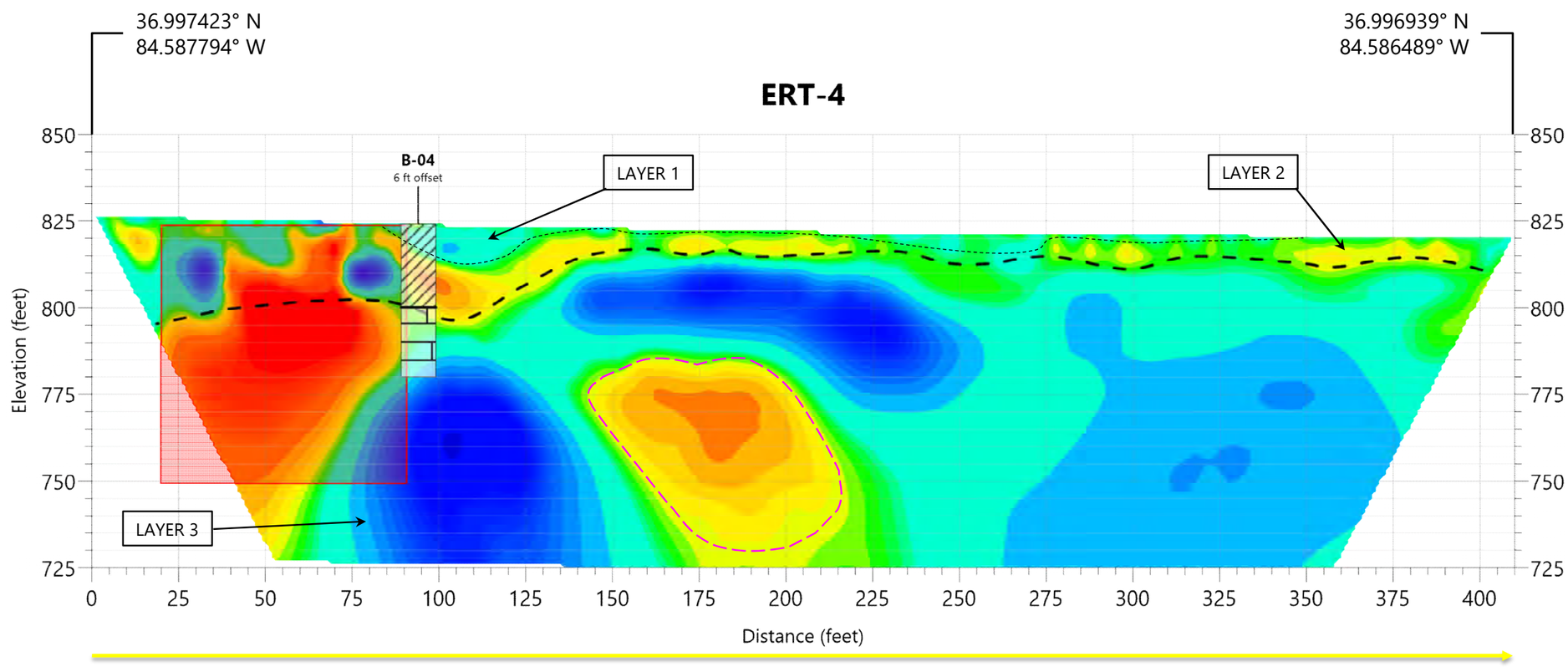


Iteration = 5 RMS = 8.02% L2 = 2.74 Electrode Spacing = 10 ft

ELECTRICAL RESISTIVITY TOMOGRAPHY (ERT) DATA PROFILE
ERT-4

EAST KENTUCKY POWER COOPERATIVE
COOPER POWER PLANT COMBINED CYCLE
SOMERSET, PULASKI COUNTY, KENTUCKY

SCALE:
AS SHOWN

DATE:
10/24/2024

PROJECT NUMBER
23360111

FIGURE NO.
7

Drawing Path: C:\Users\AGostic\OneDrive - S&ME, Inc\Documents\ArcGIS\Projects\23360111_EKPC Cooper Station\23360111_EKPC Cooper Station_11x17_whitetout_inset_14.mxd plotted by agostic 05-03-2024

Layer 1 – Layer 2 Contact

Interpreted Top of Rock (Layer 3)

High-noise Data

Low Resistivity Anomaly

High Resistivity Anomaly

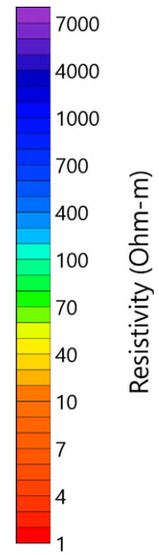
Borehole Position

Coal

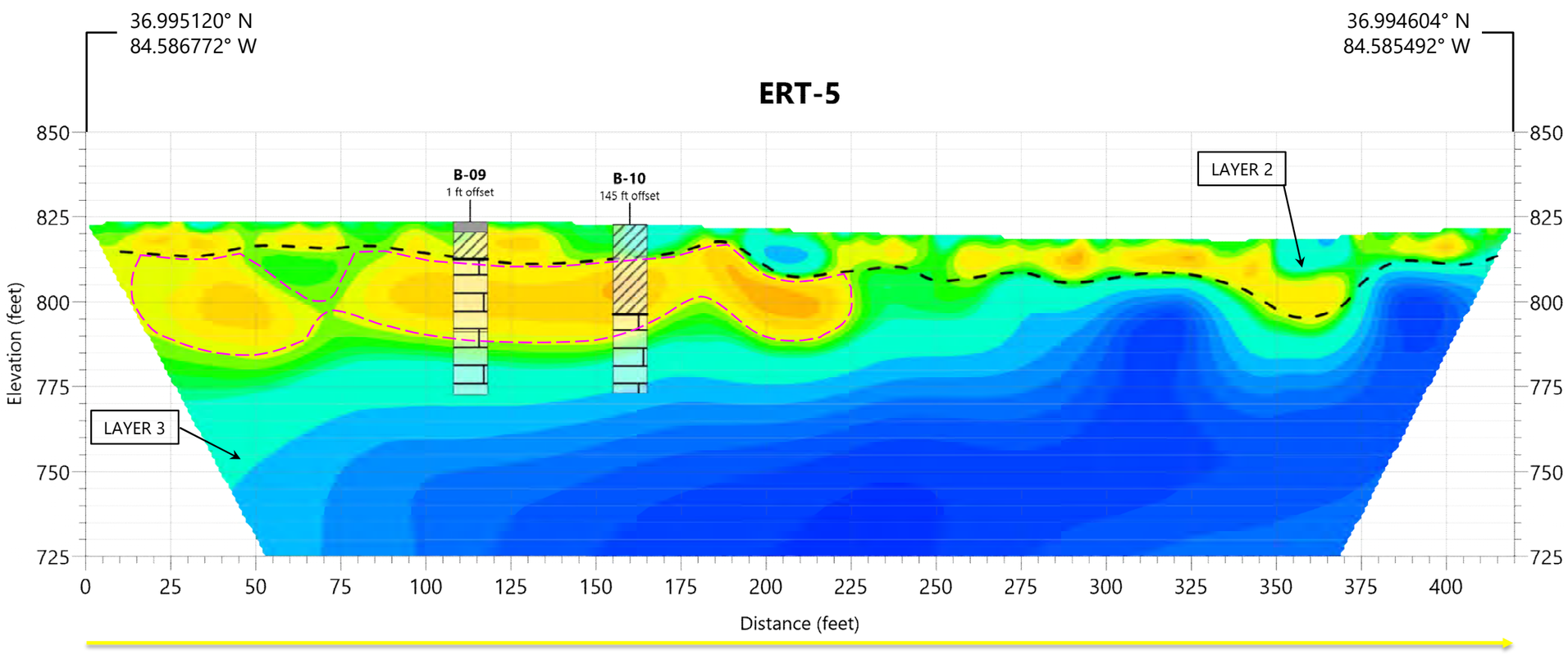
Fill

Clay

Limestone



REFERENCE:
GIS BASE LAYERS WERE OBTAINED FROM GOOGLE (2024). THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED. THEY ARE NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.



Iteration = 3 RMS = 4.86% L2 = 0.94 Electrode Spacing = 10 ft

ELECTRICAL RESISTIVITY TOMOGRAPHY (ERT) DATA PROFILE
ERT-5

EAST KENTUCKY POWER COOPERATIVE
COOPER POWER PLANT COMBINED CYCLE
SOMERSET, PULASKI COUNTY, KENTUCKY

SCALE:
AS SHOWN

DATE:
10/24/2024

PROJECT NUMBER
23360111

FIGURE NO.
8

Drawing Path: C:\Users\AGostic\OneDrive - S&ME, Inc\Documents\ArcGIS\Projects\23360111_EKPC Cooper Station\23360111_EKPC Cooper Station_11x17_whitetrout_inset_5.mxd plotted by agostic 05-03-2024

Summary of Field Procedures

Boring and Sampling

Soil Test Boring with Hollow-Stem Auger

Soil sampling and penetration testing were performed in general accordance with ASTM D1586, *Standard Test Method for Penetration Test and Split Barrel Sampling of Soils*. Borings were made by mechanically twisting a continuous steel hollow stem auger into the soil. At regular intervals, soil samples were obtained with a standard 1.4-inch I. D., 2-inch O. D., split barrel sampler. The sampler was first seated six inches to penetrate any loose cuttings, then driven an additional 12 inches with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler through the two final six inch increments was recorded as the penetration resistance (SPT N) value. The N-value, when properly interpreted by qualified professional staff, is an index of the soil strength and foundation support capability.

Soil Test Boring with Rotary Wash

Soil sampling and penetration testing were performed in general accordance with ASTM D1586, *Standard Test Method for Penetration Test and Split Barrel Sampling of Soils*. A rotary drilling process was used to advance the hole and a heavy drilling fluid was circulated in the bore holes to stabilize the sides and flush the cuttings. At regular intervals, drilling tools were removed and soil samples were obtained with a standard 1.4 inch I. D., 2-inch O. D., split barrel sampler. The sampler was first seated six inches to penetrate any loose cuttings, then driven an additional 12 inches with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler through the two final six inch increments was recorded as the penetration resistance (SPT N) value. The N-value, when properly interpreted by qualified professional staff, is an index of the soil strength and foundation support capability.

Bulk Samples

At selected locations and depths, representative bulk samples of the soils were obtained by randomly taking shovel loads from the cuttings or spoil brought to the surface, until a sample of 30 to 50 pounds was obtained. The sample was placed in a cloth or plastic sack marked with appropriate descriptive information. Samples were protected from freezing at all times.

Undisturbed (UD) Sampling

Split spoon or split barrel sampling provide samples suitable for visual examination and classification tests but not sufficiently intact for quantitative laboratory testing. To provide samples for quantitative tests, relatively undisturbed samples were obtained by pushing sections of 3-inch O.D., 16-guage, steel tubing (Shelby tube) into the soil at the desired sampling intervals. The procedures used generally followed those described in ASTM D1587, *Standard Practice for Thin-Walled Tube Geotechnical Sampling of Soils*. Each tube, together with the encased soil, was carefully removed from the ground and the length of the recovered soil measured. Locations and depths of undisturbed samples were recorded on each field test boring record.

Refusal to Drilling

Refusal to the soil drilling methods used at this site may result from encountering hard cemented soil, soft weathered rock, coarse gravel, cobbles or boulders, thin rock seams, or the upper surface of sound continuous rock. Core drilling would be required to determine the character and continuity of materials below refusal of the soil auger in natural soils. Where fills are present, refusal to drilling may also result from encountering buried debris, building materials, or objects. Backhoe test pits would be required to expose and identify buried materials below refusal levels in filled areas.

Rock Core Drilling in Cased Borehole

In selected borings where refusal to the drilling tools had been encountered, steel casing was set in the hole to the refusal depth to keep the hole from caving. Materials below refusal level were then cored using a diamond studded bit fastened to the end of hollow double tube core barrel, in general accordance with the procedures described in ASTM D2113, *Standard Practice for Rock Core Drilling and Sampling of Rock for Site Investigation*. In this case an NX size core barrel was used to produce cylindrical cores, 1-7/8 inches in diameter. Core rod RPM and advance rate were closely monitored to prevent plugging the bit or core blockage or damage. A circulating media was used to flush cuttings during the coring process. In this case the circulating media used was water without additives. Circulating water was released on the surface after completion of coring.

Borehole Closure

Following collection of relevant geotechnical data, boreholes were abandoned using a bentonite-grout slurry to backfill the holes.

♦ Field Tests of Earth Materials

The subsurface conditions encountered during drilling were reported on a field test boring record by the chief driller. The record contains information about the drilling method, samples attempted and sample recovery, indications of materials in the borings such as coarse gravel, cobbles, etc., and indications of materials encountered between sample intervals. Representative soil samples were placed in glass jars and transported to the laboratory along with the field boring records. Recovered samples not expended in laboratory tests are commonly retained in our laboratory for 60 days following completion of drilling. Field boring records are retained at our office.

Measurement of Static Water Levels

Water level readings were made in the open boreholes immediately after completing drilling and withdrawal of the tools. Where feasible, measurements were repeated after an elapsed period of 24 hours to gauge the stabilized water level. Procedures for measurement of liquid levels in open boreholes are described in ASTM D4750, *Standard Test Method for Determining Subsurface Liquid Levels in a Borehole or Monitoring Well (Observation Well)*. A calibrated cable with electrical wire encased, equipped with a weighted sensing tip at one end and an electric meter at the other, was slowly lowered into each borehole until the liquid surface was penetrated by the weighted end. Contact with the water closed an electric circuit and was recorded by the meter. The depth reading on the cable was then recorded relative to a reference point on the surface. Measurements made by this method were then repeated until approximately consistent values were obtained.

Field Resistivity Testing

Apparent resistivity of the soil was measured at selected locations in the field by measuring the voltage potential between four equally spaced, in-line direct current electrodes in the Wenner Electrode Arrangement as described in ASTM D6431, *Standard Guide for Using the Direct Current Resistivity Method for Subsurface Investigation*. Using the measured voltages, resistivity was estimated using the approach described in *A Method of Measuring Earth Resistivity*, U. S. Bureau of Standards Bulletin No. 258, by Dr. F. Wenner, in which the average resistivity of the soil to a depth of "A" is given by:

$$r = 191.5 \times AE/I, \text{ where:}$$

r = Average resistivity of soil, ohm-cm
A = Distance between electrodes, cm
E = Measured Voltage, Volts
I = Current, Amperes

Appendix III – Laboratory Testing Summaries and Data Sheets

Table III-1 – Laboratory Data Summary (Soil)

Boring	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	USCS Classification
B-06	3.0 to 5.0	44	17	27	Lean Clay (CL)
B-09	3.5 to 4.0	49	19	30	Lean Clay (CL)
B-09	3.0 to 5.0	41	17	24	Lean Clay (CL)
B-10	5.0 to 7.0	39	19	20	Clayey Sand (SC)
B-11	3.0 to 5.0	31	14	17	Lean Clay (CL)
B-14	0 to 3.0	74	23	51	Fat Clay (CH)

Table III-2 – Laboratory Data Summary (Rock)

Boring	Sample ID	Depth (ft)	Natural Moisture Content (%)	Dry Unit Weight (pcf)	Uniaxial Compressive Strength (psi)
B-01	RC-2	29.5	0.2	167.8	35,268
B-02	RC-3	19.1	0.2	166.9	24,470
B-03	RC-5	34.6	0.1	162.3	28,462
B-05	RC-5	34.7	0.1	167.5	24,542
B-06	RC-3	44.6	4.1	148	11,865
B-07	RC-3	31	0.1	169.6	23,223
B-10	RC-5	44.5	0.1	167.3	29,239
B-11	RC-4	34.5	0.1	168.2	19,705
B-15	RC-3	9.9	0.1	167.3	10,794

Table III-3 – Corrosion Series Laboratory Test Results Summary (Soil)

Boring	Sample ID	Sample Depth (ft)	pH	Electrical Resistivity (ohm-cm)	Redox Potential (mV)	Sulfate (mg/kg)	Sulfide (mg/kg)	Chloride (mg/kg)
B-02	ST-1	4.0 to 6.0	6.7	2,100	46 to 61	640	BRL (<11)	BRL (<43.3)
B-05	ST-1	10.5 to 12.5	4.5	2,620	170 to 190	500	BRL (<11)	BRL (<40.8)
B-09	SS-2	3.5 to 5.0	7.6	1,890	89 to 110	210	17	BRL (<47.6)
B-13	BK-1	3.0 to 5.0	6.4	2,450	120 to 130	59	BRL (<12)	BRL (<46.3)

Table III-4 – Concrete Exposure Classes

Boring	Sample	Depth (ft)	Freezing and Thawing (F)	Sulfate (S)	In Contact with Water (W)	Corrosion Protection of Reinforcement (C)
B-02	ST-1	4.0 to 6.0	F0	S0	W0	C1
B-05	ST-1	10.5 to 12.5	F0	S0	W0	C1
B-09	SS-2	3.5 to 5.0	F0	S0	W0	C1
B-13	BK-1	3.0 to 5.0	F0	S0	W0	C1

Soil Test Evaluation for Ductile Iron Pipe

(10-Point System)*

Soil Characteristics	*Points*
Resistivity (ohm-cm)**	
<1,500	10
≥1,500-1,800	8
>1,800-2,100	5
>2,100-2,500	2
>2,500-3,000	1
>3,000	0
pH	
0-2	5
2-4	3
4-6.5	0
6.5-7.5	0***
7.5-8.5	0
>8.5	3
Redox potential	
>+100 mv	0
+50 to +100 mv	3.5
0 to +50 mv	4
Negative	5
Sulfides	
Positive	3.5
Trace	2
Negative	0
Moisture	
Poor drainage, continuously wet	2
Fair drainage, generally moist	1
Good drainage, generally dry	0

*Ten points–corrosive to Ductile Iron pipe. Protection is indicated.

**Based on water-saturated soil box. This method is designed to obtain the lowest–and most accurate–resistivity reading.

***If sulfides are present and low (<100 mv) or negative redox-potential results are obtained, 3 points should be given for this range.

Note: DIPRA recommends that the soil sample used in the 10-point evaluation be taken at pipe depth rather than at the surface. Soil corrosivity readings can vary substantially from the surface to pipe depth.

Figure III-1 – Soil Test Evaluation for Ductile Iron Pipe Table

ACI 318-11 Requirements for Concrete Exposed to Sulfates

Exposure Class (Concrete in contact with soluble sulfates in soil/sea water)	Max. w/cm	Minimum f'_c, psi	ASTM C150 Cementitious Type	ASTM C1012 expansion
S0 – Low sulfates*	N/A	2500	NA	
S1 - Moderate sulfates*	0.50	4000	Type II	0.10% at 6 m
S2 - Severe sulfates*	0.45	4500	Type V	0.05% at 6 m or 0.10% at 12 m
S3 – Very severe sulfates*	0.45	4500	Type V+pozzolan or slag	0.10% at 18 m

*Sulfate concentration is provided in ACI 318-11

Figure III-2 – ACI 318 Requirements for Concrete Exposed to Sulfates

Category	Class	Condition	
Freezing and thawing (F)	F0	Concrete not exposed to freezing-and-thawing cycles	
	F1	Concrete exposed to freezing-and-thawing cycles with limited exposure to water	
	F2	Concrete exposed to freezing-and-thawing cycles with frequent exposure to water	
	F3	Concrete exposed to freezing-and-thawing cycles with frequent exposure to water and exposure to deicing chemicals	
Sulfate (S)		Water-soluble sulfate (SO_4^{2-}) in soil, percent by mass[1]	Dissolved sulfate (SO_4^{2-}) in water, ppm[2]
	S0	$SO_4^{2-} < 0.10$	$SO_4^{2-} < 150$
	S1	$0.10 \leq SO_4^{2-} < 0.20$	$150 \leq SO_4^{2-} < 1500$ or seawater
	S2	$0.20 \leq SO_4^{2-} \leq 2.00$	$1500 \leq SO_4^{2-} \leq 10{,}000$
	S3	$SO_4^{2-} > 2.00$	$SO_4^{2-} > 10{,}000$
In contact with water (W)	W0	Concrete dry in service Concrete in contact with water and low permeability is not required	
	W1	Concrete in contact with water and low permeability is required	
Corrosion protection of reinforcement (C)	C0	Concrete dry or protected from moisture	
	C1	Concrete exposed to moisture but not to an external source of chlorides	
	C2	Concrete exposed to moisture and an external source of chlorides from deicing chemicals, salt, brackish water, seawater, or spray from these sources	

[1]Percent sulfate by mass in soil shall be determined by ASTM C1580.

[2]Concentration of dissolved sulfates in water, in ppm, shall be determined by ASTM D516 or ASTM D4130.

Figure III-3 – ACI 318 Table 19.3.1.1 Exposure Categories and Classes

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Revision No. : 0a
Revision Date. : 11/15/20

Lab Summary

S&ME, Inc - Lexington 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project No.: 23360111 Report Date: 03/12/24

Project Name: EKPC Cooper Combined Cycle Plant

Client Name: East Kentucky Power Cooperative

Client Address: 4775 Lexington Rd., Winchester, KY 40391

BORING NO.	SAMPLE DEPTH, FT.	SAMPLE NO/TYPE	USCS	NATURAL MOISTURE CONTENT,%	ATT. LIMITS L.L.	ATT. LIMITS P.L.	ATT. LIMITS P. I.	APPROX % RET.ON #40	MAX DRY DENSITY, PCF @ OPT MC % (STD. PROCTOR)	WET UNIT WEIGHT, PCF	DRY UNIT WEIGHT, PCF	ROCK UNCONFINED COMPRESSIVE STRENGTH, PSI	SPECIFIC GRAVITY	% FINER THAN NO. 200	pH
B-02	4	ST-1, UD		11.0									2.645		6.7
B-05	10.5	ST-1, UD	*	9.9									1.513		4.5
B-09	3.5	SS-2, SS	CL	18.0	49	19	30	25							7.6
B-09	3	BK-1, BK	CL	27.4	41	17	24	35	112.0 @ 15.6						
B-11	3	ST-1, UD	CL	19.3	31	14	17	5		122.2	102.5		2.670		
B-13	3	BK-1, BK		19.6											6.4
B-14	0.3	BK-1, BK	CH	26.5	74	23	51	<5	98.6 @ 23.4						
B-01	0	SS-1, SS		8.0											
B-01	1.5	SS-2, SS		11.1											
B-01	4	SS-3, SS		17.9											
B-01	6.5	SS-4, SS		20.6											
B-01	9	SS-5, SS		24.8											
B-01	11.5	SS-6, SS		25.4											
B-01	14	SS-7, SS		41.8											
B-01	19	SS-8, SS		27.5											
B-01	29.5	Run-2, RC		0.2						168.1	167.8	35,268			

Notes: * Coal

Jacob Folsom
Technical Responsibility

Jacob Folsom

Lab Services Manager
Position

03/18/24
Date

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B-02	0	SS-1, SS		14.5											
B-02	1.5	SS-2, SS		22.4											
B-02	6	SS-3, SS		29.3											
B-02	19.1	Run-3, RC		0.2						167.2	166.9	24,470			
B-03	0	SS-1, SS		10.0											
B-03	1.5	SS-2, SS		18.4											
B-03	4	SS-3, SS		32.6											
B-03	6.5	SS-4, SS		26.1											
B-03	34.6	Run-5, RC		0.1						162.5	162.3	28,462			
B-04	0	SS-1, SS		13.6											
B-04	1.5	SS-2, SS		21.9											
B-04	6.5	SS-4, SS		15.2											
B-04	9	SS-5, SS		16.5											
B-04	11.5	SS-6, SS		22.3											
B-04	14	SS-7, SS		14.3											

Notes: * Coal

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B-04	19	SS-8, SS		28.3											
B-04	24	SS-9, SS		26.9											
B-05	0	SS-1, SS		4.7											
B-05	1.5	SS-2, SS		15.5											
B-05	4	SS-3, SS		17.7											
B-05	6.5	SS-4, SS		15.3											
B-05	9	SS-5, SS		6.5											
B-05	14	SS-6, SS		36.6											
B-05	34.7	Run-5, RC		0.1						167.7	167.5	24,542			
B-06	0	SS-1, SS		11.4											
B-06	1.5	SS-2, SS		16.3											
B-06	3	UD-1, UD	CL	24.1	44	17	27	20							
B-06	4.5	SS-3, SS		22.6											
B-06	6.5	SS-4, SS		24.0											
B-06	9	SS-5, SS		30.0											
B-06	11.5	SS-6, SS		28.0											

Notes: * Coal

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B-06	14	SS-7, SS		18.4											
B-06	19	SS-8, SS		26.8											
B-06	24	SS-9, SS		21.7											
B-06	29	SS-10, SS		25.4											
B-06	34	SS-11, SS		42.4											
B-06	44.6	Run-3, RC		4.1						154.1	148.0	11,865			
B-07	0	SS-1, SS		16.2											
B-07	1.5	SS-2, SS		21.3											
B-07	4	SS-3, SS		20.6											
B-07	6.5	SS-4, SS		19.6											
B-07	9	SS-5, SS		16.4											
B-07	11.5	SS-6, SS		18.1											
B-07	14	SS-7, SS		19.8											
B-07	19	SS-8, SS		30.4											
B-07	31	Run-3, RC		0.1						169.8	169.6	23,223			

Notes: * Coal

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BORING NO.	SAMPLE DEPTH, FT.	SAMPLE NO/TYPE	USCS	NATURAL MOISTURE CONTENT,%	ATT. LIMITS L.L.	P.L.	P. I.	APPROX % RET.ON #40	MAX DRY DENSITY, PCF @ OPT MC % (STD. PROCTOR)	WET UNIT WEIGHT, PCF	DRY UNIT WEIGHT, PCF	ROCK UNCONFINED COMPRESSIVE STRENGTH, PSI	SPECIFIC GRAVITY	% FINER THAN NO. 200	pH
B-08	1.5	SS-1, SS		19.1											
B-08	4	SS-2, SS		22.8											
B-09	0	SS-1, SS		2.8											
B-09	9	SS-3, SS		14.0											
B-10	0	SS-1, SS		22.2											
B-10	3.5	SS-2, SS		18.1											
B-10	5	UD-1, UD	SC	13.0	39	19	20	<5		120.0	106.2		2.702	48.5	
B-10	7	SS-3, SS		17.6											
B-10	9.5	SS-4, SS		19.2											
B-10	12	SS-5, SS		21.2											
B-10	14.5	SS-6, SS		11.2											
B-10	20	SS-7, SS		19.1											
B-10	25	SS-8, SS		7.0											
B-10	44.5	Run-5, RC		0.1						167.5	167.3	29,239			

Notes: * Coal

Form No. TR-2310LEX-SUM1
Revision No. : 0a
Revision Date. : 11/15/20

Lab Summary

S&ME, Inc - Lexington 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project No.: 23360111 Report Date: 03/12/24

Project Name: EKPC Cooper Combined Cycle Plant

Client Name: East Kentucky Power Cooperative

Client Address: 4775 Lexington Rd., Winchester, KY 40391

BORING NO.	SAMPLE DEPTH, FT.	SAMPLE NO/TYPE	USCS	NATURAL MOISTURE CONTENT,%	ATT. LIMITS L.L.	ATT. LIMITS P.L.	ATT. LIMITS P. I.	APPROX % RET.ON #40	MAX DRY DENSITY, PCF @ OPT MC % (STD. PROCTOR)	WET UNIT WEIGHT, PCF	DRY UNIT WEIGHT, PCF	ROCK UNCONFINED COMPRESSIVE STRENGTH, PSI	SPECIFIC GRAVITY	% FINER THAN NO. 200	pH
B-11	0	SS-1, SS		19.7											
B-11	3	SS-2, SS		32.7											
B-11	6.5	SS-3, SS		27.8											
B-11	9	SS-4, SS		24.1											
B-11	11.5	SS-5, SS		24.1											
B-11	14	SS-6, SS		24.1											
B-11	19	SS-7, SS		22.8											
B-11	34.5	Run-4, RC		0.1						168.4	168.2	19,705			
B-12	0	SS-1, SS		16.3											
B-13	0	SS-1, SS		19.7											
B-14	0	SS-1, SS		18.7											
B-14	1.5	SS-2, SS		31.0											
B-14	4	SS-3, SS		30.3											
B-15	0	SS-1, SS		26.1											
B-15	9.9	Run-3, RC		0.1						167.5	167.3	10,794			

Notes: * Coal

Form No. TR-D4318-T89-90
Revision No. 1 LEXb
Revision Date: 05/16/22

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX

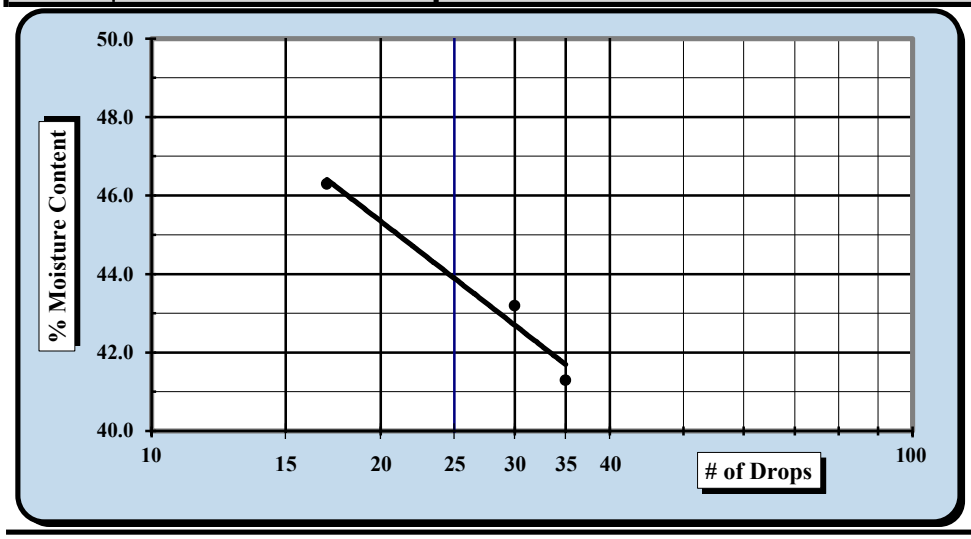
ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project #:	23360111	Report Date:	03/21/24
Project Name:	EKPC Cooper Combined Cycle Plant	Test Date(s)	02/28/24
Client Name:	East Kentucky Power Cooperative		
Client Address:	4775 Lexington Rd., Winchester, KY 40391		
		Sample Date:	02/20/24
Location:	B-06	Depth (ft):	3.0
Sample Description:	LEAN CLAY WITH GRAVEL (CL)		

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	32672	01/24/24	Grooving tool	2024.02.07B	02/07/24
LL Apparatus	37589	01/08/24			
Oven (brown)	24438	02/09/24			

		Liquid Limit						Plastic Limit		
A	Tare Weight	16.63	12.05	16.59				17.18	17.01	
B	Wet Soil Weight + A	28.82	23.98	27.39				23.70	24.26	
C	Dry Soil Weight + A	25.26	20.38	23.97				22.77	23.17	
D	Water Weight (B-C)	3.56	3.60	3.42				0.93	1.09	
E	Dry Soil Weight (C-A)	8.63	8.33	7.38				5.59	6.16	
F	% Moisture (D/E)*100	41.3%	43.2%	46.3%				16.6%	17.7%	
N	# OF DROPS	35	30	17				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**17.2%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐

Liquid Limit	**44**
Plastic Limit	**17**
Plastic Index	**27**
Group Symbol	**CL***

Multipoint Method ☒
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☒ Air Dried ☒ *Est. the % retained on the #40 Sieve:* 20%

Notes / Deviations / References: *Classification listed here applies only to portion passing No. 40 sieve.

KKS	2/28/2024	Abigail Carr	3/21/2024
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 1 LEXb
Revision Date: 05/16/22

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX

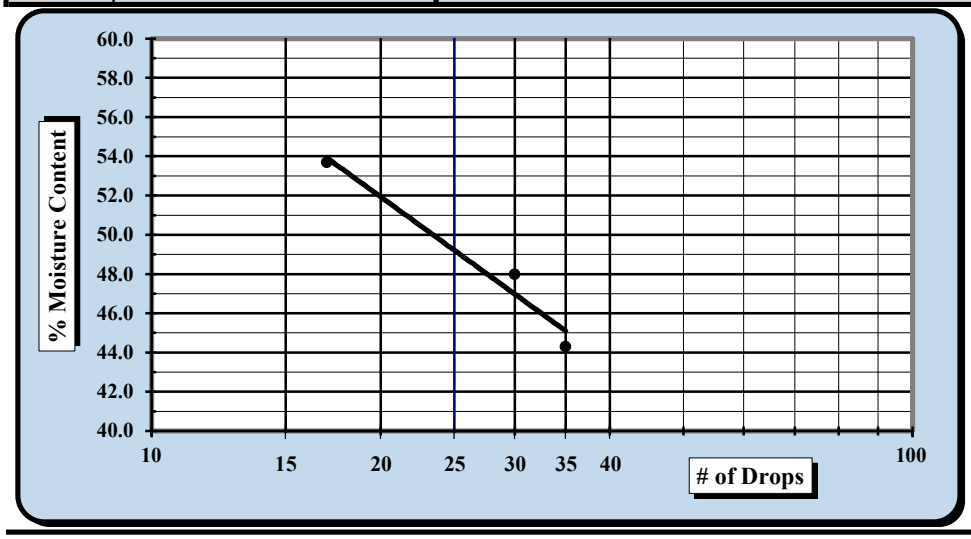
ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project #:	23360111	Report Date:	03/21/24
Project Name:	EKPC Cooper Combined Cycle Plant	Test Date(s)	02/28/24
Client Name:	East Kentucky Power Cooperative		
Client Address:	4775 Lexington Rd., Winchester, KY 40391		
		Sample Date:	02/20/24
Location:	B-09	Depth (ft):	3.5
Sample Description:	LEAN CLAY WITH GRAVEL (CL)		

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	32672	01/24/24	Grooving tool	2024.02.07B	02/07/24
LL Apparatus	37589	01/08/24			
Oven (brown)	24438	02/09/24			

		Liquid Limit						Plastic Limit		
A	Tare Weight	15.20	16.84	15.15				15.72	16.58	
B	Wet Soil Weight + A	27.77	28.06	28.00				22.72	23.61	
C	Dry Soil Weight + A	23.91	24.42	23.51				21.62	22.52	
D	Water Weight (B-C)	3.86	3.64	4.49				1.10	1.09	
E	Dry Soil Weight (C-A)	8.71	7.58	8.36				5.90	5.94	
F	% Moisture (D/E)*100	44.3%	48.0%	53.7%				18.6%	18.4%	
N	# OF DROPS	35	30	17				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**18.5%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐

Liquid Limit	**49**
Plastic Limit	**19**
Plastic Index	**30**
Group Symbol	**CL***

Multipoint Method ☒
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☒ Air Dried ☒ *Est. the % retained on the #40 Sieve:* 25%

Notes / Deviations / References: *Classification listed here applies only to portion passing No. 40 sieve.

RCS	2/28/2024	Abigail Carr	3/21/2024
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 1 LEXb
Revision Date: 05/16/22

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX

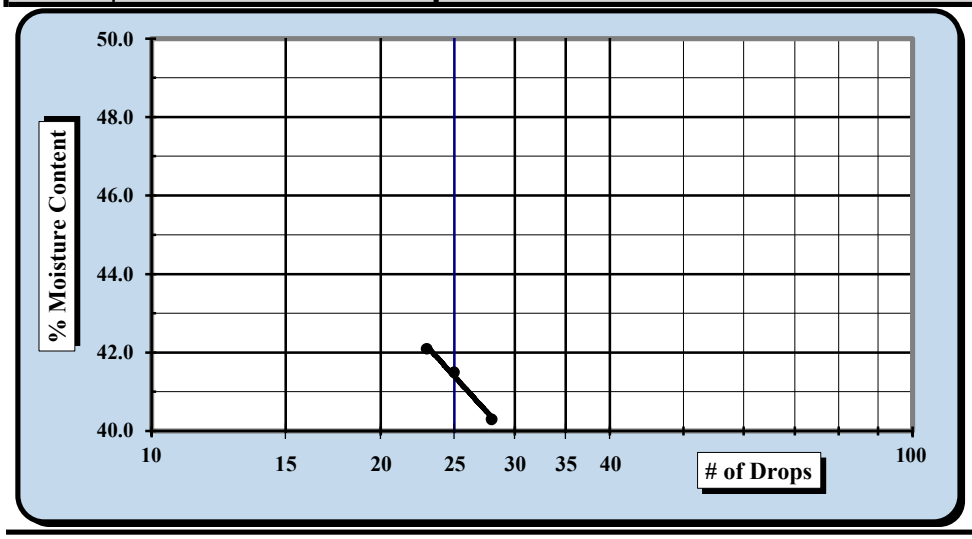
ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project #:	23360111	Report Date:	03/21/24
Project Name:	EKPC Cooper Combined Cycle Plant	Test Date(s)	02/28/24
Client Name:	East Kentucky Power Cooperative		
Client Address:	4775 Lexington Rd., Winchester, KY 40391		
		Sample Date:	02/20/24
Location:	B-09	Depth (ft):	3.0
Sample Description:	SANDY LEAN CLAY WITH GRAVEL (CL)		

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	32672	01/24/24	Grooving tool	2024.02.07B	02/07/24
LL Apparatus	37589	01/08/24			
Oven (brown)	24438	02/09/24			

		Liquid Limit						Plastic Limit		
A	Tare Weight	16.04	16.85	12.34				16.72	15.08	
B	Wet Soil Weight + A	28.20	29.44	23.65				23.50	22.01	
C	Dry Soil Weight + A	24.71	25.75	20.30				22.55	21.02	
D	Water Weight (B-C)	3.49	3.69	3.35				0.95	0.99	
E	Dry Soil Weight (C-A)	8.67	8.90	7.96				5.83	5.94	
F	% Moisture (D/E)*100	40.3%	41.5%	42.1%				16.3%	16.7%	
N	# OF DROPS	28	25	23				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**16.5%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	☐
Liquid Limit	**41**
Plastic Limit	**17**
Plastic Index	**24**
Group Symbol	**CL***
Multipoint Method	☒
One-point Method	☐

Wet Preparation ☐ Dry Preparation ☒ Air Dried ☒ *Est. the % retained on the #40 Sieve:* 35%

Notes / Deviations / References: *Classification listed here applies only to portion passing No. 40 sieve.

RCS	2/28/2024	Abigail Carr	3/21/2024
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 1 LEXb
Revision Date: 05/16/22

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX

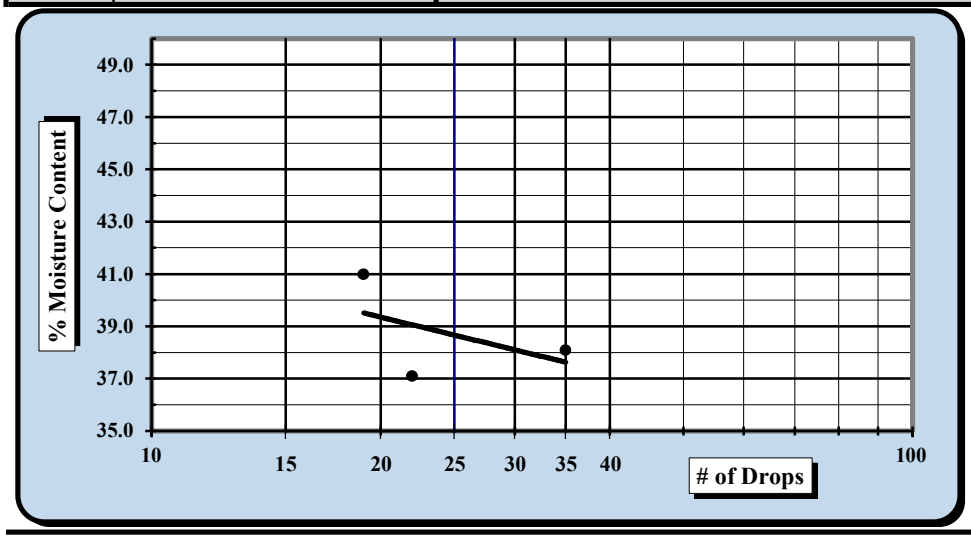
ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project #:	23360111	Report Date:	03/21/24
Project Name:	EKPC Cooper Combined Cycle Plant	Test Date(s)	02/28/24
Client Name:	East Kentucky Power Cooperative		
Client Address:	4775 Lexington Rd., Winchester, KY 40391		
		Sample Date:	02/20/24
Location:	B-10	Depth (ft):	5.0
Sample Description:	LEAN CLAY (CL)		

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	32672	01/24/24	Grooving tool	2024.02.07B	02/07/24
LL Apparatus	37589	01/08/24			
Oven (brown)	24438	02/09/24			

		Liquid Limit						Plastic Limit		
A	Tare Weight	12.12	16.76	16.54				14.96	16.54	
B	Wet Soil Weight + A	22.09	26.42	30.20				21.98	23.41	
C	Dry Soil Weight + A	19.34	23.61	26.50				20.89	22.33	
D	Water Weight (B-C)	2.75	2.81	3.70				1.09	1.08	
E	Dry Soil Weight (C-A)	7.22	6.85	9.96				5.93	5.79	
F	% Moisture (D/E)*100	38.1%	41.0%	37.1%				18.4%	18.7%	
N	# OF DROPS	35	19	22				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**18.6%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	☐
Liquid Limit	**39**
Plastic Limit	**19**
Plastic Index	**20**
Group Symbol	**CL***
Multipoint Method	☒
One-point Method	☐

Wet Preparation ☐ Dry Preparation ☒ Air Dried ☒ *Est. the % retained on the #40 Sieve:* <5%

Notes / Deviations / References: *Classification listed here applies only to portion passing No. 40 sieve.

KKS	2/28/2024	Abigail Carr	3/21/2024
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 1 LEXb
Revision Date: 05/16/22

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX

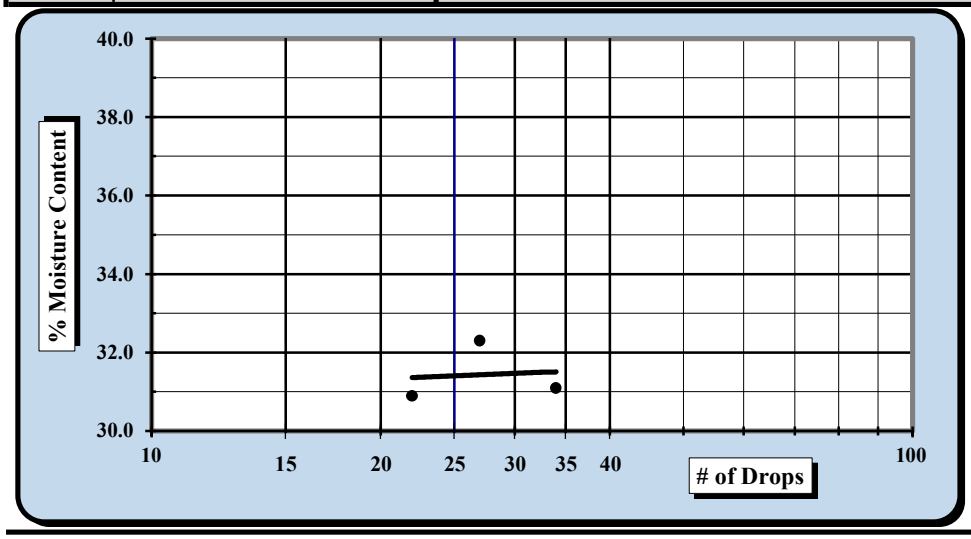
ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project #:	23360111	Report Date:	03/21/24
Project Name:	EKPC Cooper Combined Cycle Plant	Test Date(s)	03/06/24
Client Name:	East Kentucky Power Cooperative		
Client Address:	4775 Lexington Rd., Winchester, KY 40391		
		Sample Date:	02/20/24
Location:	B-11	Depth (ft):	3.0
Sample Description:	LEAN CLAY (CL)		

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	32672	01/24/24	Grooving tool	2024.02.07A	02/07/24
LL Apparatus	37589	01/08/24			
Oven (brown)	24438	02/09/24			

		Liquid Limit						Plastic Limit		
A	Tare Weight	12.38	12.20	12.47				17.15	15.53	
B	Wet Soil Weight + A	19.87	21.90	22.91				24.13	22.39	
C	Dry Soil Weight + A	18.10	19.60	20.36				23.30	21.54	
D	Water Weight (B-C)	1.77	2.30	2.55				0.83	0.85	
E	Dry Soil Weight (C-A)	5.72	7.40	7.89				6.15	6.01	
F	% Moisture (D/E)*100	30.9%	31.1%	32.3%				13.5%	14.1%	
N	# OF DROPS	22	34	27				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**13.8%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	☐
Liquid Limit	**31**
Plastic Limit	**14**
Plastic Index	**17**
Group Symbol	**CL***
Multipoint Method	☒
One-point Method	☐

Wet Preparation ☐ Dry Preparation ☒ Air Dried ☒ *Est. the % retained on the #40 Sieve:* 5%

Notes / Deviations / References: *Classification listed here applies only to portion passing No. 40 sieve.

RCS	2/28/2024	Abigail Carr	3/21/2024
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 1 LEXb
Revision Date: 05/16/22

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX

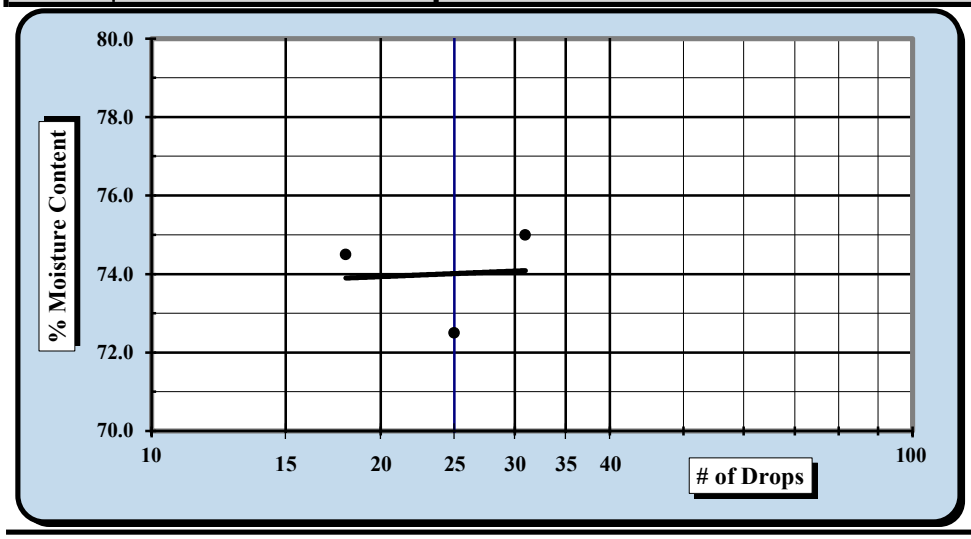
ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project #:	23360111	Report Date:	03/21/24
Project Name:	EKPC Cooper Combined Cycle Plant	Test Date(s)	03/12/24
Client Name:	East Kentucky Power Cooperative		
Client Address:	4775 Lexington Rd., Winchester, KY 40391		
		Sample Date:	02/20/24
Location:	B-14	Depth (ft):	4.0
Sample Description:	FAT CLAY (CH)		

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	32672	01/24/24	Grooving tool	2024.02.07A	02/07/24
LL Apparatus	37589	01/08/24			
Oven (brown)	24438	02/09/24			

		Liquid Limit						Plastic Limit		
A	Tare Weight	11.52	16.56	15.70				16.31		
B	Wet Soil Weight + A	20.99	25.88	24.66				19.99		
C	Dry Soil Weight + A	17.01	21.90	20.82				19.31		
D	Water Weight (B-C)	3.98	3.98	3.84				0.68		
E	Dry Soil Weight (C-A)	5.49	5.34	5.12				3.00		
F	% Moisture (D/E)*100	72.5%	74.5%	75.0%				22.7%		
N	# OF DROPS	25	18	31				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**22.7%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐

Liquid Limit	**74**
Plastic Limit	**23**
Plastic Index	**51**
Group Symbol	**CH***

Multipoint Method ☒
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☒ Air Dried ☒ *Est. the % retained on the #40 Sieve:* <5%

Notes / Deviations / References: *Classification listed here applies only to portion passing No. 40 sieve.

KKS	2/28/2024	Abigail Carr	3/21/2024
Technician Name	*Date*	*Technical Responsibility*	*Date*

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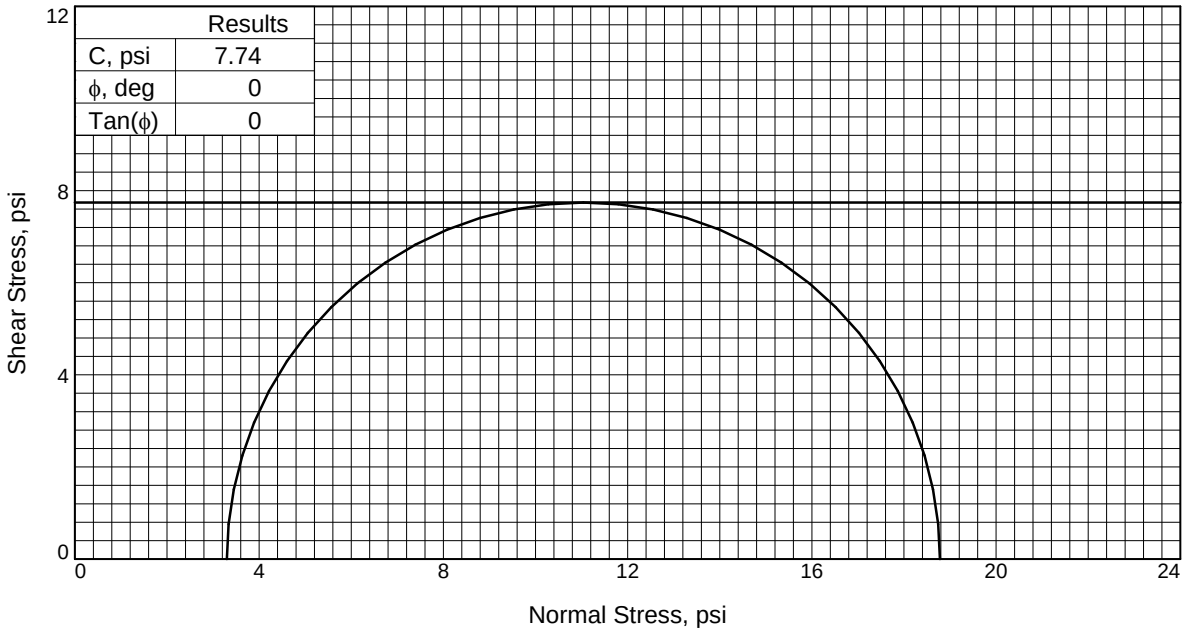
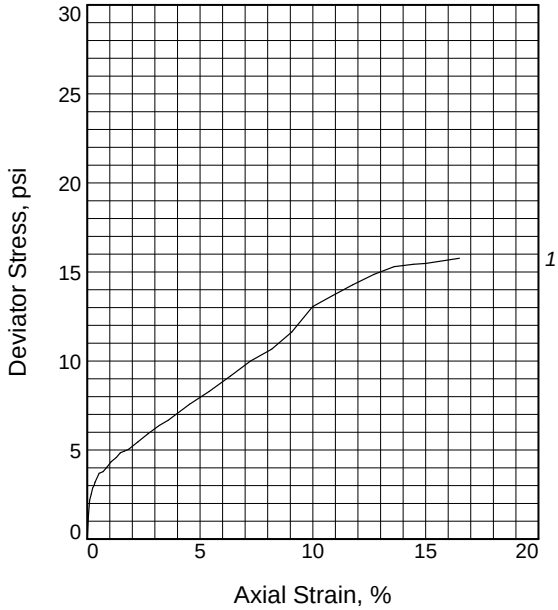
C & phi are not test results but an interpretation of the test results. The designer is responsible for interpreting test data as provided by S&ME.





Sample No.		1
Initial	Water Content, %	20.9
	Dry Density, pcf	102.5
	Saturation, %	89.3
	Void Ratio	0.6257
	Diameter, in.	2.748
	Height, in.	5.516
At Test	Water Content, %	20.5
	Dry Density, pcf	102.5
	Saturation, %	87.6
	Void Ratio	0.6257
	Diameter, in.	2.748
	Height, in.	5.516
Strain rate, %/min.		1.00
Back Pressure, psi		0.0
Cell Pressure, psi		3.3
Fail. Stress, psi		15.5
Strain, %		15.0
Ult. Stress, psi		15.5
Strain, %		15.0
σ_1 Failure, psi		18.8
σ_3 Failure, psi		3.3

Type of Test:
Unconsolidated Undrained

Sample Type: Intact

Description: LEAN CLAY (CL), red brown

LL= 31 **PL=** 14 **PI=** 17

Specific Gravity= 2.670

Remarks: Failure criterion is peak deviator stress.

Client: East Kentucky Power Cooperative

Project: EKPC Cooper Combined Cycle Plant

Source of Sample: B-11 **Depth:** 3.3-3.8

Sample Number: ST-1

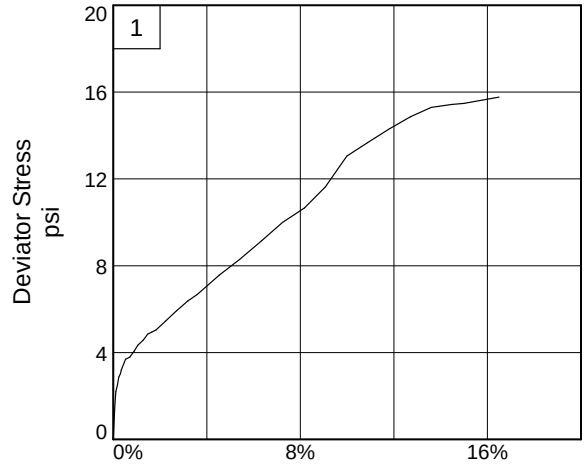
Proj. No.: 23360111 **Date Sampled:** 2/20/24

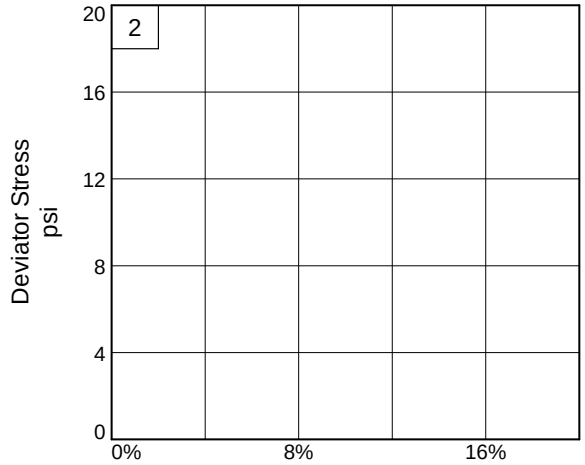
TRIAXIAL SHEAR TEST REPORT
S&ME, Inc.
Lexington, Kentucky

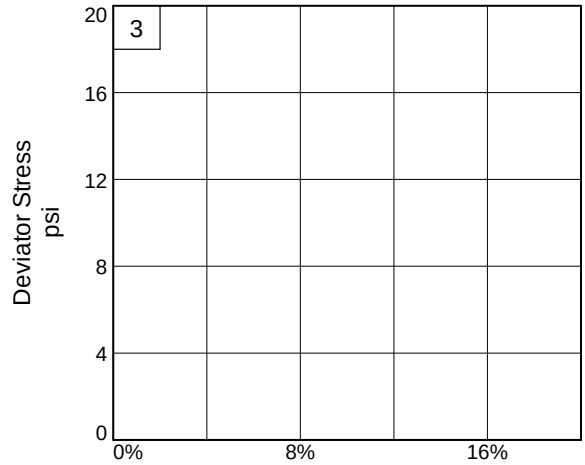
Figure 1 of 2

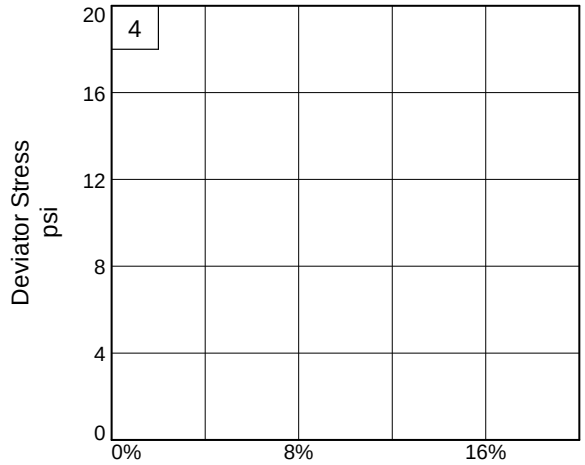
Tested By: J. LaMothe

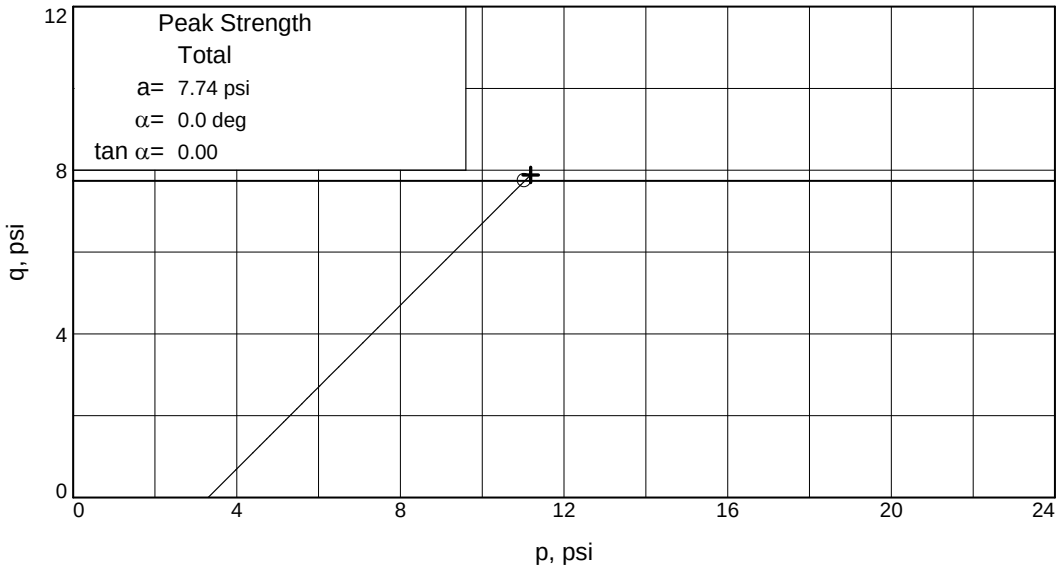
C & phi are not test results but an interpretation of the test results. The designer is responsible for interpreting test data as provided by S&ME.











Stress Paths: o indicates peak + indicates end

Client: East Kentucky Power Cooperative

Project: EKPC Cooper Combined Cycle Plant

Source of Sample: B-11 **Depth:** 3.3-3.8 **Sample Number:** ST-1

Project No.: 23360111 **Figure** 2 of 2

S&ME, Inc.

Tested By: J. LaMothe

Form No. TR-D7012C-01
Revision No. : 1LexC
Revision Date: 12/12/23

UNIAXIAL COMPRESSIVE STRENGTH OF ROCK

ASTM D7012 Method C

Quality Assurance

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project No.:	23360111	Report Date:	03/11/24
Project Name:	EKPC Cooper Combined Cycle Plant	Test Date(s):	02/26/24
Client Name:	East Kentucky Power Cooperative		
Client Address:	4775 Lexington Rd., Winchester, KY 40391	Received Date:	02/20/24
Location:	B-01	Depth, ft:	31.5-31.9
Sample Description:	Gray Limestone		

Angle of load relative to lithology: Approximately perpendicular

Test Results

Moisture Content ***0.2*** **%** ***Dry Unit Weight*** ***167.8*** **pcf**

Compressive Strength ***35,268*** **psi**

Before Test | **After Test**

Strain rate: 0.015 in/min.

Notes / Deviations / References:

J. Folsom	Jacob Folsom	Lab Services Manager	3/18/2024
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D7012C-01
Revision No. 0
Devision Date: 06/25/15

UNIAXIAL COMPRESSIVE STRENGTH OF ROCK

ASTM D 7012 Method C

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project Name: EKPC Cooper Combined Cycle Plant Location: B-01 Depth, feet: 31.5-31.9

Summary of Specimen Tolerances

Length/diameter target:	**MET**	Perpendicularity target:	**MET**
Side straightness target:	**MET**	Planeness target:	**MET**
Parallelism target:	**MET**		

*ASTM D4543-08 Standard Practice for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerance, Section 1.2 - "Rock is a complex engineering material that can vary greatly as a function of lithology, stress history, weathering, moisture content, chemistry, and other natural geologic processes. As such, it is not always possible to obtain or prepare rock core specimens that satisfy the desirable tolerances given in this practice. Most commonly, this situation presents itself with weaker, more porous, and poorly cemented rock types and rock types containing significant or weak (or both) structural features. For these and other rock types which are difficult to prepare, all reasonable efforts shall be made to prepare a specimen in accordance with this practice and for the intended test procedure. However, when it has been determined by trial that this is not possible, the rock specimen will be prepared to the closest tolerance practicable and be considered the best effort and report it as such. If allowable or necessary for the intended test, capping the ends of the specimen as discussed in ASTM D7012 is permitted."

Length to Diameter Ratio

Length, inches: 4.16 Diameter, inches: 1.983

Ratio: 2.10 length to 1 diameter

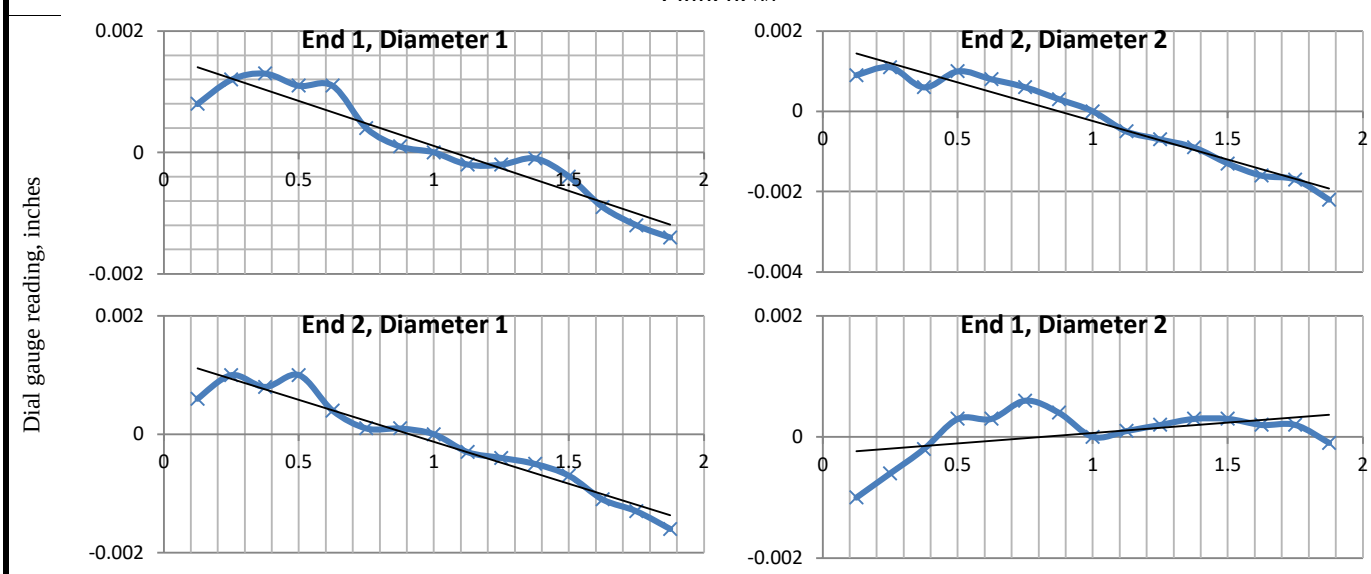
Target tolerance: L:D ratio between 2 to 1 and 2.5 to 1

Side Straightness

Maximum gap between side of core and reference plate, inches: < .02

Target tolerance: Maximum gap less than .02 inches

Planeness



Distance along diameter, inches

Maximum point-line deviation, inches: < .001

Target Tolerance: No individually measured point should deviate from the best fit line by more than .001 inches.

Perpendicularity

Slope of End 1, Diameter 1, degrees:	-0.08
Slope of End 2, Diameter 1, degrees:	-0.08
Slope of End 1, Diameter 2, degrees:	0.02
Slope of End 2, Diameter 2, degrees:	-0.11

Target Tolerance: Each diameter perpendicular to the long axis to within 0.25º

Parallelism

Slope difference, Diameter 1, degrees:	0.00
Slope difference, Diameter 2, degrees:	0.13

Target Tolerance: Difference between slopes on each end less than 0.25º

Test Information

Strain rate, in/min:	0.015
OR	
Stress rate, lbs/sec:	
Time to failure, min:	8.2
Temperature:	room temperature

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Form No. TR-D7012C-01
Revision No. : 1LexC
Revision Date: 12/12/23

UNIAXIAL COMPRESSIVE STRENGTH OF ROCK

ASTM D7012 Method C

Quality Assurance

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project No.:	23360111	Report Date:	03/11/24
Project Name:	EKPC Cooper Combined Cycle Plant	Test Date(s):	02/27/24
Client Name:	East Kentucky Power Cooperative		
Client Address:	4775 Lexington Rd., Winchester, KY 40391	Received Date:	02/20/24
Location:	B-2	Depth, ft:	20.6-21.0
Sample Description:	Gray Limestone		

Angle of load relative to lithology: Approximately perpendicular

Test Results

Moisture Content ***0.2*** **%** ***Dry Unit Weight*** ***166.9*** **pcf**

Compressive Strength ***24,470*** **psi**

Before Test | **After Test**

Strain rate: 0.015 in/min.

Notes / Deviations / References:

J. Folsom	Jacob Folsom	Lab Services Manager	3/18/2024
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D7012C-01
Revision No. 0
Devision Date: 06/25/15

UNIAXIAL COMPRESSIVE STRENGTH OF ROCK

ASTM D 7012 Method C

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project Name: EKPC Cooper Combined Cycle Plant Location: B-2 Depth, feet: 20.6-21.0

Summary of Specimen Tolerances

Length/diameter target:	**MET**	Perpendicularity target:	**MET**
Side straightness target:	**MET**	Planeness target:	**MET**
Parallelism target:	**MET**		

*ASTM D4543-08 Standard Practice for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerance, Section 1.2 - "Rock is a complex engineering material that can vary greatly as a function of lithology, stress history, weathering, moisture content, chemistry, and other natural geologic processes. As such, it is not always possible to obtain or prepare rock core specimens that satisfy the desirable tolerances given in this practice. Most commonly, this situation presents itself with weaker, more porous, and poorly cemented rock types and rock types containing significant or weak (or both) structural features. For these and other rock types which are difficult to prepare, all reasonable efforts shall be made to prepare a specimen in accordance with this practice and for the intended test procedure. However, when it has been determined by trial that this is not possible, the rock specimen will be prepared to the closest tolerance practicable and be considered the best effort and report it as such. If allowable or necessary for the intended test, capping the ends of the specimen as discussed in ASTM D7012 is permitted."

Length to Diameter Ratio

Length, inches: 4.29 Diameter, inches: 1.984

Ratio: 2.16 length to 1 diameter

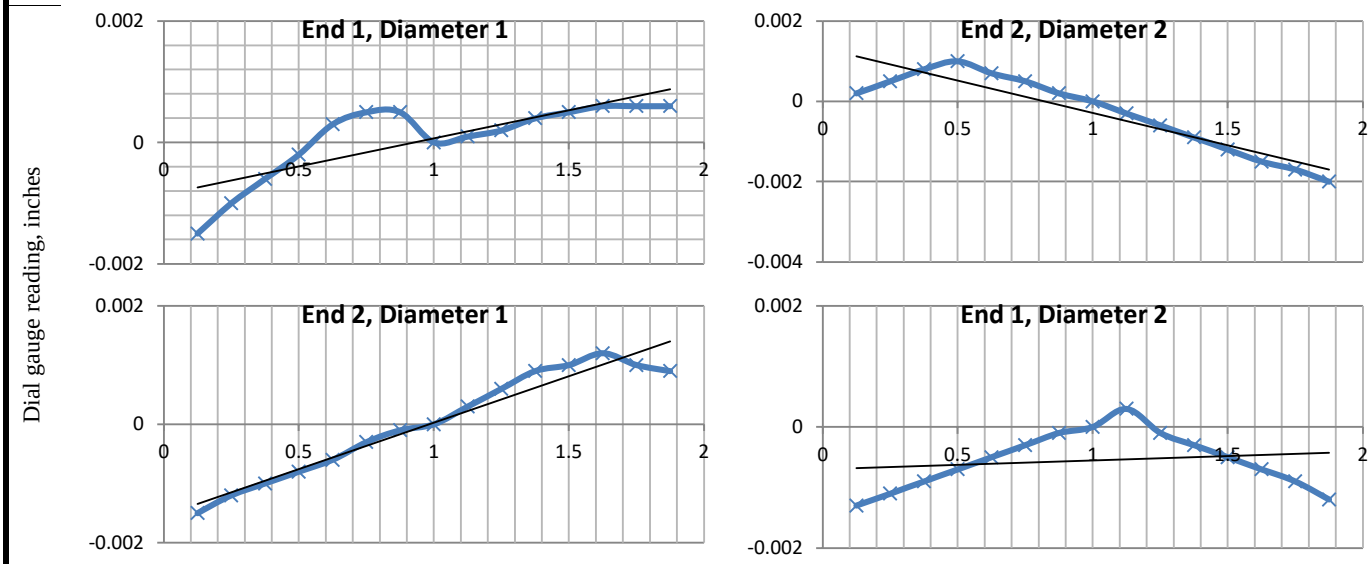
Target tolerance: L:D ratio between 2 to 1 and 2.5 to 1

Side Straightness

Maximum gap between side of core and reference plate, inches: < .02

Target tolerance: Maximum gap less than .02 inches

Planeness



Distance along diameter, inches

Maximum point-line deviation, inches: < .001

Target Tolerance: No individually measured point should deviate from the best fit line by more than .001 inches.

Perpendicularity

Slope of End 1, Diameter 1, degrees:	0.05
Slope of End 2, Diameter 1, degrees:	0.09
Slope of End 1, Diameter 2, degrees:	0.01
Slope of End 2, Diameter 2, degrees:	-0.09

Target Tolerance: Each diameter perpendicular to the long axis to within 0.25º

Parallelism

Slope difference, Diameter 1, degrees:	0.04
Slope difference, Diameter 2, degrees:	0.10

Target Tolerance: Difference between slopes on each end less than 0.25º

Test Information

Strain rate, in/min:	0.015
OR	
Stress rate, lbs/sec:	
Time to failure, min:	5.8
Temperature:	room temperature

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Form No. TR-D7012C-01
Revision No. : 1LexC
Revision Date: 12/12/23

UNIAXIAL COMPRESSIVE STRENGTH OF ROCK

ASTM D7012 Method C

Quality Assurance

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project No.:	23360111	Report Date:	03/11/24
Project Name:	EKPC Cooper Combined Cycle Plant	Test Date(s):	02/27/24
Client Name:	East Kentucky Power Cooperative		
Client Address:	4775 Lexington Rd., Winchester, KY 40391	Received Date:	02/20/24
Location:	B-3	Depth, ft:	37.7-38.1
Sample Description:	Gray Limestone		

Angle of load relative to lithology: Approximately perpendicular

Test Results

Moisture Content ***0.1*** **%** ***Dry Unit Weight*** ***162.3*** **pcf**

Compressive Strength ***28,642*** **psi**

Before Test | **After Test**

Strain rate: 0.015 in/min.

Notes / Deviations / References:

J. Folsom	Jacob Folsom	Lab Services Manager	3/18/2024
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D7012C-01
Revision No. 0
Devision Date: 06/25/15

UNIAXIAL COMPRESSIVE STRENGTH OF ROCK

ASTM D 7012 Method C

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project Name: EKPC Cooper Combined Cycle Plant Location: B-3 Depth, feet: 37.7-38.1

Summary of Specimen Tolerances

Length/diameter target:	**MET**	Perpendicularity target:	**MET**
Side straightness target:	**MET**	Planeness target:	**MET**
Parallelism target:	**MET**		

*ASTM D4543-08 Standard Practice for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerance, Section 1.2 - "Rock is a complex engineering material that can vary greatly as a function of lithology, stress history, weathering, moisture content, chemistry, and other natural geologic processes. As such, it is not always possible to obtain or prepare rock core specimens that satisfy the desirable tolerances given in this practice. Most commonly, this situation presents itself with weaker, more porous, and poorly cemented rock types and rock types containing significant or weak (or both) structural features. For these and other rock types which are difficult to prepare, all reasonable efforts shall be made to prepare a specimen in accordance with this practice and for the intended test procedure. However, when it has been determined by trial that this is not possible, the rock specimen will be prepared to the closest tolerance practicable and be considered the best effort and report it as such. If allowable or necessary for the intended test, capping the ends of the specimen as discussed in ASTM D7012 is permitted."

Length to Diameter Ratio

Length, inches: 4.29 Diameter, inches: 1.948

Ratio: 2.20 length to 1 diameter

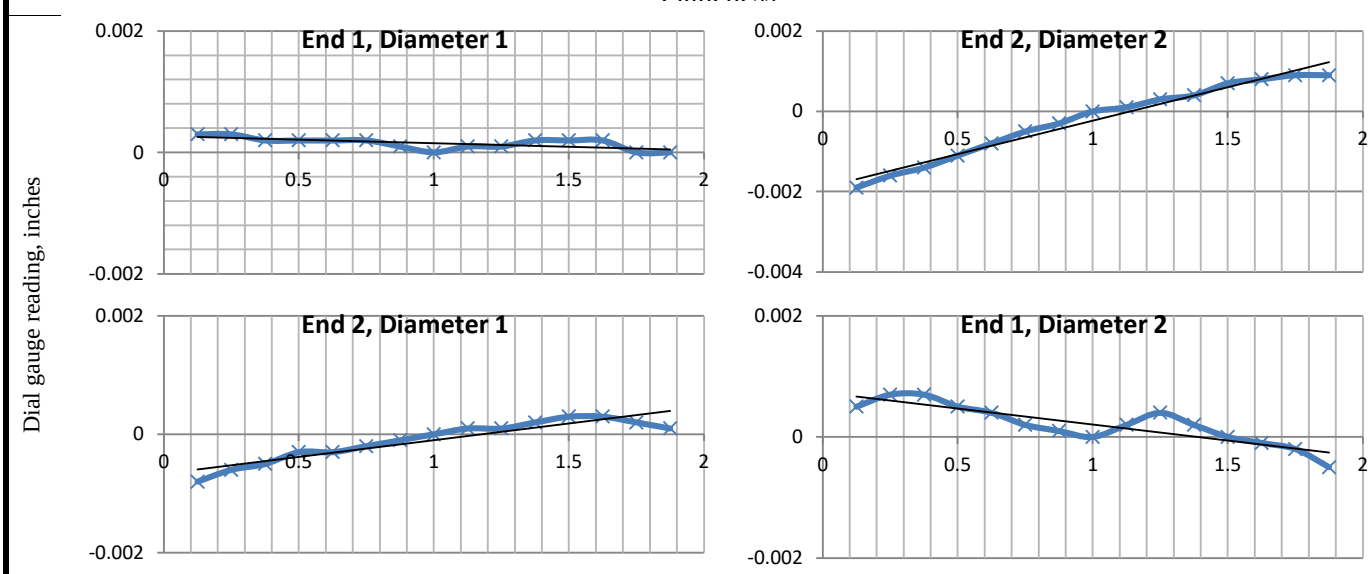
Target tolerance: L:D ratio between 2 to 1 and 2.5 to 1

Side Straightness

Maximum gap between side of core and reference plate, inches: < .02

Target tolerance: Maximum gap less than .02 inches

Planeness



Distance along diameter, inches

Maximum point-line deviation, inches: < .001

Target Tolerance: No individually measured point should deviate from the best fit line by more than .001 inches.

Perpendicularity

Slope of End 1, Diameter 1, degrees:	-0.01
Slope of End 2, Diameter 1, degrees:	0.03
Slope of End 1, Diameter 2, degrees:	-0.03
Slope of End 2, Diameter 2, degrees:	0.10

Target Tolerance: Each diameter perpendicular to the long axis to within 0.25º

Parallelism

Slope difference, Diameter 1, degrees:	0.04
Slope difference, Diameter 2, degrees:	0.13

Target Tolerance: Difference between slopes on each end less than 0.25º

Test Information

Strain rate, in/min:	0.015
OR	
Stress rate, lbs/sec:	
Time to failure, min:	6.95
Temperature:	room temperature

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Form No. TR-D7012C-01
Revision No. : 1LexC
Revision Date: 12/12/23

UNIAXIAL COMPRESSIVE STRENGTH OF ROCK

ASTM D7012 Method C

Quality Assurance

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project No.:	23360111	Report Date:	03/11/24
Project Name:	EKPC Cooper Combined Cycle Plant	Test Date(s):	02/27/24
Client Name:	East Kentucky Power Cooperative		
Client Address:	4775 Lexington Rd., Winchester, KY 40391	Received Date:	02/20/24
Location:	B-5	Depth, ft:	33.6-34.0
Sample Description:	Gray Limestone		

Angle of load relative to lithology: Approximately perpendicular

Test Results

Moisture Content ***0.1*** **%** ***Dry Unit Weight*** ***167.5*** **pcf**

Compressive Strength ***24,542*** **psi**

Before Test | **After Test**

Strain rate: 0.015 in/min.

Notes / Deviations / References:

J. Folsom	Jacob Folsom	Lab Services Manager	3/18/2024
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D7012C-01
Revision No. 0
Devision Date: 06/25/15

UNIAXIAL COMPRESSIVE STRENGTH OF ROCK

ASTM D 7012 Method C

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project Name: EKPC Cooper Combined Cycle Plant Location: B-5 Depth, feet: 33.6-34.0

Summary of Specimen Tolerances

Length/diameter target:	**MET**	Perpendicularity target:	**MET**
Side straightness target:	**MET**	Planeness target:	**MET**
Parallelism target:	**MET**		

*ASTM D4543-08 Standard Practice for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerance, Section 1.2 - "Rock is a complex engineering material that can vary greatly as a function of lithology, stress history, weathering, moisture content, chemistry, and other natural geologic processes. As such, it is not always possible to obtain or prepare rock core specimens that satisfy the desirable tolerances given in this practice. Most commonly, this situation presents itself with weaker, more porous, and poorly cemented rock types and rock types containing significant or weak (or both) structural features. For these and other rock types which are difficult to prepare, all reasonable efforts shall be made to prepare a specimen in accordance with this practice and for the intended test procedure. However, when it has been determined by trial that this is not possible, the rock specimen will be prepared to the closest tolerance practicable and be considered the best effort and report it as such. If allowable or necessary for the intended test, capping the ends of the specimen as discussed in ASTM D7012 is permitted."

Length to Diameter Ratio

Length, inches: 4.29 Diameter, inches: 1.982

Ratio: 2.17 length to 1 diameter

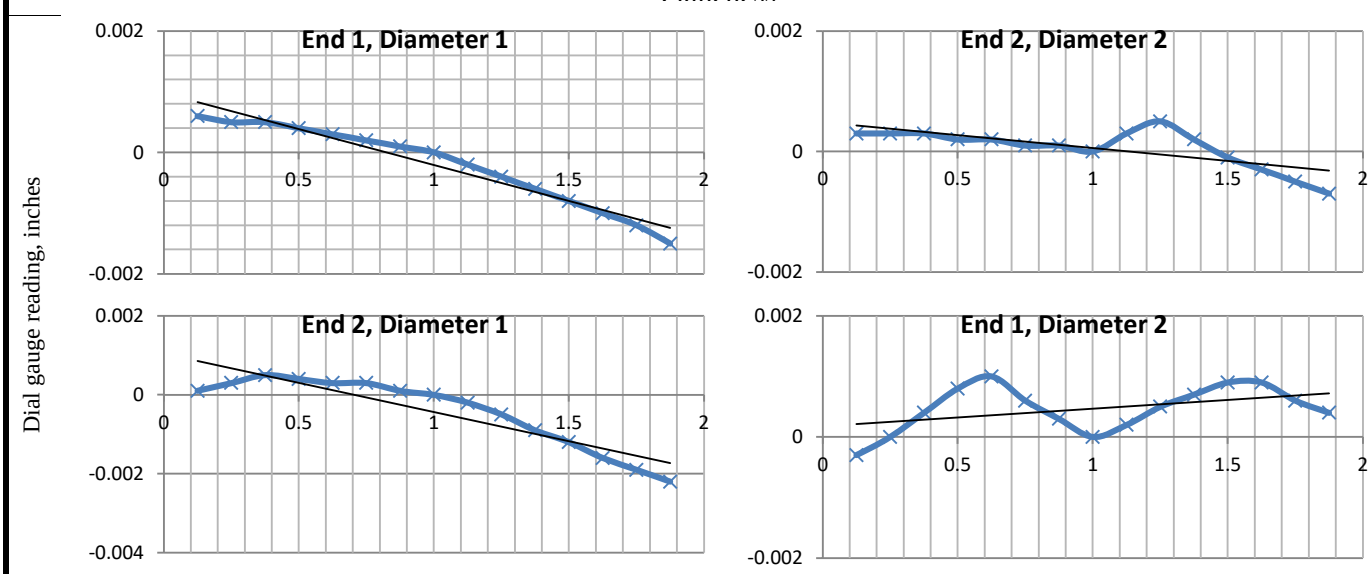
Target tolerance: L:D ratio between 2 to 1 and 2.5 to 1

Side Straightness

Maximum gap between side of core and reference plate, inches: < .02

Target tolerance: Maximum gap less than .02 inches

Planeness



Distance along diameter, inches

Maximum point-line deviation, inches: < .001

Target Tolerance: No individually measured point should deviate from the best fit line by more than .001 inches.

Perpendicularity

Slope of End 1, Diameter 1, degrees:	-0.07
Slope of End 2, Diameter 1, degrees:	-0.08
Slope of End 1, Diameter 2, degrees:	0.02
Slope of End 2, Diameter 2, degrees:	-0.02

Target Tolerance: Each diameter perpendicular to the long axis to within 0.25º

Parallelism

Slope difference, Diameter 1, degrees:	0.02
Slope difference, Diameter 2, degrees:	0.04

Target Tolerance: Difference between slopes on each end less than 0.25º

Test Information

Strain rate, in/min:	0.015
OR	
Stress rate, lbs/sec:	
Time to failure, min:	5.88
Temperature:	room temperature

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Form No. TR-D7012C-01
Revision No. : 1LexC
Revision Date: 12/12/23

UNIAXIAL COMPRESSIVE STRENGTH OF ROCK

ASTM D7012 Method C

Quality Assurance

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project No.:	23360111	Report Date:	03/11/24
Project Name:	EKPC Cooper Combined Cycle Plant	Test Date(s):	02/26/24
Client Name:	East Kentucky Power Cooperative		
Client Address:	4775 Lexington Rd., Winchester, KY 40391	Received Date:	02/20/24
Location:	B-6	Depth, ft:	48.2-48.6
Sample Description:	Gray Limestone		

Angle of load relative to lithology: Approximately perpendicular

Test Results

Moisture Content ***4.1*** **%** ***Dry Unit Weight*** ***148.0*** **pcf**

Compressive Strength ***11,865*** **psi**

Before Test | **After Test**

Strain rate: 0.015 in/min.

Notes / Deviations / References:

J. Folsom	Jacob Folsom	Lab Services Manager	3/18/2024
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D7012C-01
Revision No. 0
Devision Date: 06/25/15

UNIAXIAL COMPRESSIVE STRENGTH OF ROCK

ASTM D 7012 Method C

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project Name: EKPC Cooper Combined Cycle Plant Location: B-6 Depth, feet: 48.2-48.6

Summary of Specimen Tolerances

Length/diameter target:	**MET**	Perpendicularity target:	**MET**
Side straightness target:	**MET**	Planeness target:	**MET**
Parallelism target:	**MET**		

*ASTM D4543-08 Standard Practice for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerance, Section 1.2 - "Rock is a complex engineering material that can vary greatly as a function of lithology, stress history, weathering, moisture content, chemistry, and other natural geologic processes. As such, it is not always possible to obtain or prepare rock core specimens that satisfy the desirable tolerances given in this practice. Most commonly, this situation presents itself with weaker, more porous, and poorly cemented rock types and rock types containing significant or weak (or both) structural features. For these and other rock types which are difficult to prepare, all reasonable efforts shall be made to prepare a specimen in accordance with this practice and for the intended test procedure. However, when it has been determined by trial that this is not possible, the rock specimen will be prepared to the closest tolerance practicable and be considered the best effort and report it as such. If allowable or necessary for the intended test, capping the ends of the specimen as discussed in ASTM D7012 is permitted."

Length to Diameter Ratio

Length, inches: 4.34 Diameter, inches: 1.772

Ratio: 2.45 length to 1 diameter

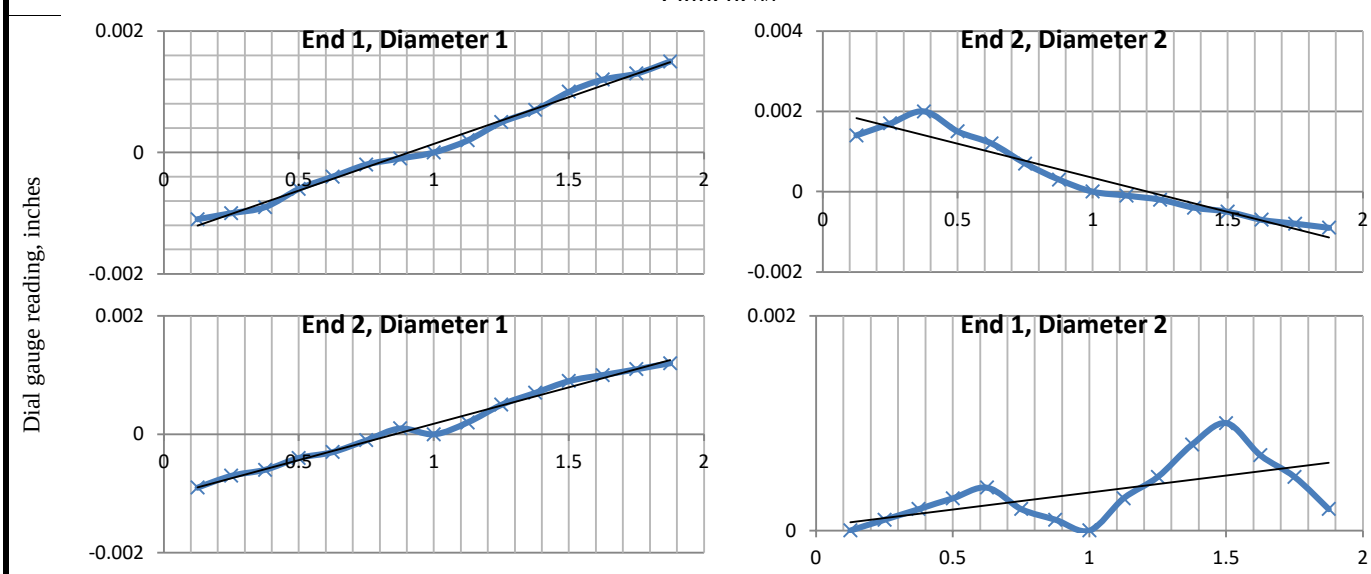
Target tolerance: L:D ratio between 2 to 1 and 2.5 to 1

Side Straightness

Maximum gap between side of core and reference plate, inches: < .02

Target tolerance: Maximum gap less than .02 inches

Planeness



Distance along diameter, inches

Maximum point-line deviation, inches: < .001

Target Tolerance: No individually measured point should deviate from the best fit line by more than .001 inches.

Perpendicularity

Slope of End 1, Diameter 1, degrees:	0.09
Slope of End 2, Diameter 1, degrees:	0.07
Slope of End 1, Diameter 2, degrees:	0.02
Slope of End 2, Diameter 2, degrees:	-0.10

Target Tolerance: Each diameter perpendicular to the long axis to within 0.25º

Parallelism

Slope difference, Diameter 1, degrees:	0.02
Slope difference, Diameter 2, degrees:	0.12

Target Tolerance: Difference between slopes on each end less than 0.25º

Test Information

Strain rate, in/min:	0.015
OR	
Stress rate, lbs/sec:	
Time to failure, min:	3.27
Temperature:	room temperature

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Form No. TR-D7012C-01
Revision No. : 1LexC
Revision Date: 12/12/23

UNIAXIAL COMPRESSIVE STRENGTH OF ROCK

ASTM D7012 Method C

Quality Assurance

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project No.:	23360111	Report Date:	03/11/24
Project Name:	EKPC Cooper Combined Cycle Plant	Test Date(s):	02/26/24
Client Name:	East Kentucky Power Cooperative		
Client Address:	4775 Lexington Rd., Winchester, KY 40391	Received Date:	02/20/24
Location:	B-7	Depth, ft:	31.3-31.7
Sample Description:	Gray Limestone		

Angle of load relative to lithology: Approximately perpendicular

Test Results

Moisture Content ***0.1*** **%** ***Dry Unit Weight*** ***169.6*** **pcf**

Compressive Strength ***23,223*** **psi**

Before Test | **After Test**

Strain rate: 0.015 in/min.

Notes / Deviations / References:

J. Folsom	Jacob Folsom	Lab Services Manager	3/18/2024
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D7012C-01
Revision No. 0
Devision Date: 06/25/15

UNIAXIAL COMPRESSIVE STRENGTH OF ROCK

ASTM D 7012 Method C

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project Name: EKPC Cooper Combined Cycle Plant Location: B-7 Depth, feet: 31.3-31.7

Summary of Specimen Tolerances

Length/diameter target:	**MET**	Perpendicularity target:	**MET**
Side straightness target:	**MET**	Planeness target:	**MET**
Parallelism target:	**MET**		

*ASTM D4543-08 Standard Practice for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerance, Section 1.2 - "Rock is a complex engineering material that can vary greatly as a function of lithology, stress history, weathering, moisture content, chemistry, and other natural geologic processes. As such, it is not always possible to obtain or prepare rock core specimens that satisfy the desirable tolerances given in this practice. Most commonly, this situation presents itself with weaker, more porous, and poorly cemented rock types and rock types containing significant or weak (or both) structural features. For these and other rock types which are difficult to prepare, all reasonable efforts shall be made to prepare a specimen in accordance with this practice and for the intended test procedure. However, when it has been determined by trial that this is not possible, the rock specimen will be prepared to the closest tolerance practicable and be considered the best effort and report it as such. If allowable or necessary for the intended test, capping the ends of the specimen as discussed in ASTM D7012 is permitted."

Length to Diameter Ratio

Length, inches: 4.22 Diameter, inches: 1.962

Ratio: 2.15 length to 1 diameter

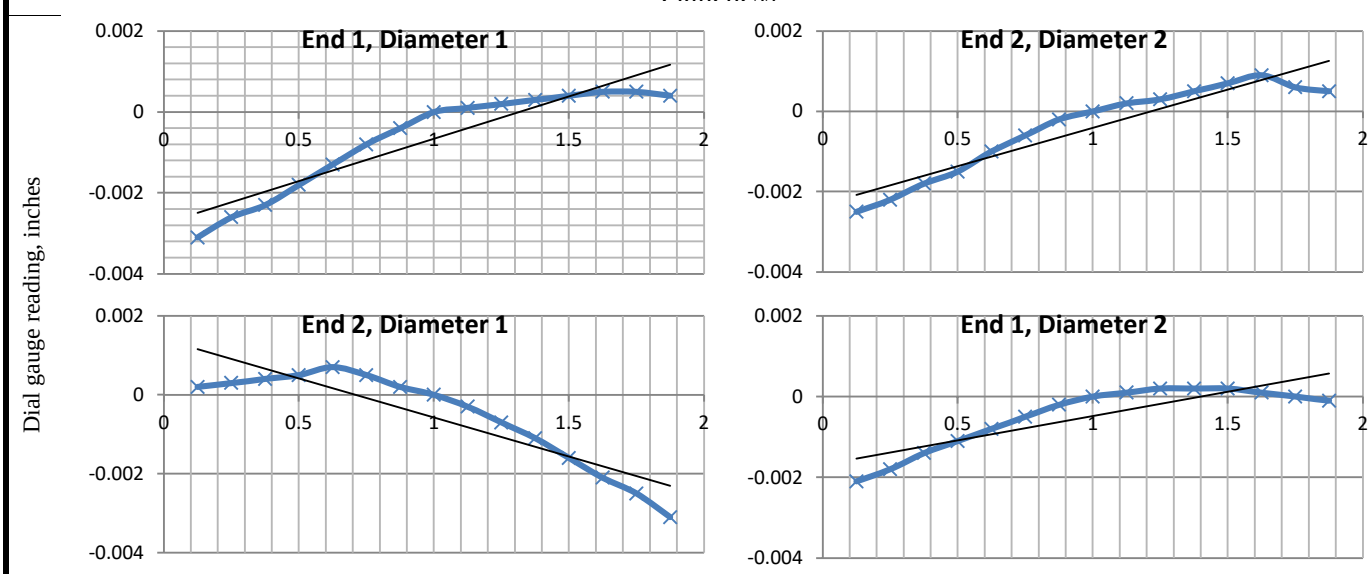
Target tolerance: L:D ratio between 2 to 1 and 2.5 to 1

Side Straightness

Maximum gap between side of core and reference plate, inches: < .02

Target tolerance: Maximum gap less than .02 inches

Planeness



Distance along diameter, inches

Maximum point-line deviation, inches: < .001

Target Tolerance: No individually measured point should deviate from the best fit line by more than .001 inches.

Perpendicularity

Slope of End 1, Diameter 1, degrees:	0.12
Slope of End 2, Diameter 1, degrees:	-0.11
Slope of End 1, Diameter 2, degrees:	0.07
Slope of End 2, Diameter 2, degrees:	0.11

Target Tolerance: Each diameter perpendicular to the long axis to within 0.25º

Parallelism

Slope difference, Diameter 1, degrees:	0.23
Slope difference, Diameter 2, degrees:	0.04

Target Tolerance: Difference between slopes on each end less than 0.25º

Test Information

Strain rate, in/min:	0.015
OR	
Stress rate, lbs/sec:	
Time to failure, min:	5.15
Temperature:	room temperature

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Form No. TR-D7012C-01
Revision No. : 1LexC
Revision Date: 12/12/23

UNIAXIAL COMPRESSIVE STRENGTH OF ROCK

ASTM D7012 Method C

Quality Assurance

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project No.:	23360111	Report Date:	03/11/24
Project Name:	EKPC Cooper Combined Cycle Plant	Test Date(s):	02/27/24
Client Name:	East Kentucky Power Cooperative		
Client Address:	4775 Lexington Rd., Winchester, KY 40391	Received Date:	02/20/24
Location:	B-10	Depth, ft:	44.7-45.1
Sample Description:	Gray Limestone		

Angle of load relative to lithology: Approximately perpendicular

Test Results

Moisture Content ***0.1*** **%** ***Dry Unit Weight*** ***167.3*** **pcf**

Compressive Strength ***29,239*** **psi**

Before Test

After Test

Strain rate: 0.015 in/min.

Notes / Deviations / References:

J. Folsom	Jacob Folsom	Laboratory Services Manager	3/18/2024
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D7012C-01
Revision No. 0
Devision Date: 06/25/15

UNIAXIAL COMPRESSIVE STRENGTH OF ROCK

ASTM D 7012 Method C

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project Name: EKPC Cooper Combined Cycle Plant Location: B-10 Depth, feet: 44.7-45.1

Summary of Specimen Tolerances

Length/diameter target:	**MET**	Perpendicularity target:	**MET**
Side straightness target:	**MET**	Planeness target:	**MET**
Parallelism target:	**MET**		

*ASTM D4543-08 Standard Practice for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerance, Section 1.2 - "Rock is a complex engineering material that can vary greatly as a function of lithology, stress history, weathering, moisture content, chemistry, and other natural geologic processes. As such, it is not always possible to obtain or prepare rock core specimens that satisfy the desirable tolerances given in this practice. Most commonly, this situation presents itself with weaker, more porous, and poorly cemented rock types and rock types containing significant or weak (or both) structural features. For these and other rock types which are difficult to prepare, all reasonable efforts shall be made to prepare a specimen in accordance with this practice and for the intended test procedure. However, when it has been determined by trial that this is not possible, the rock specimen will be prepared to the closest tolerance practicable and be considered the best effort and report it as such. If allowable or necessary for the intended test, capping the ends of the specimen as discussed in ASTM D7012 is permitted."

Length to Diameter Ratio

Length, inches: 4.23 Diameter, inches: 1.963

Ratio: 2.15 length to 1 diameter

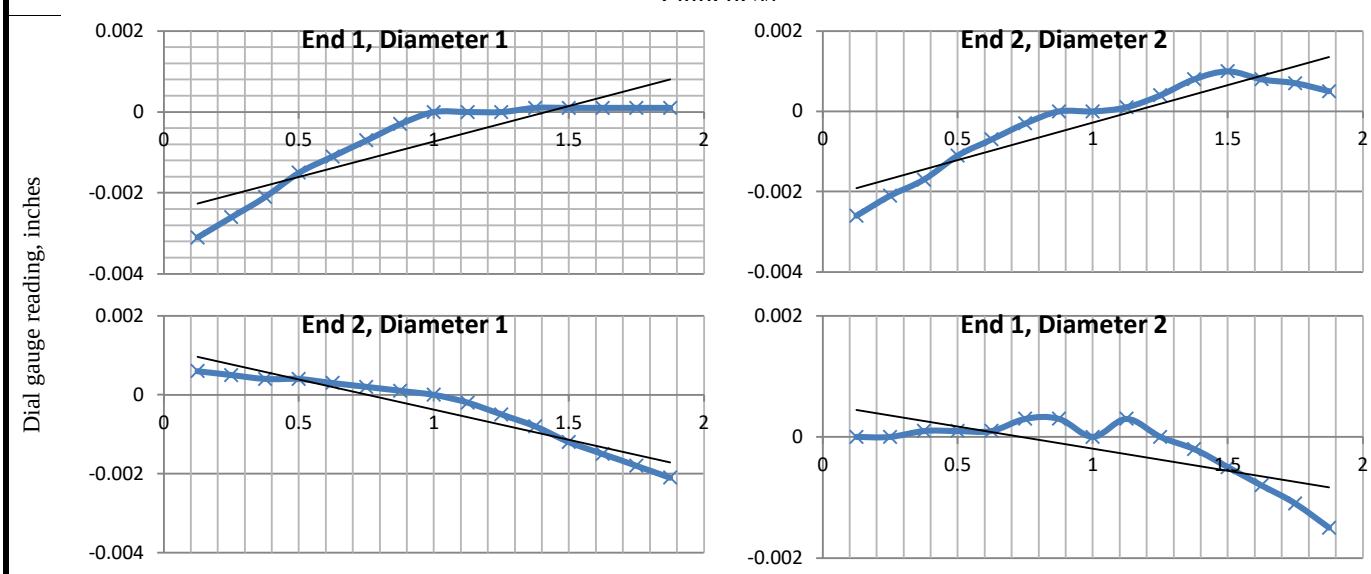
Target tolerance: L:D ratio between 2 to 1 and 2.5 to 1

Side Straightness

Maximum gap between side of core and reference plate, inches: < .02

Target tolerance: Maximum gap less than .02 inches

Planeness



Distance along diameter, inches

Maximum point-line deviation, inches: < .001

Target Tolerance: No individually measured point should deviate from the best fit line by more than .001 inches.

Parallelism

Slope difference, Diameter 1, degrees: 0.19

Slope difference, Diameter 2, degrees: 0.15

Target Tolerance: Difference between slopes on each end less than 0.25º

Perpendicularity

Slope of End 1, Diameter 1, degrees: 0.10

Slope of End 2, Diameter 1, degrees: -0.09

Slope of End 1, Diameter 2, degrees: -0.04

Slope of End 2, Diameter 2, degrees: 0.11

Target Tolerance: Each diameter perpendicular to the long axis to within 0.25º

Test Information

Strain rate, in/min: 0.015

OR

Stress rate, lbs/sec:

Time to failure, min: 7.83

Temperature: room temperature

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Form No. TR-D7012C-01
Revision No. : 1LexC
Revision Date: 12/12/23

UNIAXIAL COMPRESSIVE STRENGTH OF ROCK

ASTM D7012 Method C

Quality Assurance

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project No.:	23360111	Report Date:	03/11/24
Project Name:	EKPC Cooper Combined Cycle Plant	Test Date(s):	02/26/24
Client Name:	East Kentucky Power Cooperative		
Client Address:	4775 Lexington Rd., Winchester, KY 40391	Received Date:	02/20/24
Location:	B-11	Depth, ft:	37.0-37.4
Sample Description:	Gray Limestone		

Angle of load relative to lithology: Approximately perpendicular

Test Results

Moisture Content ***0.1*** **%** ***Dry Unit Weight*** ***168.2*** **pcf**

Compressive Strength ***19,705*** **psi**

Before Test | **After Test**

Strain rate: 0.015 in/min.

Notes / Deviations / References:

J. Folsom	Jacob Folsom	Lab Services Manager	3/18/2024
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D7012C-01
Revision No. 0
Devision Date: 06/25/15

UNIAXIAL COMPRESSIVE STRENGTH OF ROCK

ASTM D 7012 Method C

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project Name: EKPC Cooper Combined Cycle Plant Location: B-11 Depth, feet: 37.0-37.4

Summary of Specimen Tolerances

Length/diameter target:	**MET**	Perpendicularity target:	**MET**
Side straightness target:	**MET**	Planeness target:	**MET**
Parallelism target:	**MET**		

*ASTM D4543-08 Standard Practice for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerance, Section 1.2 - "Rock is a complex engineering material that can vary greatly as a function of lithology, stress history, weathering, moisture content, chemistry, and other natural geologic processes. As such, it is not always possible to obtain or prepare rock core specimens that satisfy the desirable tolerances given in this practice. Most commonly, this situation presents itself with weaker, more porous, and poorly cemented rock types and rock types containing significant or weak (or both) structural features. For these and other rock types which are difficult to prepare, all reasonable efforts shall be made to prepare a specimen in accordance with this practice and for the intended test procedure. However, when it has been determined by trial that this is not possible, the rock specimen will be prepared to the closest tolerance practicable and be considered the best effort and report it as such. If allowable or necessary for the intended test, capping the ends of the specimen as discussed in ASTM D7012 is permitted."

Length to Diameter Ratio

Length, inches: 4.30 Diameter, inches: 1.953

Ratio: 2.20 length to 1 diameter

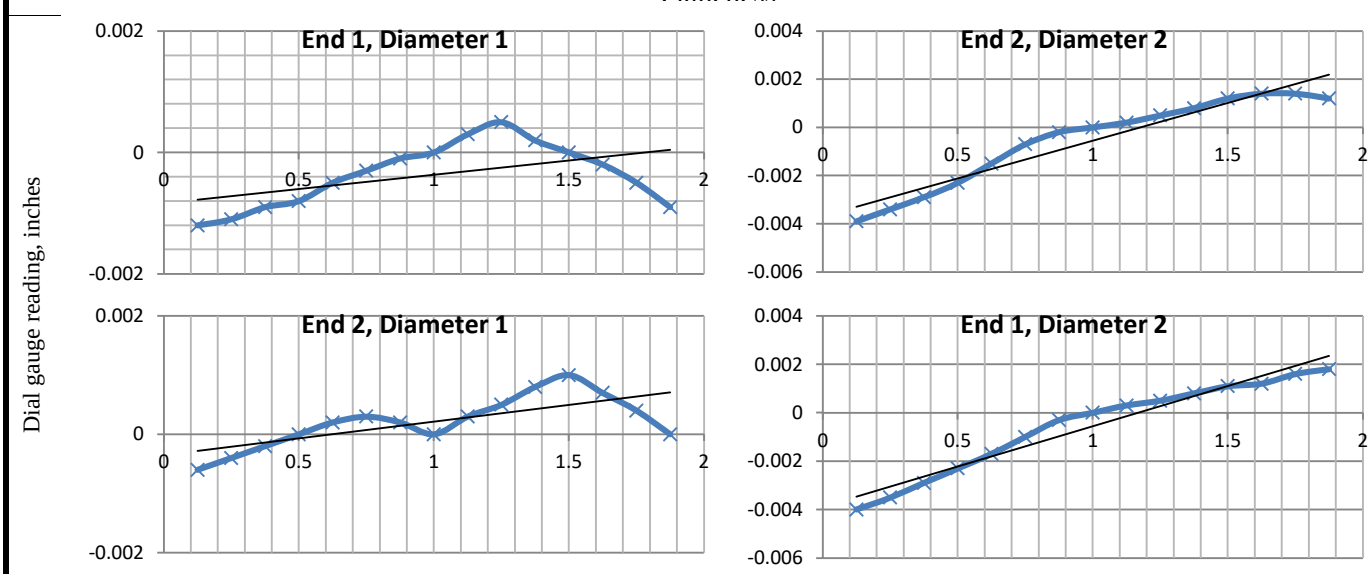
Target tolerance: L:D ratio between 2 to 1 and 2.5 to 1

Side Straightness

Maximum gap between side of core and reference plate, inches: < .02

Target tolerance: Maximum gap less than .02 inches

Planeness



Distance along diameter, inches

Maximum point-line deviation, inches: < .001

Target Tolerance: No individually measured point should deviate from the best fit line by more than .001 inches.

Perpendicularity

Slope of End 1, Diameter 1, degrees:	0.03
Slope of End 2, Diameter 1, degrees:	0.03
Slope of End 1, Diameter 2, degrees:	0.19
Slope of End 2, Diameter 2, degrees:	0.18

Target Tolerance: Each diameter perpendicular to the long axis to within 0.25º

Parallelism

Slope difference, Diameter 1, degrees:	0.01
Slope difference, Diameter 2, degrees:	0.01

Target Tolerance: Difference between slopes on each end less than 0.25º

Test Information

Strain rate, in/min:	0.015
OR	
Stress rate, lbs/sec:	
Time to failure, min:	8.5
Temperature:	room temperature

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Form No. TR-D7012C-01
Revision No. : 1LexC
Revision Date: 12/12/23

UNIAXIAL COMPRESSIVE STRENGTH OF ROCK

ASTM D7012 Method C

Quality Assurance

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project No.:	23360111	Report Date:	03/11/24
Project Name:	EKPC Cooper Combined Cycle Plant	Test Date(s):	02/26/24
Client Name:	East Kentucky Power Cooperative		
Client Address:	4775 Lexington Rd., Winchester, KY 40391	Received Date:	02/20/24
Location:	B-15	Depth, ft:	14.0-14.4
Sample Description:	Gray Limestone		

Angle of load relative to lithology: Approximately perpendicular

Test Results

Moisture Content ***0.1*** **%** ***Dry Unit Weight*** ***167.3*** **pcf**

Compressive Strength ***10,794*** **psi**

Before Test | **After Test**

Strain rate: 0.015 in/min.

Notes / Deviations / References:

J. Folsom	Jacob Folsom	Lab Services Manager	3/18/2024
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D7012C-01
Revision No. 0
Devision Date: 06/25/15

UNIAXIAL COMPRESSIVE STRENGTH OF ROCK

ASTM D 7012 Method C

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project Name: EKPC Cooper Combined Cycle Plant Location: B-15 Depth, feet: 14.0-14.4

Summary of Specimen Tolerances

Length/diameter target:	**MET**	Perpendicularity target:	**MET**
Side straightness target:	**MET**	Planeness target:	**MET**
Parallelism target:	**MET**		

*ASTM D4543-08 Standard Practice for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerance, Section 1.2 - "Rock is a complex engineering material that can vary greatly as a function of lithology, stress history, weathering, moisture content, chemistry, and other natural geologic processes. As such, it is not always possible to obtain or prepare rock core specimens that satisfy the desirable tolerances given in this practice. Most commonly, this situation presents itself with weaker, more porous, and poorly cemented rock types and rock types containing significant or weak (or both) structural features. For these and other rock types which are difficult to prepare, all reasonable efforts shall be made to prepare a specimen in accordance with this practice and for the intended test procedure. However, when it has been determined by trial that this is not possible, the rock specimen will be prepared to the closest tolerance practicable and be considered the best effort and report it as such. If allowable or necessary for the intended test, capping the ends of the specimen as discussed in ASTM D7012 is permitted."

Length to Diameter Ratio

Length, inches: 4.39 Diameter, inches: 1.975

Ratio: 2.22 length to 1 diameter

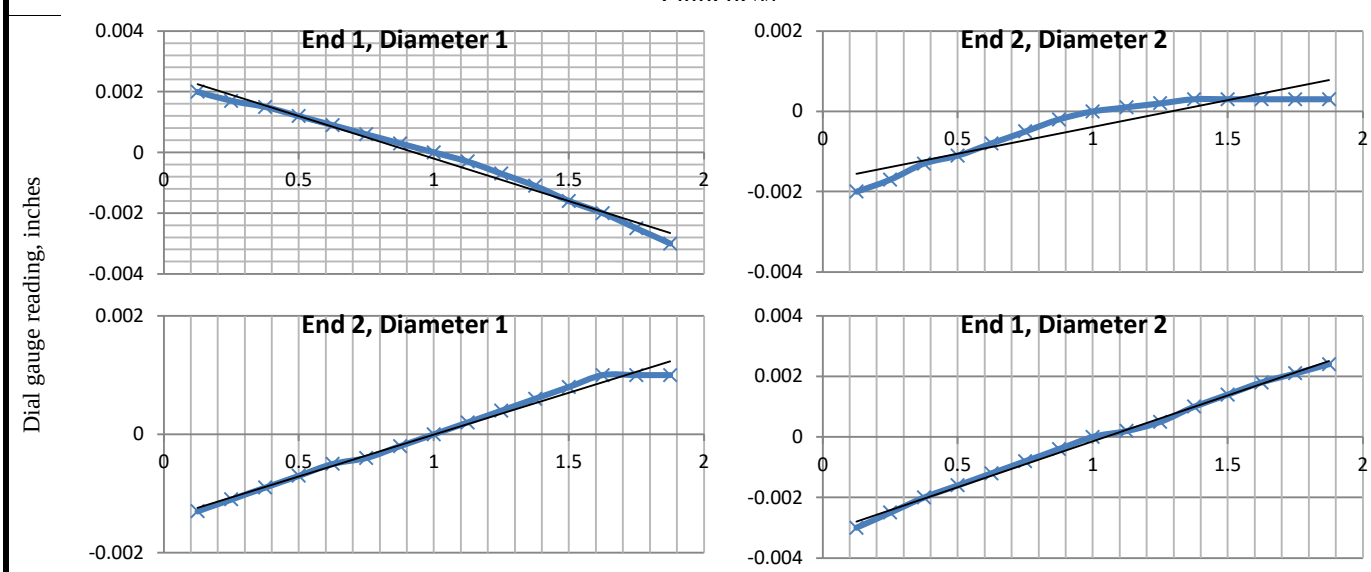
Target tolerance: L:D ratio between 2 to 1 and 2.5 to 1

Side Straightness

Maximum gap between side of core and reference plate, inches: < .02

Target tolerance: Maximum gap less than .02 inches

Planeness



Distance along diameter, inches

Maximum point-line deviation, inches: < .001

Target Tolerance: No individually measured point should deviate from the best fit line by more than .001 inches.

Perpendicularity

Slope of End 1, Diameter 1, degrees:	-0.16
Slope of End 2, Diameter 1, degrees:	0.08
Slope of End 1, Diameter 2, degrees:	0.17
Slope of End 2, Diameter 2, degrees:	0.08

Target Tolerance: Each diameter perpendicular to the long axis to within 0.25º

Parallelism

Slope difference, Diameter 1, degrees:	0.24
Slope difference, Diameter 2, degrees:	0.10

Target Tolerance: Difference between slopes on each end less than 0.25º

Test Information

Strain rate, in/min:	0.015
OR	
Stress rate, lbs/sec:	
Time to failure, min:	3.8
Temperature:	room temperature

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Form No: TR-D2974
Revision No. 2
Revision Date: 03/7/2023

MOISTURE, ASH, AND ORGANIC MATTER

ASTM D2974

Method A ☑ *Method B* ☐

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project #:	23360111	Report Date:	03/11/24
Project Name:	EKPC Cooper Combined Cycle Plant	Test Date(s):	02/27/24
Client Name:	East Kentucky Power Cooperative		
Client Address:	4775 Lexington Rd., Winchester, KY 40391		
Boring No.:	B-11	Sample Date:	02/20/24
		Depth (ft):	0.0 - 1.5
Sample Description:	LEAN CLAY (CL), red brown		

Equipment Used:

Balance:	S&ME ID#:	32723	Readability:	0.01-g	Calibration Date:	01/24/24
Oven:	S&ME ID#:	24438			Calibration Date:	02/09/24
Muffle Furnace:	S&ME ID#:	24239			Calibration Date:	02/13/24

Moisture Content Determination

Oven Temperature **105-115 °C**		*Tare #*	TIN
t	Tare Weight *(Dish plus Cover)*	*grams*	185.75
a	Mass of ***As-Received*** Specimen + Tare Wt.		382.37
b	Mass of Oven Dry Specimen + Tare Wt.	*grams*	350.02
w	Water Weight	*(a-b)*	32.35
A	Mass of As-Received Specimen	*(a-t)*	196.62
B	Mass of Oven Dry Specimen	*(b-t)*	164.27
% Moisture Content as a % of As Received or Total Mass		*(w/A)*100*	**16.5%**
% Moisture Content as a % of Oven-dried Mass		*(w/B)*100*	**19.7%**

Method A (440°C) or B (750°C): Ash Content and Organic Matter Determination

Furnace Temperature: **°C** *(at test)*		*Tare #*	CERAMIC
t	Tare Weight *(Dish plus Cover)*	*grams*	87.61
b	Mass of Oven Dry Specimen + Tare Wt.	*grams*	123.49
c	Ash Weight + Tare Wt.	*grams*	122.50
C	Ash Weight	*c-t*	34.89
B	Mass of Oven Dry Specimen	*(b-t)*	35.88
D	***% Ash Content***	*(C/B)*100*	**97.2%**
	% Organic Matter	*100-D*	**2.8%**
	Duration of Specimen in Furnace	*minutes*	360

Notes / Deviations / References:

Jacob Folsom	Jacob Folsom	Laboratory Services Manager	03/18/24
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D698-2
Revision No. 1LEXeH
Revision Date: 01/08/24

MOISTURE - DENSITY REPORT

Note: An oversize correction, found in bottom right box, applies to these density/moisture values.

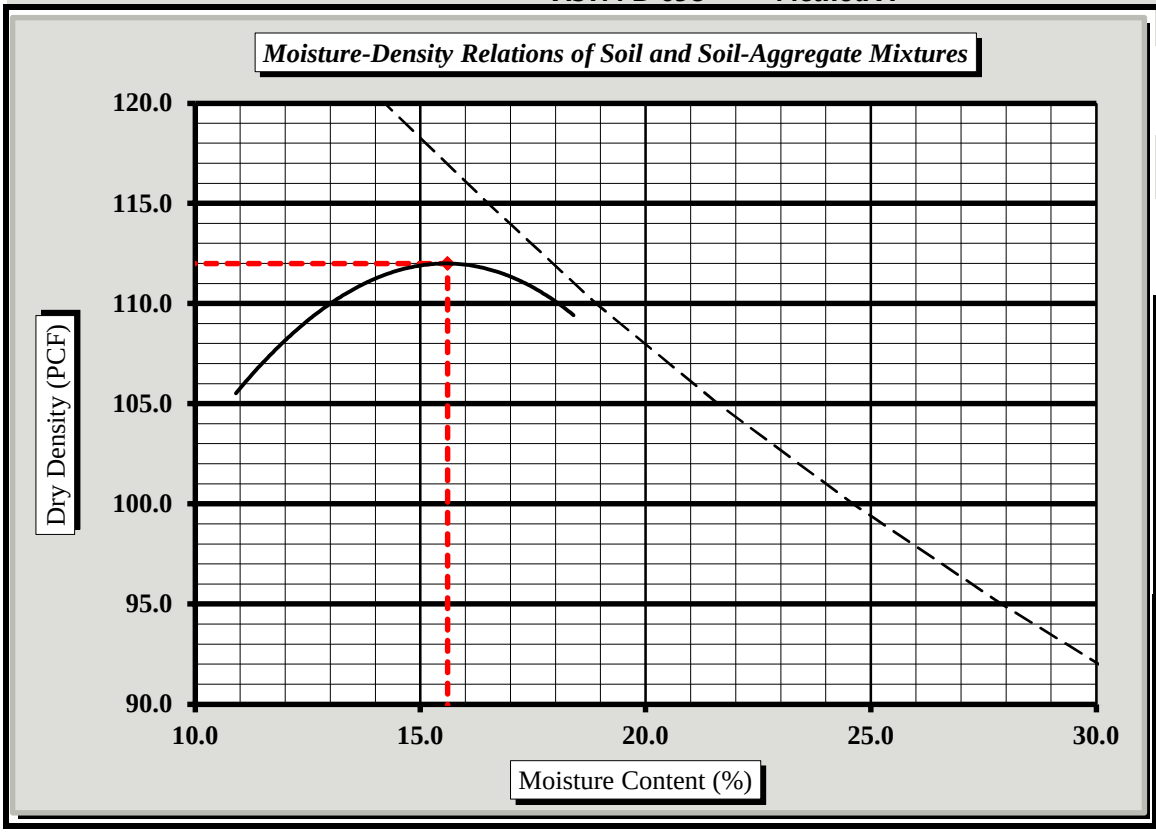
Quality Assurance ASTM D 698 Method A

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project #:	23360111	Report Date:	03/11/24
Project Name:	EKPC Cooper Combined Cycle Plant	Test Date(s):	02/26/24
Client Name:	East Kentucky Power Cooperative		
Client Address:	4775 Lexington Rd., Winchester, KY 40391		
	Sample No.: BK-1	Sample Date:	02/20/24
Location:	B-09	Depth (ft.):	3
Sample Description:	LEAN CLAY WITH GRAVEL(CL), red brown		

Maximum Dry Density 112.0 PCF. Optimum Moisture Content 15.6%

ASTM D 698 - - Method A



Soil Properties

As Received MC	27.4%
Specific Gravity Soil:*	2.650
Liquid Limit	41
Plastic Limit	17
Plastic Index	24

% Passing	
3/4"	ND
3/8"	ND
#4	85%
#10	ND
#40	ND
#60	ND
#200	ND

Oversize Fraction	
Bulk Gravity	2.545
% Moisture	1.3%
% Oversize	15%
MDD	**117.1**
Opt. MC	**13.6%**

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐

Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐

Mechanical Rammer ☒ circular face Manual Rammer ☐ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations: NA = Not Applicable; ND = Not Determined. *Specific gravity of soil assumed.
Percent retained on separating sieve estimated from Proctor sample separation operations.

Jacob Folsom	Jacob Folsom	Lab Services Manager	3/18/2024
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D698-2
Revision No. 1LEXeH
Revision Date: 01/08/24

MOISTURE - DENSITY REPORT

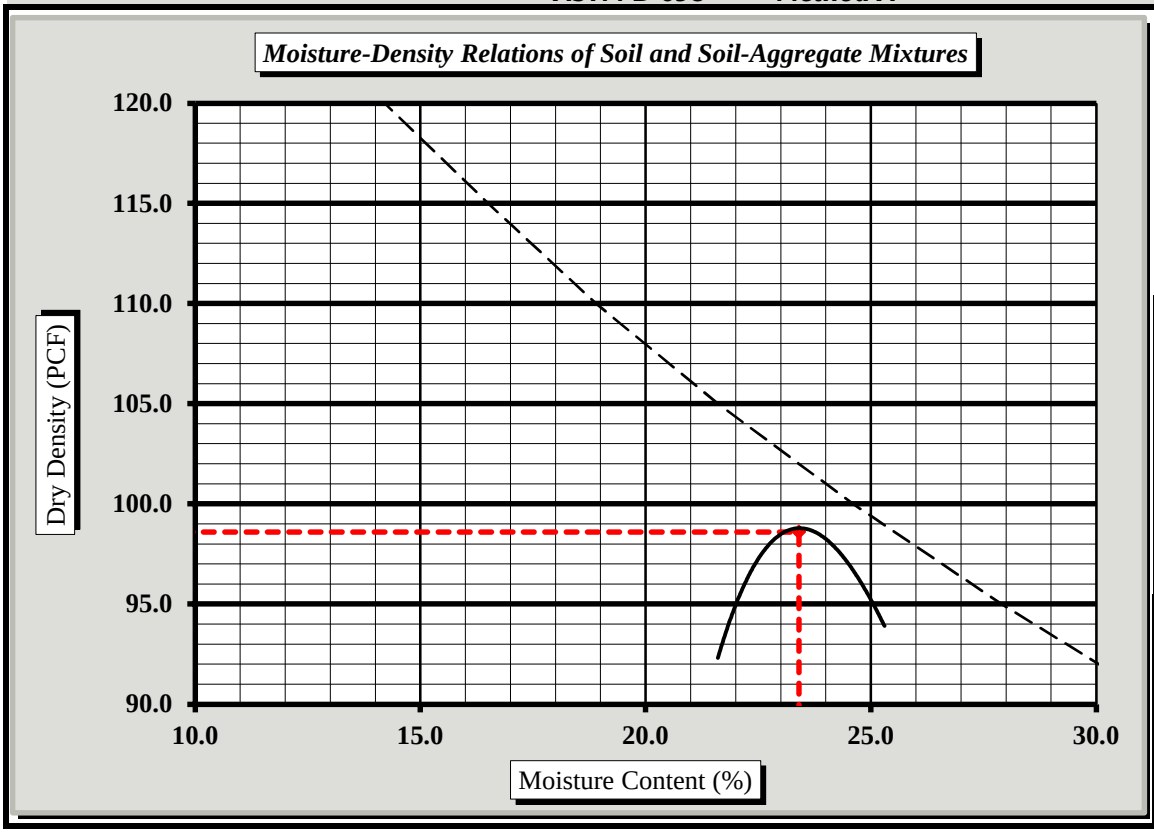
Quality Assurance ASTM D 698 Method A

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project #:	23360111	Report Date:	03/12/24
Project Name:	EKPC Cooper Combined Cycle Plant	Test Date(s):	03/06/24
Client Name:	East Kentucky Power Cooperative		
Client Address:	4775 Lexington Rd., Winchester, KY 40391		
	Sample No.: BK-1	Sample Date:	02/20/24
Location:	B-14	Depth (ft.):	3
Sample Description:	FAT CLAY (CH), brown red		

Maximum Dry Density 98.6 PCF. Optimum Moisture Content 23.4%

ASTM D 698 - - Method A



Soil Properties

As Received MC	26.5%
Specific Gravity Soil:*	2.650
Liquid Limit	74
Plastic Limit	23
Plastic Index	51

% Passing	
3/4"	ND
3/8"	ND
#4	97%
#10	ND
#40	ND
#60	ND
#200	ND

Oversize Fraction	
Bulk Gravity	ND
% Moisture	ND
% Oversize	3%
MDD	NA
Opt. MC	NA

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐

Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐

Mechanical Rammer ☒ circular face Manual Rammer ☐ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations: NA = Not Applicable; ND = Not Determined. *Specific gravity of soil assumed.
Percent retained on separating sieve estimated from Proctor sample separation operations.

Jacob Folsom	Jacob Folsom	Lab Services Manager	3/18/2024
Technical Responsibility	*Signature*	*Position*	*Date*

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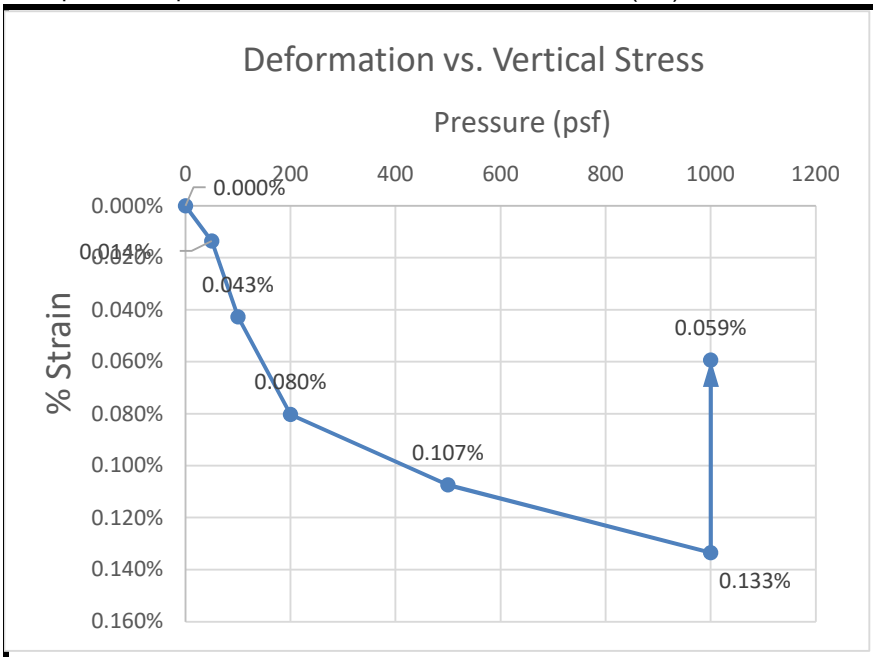
Form No: TR-1830-D4546R
Revision No. 1
Revision Date: 11/14/23

Single-Point Wetting After Loading

ASTM D4546 Method A

S&ME, Inc. - Lexington:	2020 Liberty Road, Suite 105, Lexington, KY 40505		
Project #:	23360111	Report Date:	03/11/24
Project Name:	EKPC Cooper Combined Cycle Plant	Test Date(s):	03/07/24
Client Name:	East Kentucky Power Cooperative		
Client Address:	4775 Lexington Rd., Winchester, KY 40391		
		Sample Date:	02/20/24
Location:	B-09	Depth (ft):	3.0
Sample Description:	LEAN CLAY WITH GRAVEL (CL), red brown		



Initial		
Height	0.9593	in
Moisture Content	12.8%	%
Wet Density	117.4	pcf
Dry Density	104.1	pcf
Void Ratio	0.616	
Saturation	56.1%	%
Final		
Height	0.9587	in
Moisture Content	20.0%	%
Wet Density	125.0	pcf
Dry Density	104.2	pcf
Void Ratio	0.615	
Saturation	87.7%	%

LL:	41	PL:	17	% Gravel	14.0%	% Sand ND	% Fines ND

Type/Source of Water: Distilled; Highbridge Springs	Δ between Consolidation and Inundation		
Preparation: Remolded	Height After Consolidation	0.9580	in
Maximum Dry Density: 112.0 pcf	% Strain After Consolidation	0.13%	
Optimum Moisture Content 15.6%	% Strain After Inundation	0.06%	
	Δ% Swell	**0.07%**	

Notes / Deviations / References: Volumetrics based on an assumed specific gravity value of 2.7.

Remolded at 95% of MDD

Jacob Folsom	Jacob Folsom	Lab Services Manager	3/18/2024
Technical Responsibility	*Signature*	*Position*	*Date*

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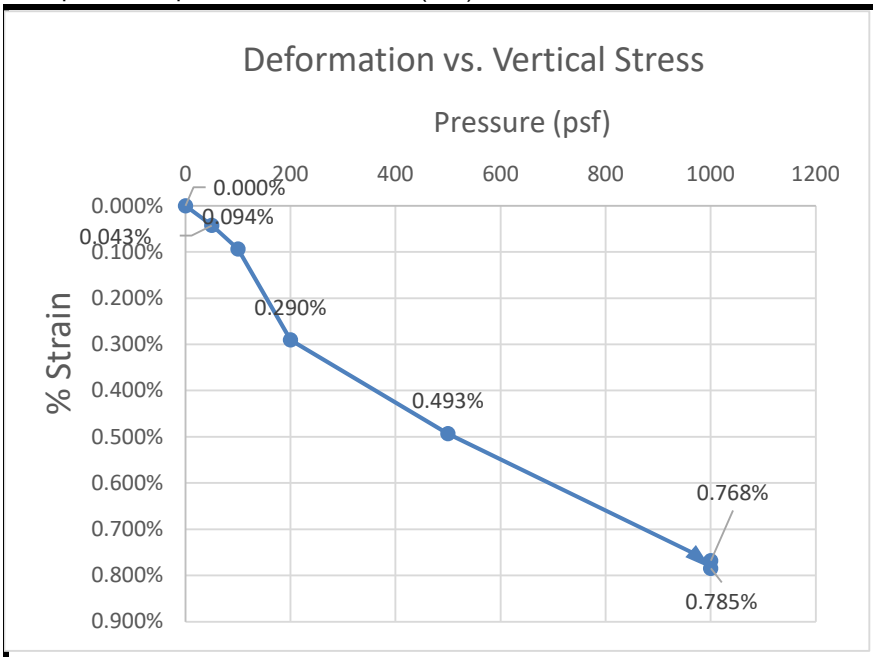
Form No: TR-1830-D4546R
Revision No. 1
Revision Date: 11/14/23

Single-Point Wetting After Loading

ASTM D4546 Method B

S&ME, Inc. - Lexington:	2020 Liberty Road, Suite 105, Lexington, KY 40505		
Project #:	23360111	Report Date:	03/11/24
Project Name:	EKPC Cooper Combined Cycle Plant	Test Date(s):	03/07/24
Client Name:	East Kentucky Power Cooperative		
Client Address:	4775 Lexington Rd., Winchester, KY 40391		
		Sample Date:	02/20/24
Location:	B-14	Depth (ft):	0.3
Sample Description:	FAT CLAY (CH), brown red		



Initial		
Height	0.9608	in
Moisture Content	20.1%	%
Wet Density	112.4	pcf
Dry Density	93.6	pcf
Void Ratio	0.798	
Saturation	68.0%	%
Final		
Height	0.9532	in
Moisture Content	25.6%	%
Wet Density	118.4	pcf
Dry Density	94.3	pcf
Void Ratio	0.784	
Saturation	88.0%	%

LL:	74	PL:	23	% Gravel	3.0%	% Sand ND	% Fines ND

Type/Source of Water: Distilled; Highbridge Springs		
Preparation: Remolded		
Maximum Dry Density: 98.6 pcf		
Optimum Moisture Content: 23.4%		

Δ between Consolidation and Inundation		
Height After Consolidation	0.9534	in
% Strain After Consolidation	0.77%	
% Strain After Inundation	0.78%	
Δ% Collapse	**0.02%**	

Notes / Deviations / References: Volumetrics based on an assumed specific gravity value of 2.7.

Remolded at 95% of MDD

Jacob Folsom	Jacob Folsom	Lab Services Manager	3/18/2024
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No: TR-2310LEX-G57-T289-R
Revision No. 0
Revision Date: 04/16/21

LEAST ELECTRICAL RESISTIVTY AND pH FOR CORROSION

Electrical resistivity by Wenner 4-Pin

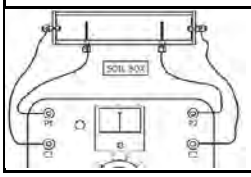
Quality Assurance ASTM G57, AASHTO T 289

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project #:	**23360111**	Report Date:	03/11/24
Project Name:	EKPC Cooper Combined Cycle Plant	Test Date(s):	03/05/24
Client Name:	East Kentucky Power Cooperative		
Client Address:	4775 Lexington Rd., Winchester, KY 40391		
		Sample Date:	02/20/24

Boring/Location	Depth (ft.)	pH	Least Electrical Resistivity, Ω-cm	Water content for ER measurement
B-02	4.0 - 6.0	6.7	2,100	17.5%
B-05	10.5 - 12.5	4.5	2,620	29.7%
B-09	3.5 - 5.0	7.6	1,890	34.7%
B-13	3.0 - 5.0	6.4	2,450	42.0%

Electrical Resistivity Method



A voltage is impressed between the outer electrodes, and the voltage drop between the inner electrodes is measured using a voltmeter.

RESISTIVITY, ρ, Ω*cm = (R) * A / a

a, inner electrode spacing, cm : 7.2

A, cross sectional area perpendicualr to flow, cm^2: 7.2

Notes / Deviations / References:

J. Folsom	Jacob Folsom	Lab Services Manager	3/18/2024
Technical Responsibility	*Signature*	*Position*	*Date*

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eurofins | Environment Testing

March 13, 2024

Jacob Folsom
S&ME, Inc.

862 E Crescentville RD, West
Lexington KY 40505

RE: Cooper

Dear Jacob Folsom: Order No: 2403618

Eurofins Environment Testing Southeast-Atlanta, LLC (EETSE-Atlanta) received 4 samples on March 6, 2024 3:00 pm for the analyses presented in following report.

No problems were encountered during the analyses except as noted in the Case Narrative or by qualifiers in the report or QC Summary. Additionally, all results for the associated Quality Control samples were within EPA and/or EETSE-Atlanta established limits.

EETSE-Atlanta accreditations are as follows:

-NELAP/State of Florida Laboratory ID E87582 for analysis of Non-Potable Water, Solid & Chemical Materials, Air & Emissions Volatile Organics, and Drinking Water Microbiology & Metals, effective 07/01/23-06/30/24.

-State of Georgia, Department of Natural Resources ID #800 for analysis of Drinking Water Metals, effective through 06/30/24 and Total Coliforms/ E. coli, effective 04/25/23-04/24/24.

-AIHA LAP, LLC Laboratory ID: 100671 for Industrial Hygiene samples (Metals and PCM Asbestos), Environmental Lead (Paint, Soil, Dust Wipes, Air), and Environmental Microbiology (Fungal) Direct Examination, effective until 11/01/25.

These results relate only to the items tested as received. This report may only be reproduced in full.

If you have any questions regarding these test results, please feel free to call.

Sincerely,

Hunter Maddux

Hunter Maddux
Project Manager

ANALYTICAL ENVIRONMENTAL SERVICES, INC.
3080 Presidential Drive Atlanta, GA 30340-3704
Phone: (770) 457-8177 / Toll-Free: (800) 972-4889 / Fax: (770) 457-8188

CHAIN OF CUSTODY

Work Order: 2403618

Date: 3/4/24 Page 1 of 1

COMPANY: S&ME INC

ADDRESS: 2020 Liberty Rd. Suite 105 Lexington, KY 40505

PHONE: 859-536-4839

EMAIL: jfolsom@smeinc.com

SAMPLED BY:

SIGNATURE:

Visit our website www.aesatlanta.com for downloadable COCs and to log in to your AESAccess account.

ANALYSIS REQUESTED / PRESERVATION (see codes)

#	SAMPLE ID	SAMPLED: DATE	SAMPLED: TIME	GRAB	COMPOSITE	MATRIX (see codes)	SULFATES	SULFIDES	CHLORIDES	REDOX										REMARKS	Number of Containers
1	B-2 4'	2/20/24	12:00 pm			SO	✔	✔	✔	✔											1
2	B-5 10.5'	2/20/24	12:00 pm			SO	✔	✔	✔	✔											1
3	B-9 3'	2/20/24	12:00 pm			SO	✔	✔	✔	✔											1
4	B-13 3'	2/20/24	12:00 pm			SO	✔	✔	✔	✔											1
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					
13																					
14																					

RELINQUISHED BY: DATE/TIME:
1.
2.
3.

RECEIVED BY: DATE/TIME:
1. 3/26/24 1500
2.
3.

SPECIAL INSTRUCTIONS/COMMENTS:

SHIPMENT METHOD
OUT: / / VIA:
IN: / / VIA:
client FedEx UPS US mail courier
other: _____

PROJECT INFORMATION
PROJECT NAME: Cooper
PROJECT #: 23360111
SITE ADDRESS:
SEND REPORT TO: njones@smeinc.com
INVOICE TO (IF DIFFERENT FROM ABOVE):
QUOTE #: _____ PO#: _____

RECEIPT
Total # of Containers 4

Turnaround Time (TAT) Request
- [x] Standard
- [ ] 2 Business Day Rush
- [ ] Next Business Day Rush
- [ ] Same-Day Rush (auth req.)
- [ ] Other _____

STATE PROGRAM (if any): _____
E-mail? ☐ Fax? ☐
DATA PACKAGE: I ○ II ○ III ○ IV ○

Submission of samples to the laboratory constitutes acceptance of AES's Terms & Conditions. Client assumes sole responsibility for damage or loss of samples before we accept them. Samples received after 3PM or on Saturday are considered as received the following business day. If no TAT is marked on COC, AES will proceed with standard TAT. Samples are disposed of 30 days after completion of report unless other arrangements are made.

7.11.18_CO

Matrix Codes: A = Air GW = Groundwater SE = Sediment SO = Soil SW = Surface Water ST=Stormwater WW = Waste Water W = Water (Blanks) DW = Drinking Water (Blanks) O = Other (specify)

Preservative Codes: H+I = Hydrochloric acid + ice I = Ice only N = Nitric acid S+I = Sulfuric acid + ice S/M+I = Sodium Bisulfate/Methanol + ice O = Other (specify) NA = None

White Copy - Original; Yellow Copy - Client

eurofins | Environment Testing

Date: 12-Mar-24

Client: S&ME, Inc.
Project Name: Cooper
Lab ID: 2403618

Case Narrative

Sample Receiving Nonconformance:

Samples for work order 2403618 were received at ambient temperature, outside required temperature range of 0-6°C. No ice or melted ice was present. Laboratory proceeded with analysis per Joseph LaMothe via email 3/4/24.

Sample collection date/time on the Chain of Custody did not match that on the sample bottles for all samples in work order 2403618. Collection date/time was not written on the sample containers. Samples were logged in using the information on the COC.

Samples for work order 2403618 were received outside EPA/Method specified holding time of 7 days for method SW9030. Laboratory proceeded with analysis per Joseph LaMothe via email 3/4.

Oxidation/Reduction Potential in Water by Method SM2580B or Soil by Method ASTM G200-9:

Samples for Oxidation/Reduction Potential were received and analyzed outside holding time requirement of "immediate or 15 minutes".

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Date: 12-Mar-24

Client:	S&ME, Inc.	**Client Sample ID:**	B-2 4'
Project Name:	Cooper	**Collection Date:**	2/20/2024 12:00:00 PM
Lab ID:	2403618-001	**Matrix:**	Soil

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**			
Sulfide	BRL	43.3	H	mg/Kg-dry	372806	1	03/12/2024 13:34	AA
Oxidation/Reduction Potential by ASTM G200-9								
Oxidation-Reduction Potential	46	1.0	H	mV	R540194	1	03/12/2024 13:30	AH
Oxidation-Reduction Potential	42	1.0	H	mV	R540194	1	03/12/2024 13:30	AH
Oxidation-Reduction Potential	61	1.0	H	mV	R540194	1	03/12/2024 13:30	AH
ION SCAN SW9056A					**(SW9056A)**			
Chloride	BRL	11		mg/Kg-dry	372718	1	03/09/2024 00:50	JO
Sulfate	640	110		mg/Kg-dry	372718	10	03/09/2024 12:03	JO
PERCENT MOISTURE D2216								
Percent Moisture	11.1	0		wt%	R540043	1	03/11/2024 00:00	IG

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated (value above quantitation range)
BRL	Below reporting limit	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	Narr	See case narrative
N	Analyte not NELAC certified	F	Analyzed in the lab which is a deviation from the method
B	Analyte detected in the associated method blank	<	Less than Result value
>	Greater than Result value	J	Estimated value detected below Reporting Limit

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Date: 12-Mar-24

Client:	S&ME, Inc.	**Client Sample ID:**	B-5 10.5'
Project Name:	Cooper	**Collection Date:**	2/20/2024 12:00:00 PM
Lab ID:	2403618-002	**Matrix:**	Soil

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**			
Sulfide	BRL	40.8	H	mg/Kg-dry	372806	1	03/12/2024 13:34	AA
Oxidation/Reduction Potential by ASTM G200-9								
Oxidation-Reduction Potential	190	1.0	H	mV	R540194	1	03/12/2024 13:30	AH
Oxidation-Reduction Potential	180	1.0	H	mV	R540194	1	03/12/2024 13:30	AH
Oxidation-Reduction Potential	170	1.0	H	mV	R540194	1	03/12/2024 13:30	AH
ION SCAN SW9056A					**(SW9056A)**			
Chloride	BRL	11		mg/Kg-dry	372718	1	03/09/2024 01:02	JO
Sulfate	500	11		mg/Kg-dry	372718	1	03/09/2024 01:02	JO
PERCENT MOISTURE D2216								
Percent Moisture	6.69	0		wt%	R540043	1	03/11/2024 00:00	IG

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated (value above quantitation range)
BRL	Below reporting limit	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	Narr	See case narrative
N	Analyte not NELAC certified	F	Analyzed in the lab which is a deviation from the method
B	Analyte detected in the associated method blank	<	Less than Result value
>	Greater than Result value	J	Estimated value detected below Reporting Limit

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Date: 12-Mar-24

Client:	S&ME, Inc.	**Client Sample ID:**	B-9 3'
Project Name:	Cooper	**Collection Date:**	2/20/2024 12:00:00 PM
Lab ID:	2403618-003	**Matrix:**	Soil

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**			
Sulfide	BRL	47.6	H	mg/Kg-dry	372806	1	03/12/2024 13:34	AA
Oxidation/Reduction Potential by ASTM G200-9								
Oxidation-Reduction Potential	110	1.0	H	mV	R540194	1	03/12/2024 13:30	AH
Oxidation-Reduction Potential	91	1.0	H	mV	R540194	1	03/12/2024 13:30	AH
Oxidation-Reduction Potential	89	1.0	H	mV	R540194	1	03/12/2024 13:30	AH
ION SCAN SW9056A					**(SW9056A)**			
Chloride	17	12		mg/Kg-dry	372718	1	03/09/2024 01:14	JO
Sulfate	210	12		mg/Kg-dry	372718	1	03/09/2024 01:14	JO
PERCENT MOISTURE D2216								
Percent Moisture	16.8	0		wt%	R540043	1	03/11/2024 00:00	IG

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated (value above quantitation range)
BRL	Below reporting limit	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	Narr	See case narrative
N	Analyte not NELAC certified	F	Analyzed in the lab which is a deviation from the method
B	Analyte detected in the associated method blank	<	Less than Result value
>	Greater than Result value	J	Estimated value detected below Reporting Limit

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Date: 12-Mar-24

Client:	S&ME, Inc.	**Client Sample ID:**	B-13 3'
Project Name:	Cooper	**Collection Date:**	2/20/2024 12:00:00 PM
Lab ID:	2403618-004	**Matrix:**	Soil

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**			
Sulfide	BRL	46.3	H	mg/Kg-dry	372806	1	03/12/2024 13:34	AA
Oxidation/Reduction Potential by ASTM G200-9								
Oxidation-Reduction Potential	130	1.0	H	mV	R540194	1	03/12/2024 13:30	AH
Oxidation-Reduction Potential	120	1.0	H	mV	R540194	1	03/12/2024 13:30	AH
Oxidation-Reduction Potential	120	1.0	H	mV	R540194	1	03/12/2024 13:30	AH
ION SCAN SW9056A					**(SW9056A)**			
Chloride	BRL	12		mg/Kg-dry	372718	1	03/09/2024 01:26	JO
Sulfate	59	12		mg/Kg-dry	372718	1	03/09/2024 01:26	JO
PERCENT MOISTURE D2216								
Percent Moisture	16.0	0		wt%	R540043	1	03/11/2024 00:00	IG

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated (value above quantitation range)
BRL	Below reporting limit	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	Narr	See case narrative
N	Analyte not NELAC certified	F	Analyzed in the lab which is a deviation from the method
B	Analyte detected in the associated method blank	<	Less than Result value
>	Greater than Result value	J	Estimated value detected below Reporting Limit

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Clear | Save as

SAMPLE/COOLER RECEIPT CHECKLIST

1. Client Name: **S&ME** AES Work Order Number: **2403618**

2. Carrier: FedEx ☑ UPS ☐ USPS ☐ Client ☐ Courier ☐ Other _____

		Yes	No	N/A	Details	Comments
3.	Shipping container/cooler received in good condition?	●	○	○	damaged ☐ leaking ☐ other ☐	
4.	Custody seals present on shipping container?	○	●	○		
5.	Custody seals intact on shipping container?	○	○	●		
6.	Cooler temperature(s) within limits of 0-6°C? [See item 12 for temperature recordings.]	○	●	○		
7.	Chain of Custody (COC) present?	●	○	○		
8.	Chain of Custody signed, dated, and timed when relinquished and received?	○	●	○		Not relinquished by client.
9.	Sampler name and/or signature on COC?	○	●	○		
10.	Were all samples received within holding time?	○	●	○		
11.	TAT marked on the COC?	●	○	○	If no TAT indicated, proceeded with standard TAT per Terms & Conditions.	

12. Cooler 1 Temperature AMBIENT °C Cooler 2 Temperature _____ °C Cooler 3 Temperature _____ °C Cooler 4 Temperature _____ °C

Cooler 5 Temperature _____ °C Cooler 6 Temperature _____ °C Cooler 7 Temperature _____ °C Cooler 8 Temperature _____ °C

13. Comments: _____

I certify that I have completed sections 1-13 (dated initials). ZB 03/06/24

		Yes	No	N/A	Details	Comments
14.	Temperature blanks present?	○	●	○		
15.	Were sample containers intact upon receipt?	●	○	○		
16.	Custody seals present on sample containers?	○	●	○		
17.	Custody seals intact on sample containers?	○	○	●		
18.	Do sample container labels match the COC?	○	●	○	incomplete info ☑ illegible ☐ no label ☐ other ☐	
19.	Are analyses requested indicated on the COC?	●	○	○		
20.	Were all of the samples listed on the COC received?	●	○	○	samples received but not listed on COC ☐ samples listed on COC not received ☐	
21.	Was the sample collection date/time noted?	●	○	○		
22.	Did we receive sufficient sample volume for indicated analyses?	●	○	○		
23.	Were samples received in appropriate containers?	●	○	○		
24.	Were VOA samples received without headspace (< 1/4" bubble)?	○	○	●		
25.	Were trip blanks submitted?	○	○	●	listed on COC ☐ not listed on COC ☐	

26. Comments: _____

I certify that I have completed sections 14-26 (dated initials). DE 3/07/24

This section only applies to samples where pH can be checked at Sample Receipt.

		Yes	No	N/A	Details	Comments
27.	Have containers needing chemical preservation been checked?*	○	○	●		
28.	Containers meet preservation guidelines?	○	○	●		
29.	Was pH adjusted at Sample Receipt?	○	○	●		

***Note: Certain analyses require chemical preservation but must be checked in the laboratory and not upon Sample Receipt such as Coliforms, VOCs and Oil & Grease/TPH. This also excludes metals by EPA 200.7, 200.8 and 245.1 which will be verified between 16 and 24 hours after preservation.**

I certify that I have completed sections 27-29(dated initials). DE 3/07/24

Locked

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Date: 13-Mar-24

Client: S&ME, Inc.
Project Name: Cooper
Lab Order: 2403618

Dates Report

Lab Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	TCLP Date	Prep Date	Analysis Date
2403618-001A	B-2 4'	2/20/2024 12:00:00PM	Soil	Sulfide		3/12/2024 10:35:00 AM	03/12/2024
2403618-001A	B-2 4'	2/20/2024 12:00:00PM	Soil	ION SCAN		3/8/2024 3:00:00 PM	03/09/2024
2403618-001A	B-2 4'	2/20/2024 12:00:00PM	Soil	PERCENT MOISTURE			03/11/2024
2403618-001A	B-2 4'	2/20/2024 12:00:00PM	Soil	Oxidation/Reduction Potential in Soil			03/12/2024
2403618-001B	B-2 4'	2/20/2024 12:00:00PM	Soil	Oxidation/Reduction Potential in Soil			03/12/2024
2403618-001C	B-2 4'	2/20/2024 12:00:00PM	Soil	Oxidation/Reduction Potential in Soil			03/12/2024
2403618-002A	B-5 10.5'	2/20/2024 12:00:00PM	Soil	Sulfide		3/12/2024 10:35:00 AM	03/12/2024
2403618-002A	B-5 10.5'	2/20/2024 12:00:00PM	Soil	ION SCAN		3/8/2024 3:00:00 PM	03/09/2024
2403618-002A	B-5 10.5'	2/20/2024 12:00:00PM	Soil	PERCENT MOISTURE			03/11/2024
2403618-002A	B-5 10.5'	2/20/2024 12:00:00PM	Soil	Oxidation/Reduction Potential in Soil			03/12/2024
2403618-002B	B-5 10.5'	2/20/2024 12:00:00PM	Soil	Oxidation/Reduction Potential in Soil			03/12/2024
2403618-002C	B-5 10.5'	2/20/2024 12:00:00PM	Soil	Oxidation/Reduction Potential in Soil			03/12/2024
2403618-003A	B-9 3'	2/20/2024 12:00:00PM	Soil	Sulfide		3/12/2024 10:35:00 AM	03/12/2024
2403618-003A	B-9 3'	2/20/2024 12:00:00PM	Soil	ION SCAN		3/8/2024 3:00:00 PM	03/09/2024
2403618-003A	B-9 3'	2/20/2024 12:00:00PM	Soil	PERCENT MOISTURE			03/11/2024
2403618-003A	B-9 3'	2/20/2024 12:00:00PM	Soil	Oxidation/Reduction Potential in Soil			03/12/2024
2403618-003B	B-9 3'	2/20/2024 12:00:00PM	Soil	Oxidation/Reduction Potential in Soil			03/12/2024
2403618-003C	B-9 3'	2/20/2024 12:00:00PM	Soil	Oxidation/Reduction Potential in Soil			03/12/2024
2403618-004A	B-13 3'	2/20/2024 12:00:00PM	Soil	Sulfide		3/12/2024 10:35:00 AM	03/12/2024
2403618-004A	B-13 3'	2/20/2024 12:00:00PM	Soil	ION SCAN		3/8/2024 3:00:00 PM	03/09/2024
2403618-004A	B-13 3'	2/20/2024 12:00:00PM	Soil	PERCENT MOISTURE			03/11/2024
2403618-004A	B-13 3'	2/20/2024 12:00:00PM	Soil	Oxidation/Reduction Potential in Soil			03/12/2024
2403618-004B	B-13 3'	2/20/2024 12:00:00PM	Soil	Oxidation/Reduction Potential in Soil			03/12/2024
2403618-004C	B-13 3'	2/20/2024 12:00:00PM	Soil	Oxidation/Reduction Potential in Soil			03/12/2024

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Date: 12-Mar-24

Client: S&ME, Inc.
Project Name: Cooper
Workorder: 2403618

ANALYTICAL QC SUMMARY REPORT

BatchID: 372718

Sample ID: **MB-372718** Client ID: Units: **mg/Kg** Prep Date: **03/08/2024** Run No: **540163**
SampleType: **MBLK** TestCode: **ION SCAN SW9056A** BatchID: **372718** Analysis Date: **03/08/2024** Seq No: **12866453**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chloride	BRL	10									
Sulfate	BRL	10									

Sample ID: **LCS-372718** Client ID: Units: **mg/Kg** Prep Date: **03/08/2024** Run No: **540163**
SampleType: **LCS** TestCode: **ION SCAN SW9056A** BatchID: **372718** Analysis Date: **03/08/2024** Seq No: **12866454**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chloride	97.16	10	100.0		97.2	90	110				
Sulfate	254.8	10	250.0		102	90	110				

Sample ID: **2403456-001AMS** Client ID: Units: **mg/Kg-dry** Prep Date: **03/08/2024** Run No: **540163**
SampleType: **MS** TestCode: **ION SCAN SW9056A** BatchID: **372718** Analysis Date: **03/09/2024** Seq No: **12866456**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chloride	109.4	11	106.7		103	80	120				
Sulfate	313.3	11	266.8	24.23	108	80	120				

Sample ID: **2403456-001AMSD** Client ID: Units: **mg/Kg-dry** Prep Date: **03/08/2024** Run No: **540163**
SampleType: **MSD** TestCode: **ION SCAN SW9056A** BatchID: **372718** Analysis Date: **03/09/2024** Seq No: **12866457**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Chloride	109.6	11	106.7		103	80	120	109.4	0.145	15	
Sulfate	322.2	11	266.8	24.23	112	80	120	313.3	2.79	15	

Qualifiers:

>	Greater than Result value	<	Less than Result value	B	Analyte detected in the associated method blank
BRL	Below reporting limit	E	Estimated (value above quantitation range)	H	Holding times for preparation or analysis exceeded
J	Estimated value detected below Reporting Limit	N	Analyte not NELAC certified	R	RPD outside limits due to matrix
Rpt Lim	Reporting Limit	S	Spike Recovery outside limits due to matrix		

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Date: 12-Mar-24

Client: S&ME, Inc.
Project Name: Cooper
Workorder: 2403618

ANALYTICAL QC SUMMARY REPORT

BatchID: 372806

Sample ID: **MB-372806** Client ID: Units: **mg/Kg** Prep Date: **03/11/2024** Run No: **540096**
SampleType: **MBLK** TestCode: **Sulfide by SW9030B/9034** BatchID: **372806** Analysis Date: **03/11/2024** Seq No: **12864368**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Sulfide	BRL	40.0									

Sample ID: **LCS-372806** Client ID: Units: **mg/Kg** Prep Date: **03/11/2024** Run No: **540096**
SampleType: **LCS** TestCode: **Sulfide by SW9030B/9034** BatchID: **372806** Analysis Date: **03/11/2024** Seq No: **12864369**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Sulfide	1620	40.0	1620		100	70	130				

Sample ID: **2403455-001AMS** Client ID: Units: **mg/Kg-dry** Prep Date: **03/11/2024** Run No: **540096**
SampleType: **MS** TestCode: **Sulfide by SW9030B/9034** BatchID: **372806** Analysis Date: **03/11/2024** Seq No: **12864371**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Sulfide	1806	43.0	1742		104	52.6	125				H

Sample ID: **2403455-001AMSD** Client ID: Units: **mg/Kg-dry** Prep Date: **03/11/2024** Run No: **540096**
SampleType: **MSD** TestCode: **Sulfide by SW9030B/9034** BatchID: **372806** Analysis Date: **03/11/2024** Seq No: **12864372**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Sulfide	1806	43.0	1742		104	52.6	125	1806	0	24.5	H

Qualifiers:

>	Greater than Result value	<	Less than Result value	B	Analyte detected in the associated method blank
BRL	Below reporting limit	E	Estimated (value above quantitation range)	H	Holding times for preparation or analysis exceeded
J	Estimated value detected below Reporting Limit	N	Analyte not NELAC certified	R	RPD outside limits due to matrix
Rpt Lim	Reporting Limit	S	Spike Recovery outside limits due to matrix		

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Date: 12-Mar-24

Client: S&ME, Inc.
Project Name: Cooper
Workorder: 2403618

ANALYTICAL QC SUMMARY REPORT

BatchID: R540194

Sample ID: **LCS-R540194** Client ID: Units: **mV** Prep Date: Run No: **540194**
SampleType: **LCS** TestCode: **Oxidation/Reduction Potential by ASTM G200-9** BatchID: **R540194** Analysis Date: **03/12/2024** Seq No: **12866958**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Oxidation-Reduction Potential	238.5	1.0	240.0		99.4	80	120				

Qualifiers:

>	Greater than Result value	<	Less than Result value	B	Analyte detected in the associated method blank
BRL	Below reporting limit	E	Estimated (value above quantitation range)	H	Holding times for preparation or analysis exceeded
J	Estimated value detected below Reporting Limit	N	Analyte not NELAC certified	R	RPD outside limits due to matrix
Rpt Lim	Reporting Limit	S	Spike Recovery outside limits due to matrix		

End of Report

21239 FM529 Rd., Bldg. F
Cypress, TX 77433
Tel: 281-985-9344
Fax: 832-427-1752
info@geothermusa.com
http://www.geothermusa.com

March 20, 2024

S&ME
1913 Unruh Court,
New Albany, IN 47150
Attn: Nicholas (Nick) R. Jones, P.E.

Re: Thermal Analysis of Native Soil Samples
Cooper – Somerset, KY (Project No. 23360111)

The following is the report of thermal dryout characterization tests conducted on one (1) bulk sample and three (3) tube samples of native soil from the referenced project sent to our laboratory.

Thermal Resistivity Tests: The tube samples were tested 'as is'. The bulk sample was tested at the optimum moisture content and at 95% of the standard Proctor dry density ***provided by S&ME.*** The tests were conducted in accordance with the **IEEE standard 442-2017**. The results are tabulated below and the thermal dryout curves are presented in **Figures 1 to 4.**

Sample ID, Description, Thermal Resistivity, Moisture Content and Density

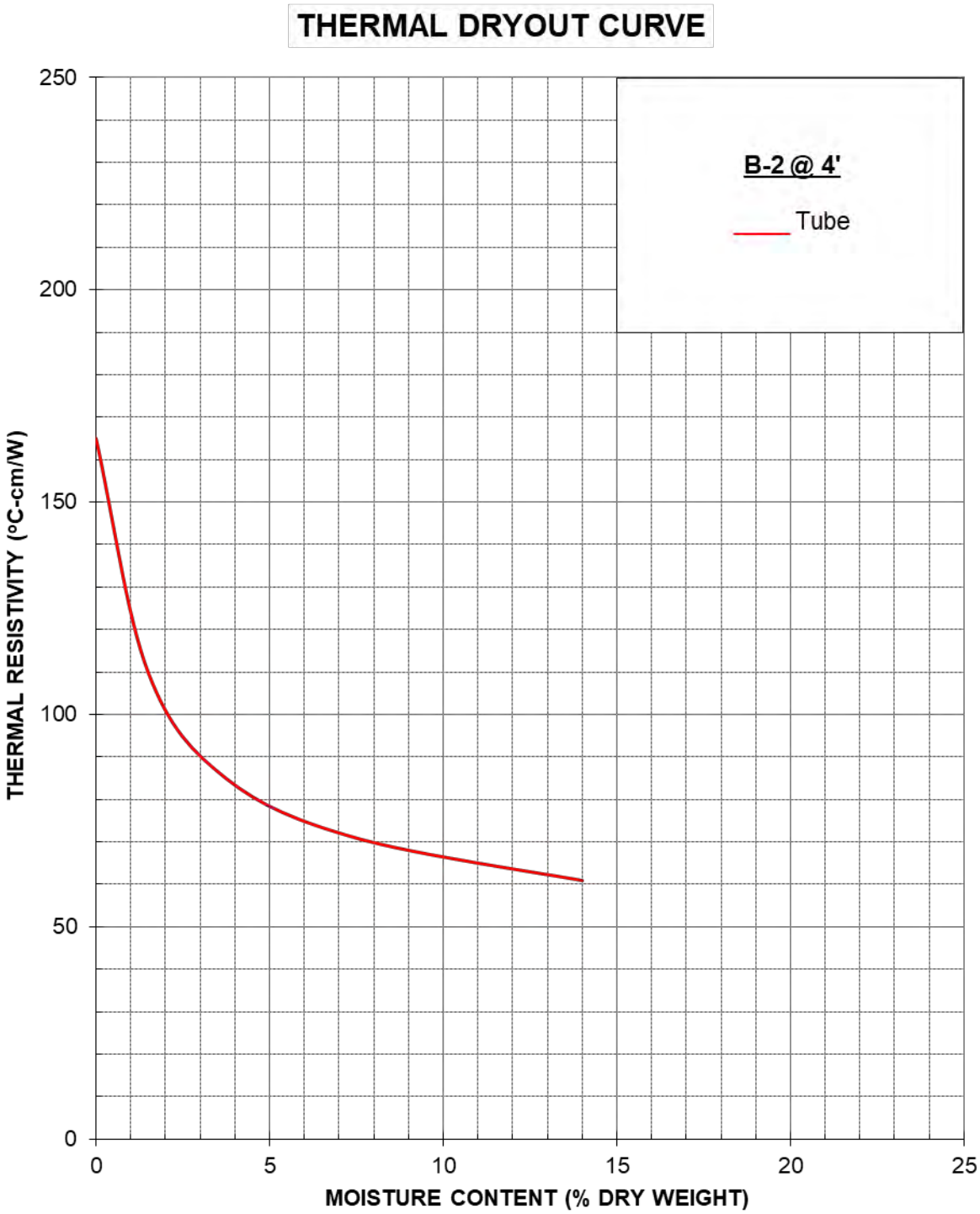
Sample ID	Depth (ft)	Effort (%)	Description (S&ME)	Thermal Resistivity (°C-cm/W)		Moisture Content (%)	Dry Density (lb/ft^3)
				Wet	Dry		
B-2	4	Tube	Clayey Gravel	61	165	14	101
B-5	10.5	Tube	Coal Fragments	509	632	4	63
B-9	3	95	Lean Clay Reddish Brown	54	185	16	106
B-11	3	Tube	Sandy Lean Clay, Red Brown	49	157	19	108

Comments: The thermal characteristic depicted in the dryout curves apply for the soils at their respective test dry density.

Please contact us if you have any questions or if we can be of further assistance.

Geotherm USA

Nimesh Patel



S&ME (Project No. 23360111)

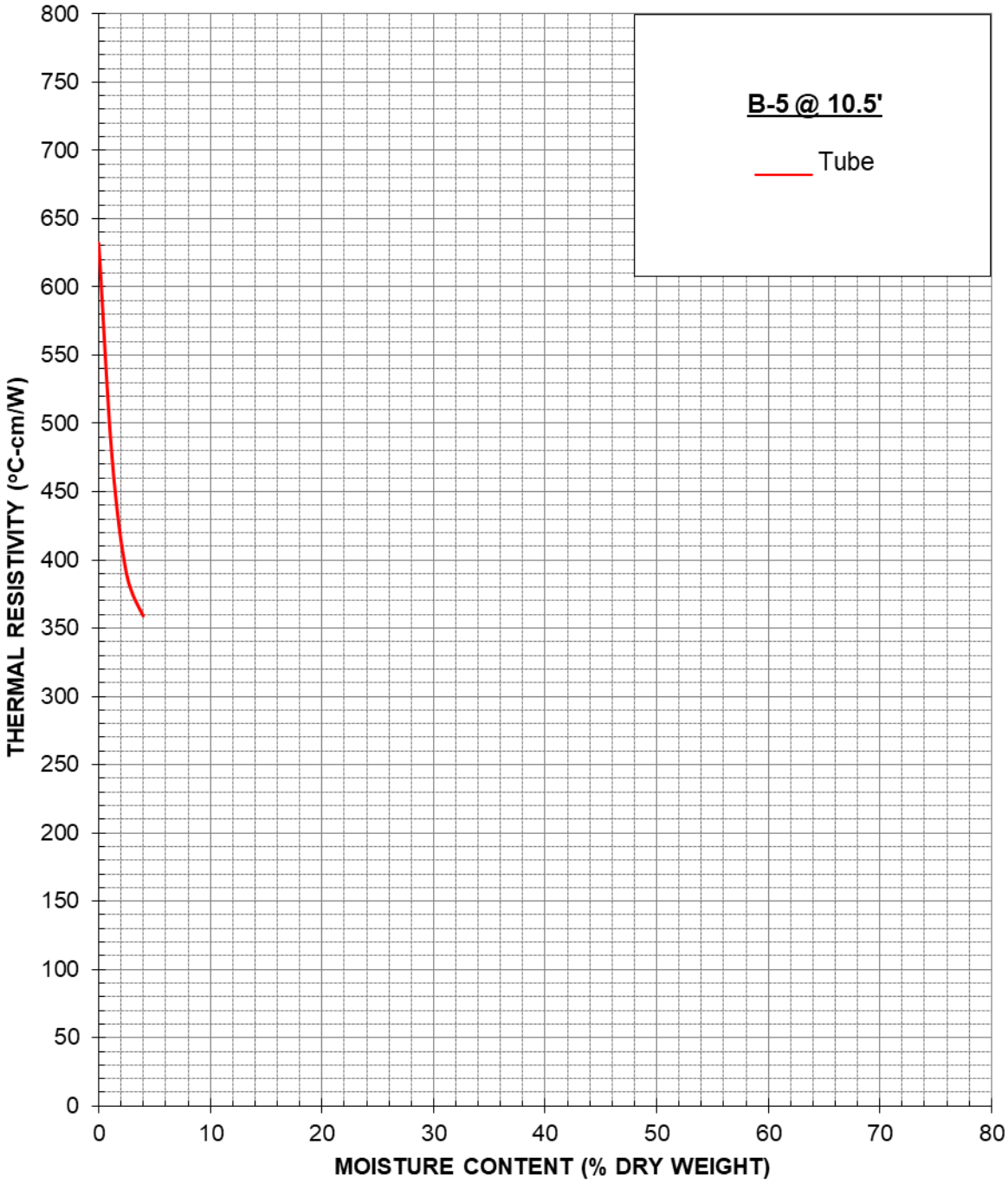
Cooper – Somerset, KY

Thermal Analysis of Native Soil Samples

March 2024 **Figure 1**

Geotherm USA

THERMAL DRYOUT CURVE

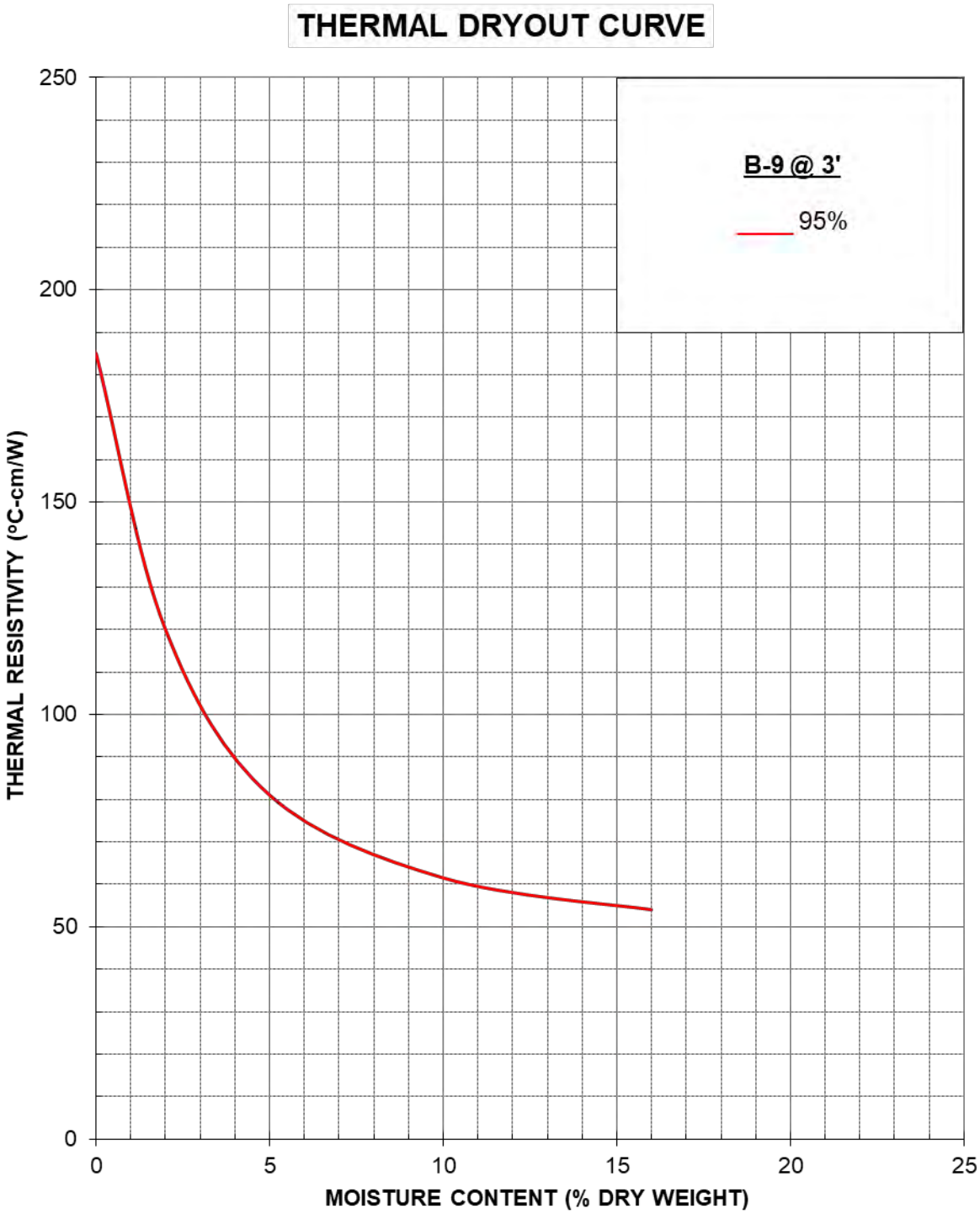


S&ME (Project No. 23360111)

Cooper – Somerset, KY

Thermal Analysis of Native Soil Samples

March 2024 **Figure 2**

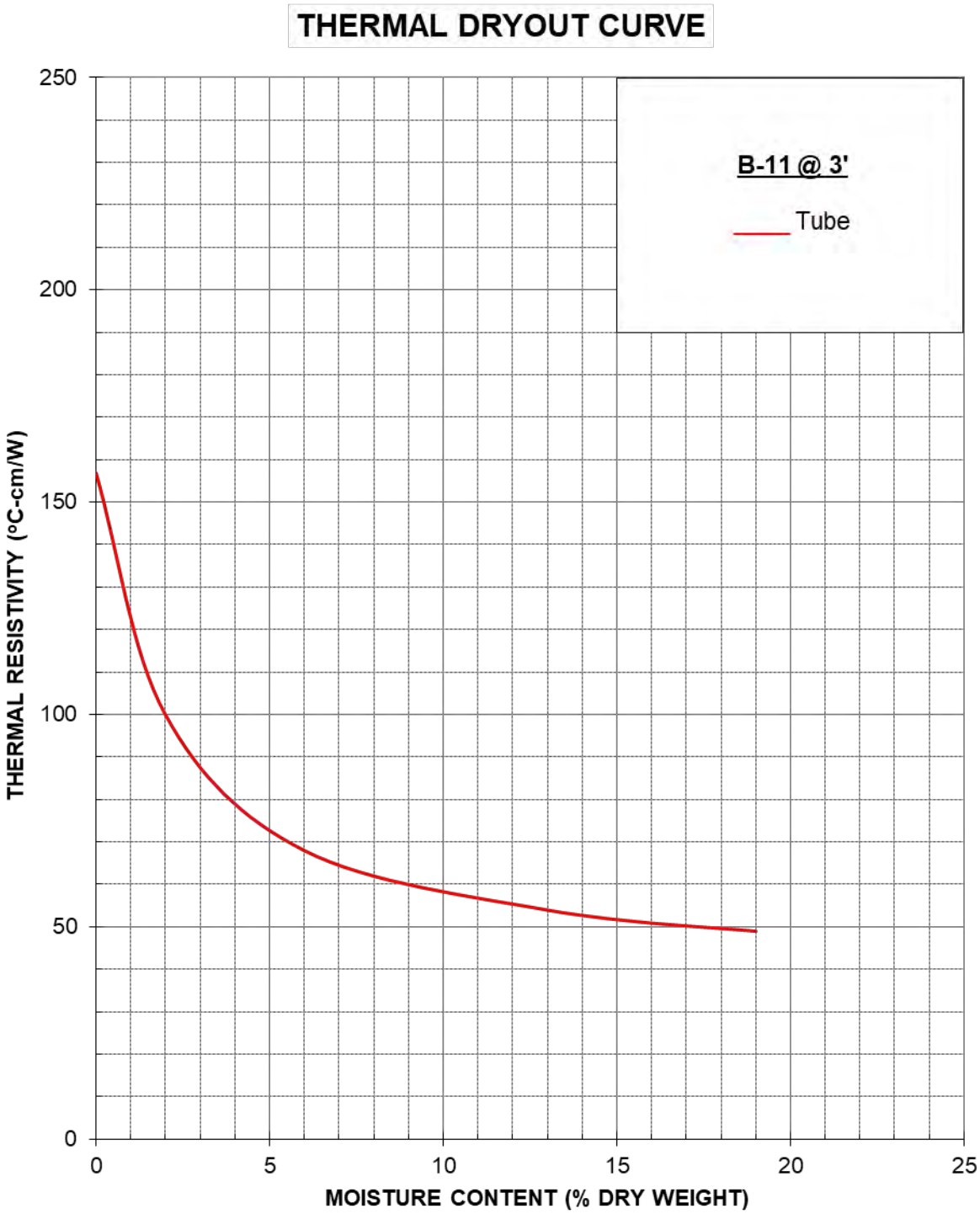


S&ME (Project No. 23360111)

Cooper – Somerset, KY

Thermal Analysis of Native Soil Samples

March 2024 **Figure 3**



S&ME (Project No. 23360111)

Cooper – Somerset, KY

Thermal Analysis of Native Soil Samples

March 2024 **Figure 4**

Summary of Laboratory Procedures

Recovered disturbed and undisturbed samples and the drillers' field logs were transported to the laboratory where they were examined by the geotechnical engineer. Selected samples representative of certain groups of soils were subjected to simple classification tests by hand or other simple means.

Recovered disturbed and undisturbed samples and the drillers' field logs were transported to the laboratory where they were examined by the geotechnical engineer. Selected samples representative of certain groups of soils were subjected to simple classification tests by hand or other simple means. Other samples were tested in the laboratory to determine their strength or consolidation properties.

♦ Laboratory Tests of Soil

Examination of Split Spoon Soil Samples

Soil and rock samples and field boring records were reviewed in the laboratory by the geotechnical engineer. Soils were classified in general accordance with the visual-manual method described in ASTM D 2488, *Standard Practice for Description and Identification of Soils (Visual-Manual Method)*. The geotechnical engineer also prepared the final boring records enclosed with this report.

Moisture Content Testing of Soil Samples by Oven Drying

Moisture content was determined in general conformance with the methods outlined in ASTM D2216, "Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil or Rock by Mass." This method is limited in scope to Group B, C, or D samples of earth materials which do not contain appreciable amounts of organic material, soluble solids such as salt or reactive solids such as cement. This method is also limited to samples which do not contain contamination.

A representative portion of the soil was divided from the sample using one of the methods described in Section 9 of ASTM D2216. The split portion was then placed in a drying oven and heated to approximately 110 degrees C overnight or until a constant mass was achieved after repetitive weighing. The moisture content of the soil was then computed as the mass of water removed from the sample by drying, divided by the mass of the sample dry, times 100 percent. No attempt was made to exclude any particular particle size from the portion split from the sample.

Liquid and Plastic Limits Testing

Atterberg limits of the soils was determined generally following the methods described by ASTM D4318, *Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils*. Albert Atterberg originally defined "limits of consistency" of fine grained soils in terms of their relative ease of deformation at various moisture contents. In current engineering usage, the liquid limit of a soil is defined as the moisture content, in percent, marking the upper limit of viscous flow and the boundary with a semi-liquid state. The plastic limit defines the lower limit of plastic behavior, above which a soil behaves plastically below which it retains its shape upon drying. The plasticity index (PI) is the range of water content over which a soil behaves plastically. Numerically, the PI is the difference between liquid limit and plastic limit values.

Representative portions of fine grained Group A, B, C, or D samples were prepared using the wet method described in Section 10.1 of ASTM D4318. The liquid limit of each sample was determined using the multipoint method (Method A) described in Section 11. The liquid limit is by definition the moisture content where 25 drops of a hand operated liquid limit device are required to close a standard width groove cut in a soil sample placed in the device. After each test, the moisture content of the sample was adjusted and the sample replaced in the device. The test was repeated to provide a minimum of three widely spaced combinations of N versus moisture content. When plotted on semilog paper, the liquid limit moisture content was determined by straight line interpolation between the data points at N equals 25 blows.

The plastic limit was determined using the procedure described in Section 17 of ASTM D4318. A selected portion of the soil used in the liquid limit test was kneaded and rolled by hand until it could no longer be rolled to a 3.2 mm thread on a glass plate. This procedure was repeated until at least 6 grams of material was accumulated, at which point the moisture content was determined using the methods described in ASTM D2216.

Grain Size Analysis of Samples

The distribution of particle sizes greater than 75 µm was determined in general accordance with the procedures described by ASTM D421, *Standard Practice for Dry Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants*, and D422, *Standard Test Method for Particle Size Analysis of Soils*. During preparation samples were divided into two portions. The material coarser than the No. 30 U.S. sieve size fraction was dry sieved through a nest of standard sieves as described in Article 6. Material passing the No. 30 sieve was independently passed through a nest of sieves down to the No. 200 size.

Grain Size Analysis of Samples with Hydrometer

The distribution of particle sizes was determined in general accordance with the procedures described by ASTM D421, *Standard Practice for Dry Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants*, and D422, *Standard Test Method for Particle Size Analysis of Soils*. During preparation samples were divided into two portions. The material coarser than the No. 10 U.S. sieve size fraction was dry sieved through a nest of standard sieves as described in Article 6. Material passing the No. 10 sieve was soaked in demineralized water and a dispersing agent, then the soil-water slurry placed in a glass sedimentation chamber and the specific gravity of the slurry recorded at various time intervals. The grain size distribution was calculated from the time rate of sedimentation of the various size particles. After the final hydrometer reading was obtained, the suspension was washed through the No. 200 sieve. The remaining material retained on the No. 200 sieve was oven dried, and then passed through a standard nest of sieves.

Percent Fines Determination of Samples

A selected specimen of soils was washed over a No. 200 sieve after being thoroughly mixed and dried. This test was conducted in general accordance with ASTM D1140, *Standard Test Method for Amount of Material Finer Than the No. 200 Sieve*. Method A, using water to wash the sample through the sieve without soaking the sample for a prescribed period of time, was used and the percentage by weight of material washing through the sieve was deemed the “percent fines” or percent clay and silt fraction.

Percent Organics (Organic Loss on Ignition)

The content of relatively undecayed or undecomposed vegetative matter in the soils is determined for representative samples of topsoil or stained subsoils using the procedures described by AASHTO T-267, *Determination of Organic Content in Soils by Loss on Ignition*. Representative samples of the minus No. 10 sieve size are dried at 105 C, then heated in a muffle furnace at 455 C for six hours. The resulting dry weight of the sample after ignition is then compared to the pre-ignition dry weight to estimate the organic content.

Compaction Tests of Soils Using Standard Effort

Soil placed as engineering fill is compacted to a dense state to obtain satisfactory engineering properties. Laboratory compaction tests provide the basis for determining the percent compaction and water content needed to achieve the required engineering properties, and for controlling construction to assure the required compaction and water contents are achieved. Test procedures generally followed those described by ASTM D698, *Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 lbf/ft3)*.

The relationship between water content and the dry unit weight is determined for soils compacted in either 4 or 6 inch diameter molds with a 5.5 lbf rammer dropped from a height of 12 inches, producing a compactive effort of 12,400 lbf/ft3. ASTM D 698 provides three alternative procedures depending on material gradation:

Method A (Shall be used if 20 percent or less by weight is retained on No. 4 sieve)

- All material passes No. 4 sieve size
- 4 inch diameter mold
- Soil in 3 layers with 25 blows per layer

Method B (Shall be used if 20 percent by weight is retained on the No. 4 sieve and 20 percent or less by weight is retained on the 3/8-inch sieve)

- All material passes 3/8 inch sieve
- 4 inch diameter mold
- Soil in 3 layers with 25 blows per layer

Method C (Shall be used if more than 20 percent by weight is retained on the 3/8-inch sieve and less than 30 percent is retained on the 3/4-inch sieve)

- All material passes ¾ inch sieve
- 6-inch diameter mold
- Soil in 3 layers with 56 blows per layer

Soil was compacted in the mold in three layers of approximately equal thickness, each compacted with either 25 or 56 blows of the rammer. After compaction of the sample in the mold, the resulting dry density and moisture content was determined and the procedure repeated. Separate soils were used for each sample point, adjusting the moisture content of the soil as described in Section 10.2 (Moist Preparation Method). The procedure was repeated for a sufficient number of water content values to allow the dry density vs. water

content values to be plotted and the maximum dry density and optimum moisture content to be determined from the resulting curvilinear relationship.

Soil pH Testing

Soil pH measures the activity of hydrogen ions in a water solution. The pH scale ranges from 0 (very acidic) to 14 (very alkaline or basic). Test methods follow those given by AASHTO T-289-91(2004), *Determining pH for Soil for Use in Corrosion Testing*.

Moist samples are sieved and pulverized as described in Section 6.2. A 30 mg sample is then suspended in distilled water for one hour. A pH meter is first standardized against a buffer solution of known pH, then the probe immersed in the suspended solution and the pH reading recorded. If the pH of the soil is below 4.5 the soil is reported as aggressive.

Soil Resistivity of Samples

This method is used to evaluate soil resistivity for the control of corrosion of buried structures, both for the estimation of expected corrosion rates and for the design of cathodic protection systems. Laboratory soil resistivity tests were run in general accordance with the procedure laid out in ASTM G57, *Standard Test Method for Field Measurement of Soil Resistivity using the Wenner Four-Electrode Method*. Laboratory tests were performed using Section 7.2.

A soil sample representative of the area of interest was mixed thoroughly and brought to saturation by adding only a sufficient amount of distilled water to produce a slight amount of surface water. The sample was condition overnight allowing excess surface water to evaporate. The saturated stiff slurry sample was placed in the soil box in layers, eliminating air spaces as far as practicable. A voltage was impressed across the outer electrodes. The voltage drop across the inner electrodes was measured with both the current and voltage drop recorded, if a separate ammeter and voltmeter were used. Where a resistivity meter was used, the resistance was read directly. The saturated measurement will provide an approaching minimum resistivity.

Laboratory Sulfate Ion Content Test

External sulfate can occur when concrete is in contact with sulfate containing water e.g. seawater, swamp water, ground water or sewage water. The often massive formation of gypsum and ettringite formed during the external sulfate attack may cause concrete to crack and scale.

Water soluble sulfate ion content is determined using either Method A or B as described by AASHTO T-290-95(2003), *Determining Water-Soluble Sulfate Ion Content in Soil*. Soil specimens were first prepared by splitting and quartering representative portions from recovered samples as described in Section 7.2.

Method A, the Gravimetric Method, determines sulfate content by precipitation of barium sulfate from a heated solution of the soil and chemical reagents. Method B, the Turbidimetric Method, relies on a photoelectric colorimeter to determine the turbidity of a barium sulfate suspension after chemical reagents are added. Laboratory test data sheets will indicate the method used.

Laboratory Chloride Ion Content Test

Water soluble chloride ion content is determined using either Method A or B as described by AASHTO T-291-94(2004), *Determining Water-Soluble chloride Ion Content in Soil*. Soil specimens were first prepared by splitting and quartering representative portions from recovered samples as described in Section 7.2.

Method A, the Mohr Titration Method, determines chloride ion content using silver nitrate in a suspended solution of the soil and distilled water. A reaction between a potassium chromate indicator solution and the silver nitrate produces a red-silver chromate precipitate.

Method B utilizes a pH/mV meter with chloride ion selective electrodes. When inserted into the suspension the meter records the activity of the chloride ions. These readings are compared to a set of calibration curves to determine the ion content in mg/kg.

Consolidation Tests of Undisturbed Samples

The data from the consolidation test are used to estimate the magnitude and rate of both total and differential settlement of a structure or earthfill. In this test method a saturated soil specimen is restrained laterally by a steel mold and loaded axially with total stress increments. As the specimen consolidates, measurements are made of the change in specimen height and plotted vs. time to determine the relationship between the effective stress and void ratio or strain, and the time rate at which consolidation occurs.

Procedures for determining the magnitude and rate of consolidation of laterally restrained soil generally followed those described in ASTM D2435, *Standard Test Method for One-Dimensional Consolidation of Soils*. Undisturbed samples intended for use in consolidation testing were handled as Group C or D samples as described in ASTM D4220. Extruded samples were each trimmed to a disc 2.5 inches in diameter and 1.0 inches thick as described in Section 9. Each disc was confined in a stainless steel ring and sandwiched between two porous stone plates. After application of a seating load of 100 lb/ft2 to confine the specimen, the ring was placed in an oedometer and the sample immersed in water to full saturation.

Prepared specimens were loaded to the desired stress in accordance with one of the standard loading schedules ("A" or "B") described in Section 11.5 and indicated on the attached test reports, then unloaded in four equal decrements. Resulting deformation of the sample was measured using a micrometer dial gage.

Time deformation properties were plotted for each load increment using either the log time or square root of time methods described in Section 12.3 and the coefficient of consolidation Cv computed. Load deformation properties were plotted in terms of either void ratio at 100 percent consolidation for each loading increment vs. applied load or in terms of percentage strain (of initial sample height) vs. applied load plotted on log scale. The preconsolidation stress pc of the specimen was estimated from this plot using the Casagrande construction described in Section 12.4.6. The compression index Cc was estimated from the straight line portion of the semilog consolidation curve, above the preconsolidation stress.

UU or "Q" Triaxial Shear Tests of Undisturbed Samples

Shear tests were performed using the UU or "Q" test method described by ASTM D2850, *Standard Test Method for Unconsolidated-Undrained Triaxial Compression Test on Cohesive Soils*. This test is typically limited to fine-grained soils having a permeability slower than 10^{-3} cm/sec, which are preserved as Group C samples as defined in ASTM D4220. The UU test employs rapid application of both confining and axial stresses

without permitting drainage of pore water. This condition simulates rapid loading of the soil during construction before sufficient time is allowed for the soil to consolidate. UU tests were performed on samples at their "as-received" moisture content, so that results may be applied to "construction conditions" in embankment stability analyses. The extruded sample was encased in a rubber membrane and sealed to the specimen base and cap with rubber O-rings to prevent drainage of the specimen. For this test UD samples were tested without trimming except for cutting the end surfaces plane and perpendicular to the longitudinal axis of the specimen.

The UU test is performed with the drain valve of the triaxial cell closed during all phases of the test and before the sample has a chance to consolidate (S<100 percent). The chamber was pressurized to the desired confining pressure and the sample allowed to stabilize at least 10 minutes before application of axial load. The sample was loaded axially by compressing the top platen into the sample at a constant rate of approximately one percent strain per minute. Deformation of the sample and the applied stress was recorded electronically using LVDT strain gauges. Failure of the specimens during the tests was defined as the maximum principal stress difference (deviator stress) attained at any point during the test, or as the deviator stress at 15 percent strain, whichever occurred first. Test output is attached in the Appendix and includes a plot of deviator stress vs. applied strain for various load increments, and Mohr Circle plots at various increments of confining stress.

CU or "R" Triaxial Shear Tests of Undisturbed Samples

Shear tests were performed using the CU or "R" test method described by ASTM D4767, *Standard Test Method for Consolidated-Undrained Triaxial Compression Test for Cohesive Soils*. This test is typically applicable to fine-grained soils preserved as Group C samples as defined in ASTM D4220. Samples tested using the R test method are isotropically consolidated and sheared in compression without drainage at a constant rate of axial deformation. The shear characteristics measured under undrained conditions are applicable to field conditions where soils that have been fully consolidated under one set of stresses are subjected to a change in stress without time for further consolidation to take place. Measured pore pressures induced by the change in stress can be used to compute effective stress shear strength, which may be applied to field conditions in which full drainage can occur or to conditions in which pore pressures induced by loading can be estimated.

R tests were performed on samples prepared as generally described in Section 6 of ASTM D4767. Each extruded sample was encased in a rubber membrane and sealed to the specimen base and cap with rubber O-rings to prevent drainage of the specimen. For this test UD samples were tested without trimming except for cutting the end surfaces plane and perpendicular to the longitudinal axis of the specimen. Samples were saturated by back pressuring the pore water in the specimen to drive the air in the void spaces into solution, after the system was saturated by applying a vacuum to the specimen and dry drainage system as described in section 8.2.

With the drainage valves of the triaxial cell closed, the cell pressure was increased while maintaining back pressure constant to confine the specimen. After the chamber was pressurized to the desired confining pressure the appropriate drainage ports were opened and the sample allowed to fully consolidate to equilibrium before application of axial load. The fully consolidated sample was then loaded axially by compressing the top platen into the sample at a constant rate of approximately one percent strain per minute, with the drainage ports again closed. Deformation of the sample and the applied stress was recorded

electronically using LVDT strain gauges and induced pore pressures measured using a stiff electronic pressure transducer.

Failure of the specimens during the tests was defined as the point of maximum effective stress obliquity, the maximum stress difference (deviator stress) attained at any point during the test, or as the deviator stress at 15 percent strain, whichever occurred first. Test output is attached in the Appendix and includes a plot of deviator stress vs. applied strain for various load increments, induced pore pressure vs. applied strain, p'-q' diagram, and Mohr Circle plots at various increments of confining stress.

Laboratory Tests of Rock

Examination of Rock Core Specimens

Rock core samples returned to the laboratory were examined by the geotechnical engineer or geologist and the percentage recovery and rock quality designation (RQD) estimated for each run. A core run is defined either as 1) a drill run defined by the length of the core barrel; 2) a change in formation or rock type could constitute the end of a core run; or 3) a core run can be a selected zone of concern. Core run lengths are indicated on the attached boring records.

The "recovery" is the ratio of the sample length recovered in the core barrel to the total length of the core run, expressed as a percent. Rock Quality Designation is described by ASTM D6032, *Standard Test Method for Determining Rock Quality Designation (RQD) of Rock Core*. The RQD is the percentage of the core run consisting of moderately hard or harder NX-sized rock core recovered in segments 4 inches long or longer. When properly interpreted by a qualified professional, the RQD value provides a basis for preliminary design decisions involving foundations or excavation in rock.

Only those pieces or rock formed by natural joints, bedding planes, shear zones, or cleavage planes that result in surfaces of separation were considered for RQD purposes. Pieces formed by breaks in the core due to drilling or handling were not considered. Pieces were considered intact when they appeared to have been bonded together prior to coring and broken surfaces consisted of fresh rock. Where a surface could not be determined as either a natural or mechanical break, it was considered a natural break.

Rock core specimens were classified based on the following characteristics:

Hardness	Description of Core
Soft Rock	May be broken with fingers
Moderately Soft	May be scratched by a nail, corners and edges may be broken with fingers
Moderately Hard	Light blow of hammer required to break sample
Hard Rock	Hard blow of hammer required to break sample
Very Hard	Rock core rings when struck by hammer

Continuity	Core Recovery in Percent
Incompetent	Less than 40 percent

Competent	40 – 70 percent
Fairly Continuous	70 – 90 percent
Continuous	90 – 100 percent

Rock Quality	Rock Quality Designation
Very Poor	0 - 25 percent
Poor	25 – 50 percent
Fair	50 – 75 percent
Good	75 – 90 percent
Excellent	90 – 100 percent

Weathering	Description
Fresh	Rock fresh, crystals bright, some joints may show slight staining
Very Slight	Joints stained, some joints may show thin clay coatings
Slight	Joints stained and rock discolored up to 1 inch from joint surfaces
Moderate	Significant discoloration and weathering effects
Moderately Severe	All rock except quartz discolored and stained
Severe	Rock severely discolored and stained, few intact pieces remain
Very Severe	Rock fabric remains but reduced in strength to strong soil

Detailed rock descriptions, percent recovery, RQD values and the core barrel or bit size used are shown on the appropriate boring records in the Appendix.

Unconfined Compressive Strength Tests of Intact Rock Core

The unconfined compressive strength of intact rock core specimens will be determined generally following the procedures described in ASTM D7012, *Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens under Varying States of Stress and Temperatures*. Selected recovered samples of intact rock core representative of each run will be cut to length and the ends machined flat. Specimens will then be placed in a loading frame and axial load continuously applied until peak load and failure are obtained. Specimens selected for testing will meet shape and L/D proportions outlined in ASTM D4543, *Standard Practice for Preparing Rock Core Specimens and Determining Dimensional and Shape Tolerances*. The specimen minimum dimension should be at least six to ten times the maximum particle or mineral dimension, and the L/D ratio at least 2 to 2.5. Samples will be soaked prior to testing.

Appendix I – PRELIMINARY NOISE ASSESSMENT

BURNS McDONNELL

EAST KENTUCKY POWER COOPERATIVE

SOUND STUDY REPORT

COOPER POWER PLANT

PROJECT NO. 157787

REVISION 1

OCTOBER 2024

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List of Abbreviations

Abbreviation	Term/Phrase/Name
ANSI	American National Standards Institute
BOP	Balance of Plant
CadnaA	Computer Aided Noise Abatement
dB	decibel
dBA	A-weighted decibel
dBC	C-weighted decibel
EKPC	East Kentucky Power Cooperative
Hz	Hertz
ISO	International Organization for Standardization
L_{dn}	day-night average sound level
L_{eq}	equivalent-continuous sound level
L_{10}	10-percentile exceedance sound level
L_{50}	50-percentile exceedance sound level
L_{90}	90-percentile exceedance sound level
MP	measurement point
mph	miles per hour
Project	Cooper Power Plant
PWL	sound power level
SPL	sound pressure level
USEPA	United States Environmental Protection Agency

Executive Summary

Burns & McDonnell conducted a sound study for the East Kentucky Power Cooperative (EKPC) Cooper Power Plant (Project), located in Pulaski County, KY. The Project is a new 2x1 F-Class power generation facility with combustion turbines and heat recovery steam generators (HRSG) located outside, an indoor steam turbine generator, and associated balance-of-plant (BOP) equipment.

The objectives of this study were to identify the applicable noise regulations, model operational sound levels of the Project, and compare Project-generated sound levels to the applicable noise regulations. As of this version of the report, existing ambient sound level measurements have not been completed.

The State of Kentucky does not have applicable noise statutes which limit noise from the Project nor does Pulaski County. In the absence of regulatory limits, Project sound levels were compared to industry guidelines for limiting noise impacts on the surrounding community. For A-weighted sound levels, the United States Environmental Protection Agency (USEPA) has guidance to limit sound levels at nearby residential receptors to a day-night sound level (L_{dn}) of 55 dBA, which is equivalent to a constant sound level of less than 48.6 dBA. In the interest of potential low-frequency impacts, the American National Standards Institute (ANSI) standard, ANSI S12.9, provides guidance that low-frequency sound levels in the 16, 31.5, and 63-Hz octave bands less than 65 dB generally result in minimal annoyance. This would be approximately equivalent to a C-weighted sound level of 65 to 70 dBC for sources with strong low frequency content.

The Project operational sound levels, as currently designed, are expected to slightly exceed the recommended sound level guidelines provided by USEPA and ANSI at the nearest receptor. Mitigation upgrades, including upgraded exhaust stack silencers, low-noise fans and splash mats for the cooling tower, and enclosures on some of the surrounding auxiliary skids, have been included as part of the Project acoustic design to reduce base offering sound levels closer to the recommended sound levels. It should be noted that the USEPA guidelines and the ANSI informative standard are not intended to be construed as regulatory limits as they do not consider cost or engineering feasibility associated with additional mitigation. Instead, these should be used only as guidance for minimizing the potential for noise impacts on the surrounding community.

1.0 Acoustical Terminology

The term "sound level" is often used to describe two different sound characteristics: sound power and sound pressure. Every source that produces sound has a sound power level (PWL). The PWL is the acoustical energy emitted by a sound source and is an absolute number that is not affected by the surrounding environment. The acoustical energy produced by a source propagates through media as pressure fluctuations. These pressure fluctuations, also called sound pressure levels (SPL), are what human ears hear and microphones measure.

Sound is physically characterized by amplitude and frequency. The amplitude of sound is measured in decibels (dB) as the logarithmic ratio of a sound pressure to a reference sound pressure (20 micropascals). The reference sound pressure corresponds to the typical threshold of human hearing. To the average listener, a 3-dB change in a continuous broadband sound is generally considered "just barely perceptible"; a 5-dB change is generally considered "clearly noticeable"; and a 10-dB change is generally considered a doubling (or halving, if the sound is decreasing) of the apparent loudness.

Sound waves can occur at many different wavelengths, also known as the frequency. Frequency is measured in hertz (Hz) and is the number of wave cycles per second that occur. The typical human ear can hear frequencies ranging from approximately 20 to 20,000 Hz. Normally, the human ear is most sensitive to sounds in the middle frequencies (1,000 to 8,000 Hz) and is less sensitive to sounds in the lower and higher frequencies. As such, the A-weighting scale was developed to simulate the frequency response of the human ear to sounds at typical environmental levels. The A-weighting scale emphasizes sounds in the middle frequencies and de-emphasizes sounds in the low and high frequencies. Any sound level to which the A-weighting scale has been applied is expressed in A-weighted decibels, or dBA. For reference, the A-weighted sound pressure level and subjective loudness associated with some common sound sources are listed in Table 1-1. The C-weighting scale has more of an emphasis on low frequency content than the A-weighting scale and is generally used to describe the low frequency characteristics of sound levels (e.g., "rattling" or "rumbling" associated with sound levels).

Sound in the environment is constantly fluctuating, as when a car drives by, a dog barks, or a plane passes overhead. Therefore, sound metrics have been developed to quantify fluctuating environmental sound levels. These metrics include the exceedance sound level. The exceedance sound level is the sound level exceeded during "x" percent of the sampling period and is also referred to as a statistical sound level. Common exceedance sound level values are the 10-, 50-,90-percentile exceedance sound levels, denoted by L_{10}, L_{50}, and L_{90}. The equivalent-continuous sound level (L_{eq}) is the arithmetic average of the varying sound over a given time period and is the most common metric used to describe sound. The USEPA uses a noise metric called the day-night average sound level (L_{dn}) which is a 24-hour average sound level, with a 10-dBA penalty applied to sound measured during nighttime hours (10:00 PM to 7:00 AM).

Table 1-1: Typical Sound Pressure Levels Associated with Common Sound Sources

Sound Pressure Level (dBA)	Subjective Evaluation	Environment
140	Deafening	Jet aircraft at 75 feet
130	Threshold of pain	Jet aircraft during takeoff at a distance of 300 feet
120	Threshold of feeling	Elevated train
110	Very loud	Jet flyover at 1,000 feet
100		Motorcycle at 25 feet
90	Moderately loud	Propeller plane flyover at 1,000 feet
80		Diesel truck (40 mph) at 50 feet
70	Loud	B-757 cabin during flight
60	Moderate	Air-conditioner condenser at 15 feet
50	Quiet	Private Office
40		Farm field with light breeze, birdcalls
30	Very quiet	Quiet residential neighborhood
20		Rustling leaves
10	Just audible	--
0	Threshold of hearing	--

Sources:
(1) Adapted from *Architectural Acoustics*, *M. David Egan, 1988*
(2) *Architectural Graphic Standards*, Ramsey and Sleeper, 1994

2.0 Applicable Regulations & Criteria

State and local noise regulations were reviewed to determine Project noise limits. The State of Kentucky, nor Pulaski County, have applicable noise requirements which limit noise from the Project. In the absence of local noise limits, Project sound levels can be compared to USEPA guidelines and the ANSI S12.9 standard.

2.1 USEPA Guidelines

In 1974 the USEPA published *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.* As part of this document, the recommended noise limit is a day-night level, L_{dn}, of 55 dBA at the nearest noise sensitive receptors (i.e., residents). This would be equal to an equivalent continuous sound level, L_{eq}, of 48.6 dBA for a constant source operating continuously (i.e., 24-hours). The USEPA notes that these recommended sound levels are not to be construed as regulatory limits as they do not account for costs or feasibility associated with meeting these target sound levels. However, they are generally appropriate levels to protect the health and welfare of the community.

2.2 ANSI S12.9 Part 4

Since there is potential for low-frequency noise to be emitted from the Project, ANSI S12.9 Part 4 provides informative guidance for sounds with strong low-frequency content. Section D.2 states the following:

> *"Generally, annoyance is minimal when octave-band sound pressure levels are less than 65 dB at 16, 31.5, and 63-Hz midband frequencies."*

For sounds with strong low-frequency content, this would be approximately equivalent to a C-weighted sound level of 65 to 70 dBC.

3.0 Modeled Sound Levels

Operational sound levels for the proposed Project were performed using the Computer Aided Noise Abatement (CadnaA) modeling software. Equipment sound levels used for modeling were based on a combination of supplier provided data and in-house data based on experience with similar make and sized equipment. This model was used for determining expected sound levels due to the Project and the associated impacts to the existing ambient sound levels at the nearest noise sensitive receptors.

3.1 Sound Modeling Methodology and Input Parameters

Predictive noise modeling was performed using the industry-accepted sound modeling software CadnaA, version 2024. The software is a scaled, three-dimensional program, which considers air absorption, terrain, ground absorption, and reflections and shielding for each piece of noise-emitting equipment, and then predicts sound pressure levels at discrete locations and over a gridded area based on input source sound levels. The model calculates sound propagation based on International Organization for Standardization (ISO) 9613-2:2024, General Method of Calculation. ISO 9613-2 assesses the sound level propagation based on the octave band center-frequency range from 31.5 to 8,000 Hz.

The ISO standard considers sound propagation and directivity. The sound-modeling software calculates omnidirectional, downwind sound propagation using worst-case directivity factors, in tandem with user-specified directivities and propagation properties. Empirical studies accepted within the industry have demonstrated that modeling may over-predict sound levels in certain directions, and as a result, modeling results generally are considered a conservative measure of the Project's actual sound level.

The modeled atmospheric conditions were assumed to be calm, and the temperature and relative humidity were left at the program's default values. Reflections and shielding were considered for sound waves encountering physical structures. Sound levels around the site can be influenced by the sound reflections from physical structures onsite. The area surrounding the Project has mild elevation changes, which scatter and absorb the sound waves. Thus, terrain was included to account for surface effects such as ground absorption. Average ground absorption for the Project site and surrounding area was set to a value of 0.5 to account for the mix of hard pavement and soft vegetative ground. The modeling assumptions are outlined in Table 3-1. This model is exclusive of noise sources not associated with the Project (e.g., traffic noise and local fauna). Only Project sound levels have been evaluated.

The Project general arrangement is included as Figure A-1 of Appendix A. The modeled equipment octave-band sound levels for each piece of equipment are included in Appendix B. A summary of the Project's expected acoustical design is shown in Table 3-2.

Table 3-1: Sound Modeling Parameters

Model Input	Parameter Value
Ground Absorption	0.5
Number of Reflections	2
Receptor Height	5 feet above grade
Terrain	USGS topographic land data
Temperature	50 °F
Humidity	70%

Table 3-2: Project Expected Acoustical Design

Equipment	QTY	Base Sound Level	Notes
Siemens Equipment			
Exhaust Stack Exit	2	L_w = 104 dBA	Upgraded silencers
Combustion Turbine Train[a]	2	L_p = 85 dBA at 3 feet	See appendix for full package incl. aux skids
Water Injection Skid	2	L_w = 95 dBA	Low-noise enclosure
Fuel Oil Pump Skid	2	L_w = 96 dBA	Low-noise enclosure
Steam Turbine Building Interior[b]	1	L_p = 90 dBA average interior	Standard insulated metal panel (STC 35)[c]
BOP Equipment			
New Cooling Tower	1	L_p = 61 dBA at 400 feet	Low-noise fans and splash mats
Boiler Feed Pumps	4	L_p = 85 dBA at 3 feet	Low-noise enclosure
All Pumps, valves, etc.	Varies	L_p = 85 dBA at 3 feet	

*L_w – sound power level, L_p – sound pressure level at distance
a) Includes HRSG, Stack Exit, Gas Turbine, Generator, and Intake. Doesn't include auxiliary skids. See appendix for full package equipment sound levels.
b) Includes Steam Turbine, Generator, Condenser, and associated equipment inside building.
c) Steam Turbine building assumed to have insulated metal panel wall/roof with minimum sound transmission class rating (STC) of 35.

3.2 Sound Modeling Results

The Project will operate at fairly constant sound levels when operational. Therefore, steady-state sound level predictions were completed. The predicted overall steady-state operational A-weighted sound levels, which do not include contributions from ambient sound sources, are shown with 5-dB contours in Figure A-2 of Appendix A. The predicted C-weighted sound level contours are shown in Figure A-3. The Project-generated sound levels were also calculated at the nearest residential properties. Table 3-3 show the predicted Project sound levels at the nearest residential receptors.

Table 3-3: Modeled Sound Levels – Base Design New Cooling Tower

Receptor Name	Industry Noise Guidelines		Project-Only Sound Levels	
	USEPA Guidelines [a] (dBA)	Industry dBC Recommendation [b] (dBC)	(dBA)	(dBC)
R1	48.6	65-70	55	75
R2			43	66
R3			41	67

a) USEPA guidelines is recommended 55 dBA L_{dn} (48.6 dBA L_{eq}).
b) Industry recommended 65-70 dBC equivalent limit to reduce potential for low frequency impacts (ANSI S12.9).

Although Project sound levels are expected to slightly exceed the recommended sound levels at R1, additional mitigation may not be considered feasible from a cost or performance basis since the USEPA and ANSI recommended levels are only for guidance and not a regulatory limit.

4.0 Conclusions

Burns & McDonnell conducted a preliminary sound study for the proposed EKPC Cooper Project. This preliminary study consists of predictive sound modeling of the Project to analyze potential offsite sound impacts from operation of the Project.

There are no regulatory noise limits for the Project. Recommendations from the USEPA and ANSI S12.9 could be used as guidance to minimize potential for A-weighted and C-weighted sound level impacts on the nearby residential receptors. The Project, as currently designed with low-noise options included, is expected to be below these guidelines at all receptors except near R1, where the sound levels are expected to slightly exceed these guideline sound levels.

The base design incorporates significant low-noise mitigation options to the stack exhaust silencer, the cooling tower, and some of the more significant noise source auxiliary skids. Additional mitigation may not be feasible or reasonable, as the USEPA and ANSI guidelines are not regulatory limits and should only be used as guidance to help minimize potential noise impacts from the Project to the nearby residential receptors.

APPENDIX A – FIGURES

Figure A-1 - General Arrangement

PRELIMINARY - NOT FOR CONSTRUCTION

no.	date	by	ckd	description
E	01/17/24	CWR	-	PRELIMINARY
D	12/12/23	CWR	-	PRELIMINARY
C	12/01/23	CWR	-	PRELIMINARY
B	11/20/23	CWR	-	PRELIMINARY
A	10/16/23	WRI	-	PRELIMINARY

no.	date	by	ckd	description
K	08/08/24	TLB	-	ISSUED WITH PROJECT SCOPING REPORT
J	05/28/24	CWR	-	ISSUED WITH PROJECT SCOPING REPORT
H	05/02/24	CWR	-	ISSUED WITH PROJECT SCOPING REPORT
G	03/15/24	CWR	-	PRELIMINARY
F	02/18/24	CWR	-	PRELIMINARY

OVERALL SITE PLAN

SCALE IN FEET

NORTH

BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Engineering Company, Inc.
FIRM LICENSE NO.

designed | detailed W. LESNIAK

PULASKI COUNTY, KENTUCKY

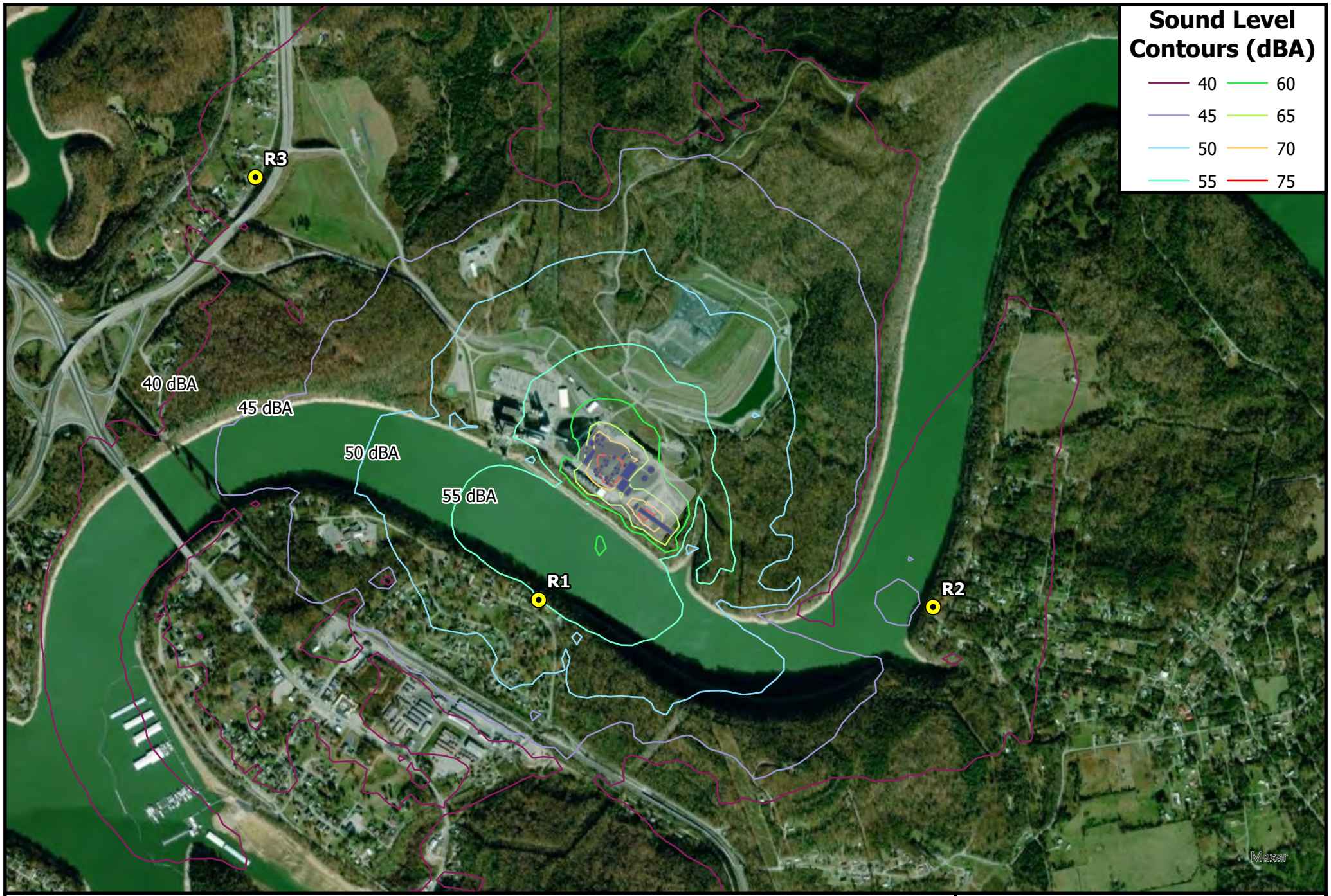
COOPER POWER PLANT
2 x1 CCGT PLANT
OVERALL SITE PLAN NEW COOLING TOWER
- BASED ON SIEMENS GTG's

project 157787 | contract

drawing GA200 — rev. K

sheet of sheets

file: 157787_2X1-SIEMENS-COOPER-GA200.DWG



LEGEND

- Structures
- Project Area
- Receptors

REFERENCE

0 0.2 0.4 MILES

0 0.2 0.4 KILOMETERS

N

Figure A-2 - Project Sound Level Contours (dBA)

LOCATION:	Pulaski County, KY
PROJECT:	EKPC Cooper
PROJ. NO.:	157787
CREATED:	10/24/2024

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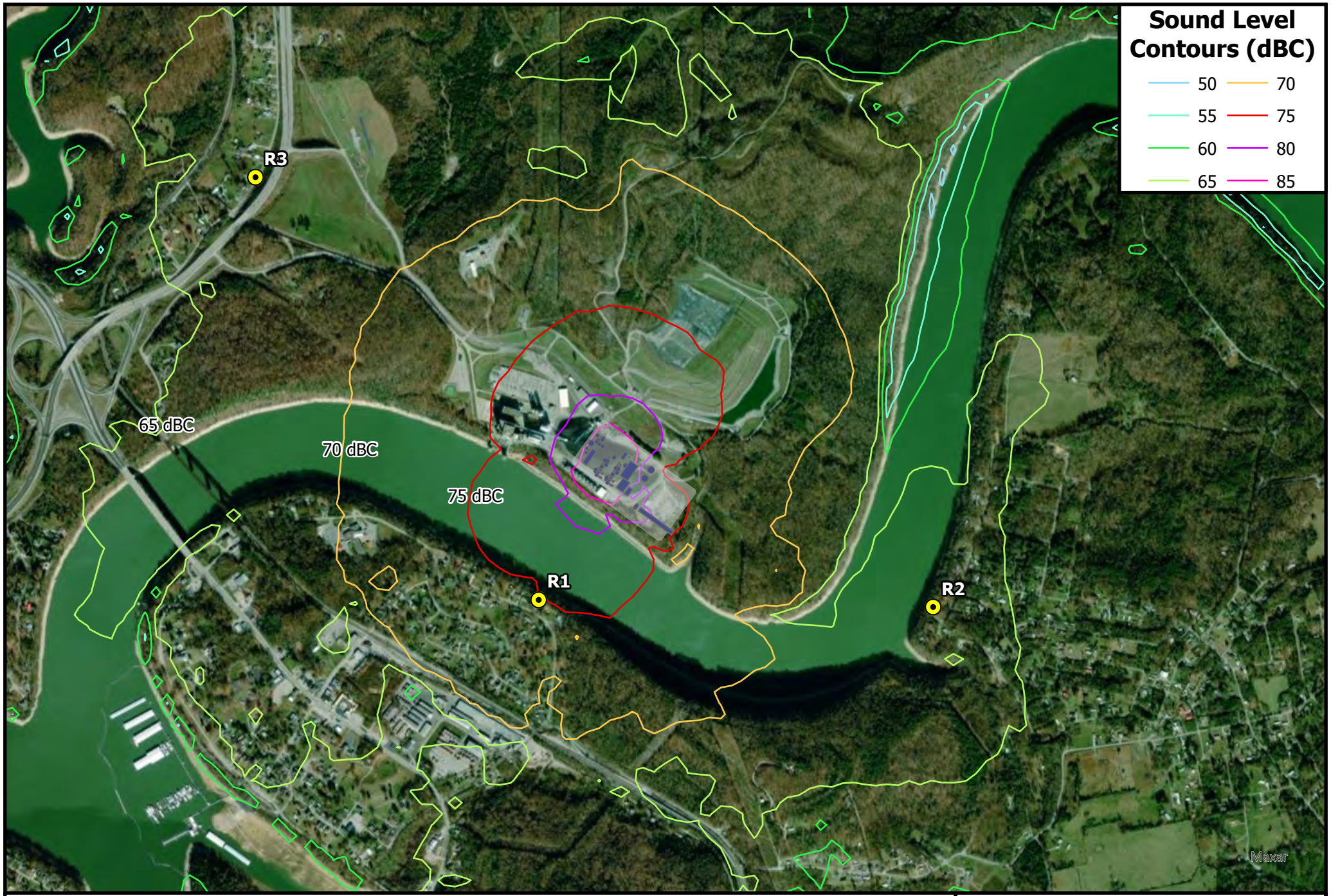
Path: Z:\Clients\ENR\EKPC\157787_SMITHCCGTSTUDY\7_Studies\Permitting\Modeling\Noise\GIS\EKPC Cooper\EKPC Cooper.aprx



LEGEND

- Structures
- Project Area
- Receptors

REFERENCE

0 0.2 0.4 MILES

0 0.2 0.4 KILOMETERS

N

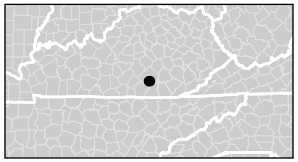


Figure A-3 - Project Sound Level Contours (dBC)

LOCATION:	Pulaski County, KY
PROJECT:	EKPC Cooper
PROJ. NO.:	163618
CREATED:	10/24/2024

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APPENDIX B – MODELED SOUND POWER LEVELS

Appendix B - Modeled Sound Power Levels

EKPC

Cooper Power Plant Expansion

Name	Number of Sources	Sound Power Level (dB)[1] Octave Band Frequency (Hz)									Overall (dBA)	Notes
		31.5	63.0	125	250	500	1000	2000	4000	8000		
Air Compressor	2	90	89	89	88	91	94	94	92	89	**100**	Estimated 85 dBA @ 3ft
Cooling Tower Aux Pump	1	87	88	89	91	91	94	91	87	81	**98**	Estimated 85 dBA @ 3ft
Circulating Water Pump	2	93	94	95	97	97	100	97	93	87	**104**	Estimated 85 dBA @ 3ft
Dew Point Exaust Stack	2	119	101	93	88	89	95	93	92	91	**100**	In-house
Forwarding Pump	4	87	88	89	91	91	94	91	87	81	**98**	Estimated 85 dBA @ 3ft
Fuel Gas Separator	2	105	97	96	89	85	86	84	81	76	**91**	Estimated 85 dBA @ 3ft
Fuel Oil Heaters	2	105	97	96	89	85	86	84	81	76	**91**	In-house
Gas Valve	1	104	100	89	81	80	86	88	91	89	**96**	Estimated 85 dBA @ 3ft
GT Air Discharge Vents	4	89	98	93	92	89	94	99	91	86	**102**	In-house
GT Air Inlet Vents	4	89	98	93	93	90	93	98	91	87	**101**	In-house
HRSG Blowdown Tank Exhaust	2	103	98	100	93	93	91	94	91	88	**99**	Estimated 85 dBA @ 3ft
HRSG Steam Vent	2	103	98	100	93	93	91	94	91	88	**99**	Estimated 85 dBA @ 3ft
Recirc Pump	2	87	88	89	91	91	94	91	87	81	**98**	Estimated 85 dBA @ 3ft
SEE Transformer	2	78	86	87	94	85	75	69	59	50	**87**	Estimated 75 dBA @ 3ft
SFC Transformer	2	78	86	87	94	85	75	69	59	50	**87**	Estimated 75 dBA @ 3ft
Exhaust Stack Exit - Mitigated	2	129	117	114	109	99	85	70	75	70	**104**	In-house Silencer Data
Fuel Gas Piping	1	104	100	89	81	80	86	88	91	89	**96**	Estimated 85 dBA @ 3ft
Performance Heater	2	105	97	96	89	85	86	84	81	76	**91**	In-house
Air Inlet Duct	2	109	105	101	92	85	100	84	86	93	**101**	Estimated 75 dBA @ 3ft
Ammonia Flow Skid	2	87	88	89	91	91	94	91	87	81	**98**	Estimated 85 dBA @ 3ft
Aux Transformer	3	84	92	93	100	91	81	75	65	56	**93**	Estimated 75 dBA @ 3ft
BFP	2	92	93	94	96	96	99	96	92	86	**103**	Estimated 93 dBA @ 3ft
Cooling Tower Fan Deck (Mit CT)	1	72	85	95	99	101	102	95	91	85	**104**	Mitigated (61 dBA @ 400 ft)
Cooling Tower Intake (Mit CT)	2	59	78	85	90	89	93	95	96	93	**101**	
Dew Point Heater	2	109	101	100	93	89	90	88	85	80	**95**	Estimated 75 dBA @ 3ft
Exhaust Diffuser & Exp Duct	2	133	126	115	116	112	106	105	102	82	**114**	In-house
Fuel Oil Pump Skid (Mit)		88	88	89	90	91	89	91	89	83	**96**	Mitigated (e.g., low-noise enclosure)
Generator	2	111	118	110	93	88	86	88	85	77	**98**	Estimated 75 dBA @ 3ft
GSUT	2	97	105	106	103	104	94	88	78	69	**103**	Estimated 85 dBA @ 3ft
GT Enclosure	2	94	99	91	87	82	86	90	84	75	**94**	In-house
HRSG Body	2	131	132	117	113	108	104	99	99	82	**111**	In-house
Lube Oil Package	2	94	94	100	95	97	92	89	85	80	**98**	In-house
Roto Air Cooler	2	107	105	100	96	94	89	85	83	79	**96**	In-house
ST Building Interior sound pressure level	1	97	96	97	91	86	84	82	81	77	**91**	Average Interior Sound Pressure Level
Steam Turbine Step Up Xfmr	1	97	105	106	103	104	94	88	78	69	**103**	Estimated 85 dBA @ 3ft
Water Injection Pump Skid (Mit)	2	89	90	87	87	87	87	88	90	83	**95**	Mitigated (e.g., low-noise enclosure)
Water Treatment Building Interior	1	74	75	76	78	78	81	78	74	68	**85**	Average Interior Sound Pressure Level
GT Filter Face	1	121	115	108	102	90	92	81	97	104	**105**	In-house
Exhaust Stack Casing (Lower Section)	2	114	109	99	100	92	93	88	86	69	**98**	In-house

Notes:

1. All sound levels are inclusive of Project designed noise mitigation. Interior sound levels are average sound pressure levels.

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Appendix J – PERMITTING MATRIX

East Kentucky Power Cooperative (EKPC) Cooper Power Station
Coal to Gas Conversion and Addition of Natural Gas Combined Cycle (NGCC)
Permit Matrix

Item No.	Permit/Clearance	Regulatory Agency	Details	When Required	Comments
Federal					
1	Notice of Proposed Construction or Alteration	Federal Aviation Administration (FAA)	Must notify the FAA if structures will exceed 200 feet in height or if the structures (stacks & cranes) are located within the 100:1 (distance to height) ratio from the nearest point of the nearest FAA designated airport runway. Notifying the FAA includes completing Form 7460-1 for all required structures and providing a site layout map depicting structure locations.	Prior to construction	
2	Section 7 Threatened and Endangered Species Consultation and Clearance	U.S. Fish & Wildlife Service (FWS), Ecological Services	If the project will potentially impact protected species or their respective habitat, then the FWS must be contacted. The FWS will determine the level of effort needed for the project to proceed (e.g., habitat assessment, species surveys, avian impact studies, etc.).	Prior to construction	Because the facility site is previously disturbed, a habitat assessment may only be required, if routed through undisturbed areas. USFWS IPaC indicates that 14 Special Status species have potential to occur within Project Area. Habitat assessments and/or species surveys may be required to determine presence/absence of protected plant and wildlife species, including bats. Seasonal tree clearing restrictions may be imposed to avoid bat roosting periods.
3	Migratory Bird Treaty Act / Bald and Golden Eagle Protection Act Compliance	U.S. Fish & Wildlife Service (USFWS), Ecological Services	Required when construction or operation of a proposed facility could impact migratory birds and bald and golden eagles and/or their nests, and especially threatened or endangered species	Prior to construction	Because the facility site is previously disturbed, a habitat assessment may only be required, if routed through undisturbed areas. Nesting period for Migratory Birds within the Project Area is indicated by USFWS to be March 15 - August 31. If tree clearing must occur inside that window it is recommended that avian nest surveys be conducted no more than 5 days prior to clearing a given area. Bald Eagles are known to remain in nests year-round. Bald Eagle nests should be surveyed for during a site visit to determine if further consultation is required.
4	Spill Prevention, Control, and Countermeasure (SPCC) Plan	U.S. Environmental Protection Agency	Required if the facility will have 1,320 gallons or more of aboveground petroleum storage capacity in 55-gallon-sized or larger containers (or 42,000 gallons in underground storage not regulated by underground storage tank rules)	Prior to storage of petroleum products onsite in excess of SPCC thresholds	
5	Permits under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act	U.S. Army Corps of Engineers (USACE) Nashville District	Nationwide Permit: Less than or equal to 0.5 acre of wetland impacts Individual Permit: Greater than 0.5 acre of wetland or stream impacts Section 10 Authorization for any structures within or over any navigable waters of the U.S.	Prior to construction start and activities within wetland areas. Section 404 authorization required to dredge or place fill in a jurisdictional water, including wetlands. Section 10 authorization required for crossings/activities within any navigable waterways.	A wetland delineation will be required to determine the extent of wetland and stream impacts associated with the Project. If permanent impacts to wetlands and streams are less than 0.5-acre total, Project would qualify for a Nationwide Permit. Mitigation credits would be required for cumulative permanent impacts of 0.10 acre or greater of wetlands and waterbodies. A pre-construction notification (PCN) will likely be required.
6	Prime Farmland Consultation under the Farmland Protection Policy Act (FPPA)	U.S. Department of Agriculture- Farm Service Agency and Natural Resources Conservation Service (NRCS)	FPPA consultation form AD-1006; coordination on erosion and sedimentation controls (ESC) and seed mixes; potential NRCS consultation for Conservation and/or Wetland Reserve Programs	Prior to construction	Contractor will fill out form AD-1006 and submit to NRCS for review and scoring (NRCS has 45 days to make determination and return the form). For project sites where the total points equal or exceed 160, consider alternative actions, as appropriate, that could reduce adverse impacts (e.g. Alternative Sites, Modifications or Mitigation).
State - Kentucky					
7	National Environmental Policy Act (NEPA) Review	Lead Federal agency	Required pursuant to NEPA for public disclosure of environmental impacts resulting from Federal actions. Process can be a phased approach. The applicant typically prepares a preliminary Environmental Assessment (EA). The agency reviews the document and can either attach a Finding of No Significant Impact or require the preparation of an Environmental Impact Statement (EIS).	Prior to construction	
8	Certificate of Public Convenience and Necessity	Kentucky Public Service Commission	Required for the construction of electric generating facilities	Prior to construction	A Notice of Intent must be submitted at least 30 days prior to submitting an application for a certificate.
9	Site Compatibility Certificate	Kentucky Public Service Commission	Required for the construction of electric generating facilities 10 MW or greater	Prior to construction	The site compatibility certificate application will include a site assessment report. Documentation of compliance with NEPA may be submitted in lieu of a site assessment report.
10	Air Quality Construction / Operating Permit (PSD and Title V permit Update)	Kentucky Department of Environmental Protection Division for Air Quality	New Source Review construction permit is required for new major stationary sources of air emissions, and Title V operating permit is required if more than 100 TPY of any non-hazardous regulated air pollutant is emitted	Prior to construction	Replacement of burner can only likely be accomplished with a State permit (Prevention of Significant Deterioration [PSD] minor). The addition of a new combined-cycle unit will likely trigger PSD major source permitting for at least one pollutant, although several pollutants should be able to "net out" of PSD. The existing Title V operating permit will need to be updated.
11	Noise Compliance	Kentucky Public Service Commission (as a part of a larger certificate application).	Required to demonstrate that facility operation will comply with State, county, and city noise regulations. The PSC may require/request additional noise mitigation measures.	Prior to construction	City has local regulations based on time of day and receiving land use that will need to be analyzed for the surrounding area and modeled to determine compliance. Review of County ordinances did not find any numerical noise limits. Any compressors along the pipeline and booster stations will be required to meet the FERC limit of an Ldn of 55 dBA.
12	Section 401 Water Quality Certification (WQC)	Kentucky Energy and Environment Cabinet Department of Environmental Protection Division of Water	Authorizes work and placement of dredged or fill material within waters of the State. General 401 Certification with approved USACE Nationwide Permit assuming project meets conditions listed in the Kentucky Energy and Environment Cabinet DEP*General Certification--Nationwide Permit (NWP)* document for NWP 57. Individual 401 Certification required if Project is unable to meet conditions listed in the *General Certification--Nationwide Permit (NWP)* document.	Prior to construction	This permit provides Section 401 WQC and floodplain construction approval. The purpose of the WQC is to confirm that the discharge of fill materials will be in compliance with the State's applicable water quality standards. Assumes automatic Water Quality Certification authorization through a USACE Nationwide Permit. The permit application must be reviewed and signed by the local county floodplain coordinator(s) prior to submitting the application to the State.

Item No.	Permit/Clearance	Regulatory Agency	Details	When Required	Comments
13	Floodplain Development Permit	Kentucky Energy and Environment Cabinet Department of Environmental Protection Division of Water	Authorizes construction and development activities along, or adjacent to a stream, or within a floodway. General Permit KY FPGP if Project meets eligibility requirements listed in Section 2.2 of KY FPGP and does not increase the Base Flood Elevation Individual Permit if Project is unable to meet eligibility requirements in Section 2.2 of KY FPGP or has potential to increase the Base Flood Elevation.	Prior to construction	
14	Groundwater Protection Plan	Kentucky Energy and Environment Cabinet Department of Environmental Protection Division of Water	Required for activities that have the potential to pollute groundwater. The Groundwater Protection Plan must define best management practices for groundwater protection.	Prior to operation	The Groundwater Protection Plan is not submitted for review unless requested by the State.
15	One-Time/Temporary Discharge Request for Off-Permit Authorization (hydrostatic testing)	Kentucky Energy and Environment Cabinet Department of Environmental Protection Division of Water	Required prior to discharging waters used for hydrostatic testing pipelines and/or tanks.	Prior to testing	
16	Water Withdrawal Permit (NOT REQUIRED)	Kentucky Energy and Environment Cabinet Department of Environmental Protection Division of Water	According to the Kentucky Department of Environmental Protection, withdrawals of water greater than 10,000 gallons per day from any surface, spring, or groundwater source, with the exception of water required for steam-powered electrical generating plants whose retail rates are regulated by the Kentucky Public Service Commission or for which facilities a certificate of environmental compatibility from such commission is required by law, require a Water Withdrawal Permit.		
17	General Permit for Stormwater Discharges Associated with Construction Activities	Kentucky Energy and Environment Cabinet Department of Environmental Protection Division of Water	Required for all stormwater discharges from construction activities which will disturb of one or more total acres of land. The General Permit requires the development of a Stormwater Pollution Prevention Plan (SWPPP) prior to submitting a Notice of Intent for permit coverage.	Prior to construction	The permit also authorizes the discharge of construction dewatering waters if managed through the use of appropriate best management practices.
18	KPDES Operational Discharge Permit (Modification to KY0003611)	Kentucky Energy and Environment Cabinet Department of Environmental Protection Division of Water	A modification to NPDES Permit No. KY0003611 will be required if the quantity or quality of wastewater discharged from the plant site to Lake Cumberland will change as a result of project activities. Changes to existing outfalls or the need for additional outfalls would also require a permit modification.	Prior to operation	Project changes will also require a modification to the site's operational SWPPP.
19	National Historic Preservation Act (NHPA) – Section 106 Consultation	Kentucky Heritage Council - State Historic Preservation Office (SHPO)	Under Section 106 of the National Historic Preservation Act, Federal agencies must work with the State Historic Preservation Office to address historic preservation issues when planning projects or issuing funds or permits that may affect historic properties and archaeological resources listed in or determined eligible for the National Register of Historic Places.	Prior to approval of expenditure of federal funds or prior to issuance of a license	Because the facility site is previously disturbed, a Section 106 occurrence may only be required, if routed through undisturbed areas.
20	Threatened & Endangered Species Clearance (State)	Kentucky Department of Fish and Wildlife Resources, Office of Kentucky State Nature Preserves, Kentucky Energy and Environment Cabinet	Recommended for Projects with potential to impact state threatened and/or endangered species.	Prior to construction	Because the facility site is previously disturbed, a habitat assessment may only be required, if routed through undisturbed areas. Desktop review conducted, 2 special status species have been historically observed within the Project footprint; 8 special status species have been observed within 1-mile of the Project footprint.
21	Right-of-Way Certification	Kentucky Transportation Cabinet	Required if any part of the facility (including pipelines) will be constructed within State road rights-of-way.	Prior to construction	
County					
22	Building Permit	Pulaski County	Required for non-residential projects	Prior to construction	
Tribal Permits					
23	Section 106 of the National Historic Preservation Act	Tribal Consultations	Coordination with local tribes required as part of Section 106 consultation	Prior to approval of expenditure of federal funds or prior to issuance of a license	

Appendix K – TIE-IN LIST

Mechanical Interface List

COOPER STATION 2X1 CCGT PROJECT

EAST KENTUCKY POWER COOPERATIVE

Project Number: 157787

ISSUED FOR PROJECT SCOPING REPORT

Rev: A

4/15/2024

PRELIMINARY - NOT FOR CONSTRUCTION

				Approximate Coordinates									
Terminal Point Number (T)	**System**	**Description/Comment**	**Drawing**	**Northing (ft)**	**Easting (ft)**	**Grade Status**	**Elevation from Grade (ft)**	**Expected Connection Size**	**Connection Type and Rating**	**Maximum Pressure (psig)**	**Maximum Temperature (F)**	**P&ID Drawing Number**	**Other requirements/ comments**
TP-1	Natural Gas	Natural Gas Supply to site. Tie-in assumed to be 5ft outside of the fence line to the new gas yard.	157787-GA-200	Note 1	Note 1	Below Grade	3	18"	600# RFFE Carbon Steel	650	100	MM0FGS-001	
TP-2	Potable Water	Main potable water tie-in	157787-GA-200	Note 1	Note 1	Above Grade	5	4"	150# RFFE HDPE	150	100	MM0WPO-001	
TP-3	Potable Water	Tie-in at ammonia area for safety showers	157787-GA-200	Note 1	Note 1	Below Grade	5	4"	150# RFFE Stainless Steel	150	100	MM0WPO-001	
TP-4	Aqueous Ammonia	Ammonia Tie-in to existing tank system	157787-GA-200	Note 1	Note 1	Above Grade	5	2"	150# welded carbon steel	150	100	MM0AAU-001	
TP-5	Aqueous Ammonia	Ammonia Tie-in to existing tank system	157787-GA-200	Note 1	Note 1	Above Grade	5	2"	150# welded carbon steel	150	100	MM0AAU-001	
TP-6	Raw Water	Installation of new clarified pumps and recirc line in the existing intake structure	157787-GA-200	Note 1	Note 1	Above Grade	-	-	-	-	-	MM0WRW-001	
TP-7A	Waste Water	Tie-in of waste water supply to WWT area from existing units. Reroute around new coal pond	157787-GA-200	Note 1	Note 1	Below Grade	5	20"	-	-	-	-	
TP-7B	Waste Water	Tie-in of waste water supply to WWT area from existing units. Reroute around new coal pond	157787-GA-200	Note 1	Note 1	Below Grade	-	20"	-	-	-	-	
TP-8A	Waste Water	Tie-in of waste water return from WWT area to outfall. Reroute around new coal pond	157787-GA-200	Note 1	Note 1	Below Grade	-	12"	-	-	-	-	
TP-8B	Waste Water	Tie-in of waste water return from WWT area to outfall. Reroute around new coal pond	157787-GA-200	Note 1	Note 1	Below Grade	-	12"	-	-	-	-	
TP-9	Waste Water	Existing wastewater discharge, rerouted to new storage tank	157787-GA-200	Note 1	Note 1	Below Grade	5	12"	-	-	-	MM0WWT-001	
TP-10	Waste Water	New wastewater discharge, tie-in to existing wastewater discharge line	157787-GA-200	Note 1	Note 1	Below Grade	5	12"	-	-	-	MM0WWT-001	
TP-11	Waste Water	Existing landfill leachate runoff line tie-in to new lift station.	157787-GA-200	Note 1	Note 1	Below Grade	-	-	-	-	-	-	
TP-12	Waste Water	Existing U2 Cooling Tower Blowdown line reroute	157787-GA-200	Note 1	Note 1	Below Grade	-	-	-	-	-	-	
TP-13	Waste Water	Existing U2 Cooling Tower Chem Feed Sump discharge reroute	157787-GA-200	Note 1	Note 1	Below Grade	-	-	-	-	-	-	

Notes:

1) Refer to site plan for assumed tie-in locations.
2) Elevation in relation to existing grade.

PARTIAL PLAN
SEE UPPER LEFT FOR CONTINUATION

PRELIMINARY - NOT FOR CONSTRUCTION

no.	date	by	ckd	description
E	01/17/24	CWR	-	PRELIMINARY
D	12/12/23	CWR	-	PRELIMINARY
C	12/01/23	CWR	-	PRELIMINARY
B	11/20/23	CWR	-	PRELIMINARY
A	10/16/23	WRL	-	PRELIMINARY

no.	date	by	ckd	description
K	08/08/24	TLB	-	ISSUED WITH PROJECT SCOPING REPORT
J	05/28/24	CWR	-	ISSUED WITH PROJECT SCOPING REPORT
H	05/02/24	CWR	-	ISSUED WITH PROJECT SCOPING REPORT
G	03/15/24	CWR	-	PRELIMINARY
F	02/19/24	CWR	-	PRELIMINARY

OVERALL SITE PLAN

0 100' 200'
SCALE IN FEET

NORTH

BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Engineering Company, Inc.
FIRM LICENSE NO.

designed
detailed W. LESNIAK

EAST KENTUCKY POWER COOPERATIVE

PULASKI COUNTY, KENTUCKY

COOPER POWER PLANT
2 x1 CCGT PLANT

PLANT INTERFACE DRAWING

project 157787
contract

drawing **GA200** – rev. **K**

sheet of sheets

file 157787_2X1-SIEMENS-COOPER-GA200.DWG

Z:\CLIENTS\ENR\EKPC\156007_NEWCCGT\2_DESIGN\MECH\DWGS\GNRL_ARRANGMNT\COOPER POWER PLANT\157787_2X1-SIEMENS-COOPER-GA200.DWG 8/8/2024 1:15 PM TBROSS

Appendix L – DESIGN FUEL BASIS

DESIGN FUEL BASIS

NATURAL GAS BASIS:

Constituent	Basis Value	Unit
CH4	89.633%	Mol %
C2H6	8.289%	Mol %
C3H8	0.348%	Mol %
i-C4H10	0.006%	Mol %
n-C4H10	0.011%	Mol %
i-C5H12	0.001%	Mol %
n-C5H12	0.001%	Mol %
n-C6H14	0.000%	Mol %
N2	1.323%	Mol %
CO2	0.388%	Mol %
Total Sulfur (Maximum)	<2.0	grain/100 SCF
Fuel LHV (Btu/lb)	20,680	Btu/lbm

BACKUP FUEL OIL BASIS:

Ultra Low Sulfur Diesel

Fuel LHV: 18,400 Btu/lb

PRODUCT SPECIFICATIONS

3.23.1 **SPECIFICATIONS FOR FUNGIBLE 15 ppm SULFUR DIESEL FUEL GRADE 62**

EPA Designation: MVNRLM, Motor vehicle diesel fuel, 15 ppm sulfur

Cancels Previous Issues of Grade 62

PRODUCT PROPERTY	ASTM Test Method	Test Results Minimum	Maximum		Note
Gravity API	D4052	30			
Flash Point, °F					
Pensky-Martin	D93	130			
Physical Distillation, °C(°F)	D86				[W]~~5~~4
50%			Report		
90%		282(540)	338(640)		
End Point			366(690)		
or Simulated Distillation, °C(°F)	D2887				[W]~~5~~4
50% recovered			Report		
90% recovered		300(572)	356(673)		
End Point			421(790)		
Color ASTM	D6045		2.5		
Color Visual		Undyed			
Viscosity, cSt @ 40°C (104°F)	D445	1.9	4.1		
Pour Point	D97				2
Cloud Point	D2500				2
Corrosion, 3 hrs. @ 50°C (122°F)	D130		1		
Total Sulfur, ppmwt	D5453		11	Origin	3
			14	Delivery	
Cetane Number	D613	40			[C]4
Aromatics (Volume %)	D1319		31.7		
or Aromatics by Cetane Index	D976	40			
Ash, wt.%	D482		0.01		
Carbon Residue: Ramsbottom					
on 10% Bottom	D524		0.35		
BS&W, vol.%	D2709				
	or equivalent		< 0.05		
Thermal stability, 90 minutes					
150°CPad rating,					
DuPont scale			7		
OR					
Thermal stability	D6468				
Y/Green		73%			
W Unit		65%			
OR					
Oxidation stability, mg/100 ml	D2274		2.5		
Haze rating @ 25°C (77°F)	D4176				
	Procedure 2		2		
Nace Corrosion	TM0172	B+ (Origin)			
Electrical					
Conductivity, pS/m @ 21°C(70°F)	D2624		250		

Appendix M – WATER QUALITY BASIS

Cumberland Lake Water Quality

Constituent (mg/l as species unless noted otherwise)	Minimum	Maximum	Average
pH, Std Units	6.2	9.2	7.2
Conductivity, uS/cm	105	380	198
Total Suspended Solids	0.7	59	5.2
Total Dissolved Solids	132	235	134
Sodium	2.05	20	7.6
Calcium	9.3	26	20.2
Magnesium	3.2	11.5	7.2
Manganese	0.0002	2.4	0.2
Copper	0.0002	0.0017	0.0008
Iron	0.007	2.5	0.2
Alkalinity, mg/l as $CaCO_3$	32	86	57.5
Chloride	1.76	5.4	3.9
Total Sulfur, mg/l as SO_4	6.2	74	37.7
Silica (SiO_2) (1)	unknown	unknown	unknown

1) Silica is believed to be < 15 mg/l based on analyses balance versus total dissolved solids.

Cooling Tower Makeup Water Quality

Constituent (mg/l as species unless noted otherwise)	Minimum	Maximum	Average
pH, Std Units	6.2	9.2	7.2
Conductivity, uS/cm	105	380	198
Total Suspended Solids	0.7	10	5
Total Dissolved Solids	132	235	134
Sodium	10	20	15
Calcium	9.3	26	20.2
Magnesium	3.2	11.5	7.2
Manganese	0.0002	2.4	0.2
Copper	0.0002	0.0017	0.0008
Iron	0.007	2.5	0.2
Alkalinity, mg/l as $CaCO_3$	20 (2)	50	30
Chloride	1.76	5.4	3.9
Total Sulfur, mg/l as SO_4	6.2	74	37.7
Silica (SiO_2) (1)	unknown	unknown	unknown

1) Silica is believed to be < 15 mg/l based on analyses balance versus total dissolved solids.
2) Minimum alkalinity to be controlled through supplemental alkalinity feed at clarifiers.

Service/Fire Water Quality

Constituent (mg/l as species unless noted otherwise)	Minimum	Maximum	Average
pH, Std Units	6.2	9.2	7.2
Conductivity, uS/cm	105	380	198
Total Suspended Solids(3)	0.7	5	1
Total Dissolved Solids,	132	235	134
Sodium	10	20	15
Calcium	9.3	26	20.2
Magnesium	3.2	11.5	7.2
Manganese	0.0002	2.4	0.2
Copper	0.0002	0.0017	0.0008
Iron	0.007	2.5	0.2
Alkalinity, mg/l as $CaCO_3$	20 (2)	50	30
Chloride	1.76	5.4	3.9
Total Sulfur, mg/l as SO_4	6.2	74	37.7
Silica (SiO_2) (1)	unknown	unknown	unknown

1) Silica is believed to be < 15 mg/l based on analyses balance versus total dissolved solids.
3) Minimum alkalinity to be controlled through supplemental alkalinity feed at clarifiers.
4) Clarified River Water to be filtered, further lowering the suspended solids, to form Service/Fire Water.

Demineralized Water Quality

Parameter	Maximum
Silica, ppb	< 10
Specific Conductivity, uS/cm	< 0.1
Total Organic Carbon, ppb	< 100
Sodium, ppb	< 2
Chloride, ppb	< 2
Sulfate, ppb	< 2

Reference: *Comprehensive Cycle Chemistry Guidelines for Combined Cycle- Heat Steam Generators*, EPRI, 2013

Appendix N – PRELIMINARY FIRE PROTECTION DESIGN BASIS

Fire Protection Concept Report

East Kentucky Power Cooperative

Cooper Power Plant
Project No. 157787

Revision C
9/17/2024

Fire Protection Concept Report

prepared for

East Kentucky Power Cooperative
Cooper Power Plant
Clark County, KY

Project No. 157787

Revision C
9/17/2024

prepared by

Burns & McDonnell Engineering Company, Inc.
Kansas City, MO

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LIST OF ABBREVIATIONS

Abbreviation	Term/Phrase/Name
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
AWWA	American Water Works Association
BOP	Balance of Plant
Burns & McDonnell	Burns & McDonnell Engineering Company, Inc.
CEMS	Continuous Emissions Monitoring System
CO_2	Carbon Dioxide
DCS	Distributed Control System
EKPC	Eastern Kentucky Power Cooperative
FACU	Fire Alarm Control Unit
FM	FM Global
GPM	Gallons per Minute
GSU	Generator Step-Up
GTG	Gas Turbine Generator
HDPE	High Density Polyethylene
HRSG	Heat Recovery Steam Generator
HVAC	Heating, Ventilation, Air-Conditioning
I&C	Instrument & Controls
IBC	International Building Code
IFC	International Fire Code

Abbreviation	Term/Phrase/Name
I/O	Input/Output
LEL	Lower Explosive Limit
MCC	Motor Control Center
MW	Megawatt
NEC	National Electric Code
NFPA	National Fire Protection Association
OEM	Original Equipment Manufacturer
OSHA	Occupational Safety & Heath Administration
PCM	Power Control Module
PEMB	Pre-Engineered Metal Building
PLC	Programmable Logic Controller
PIV	Post Indicator Valve
SEE/SFC	Static Excitation Equipment/Starting Frequency Converter
STG	Steam Turbine Generator
UL	Underwriters Laboratory
UPS	Uninterruptible Power Supply
UV/IR	Ultraviolet/Infrared
VDC	Voltage Direct Current

1.0 EXECUTIVE SUMMARY

The Cooper Power Plant Project, referred to in the remainder of this report as the Project, is a 774 Megawatts (MW) nominal net 2x1 combined-cycle power generation facility. The Project will provide two Gas Turbine Generators (GTGs), two Heat Recovery Steam Generators (HRSGs), one Steam Turbine Generator (STG), three Generator Step-Up (GSU) transformers, three Unit Auxiliary transformers, and balance of plant (BOP) equipment required to support the plant. Fuel for the Project will be natural gas and No.2 fuel oil. Eastern Kentucky Power Cooperative (EKPC) is the owner/operator of the plant.

The Project is located in Pulaski County, Kentucky.

Plant equipment and structures will include:

- Administration Building and Control Room
- GTG Enclosures
- STG Building
- Service/Fire Water Storage Tank
- Fire Pump Enclosure
- Emergency Diesel Generator
- Water Treatment Building
- Water Treatment Electrical Room
- Instrument & Controls (I&C) Tech Shop and Maintenance Building
- Cooling Tower
- Cooling Tower Chemical Feed Enclosure
- Cooling Tower Power Control Module (PCM)
- Main Gas Turbine Electrical Building
- GSU and Station Service Transformers
- Continuous Emissions Monitoring System (CEMS) Enclosures
- Fuel Oil Tanks
- Fuel Oil Unloading and Forwarding Pumps

The fire protection measures for the Project will be designed to assist the following:

- Control the spread of fire
- Protect plant personnel
- Provide fire detection and notification to occupants
- Reduce facility damage resulting from a fire

To prevent the spread of fire, the plant will be divided into fire areas. Fire areas will be established by passive measures such as structural construction or spatial separation. Operational or active measures such as fixed fire suppression systems, standpipe and hose stations, fire hydrants, and portable fire extinguishers are also provided.

Fire protection equipment will be Underwriters Laboratory (UL) Listed or Factor Mutal (FM) Approved for their intended fire protection use as required to comply with applicable Codes and Standards adopted by State of Kentucky.

This FP Concept Report represents the minimum level of fire protection systems and features required by NFPA and the applicable building and fire codes. Any additional systems or protection requirements which may be imposed by the Owner's property insurer (FM Global) and/or the local Authority Having Jurisdiction (AHJ) shall be identified and included by the Subcontractor/Bidder.

During major equipment overhauls, additional fire protection measures may be required by the Owner. These additional measures should be defined by the Owner in plant maintenance or construction procedures.

The information contained herein serves as the basis for the design and installation of the fire protection systems and features at the facility. Refer to the Project's Life Safety & Building Code Summary Report for hazardous material quantities, means of egress, emergency lighting and fire barrier locations.

The building dimensions and equipment sizes in the report are approximate and will be finalized during detailed design.

Fire protection for the Project is summarized in Table 3-1 within this Report.

2.0 CODES AND STANDARDS

The following codes and standards were used for the fire protection design for the project.

2.1 National Fire Protection Association (NFPA)

NFPA 10	Standard for Portable Fire Extinguishers
NFPA 12	Standard on Carbon Dioxide Extinguishing Systems
NFPA 13	Standard for the Installation of Sprinkler Systems
NFPA 14	Standard of the Installation of Standpipe and Hose Systems
NFPA 15	Standard for Water Spray Fixed Systems for Fire Protection
NFPA 20	Standard for Stationary Pumps for Fire Protection
NFPA 22	Standard for Water Tanks for Private Fire Protection
NFPA 24	Standard for the Installation of Private Fire Service Mains and their Appurtenances
NFPA 30	Flammable and Combustible Liquids Code
NFPA 37	Installation ad Use of Stationary Combustion Engines and Gas Turbines
NFPA 70	National Electrical Code
NFPA 72	National Fire Alarm and Signaling Code
NFPA 85	Boiler and Combustion Hazards Code
NFPA 101	Life Safety Code
NFPA 220	Standard on Types of Building Construction
NFPA 497	Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Area
NFPA 720	Standard for Installation of Carbon Monoxide (CO) Detection and Warning Equipment
NFPA 750	Standard for Water Mist Fire Suppression Systems

NFPA 850	Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations
NFPA 2001	Standard for Installation of Clean Agent Suppression Systems

2.2 International Building and Fire Codes

International Building Code (IBC) 2015 – Kentucky Building Code – 2018

International Fire Code (IFC) 2015 – Kentucky Fire Code – 2015

2.3 Underwriters Laboratory

Fire Protection Equipment Directory

2.4 FM Global

Factory Mutual Approvals Guide

2.5 Occupational Health and Safety

Occupational Health and Safety Administration (OSHA)

2.6 American Society of Mechanical Engineers

American Society of Mechanical Engineers (ASME) B31.1 - Power Piping

2.7 American Water Works Association

American Water Works Association (AWWA) D100 - Welded Carbon Steel Tanks for Water Storage

2.8 American Petroleum Institute

American Petroleum Institute (API) 650 – Welded Tanks for Oil Storage

3.0 FIRE PROTECTION SYSTEMS

3.1 Fire Protection Water Supply

The fire protection water supply will be stored in the service/fire water storage tank, which has a 2-hour reserve to meet fire protection system demands. The dedicated fire water supply in the tank is supplied via the fire pumps using the underground fire distribution loop and the fixed pipe suppression systems for the project. Restoration of the fire water supply volume, required within 8 hours following a fire event per NFPA 850, will be available from the new water treatment system.

3.1.1 Service/Fire Water Storage Tank

Fire protection and process water will be stored in the heated and insulated Service/Fire Water Storage Tank. The tank is supplied from a new water treatment system consisting of clarifier makeup pumps, clarifiers, and multimedia filters with a clarified water storage tank and transfer pumps. The Service/Fire Water Storage tank is sized for 220,000 gallons of fire water reserve to supply the most demanding fire protection systems plus a 500 gpm hose allowance for a 2-hour duration with additional capacity for service water. The water level is automatically maintained and monitored by the plant Distributed Control System (DCS), and the bottom portion of the tank is reserved for fire protection purposes by utilizing an internal standpipe to supple water to the suction of the plant service water pumps.

The Service/Fire Water Storage Tank will be designed, installed, and tested in accordance with the NFPA 22 and AWWA D100 (carbon steel) or API 650 (if stainless steel option is selected).

3.1.2 Fire Pumps

Fire pumps will be provided in a separate location and take suction from the Service/Fire Water Storage Tank. The primary fire pump will be electric motor driven and will be located in a dedicated fire pump enclosure. The redundant fire pump will be diesel engine driven, and it will be colocated in the same fire pump enclosure with the electric fire pump. Each fire pump will be provided with a dedicated controller for automatic starting and monitoring of the pump availability. Outputs from the respective controllers will be available through the DCS to indicate fire pump running, power available, and fire pump failed to start at a minimum. A wet pipe sprinkler system will be provided for the fire pump enclosure in accordance with NFPA 13 and NFPA 20. A 2-hour fire barrier will separate the electric and diesel fire pump in accordance with NFPA 850. A jockey pump will maintain system pressure in the fire water loop. Suction piping from the Service/Fire Water Storage Tank will be in a heated/insulated enclosure or heat-traced to protect the piping from freezing conditions.

The fire pumps will be designed, installed, and tested in accordance with the NFPA 20 and will be supervised by the fire alarm system.

The existing fire pumps on site are as follows:

- Electric fire pump – 2800 gpm @ 195 psi
- Diesel fire pump – 1000 gpm @ 168 psi

The current estimated single largest fire water demand is for the GSU Transformer deluge spray system and is estimated at 1,700 gpm demand (including 500 gpm for manual hose streams). The existing electric fire pump would bound this fire water demand; however, the existing diesel fire pump would not be capable of providing 100% backup to the existing electric fire pump. At a minimum, a new single fire pump with 100% backup would be required for the Project.

3.1.3 Underground Fire Distribution Loop

An underground fire protection distribution loop will supply water to the hydrants and fire protection systems.

Post indicator valves (PIVs) will be provided for the underground fire loop to allow for isolation of sections of the fire main in the event of fire main break or planned maintenance activities. PIVs will be located a minimum of 40 feet from all structures and special hazards, where practical. PIVs will be secured in the open position with locks or seals.

Fire hydrants with PIVs will be provided on the main fire loop. Hydrants will be located throughout the facility with a maximum of 300 feet between hydrants.

The fire loop will be designed, installed, and tested in accordance with the NFPA 24. The piping materials of the fire loop will be FM Approved High Density Polyethylene (HDPE) in accordance with NFPA 24. Local fire loop pressure indication will also be provided in the fire pump enclosure.

3.2 Fixed Pipe Suppression Systems

Automatic sprinkler, water spray systems and clean agent fire suppression systems will be installed with the appropriate design in accordance with NFPA standards to provide coverage of the fire hazards. See Section 4.0 for a description of hazards and the corresponding fire protection systems. Aboveground piping will be noncoated galvanized Schedule 40 carbon steel with threaded, grooved, welded, or flanged connections to meet NFPA 13.

Fixed fire suppression systems will be provided in the following locations:

- GTG Enclosures and associated packages
- Gas Turbine Lube Oil Reservoirs
- GSU Transformers
- STG Bearings
- STG Lube Oil Module
- Maintenance Shop Area
- Water Treatment Enclosure
- Steam Turbine Seal Oil system
- Administration Building
- Diesel Fire Pump Enclosure
- Emergency Diesel Generator Enclosure

The fire protection systems will be designed, installed, and tested according to the appropriate NFPA standards and IFC requirements. Materials and equipment will be UL listed and/or FM Approved for fire protection service and appropriately selected with pressure/temperature/flow margins for service in accordance with manufacturer's recommendations.

3.3 Manual Fire Suppression

Portable fire extinguishers for manual firefighting purposes will be provided in the buildings and structures. The number, type, and locations of the portable fire extinguishers will be based on NFPA 10. Carbon Dioxide (CO_2) fire extinguishers will be provided in electrical equipment rooms. Multipurpose dry chemical ABC fire extinguishers will be provided for the remaining areas.

Class III standpipes and hose stations will be provided for the STG Building.

3.4 Fire Alarm System

A fire alarm system will be provided to monitor new fire protection equipment for this Project. Local Fire Alarm Control Units (FACUs) will be located in various buildings and structures with system wiring to pull stations, smoke and heat detectors, horn/strobe, fire safety controls, Heating, Ventilation, Air-Conditioning (HVAC) system and damper shutdown functions, supervision of the fire pumps, sprinkler systems, and extinguishing systems. All FACUs will be networked together and display system conditions at the Main Fire Alarm Annunciator Panel in the constantly attended control room. Remote annunciators will be provided in accessible locations as determined in the detailed design stage. All

FACUs will be provided with dedicated backup power supplies to allow operation under normal supervisory and alarm conditions. The fire alarm system will provide outputs to the DCS via hardwired signals for alarm, trouble, and supervisory conditions.

The fire alarm systems will be designed, installed, and tested in accordance with NFPA 72 and the National Electrical Code (NEC).

The following table provides a summary of the Project structures/equipment and fire protection features provided:

Table 3-1: Fire Protection Summary

Facility Areas	Area (SF)	Occupancy	Protection
Administration, Control Room	7,350	B – Business	Wet Pipe Sprinkler System, Smoke Detection, Alarm Notification, Manual Pull Stations, HVAC Shutdown, Portable Fire Extinguishers
STG Electrical Room	3,500	F-2 – Factory, Low Hazard	Smoke Detection, Alarm Notification, HVAC Shutdown, Manual Pull Stations, Hydrogen Detection, Portable Fire Extinguishers
GTG (2)	2,200 each	F-1 –Factory, Moderate Hazard	Suppression System for GTG Enclosure Standpipe and Hose Stations, Manual Pull Stations, Alarm Notification, Flammable Gas Detection, Portable Fire Extinguishers
GT Fuel Oil Pump Skid (2)	115 each	F-1 –Factory, Moderate Hazard	Deluge Spray System, Heat Detection, Standpipe and Hose Stations, Manual Pull Stations, Alarm Notification, Portable Fire Extinguishers

Facility Areas	Area (SF)	Occupancy	Protection
GT Control Oil Package (2)	23 each	F-1 –Factory, Moderate Hazard	Deluge Spray System, Heat Detection, Standpipe and Hose Stations, Manual Pull Stations, Alarm Notification, Portable Fire Extinguishers
GT Lube Oil Package (2)	273 each	F-1 –Factory, Moderate Hazard	Deluge Spray System, Heat Detection, Standpipe and Hose Stations, Manual Pull Stations, Alarm Notification, Portable Fire Extinguishers
STG Building	24,000	F-1 –Factory, Moderate Hazard	Preaction Sprinkler System for STG Bearings, Deluge Spray System for Lube Oil Module, Standpipe and Hose Stations for STG Building, Manual Pull Stations, Alarm Notification, Portable Fire Extinguishers
Fire Pump Enclosure	450	F-1 –Factory, Moderate Hazard	Wet Pipe Sprinkler System, Manual Pull Stations, Alarm Notification, Portable Fire Extinguishers
Emergency Diesel Generator	500	F-1 –Factory, Moderate Hazard	Clean Agent Suppression System, Manual Pull Stations, Portable Fire Extinguishers, Fire Hydrants
Water Treatment Building	16,000	F-2 – Factory, Moderate Hazard	Wet Pipe Sprinkler System, Alarm Notification, HVAC Shutdown, Manual Pull Stations, Portable Fire Extinguishers
Water Treatment Electrical Room	800	F-2 – Factory, Low Hazard	Smoke Detection, Alarm Notification, HVAC Shutdown, Manual Pull Stations, Portable Fire Extinguishers

Facility Areas	Area (SF)	Occupancy	Protection
I&C Tech and Maintenance Shop	5,500	F-2 – Factory, Low Hazard	Wet Pipe Sprinkler System, Alarm Notification, Manual Pull Stations, Portable Fire Extinguishers
Cooling Tower	N/A	N/A	Fire Hydrants
Cooling Tower Chemical Feed Enclosure	450	F-1 – Factory, Moderate Hazard	Heat/Smoke Detection, Alarm Notification, Manual Pull Stations, Portable Fire Extinguishers, Fire Hydrants
Cooling Tower PCM	1,400	F-2 – Factory, Low Hazard	Smoke Detection, Alarm Notification, Manual Pull Stations, Portable Fire Extinguishers
Main Gas Turbine Electrical Building	3,600	F-2 – Factory, Low Hazard	Smoke Detection, Alarm Notification, Manual Pull Stations, Portable Fire Extinguishers
GTG GSU/Auxiliary Transformers	N/A	N/A	Deluge Spray Systems, Fire Hydrants, Fire Walls or Separation per NFPA 850, Containment and Drainage
STG GSU/Exciter Transformer	N/A	N/A	Deluge Spray Systems, Fire Hydrants, Fire Walls or Separation per NFPA 850, Containment and Drainage
CEMS Enclosures (2)	110 each	F-2 – Factory, Low Hazard	Smoke Detection, Alarm Notification, Manual Pull Stations, Portable Fire Extinguishers
Fuel Oil Storage Tanks (2)	N/A	N/A	85 ft diameter tanks, fixed water monitors on adjacent fire hydrants

Facility Areas	Area (SF)	Occupancy	Protection
Fuel Oil Unloading and Forwarding Pumps	N/A	N/A	Deluge Spray Systems, Heat Detectors, Fire Extinguishers, Fire Hydrants

4.0 FACILITY AREAS

4.1 Administration Building

The Project will provide a building for administrative offices, Control Room, and DCS Room. The combined area of the space is approximately 7,350 sf. The single-story building will be constructed of noncombustible construction and finishes and is considered a B-Business occupancy.

Fire protection for the building will consist of:

- Portable fire extinguishers
- HVAC shutdown controls.
- Dual sensing photoelectric and ionization smoke and heat detectors.
- Manual pull stations and notification appliances.
- Fire barrier to separate B occupancy from STG Building F-1 occupancy
- Automatic sprinkler protection.
- Fire hydrants supplied by the fire loop.

4.1.1 STG Electrical Room

As part of the Administration Building, the STG Electrical Room will include a single-story 3,500 square foot room containing power distribution equipment (medium voltage switchgear and low voltage switchgear, motor control centers (MCC's), power panels, switchboards, and uninterrupted power system (UPS) including a battery room to distribute 125 VDC power to the plant equipment. The STG Electrical Room will be provided with an HVAC system and be integrated with the fire alarm system for HVAC shutdown upon fire alarm. The STG Electrical Room will be constructed of noncombustible construction and interior finishes. The STG Electrical Room is considered an IBC F-2, Factory, Low Hazard occupancy. The volume of battery electrolyte is approximately 516 gallons.

Fire protection for the STG Electrical Room will consist of:

- Noncombustible construction and finishes.
- Battery rack spill containment with absorbent pillows.
- Fire alarm smoke detection, pull stations, HVAC shutdown relays and horn/strobe notification appliances connected to the fire alarm system.
- CO_2 fire extinguishers.
- Hydrogen detection connected to the DCS and continuous exhaust ventilation in the battery room.

4.2 STG Building and GTG/HRSG Areas

The Project will provide an approximate 24,000 square foot building for a STG, and associated equipment. The building will be constructed of noncombustible construction and finishes, including the building roof deck. Several noncombustible equipment platforms consisting of metallic grating will be provided at different elevations for equipment maintenance access. The building is considered an IBC F-1, Factory, Moderate Hazard occupancy.

Fire protection for the building will consist of:

- Portable fire extinguishers.
- Fire hydrants supplied by the fire loop.
- Class III standpipe and hose stations for manual fire-fighting.
- Fire alarms pull stations and notification appliances.
- Mechanical ventilation to minimize natural gas concentrations.
- Flammable gas detectors monitored by the DCS.
- Emergency gas shutoff valve and vent valve on the main gas header, located in the gas yard, to isolate the plant and vent gas piping in case of a fire.
- Local automatic fire protection systems and features.

4.2.1 Equipment

The following sections describe the fire protection provided for the GTG's, HRSG's, and STG.

4.2.1.1 Gas Turbine Generators

Two GTG packages consisting of two Siemens model SGT6-5000F gas turbines, each paired with a Siemens model SGen6-1000A 113/55 generator, or similar, will be located inside outdoor enclosures. Each GTG will have a prefabricated equipment console, Static Excitation Equipment/Starting Frequency Converter (SEE/SFC) package, and transformers. Exhaust emissions will be measured by the CEMS.

Fire protection for the GTG area and associated cable vault will consist of:

- A total flooding fire suppression system (either CO_2 or water mist).
- Thermal detectors set to activate at fixed setpoints or during rapid temperature rise. First activation will initiate the alarm system. Second activation will initiate fire suppression, trip the gas turbine, deactivate the enclosure exhaust fans, and close the intake and exhaust dampers.
- Flammable gas detectors will be provided for remote and local alarm and indication via the DCS.

- Automatic deluge spray system for lube oil system, as well as the oil flow path in the case of spills. This includes the GT Fuel Oil Pump Skids (2), GT Control Oil Packages (2), and GT Lube Oil Packages (2).
- Deluge spray to be activated by heat detection.
- Containment and drainage for lube oil and fire protection water to prevent spreading of combustible/ignitable liquids and fire water.

4.2.1.2 Heat Recovery Steam Generators

Two Nooter-Eriksen triple pressure, reheat, unfired, natural circulation HRSG's, or similar, will be located outdoors. Both HRSG's will include an economizer section and no duct firing.

Fire protection for the HRSG's will consist of:

- Class III Standpipe and hose station for manual firefighting as necessary.

4.2.1.3 Steam Turbine Generator

A STG package consisting of a single Siemens model SST6-5000 steam turbine paired with a Siemens model SGen6-1000A 113/55 generator, or similar, will be located inside the STG building. High, intermediate, and low-pressure steam is supplied from the HRSG's to power the STG. The STG has a lube oil reservoir and control oil reservoir.

Fire protection for the STG will consist of:

- Containment and drainage for lube oil reservoirs, lube oil system piping and fire water to prevent spreading of combustible/ignitable liquids.
- Pre-action sprinkler system for the STG bearings.
- Protection of direct current (DC) Lube Oil Pump power cables where exposed to lube oil containment areas.
- Automatic deluge suppression systems for the lube oil systems, as well as the oil flow path in the case of spills.
- Class III Standpipe and hose station for manual firefighting as necessary.

4.3 Fire Pump Enclosure

The Project will provide a single-story, 450 square foot enclosure containing the new electric and diesel fire pumps and supporting equipment. The factory constructed enclosure will have lighting, insulation,

heating and ventilation, and will be of noncombustible construction and interior finishes. The enclosure is considered an IBC F-1, Factory, Moderate Hazard occupancy.

Fire protection for the Fire Pump Enclosure will consist of:

- Wet pipe sprinkler system
- Portable fire extinguishers
- Monitoring of the fire pump controller
- Manual pull stations
- Horns/strobes

4.4 Emergency Diesel Generator

The Project will provide a 1,000 kW diesel engine-driven generator in a factory-constructed enclosure that provides back-up power for the essential electrical systems for safe plant shutdown. The generator will be in a 500 square foot pre-manufactured modular enclosure with lighting, insulation, heat, and ventilation, and it will be constructed of noncombustible construction and interior finishes. The enclosure is considered an IBC F-1, Factory, Moderate Hazard occupancy.

Fire protection for the diesel generator will consist of:

- Clean agent suppression system.
- Manual pull stations.
- Fire hydrants supplied by the fire loop.
- Noncombustible construction and interior finishes.
- UL 142 double-walled fuel tank.
- Fire extinguishers.
- Monitoring by the DCS.

The generator will be designed, installed, and tested in accordance with NFPA 110. The clean agent suppression system for the enclosure will be designed, installed, and tested in accordance with NFPA 2001.

4.5 Water Treatment Building

The Project will provide a 16,000 square foot building containing water treatment equipment. Of that, 13,525 sq ft will be single-story and 2,475 sq ft will have two stories. The two-story portion of the building will contain a fully open ground floor drive through bay and fully enclosed, heated, and

ventilated second floor containing two filter presses. The water treatment building will have lighting, insulation, heating and ventilation, and will be of noncombustible construction and interior finishes. The building is considered an IBC F-2, Factory, Low Hazard occupancy.

Fire protection for the Water Treatment Building will consist of:

- Wet pipe sprinkler system
- Manual pull stations.
- Fire hydrants supplied by the fire loop.
- Noncombustible construction and interior finishes.
- Portable Fire extinguishers.

4.5.1 Water Treatment Building Electrical Room

Adjacent to the Water Treatment Building will be a single-story 800 square foot electrical room containing electrical gear, MCC, power panels, and system variable frequency drives (VFD's). The Water Treatment Building Electrical Room will be provided with an HVAC system and be integrated with the fire alarm system for HVAC shutdown upon fire alarm. The electrical room will be constructed of noncombustible construction and interior finishes. The electrical room is considered an IBC F-2, Factory, Low Hazard occupancy.

Fire protection for the Water Treatment Building Electrical Room will consist of:

- Noncombustible construction and finishes.
- Automatic sprinkler protection.
- Fire alarm smoke detection, pull stations, HVAC shutdown relays and horn/strobe notification appliances connected to the fire alarm system.
- CO_2 fire extinguishers.

4.6 I&C Tech and Maintenance Shop

The Project will provide a I&C Tech and Maintenance Shop building. This building will be single story, approximately 5,500 square feet, non-combustible construction and an IBC F-2, Factory, Low Hazard occupancy. Fire protection for this building will be a wet pipe sprinkler system, local alarm notification, portable fire extinguishers, and manual pull stations.

4.7 Cooling Tower

The Project will provide a counter-flow, high efficiency Cooling Tower to provide a closed-loop cooling system for the equipment heat exchangers. The Cooling Tower will consist of non-combustible fill and construction including access stairs and maintenance platforms.

Fire protection for the Cooling Tower will consist of:

- Fire hydrants supplied by the fire loop.
- Noncombustible construction.

4.7.1 Cooling Tower Chemical Feed Enclosure

The Project will provide an approximate 450 square foot enclosure containing cooling tower related water treatment equipment. The Cooling Tower Chemical Feed Enclosure will have lighting, insulation, heating and ventilation, and will be of noncombustible construction and interior finishes. The enclosure is considered an IBC F-1, Factory, Moderate Hazard occupancy.

Fire protection for the Cooling Tower Chemical Feed Enclosure will consist of:

- Fire hydrants supplied by the fire loop.
- Fire alarm smoke detection, pull stations, and horn/strobe notification appliances connected to the fire alarm system.
- Noncombustible construction and interior finishes.
- Portable Fire extinguishers.

4.7.2 Cooling Tower PCM

The Project will provide a single-story, approximate 1,400 square foot factory-constructed PCM enclosure containing power distribution equipment (MCC's and power panels) to distribute power to the Cooling Tower equipment. The PCM enclosure will be constructed of noncombustible construction and interior finishes. The enclosure will be provided with an HVAC system. The enclosure is considered an IBC F-2, Factory, Low Hazard occupancy.

Fire protection for the Cooling Tower PCM will consist of:

- Noncombustible construction.
- Fire alarm smoke detection, pull stations, and horn/strobe notification appliances connected to the fire alarm system.

- CO_2 fire extinguishers.
- Fire hydrants supplied by the fire loop.

4.8 Main Gas Turbine Electrical Building

The Project will provide a single-story, approximate 3,600 square foot Main Gas Turbine Electrical Building containing power distribution equipment (medium voltage switchgear and low voltage switchgear, motor control centers, power panels, and switchboards). The Main Gas Turbine Electrical Building will be provided with an HVAC system. The building will be constructed of noncombustible construction and interior finishes. The building is considered an IBC F-2, Factory, Low Hazard occupancy.

Fire protection for the Main Electrical Building will consist of:

- Noncombustible construction and finishes.
- Fire alarm smoke detection, pull stations, and horn/strobe notification appliances connected to the fire alarm system.
- CO_2 fire extinguishers.

4.9 GTG GSU and Unit Auxiliary Transformers

The Project will provide one 246/328/410 MVA GSU transformers and one 27.75/37/46.25 MVA Unit Auxiliary transformer for each GTG. The GSU and Unit Auxiliary transformers will be mineral oil filled. The oil capacity of each GSU transformer is over 5,000 gallons. The oil capacity of each Unit Auxiliary transformer is approximately 2,600 gallons. Each GTG GSU exceeds the 5000-gallon limit which is the volume of insulating oil used in NFPA 850 to establish minimum 50 ft separation distances without fire barriers. Because each GTG Unit Auxiliary transformer has an oil capacity greater than 500 gallons but less than 5,000 gallons, a minimum of 25 ft separation distances without fire barriers are required per NFPA 850.

Fire protection for the transformers will consist of:

- Deluge Spray Systems per NFPA 15
- Fire hydrants supplied by the fire loop.
- Spatial separation or fire walls to separate near buildings and equipment per NFPA 850.
- Concrete basin containment for transformer oil and fire water for the GSU and auxiliary transformers. Sizing of the containment basin is based on the volume of transformer oil and 10 minutes of manual hose stream for firefighting at 500 gpm. The concrete basin will be filled with

crushed rock with a vacuum truck connection to allow for water collection. Additional drain piping with normally closed drain valve to be provided. Basin to have means of testing water. If water is proven to not be contaminated and suitable for discharge, the drain valve can be opened to gravity drain to the plant storm water system.

- Monitoring to the annunciators.

4.10 STG GSU / Exciter Transformer

The Project will provide one 231/308/385 MVA GSU transformer for the STG. The GSU will be mineral oil filled. The oil capacity of the GSU transformer is over 5,000 gallons.

Fire protection for the transformers will consist of:

- Deluge Spray Systems per NFPA 15
- Fire hydrants supplied by the fire loop.
- Spatial separation or fire walls to separate near buildings and equipment per NFPA standards.
- Concrete basin containment for transformer oil and fire water for the GSU and auxiliary transformers. Sizing of the containment basin is based on the volume of transformer oil and 10 minutes of manual hose stream for firefighting at 500 gpm. The concrete basin will be filled with crushed rock with a vacuum truck connection to allow for water collection. Additional drain piping with normally closed drain valve to be provided. Basin to have means of testing water. If water is proven to not be contaminated and suitable for discharge, the drain valve can be opened to gravity drain to the plant storm water system.
- Monitoring to the annunciators.

4.11 CEMS Enclosures

Two CEMS Enclosures will be provided to measure and report emission data from the station. The single-story, 110 square foot enclosures will contain monitoring equipment, programmable logic controller (PLC) processing, Input/Output (I/O) equipment, and other miscellaneous electrical equipment. The CEMS enclosures will be constructed of noncombustible construction and interior finishes. The enclosures are considered an IBC, F-2, Factory, Low Hazard occupancy.

Fire protection for the CEMS enclosures will consist of:

- Noncombustible construction.
- CO_2 fire extinguishers.

- Fire alarm smoke detection, pull stations, horn/strobe notification appliances connected to the fire alarm system.
- Fire hydrants supplied by the fire loop.

4.12 Fuel Oil Storage Tanks

Two fuel oil storage tanks of approximately 85 ft diameter and 1,400,000 gallons volume each will be provided for the Project. The tanks will be located in a common containment berm designed to contain the volume of a single tank in addition to fire-water flow for a duration of 20 minutes.

Fire protection for Fuel Oil Storage Tanks will consist of:

- Fire hydrants with fixed monitors at the perimeter of the containment berm

4.13 Fuel Oil Unloading and Forwarding Pumps

Fuel oil unloading and forwarding pump skids will be provided and located adjacent to the fuel oil tank containment berms.

Fire protection for the Fuel Oil Pump Skids will consist of:

- Deluge Spray system per NFPA 15
- Linear heat detection for system actuation, pull stations, and horn/strobe notification appliances connected to the fire alarm system.
- Portable Fire Extinguishers.
- Fire hydrants supplied by the fire loop.

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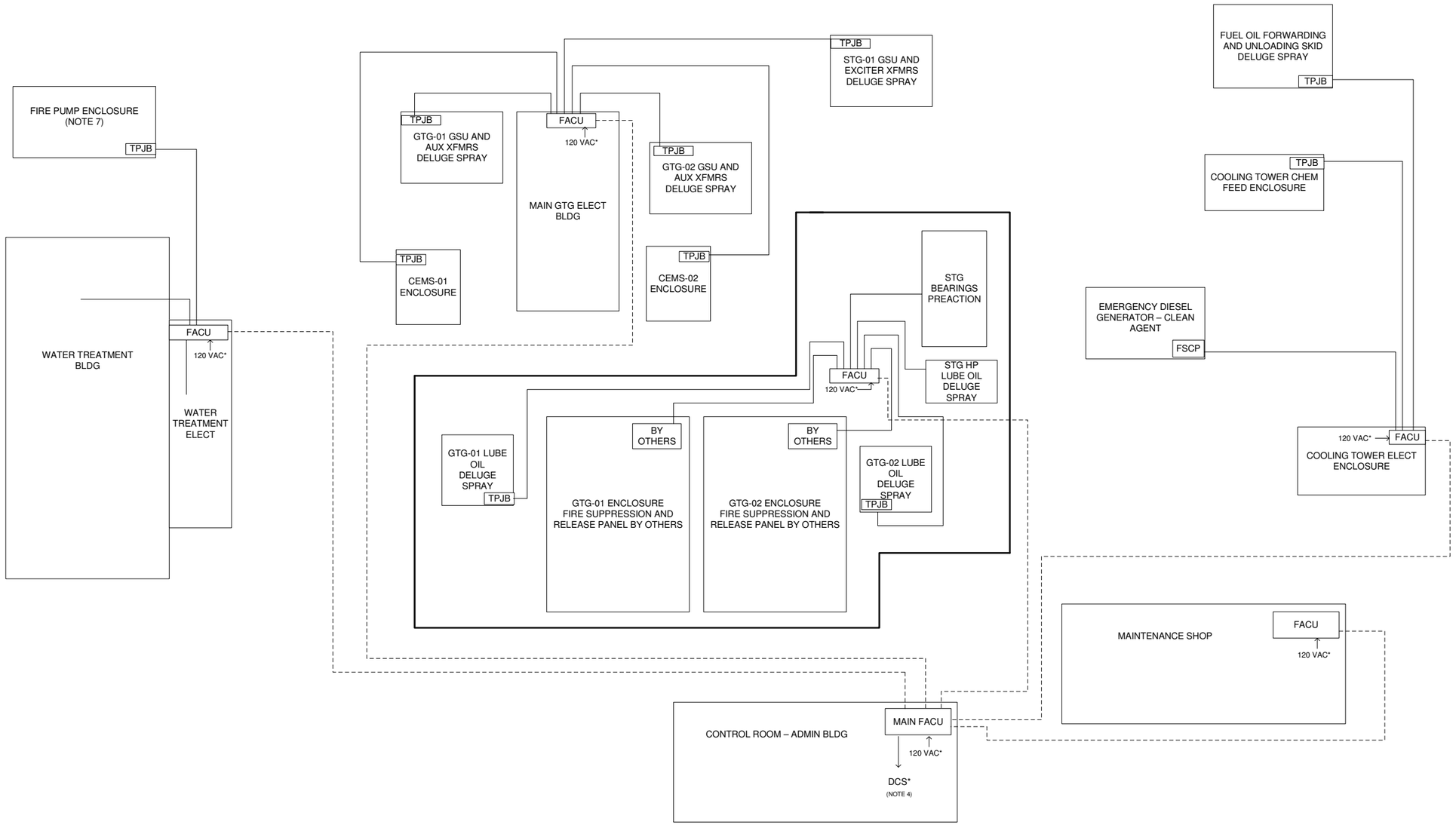
EKPC – Cooper 2x1 Power Project

FIRE ALARM SYSTEM CONCEPTUAL LAYOUT
157787.5.8360



NOTES:
1. FIRE ALARM AND DETECTION SYSTEMS TO BE DESIGNED, INSTALLED AND TESTED PER NFPA 72 AND LOCAL CODES/STANDARDS.
2. REFER TO SITE GENERAL ARRANGEMENT DRAWINGS FOR EQUIPMENT LAYOUT.
3. ALL COMPONENTS, DEVICES TO BE UL LISTED OR FM APPROVED FOR FIRE ALARM SYSTEMS.
4. DCS OUTPUTS FROM MAIN FACU TO BE COMMON ALARM, COMMON TROUBLE AND COMMON SUPERVISORY SIGNALS VIA 5.8360 PROVIDED RELAYS.
5. DUCTBANK AND BELOW-GRADE WIRING PROVIDED AND INSTALLED BY OTHERS.
6. ANY ABOVE-GROUND RACEWAY AND WIRING REQUIRED BETWEEN SITE STRUCTURES TO BE FURNISHED AND INSTALLED BY 5.8360.
7. MONITOR SPRINKLER SYSTEM FLOW SWITCH, ALL FIRE PUMP CONTROLLERS, FIRE WATER TANK LEVEL AND TEMP SWITCHES
8. NOT USED
9. MANUAL PULL STATIONS TO BE PROVIDED AT ALL BUILDING EXITS, MEZZANINES, ELEVATED PLATFORMS AND ALONG EGRESS PATHS AS REQUIRED.

LEGEND

FACU	FIRE ALARM CONTROL UNIT
DCS	DISTRIBUTED CONTROL SYSTEM
FSCP	FIRE SYSTEM CONTROL PANEL
TPJB	TIE POINT JUNCTION BOX

CABLES BY 5.8360

COPPER CABLE, TSP, 16 AWG MIN.

MULTI-MODE FIBER CABLE

NOT FOR CONSTRUCTION
FOR REVIEW ONLY

no.	date	by	ckd	description
A	02/29/2024	DJB		Cost Estimating

BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114

date 02/29/2024 | detailed N/A
designed D. BUELL | checked

EKPC
Cooper 2x1 Power Project

FIRE ALARM AND DETECTION CONCEPTUAL LAYOUT

Project No. 157787 | Specification No. 5.8360
Sketch No. SK-157787-001 | rev. 0
sheet 1 of 1 sheets
file

BURNS & McDONNELL ENGINEERING COMPANY, INC.

Appendix O – LIFE SAFETY CODE AND CRITERIA

1. APPLICABLE CODES AND STANDARDS

ABBREVIATIONS	TITLE	EDITION
ASHRAE 90.1	ENERGY STANDARD FOR BUILDINGS	2013
IBC	KENTUCKY BUILDING CODE, IBC AMENDED	2015
IECC	COMMERCIAL ENERGY CONSERVATION CODE OF KENTUCKY, IECC AMENDED	2012
IFC	KENTUCKY FIRE CODE	2012
IMC	KENTUCKY MECHANICAL CODE, IMC AMENDED	2015
IPC	KENTUCKY PLUMBING CODE, IPC AMENDED	2015
NFPA 1	KENTUCKY FIRE CODE	2018
NFPA 10	STANDARD FOR PORTABLE FIRE EXTINGUISHERS	2018
NFPA 13	STANDARD FOR THE INSTALLATION OF SPRINKLER SYSTEMS	2013
NFPA 70	NATIONAL ELECTRICAL CODE	2017
NFPA 72	NATIONAL FIRE ALARM AND SIGNALING CODE	2013
NFPA 80A	RECOMMENDED PRACTICE FOR PROTECTION OF BUILDINGS FROM EXTERIOR FIRE EXPOSURES	2022
NFPA 101	NATIONAL LIFE SAFETY CODE	2018
NFPA 850	RECOMMENED PRACTICE FOR FIRE PROTECTION FOR ELECTRIC GENERATING PLANTS AND HIGH VOLTAGE DIRECT CURRENT CONVERTER STATIONS	2020

2. TYPE OF CONSTRUCTION (IBC 601)

BUILDING ELEMENT	TYPE OF CONSTRUCTION	FIRE RESISTANCE RATING
PRIMARY STRUCTURAL FRAME	IIB	0 HR
BEARING EXTERIOR WALL	IIB	0 HR
BEARING INTERIOR WALL	IIB	0 HR
NON-BEARING EXTERIOR WALL	IIB	0 HR
NON-BEARING INTERIOR WALL	IIB	0 HR
FLOOR CONSTRUCTION INCLUDING SUPPORTING BEAMS AND JOISTS	IIB	0 HR
ROOF CONSTRUCTION INCLUDING SUPPORTING BEAMS AND JOISTS	IIB	0 HR

3. CLASSIFICATION OF OCCUPANCY

AREAS	OCCUPANCY	IBC
ADMINISTRATION	BUSINNESS, B	304.1
MAINTENANCE BLDG	BUSINNESS, B	304.1
STEAM TURBINE BLDGS	INDUSTRIAL MODERATE-HAZARD, F-1	306.2
WATER TREATMENT BLDG	INDUSTRIAL LOW HAZARD, F-2	306.3
MAIN GT ELECTRICAL BLDG	MODERATE-HAZARD STORAGE, GROUP S-1	311.2

4. OCCUPANCY SEPARATION

AREA	FLOOR / OCCUPANCY	SEPARATION	FLOOR / OCCUPANCY	SEPARATION RATING	IBC
GT ELECTRICAL ROOM	F-2	NONSEPARATED	F-1	0 HR BARRIER	508.3.3
MAINTENANCE SHOP	B	NONSEPARATED	F-2	0 HR BARRIER	508.3.3

5. UNLIMITED AREA BUILDING (IBC 507)

BUILDING	OCCUPANCY	FLOORS	FRONTAGE	FIRE SUPPRESSION	IBC
STEAM TURBINE, ADMIN, ELECTRICAL & MAINTENANCE COMBINED	B, F-1, F-2	1 LEVEL	> 60 FT ON NORTH, SOUTH, EAST, & WEST SIDES	FULLY SPRINKLERED	507.4

6. MODIFIED ALLOWABLE AREA (TABLE 506.2)

AREA	OCCUPANCY	ALLOWABLE AREA (SF)	FRONTAGE INCREASE (SF)	SPRINKLER INCREASE (SF)	MODIFIED ALLOWABLE AREA (SF)
ADMINISTRATIVE	B	23,000	NOT REQUIRED	69,000	UNLIMITED AREA BLDG
ELECTRICAL & BOILER RM	F-2	23,000	NOT REQUIRED	69,000	UNLIMITED AREA BLDG
GT ELECTRICAL ROOM	F-2	23,000	NOT REQUIRED	69,000	UNLIMITED AREA BLDG
MAINTENANCE SHOP	F-2	23,000	NOT REQUIRED	69,000	UNLIMITED AREA BLDG
STEAM TURBINE	F-1	15,500	NOT REQUIRED	46,500	UNLIMITED AREA BLDG
WATER TREATMENT BLDG	F-2	23,000	NOT REQUIRED	NOT SPRINKLERED	23,000

7. BUILDING ALLOWABLE AREA (IBC 506)

AREA	OCCUPANCY	ACTUAL AREA (SF)	RESTRICTING MODIFIED ALLOWABLE AREA (SF)	RATIO (SUM < 1)
ADMINISTRATIVE	B	7,317	UNLIMITED	-
ELECTRICAL & BOILER RM	F-2	7,525	UNLIMITED	-
GT ELECTRICAL ROOM	F-2	3,600	UNLIMITED	-
MAINTENANCE SHOP	F-2	5,500	UNLIMITED	-
STEAM TURBINE	F-1	23,631	UNLIMITED	-
WATER TREATMENT BLDG	F-2	14.300	23,000	.59

8. MODIFIED ALLOWABLE HEIGHT (IBC 504)

AREA	OCCUPANCY	RESTRICTING ALLOWABLE HEIGHT (FT / STORY)	SPRINKLER INCREASE (FT / STORY)	MODIFIED ALLOWABLE HEIGHT (FT / STORY)	ACTUAL HEIGHT
GT ELECTRICAL ROOM	F-2	55 / 2	20 / 1	75 / 3	33'-3"
MAINTENANCE SHOP	F-2	55 / 2	20 / 1	75 / 3	43'-9"
STEAM TURBINE & ADMIN	F-1, B	EXEMPT PER 503.1.1	-	EXEMPT PER 503.1.1	116'-6"
WATER TREATMENT BLDG	F-2	55 / 2	20 / 1	75 / 3	49'-0"

9. INCIDENTAL USE AND OTHER PASSIVE FIRE PROTECTION

AREA	REQUIRED RATING	CODE
CORRIDOR	0 HOUR BARRIER	IBC 1020.1
BOILER ROOM	1 HR FIRE BARRIER	NFPA 101 SECTION 38.3.2.1
ELECTRICAL ROOM TRANSFORMER > 112 1/2 KVA	1 HR FIRE BARRIER	NFPA 70 450.21(B)

10. BUILDING SEPARATION (IBC TABLE 602)

AREA	OCCUPANCY	ELEVATION	RESTRICTIVE FIRE SEPARATION DISTANCE (FT)*	FIRE RESISTIVE RATING OF EXTERIOR WALL
GT ELECTRICAL ROOM	F-2	NORTH/SOUTH/WEST/EAST	10' SOUTH, >30' TYP	NO RATING
MAINTENANCE SHOP	B	NORTH/SOUTH/WEST/EAST	15' WEST, >30' TYP	NO RATING
STEAM TURBINE & ADMIN	B, F-1, F-2	NORTH/SOUTH/WEST/EAST	10' NORTH, 15' EAST, > 30' TYP	NO RATING
WATER TREATMENT BLDG	F-2	NORTH/SOUTH/WEST/EAST	> 30' TYP	NO RATING

11. OPENING PROTECTION FOR FIRE AND SMOKE RESISTIVE CONSTRUCTION

COMPONENT	FIRE DOOR / SHUTTER ASSEMBLIES	DUCT PENETRATIONS	OTHER PENETRATIONS	IBC
1 HR FIRE BARRIER	3/4 HR	1-1/2 HR FIRE DAMPER ONLY ON TRANSFER DUCTS	1 HR	716.1, 717.5.2

12. OCCUPANT LOAD CALCULATIONS (IBC 1004)

AREA	DESCRIPTION	FUNCTION OF SPACE	AREA (SF)	OCCUPANT LOAD FACTOR (SF/PERSON)	OCCUPANTS
ADMINISTRATIVE	OFFICES, BATHROOMS	BUSINESS AREAS	4,968	100	50
BUSINESS	CONFERENCE ROOMS	BUSINESS COLLABORATION	2,349	15	157
ELECTRICAL & BOILER ROOMS	BOILER ROOM,ELEC ROOM, STORAGE	INDUSTRIAL AREA	7,525	100	76
GT ELECTRICAL ROOM	ELECTRICAL ROOM	INDUSTRIAL AREA	3,600	100	36
MAINTENANCE SHOP	MAINTENANCE SHOP, I&C TECH SHOP	INDUSTRIAL AREA	5,500	100	55
STEAM TURBINES	STEAM TURBINE BLDGS	INDUSTRIAL AREA	23,631	100	237
WATER TREATMENT BLDG	WATER TREATMENT BLDG	INDUSTRIAL AREA	11,102	100	111
WATER TREATMENT BLDG	ELECTRICAL ROOM	INDUSTRIAL AREA	837	100	9

13. OCCUPANT LOAD SUMMARY AND MINIMUM EXITS FROM FLOOR

AREA	GROSS AREA (SF)	OCCUPANTS	REQUIRED EXITS (1006.3.1)	REQUIRED EXIT SEPARATION
ADMINISTRATIVE	4,968	50	2	1/3 DIAGONAL
ELECTRICAL & BOILER ROOMS	7,525	76	2	1/3 DIAGONAL
GT ELECTRICAL BLDG	3,600	36	2	1/3 DIAGONAL
MAINTENANCE SHOP	5,500	55	2	1/3 DIAGONAL
STEAM TURBINES	23,631	237	2	1/3 DIAGONAL
WATER TREATMENT BLDG	14,330	144	2	1/2 DIAGONAL

14. MINIMUM EXITS OR EXIT ACCESSES FROM A SPACE OR AREA

OCCUPANCY	CONDITION PERMITTING ONE EXIT	CONDITION REQUIRING TWO OR MORE EXITS	CODE SECTION
INDUSTRIAL F-1. F-2	LESS THAN 49 OCCUPANTS	>49 OCCUPANTS	TABLE 1006.2.1
BUSINESS. B	LESS THAN 49 OCCUPANTS	>49 OCCUPANTS	TABLE 1006.2.1

15. COMMON PATH, DEAD-END, AND TRAVEL DISTANCE LIMITS

OCCUPANCY	COMMON PATH LIMIT (FT) (IBC 1006.2.1)	DEAD END LIMIT (FT) (IBC 1020.4)	TRAVEL DISTANCE LIMIT (FT) (IBC 1017.2)
F-1	100	50	250
B	100	50	300
F-2	75	20	300

*NOTE: THE MAXIMUM EXIT ACCESS TRAVEL DISTANCE SHALL BE INCREASED TO 400' PER 1017.2.2 FOR F-1 & S-1 OCCUPANCIES

16. MINIMUM EGRESS WIDTHS

COMPONENT	REQUIREMENT	WIDTH (IN)	IBC
CORRIDOR SERVING LESS THAN 50 OCCUPANTS	MINIMUM	36	1020.2
CORRIDOR SERVING MORE THAN 50 OCCUPANTS	MINIMUM	44	1020.2
DOORS IN EGRESS ACCESS	PER COMPONENT	32	1010.1.1
NEW STAIR IN EGRESS ACCESS	MINIMUM	44	1011.2

17. MINIMUM INTERIOR FINISH RATINGS (IBC 803.11)

OCCUPANCY	EXIT STAIRWAYS, RAMPS & EXIT PASSAGEWAYS	EXIT ACCESS CORRIDORS	ROOMS & ENCLOSED SPACES
B	CLASS B	CLASS C	CLASS C
F-1	CLASS C	CLASS C	CLASS C
F-2	CLASS B	CLASS C	CLASS C

18. FIRE SUPPRESSION REQUIREMENTS

AREA	SPRINKLERS (IBC 903)	STANDPIPE (IBC 905)	FIRE EXTINGUISHERS (IBC 906)
ELECTRICAL & BOILER ROOM	SPRINKLERS ARE REQUIRED	NOT REQUIRED	FIRE EXTINGUISHERS PROVIDED THROUGHOUT THE BUILDING
GT ELECTRICAL ROOM	SPRINKLERS ARE NOT REQUIRED	NOT REQUIRED	FIRE EXTINGUISHERS PROVIDED THROUGHOUT THE BUILDING
MAINTENANCE SHOP	SPRINKLERS ARE REQUIRED	NOT REQUIRED	FIRE EXTINGUISHERS PROVIDED THROUGHOUT THE BUILDING
STEAM TURBINE	SPRINKLERS ARE REQUIRED	NOT REQUIRED	FIRE EXTINGUISHERS PROVIDED THROUGHOUT THE BUILDING
WATER TREATMENT BLDG	SPRINKLERS ARE NOT REQUIRED	NOT REQUIRED	FIRE EXTINGUISHERS PROVIDED THROUGHOUT THE BUILDING

19. FIRE ALARM REQUIREMENTS (IBC 907)

MANUAL INITIATION	AUTOMATIC INITIATION	OCCUPANT NOTIFICATION
MANUAL FIRE ALARM PULL STATIONS PROVIDED AT EXITS	FLOW AND TAMPER SWITCHES, SPOT SMOKE DETECTORS AT ALARM PANELS AND DUCT SMOKE DETECTORS PROVIDED	AUDIBLE AND VISUAL NOTIFICATION PROVIDED. VISUAL ONLY IN PUBLIC AND COMMON AREAS

20. SMOKE MANAGEMENT SYSTEMS

SMOKE CONTROL SYSTEM (IBC 909)	SMOKE AND HEAT VENTS (IBC 910)	PASSIVE SMOKE MANAGEMENT
NOT REQUIRED	NOT REQUIRED	NOT REQUIRED

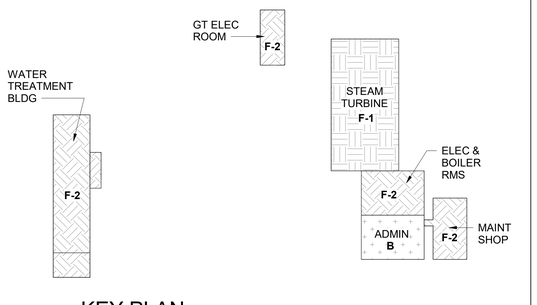
21. REQUIRED PLUMBING FIXTURES (IBC 2902)

BUILDING	OCCUPANCY	OCCUPANT LOAD	WATER CLOSETS	LAVATORIES	DRINKING FOUNTAINS
STEAM TURBINE	F-1	237	2 M 1 F	2 M 1 F	1
ELECTRICAL & BOILER ROOM	F-2	76	1 M 1 F	1 M 1 F	1
ADMINISTRATIVE	B	207	4 M 4 F	2 M 2 F	3
GT ELECTRICAL ROOM	F-2	36	1 M 1 F	1 M 1 F	1
MAINTENANCE SHOP	F-2	55	1 M 1 F	1 M 1 F	1
COMBINED BUILDING TOTAL		611	9 M 8 W	7 M 6 F	7
COMBINED ACTUAL FIXTURE COUNT			12 M 9 W	9 M 7 F	10
WATER TREATMENT BUILDING	F-2	144	1 M 1 F	1 M 1 F	1
WATER TREATMENT ACTUAL FIXTURE COUNT			1 M 1 F	1 M 1 F	1

22. ENERGY CODE SUMMARY (IECC 2012)

COUNTY, STATE , ZONE	BLDG COMPONENT	REQUIRED	PROVIDED - R VALUE
PULASKI, KY, ZONE 4A	ROOFS- METAL BUILDING (PEMB)	R-19+R-11 LS	R-19+R-11 LS
	ROOFS - ROOF INSULATION ABOVE DECK	R-25ci	R-25ci
	WALLS, ABOVE GRADE-METAL BUILDING (PEMB)	R-13 + R-13ci	R-13 + R-13ci
	WALLS, ABOVE GRADE-METAL FRAMED	R-13 + 7.5ci	R-13 + 7.5ci
	WALLS, BELOW GRADE	R-7.5ci	R-7.5ci
	SLAB-ON-GRADE FLOORS	R-10 FOR 24" BELOW	R-10 FOR 24" BELOW
	OPAQUE DOORS	ROLL-UP OR SLIDING R-4.75	R-4.75
	OPAQUE DOORS	SWINGING U-0.61	U-0.61

PROJECT ADDRESS:
COOPER POWER PLANT RD.
SOMERSET, KY 42501



KEY PLAN
SCALE: NTS

PRELIMINARY - NOT FOR CONSTRUCTION

no.	date	by	ckd	description

BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Enguneering Co. Inc
Firm Reg. No. 1308-011
designed Designer
detailed Checker

EAST KENTUCKY POWER COOPERATIVE
CLARK COUNTY, KENTUCKY

COOPER POWER PLANT
2 x1 CCGT PLANT
LIFE SAFETY CODE AND CRITERIA

project 157787
contract CONTRACT
drawing F-001
rev. —
sheet of sheets
file 157787._A_CENTRAL

Appendix P – RISK MATRIX

Cooper Combined Cycle - PROJECT RISK REGISTER - LEVEL 1 IDENTIFICATION

East Kentucky Power Cooperative

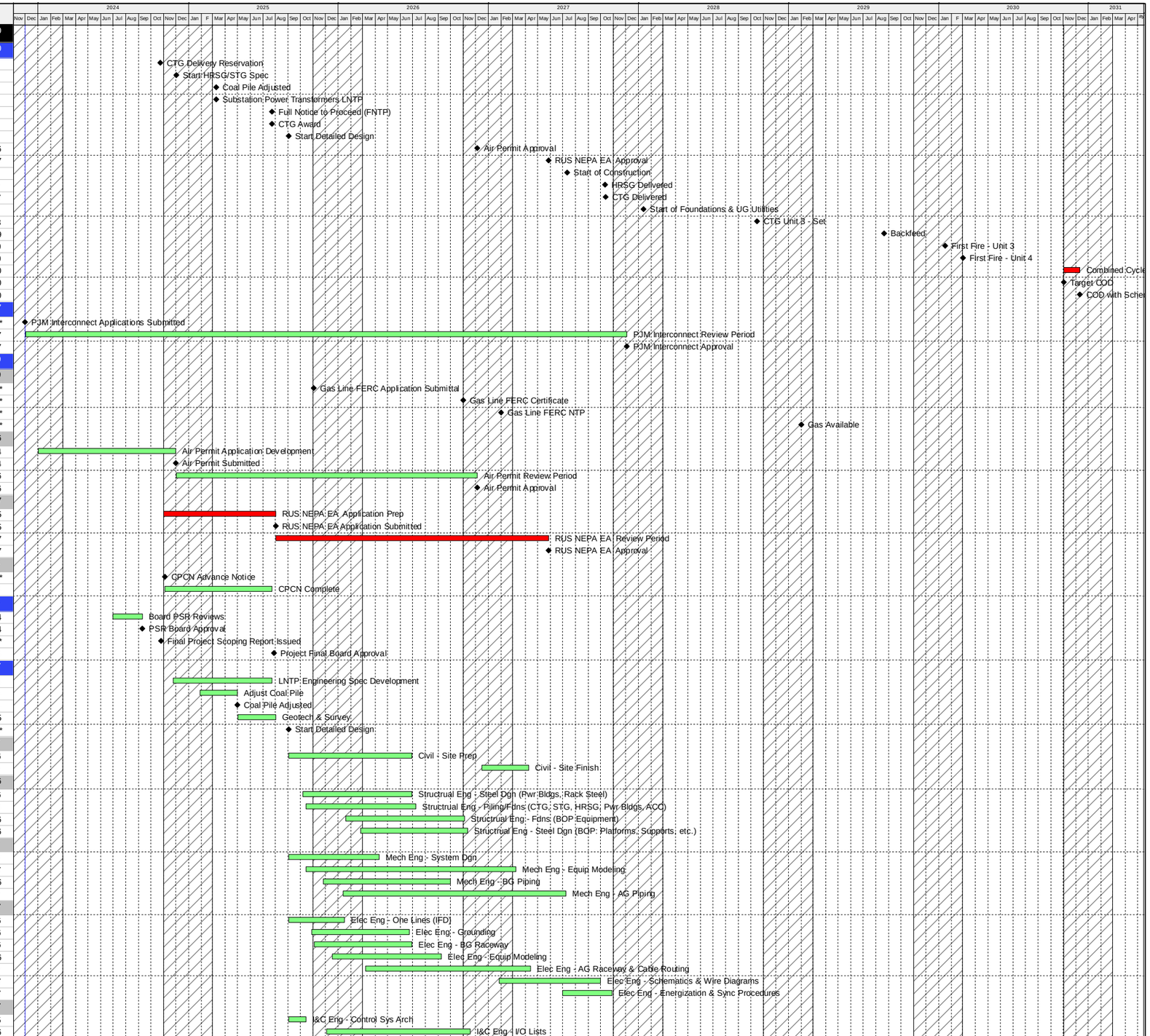
Risk ID No. (NNN)	Key Project Risk Factors (Circumstances) ("because of")	Is Risk Controlled or Uncontrolled?	Party in Control of Risk Event	What Category of Risk Event?	Likely Risk Events due to Risk Factors	Risk Event Details ("What Can Go Wrong?)	Anticipated Impacts of Risk Event ("Enter Y for YES Enter N for No Impact")								Impact Details ("Consequences")	Planned Mitigation Activities
							Health / Safety	Environmental	Quality	Performance	Claims / Litigation	Reputation	Schedule / Time	Cost / Finances ($		
001	Late Delivery of CTG / HRSG / STG Equipment	Controlled	_3rd Party_Client	SCHEDULE RELATED	Change start/completion date	Due to logistic and manufacturing reasons, equipment delivered late pushing the schedule potentially by the length of the delay.	N	N	N	N	Y	Y	Y	Y	Miss the COD date. Results in costs and due to not being able to provide power to grid.	Select supplier who can meet schedule. Involve Expediter throughout project timeline of manufacturing. Add time for shop inspections of all Equipment and Materials. Award contracts as early as possible, after RUS approval. Include contract clause for late delivery.
002	Late Delivery of Switchgear and MCCs	Controlled	_3rd Party_Client	SCHEDULE RELATED	Change start/completion date	Due to logistics reasons, equipment delivered late pushing the schedule potentially up to 4 months to complete electrical construction	N	N	N	N	Y	Y	Y	Y	Miss the COD date. Results in costs due to not being able to provide power to grid.	Select supplier who can meet schedule. Involve Expediter throughout project timeline of manufacturing. Add time for shop inspections of all Equipment and Materials. Award contracts as early as possible, after RUS approval.
003	Acoustic/Sound results exceed expected values	Controlled	_3rd Party_Client	PERFORMANCE RELATED	Design misjudgment, miscalculation, misinterpretation or oversight	Sound levels exceed predicted values	N	Y	N	N	Y	Y	Y	Y	Additional sound mitigation activities are required to be purchased and installed	Understand existing sound margin. Purchase low noise options when available and practical
004	Late Delivery of GSU Equipment.	Controlled	_3rd Party_Client	SCHEDULE RELATED	Change start/completion date	Due to logistics reasons or manufacturing the GSU delivered late	N	N	N	N	Y	Y	Y	Y	Miss the COD date. Results in costs to Client for not being able to provide power to grid.	Select the right supplier who can meet schedule. Involve Expediter throughout project timeline of manufacturing. Add time for shop inspections of all Equipment and Materials.
005	Labor shortages due to other more attractive projects	Controlled	BMCD	SCHEDULE RELATED	Underestimate time required to perform work	Other Projects In The Area Make Labor Harder to Attract	Y	N	Y	Y	Y	Y	Y	Y	Falling Behind Schedule. Increased Cost.	Planned Per Diem Incentive. Perform a Labor Study in the area.
006	Late Award / Material Availability for Buildings	Controlled	Client	SCHEDULE RELATED	Deliver goods/work product after due date	Overall construction, equipment delivery, and building construction are late	N	N	N	Y	Y	Y	Y	Y	Large Cost to increase staff, work overtime or put on 2nd shift. Delay Equipment installation and services. Potential to miss COD.	Get design and procurement completed early in project to support undergrounds, foundations and building erection prior to winter months.
007	RUS approval delayed	Uncontrolled	Regulatory Authority	SCHEDULE RELATED	Suspend/stop work	RUS approval takes longer than anticipated	N	N	N	Y	Y	Y	Y	Y	Failure to meet COD date. Results in cost due to not being able to produce power. Delay to detailed design, award of equipment contracts (may require increased cost or different payment terms to makeup schedule)	Current project schedule assumes 24 months to approval after submitting application Oct. 2025, which should be conservative for an EA.
008	PSC delays or interveners	Uncontrolled	Regulatory Authority	SCHEDULE RELATED	Suspend/stop work	Approval process takes longer than anticipated or separate party intervenes	N	N	N	Y	Y	Y	Y	Y	Failure to meet COD date due to delayed start date. Results in cost due to not being able to produce power.	PSC process planned to support submittal in October. Typical turnaround timeframe is 8 months based on past project experience. There are several months of margin between approval and project expenditures.
009	Executing A Project In An Environment of Inflation / Supply Chain Challenges	Uncontrolled	Uncontrolled	PRICING/FINANCIALS	Commodity/goods price increase	Due to supply chain issues, vendors might increase prices outside normal increase schedule	N	N	N	N	N	N	N	Y	Project goes over budget	Buy out as much as possible early in project. Continue managing procurements as conditions change. Look at other suppliers/methods to purchase equipment/commodities early. Break potential long lead items out into separate contracts. Include allowances for Field Service Time or perceived scope changes to mitigate costs.
010	Scope item not captured in PSR scope	Controlled	BMCD	PRICING/FINANCIALS	Underbid project	Scope change or additional scope required	N	N	Y	Y	Y	Y	Y	Y	Cost increase to project and potential schedule delays.	Define as much scope as possible in PSR and carry adequate contingency to cover realistic future scope changes/misses.
011	Shortages or delivery delays for wire, conduit, and products.	Controlled	BMCD	SCHEDULE RELATED	Change project sequence	Award materials too late	Y	N	Y	Y	Y	Y	Y	Y	Electrical Construction Falls Behind Schedule. Additional Manpower Required LDs or additional TFA cost Miss the COD date. Results in costs for not being able to provide power to grid.	Identify the long lead time materials during the design phase and buy them out prior to the award of the electrical construction contract.
012	Can't staff site / recurring site shutdowns due to Force Majeure event	Controlled	BMCD	ENVIRONMENTAL EVENTS	Force Majeure	Direct or Indirect COVID exposure or other pandemic type event.	Y	N	Y	Y	Y	Y	Y	Y	Reduced resources throughout schedule	
013	Engineering is late due to submittal delays from CTG, HRSG, STG supplier	Controlled	_3rd Party_Client	SCHEDULE RELATED	Change project sequence	Engineering is late due to submittal delays from CTG, HRSG, STG suppliers	N	N	N	N	Y	N	Y	N	compressed engineering schedule, missed IFC firewall dates	LDs on critical submittals, weekly coordination meetings with OEM, visits to OEM office
014	Coal pile not reduced in adequate time to start project	Controlled	Client	SCHEDULE RELATED	Change start/completion date	Start site prep work later than anticipated	N	Y	Y	Y	N	N	Y	Y	Failure to meet COD date or increase cost for site prep contract for additional scope	EKPC to coordinate and plan the consumption and re-stock of coal pile to make sure pile is adequately reduced by start of project.
015	Housing Availability	Uncontrolled	BMCD	PERFORMANCE RELATED	Interfere with activities of others	No availability of housing for staff and craft	N	N	N	N	N	N	Y	Y		Perform study of local housing availability during project execution. Per Diem included in cost estimate to help attract labor and cover costs for
016	Gas line and M&R station delayed	Controlled	_3rd Party_Client	SCHEDULE RELATED	Change project sequence	Gas line and M&R yard installed later than anticipated	N	N	N	Y	Y	N	Y	Y	Delays startup resulting in failure to meet COD date and/or impacts productivity of project contractors based on site access availability.	Coordinate with gas line supplier.

Risk ID No. (NNN)	Key Project Risk Factors (Circumstances) ("because of")	Is Risk Controlled or Uncontrolled?	Party in Control of Risk Event	What Category of Risk Event?	Likely Risk Events due to Risk Factors	Risk Event Details ("What Can Go Wrong?)	Anticipated Impacts of Risk Event ("Enter Y for YES Enter N for No Impact")								Impact Details ("Consequences")	Planned Mitigation Activities
							Health / Safety	Environmental	Quality	Performance	Claims / Litigation	Reputation	Schedule / Time	Cost / Finances ($		
017	Transmission upgrade projects delayed	Controlled	_3rd Party_Client	SCHEDULE RELATED	Change start/completion date	Additional transmission upgrade projects completed later than anticipated	N	N	Y	Y	Y	N	Y	Y	Plant unable to export power to grid by COD date.	EKPC to coordinate with contractors and equipment suppliers for transmission upgrades to maintain schedule margin at the front end.
018	CTG TFA hour (overruns)	Controlled	Client	SCHEDULE RELATED	Change start/completion date	Failure to achieve owner COD date	N	N	N	Y	Y	N	Y	Y	Increased TFA cost or schedule LD's	Bid TFA durations based on similar projects. Review schedule with owner equipment suppliers early to get full buy in.
019	Geotech investigation finds more karst or other challenges	Controlled	BMCD	PRICING/FINANCIALS	Underbid project	Piling quantity and length increase and flow fill volume increases, requires additional cost and schedule to install, potentially holding up downstream activities	N	N	N	Y	Y	Y	Y	Y	Must move pile locations or increase quantity/length which impacts foundation dimensions	Release Geotech investigation early in project. Conservative foundation quantities if dimensions need to increase. Plan to mobilize multiple rigs to support schedule. Costs include micro piles under major foundations, assuming karst will be discovered - conservative approach
020	OEM scope gap	Controlled	BMCD	PRICING/FINANCIALS	Underbid project	Required Equipment Is Not Delivered For Construction	Y	N	Y	N	Y	Y	Y	Y	Schedule Pushes Project Cost Impacts Miss the COD date. Results in costs due to not being	Align scopes between OEM scope and BOP scope. Collaboration in OEM Contract Negotiations and Developing the Division of Responsibility Matrix.
021	Delayed owner approval of engineering deliverables	Controlled	Client	SCHEDULE RELATED	Decide/deliver decision after due date	Rework after approvals/release	N	N	Y	Y	Y	Y	Y	Y	Schedule pushes	Provide adequate time for owner review, setup meetings to drive faster review/discussion
022	Value engineering / estimate reduction studies in parallel with detail design	Controlled	Client	SCHEDULE RELATED	Decide/deliver decision after due date	Need to evaluate many items for cost reduction opportunities	N	N	N	N	N	N	Y	Y	Engineering is delayed/late due to increased scope	PSR process has worked through a lot of options already. Manage cost reduction expectations.
023	Delayed air permit finalization	Uncontrolled	Regulatory Authority	SCHEDULE RELATED	Suspend/stop work	Permit process and approval takes longer than anticipated	N	N	N	Y	Y	Y	Y	Y	Cannot set emissions producing equipment without air permit.	Coordinate air permit progress with execution schedule.
024	FM Global involvement / requirements not well defined	Controlled	Client	SCHEDULE RELATED	Change project scope	additional technical requirements and FM Global involvement	Y	N	N	Y	Y	Y	Y	Y	additional design & review requirements that could impact engineering schedule, and material/const costs	Proactive request to clarify FM Global requirements prior to detailed engineering.
025	Environmental impact due to release of chemical/waste	Controlled	Client	ENVIRONMENTAL EVENTS	Unplanned discharge of hazardous materials	Unexpected discharge of hazardous material	Y	Y	N	Y	Y	Y	Y	Y	Potential delay to schedule and hold on construction, increased costs for cleanup/remediation and for adjusted schedule	Develop detailed plan for handling of hazardous material and minimize interaction with existing materials/plant from new project.
026	Escalation for equipment, materials, and labor	Uncontrolled	Uncontrolled	PRICING/FINANCIALS	Price escalation	Costs for labor, equipment, and material escalates from current costs.	N	N	N	N	Y	Y	Y	Y	Cost increase due to higher costs for labor, material, and/or equipment.	Recommend carrying reasonable allowance in cost estimate for escalation. Communicate changes in escalation as they are discovered. PSR cost estimate does not include escalation. However, estimated values of escalation have been communicated which include 4 to 5% escalation per annum for labor, equipment and materials through execution, assuming project starts today as per the execution schedule.
027	Damage to Existing Property	Controlled	_3rd Party_Client	PRICING/FINANCIALS	Don't properly pay/withhold invoice	Contractor damages existing property	Y	N	N	Y	Y	Y	Y	Y	Existing property insurance deductible subcap coverage (TBD $$), Existing facility repairs likely to impact project schedule and costs.	Manage Work to stay outside existing fence as much as possible. Utilization of proper barricades, spotters, and other preventative measures to protect existing property in the vicinity of work areas. Coordinate work with Owner operations to avoid potential issues and interruptions. Develop plan for contractors' access and transportation around site.
028	Design changes for major equipment after award	Controlled	_3rd Party_Client	PERFORMANCE RELATED	Interfere with activities of others	OEM changes design or scope of supply after award.	N	N	Y	Y	Y	Y	Y	Y	Adjust project schedule which may impact COD date. May also result in increased cost for Equipment contract and contractor contracts.	Coordinate with OEMs prior to and shortly after award that scope and design are well understood by all parties.
029	Replacement / repair of equipment required after installation	Controlled	_3rd Party_Client	SCHEDULE RELATED	Deliver goods/work product after due date	Equipment requires repairs or replacement after installation	N	N	N	Y	Y	Y	Y	Y	Potential delay to schedule to wait on repair/replacement, if critical equipment, which could result in missing Client's COD date. Cost increase for prolonged contractor onsite if issue not caused by OEM	Include adequate coverage in equipment contracts to cover expenses and delays caused by equipment issues.
030	Increased duration for steam blows, flushes, chem cleaning	Uncontrolled	Uncontrolled	SCHEDULE RELATED	Underestimate time required to perform work	Duration to complete startup activities takes longer than anticipated such as steam blows, flushes, and chemical cleaning	N	Y	Y	N	Y	Y	Y	Y	Delays startup resulting in failure to meet COD date and/or increases costs for startup activities.	Schedule includes 1.5 months of float for required COD. Control work environment and access during flushes, steam blow, chem cleaning to reduce opportunity for interference.
031	Controls Integration	Controlled	BMCD	PERFORMANCE RELATED	Execute less efficiently than planned (poor productivity)	Delay in programming efforts, FATs, and/or startup and commissioning	N	N	Y	Y	Y	Y	Y	Y	Delays completion of construction and startup/commissioning resulting in failure to meet COD date and/or increases costs.	Hold regular design reviews with major suppliers to coordinate key interfaces. Require "readiness submittals" to facilitate productive FATs and confirm key documentation is available. Include field services / technician support from major suppliers during checkout, startup, and commissioning.
032	CTG / STG suppliers need longer to set/commission equipment	Controlled	_3rd Party_Client	SCHEDULE RELATED	Underestimate time required to perform work	Cannot meet owner COD dates with the allocated TFA time.	N	N	Y	Y	Y	Y	Y	Y	Schedule pushes due to longer set/commissioning schedule and additional TFA time financial impact.	Give Suppliers schedule before contract award so they understand and agree to planned duration onsite. True up the TFA time against the Level 3 Schedule once it is complete. This includes budgeting CMCI / Craft Support for 7 days a week

Risk ID No. (NNN)	Key Project Risk Factors (Circumstances) ("because of")	Is Risk Controlled or Uncontrolled?	Party in Control of Risk Event	What Category of Risk Event?	Likely Risk Events due to Risk Factors	Risk Event Details ("What Can Go Wrong?)	Anticipated Impacts of Risk Event ("Enter Y for YES Enter N for No Impact")								Impact Details ("Consequences")	Planned Mitigation Activities
							Health / Safety	Environmental	Quality	Performance	Claims / Litigation	Reputation	Schedule / Time	Cost / Finances ($		
033	Care, Custody, Control - Handoff of Materials delivered in boxes but not being opened until later date	Controlled	Client	PRICING/FINANCIALS	Don't properly pay/withhold invoice	Material is not delivered as expected but is not discovered until shipments are opened upon needing to be used, not upon delivery	N	N	Y	Y	Y	Y	Y	Y	Increased cost to procure/expedite missing material and to cover cost of extended time onsite for contractors/staff	Open and inventory OEM Equipment under OEM supervision. Open boxes early enough that if materials aren't delivered that we can react accordingly to maintain schedule
034	Care, Custody, Control - Handoff of Materials delivered in boxes but not being opened until later date	Controlled	Client	SCHEDULE RELATED	Deliver goods/work product after due date	Material is not delivered as expected but is not discovered until shipments are opened upon needing to be used, not upon delivery	N	N	Y	Y	Y	Y	Y	Y	Delay in schedule to wait for needed material to be provided.	Open and inventory OEM Equipment under OEM supervision. Open boxes early enough that if materials aren't delivered that we can react accordingly to maintain schedule
035	Additional underground utilities require demolition or work-around	Controlled	Client	PERFORMANCE RELATED	Interfere with activities of others	Unanticipated utilities exist that need to be demo'd or avoided	Y	Y	Y	Y	Y	Y	Y	Y	Delay in schedule to complete additional work and increased cost for unanticipated work	Review all available underground utility drawings to confirm all have been accounted for in detailed design. Complete potholing as needed.
036	Existing equipment and systems that are re-used have failure	Uncontrolled	Client	SCHEDULE RELATED	Change project scope	Existing equipment that is used for new project has unexpected failure which needs to be resolved/replaced	Y	Y	Y	Y	Y	Y	Y	Y	Delay in schedule to repair/replace existing equipment and increased cost for work	Consider all existing equipment/systems being used and assess condition prior to project and consider contingency plans in case of failure
037	Shop Inspections	Controlled	BMCD	PERFORMANCE RELATED	Interfere with activities of others	Make suppliers be prepared for inspections to determine Equipment at shops and quality prior to shipment.	N	N	Y	Y	Y	Y	Y	Y	Cost and schedule impact to release of material later than planned. Additional and / or extended travel to facilities due to supplier not being ready for inspection	Defined plan for shop inspections and visits along with expected progress. Video inspection to verify proper progress prior to travel. Factor in rework for inspection findings.
038	Force Majeure weather delay	Uncontrolled	Uncontrolled	ENVIRONMENTAL EVENTS	Inclement Weather	Weather event interrupts work progress or damages equipment/material	Y	Y	Y	Y	Y	Y	Y	Y	Schedule delay that could result in missing the COD date. Results in costs due to not being able to provide power to grid.	Include schedule margin (PSR includes 1.5 months of schedule margin)
039	Payment schedule of equipment and construction contracts	Controlled	Client	PRICING/FINANCIALS	Don't properly pay/withhold invoice	Equipment or Contractor payment schedule and terms are different than expected or different than typical	N	N	N	Y	Y	Y	Y	Y	May impact cashflow for project and ability to have net funds for invoices.	Confirm each contract payment terms align with EKPC and RUS requirements prior to award. Consider any contingency that should be included in PSR budget cost for additional cost needed to get supplier to accommodate payment terms.
040	Craft productivity and re-work	Controlled	_3rd Party_Client	PERFORMANCE RELATED	Execute less efficiently than planned (poor productivity)	Labor productivity worse than assumed or contractor requires re-work	N	N	Y	Y	Y	Y	Y	Y	Increased costs and potential schedule delays	Utilizing contractors with knowledge of the local area and labor market and scope. Contractors have indicated quality local labor available based on previous project history and budgetary bid process.
041	Specifications	Controlled	BMCD	CONTRACTING	Deliver goods/work product after due date	Engineered / Specified Equipments Cannot Be Purchased.	Y	N	Y	N	Y	Y	Y	Y	Schedule Delays / Cost Delays	Schedule sufficient time for proper internal and external reviews prior to issuing for bid. Perform biddability / constructability reviews as early as possible to help identify potential items that may present challenges for supply as specified. Allow for sufficient float / margin in project schedule.
042	Storm Water Plan Phasing	Controlled	BMCD	SCHEDULE RELATED	Underbid project	Work is delayed due to wet/muddy conditions / standing water	Y	N	Y	N	Y	Y	Y	Y	Schedule / Cost impacts	Develop a plan for each phase of the project.
043	Incomplete Deliveries	Controlled	BMCD	SCHEDULE RELATED	Deliver goods/work product after due date	We are unable to complete work on schedule because vendor components are not complete.	Y	N	Y	N	Y	Y	Y	Y	Schedule / Cost impacts	Develop and follow the material management plan and complete proper expediting.
044	Safety incident, standdown, investigation, etc.	Uncontrolled	_3rd Party_Client	SCHEDULE RELATED	Change project sequence	Delay construction	Y	N	N	Y	Y	Y	Y	Y	Schedule / Cost impacts	Use contractors with good safety records and understanding of project scope. Safety oversight throughout project.
045	Theft	Controlled	BMCD	SCHEDULE RELATED	Deliver goods/work product after due date	Theft of equipment or material prevents work from being complete on schedule	Y	N	Y	N	Y	Y	Y	Y	Schedule / Cost impacts	Evaluate site for security deficiencies and develop plan to mitigate theft on work site. Cost estimate includes site security during construction.
046	Design Error resulting in the failure of the equipment or resulting in inability to use equipment	Uncontrolled	BMCD	SCHEDULE RELATED	Change project sequence	Design error creates re-work and potential impacts in the field	Y	Y	Y	Y	Y	Y	Y	Y	Schedule / Cost impacts	Apply thorough quality review process through entire design phase and include Owner in reviews of various design systems and packages.
047	Asbestos abatement	Controlled	Client	ENVIRONMENTAL EVENTS	Unplanned discharge of hazardous materials	Asbestos is unexpectedly encountered requiring abatement prior to work proceeding.	Y	Y	N	N	Y	N	Y	Y	Schedule / Cost impacts	Test early in project after scope is defined enough to determine whether abatement is required. Perform any required abatement well in advance of construction.
048	Contractor delays	Controlled	Client	SCHEDULE RELATED	Change start/completion date	Contractor falls behind schedule due to poor performance and/or productivity, rework, etc.	N	N	N	Y	Y	Y	Y	Y	Increased costs and potential schedule delays. Potential impacts to follow-on work and / or checkout, startup, and commissioning.	Vet Contractors prior to bid / award. Regular planning and progress meetings after award and throughout project execution to identify schedule slips and possible impact mitigation as early as possible. Allow for sufficient float / margin in project schedule.
049	Commissioning delays and/or issues	Controlled	Client	SCHEDULE RELATED	Change start/completion date	Commissioning activities take longer than expected.	N	N	N	Y	Y	Y	Y	Y	Increased costs and potential schedule delays	Prepare a detailed outage schedule and startup and commissioning staffing plan. Provide startup management experienced with similar project scope. Allow for sufficient float / margin in project schedule.
050	Change management	Controlled	Client	PRICING/FINANCIALS	Don't properly pay/withhold invoice	Cost / schedule impacts not fully recognized or communicated early.	N	N	N	N	Y	Y	Y	Y	Increased costs and potential schedule delays	Establish and follow defined change management process. Communicate potential changes early to facilitate informed decisions and mitigate impacts.

Appendix Q – PROJECT SCHEDULE

Activity ID	Activity Name	RD	Start	Finish
EKPC Generation - 2x1F Class Cooper CC Dec 2030 COD		1784	30-Nov-23	10-Dec-30
Milestones		1555	25-Oct-24	10-Dec-30
MS-1110	CTG Delivery Reservation	0	25-Oct-24*	
MS-1130	Start HRSG/STG Spec	0	03-Dec-24	
MS-1140	Coal Pile Adjusted	0	10-Mar-25*	
MS-1180	Substation Power Transformers LNTP	0	10-Mar-25*	
MS-1000	Full Notice to Proceed (FNTP)	0	24-Jul-25*	
MS-1120	CTG Award	0	24-Jul-25*	
MS-1010	Start Detailed Design	0	02-Sep-25	
A6990	Air Permit Approval	0		04-Dec-26
A7000	RUS NEPA EA Approval	0		27-May-27
MS-1020	Start of Construction	0	12-Jul-27	
MS-1160	HRSG Delivered	0		11-Oct-27
MS-1040	CTG Delivered	0		13-Oct-27
MS-1030	Start of Foundations & UG Utilities	0	13-Jan-28	
MS-1170	CTG Unit 3 - Set	0		16-Oct-28
MS-1050	Backfeed	0		22-Aug-29
MS-1060	First Fire - Unit 3	0		16-Jan-30
MS-1100	First Fire - Unit 4	0		01-Mar-30
MS-1070	Combined Cycle Schedule Margin	40	01-Nov-30	10-Dec-30
MS-1080	Target COD	0		01-Nov-30
MS-1090	COD with Schedule Margin	0		10-Dec-30
PJM Interconnect		1018	30-Nov-23	03-Dec-27
A2060	PJM Interconnect Applications Submitted	0		30-Nov-23*
A2070	PJM Interconnect Review Period	1018	01-Dec-23	03-Dec-27
A2080	PJM Interconnect Approval	0		03-Dec-27
Permitting		1859	01-Jan-24	01-Feb-29
Gas Line Permitting		1189	01-Nov-25	01-Feb-29
A6970	Gas Line FERC Application Submittal	0		01-Nov-25*
A6980	Gas Line FERC Certificate	0		01-Nov-26*
A1990	Gas Line FERC NTP	0		01-Feb-27*
A1840	Gas Available	0		01-Feb-29*
Air Permitting		1069	01-Jan-24	04-Dec-26
A6950	Air Permit Application Development	336	01-Jan-24*	01-Dec-24
A6820	Air Permit Submitted	0		01-Dec-24
A6830	Air Permit Review Period	733	02-Dec-24	04-Dec-26
A6840	Air Permit Approval	0		04-Dec-26
RUS NEPA EA		938	01-Nov-24	27-May-27
A6940	RUS NEPA EA Application Prep	274	01-Nov-24*	01-Aug-25
A6850	RUS NEPA EA Application Submitted	0		01-Aug-25
A6860	RUS NEPA EA Review Period	664	02-Aug-25	27-May-27
A6870	RUS NEPA EA Approval	0		27-May-27
CPCN		262	04-Nov-24	23-Jul-25
A6880	CPCN Advance Notice	0		04-Nov-24*
A6890	CPCN Complete	262	04-Nov-24	23-Jul-25
Project Scoping		393	01-Jul-24	28-Jul-25
A6920	Board PSR Reviews	72	01-Jul-24*	10-Sep-24
A6930	PSR Board Approval	0		10-Sep-24
A6910	Final Project Scoping Report Issued	0		25-Oct-24*
A6960	Project Final Board Approval	0		28-Jul-25
Engineering		744	25-Nov-24	29-Oct-27
EN-G-1040	LNTP Engineering Spec Development	167	25-Nov-24*	23-Jul-25
EN-G-1020	Adjust Coal Pile	65	30-Jan-25	30-Apr-25
EN-G-1030	Coal Pile Adjusted	0		30-Apr-25
EN-G-1000	Geotech & Survey	65	01-May-25	01-Aug-25
EN-G-1010	Start Detailed Design	0		02-Sep-25*
Civil Engineering		408	02-Sep-25	09-Apr-27
EN-C-1000	Civil - Site Prep	210	02-Sep-25	29-Jun-26
EN-C-1010	Civil - Site Finish	80	16-Dec-26	09-Apr-27
Structural Engineering		281	07-Oct-25	12-Nov-26
EN-S-1000	Structrual Eng - Steel Dgn (Pwr Bldgs, Rack Steel)	185	07-Oct-25	29-Jun-26
EN-S-1010	Structrual Eng - Piling/Fdns (CTG, STG, HRSG, Pwr Bldgs, ACC)	185	14-Oct-25	07-Jul-26
EN-S-1020	Structrual Eng - Fdns (BOP Equipment)	205	19-Jan-26	04-Nov-26
EN-S-1030	Structrual Eng - Steel Dgn (BOP: Platforms, Supports, etc.)	185	24-Feb-26	12-Nov-26
Mechanical Engineering		470	02-Sep-25	08-Jul-27
EN-M-1000	Mech Eng - System Dgn	155	02-Sep-25	10-Apr-26
EN-M-1010	Mech Eng - Equip Modeling	355	14-Oct-25	09-Mar-27
EN-M-1020	Mech Eng - BG Piping	215	25-Nov-25	30-Sep-26
EN-M-1030	Mech Eng - AG Piping	380	12-Jan-26	08-Jul-27
Electrical Engineering		550	02-Sep-25	29-Oct-27
EN-E-1010	Elec Eng - One Lines (IFD)	95	02-Sep-25	16-Jan-26
EN-E-1020	Elec Eng - Grounding	165	28-Oct-25	22-Jun-26
EN-E-1030	Elec Eng - BG Raceway	165	04-Nov-25	29-Jun-26
EN-E-1000	Elec Eng - Equip Modeling	185	17-Dec-25	09-Sep-26
EN-E-1040	Elec Eng - AG Raceway & Cable Routing	280	09-Mar-26	13-Apr-27
EN-E-1050	Elec Eng - Schematics & Wire Diagrams	175	27-Jan-27	01-Oct-27
EN-E-1060	Elec Eng - Energization & Sync Procedures	85	01-Jul-27	29-Oct-27
I&C Engineering		530	02-Sep-25	01-Oct-27
EN-N-1000	I&C Eng - Control Sys Arch	30	02-Sep-25	13-Oct-25
EN-N-1010	I&C Eng - I/O Lists	245	03-Dec-25	18-Nov-26



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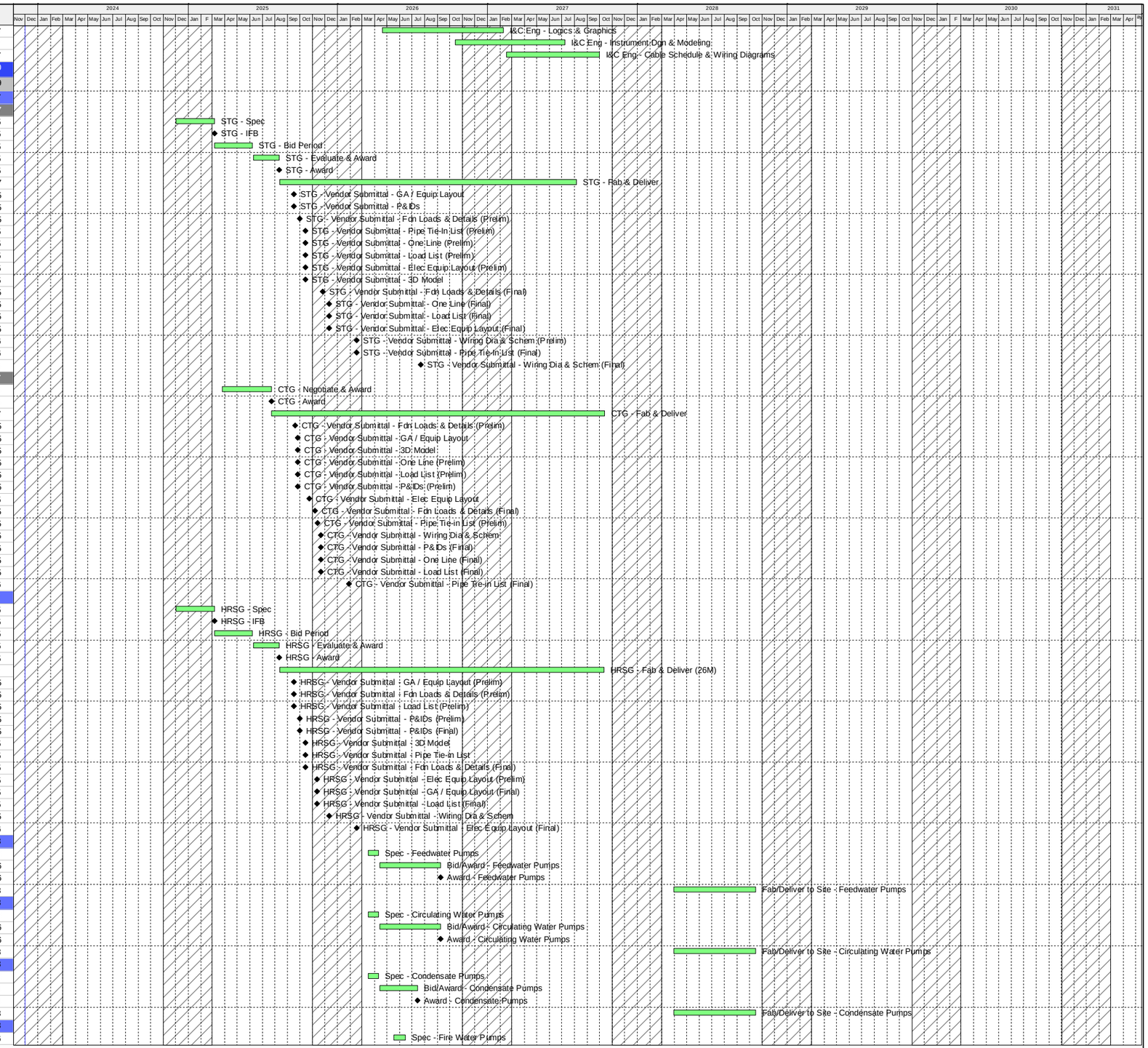
BURNS McDONNELL

EKPC Generation - 2x1F Class Cooper CC Dec 2030 COD

Project Schedule

Date	Revision	Checked	Approved

Activity ID	Activity Name	RD	Start	Finish
EN-N-1020	I&C Eng - Logics & Graphics	205	20-Apr-26	09-Feb-27
EN-N-1030	I&C Eng - Instrument Dgn & Modeling	185	15-Oct-26	08-Jul-27
EN-N-1040	I&C Eng - Cable Schedule & Wiring Diagrams	160	17-Feb-27	01-Oct-27
Procurement		1530	02-Dec-24	10-Dec-30
Equipment Contracts		1194	02-Dec-24	14-Aug-29
1120 - Steam Turbine Generator & Gas Turbine Generator		727	03-Dec-24	13-Oct-27
1110 - STEAM TURBINE GENERATOR		680	03-Dec-24	06-Aug-27
PR-1110-3150	STG - Spec	65	03-Dec-24	06-Mar-25
PR-1110-3180	STG - IFB	0		06-Mar-25
PR-1110-1000	STG - Bid Period	65	07-Mar-25	06-Jun-25
PR-1110-1100	STG - Evaluate & Award	45	09-Jun-25	11-Aug-25
PR-1110-3170	STG - Award	0		11-Aug-25
PR-1110-2000	STG - Fab & Deliver	505	12-Aug-25	06-Aug-27
PR-1110-3000	STG - Vendor Submittal - GA / Equip Layout	0		16-Sep-25
PR-1110-3010	STG - Vendor Submittal - P&IDs	0		16-Sep-25
PR-1110-3020	STG - Vendor Submittal - Fdn Loads & Details (Prelim)	0		30-Sep-25
PR-1110-3030	STG - Vendor Submittal - Pipe Tie-In List (Prelim)	0		14-Oct-25
PR-1110-3040	STG - Vendor Submittal - One Line (Prelim)	0		14-Oct-25
PR-1110-3050	STG - Vendor Submittal - Load List (Prelim)	0		14-Oct-25
PR-1110-3060	STG - Vendor Submittal - Elec Equip Layout (Prelim)	0		14-Oct-25
PR-1110-3070	STG - Vendor Submittal - 3D Model	0		14-Oct-25
PR-1110-3080	STG - Vendor Submittal - Fdn Loads & Details (Final)	0		25-Nov-25
PR-1110-3090	STG - Vendor Submittal - One Line (Final)	0		10-Dec-25
PR-1110-3100	STG - Vendor Submittal - Load List (Final)	0		10-Dec-25
PR-1110-3110	STG - Vendor Submittal - Elec Equip Layout (Final)	0		10-Dec-25
PR-1110-3120	STG - Vendor Submittal - Wiring Dia & Schem (Prelim)	0		16-Feb-26
PR-1110-3130	STG - Vendor Submittal - Pipe Tie-In List (Final)	0		16-Feb-26
PR-1110-3140	STG - Vendor Submittal - Wiring Dia & Schem (Final)	0		22-Jul-26
1120 - GAS TURBINE GENERATOR		650	25-Mar-25	13-Oct-27
PR-1120-3260	CTG - Negotiate & Award	85	25-Mar-25	23-Jul-25
PR-1120-1000	CTG - Award	0		24-Jul-25
PR-1120-2000	CTG - Fab & Deliver	565	24-Jul-25	13-Oct-27
PR-1120-3020	CTG - Vendor Submittal - Fdn Loads & Details (Prelim)	0		18-Sep-25
PR-1120-3010	CTG - Vendor Submittal - GA / Equip Layout	0		25-Sep-25
PR-1120-3060	CTG - Vendor Submittal - 3D Model	0		25-Sep-25
PR-1120-3050	CTG - Vendor Submittal - One Line (Prelim)	0		25-Sep-25
PR-1120-3030	CTG - Vendor Submittal - Load List (Prelim)	0		25-Sep-25
PR-1120-3040	CTG - Vendor Submittal - P&IDs (Prelim)	0		25-Sep-25
PR-1120-3090	CTG - Vendor Submittal - Elec Equip Layout	0		23-Oct-25
PR-1120-3100	CTG - Vendor Submittal - Fdn Loads & Details (Final)	0		06-Nov-25
PR-1120-3110	CTG - Vendor Submittal - Pipe Tie-in List (Prelim)	0		13-Nov-25
PR-1120-3120	CTG - Vendor Submittal - Wiring Dia & Schem	0		20-Nov-25
PR-1120-3130	CTG - Vendor Submittal - P&IDs (Final)	0		20-Nov-25
PR-1120-3080	CTG - Vendor Submittal - One Line (Final)	0		20-Nov-25
PR-1120-3070	CTG - Vendor Submittal - Load List (Final)	0		20-Nov-25
PR-1120-3140	CTG - Vendor Submittal - Pipe Tie-in List (Final)	0		28-Jan-26
1215 - Heat Recovery Steam Generator		725	03-Dec-24	11-Oct-27
PR-1215-3280	HRSG - Spec	65	03-Dec-24*	06-Mar-25
PR-1215-3190	HRSG - IFB	0		06-Mar-25
PR-1215-3170	HRSG - Bid Period	65	07-Mar-25	06-Jun-25
PR-1215-3180	HRSG - Evaluate & Award	45	09-Jun-25	11-Aug-25
PR-1215-1000	HRSG - Award	0		11-Aug-25
PR-1215-2000	HRSG - Fab & Deliver (26M)	550	12-Aug-25	11-Oct-27
PR-1215-3000	HRSG - Vendor Submittal - GA / Equip Layout (Prelim)	0		16-Sep-25
PR-1215-3010	HRSG - Vendor Submittal - Fdn Loads & Details (Prelim)	0		16-Sep-25
PR-1215-3020	HRSG - Vendor Submittal - Load List (Prelim)	0		16-Sep-25
PR-1215-3030	HRSG - Vendor Submittal - P&IDs (Prelim)	0		30-Sep-25
PR-1215-3040	HRSG - Vendor Submittal - P&IDs (Final)	0		30-Sep-25
PR-1215-3060	HRSG - Vendor Submittal - 3D Model	0		14-Oct-25
PR-1215-3070	HRSG - Vendor Submittal - Pipe Tie-in List	0		14-Oct-25
PR-1215-3050	HRSG - Vendor Submittal - Fdn Loads & Details (Final)	0		14-Oct-25
PR-1215-3080	HRSG - Vendor Submittal - Elec Equip Layout (Prelim)	0		11-Nov-25
PR-1215-3090	HRSG - Vendor Submittal - GA / Equip Layout (Final)	0		11-Nov-25
PR-1215-3100	HRSG - Vendor Submittal - Load List (Final)	0		11-Nov-25
PR-1215-3110	HRSG - Vendor Submittal - Wiring Dia & Schem	0		10-Dec-25
PR-1215-3120	HRSG - Vendor Submittal - Elec Equip Layout (Final)	0		16-Feb-26
2110 - Feedwater Pumps		659	16-Mar-26	16-Oct-28
PR-2110-000	Spec - Feedwater Pumps	20	16-Mar-26	10-Apr-26
PR-2110-100	Bid/Award - Feedwater Pumps	105	13-Apr-26	09-Sep-26
PR-2110-200	Award - Feedwater Pumps	0		09-Sep-26
PR-2110-300	Fab/Deliver to Site - Feedwater Pumps	140	30-Mar-28	16-Oct-28
2120 - Circulating Water Pumps		659	16-Mar-26	16-Oct-28
PR-2120-000	Spec - Circulating Water Pumps	20	16-Mar-26	10-Apr-26
PR-2120-100	Bid/Award - Circulating Water Pumps	105	13-Apr-26	09-Sep-26
PR-2120-200	Award - Circulating Water Pumps	0		09-Sep-26
PR-2120-300	Fab/Deliver to Site - Circulating Water Pumps	140	30-Mar-28	16-Oct-28
2130 - Condensate Pumps		659	16-Mar-26	16-Oct-28
PR-2130-000	Spec - Condensate Pumps	20	16-Mar-26	10-Apr-26
PR-2130-100	Bid/Award - Condensate Pumps	65	13-Apr-26	14-Jul-26
PR-2130-200	Award - Condensate Pumps	0		14-Jul-26
PR-2130-300	Fab/Deliver to Site - Condensate Pumps	140	30-Mar-28	16-Oct-28
2150 - Fire Water Pumps		614	18-May-26	16-Oct-28
PR-2150-000	Spec - Fire Water Pumps	20	18-May-26	15-Jun-26



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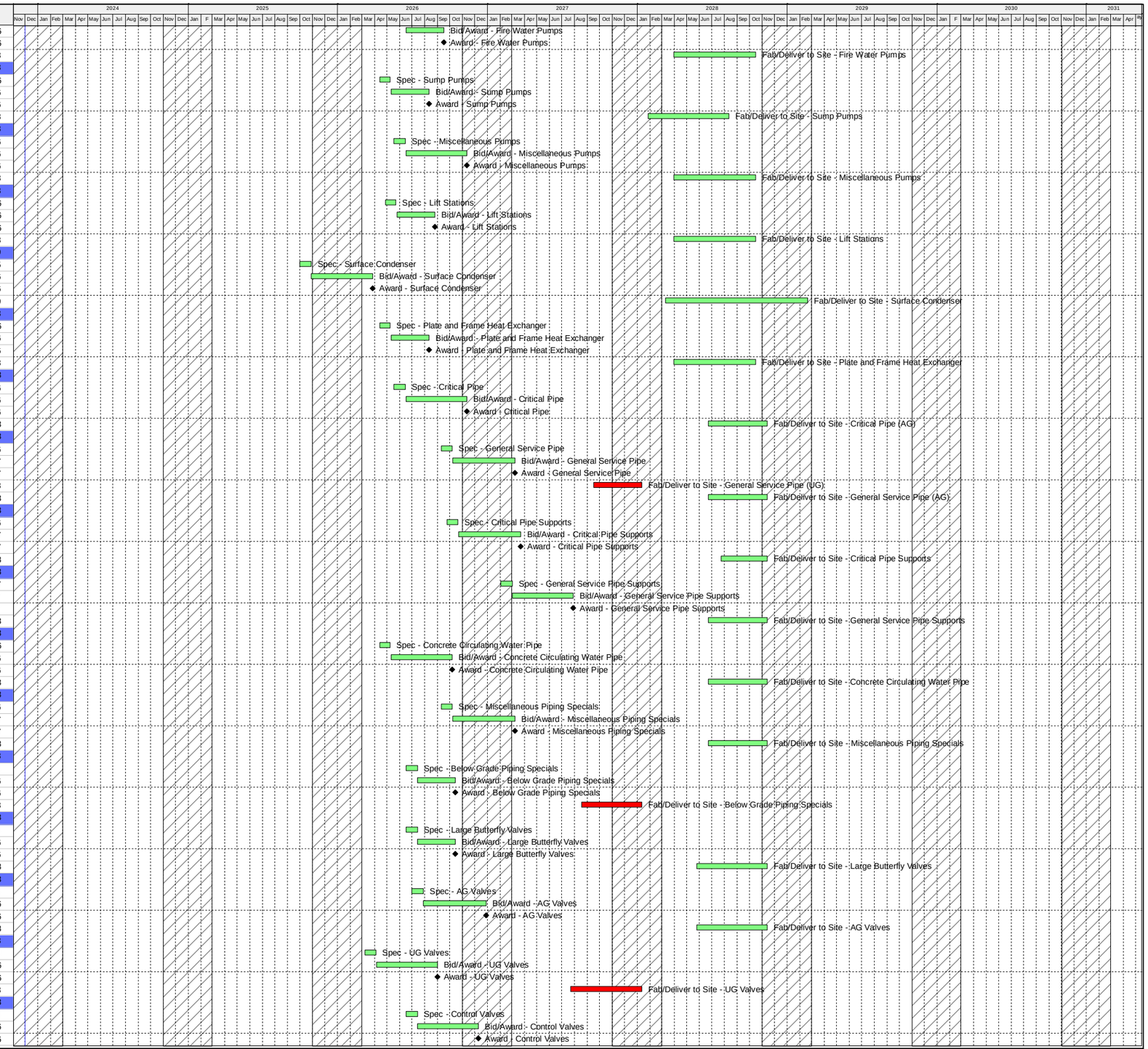
Activity ID	Activity Name	RD	Start	Finish
PR-2150-100	Bid/Award - Fire Water Pumps	65	16-Jun-26	16-Sep-26
PR-2150-200	Award - Fire Water Pumps	0		16-Sep-26
PR-2150-300	Fab/Deliver to Site - Fire Water Pumps	140	30-Mar-28	16-Oct-28
2180 - Sump Pumps		594	13-Apr-26	11-Aug-28
PR-2180-000	Spec - Sump Pumps	20	13-Apr-26	08-May-26
PR-2180-100	Bid/Award - Sump Pumps	65	11-May-26	11-Aug-26
PR-2180-200	Award - Sump Pumps	0		11-Aug-26
PR-2180-300	Fab/Deliver to Site - Sump Pumps	140	27-Jan-28	11-Aug-28
2190 - Miscellaneous Pumps		614	18-May-26	16-Oct-28
PR-2190-000	Spec - Miscellaneous Pumps	20	18-May-26	15-Jun-26
PR-2190-100	Bid/Award - Miscellaneous Pumps	105	16-Jun-26	11-Nov-26
PR-2190-200	Award - Miscellaneous Pumps	0		11-Nov-26
PR-2190-300	Fab/Deliver to Site - Miscellaneous Pumps	140	30-Mar-28	16-Oct-28
2191 - Lift Stations		629	27-Apr-26	16-Oct-28
PR-2191-000	Spec - Lift Stations	20	27-Apr-26	22-May-26
PR-2191-100	Bid/Award - Lift Stations	65	26-May-26	25-Aug-26
PR-2191-200	Award - Lift Stations	0		25-Aug-26
PR-2191-300	Fab/Deliver to Site - Lift Stations	140	30-Mar-28	16-Oct-28
2220 - Surface Condenser		860	30-Sep-25	19-Feb-29
PR-2220-000	Spec - Surface Condenser	20	30-Sep-25	27-Oct-25
PR-2220-100	Bid/Award - Surface Condenser	105	28-Oct-25	27-Mar-26
PR-2220-200	Award - Surface Condenser	0		27-Mar-26
PR-2220-300	Fab/Deliver to Site - Surface Condenser	240	10-Mar-28	19-Feb-29
2280 - Plate and Frame Heat Exchanger		639	13-Apr-26	16-Oct-28
PR-2280-000	Spec - Plate and Frame Heat Exchanger	20	13-Apr-26	08-May-26
PR-2280-100	Bid/Award - Plate and Frame Heat Exchanger	65	11-May-26	11-Aug-26
PR-2280-200	Award - Plate and Frame Heat Exchanger	0		11-Aug-26
PR-2280-300	Fab/Deliver to Site - Plate and Frame Heat Exchanger	140	30-Mar-28	16-Oct-28
2310 - Critical Pipe		634	18-May-26	13-Nov-28
PR-2310-000	Spec - Critical Pipe	20	18-May-26	15-Jun-26
PR-2310-100	Bid/Award - Critical Pipe	105	16-Jun-26	11-Nov-26
PR-2310-200	Award - Critical Pipe	0		11-Nov-26
PR-2310-310	Fab/Deliver to Site - Critical Pipe (AG)	100	23-Jun-28	13-Nov-28
2320 - General Service Pipe		554	10-Sep-26	13-Nov-28
PR-2320-000	Spec - General Service Pipe	20	10-Sep-26	07-Oct-26
PR-2320-100	Bid/Award - General Service Pipe	105	08-Oct-26	09-Mar-27
PR-2320-200	Award - General Service Pipe	0		09-Mar-27
PR-2320-300	Fab/Deliver to Site - General Service Pipe (UG)	80	17-Sep-27	12-Jan-28
PR-2320-310	Fab/Deliver to Site - General Service Pipe (AG)	100	23-Jun-28	13-Nov-28
2330 - Cricitcal Pipe Supports		544	24-Sep-26	13-Nov-28
PR-2330-000	Spec - Critical Pipe Supports	20	24-Sep-26	21-Oct-26
PR-2330-100	Bid/Award - Critical Pipe Supports	105	22-Oct-26	23-Mar-27
PR-2330-200	Award - Critical Pipe Supports	0		23-Mar-27
PR-2330-300	Fab/Deliver to Site - Critical Pipe Supports	80	24-Jul-28	13-Nov-28
2340 - General Service Pipe Supports		454	03-Feb-27	13-Nov-28
PR-2340-000	Spec - General Service Pipe Supports	20	03-Feb-27	02-Mar-27
PR-2340-100	Bid/Award - General Service Pipe Supports	105	03-Mar-27	29-Jul-27
PR-2340-200	Award - General Service Pipe Supports	0		29-Jul-27
PR-2340-300	Fab/Deliver to Site - General Service Pipe Supports	100	23-Jun-28	13-Nov-28
2350 - Concrete Circulating Water Pipe		659	13-Apr-26	13-Nov-28
PR-2350-000	Spec - Concrete Circulating Water Pipe	20	13-Apr-26	08-May-26
PR-2350-100	Bid/Award - Concrete Circulating Water Pipe	105	11-May-26	07-Oct-26
PR-2350-200	Award - Concrete Circulating Water Pipe	0		07-Oct-26
PR-2350-300	Fab/Deliver to Site - Concrete Circulating Water Pipe	100	23-Jun-28	13-Nov-28
2490 - Miscellaneous Pipe Specials		554	10-Sep-26	13-Nov-28
PR-2490-000	Spec - Miscellaneous Piping Specials	20	10-Sep-26	07-Oct-26
PR-2490-100	Bid/Award - Miscellaneous Piping Specials	105	08-Oct-26	09-Mar-27
PR-2490-200	Award - Miscellaneous Piping Specials	0		09-Mar-27
PR-2490-300	Fab/Deliver to Site - Miscellaneous Piping Specials	100	23-Jun-28	13-Nov-28
2491 - Below Grade Piping Specials		399	16-Jun-26	12-Jan-28
PR-2491-000	Spec - Below Grade Piping Specials	20	16-Jun-26	14-Jul-26
PR-2491-100	Bid/Award - Below Grade Piping Specials	65	15-Jul-26	14-Oct-26
PR-2491-200	Award - Below Grade Piping Specials	0		14-Oct-26
PR-2491-300	Fab/Deliver to Site - Below Grade Piping Specials	100	19-Aug-27	12-Jan-28
2512 - Large Butterfly Valves		614	16-Jun-26	13-Nov-28
PR-2512-000	Spec - Large Butterfly Valves	20	16-Jun-26	14-Jul-26
PR-2512-100	Bid/Award - Large Butterfly Valves	65	15-Jul-26	14-Oct-26
PR-2512-200	Award - Large Butterfly Valves	0		14-Oct-26
PR-2512-300	Fab/Deliver to Site - Large Butterfly Valves	120	25-May-28	13-Nov-28
2520 - AG Valves		604	30-Jun-26	13-Nov-28
PR-2520-000	Spec - AG Valves	20	30-Jun-26	28-Jul-26
PR-2520-100	Bid/Award - AG Valves	105	29-Jul-26	28-Dec-26
PR-2520-200	Award - AG Valves	0		28-Dec-26
PR-2520-300	Fab/Deliver to Site - AG Valves	120	25-May-28	13-Nov-28
2521 - UG Valves		469	09-Mar-26	12-Jan-28
PR-2521-000	Spec - UG Valves	20	09-Mar-26	03-Apr-26
PR-2521-100	Bid/Award - UG Valves	105	06-Apr-26	01-Sep-26
PR-2521-200	Award - UG Valves	0		01-Sep-26
PR-2521-300	Fab/Deliver to Site - UG Valves	120	22-Jul-27	12-Jan-28
2530 - Control Valves		614	16-Jun-26	13-Nov-28
PR-2530-000	Spec - Control Valves	20	16-Jun-26	14-Jul-26
PR-2530-100	Bid/Award - Control Valves	105	15-Jul-26	10-Dec-26
PR-2530-200	Award - Control Valves	0		10-Dec-26



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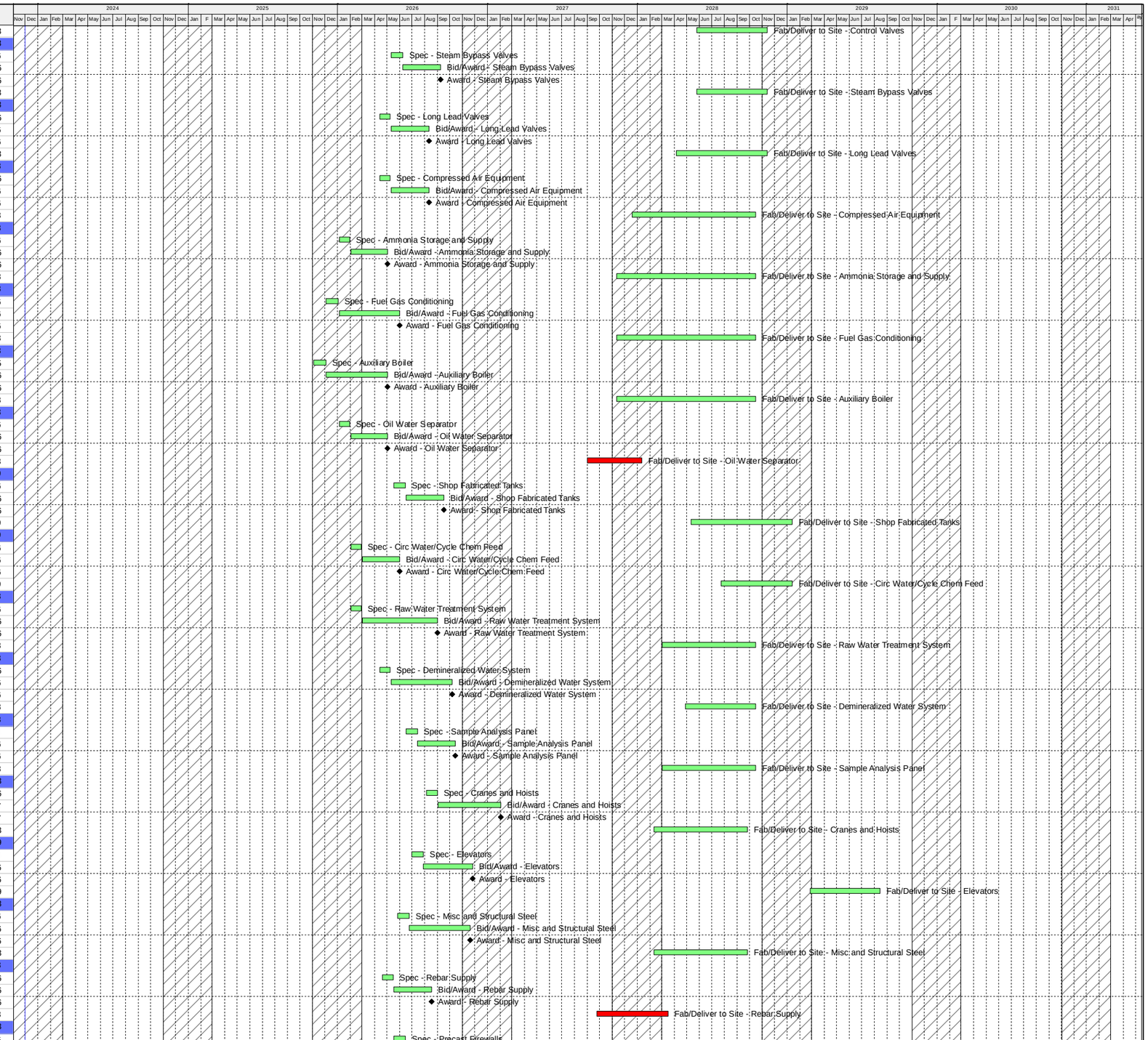
Activity ID	Activity Name	RD	Start	Finish
PR-2530-300	Fab/Deliver to Site - Control Valves	120	25-May-28	13-Nov-28
2532 - Steam Bypass Valves		639	11-May-26	13-Nov-28
PR-2532-000	Spec - Steam Bypass Valves	20	11-May-26	08-Jun-26
PR-2532-100	Bid/Award - Steam Bypass Valves	65	09-Jun-26	09-Sep-26
PR-2532-200	Award - Steam Bypass Valves	0		09-Sep-26
PR-2532-300	Fab/Deliver to Site - Steam Bypass Valves	120	25-May-28	13-Nov-28
2570 - Fuel Gas Ball Valves		659	13-Apr-26	13-Nov-28
PR-2570-000	Spec - Long Lead Valves	20	13-Apr-26	08-May-26
PR-2570-100	Bid/Award - Long Lead Valves	65	11-May-26	11-Aug-26
PR-2570-200	Award - Long Lead Valves	0		11-Aug-26
PR-2570-300	Fab/Deliver to Site - Long Lead Valves	155	06-Apr-28	13-Nov-28
2710 - Compressed Air Equipment		639	13-Apr-26	16-Oct-28
PR-2710-000	Spec - Compressed Air Equipment	20	13-Apr-26	08-May-26
PR-2710-100	Bid/Award - Compressed Air Equipment	65	11-May-26	11-Aug-26
PR-2710-200	Award - Compressed Air Equipment	0		11-Aug-26
PR-2710-300	Fab/Deliver to Site - Compressed Air Equipment	210	20-Dec-27	16-Oct-28
2750 - Ammonia Storage and Supply		709	05-Jan-26	16-Oct-28
PR-2750-000	Spec - Ammonia Storage and Supply	20	05-Jan-26	30-Jan-26
PR-2750-100	Bid/Award - Ammonia Storage and Supply	65	02-Feb-26	01-May-26
PR-2750-200	Award - Ammonia Storage and Supply	0		01-May-26
PR-2750-300	Fab/Deliver to Site - Ammonia Storage and Supply	235	12-Nov-27	16-Oct-28
2762 - Fuel Gas Conditioning		729	03-Dec-25	16-Oct-28
PR-2762-000	Spec - Fuel Gas Conditioning	20	03-Dec-25	02-Jan-26
PR-2762-100	Bid/Award - Fuel Gas Conditioning	105	05-Jan-26	01-Jun-26
PR-2762-200	Award - Fuel Gas Conditioning	0		01-Jun-26
PR-2762-300	Fab/Deliver to Site - Fuel Gas Conditioning	235	12-Nov-27	16-Oct-28
2910 - Auxiliary Boiler		749	04-Nov-25	16-Oct-28
PR-2910-000	Spec - Auxiliary Boiler	20	04-Nov-25	02-Dec-25
PR-2910-100	Bid/Award - Auxiliary Boiler	105	03-Dec-25	01-May-26
PR-2910-200	Award - Auxiliary Boiler	0		01-May-26
PR-2910-300	Fab/Deliver to Site - Auxiliary Boiler	235	12-Nov-27	16-Oct-28
2940 - Oil Water Separator		514	05-Jan-26	12-Jan-28
PR-2940-000	Spec - Oil Water Separator	20	05-Jan-26	30-Jan-26
PR-2940-100	Bid/Award - Oil Water Separator	65	02-Feb-26	01-May-26
PR-2940-200	Award - Oil Water Separator	0		01-May-26
PR-2940-300	Fab/Deliver to Site - Oil Water Separator	90	02-Sep-27	12-Jan-28
2980 - Shop Fabricated Tanks		674	18-May-26	12-Jan-29
PR-2980-000	Spec - Shop Fabricated Tanks	20	18-May-26	15-Jun-26
PR-2980-100	Bid/Award - Shop Fabricated Tanks	65	16-Jun-26	16-Sep-26
PR-2980-200	Award - Shop Fabricated Tanks	0		16-Sep-26
PR-2980-300	Fab/Deliver to Site - Shop Fabricated Tanks	170	11-May-28	12-Jan-29
3120 - Circ Water/Cycle Chem Feed		749	02-Feb-26	12-Jan-29
PR-3120-000	Spec - Circ Water/Cycle Chem Feed	20	02-Feb-26	27-Feb-26
PR-3120-100	Bid/Award - Circ Water/Cycle Chem Feed	65	02-Mar-26	01-Jun-26
PR-3120-200	Award - Circ Water/Cycle Chem Feed	0		01-Jun-26
PR-3120-300	Fab/Deliver to Site - Circ Water/Cycle Chem Feed	120	24-Jul-28	12-Jan-29
3210 - Raw Water Treatment System		689	02-Feb-26	16-Oct-28
PR-3210-000	Spec - Raw Water Treatment System	20	02-Feb-26	27-Feb-26
PR-3210-100	Bid/Award - Raw Water Treatment System	130	02-Mar-26	01-Sep-26
PR-3210-200	Award - Raw Water Treatment System	0		01-Sep-26
PR-3210-300	Fab/Deliver to Site - Raw Water Treatment System	160	02-Mar-28	16-Oct-28
3220 - Demineralized Water System		639	13-Apr-26	16-Oct-28
PR-3220-000	Spec - Demineralized Water System	20	13-Apr-26	08-May-26
PR-3320-100	Bid/Award - Demineralized Water System	105	11-May-26	07-Oct-26
PR-3320-200	Award - Demineralized Water System	0		07-Oct-26
PR-3220-300	Fab/Deliver to Site - Demineralized Water System	120	27-Apr-28	16-Oct-28
3310 - Sample Analysis Panel		594	16-Jun-26	16-Oct-28
PR-3310-000	Spec - Sample Analysis Panel	20	16-Jun-26	14-Jul-26
PR-3310-100	Bid/Award - Sample Analysis Panel	65	15-Jul-26	14-Oct-26
PR-3310-200	Award - Sample Analysis Panel	0		14-Oct-26
PR-3310-300	Fab/Deliver to Site - Sample Analysis Panel	160	02-Mar-28	16-Oct-28
4210 - Cranes and Hoists		545	05-Aug-26	26-Sep-28
PR-4210-000	Spec - Cranes and Hoists	20	05-Aug-26	01-Sep-26
PR-4210-100	Bid/Award - Cranes and Hoists	105	02-Sep-26	02-Feb-27
PR-4210-200	Award - Cranes and Hoists	0		02-Feb-27
PR-4210-300	Fab/Deliver to Site - Cranes and Hoists	160	11-Feb-28	26-Sep-28
4320 - Elevators		794	30-Jun-26	14-Aug-29
PR-4320-000	Spec - Elevators	20	30-Jun-26	28-Jul-26
PR-4320-100	Bid/Award - Elevators	85	29-Jul-26	25-Nov-26
PR-4320-200	Award - Elevators	0		25-Nov-26
PR-4320-300	Fab/Deliver to Site - Elevators	120	26-Feb-29	14-Aug-29
4520 - Fabricated Steel		594	27-May-26	26-Sep-28
PR-4520-000	Spec - Misc and Structural Steel	20	27-May-26	23-Jun-26
PR-4520-310	Bid/Award - Misc and Structural Steel	105	24-Jun-26	19-Nov-26
PR-4520-100	Award - Misc and Structural Steel	0		19-Nov-26
PR-4520-300	Fab/Deliver to Site - Misc and Structural Steel	160	11-Feb-28	26-Sep-28
4525 - Rebar Supply		484	20-Apr-26	15-Mar-28
PR-4525-000	Spec - Rebar Supply	20	20-Apr-26	15-May-26
PR-4525-100	Bid/Award - Rebar Supply	65	18-May-26	18-Aug-26
PR-4525-200	Award - Rebar Supply	0		18-Aug-26
PR-4525-300	Fab/Deliver to Site - Rebar Supply	120	24-Sep-27	15-Mar-28
4570 - Precast Firewalls		600	18-May-26	26-Sep-28
PR-4570-000	Spec - Precast Firewalls	20	18-May-26	15-Jun-26



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BURNS McDONNELL

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Project Schedule

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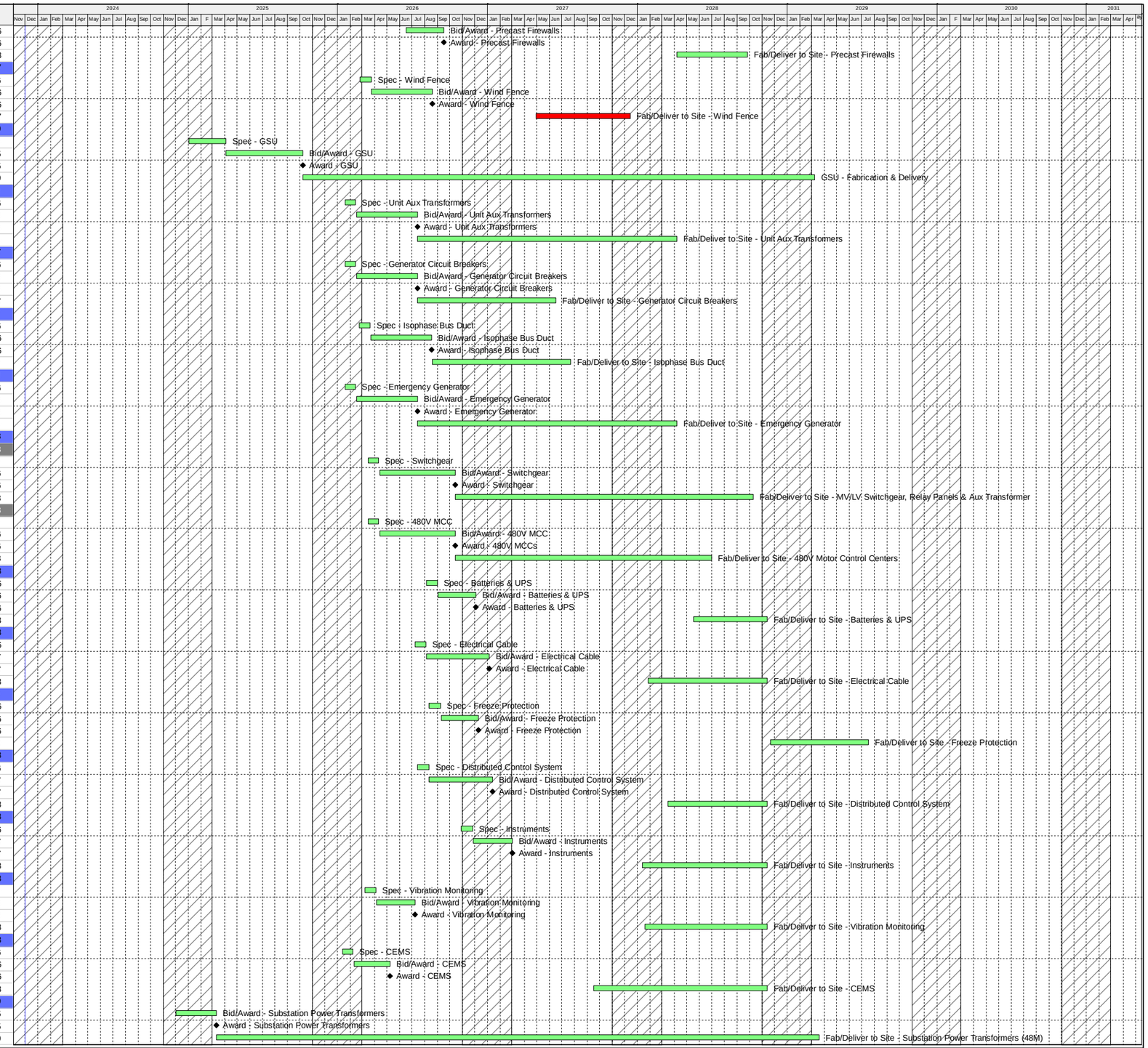
Activity ID	Activity Name	RD	Start	Finish
PR-4570-100	Bid/Award - Precast Firewalls	65	16-Jun-26	16-Sep-26
PR-4570-200	Award - Precast Firewalls	0		16-Sep-26
PR-4570-300	Fab/Deliver to Site - Precast Firewalls	120	07-Apr-28	26-Sep-28
4590 - Wind Fence		460	24-Feb-26	14-Dec-27
PR-4590-000	Spec - Wind Fence	20	24-Feb-26	23-Mar-26
PR-4590-100	Bid/Award - Wind Fence	105	24-Mar-26	19-Aug-26
PR-4590-200	Award - Wind Fence	0		19-Aug-26
PR-4590-300	Fab/Deliver to Site - Wind Fence	160	29-Apr-27	14-Dec-27
5110 - Generator Step-Up Transformers		1063	03-Jan-25	09-Mar-29
PR-5110-000	Spec - GSU	65	03-Jan-25	03-Apr-25
PR-5110-100	Bid/Award - GSU	130	04-Apr-25	07-Oct-25
PR-5110-200	Award - GSU	0		07-Oct-25
PR-5110-300	GSU - Fabrication & Delivery	868	08-Oct-25	09-Mar-29
5120 - Unit Auxiliary Transformers		565	19-Jan-26	06-Apr-28
PR-5120-000	Spec - Unit Aux Transformers	20	19-Jan-26	13-Feb-26
PR-5120-100	Bid/Award - Unit Aux Transformers	105	16-Feb-26	14-Jul-26
PR-5120-200	Award - Unit Aux Transformers	0		14-Jul-26
PR-5120-300	Fab/Deliver to Site - Unit Aux Transformers	440	15-Jul-26	06-Apr-28
5210 - Generator Circuit Breakers		360	19-Jan-26	16-Jun-27
PR-5210-000	Spec - Generator Circuit Breakers	20	19-Jan-26	13-Feb-26
PR-5210-100	Bid/Award - Generator Circuit Breakers	105	16-Feb-26	14-Jul-26
PR-5210-200	Award - Generator Circuit Breakers	0		14-Jul-26
PR-5210-300	Fab/Deliver to Site - Generator Circuit Breakers	235	15-Jul-26	16-Jun-27
5220 - Isophase Bus Duct		360	23-Feb-26	22-Jul-27
PR-5220-000	Spec - Isophase Bus Duct	20	23-Feb-26	20-Mar-26
PR-5220-100	Bid/Award - Isophase Bus Duct	105	23-Mar-26	18-Aug-26
PR-5220-200	Award - Isophase Bus Duct	0		18-Aug-26
PR-5220-300	Fab/Deliver to Site - Isophase Bus Duct	235	19-Aug-26	22-Jul-27
5240 - Emergency Generator		565	19-Jan-26	06-Apr-28
PR-5240-000	Spec - Emergency Generator	20	19-Jan-26	13-Feb-26
PR-5240-100	Bid/Award - Emergency Generator	105	16-Feb-26	14-Jul-26
PR-5240-200	Award - Emergency Generator	0		14-Jul-26
PR-5240-300	Fab/Deliver to Site - Emergency Generator	440	15-Jul-26	06-Apr-28
5310 - Major Electrical Equipment		655	16-Mar-26	10-Oct-28
MV/LV Switchgear & Relay Panels		655	16-Mar-26	10-Oct-28
PR-5310-410	Spec - Switchgear	20	16-Mar-26	10-Apr-26
PR-5310-420	Bid/Award - Switchgear	130	13-Apr-26	14-Oct-26
PR-5310-440	Award - Switchgear	0		14-Oct-26
PR-5310-430	Fab/Deliver to Site - MV/LV Switchgear, Relay Panels & Aux Transformer	505	15-Oct-26	10-Oct-28
480V Motor Control Centers		585	16-Mar-26	30-Jun-28
PR-5310-500	Spec - 480V MCC	20	16-Mar-26	10-Apr-26
PR-5310-510	Bid/Award - 480V MCC	130	13-Apr-26	14-Oct-26
PR-5310-540	Award - 480V MCCs	0		14-Oct-26
PR-5310-530	Fab/Deliver to Site - 480V Motor Control Centers	435	15-Oct-26	30-Jun-28
5410 - Batteries & UPS		579	05-Aug-26	13-Nov-28
PR-5410-000	Spec - Batteries & UPS	20	05-Aug-26	01-Sep-26
PR-5410-100	Bid/Award - Batteries & UPS	65	02-Sep-26	03-Dec-26
PR-5410-200	Award - Batteries & UPS	0		03-Dec-26
PR-5410-300	Fab/Deliver to Site - Batteries & UPS	125	18-May-28	13-Nov-28
5510 - Electrical Cable		599	08-Jul-26	13-Nov-28
PR-5520-000	Spec - Electrical Cable	20	08-Jul-26	04-Aug-26
PR-5520-100	Bid/Award - Electrical Cable	105	05-Aug-26	05-Jan-27
PR-5520-200	Award - Electrical Cable	0		05-Jan-27
PR-5520-300	Fab/Deliver to Site - Electrical Cable	205	27-Jan-28	13-Nov-28
5620 - Freeze Protection		744	12-Aug-26	17-Jul-29
PR-5620-000	Spec - Freeze Protection	20	12-Aug-26	09-Sep-26
PR-5620-100	Bid/Award - Freeze Protection	65	10-Sep-26	10-Dec-26
PR-5620-200	Award - Freeze Protection	0		10-Dec-26
PR-5620-300	Fab/Deliver to Site - Freeze Protection	165	21-Nov-28	17-Jul-29
6110 - Distributed Control System		594	15-Jul-26	13-Nov-28
PR-6110-000	Spec - Distributed Control System	20	15-Jul-26	11-Aug-26
PR-6110-100	Bid/Award - Distributed Control System	105	12-Aug-26	12-Jan-27
PR-6110-200	Award - Distributed Control System	0		12-Jan-27
PR-6110-300	Fab/Deliver to Site - Distributed Control System	170	16-Mar-28	13-Nov-28
6210 - Instruments		519	29-Oct-26	13-Nov-28
PR-6210-000	Spec - Instruments	20	29-Oct-26	25-Nov-26
PR-6210-100	Bid/Award - Instruments	65	27-Nov-26	02-Mar-27
PR-6210-200	Award - Instruments	0		02-Mar-27
PR-6210-300	Fab/Deliver to Site - Instruments	215	13-Jan-28	13-Nov-28
6270 - Vibration Monitoring		684	09-Mar-26	13-Nov-28
PR-6270-000	Spec - Vibration Monitoring	20	09-Mar-26	03-Apr-26
PR-6270-100	Bid/Award - Vibration Monitoring	65	06-Apr-26	07-Jul-26
PR-6270-200	Award - Vibration Monitoring	0		07-Jul-26
PR-6270-300	Fab/Deliver to Site - Vibration Monitoring	210	20-Jan-28	13-Nov-28
6310 - CEMS		724	12-Jan-26	13-Nov-28
PR-6310-000	Spec - CEMS	20	12-Jan-26	06-Feb-26
PR-6310-100	Bid/Award - CEMS	65	09-Feb-26	08-May-26
PR-6310-200	Award - CEMS	0		08-May-26
PR-6310-300	Fab/Deliver to Site - CEMS	295	17-Sep-27	13-Nov-28
C201 - Substation Power Transformers		1091	02-Dec-24	20-Mar-29
PR-C201-000	Bid/Award - Substation Power Transformers	68	02-Dec-24*	10-Mar-25
PR-C201-100	Award - Substation Power Transformers	0		10-Mar-25
PR-C201-300	Fab/Deliver to Site - Substation Power Transformers (48M)	1023	11-Mar-25	20-Mar-29



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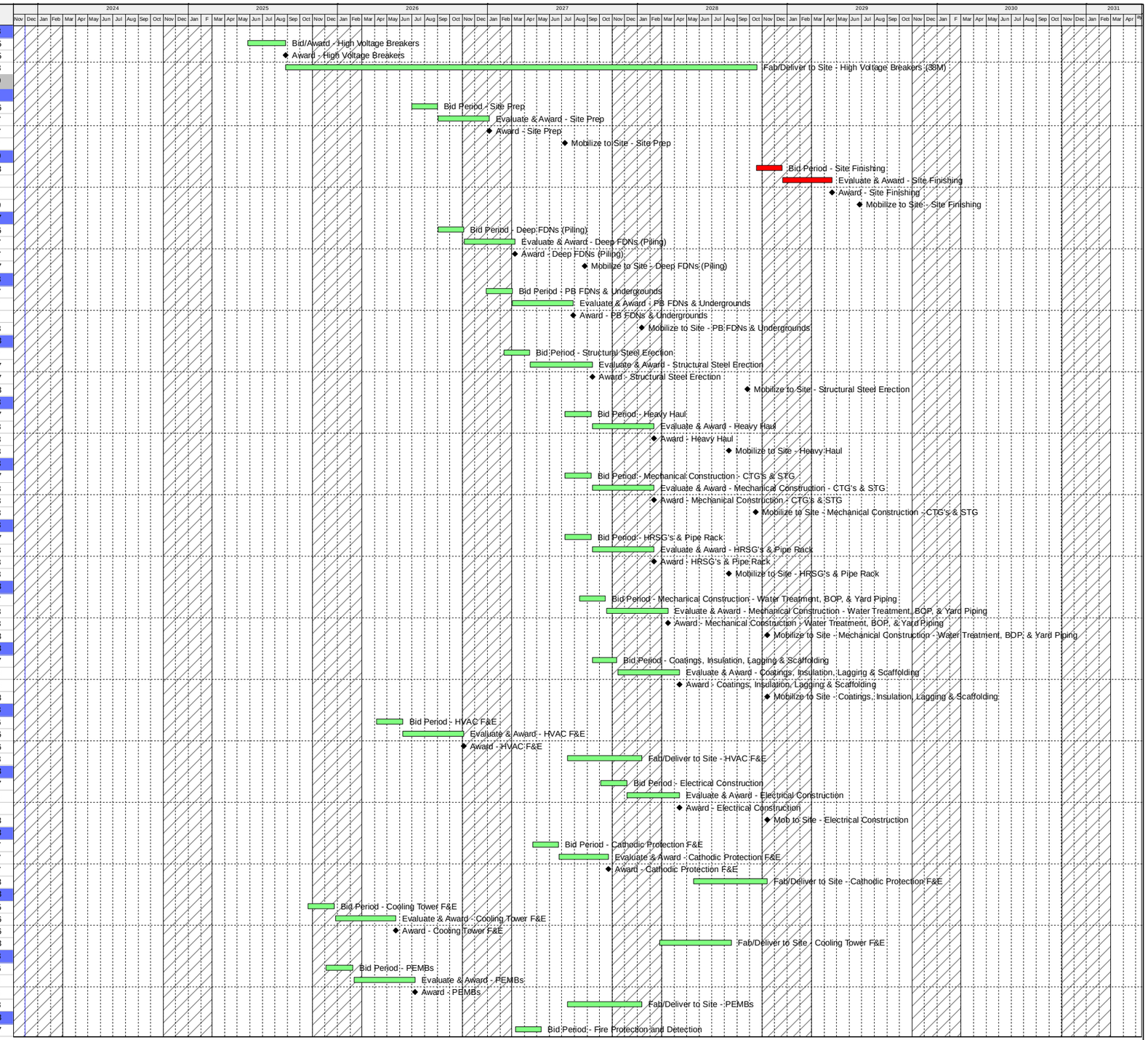
Activity ID	Activity Name	RD	Start	Finish
C202 - High Voltage Breakers		865	27-May-25	19-Oct-28
PR-C202-000	Bid/Award - High Voltage Breakers	65	27-May-25*	26-Aug-25
PR-C202-100	Award - High Voltage Breakers	0		26-Aug-25
PR-C202-300	Fab/Deliver to Site - High Voltage Breakers (38M)	800	27-Aug-25	19-Oct-28
Construction Contracts		934	21-Oct-25	25-Jun-29
8110 - Site Preparation		261	30-Jun-26	09-Jul-27
PR-8110-000	Bid Period - Site Prep	45	30-Jun-26	01-Sep-26
PR-8110-320	Evaluate & Award - Site Prep	85	02-Sep-26	05-Jan-27
PR-8110-200	Award - Site Prep	0		05-Jan-27
PR-8110-300	Mobilize to Site - Site Prep	0		09-Jul-27
8140 - Site Finishing		175	17-Oct-28	25-Jun-29
PR-8140-000	Bid Period - Site Finishing	45	17-Oct-28	19-Dec-28
PR-8140-320	Evaluate & Award - Site Finishing	85	20-Dec-28	20-Apr-29
PR-8140-200	Award - Site Finishing	0		20-Apr-29
PR-8140-300	Mobilize to Site - Site Finishing	0		25-Jun-29
8210 - Deep Foundations (Piling)		249	02-Sep-26	25-Aug-27
PR-8210-000	Bid Period - Deep FDNs (Piling)	45	02-Sep-26	04-Nov-26
PR-8210-320	Evaluate & Award - Deep FDNs (Piling)	85	05-Nov-26	09-Mar-27
PR-8210-200	Award - Deep FDNs (Piling)	0		09-Mar-27
PR-8210-300	Mobilize to Site - Deep FDNs (Piling)	0		25-Aug-27
8220 - Power Block Foundations & Undergrounds		264	29-Dec-26	12-Jan-28
PR-8220-000	Bid Period - PB FDNs & Undergrounds	45	29-Dec-26	02-Mar-27
PR-8220-330	Evaluate & Award - PB FDNs & Undergrounds	105	03-Mar-27	29-Jul-27
PR-8220-310	Award - PB FDNs & Undergrounds	0		29-Jul-27
PR-8220-300	Mobilize to Site - PB FDNs & Undergrounds	0		12-Jan-28
8240 - Structural Steel Erection		414	11-Feb-27	26-Sep-28
PR-8240-000	Bid Period - Structural Steel Erection	45	11-Feb-27	14-Apr-27
PR-8240-320	Evaluate & Award - Structural Steel Erection	105	15-Apr-27	13-Sep-27
PR-8240-200	Award - Structural Steel Erection	0		13-Sep-27
PR-8240-300	Mobilize to Site - Structural Steel Erection	0		26-Sep-28
8315 - Heavy Haul		279	09-Jul-27	11-Aug-28
P-8315-000	Bid Period - Heavy Haul	45	09-Jul-27	10-Sep-27
P-8315-320	Evaluate & Award - Heavy Haul	105	13-Sep-27	10-Feb-28
P-8315-200	Award - Heavy Haul	0		10-Feb-28
P-8315-300	Mobilize to Site - Heavy Haul	0		11-Aug-28
8321 - Mechanical Construction - CTG's & STG		324	09-Jul-27	16-Oct-28
P-8321-000	Bid Period - Mechanical Construction - CTG's & STG	45	09-Jul-27	10-Sep-27
P-8321-320	Evaluate & Award - Mechanical Construction - CTG's & STG	105	13-Sep-27	10-Feb-28
P-8321-200	Award - Mechanical Construction - CTG's & STG	0		10-Feb-28
P-8321-300	Mobilize to Site - Mechanical Construction - CTG's & STG	0		16-Oct-28
8322 - Mechanical Construction - HRSG's & Pipe Rack		279	09-Jul-27	11-Aug-28
P-8322-000	Bid Period - HRSG's & Pipe Rack	45	09-Jul-27	10-Sep-27
P-8322-320	Evaluate & Award - HRSG's & Pipe Rack	105	13-Sep-27	10-Feb-28
P-8322-200	Award - HRSG's & Pipe Rack	0		10-Feb-28
P-8322-300	Mobilize to Site - HRSG's & Pipe Rack	0		11-Aug-28
8323 - Mechanical Construction - Water Treatment. BOP, & Yard Piping		319	13-Aug-27	13-Nov-28
P-8323-000	Bid Period - Mechanical Construction - Water Treatment, BOP, & Yard Piping	45	13-Aug-27	15-Oct-27
P-8323-320	Evaluate & Award - Mechanical Construction - Water Treatment, BOP, & Yard Piping	105	18-Oct-27	16-Mar-28
P-8323-200	Award - Mechanical Construction - Water Treatment, BOP, & Yard Piping	0		16-Mar-28
P-8323-300	Mobilize to Site - Mechanical Construction - Water Treatment, BOP, & Yard Piping	0		13-Nov-28
8330 - Coatings, Insulation, Lagging, & Scaffolding		299	13-Sep-27	13-Nov-28
PR-8330-000	Bid Period - Coatings, Insulation, Lagging & Scaffolding	45	13-Sep-27	12-Nov-27
PR-8330-320	Evaluate & Award - Coatings, Insulation, Lagging & Scaffolding	105	15-Nov-27	13-Apr-28
PR-8330-200	Award - Coatings, Insulation, Lagging & Scaffolding	0		13-Apr-28
PR-8330-300	Mobilize to Site - Coatings, Insulation, Lagging & Scaffolding	0		13-Nov-28
8340 - HVAC F&E		449	06-Apr-26	12-Jan-28
PR-8340-000	Bid Period - HVAC F&E	45	06-Apr-26	08-Jun-26
PR-8340-320	Evaluate & Award - HVAC F&E	105	09-Jun-26	04-Nov-26
PR-8340-200	Award - HVAC F&E	0		04-Nov-26
PR-8340-300	Fab/Deliver to Site - HVAC F&E	125	15-Jul-27	12-Jan-28
8410 - Electrical Construction		284	04-Oct-27	13-Nov-28
PR-8410-000	Bid Period - Electrical Construction	45	04-Oct-27	06-Dec-27
PR-8410-320	Evaluate & Award - Electrical Construction	90	07-Dec-27	13-Apr-28
PR-8410-200	Award - Electrical Construction	0		13-Apr-28
PR-8410-300	Mob to Site - Electrical Construction	0		13-Nov-28
8480 - Cathodic Protection F&E		399	21-Apr-27	13-Nov-28
PR-8480-000	Bid Period - Cathodic Protection F&E	45	21-Apr-27	23-Jun-27
PR-8480-320	Evaluate & Award - Cathodic Protection F&E	85	24-Jun-27	22-Oct-27
PR-8480-200	Award - Cathodic Protection F&E	0		22-Oct-27
PR-8480-300	Fab/Deliver to Site - Cathodic Protection F&E	125	18-May-28	13-Nov-28
8510 - Cooling Tower F&E		719	21-Oct-25	18-Aug-28
PR-8510-000	Bid Period - Cooling Tower F&E	45	21-Oct-25	23-Dec-25
PR-8510-320	Evaluate & Award - Cooling Tower F&E	105	26-Dec-25	22-May-26
PR-8510-200	Award - Cooling Tower F&E	0		22-May-26
PR-8510-300	Fab/Deliver to Site - Cooling Tower F&E	125	24-Feb-28	18-Aug-28
8530 - Pre-Engineered Metal Building F&E		534	03-Dec-25	12-Jan-28
PR-8530-000	Bid Period - PEMBs	45	03-Dec-25	06-Feb-26
PR-8530-320	Evaluate & Award - PEMBs	105	09-Feb-26	07-Jul-26
PR-8530-200	Award - PEMBs	0		07-Jul-26
PR-8530-300	Fab/Deliver to Site - PEMBs	125	15-Jul-27	12-Jan-28
8560 - Fire Protection and Detection		299	10-Mar-27	10-May-28
PR-8560-000	Bid Period - Fire Protection and Detection	45	10-Mar-27	11-May-27



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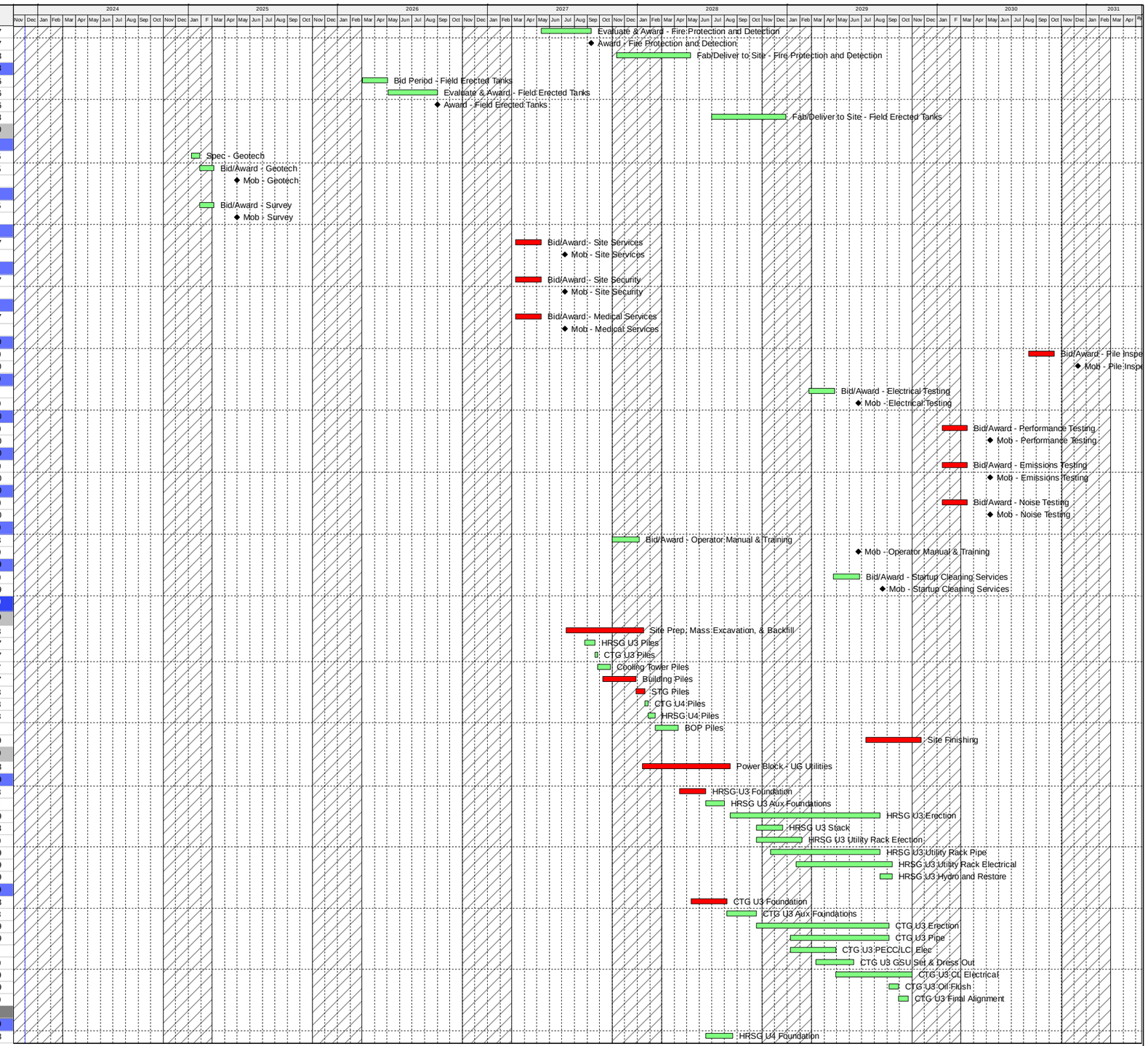
Activity ID	Activity Name	RD	Start	Finish
PR-8560-320	Evaluate & Award - Fire Protection and Detection	85	12-May-27	10-Sep-27
PR-8560-200	Award - Fire Protection and Detection	0		10-Sep-27
PR-8560-300	Fab/Deliver to Site - Fire Protection and Detection	125	12-Nov-27	10-May-28
8570 - Field Erected Tanks F&E		719	02-Mar-26	28-Dec-28
PR-8570-000	Bid Period - Field Erected Tanks	45	02-Mar-26	01-May-26
PR-8570-320	Evaluate & Award - Field Erected Tanks	85	04-May-26	01-Sep-26
PR-8570-200	Award - Field Erected Tanks	0		01-Sep-26
PR-8570-300	Fab/Deliver to Site - Field Erected Tanks	125	30-Jun-28	28-Dec-28
Service Contracts		1505	09-Jan-25	10-Dec-30
9010 - Geotech		80	09-Jan-25	30-Apr-25
PR-9010-310	Spec - Geotech	15	09-Jan-25	29-Jan-25
PR-9010-000	Bid/Award - Geotech	25	30-Jan-25	05-Mar-25
PR-9010-300	Mob - Geotech	0		30-Apr-25
9020 - Survey		65	30-Jan-25	30-Apr-25
PR-9020-000	Bid/Award - Survey	25	30-Jan-25	05-Mar-25
PR-9020-300	Mob - Survey	0		30-Apr-25
9021 - Site Services		85	11-Mar-27	09-Jul-27
PR-9021-000	Bid/Award - Site Services	45	11-Mar-27	12-May-27
PR-9021-300	Mob - Site Services	0		09-Jul-27
9110 - Site Security		85	11-Mar-27	09-Jul-27
PR-9110-000	Bid/Award - Site Security	45	11-Mar-27	12-May-27
PR-9110-300	Mob - Site Security	0		09-Jul-27
9130 - Medical Services		85	11-Mar-27	09-Jul-27
PR-9130-000	Bid/Award - Medical Services	45	11-Mar-27	12-May-27
PR-9130-300	Mob - Medical Services	0		09-Jul-27
9215 - Pile Inspections		85	12-Aug-30	10-Dec-30
PR-9215-000	Bid/Award - Pile Inspections	45	12-Aug-30	14-Oct-30
PR-9215-300	Mob - Pile Inspections	0		10-Dec-30
9230 - Electrical Testing		85	23-Feb-29	22-Jun-29
PR-9230-000	Bid/Award - Electrical Testing	45	23-Feb-29	26-Apr-29
PR-9230-300	Mob - Electrical Testing	0		22-Jun-29
9250 - Performance Testing		85	14-Jan-30	10-May-30
PR-9250-000	Bid/Award - Performance Testing	45	14-Jan-30	15-Mar-30
PR-9250-300	Mob - Performance Testing	0		10-May-30
9260 - Emissions Testing		85	14-Jan-30	10-May-30
PR-9260-000	Bid/Award - Emissions Testing	45	14-Jan-30	15-Mar-30
PR-9260-300	Mob - Emissions Testing	0		10-May-30
9270 - Noise Testing		85	14-Jan-30	10-May-30
PR-9270-000	Bid/Award - Noise Testing	45	14-Jan-30	15-Mar-30
PR-9270-300	Mob - Noise Testing	0		10-May-30
9400 - Operator Manual & Training		418	01-Nov-27	22-Jun-29
PR-9400-000	Bid/Award - Operator Manual & Training	45	01-Nov-27	06-Jan-28
PR-9400-300	Mob - Operator Manual & Training	0		22-Jun-29
9610 - Startup Cleaning Services		85	23-Apr-29	21-Aug-29
PR-9610-000	Bid/Award - Startup Cleaning Services	45	23-Apr-29	25-Jun-29
PR-9610-300	Mob - Startup Cleaning Services	0		21-Aug-29
Construction		628	12-Jul-27	02-Jan-30
General		603	12-Jul-27	23-Nov-29
C1010	Site Prep, Mass Excavation, & Backfill	130	12-Jul-27	17-Jan-28
C2170	HRSG U3 Piles	16	26-Aug-27	20-Sep-27
C2180	CTG U3 Piles	5	20-Sep-27	27-Sep-27
C2240	Cooling Tower Piles	23	27-Sep-27	28-Oct-27
C2230	Building Piles	55	08-Oct-27	29-Dec-27
C2190	STG Piles	15	29-Dec-27	20-Jan-28
C2200	CTG U4 Piles	5	20-Jan-28	27-Jan-28
C2210	HRSG U4 Piles	12	27-Jan-28	14-Feb-28
C2220	BOP Piles	40	14-Feb-28	10-Apr-28
C1560	Site Finishing	95	11-Jul-29	23-Nov-29
Power Block		500	13-Jan-28	02-Jan-30
C1030	Power Block - UG Utilities	150	13-Jan-28	14-Aug-28
HRSG U3		360	13-Apr-28	13-Sep-29
C1040	HRSG U3 Foundation	45	13-Apr-28	16-Jun-28
C1070	HRSG U3 Aux Foundations	30	16-Jun-28	31-Jul-28
C1340	HRSG U3 Erection	255	14-Aug-28	15-Aug-29
C1220	HRSG U3 Stack	45	17-Oct-28	20-Dec-28
C1230	HRSG U3 Utility Rack Erection	75	17-Oct-28	05-Feb-29
C1450	HRSG U3 Utility Rack Pipe	185	21-Nov-28	15-Aug-29
C1490	HRSG U3 Utility Rack Electrical	165	22-Jan-29	13-Sep-29
C1440	HRSG U3 Hydro and Restore	20	15-Aug-29	13-Sep-29
CTG U3		375	11-May-28	01-Nov-29
C1050	CTG U3 Foundation	60	11-May-28	07-Aug-28
C1110	CTG U3 Aux Foundations	50	07-Aug-28	17-Oct-28
C1500	CTG U3 Erection	225	17-Oct-28	06-Sep-29
C1520	CTG U3 Pipe	170	08-Jan-29	06-Sep-29
C1540	CTG U3 PECC/LCI Elec	80	08-Jan-29	30-Apr-29
C1680	CTG U3 GSU Set & Dress Out	65	12-Mar-29	12-Jun-29
C2070	CTG U3 CL Electrical	130	30-Apr-29	01-Nov-29
C1510	CTG U3 Oil Flush	20	06-Sep-29	29-Sep-29
C2160	CTG U3 Final Alignment	20	29-Sep-29	23-Oct-29
GTG - GSU, GCB, ISO PHASE		0		
HRSG U4		360	16-Jun-28	15-Nov-29
C1730	HRSG U4 Foundation	45	16-Jun-28	21-Aug-28



Start Date	30-Nov-23
Finish Date	10-Dec-30
Data Date	30-Nov-23
Run Date	30-Oct-24

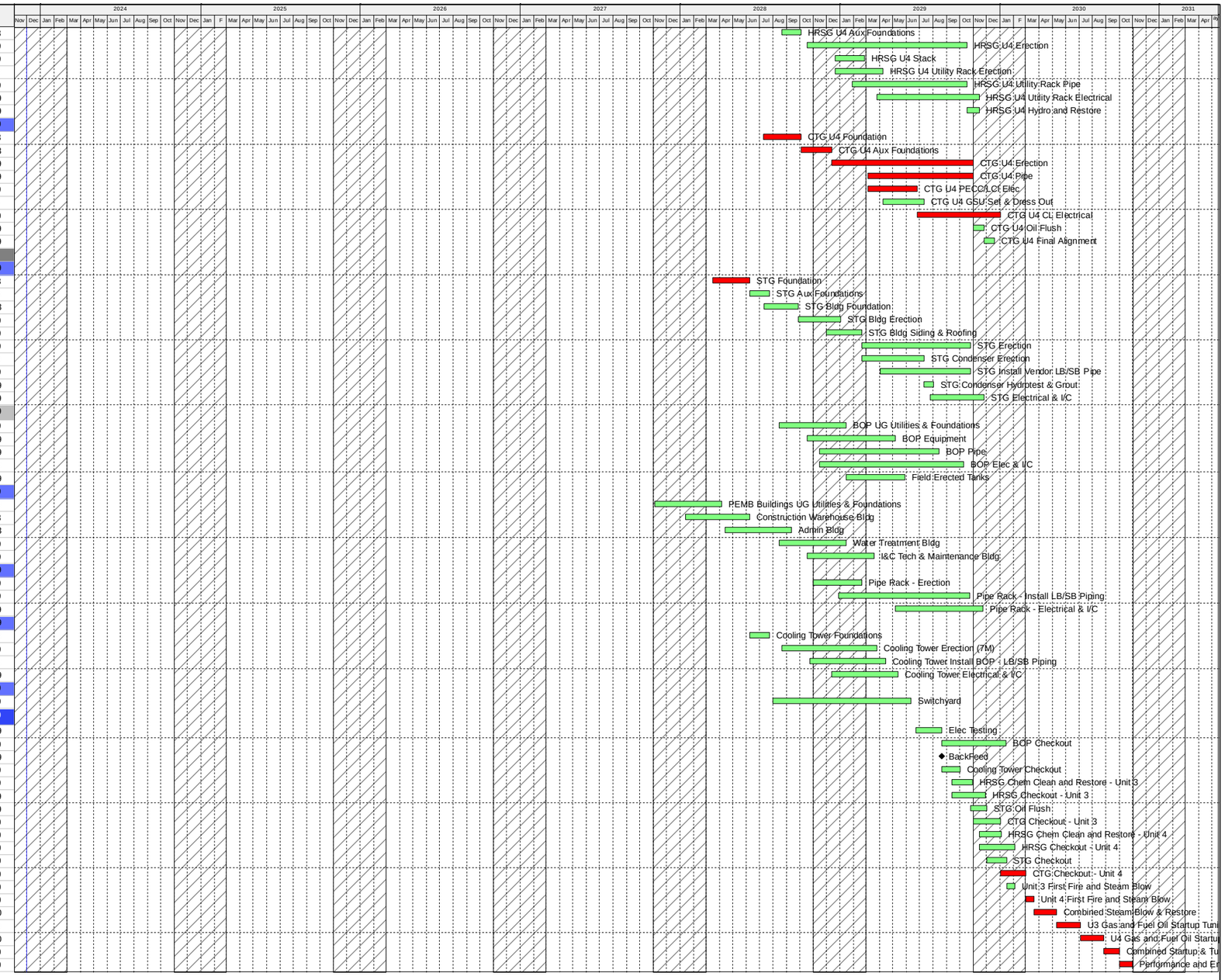
BURNS McDONNELL

EKPC Generation - 2x1F Class Cooper CC Dec 2030 COD

Project Schedule

Date	Revision	Checked	Approved

Activity ID	Activity Name	RD	Start	Finish
C1740	HRSG U4 Aux Foundations	30	21-Aug-28	03-Oct-28
C1860	HRSG U4 Erection	255	17-Oct-28	18-Oct-29
C1790	HRSG U4 Stack	45	20-Dec-28	26-Feb-29
C1800	HRSG U4 Utility Rack Erection	75	20-Dec-28	09-Apr-29
C1810	HRSG U4 Utility Rack Pipe	185	29-Jan-29	18-Oct-29
C1820	HRSG U4 Utility Rack Electrical	165	26-Mar-29	15-Nov-29
C1850	HRSG U4 Hydro and Restore	20	18-Oct-29	15-Nov-29
CTG U4		375	10-Jul-28	02-Jan-30
C1710	CTG U4 Foundation	60	10-Jul-28	03-Oct-28
C1720	CTG U4 Aux Foundations	50	03-Oct-28	13-Dec-28
C1750	CTG U4 Erection	225	13-Dec-28	01-Nov-29
C1760	CTG U4 Pipe	170	05-Mar-29	01-Nov-29
C1770	CTG U4 PECC/LCI Elec	80	05-Mar-29	26-Jun-29
C1910	CTG U4 GSU Set & Dress Out	65	09-Apr-29	11-Jul-29
C2060	CTG U4 CL Electrical	130	26-Jun-29	02-Jan-30
C1920	CTG U4 Oil Flush	20	01-Nov-29	26-Nov-29
C2150	CTG U4 Final Alignment	20	26-Nov-29	19-Dec-29
GTG - GSU, GCB, ISO PHASE		0		
STG		431	16-Mar-28	26-Nov-29
C1060	STG Foundation	60	16-Mar-28	09-Jun-28
C1080	STG Aux Foundations	30	09-Jun-28	24-Jul-28
C1140	STG Bldg Foundation	55	11-Jul-28	27-Sep-28
C1240	STG Bldg Erection	65	27-Sep-28	02-Jan-29
C1270	STG Bldg Siding & Roofing	55	30-Nov-28	20-Feb-29
C1380	STG Erection	175	20-Feb-29	26-Oct-29
C1980	STG Condenser Erection	100	20-Feb-29	12-Jul-29
C1370	STG Install Vendor LB/SB Pipe	145	03-Apr-29	26-Oct-29
C2030	STG Condenser Hydrotest & Grout	15	12-Jul-29	02-Aug-29
C1420	STG Electrical & I/C	85	26-Jul-29	26-Nov-29
BOP		520	05-Nov-27	23-Nov-29
C1170	BOP UG Utilities & Foundations	105	14-Aug-28	15-Jan-29
C1300	BOP Equipment	140	17-Oct-28	07-May-29
C1330	BOP Pipe	190	14-Nov-28	15-Aug-29
C1430	BOP Elec & I/C	230	14-Nov-28	11-Oct-29
C1280	Field Erected Tanks	95	15-Jan-29	29-May-29
PEMB		345	05-Nov-27	19-Mar-29
C2090	PEMB Buildings UG Utilities & Foundations	105	05-Nov-27	06-Apr-28
C2100	Construction Warehouse Bldg	105	13-Jan-28	09-Jun-28
C2110	Admin Bldg	105	13-Apr-28	12-Sep-28
C2080	Water Treatment Bldg	105	14-Aug-28	15-Jan-29
C2120	I&C Tech & Maintenance Bldg	105	17-Oct-28	19-Mar-29
Pipe Rack		270	31-Oct-28	23-Nov-29
C2000	Pipe Rack - Erection	75	31-Oct-28	19-Feb-29
C2020	Pipe Rack - Install LB/SB Piping	210	29-Dec-28	25-Oct-29
C2010	Pipe Rack - Electrical & I/C	140	07-May-29	23-Nov-29
Cooling Tower		235	09-Jun-28	14-May-29
C1090	Cooling Tower Foundations	30	09-Jun-28	24-Jul-28
C1400	Cooling Tower Erection (7M)	150	21-Aug-28	26-Mar-29
C1990	Cooling Tower Install BOP - LB/SB Piping	120	24-Oct-28	16-Apr-29
C1970	Cooling Tower Electrical & I/C	105	13-Dec-28	14-May-29
SWYD		219	01-Aug-28	12-Jun-29
C1320	Switchyard	219	01-Aug-28	12-Jun-29
Startup		344	23-Jun-29	31-Oct-30
C1350	Elec Testing	50	23-Jun-29	22-Aug-29
C1590	BOP Checkout	120	22-Aug-29	15-Jan-30
C1360	BackFeed	0		22-Aug-29
C1550	Cooling Tower Checkout	35	22-Aug-29	03-Oct-29
C1530	HRSG Chem Clean and Restore - Unit 3	40	13-Sep-29	30-Oct-29
C1580	HRSG Checkout - Unit 3	65	13-Sep-29	29-Nov-29
C1480	STG Oil Flush	25	26-Oct-29	03-Dec-29
C1600	CTG Checkout - Unit 3	50	01-Nov-29	03-Jan-30
C1940	HRSG Chem Clean and Restore - Unit 4	40	15-Nov-29	05-Jan-30
C1960	HRSG Checkout - Unit 4	65	15-Nov-29	04-Feb-30
C1570	STG Checkout	35	03-Dec-29	16-Jan-30
C1930	CTG Checkout - Unit 4	50	03-Jan-30	02-Mar-30
C1610	Unit 3 First Fire and Steam Blow	15	17-Jan-30	04-Feb-30
C2130	Unit 4 First Fire and Steam Blow	15	02-Mar-30	20-Mar-30
C1620	Combined Steam Blow & Restore	45	20-Mar-30	11-May-30
C1630	U3 Gas and Fuel Oil Startup Tuning	45	11-May-30	05-Jul-30
C2140	U4 Gas and Fuel Oil Startup Tuning	45	05-Jul-30	27-Aug-30
C2040	Combined Startup & Tuning	30	27-Aug-30	02-Oct-30
C2050	Performance and Emissions Testing	25	02-Oct-30	31-Oct-30



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BURNS McDONNELL

EKPC Generation - 2x1F Class Cooper CC Dec 2030 COD

Project Schedule

Date	Revision	Checked	Approved

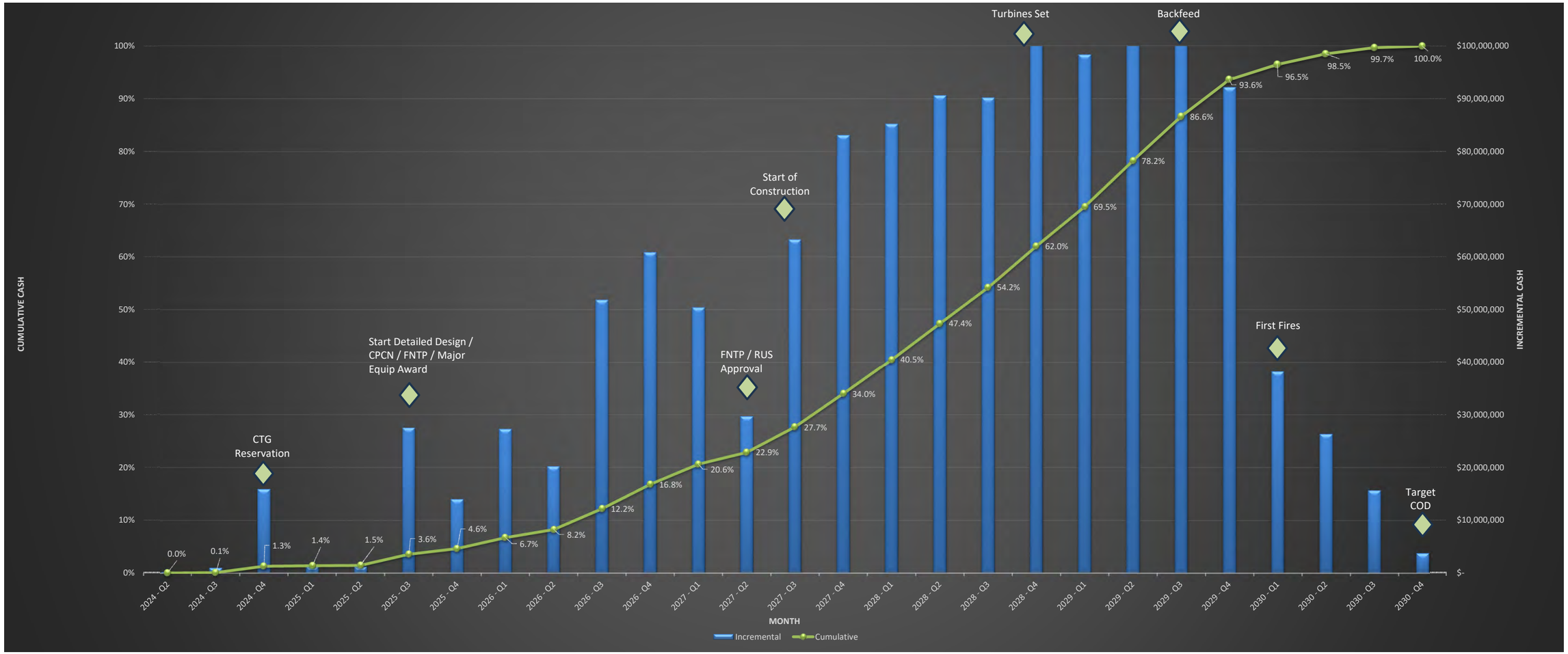
Appendix R – CAPITAL COST ESTIMATE

Appendix S – CASH FLOW

EKPC - Cooper CC
Estimated Cash Flow

Quarterly Cash Flow					
Year	Quarter	Incremental	Incremental %	Cumulative	Cumulative %
2024	2	$185,982	0.01%	$185,982	0.01%
2024	3	$978,323	0.07%	$1,164,305	0.09%
2024	4	$15,884,189	1.21%	$17,048,494	1.29%
2025	1	$1,192,810	0.09%	$18,241,304	1.39%
2025	2	$1,213,295	0.09%	$19,454,599	1.48%
2025	3	$27,506,848	2.09%	$46,961,447	3.57%
2025	4	$13,983,698	1.06%	$60,945,145	4.63%
2026	1	$27,280,627	2.07%	$88,225,772	6.70%
2026	2	$20,200,249	1.53%	$108,426,021	8.23%
2026	3	$51,858,544	3.94%	$160,284,566	12.17%
2026	4	$60,887,752	4.62%	$221,172,317	16.79%
2027	1	$50,426,892	3.83%	$271,599,209	20.62%
2027	2	$29,699,019	2.26%	$301,298,229	22.88%
2027	3	$63,308,233	4.81%	$364,606,462	27.68%
2027	4	$83,136,064	6.31%	$447,742,526	34.00%
2028	1	$85,261,164	6.47%	$533,003,690	40.47%
2028	2	$90,651,650	6.88%	$623,655,340	47.35%
2028	3	$90,214,488	6.85%	$713,869,828	54.20%
2028	4	$103,311,100	7.84%	$817,180,928	62.05%
2029	1	$98,347,845	7.47%	$915,528,773	69.52%
2029	2	$114,614,113	8.70%	$1,030,142,886	78.22%
2029	3	$110,588,555	8.40%	$1,140,731,441	86.62%
2029	4	$92,196,160	7.00%	$1,232,927,601	93.62%
2030	1	$38,320,630	2.91%	$1,271,248,231	96.53%
2030	2	$26,330,987	2.00%	$1,297,579,218	98.53%
2030	3	$15,673,227	1.19%	$1,313,252,445	99.72%
2030	4	$3,747,555	0.28%	$1,317,000,000	100.00%

EKPC - Cooper CC
Estimated Cash Flow



APPENDIX T – O&M COST ESTIMATE

EKPC Cooper 2x1 F CCGT
Operation and Maintenance Cost Summary
Burns & McDonnell Project #: 157787
Date: 10/30/24
Revision: 0

Case			
Description		2x1 5000F CC	
Operating Assumptions	**Natural Gas**	**Fuel Oil**	**TOTAL**
Basis Year	2024	2024	2024
Capacity Factor	70%	5%	75%
Number of Gas Turbines	2	2	2
Number of Steam Turbines	1	1	1
Hours @ Base Load, Including Fired	6,132	438	6,570
Number of Starts	188	188	376
Cold			2
Warm			110
Hot			76
Months of start-up power demand charge	11	1	12
Base Load Net Output, kW, Average Annual	774,552	692,095	769,054
NET Plant Heat Rate, Base Load Btu/kWhr	6,415	6,619	6,429
GT Fuel Input, per Unit, MMBtu/hr (HHV)	2,484	2,290	2,472
Steam Turbine Unfired Output (each) KW Average	261,000	225,375	258,625
Base Load Annual Net Output, MWh	4,749,550	303138	5,052,688
Incr Fired Annual Net Output, MWh	-	0	0
Total Annual Net Output, MWh	4,749,550	303,138	5,052,688
Fixed O&M			
Labor			**$ 3,080,000**
Personnel			**28**
Average Yearly Salary			**$ 110,000.00**
Office & Admin			**$ 271,854**
Other Fixed O&M			***$ 1,813,180***
Employee Expenses/Training			
Contract Labor			
Environmental Expenses			
Safety Expenses			
Buildings, Grounds, and Painting			
Other Supplies & Expenses			
Communication			
Sustaining Capital			
Control Room/Lab Expenses			
Annual major maintenance service director / PM fee (Note 4)			***$ 450,000***
Annual engine lease fee			***Excluded***
Property Taxes			***Excluded***
Insurance			***Excluded***
Start-up power demand charge			***$ -***
per kW-Mo			$ -
KW for GT			$ 2,665.81
Water supply demand charge			***$ -***
per acre-ft			$ -
acre-ft			4.384
Water discharge demand charge			***$ -***
per acre-ft			$ -
acre-ft			0.546
Standby Power Energy Costs			***$ 179,244***
per kW-hr			$ 0.0450
KW-hr			3,983,200
Standby Power Service Fee			***$ -***
per Month			$ -
Months			12
Total Fixed O&M Annual Cost			***$ 5,794,278***
Non-Fuel/Power Variable O&M			
Water **Base Load Operation**			***$ 1,968,053***
Cooling Tower Makeup Water			***$ 1,519,316***
$/1000 gal			$ 1.10
1000 gal			1,381,196
Cycle / Service Makeup Water			***$ 37,764***
$/1000 gal			$ 0.80
1000 gal			47,205
Water Disposal			***$ -***
$/1000 gal			$ -
1000 gal			177925
Demin Water Treatment Chemicals			***$ 57,286***
$/1000 gal			$ 1.25
1000 gal			45,829
Boiler Treatment Chemicals			***$ 8,389***
$/1000 gal			$ 0.20
1000 gal			41,943
Cooling Tower Water Treatment Chemical			***$ 345,299***
$/1000 gal			$ 0.25
1000 gal			1,381,196
Evap Cooler Water Treatment Chemical (Note 2)			***$ -***
$/1000 gal			$ 1.10
1000 gal			0
Major Maintenance			***$ 8,848,046***
Gas Turbine Major Maintenance			$7,961,263
Steam Turbine Major Maintenance			$886,783
Cooling Tower Major Maintenance			Incl in Other VOM
HRSG Major Maintenance			Incl in Other VOM
Other Variable O&M			***$ 4,577,733***
Electronics, Controls, BOP Electrical			
Steam Generators (unplanned maint.- parts)			
Gas turbine Generators (unplanned maint.- parts)			
BOP (HVAC, Lighting, Instrument Air, etc.)			
Misc. Maintenance Expenses			
Consummables			
SCR Ammonia & Replacements			***$ 2,121,561***
Total Variable O&M Annual Cost			***$ 17,515,394***
Summary of O&M Costs			
Total Fixed O&M Annual Labor Cost, $MM/yr			***$ 3.10***
Total Fixed O&M Annual Other Cost, $MM/yr			***$ 2.70***
Total Fixed O&M Annual Cost, $/kW-yr			***$ 7.50***
Total Fixed O&M Annual Cost, $MM/yr			***$ 5.80***
Total Non-Fuel/Power Variable O&M Annual Cost, $/hr, excluding GT Mjr Maint			***$ 1,454***
Total Non-Fuel/Power Variable O&M Annual Cost, $/MWh, excluding GT Mjr Maint			***$ 1.70***
Water Related O&M Annual Cost, $MWh			***$ 0.40***
SCR Reagent, $/MWh			***$ 0.20***
Other Consumables and Variable O&M			***$ 1.10***
Incremental Evaporative Cooler Cost, $/MWh (Note 3)			***$ 0.45***
Total Levelized Major Maintenance, $/GTG-hr			***$ 610***
Total Levelized Major Maintenance, $/MWh			***$ 1.60***
Total Levelized GT Major Maintenance, $/GTG-Start			***$ 9,800***
Catalyst Replacement Cost & Level. Cap. Maint. Replacements, $/MWh			***$ 0.20***
Water Consumption, kgal/yr			***$ 1,428,000***

Notes:
1. O&M costs exclude any fuel costs.
2. O&M costs based on annual average 56.2 °F ambient and evaporative coolers are not running below 59 °F.
3. Incremental cost is based on the 95.7 °F ambient and may vary with ambient.
4. Major maintenance / LTSA costs based on past projects and reference information and is intended to be representative

CREATE AMAZING.

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