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Portland General Electric Company
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October 27, 2016

via email
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Public Utility Commission of Oregon
201 High Street, Ste. 100
P. O. Box 1088
Salem, OR 97308-1088

Attn: Filing Center

RE: **Docket UE 230 - Annual Boardman Decommissioning Update - 2016**

Enclosed for filing in the above referenced matter please find the following:

Electronic copy of:
- **Discussion and Summary (Attachment A)**
- **2015 Closure, Decommissioning, and Demolition Strategy Documents (Attachment B)**

While PGE is proposing to maintain the currently authorized costs included in Schedule 145, we are supplementing the record in docket UE 230 (Boardman Tariff Advice Filing) to include new decommissioning, demolition, and final closure strategy plan documents. These documents, prepared in late 2015 by CH2M Hill Engineers, Inc., focus primarily on providing planning guidance, rather than providing a more detailed decommissioning cost estimate. PGE does plan to complete additional decommissioning studies prior to closure, which will provide detailed budgetary estimates.

Please direct any questions regarding this filing to Patrick Hager at (503) 464-7580 or Greg Batzler at (503) 464-8644. Please direct all formal correspondence, questions, or requests to the following e-mail address pge.opuc.filings@pgn.com.

Sincerely,

Jay Tinker for
Stefan Brown
Manager, Regulatory Affairs

SB/sp
Enclosure

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BOARDMAN TARIFF UPDATE

SCHEDULE 145

DISCUSSION

I. Boardman Tariff Advice Filing

Pursuant to Order No. 11-242 in docket UE 230, Portland General Electric Company (PGE) submits this Supplemental Filing that provides new information regarding the Boardman Power Plant Decommissioning Adjustment Tariff (Schedule 145). This filing updates the information in support of docket UE 230 (Boardman Tariff Advice Filing) to include a new decommissioning, demolition, and final closure strategy plan, supporting the planning and preparation for the potential demolition of the Boardman Power Plant (Boardman).

While the new plan documents provide a more in depth and detailed look than PGE's previous decommissioning study, the primary focus was to provide planning guidance and closure plan documentation, not to provide a more detailed cost estimate. Additionally, there remain some significant risks and uncertainties regarding certain assumptions and potential environmental liabilities. Because of these factors, PGE recommends no change in the current forecasted revenue requirement associated with the decontamination, decommissioning, and demolition of Boardman. PGE does plan to complete additional decommissioning studies prior to closure, which will provide detailed budgetary estimates. PGE will continue to update Schedule 145 on January 1 of each year, to account for updates to the load forecast and decommissioning costs, among other factors.

II. Background

The Oregon Regional Haze Plan (Haze Plan) and Oregon Utility Mercury Rule (Rule) requirements for Boardman caused PGE to examine the risks and benefits of making substantial investments in new emissions controls against the risks and benefits of ceasing plant operations and replacing Boardman with a new source of supply. In its Integrated Resource Plan (IRP) submitted November 2009 (LC 48), PGE presented the Public Utility Commission of Oregon (Commission or OPUC) with alternative scenarios ranging from a complete shutdown in July 2011 to installing all pollution control equipment required to fully comply with the Haze Plan and the Rule. During the IRP process, additional alternatives were evaluated, and PGE’s final recommendation, acknowledged by the Commission, included the cessation of coal-fired operations at the end of 2020.

The Commission adopted Staff’s recommendation to include an increase in depreciation/amortization expense and the decommissioning costs related to the planned Boardman plant closure changing from 2040 to 2020 in PGE’s revenue requirement, subject to the following conditions:

1. Beginning June 15, 2012, PGE will submit an annual informational report to all parties in the UE 230 proceeding that will include the current balance of dollars collected for decommissioning and any relevant changes to PGE forecasts of future decommissioning costs;
2. PGE shall submit its November 1st Annual Update as a supplemental filing to this docket (UE 230).

III. Black & Veatch Study (2011)

In January 2011, PGE contracted with Black & Veatch (B&V) to conduct a decommissioning study for Boardman, with the purpose of estimating future decommissioning costs, including all known potential liabilities. For this study, B&V assumed that (1) decommissioning would begin December 31, 2020 and (2) that the site would be returned to substantially the same conditions as before the plant was constructed.

In addition to the main power block, B&V assumed the decommissioning of ancillary facilities including: offices, shops, warehouses, evaporative lagoons, settling ponds, the water supply well, the coal storage area, coal handling facilities, the ash disposal area, Carty reservoir, a 15-mile rail spur, several miles of the privately-owned portion of Tower Road, and two 17-mile transmission lines. The estimate also included all known disposal and environmental cleanup costs.

Because there was approximately ten years remaining until the cessation of coal-fired operations, the entirety of B&V's study focused exclusively on providing a cost estimate for decommissioning the plant and associated facilities. The B&V study did not provide information regarding the potential strategies, methods, or procedures to employ for the successful planning and execution of decommissioning.

IV. CH2M Hill Study (2015)

In 2015, PGE engaged CH2M Hill Engineers, Inc. (CH2M) to prepare a decommissioning and demolition plan, a closure strategy plan, and a Rough Order-of-Magnitude (ROM) cost estimate for Boardman to support the initial stages of planning and preparation for the potential decommissioning and demolition of the plant. While the initial decommissioning study from B&V focused solely on providing an overall estimate of decommissioning costs, the primary focus of CH2M's plan documents are to provide PGE with (1) actionable steps for the use of developing final closure planning documents and (2) a roadmap for closing Boardman and handling associated tasks. In short, CH2M provided both general and specific information that PGE can use for the planning, budgeting, and demolition of Boardman.

The CH2M decommissioning and demolition plan details the predemolition activities required, the general scope of work to be performed, and a demolition-specific description of work. In their plan, CH2M describes an option and assumptions for how the demolition will occur, the sequence it will follow, the equipment and labor force required, what material will be brought onto site, types and volumes of material and waste that will leave the site, and what can be salvaged for resale or recycling. The closure strategy provides planning, engineering, and execution plans, along with demolition methods, risks and potential mitigation measures.

In addition to CH2M's primary focus of developing a roadmap and initial closure strategy for Boardman, they prepared a high level Class 4 budgetary cost estimate, [1] for the planning, engineering, predemolition, and demolition of Boardman. By definition,

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[1] As defined by AACE International – The Authority for Total Cost Management (AACE)

Class 4 studies are performed during the study or feasibility stage of the process and have an assumed accuracy range between -30% to +50% of actual costs, prior to application of a contingency, which CH2M did not include. In addition to the highly variable and preliminary nature of Class 4 studies, as we discuss further in Section VI, there remain some significant risks and unknowns related to the decommissioning and removal of material at Boardman, which could dramatically affect costs.

V. Different Approach and Assumptions: CH2M vs. Black & Veatch

With four and a half years passing since B&V prepared its decommissioning study, there have been a number of changes to the Boardman site and the regulatory climate, which served to guide and inform CH2M's 2015 study assumptions. Additionally, due to the level of time spent and detail studied on location at the Boardman site, CH2M's research and analysis was at a more granular level, leading to some changes in approach.

As discussed above in Sections III and IV, the principal difference between the two studies is their purpose. The primary purpose of the B&V study was to determine an estimated cost of decommissioning Boardman. To this end, the entirety of B&V's 87-page study document focuses on the cost of decommissioning. PGE commissioned CH2M to develop and present plans primarily focused on a closure method and approach, with the objective of providing PGE the foundation of a robust plan for decommissioning. To this end, the majority of CH2M's plan documents focus on project planning, scope, the description of required work, the methods to employ, and overall strategy development.

While their primary focus was not on providing PGE budgetary guidance, CH2M did prepare, as part of their overall planning documents, a ROM cost estimate. Described below are a number of key differences between the CH2M's preliminary cost estimate and the B&V study.

A. Plant Dismantling

B&V assumed that the surgical dismantling of all structures would be necessary. The CH2M study assumes that structures will be demolished using explosives.

While PGE expects this change in approach to save time and reduce complexity, it did not materially affect the estimated cost.

B. Backfill Material

In order to backfill Boardman's evaporation ponds and other areas on the site, the B&V study assumes that PGE will need to truck material onto site. Based on their review of Boardman's actual site characteristics, CH2M's approach to backfilling ponds and other areas assumes that onsite material is available. This change in assumptions has a considerable effect on costs with an estimated difference of approximately $5.0 million.

C. Loading, Hauling, and Disposal Costs

The difference in estimated costs related to the assumptions and approach for the loading, hauling, and disposal of Boardman's coal and ash represents the largest variance between the two studies and presents the greatest risk.

- Coal Disposal - The B&V study assumes there will be a relatively sizable amount of coal left over upon closure of the plant and that this coal will be disposed of offsite. CH2M assumes that Boardman will burn through the majority of its coal and that any remainder will be disposed of in the ash landfill onsite. PGE assumed better management of the coal pile than B&V's assumption, and, therefore, reduced B&V's original assumption for this cost from approximately $19.4 million, down to approximately $11.4 million. The CH2M study assumes that PGE will burn through all of its coal and that PGE will keep any remaining soil under the coal pile on-site at a cost of approximately $0.8 million.

- Ash Disposal - The B&V study assumes that PGE will need to remove and dispose of all ash at an approved landfill at an estimated cost of $26.8 million. They also provided an alternate scenario in which PGE would place a soil cap on the ash pile. PGE assumed we could cap the pile and used B&V's estimated cost of approximately $5.8 million. CH2M prepared an ash disposal area closure plan that also assumes, based on current regulations, the ash pile can be capped. However, due to different assumptions on the pile size and capping requirements, their estimate for the cost of capping the pile came in considerably less at an estimated cost of approximately $0.6 million.

D. Plant Decontamination

The B&V study had no assumption included for the decontamination of plant structures prior to demolition of the plant, but included approximately $3.2 million for the removal of asbestos containing materials during the demolition process. The CH2M plan recognized that the decontamination and removal of hazardous materials, performed in accordance with applicable regulations, would need to occur prior to the demolition of Boardman at an estimated cost of approximately $5.3 million.

E. Carty Shared Structures

The largest physical change to the Boardman site since 2011 has been the construction and commissioning of the Carty Generating Station (Carty). The completion of Carty eliminated the need to decommission a number of shared structures, previously included in the B&V plan. Table 1 below provides the primary facilities that Boardman shares with Carty that no longer require decommissioning along with their previously projected cost.

Table 1

Shared Facilities	**Assumed Cost of Removal (millions)**
Carty Reservoir	$3.6
Transmission Lines	$2.1
Tower Road	$1.1

While the bulk of changes in assumptions and approach, from the B&V plan to the CH2M plan, result in a decreased estimate of Boardman decommissioning costs, there remains a number of potentially large risks and unknown factors that CH2M has not quantified within their results.

VI. Risks and Contingencies

As discussed in Section IV above, the CH2M ROM estimate is a Class 4 level budgetary cost estimate. This means that costs have a probability of being up to 50% greater than what CH2M has estimated them to be, prior to the application of a contingency amount, which is also not included in the study assumptions. Within their study, CH2M has identified a number of potential risks that could increase their cost estimate, though they have not quantified them. These risks include:

- increases to the quantity of waste and recycling materials needing transport and backfill needing to be imported;
- availability of necessary personnel, equipment, contractor, disposal and recycling, and transport resources;
- schedule risks due to weather, resource unavailability, or other reasons;
- safety risks; and
- miscellaneous unknown risks.

Beyond these risks, which could likely be captured within the +50% accuracy range of CH2M's Class 4 budgetary estimate, are the environmental risks associated with the clean-up and disposal of Boardman's coal and ash piles. While CH2M does include the handling of both of these environmental liabilities in their estimates, their rough estimate approach assumes the least amount of remediation currently required under applicable laws and does not estimate a cost for any of the required post closure monitoring.

Coal combustion residuals (CCRs), commonly known as coal ash, are currently regulated under the Environmental Protection Agency (EPA) through a CCR rule made effective on October 19, 2015. This rule set requirements around the proper treatment and disposal of CCRs including those contained in existing landfills along with newly generated waste. Boardman currently disposes of its coal ash on site and at this point should be able to continue this process. The current closure and post-closure rules set forth in the plan appear to allow Boardman to keep its coal ash on site, subject to specific operating criteria including:

- air criteria standards;
- meeting slope erosion standards;
- maintaining impoundment construction records; and
- undertaking structural stability and safety factor assessments.

Upon closure of the plant, PGE is required, under the current rule, to install a final cover system that meets requirements for thickness, stability, erosion control, water drainage, and other specifications. After the closure process is complete, PGE is also required to follow a post-closure care plan that includes groundwater detection monitoring and site maintenance for a period of up to 30 years.

The CCR rule currently sets forth the minimum requirements for dealing with coal ash. Individual states, however, have the ability to put in to place rules that are more (but not less) stringent and restrictive. There are a number of differences between the current CCR rule and current Oregon Department of Environmental Quality (DEQ) rules pertaining to the monitoring, scheduling, and the type and thickness of the cover system, among other requirements. These differences could lead to final costs far greater than CH2M's ROM estimate. Additionally, with over four years remaining until Boardman obtains the permits required to close or remove its coal ash pile, it is possible that changes to State or Federal rules will create more restrictive and costly ash disposal regulations. Therefore, while PGE will have increased certainty as Boardman's closure date approaches, the full extent and level of CCR remediation required will not be known until the final permitting process with the State is completed.

The amount of coal left at Boardman also presents a sizable risk to the cost of decommissioning. The assumption made by CH2M is that not only will Boardman manage to burn through its entire coal reserve before closure, but that final permits will allow PGE to move any unusable coal and contaminated soil to its onsite ash landfill for final closure. This presents two primary areas of uncertainty regarding CH2M's coal disposal assumptions.

First, the assumption that PGE will be able burn through the entire coal pile presents significant challenges. PGE contracts with rail shipping companies to deliver the coal Boardman uses to generate energy from mines in the Wyoming Powder River Basin. As part of the contractual terms with these shippers, PGE makes coal commitments and nominations in the year prior to delivery. Therefore, market fluctuations (e.g., falling natural gas prices or increased rail traffic) in the delivery year will lead to increases or decreases in a plant's coal inventory. Additionally, the significant mine-to-plant distance for the Boardman plant (i.e., over 1,000 miles) can worsen the impacts of market fluctuations and lead to a larger range of inventory levels. The effect of these conditions could create a situation where Boardman runs out of coal weeks or even months before December 31, 2020, due to high economic dispatch. Alternatively, in a low gas price environment, Boardman may be uneconomic to run, forcing the plant to either run "out-of-the money" in order to reduce the size of the coal pile, or to close with a sizable amount of coal remaining.

Second, the rules and regulations governing the requirements PGE must follow to treat and dispose of Boardman's unused coal and coal-contaminated ground could significantly change over the next five years. Changes to, or different interpretations of coal disposal requirements may call for PGE to excavate a much greater volume of contaminated soil than estimated. PGE may also be required to move all coal materials offsite, resulting in a large increase to hauling, tipping, and disposal costs. Similar to the CCR rules, PGE will not fully know the level and extent of its coal liability until the final permitting process with the State is completed.

VII. Recommendation

CH2M's 2015 decommissioning, demolition and final closure strategy plans for Boardman provide PGE with extensive detail needed to begin preparing a final closure strategy for the plant. However, the primary purpose of these plans was not to generate a new estimate of decommissioning costs. While some changes in assumptions (e.g., Carty shared services) will likely result in a decrease to decommissioning estimates, there are still a number of assumption risks (e.g., tipping and hauling fees) and environmental liabilities (e.g., CCR regulations) that could substantially raise actual costs. Additionally, with five years left until Boardman must cease coal-fired operations, there will be additional studies, refining PGE's closure plan and final budgetary estimates.

For these reasons, PGE does not request any change at this time to the current revenue requirement estimate for Boardman decommissioning costs. Adjusting Schedule 145 costs based on the results of CH2M's plans would be premature and could potentially lead to a situation where PGE must rapidly adjust prices upwards, with a much shorter period to collect costs from customers.

VIII. Summary

The Schedule 145 revenue requirement for 2017 is approximately $6.3 million. While PGE has received and reviewed new plan documents related to the decommissioning of Boardman, there are still considerable uncertainties regarding the final costs associated with closing the plant. Because of this and the length of time remaining until the cessation of coal-fired operations at Boardman, the most prudent strategy regarding decommissioning costs is to make no change to the Schedule 145 revenue requirement. PGE will continue to update Schedule 145, effective January 1, 2017 and each year thereafter, to account for updates to the load forecast and decommissioning costs, among other factors.

FINAL

Closure Strategy Plan for the Boardman Power Plant in Boardman, Oregon

Purchase Order – C0050-0000012668

Prepared for

Portland General Electric
121 SW Salmon Street, 3WTCBR06
Portland, OR 97204

November 2015

ch2m

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Contents

Appendix

Tables

Figures (located at the end of text)

Acronyms and Abbreviations

ACM	asbestos-containing material
AST	aboveground storage tank
BPP	Boardman Power Plant
CADD	computer-aided design and drafting
CCR	Coal Combustion Residual
C&D	construction and demolition
CH2M	CH2M HILL Engineers, Inc.
CFR	*Code of Federal Regulations*
CM	construction manager
CY	cubic yard
D&D Plan	Decommissioning and Demolition Plan
DCR	Detailed Cost Report
EPC	engineering, procurement, and construction
ERM	environmentally regulated material
ESA	environmental site assessment
ESCP	Erosion and Sediment Control Plan
FEED	Front End Engineering Design
GC	general contractor
LBP	lead-based paint
LPTA	Lowest Price Technically Acceptable
LUCS	Land Use Compatibility Statement
NOV	notice of violation
NPDES	National Pollutant Discharge Elimination System
OE	owner’s engineer
OAR	Oregon Administrative Rule
ODEQ	Oregon Department of Environmental Quality
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyls
PGE	Portland General Electric
PM	program management
PPE	personal protective equipment
ppm	parts per million
RCRA	Resource Conservation and Recovery Act

RFI	Request(s) for Information
RFP	Request(s) for Proposal
ROM	Rough Order-of-Magnitude
TSCA	Toxic Substance Control Act
USEPA	United States Environmental Protection Agency
UST	underground storage tank

Executive Summary

This Closure Strategy Plan and Class 4 cost estimate support the planning and preparation for the potential demolition of the coal-fired Portland General Electric (PGE) Boardman Power Plant (BPP; plant) and Ash Landfill closure approximately 13 miles south-southwest of Boardman, Oregon, near the Carty Power Plant (Carty Plant). The BPP is scheduled to stop burning coal on December 31, 2020. The demolition and closure are referred to herein as the project.

The project will occur between 2015 and 2023 in three phases: planning, engineering, and execution. The planning phase will occur from 2015 to 2017 and will consist of decommissioning and demolition (D&D) planning, end-use strategy for the property, permitting, and isolation of the Carty Plant. The engineering phase will occur from 2018 to 2019 and will consist of permitting, closure strategy refinement, plant cold and dark planning, an environmentally regulated material survey and environmental assessment, refined cost estimation, assessment of salvage options, and preparation of the engineering plans for the Carty Plant isolation. The execution phase will occur from 2020 to 2023 and will consist of procurement, placement of the BPP into cold and dark status, decommissioning, abatement, demolition and site restoration of the BPP, and closure of the Ash Landfill.

The following three potential program management strategies were evaluated for managing the D&D and Ash Landfill closure:

1. PGE contracts directly with a demolition contractor as the general contractor and manages the work with only PGE staff.
2. PGE contracts directly with a demolition contractor and uses an owner’s engineer to assist in managing the work. PGE has the option to use the owner’s engineer as needed in the delivery of the work. This can be a combination of offsite Program Management roles and onsite Construction Management roles.
3. PGE uses a general contractor to contract and manage the work. PGE will maintain core program personnel to manage the contract with the general contractor and has the option to provide onsite plant staff to support the construction management of the D&D.

The primary advantages to the first two options are cost and direct access to the demolition contractor. The primary disadvantage is that PGE assumes all risk and is required to provide significant resources to manage the work. The ideal scenario for these options is if PGE can accept all risks, staff the project with the right specialty resources on a full-time basis, and maintain a site presence to oversee the scope of work for permit, safety, and environmental compliance.

The primary advantage to the third option is that the risk is placed on the general and demolition contractors. The primary disadvantage is the additional cost of using a general contractor. The ideal scenario for this strategy is if PGE prefers to avoid risks associated with cost, schedule, and notices of violation, would like the option to staff the project with the right specialty resources as desired, and has the budget for the additional general contractor cost.

The critical path activities for the project are the permitting, communication with stakeholders, and isolation of the Carty Plant. Permitted activities regulated by agencies have been identified and include demolition activities, lead-based paint abatement, asbestos abatement, aboveground storage tank and underground storage tank removal, hazardous and solid waste management and disposal, water discharge, and removal-fill activities. Specific permits are identified in Section 2.1.3. Stakeholders have been identified and consist of PGE internal, active external, and information-only stakeholders.

Evaluations of waste and recycle types and quantities have been completed based on review of existing data provided by PGE. They include waste streams of asbestos, lead-based paint, universal wastes, hazardous and nonhazardous wastes, and construction and demolition wastes. Waste minimization techniques have been planned to maximize the amount of material that can be recycled and beneficial reuse of concrete and existing site soil for backfill has been evaluated to reduce the volume of materials requiring offsite disposal. This will minimize the need for imported backfill material. Materials that will be recycled include ferrous and nonferrous metal, electronic and process equipment, and high-value alloys, all of which will be decisively tracked to assure maximum benefit to PGE.

Demolition methods for the power block have been evaluated and summarized based on identified advantages and disadvantages. Demolition methods include the use of explosives, top-down surgical dismantling, and felling. On the basis of cost, safety, effectiveness, and efficiency evaluation criteria, the use of explosives is the recommended means of demolition for the power block structure.

The closure will be performed sequentially and will include post-closure operational decommissioning, environmental decommissioning, plant demolition, and remediation, taking into consideration safety, quality, efficiency, and effectiveness. Risks associated with the D&D have been evaluated and mitigation measures identified to minimize the risk related to waste, recycle, and import quantities, resources, schedule, safety, and miscellaneous unknowns. Known and potential areas of soil contamination have been identified and plans have been developed to mitigate risks associated with these areas.

A Class 4 budgetary cost estimate has been prepared for the planning, engineering, predemolition, and D&D of the BPP and Ash Landfill closure.

SECTION 1

Introduction

Portland General Electric (PGE) has tasked CH2M HILL Engineers, Inc. (CH2M) with preparing a Closure Strategy Plan and Rough Order-of-Magnitude (ROM) cost estimate to support the planning and preparation for the demolition of the Boardman Power Plant (BPP) in Boardman, Oregon. The BPP is located adjacent to Carty Reservoir on Six Mile Canyon, approximately 13 miles south-southwest of Boardman, Oregon (Section 34, Township 3N, Range 24E, Willamette meridian) (Figure 1-1, Location Map). The BPP consists of a single-unit, 617-megawatt, coal-fired facility. Construction began in February 1976 and commercial operation commenced on August 3, 1980. The BPP is scheduled to stop burning coal on December 31, 2020. The demolition and closure are referred to herein as the project.

1.1 Background/Site Operations

The BPP site is located between Six Mile Canyon and Poverty Ridge adjacent to the north side of the Carty Reservoir. The plant site encompasses approximately 200 acres south of the Columbia River (Figure 1-2, Boardman Power Plant Site). The site topography is relatively flat and marked by flat ridges with gentle slopes descending into the shallow canyon. The terrain features sparse vegetation with sagebrush, thistle, juniper, and sand wind-eroded soil (Bechtel, 1982).

The power generating process at BPP uses primarily low-sulfur, sub-bituminous coal that is burned to heat boiler water into steam under high pressure. The steam is then directed into a turbine where it is allowed to expand turning the generator producing electricity. Exhaust steam from the turbine expands further in a condenser cooling and forming water droplets. The condensate (boiler water) is collected in a closed loop, further cooled, and returned to the boiler. To facilitate cooling of the boiler water, a separate cooling-water cycle removes heat from the boiler water in a heat exchanger. The heat exchanger transfers heat energy from the boiler water to the cooling water. Cooling water is then recirculated between Carty Reservoir (heat sink) and the heat exchanger.

Carty Reservoir was created during BPP construction by placing an earth-fill dam across Six Mile Canyon and excavating sediment and bedrock through the Rattlesnake Ridge Formation and into the Pomona Basalt to enhance reservoir capacity. At high pool (677 feet mean sea level), Carty Reservoir covers 1,450 acres and impounds 38,300 acre-feet of water, which is pumped from the Willow Creek Arm of the Columbia River. In addition to using the reservoir for cooling, PGE circulates water for steam generation, ash transport, and other internal processes. Settling ponds are used to remove solid particles from some wastewaters prior to discharge to Carty Reservoir. Internal piping controls allow PGE flexibility in directing the waste streams. Recirculation and evaporative cooling in the reservoir cause minerals (dissolved solids) that are naturally occurring in the water to become concentrated. Maximum allowable concentrations of specific chemical constituents in the reservoir are prescribed in the Site Certificate Agreement and the Water Pollution Control Facility permit. To control mineral buildup, the Site Certificate Agreement allows for agricultural irrigation of reservoir water (Bechtel, 1982). Carty Reservoir also provides year-round habitat for wildlife. However, PGE prohibits recreational use of the reservoir. Additionally, because Carty Reservoir has been determined to be a wastewater impoundment, direct discharge from the reservoir to surface waters is not permitted.

Ancillary facilities to the main power block include offices, shops, warehouses, evaporative lagoons, settling ponds, water supply well, coal storage area, coal handling, the ash-handling facilities and ash disposal area, Carty Reservoir, a 15-mile rail spur and loop originating from the Union Pacific Railroad, approximately 10 miles of Tower Road, and two transmission lines extending approximately 17 miles each. The objectives, critical success factors, potential closure management strategies for planning, engineering, and execution, and a proposed schedule are detailed in the rest of this section.

1.2 Objectives

The primary objective of the Closure Strategy Plan is to provide a roadmap for closing the facility and handling associated tasks, including stakeholder engagement, permitting, and budgeting associated with decommissioning and demolition (D&D).

A secondary objective is to utilize waste diversion techniques for maximizing recycling and reducing the volume of material requiring offsite transport and disposal. This Closure Strategy Plan and the associated *Decommissioning and Demolition Plan for the Boardman Power Plant in Boardman, Oregon* (CH2M, 2015) are key documents to be used in competitively procuring a qualified subcontractor to implement closure strategies and obtain the best value possible in the BPP closure.

1.3 Critical Success Factors

The following factors were identified as critical to the success of the project:

Safety

- Prevent fatalities, lost-time accidents, injuries, vehicle accidents, or damage to protected equipment.
- Safely decommission and demolish all designated structures.
- Leave the site in a safe and secure condition for the long term.

Environmental

- Incur no reportable notices of violation (NOVs) as a result of project-related activities.
- Avoid spill of waste materials offsite (e.g., roadways, river).
- Handle regulated materials and waste within regulatory guidelines.
- Secure all permits on time to support associated work.
- Comply with and successfully transition all operating permits.
- Return the site to a condition that meets applicable environmental regulations.

Work Quality

- Complete the various subprojects to meet stakeholder expectations.
- Engage in strategic coordination and avoid interruption of Carty Power Plant (Carty Plant) operations.
- Avoid negative media coverage.
- Provide complete and timely communications with stakeholders.

Schedule

- Maintain a mutually agreeable project schedule among stakeholders.

Financial

- Understand the relationship between scope elements and project cost plan.
- Maintain actual cost versus planned costs.
- Leave the site in a matter that reduces operations and maintenance requirements to the extent practicable.
- Anticipate any cost deviations and provide explanations and recommendations to minimize impact.

Changes necessary to successfully complete the scope of work should be reported to PGE. If project team members foresee that changes to the implementation plan will impact the budget, schedule, or other project constraints, the effect should be determined. Immediate communication with PGE for discussion and follow-up action is required.

1.3.1 Team Purpose

The purpose of the Program Management Team is to close the site by developing and implementing a Project Management System. The System should be developed for cost-effective and timely delivery of the project to meet the overall project objectives. The System should identify necessary processes, associated tools to aid in the implementation of those processes, and recommendations for organizational changes to facilitate management within the team.

1.3.2 Objectives and Goals Measured

Table 1-1 identifies the objectives and goals to be measured during execution of the work.

Table 1-1. Objectives and Goals to be Measured

Objective/Goal	Measure
Safety – No incidents or accidents On-time deliverable submissions	• Yes/No • Yes/No
Compliance with applicable regulations	• Yes/No
Meet project budget	• Yes/No
Meet completion schedule	• Yes/No
Manage change efficiently and effectively	• Efficiently – was change documented and communicated in a timely manner – Yes/No • Effectively – was change completed only when required – Yes/No
Proper communication with the owner and stakeholders regarding project status along with improved communication with project managers and staff	• Frequency • Yes/No
Quality – Zero Defects Post Closure Operational Readiness for Demolition Contractor Environmental Decommissioning to ready plant for demolition Demolition of plant structures to grade Remediation – site into final condition	• Does the quality of work meet owner’s expectations – Yes/No • Yes/No • Yes/No • Yes/No • Yes/No

1.3.3 Communication, Scheduling, and Decision-making Guidelines

Recommended communication guidelines include the following:

- Establish communication process with stakeholders
- Engage regulatory agencies

Recommended scheduling guidelines include the following:

- Involve contractors, applicable regulators, and PGE personnel
- Plan and create schedules in advance
- Stay with original schedule whenever possible
- Allow reasonable time for rescheduling

- Communicate schedules in a timely manner
- Obtain regulatory agency buy-in on schedule

Recommended decision-making guidelines should include the following:

- Communicate information for decision
- Review information by project team
- Lead team discussion of information
- Create final short list of ideas
- Negotiate short list
- Finalize ideas into the “decision”
- Obtain applicable sign-off and approvals

1.3.4 Technical Decision-making Process

The technical decision-making process should include the following:

- Identify issues early and often
- Define when – time
- Define what code and guidelines are involved or affected
- Engage stakeholders
- Discuss and negotiate
- Engender agreement and final decisions
- Obtain sign-off and approvals

1.3.5 Change Management Guidelines

The change management guidelines should include the following:

- Drivers of change
  - Owner initiated
  - Regulatory driven
  - Change in conditions
  - Weather
  - Unforeseen site conditions
  - Subcontractors
  - Suppliers
- Key change categories
  - Key staff change
  - Variations from contracted scope
  - Owner initiated
  - Evaluate impact on project cost and scheduling
  - Make recommendations

1.4 Planning and Engineering Closure Management Strategies

This section describes two potential planning and engineering closure management strategies for the demolition of BPP and closure of the Ash Landfill, and the main advantages and disadvantages of each. The strategies are referenced as options 1 and 2, as follows:

Option 1 – PGE manages and prepares the planning documents and engineering for activities leading up to the demolition and Ash Landfill closure.

Option 2 – PGE contracts to a consultant to prepare the planning documents and engineering for activities leading up to the demolition and Ash Landfill closure.

1.4.1 Option 1

Option 1 consists of PGE managing and preparing the planning documents and engineering for the activities leading up to the demolition and Ash Landfill closure. PGE would prepare the planning documents needed to support the activities for permitting, cold and dark status, salvaging, and closure engineering. Additionally, PGE would be responsible for preparing the engineering plans and specifications for the Carty Plant isolation.

Advantage

- Cost savings by using PGE professionals to perform the work

Disadvantage

- Requires full-time specialty professionals within PGE to manage

The best circumstance for using this approach is if PGE can staff the project with the right specialty resources on a full-time basis.

1.4.2 Option 2

Option 2 consists of PGE contracting to a consultant to prepare the planning documents and engineering for activities leading up to the demolition and Ash Landfill closure. The consultant prepares the planning documents needed to support the activities for permitting, cold and dark status, salvaging, and closure engineering. Additionally, the consultant would be responsible for preparing the engineering plans and specifications for the Carty Plant isolation.

Advantage

- Consultant provides the professionals to perform the work and PGE provides reviews, reducing the number of PGE specialty professionals required

Disadvantage

- Cost of the consultants labor, overhead, and profit

The best circumstance for using this approach is if PGE does not have the right specialty resources available on a full-time basis.

1.5 Demolition and Ash Landfill Closure Management Strategy

This section describes three potential management strategies for the demolition of BPP and closure of the Ash Landfill and the advantages and disadvantages of each:

- Option 1—PGE contracts directly with a demolition contractor as the general contractor (GC) and manages the work with only PGE staff.
- Option 2—PGE contracts directly with a demolition contractor and uses an owner’s engineer (OE) to assist in managing the work. PGE has the option to use the OE as needed in the delivery of the work. This can be a combination of offsite Program Management roles and onsite Construction Management roles.
- Option 3—PGE uses a general contractor to contract and manage the work. PGE will maintain core program personnel to manage the contract with the general contractor and has the option to provide onsite plant staff to support the construction management of the D&D.

1.5.1 Option 1

Option 1 consists of PGE (referred to as the owner) contracting directly with a demolition contractor and managing the process solely with PGE staff.

1.5.1.1 Management Process

The management process will be a multitiered approach involving the owner and demolition contractor. The owner will contract directly with the demolition contractor and will be responsible for managing all demolition activities performed by the demolition contractor. The owner will discuss all activities, progress, schedule, obstacles, and mitigation with the demolition contractor. The owner will verify invoicing by the demolition contractor. The demolition contractor will work directly for the owner and will be managed onsite by the owner's staff. Change orders will be handled directly between the owner and the demolition contractor.

1.5.1.2 Program Responsibility Matrix

Table 1-2 outlines the responsibilities of the owner and demolition contractor.

Table 1-2. Option 1 – Responsibilities of Owner and Demolition Contractor

Task	Owner	Demolition Contractor
Submittals	• Primary for submittal review and approval • Primary for establishing submittal control procedure • Primary for initial review for submittal completeness prior to distribution	• Primary for submittals and incorporating comments from owner
RFIs	• Primary for maintaining Request for Information (RFI) control procedure and distribution • Primary for RFI review and response • Primary for establishing RFI control procedure, handling distribution, and maintaining files • Primary for initial review for RFI completeness	• Primary for preparing and submitting RFIs to owner
Meetings	• Primary to schedule and conduct contractor meetings • Primary for keeping and distributing minutes • Primary for coordinating meeting follow-up	• Secondary for conducting meetings • Secondary for attending and supporting owner meetings
Record Keeping Documentation and Document Control	• Primary for document distribution and correspondence • Primary for documenting major project actions and documentation procedures • Primary for establishing and maintaining project files • Primary for establishing and maintaining document management and information system and procedures • Primary for document and revision control	• Secondary for documenting major project actions and documentation procedures. • Secondary for document and revision control
Budget Cost Accounting	• Primary for establishing and maintaining construction cost accounting system for the contractor construction costs • Primary for establishing and providing cost and budget reports • Primary for approving budget changes	• Secondary for construction cost reviews
Scheduling	• Primary for initial network schedule review • Primary for the review of the initial and final network construction schedule • Primary for overseeing and predicting progress	• Secondary for providing input to owner on constructability issues in schedule

Table 1-2. Option 1 – Responsibilities of Owner and Demolition Contractor

Task	Owner	Demolition Contractor
	achieved by the construction contractor. • Primary for establishing and maintaining schedule process • Primary for understanding time constraints	
Coordination	• Primary for making timely decisions and adhering to them • Primary for defining abatement goals and vision • Primary for developing functional/organizational/operational concepts • Primary for coordinating efforts of entire demolition team • Primary for determining site and existing building constraints and opportunities • Primary for developing alternative concepts together with site and basic systems/materials • Primary at each milestone, estimate design, revise design if needed, or estimate if scope changes	• Primary to serve as onsite construction/D&D representative (coordinate site activities) – RFIs – Clarifications – Estimation – Change Order • Primary to coordinate and consolidate construction comments
Safety	• Primary for establishing safety program for owner staff • Primary for the initial review of the contractor’s safety program • Primary for maintaining all submitted safety information • Primary for preparation of forms in the event of accident or fire	• Primary for establishing safety program for contractor staff • Primary for field safety review
Progress Reporting	• Primary for providing daily inspection reports to maintain work intent • Primary for maintaining files for the daily, weekly, and monthly reports.	• Secondary for maintaining files for the daily, weekly and monthly reports, and providing submittals to owner
Inspection	• Primary for inspection of the contractor’s work and notifying the contractor • Primary for coordinating inspections and as-built drawing verification • Primary in a quality assurance role and review of contractor’s quality control results	• Primary for maintaining inspection records • Primary for quality control functions
Testing	• Primary for testing report review and for compliance with the specifications • Primary for notifying contractor of testing results compliance • Primary for review of contractor’s proposed testing program	• Primary for testing report record keeping, distribution, and monitoring of follow-up actions
Contract Modifications	• Primary for initiating, defining, and documenting owner changes • Secondary for initiating and documenting contractor contract modifications • Primary for submitting and recommending contract modifications, including technical analysis • Primary for preparing any design documents required for changes	• Primary for preparing change orders • Primary for preparing backup and supporting documents

Table 1-2. Option 1 – Responsibilities of Owner and Demolition Contractor

Task	Owner	Demolition Contractor
	• Primary for establishing and implementing a contract processing system including initiating, defining, coordinating, tracking and documenting contract modifications • Primary for reviewing contract changes • Primary for coordinating preparation of change estimates • Primary for preparing analysis and reports of changes • Primary for budget and money/time consequences associated with change orders	
Claims	• Primary for collecting data and creating a document file to track claim cost and impact • Primary for finalizing the finding of fact for entitlement or denial • Primary for submission of findings of fact and recommendations • Primary in discussions and negotiations with contractor • Primary for collecting data, creating a document file, and analyzing the collected materials • Primary for preparing estimate of claim costs and impact • Primary for developing draft finding of fact for entitlement or denial and recommendation	• Support for discussion and negotiation of claim issues with owner
Labor Provisions	• Primary for drafting required reports on owner forms for contractor labor submissions • Primary for receiving, storing, and tracking contractor's labor submissions	• Primary for drafting required reports for forms for contractor labor submissions
Progress Photographs	• Primary for formal submittal of construction progress photographs and videotapes of progress • Primary for all photography collected at BPP • Primary for receiving and storing construction progress photographs and videotaping • Primary for organizing all construction progress photographs and videotaping	• Primary for preparation of construction/demolition progress photographs and videotaping during field observation
Final Inspection and Substantial Completion	• Primary for the final inspection to determine defects and omissions • Primary for preparing a checklist of completion documents and testing reports • Primary for preparing a construction defects and omissions checklist and tracking reinspections • Primary for preparing a checklist of warranties and reports	• Primary for correcting defects and omissions
As-Built Drawings	• Primary for computer-aided design and drafting (CADD) documentation • Primary for filing as-built document submittals from contractor	• Primary for preparing CADD files of as-builts based on field surveys
Security Clearance	• Primary for providing all subcontractors with necessary documents for security passes	• Primary for preparing and providing to owner security clearance documents

Table 1-2. Option 1 – Responsibilities of Owner and Demolition Contractor

Task	Owner	Demolition Contractor
		pertaining to demolition staff
Waste Management	• Primary for signing Waste Manifests • Primary for approval of transporters and disposal facility	• Primary for waste coordination with owner

1.5.1.3 PGE Program and Construction Management Roles

The PGE Program and Construction Management personnel and level of effort have been evaluated as part of the Closure Strategy Plan and ROM cost estimate. In general, the following PGE staff will make up the Program Manager/Construction Manager (PM/CM) team:

- Program Management
  - Program Manager
  - Project Manager
  - Health and Safety Manager
  - Quality Assurance Manager
  - Regulatory Compliance Manager
  - Administration Manager
    - Accounting
    - Project Controls/Scheduling
    - Document Control
    - General Administration
  - Engineering Manager
    - Electrical
    - Mechanical
    - Civil
    - Structural
- Construction Management
  - Demolition Manager
  - Health and Safety Inspectors
  - Quality Assurance Inspectors
  - Compliance Inspectors
  - General Administration

1.5.1.4 Option 1 Summary

The advantages and disadvantages for Option 1 can be summarized as follows:

Advantages

- One contract to manage
- No intermediate contractor; allows PGE direct access to the demolition contractor
- Cost savings from no markup by GC on demolition contractor
- Utilizes key plant personnel during D&D

Disadvantages

- PGE assumes risk through direct contracts with demolition contractor
- Management of the demolition subcontract including change orders and invoicing
- Requires full-time specialty professionals within PGE to manage

- PGE required to closely monitor the site activities for permit, safety, and environmental compliance to avoid NOVs or citations; NOVs could fall on PGE as the owner

The best circumstance for using this approach is if PGE can accept risks, staff the project with the right specialty resources on a full-time basis, and establish good site presence to oversee the scope of work for permit, safety, and environmental compliance.

1.5.2 Option 2

Option 2 consists of PGE contracting directly with a demolition contractor and using a third-party OE to manage the work (as determined by PGE). The Option 2 Program Management Strategy calls for a core team of professional services composed of the owner (PGE), OE, and demolition contractor. The owner will provide funding and strategic oversight of the program. The OE would provide support for the following services:

Program Management

Program Management includes those professionals supporting the project from an offsite location. This team can be a mix of PGE personnel and the OE or just the OE, as determined by PGE. The Program Management team would be responsible for the following:

- Permitting
- Regulatory Compliance
- Scheduling
- Project Controls
- Project Management
- Engineering
- Administration

Construction Management

Construction Management includes those professionals supporting the project onsite through day-to-day interaction with the demolition contractor. This team can be a mix of PGE plant staff and the OE or just the OE, as determined by PGE. The Construction Management team will be responsible for the following:

- Construction Management
- Quality Assurance Inspections
- Safety Inspections
- Compliance Oversight Inspections
- Coordination

The demolition contractor will provide the necessary labor, equipment, and materials for implementation of the D&D Plan (CH2M, 2015).

1.5.2.1 Management Process

The management process will be run by a multitiered organization consisting of the owner, OE, and demolition contractor. The owner will contract directly with the demolition contractor and the OE. The OE will be responsible for managing all demolition activities performed by the demolition contractor. The OE will act as the owner’s liaison for onsite activities. The OE will discuss activities, progress, schedule, obstacles, and mitigation with the owner and the demolition contractor. The OE will verify invoicing by the demolition contractor to the owner. The contractor will work directly for the owner but will be managed onsite by the OE. Change orders will be handled directly between the owner and the demolition contractor and change management may be handled directly by the OE with the owner’s approval.

1.5.2.2 Program Responsibility Matrix

Table 1-3 outlines the responsibilities of the owner, OE, and demolition contractor.

Table 1-3. Option 2—Responsibilities of Owner, Owner's Engineer, and Demolition Contractor

Task	Owner	Owner's Engineer	Demolition Contractor
Submittals	• Primary for submittal review and approval (but in collaboration with the OE for their areas of expertise) • Secondary for submittal control procedure	• Primary for establishing submittal control procedure • Primary for initial review for submittal completeness prior to distribution	• Primary for preparation of submittals • Primary for response to comments from submittal reviews
RFIs	• Secondary for maintaining Request for Information (RFI) control procedure and distribution • Primary for RFI review and response	• Primary for establishing RFI control procedure, handling distribution, and maintaining files • Primary for initial review for RFI completeness • All RFIs must go through owner	• Primary for preparation of RFIs
Meetings	• Primary to schedule and conduct contractor meetings • Primary to schedule and conduct owner/OE meetings	• Secondary for conducting contractor meetings • Primary for keeping and distributing minutes • Primary for coordinating meeting follow-up • Secondary for attending and supporting owner meetings	• Primary for attending meetings with the required personnel • Primary for providing follow-up on action items identified in the meeting
Record Keeping Documentation and Document Control	• Secondary for documenting major project actions and documentation procedures • Primary for document distribution and correspondence • Secondary for document and revision control	• Primary for documenting major project actions and documentation procedures • Primary for establishing and maintaining project files • Primary for establishing and maintaining document management and information system and procedures • Primary for document and revision control	• Primary for documentation of all demolition-related information produced as a result of their activities
Budget Cost Accounting	• Secondary for construction cost reviews • Primary for approving budget changes	• Primary for establishing and maintaining construction cost accounting system for the contractor construction costs • Primary for establishing and providing cost and budget reports	• Primary for monitoring their fixed price budget
Scheduling	• Secondary for initial network schedule review • Primary for reporting • Secondary for providing input to OE on constructability issues in schedule • Primary for understanding time constraints	• Primary for review of the initial and final network construction schedule • Primary for overseeing and predicting progress achieved by the construction contractor and reporting to owner • Primary for establishing and maintaining schedule process	• Primary for providing a baseline schedule upon contract award and progress schedules as determined by PGE • Primary for communicating any schedule delays or impacts to the owner
Progress Payments	• Secondary review • Primary for recommendation	• Primary for implementing contractual payment procedure • Primary for review, processing, and	• Primary for preparing and submitting monthly invoices with required

Table 1-3. Option 2—Responsibilities of Owner, Owner's Engineer, and Demolition Contractor

Task	Owner	Owner's Engineer	Demolition Contractor
		recommendations to owner regarding contractor progress payments	backup
Coordination	• Primary for making timely decisions and adhering to them • Primary for determining site and existing building constraints and opportunities	• Primary to serve as onsite construction/D&D representative (coordinate site activities) – RFIs – Clarifications – Estimation – Change Order • Primary to coordinate and consolidate construction comments • Primary for defining abatement goals and vision • Primary for developing functional/organizational/operational concepts • Primary for coordinating efforts of entire demolition team • Primary for developing alternative concepts together with site and basic systems/materials • Primary at each milestone, estimate design, revise design if needed, or estimate if scope changes	• Primary for providing information to owner and OE on a daily basis related to scope, schedule, and budget • Secondary to work with owner and/or OE for coordination
Safety	• Primary for field safety review • Primary for reporting • Secondary for review of safety program • Primary for recommendation regarding acceptance of safety program • Primary for establishing safety program for owner staff	• Primary for initial review of the contractor's safety program • Primary for maintaining all submitted safety information • Primary for assisting owner with preparation of forms in the event of accident or fire • Primary for establishing safety program for OE staff	• Primary for the implementation of their safety program • Primary for the protection of their personnel • Primary for compliance with federal, state, and local requirements
Progress Reporting	• Primary for providing daily inspection reports to maintain work intent • Primary for submitting reports	• Primary for maintaining files for the daily, weekly, and monthly reports, and providing submittals to owner • Primary for preparing monthly report	• Primary for providing progress reports as determined by PGE
Inspection	• Secondary for QA inspection of the contractor's work and notifying the contractor • Primary for coordinating inspections and as-built drawing verification	• Primary for QA inspection of contractor's work • Primary for maintaining inspection records	• Primary for the QC of all work • Primary for providing access to owner and/or OE for inspection of all work
Testing	• Primary for testing report review and for compliance with the specifications • Primary for notifying	• Primary for testing report record keeping, distribution, and monitoring of follow-up actions • Secondary for review of contractor's proposed testing program and testing	• Primary for completing all required tests in accordance with their scope of work and quality plan

Table 1-3. Option 2—Responsibilities of Owner, Owner's Engineer, and Demolition Contractor

Task	Owner	Owner's Engineer	Demolition Contractor
	contractor of testing results compliance • Primary for review of contractor's proposed testing program	subcontractors	• Primary for providing all testing logs and reports to owner and/or OE
Contract Modifications	• Primary for initiating, defining, and documenting owner changes • Secondary for initiating and documenting contractor contract modifications • Primary for submitting and recommending contract modifications including technical analysis • Primary for preparation of any design documents required for changes • Primary for budget and money/time consequences associated with change orders	• Primary for establishing and implementing a contract processing system including initiating, defining, coordinating, tracking and documenting contract modifications • Primary for review of contract changes • Primary for supporting negotiations with contractor • Primary for coordinating preparation of change estimates • Primary for preparing analysis and reports of changes for owner review and submission	• Primary for requesting contract modifications and providing backup justification
Claims	• Secondary for collecting data and creating a document file to track claim cost and impact • Primary for finalizing the finding of fact for entitlement or denial • Primary for submission of findings of fact and recommendations • Primary for supporting owner in discussions and negotiations with contractor	• Primary for collecting data, creating a document file, and analyzing the collected materials • Primary for preparing estimate of claim costs and impact • Primary for developing draft finding of fact for entitlement or denial and recommendation • Primary for supporting discussion and negotiation of claim issues with contractor	• Primary for submitting a claim
Labor Provisions	• Secondary for drafting required reports on owner forms for contractor labor submissions • Primary for submitting reports	• Primary for receiving, storing, and tracking contractor's labor submissions • Primary for drafting required reports for forms for contractor labor submissions	• Primary for compliance and reporting of labor provisions
Progress Photographs	• Primary for formal submittal of construction progress photographs and videotapes of progress • Primary for all photography collected at	• Primary for preparation of construction progress photographs and videotaping during field observation as required by contract • Primary for receiving and storing construction progress photographs and videotaping • Primary for organizing all construction progress photographs and videotaping for	• Primary for preparation of construction progress photographs and videotaping during field observation as required by contract

Table 1-3. Option 2—Responsibilities of Owner, Owner's Engineer, and Demolition Contractor

Task	Owner	Owner's Engineer	Demolition Contractor
	BPP	submission	
Final Inspection and Substantial Completion	• Primary for assisting in the final inspection to determine defects and omissions • Secondary for preparing a checklist of completion documentation and testing reports	• Primary for preparing a construction defects and omissions checklist and tracking reinspections • Primary for preparing checklist of completion documents, including warranties and reports	• Primary for notification that work is ready for inspection and providing access for the inspection • Primary for completing punch list items identified during inspections
As-Built Drawings	• Primary for computer-aided design and drafting documentation	• Primary for filing as-built document submittals from contractor	• Primary for providing as-builts for the scope of work
Security Clearance	• Primary for providing all OE and subcontractors with necessary documents for security passes	• Primary for preparing and providing to Client security clearance documents pertaining to consultant staff	• Primary for preparing and providing to Client security clearance documents pertaining to demolition contractor staff
Waste Management	• Primary for signing Waste Manifests	• Primary for waste coordination with contractor	• Primary for management of all waste in accordance with federal, state, and local requirements

1.5.2.3 Program Management and Construction Management Roles

The Program and Construction Management personnel and level of effort have been evaluated as part of the Closure Strategy Plan and ROM cost estimate. The PM/CM team can be a mix of PGE and OE personnel, as determined by PGE. In general, the following support staff will make up the PM/CM team:

- Program Management
  - Program Manager
  - Project Manager
  - Health and Safety Manager
  - Quality Assurance Manager
  - Regulatory Compliance Manager
  - Administration Manager
    - Accounting
    - Project Controls/Scheduling
    - Document Control
    - General Administration
  - Engineering Manager
    - Electrical
    - Mechanical
    - Civil
    - Structural
- Construction Management
  - Demolition Manager
  - Health and Safety Inspectors
  - Quality Assurance Inspectors
  - Environmental Compliance Inspectors

  - General Administration

1.5.2.4 Option 2 Summary

The advantages and disadvantages for Option 2 can be summarized as follows:

Advantages

- Cost savings from no markup by OE on demolition contractor
- Utilizes key plant personnel during D&D
- Allows PGE to provide key specialty professionals as desired
- Provides PGE with direct contractual access to the demolition contractor

Disadvantages

- PGE assumes risk through direct contracts with demolition contractor
- Requires specialty professionals within PGE to manage contractor
- PGE manages the demolition subcontract, including change orders and invoicing
- The risk of mixing PGE and OE is that important components could be missed and any delays cause impacts on other components. This can be managed through clearly defined roles and responsibilities.
- PGE (and/or OE as determined by PGE) required to closely monitor the site activities for permit, safety, and environmental compliance to avoid NOVs or citations. These could fall on PGE as the owner and GC.

The best circumstance for using this approach is if PGE can accept all risks, staff the project with the right specialty resources on a full-time basis, and establish a committed, knowledgeable site presence to oversee the scope of work for permit, safety, and environmental compliance. Staffing could be accomplished by using the OE for select offsite and onsite management of demolition activities to reduce the number of PGE resources required to manage the project.

1.5.3 Option 3

Option 3 consists of PGE contracting directly with a GC to contract and manage all aspects of the work. The Option 3 Program Management Strategy calls for a core team of professional services composed of the owner (PGE), GC, and demolition contractor. The owner will provide the funding and strategic oversight of the Program and contract to the GC. The GC will provide the support for the following services:

- Demolition Contracting and Management
- Reporting to Owner
- Permitting
- Regulatory Compliance
- Scheduling
- Project Controls
- Project Management
- Engineering
- Administration
- Construction Management
- Quality Control Inspections
- Safety Inspections
- Compliance Oversight Inspections
- Coordination

The demolition contractor will provide the necessary labor, equipment, and materials for implementation of the Closure Strategy Plan.

1.5.3.1 Management Process

The management process will be a multitiered approach involving the owner, GC, and demolition contractor. The GC will contract directly with the demolition contractor. The owner will contract directly with the GC. The GC will be responsible for managing all demolition activities performed by the demolition contractor. The GC will be responsible for onsite activities. The GC will discuss all activities, progress, schedule, obstacles, and mitigation with the demolition contractor. The GC will verify invoicing by the demolition contractor and complete the payment. The contractor will work directly for the GC and will be managed onsite by the GC. Change orders will be handled directly between the GC and the demolition contractor and change management may be handled directly by the GC with the owner's approval.

1.5.3.2 Program Responsibility Matrix

Table 1-4 outlines the responsibilities of the owner, GC, and demolition contractor.

Table 1-4. Responsibilities of Owner, General Contractor, and Demolition Contractor

Task	Owner	General Contractor	Demolition Contractor
Submittals	• None	• Primary for establishing submittal control procedure • Primary for initial review for submittal completeness prior to distribution • Primary for submittal review and approval	• Primary for preparation of submittals • Primary for response to comments from submittal reviews
RFIs	• None unless they include budget or schedule changes	• Primary for establishing Request for Information (RFI) control procedure, distribution and maintaining files • Primary for initial review for RFI completeness • Primary for RFI review and response	• Primary for preparation of RFIs
Meetings	• Primary for scheduling and conducting owner/GC meetings	• Primary for keeping and distributing minutes • Primary for coordinating meeting follow-up • Secondary for attending and supporting owner meetings • Primary for scheduling and conducting contractor meetings	• Primary for attending meetings with the required personnel • Primary for providing follow-up on action items identified in the meeting
Record Keeping Documentation and Document Control	• Secondary for documenting major project actions and documentation procedures • Secondary for document and revision control	• Primary for documenting major project actions and documentation procedures • Primary for establishing and maintaining project files • Primary for document distribution and correspondence • Primary for establishing and maintaining document management and information system and procedures • Primary for document and revision control	• Primary for documentation of all demolition-related information produced as a result of their activities

Table 1-4. Responsibilities of Owner, General Contractor, and Demolition Contractor

Task	Owner	General Contractor	Demolition Contractor
Budget Cost Accounting	• Secondary for construction cost reviews • Primary for approving budget changes	• Primary for establishing and maintaining construction cost accounting system for the contractor construction costs • Primary for establishing and providing cost and budget reports	• Primary for monitoring their fixed price budget
Scheduling	• Secondary for initial network schedule review • Primary for reporting	• Primary for the review of the initial and final network construction schedule • Primary for overseeing and predicting progress achieved by the construction contractor and reporting to owner • Primary for establishing and maintaining schedule process	• Primary for providing a baseline schedule upon contract award and progress schedules as determined by PGE • Primary for communicating any schedule delays or impacts to the owner
Progress Payments	• Primary for review and processing of PM/CM invoices • Primary for recommendations	• Primary for implementing contractual payment procedure • Primary for reviewing, processing, and recommending to owner regarding contractor progress payments	• Primary for preparing and submitting monthly invoices with required backup
Coordination	• Primary for making timely decisions and adhering to them • Primary for determining site and existing building constraints and opportunities	• Primary to serve as onsite construction/D&D representative (coordinate site activities) – RFIs – Clarifications – Estimation – Change Order • Primary to coordinate and consolidate construction comments • Primary for defining abatement goals and vision • Primary for developing functional/organizational/operational concepts • Primary for coordinating efforts of entire demolition team • Primary for developing alternative concepts together with site and basic systems/materials • Primary at each milestone, estimating design, revising design if needed, or estimating if scope changes	• Primary for providing information to owner and OE on a daily basis related to scope, schedule, and budget • Secondary to work with owner and/or GC for coordination
Safety	• Primary for reporting • Primary for recommendations regarding acceptance of safety program • Primary for establishing safety program for owner staff	• Primary for the initial review of the contractor's safety program • Primary for maintaining all submitted safety information • Primary for assisting owner with preparation of forms in the event of accident or fire • Primary for establishing safety program for GC staff • Primary for field safety review	• Primary for the implementation of their safety program • Primary for the protection of their personnel • Primary for compliance with federal, state, and local requirements

Table 1-4. Responsibilities of Owner, General Contractor, and Demolition Contractor

Task	Owner	General Contractor	Demolition Contractor
Progress Reporting	• Secondary for inspection of contractor's work • Quality assurance spot checking	• Primary for maintaining files for the daily, weekly, and monthly reports, and providing submittals to owner • Primary for preparing monthly report • Primary for providing daily inspection reports to maintain work intent • Primary for submitting reports	• Primary for providing progress reports as determined by PGE
Inspection	• Secondary for inspection of contractor's work and notifying the contractor	• Primary for maintaining inspection records • Primary for coordinating inspections and as-built drawing verification	• Primary for the quality control of all work • Primary for providing access to owner and/or GC for inspection of all work
Testing	• Secondary for review of contractor's proposed testing program and testing subcontractors	• Primary for testing report record keeping, distribution, and monitoring of follow-up actions • Primary for testing report review and for compliance with the specifications • Primary for notifying contractor of testing results compliance • Primary for review of contractor's proposed testing program	• Primary for completing all required tests in accordance with their scope of work and quality plan. • Primary for providing all testing logs and reports to owner and/or GC
Contract Modifications	• Primary for initiating, defining, and documenting owner changes • Primary for submitting and recommending contract modifications	• Primary for establishing and implementing a contract processing system including initiating, defining, coordinating, tracking, and documenting contract modifications • Primary for review of contract changes • Primary for coordinating preparation of change estimates • Primary for preparing analysis and reports of changes, for owner review and submission • Primary for preparation of any design documents required for changes	• Primary for requesting contract modifications and providing backup justification
Claims		• Primary for collecting data, creating a document file, and analyzing the collected materials • Primary for preparing estimate of claim costs and impact • Primary for developing draft finding of fact for entitlement or denial and recommendation • Primary for discussion and negotiation of claim issues with contractor • Primary for finalizing the finding of fact for entitlement or denial • Primary for submission of findings of fact and recommendations • Primary in discussions and negotiations with contractor	• Primary for submitting a claim

Table 1-4. Responsibilities of Owner, General Contractor, and Demolition Contractor

Task	Owner	General Contractor	Demolition Contractor
Labor Provisions	• None	• Primary for receiving, storing, and tracking contractor's labor submissions • Primary for drafting required reports for forms for contractor labor submissions • Primary for submittal of reports	• Primary for compliance and reporting of labor provisions
Progress Photographs	• None	• Primary for preparing construction progress photographs and videotaping during field observation • Primary for receiving and storing construction progress photographs and videotaping • Primary for organizing all construction progress photographs and videotaping for submission • Primary for formal submittal of construction progress photographs and videotapes of progress • Primary for all photography collected at BPP	• Primary for preparation of construction progress photographs and videotaping during field observation as required by contract
Final Inspection and Substantial Completion	• Primary for final review and acceptance of work for substantial	• Primary for preparing a construction defects and omissions checklist and tracking reinspections • Primary for preparing checklist of completion documents, including warranties and reports • Primary for the final inspection to determine defects and omissions	• Primary for notification that work is ready for inspection and providing access for the inspection • Primary for completing punch list items identified during inspections.
As-Built Drawings	• Final acceptance of finished product	• Primary for filing as-built document submittals from contractor • Primary for computer-aided design and drafting documentation	• Primary for providing all as-builts for the scope of work
Security Clearance	• Primary for providing all GCs and subcontractors with necessary documents for security passes	• Primary for preparing and providing to Client security clearance documents pertaining to consultant staff	• Primary for preparing and providing to Client security clearance documents pertaining to demolition contractor staff
Waste Management	• Primary for signing Waste Manifests	• Primary for waste coordination with contractor	• Primary for management of all waste in accordance with federal, state, and local requirements

1.5.3.3 General Contractor Management Roles

The GC personnel and level of effort have been evaluated as part of the Closure Strategy Plan and ROM cost estimate. In general, the following support staff will make up the GC team:

- Project Management
  - Project Delivery Manager
  - Project Manager

  - Health and Safety Manager
  - Quality Assurance Manager
  - Regulatory Compliance Manager
  - Administration Manager
    - Accounting
    - Project Controls/Scheduling
    - Document Control
    - General Administration
  - Engineering Manager
    - Electrical
    - Mechanical
    - Civil
    - Structural
- Construction Management
  - Demolition Manager
  - Health and Safety Inspectors
  - Quality Control Inspectors
  - Environmental Compliance Inspectors
  - General Administration

1.5.3.4 Option 3 Summary

The advantages and disadvantages for Option 3 can be summarized as follows:

Advantages

- Places the risk (safety, compliance, price and schedule) on the GC and demolition contractor
- Utilizes key plant personnel during D&D
- Allows PGE to provide key specialty professionals as desired
- GC monitors the site activities for permit, safety, and environmental compliance to avoid NOVs or citations; NOVs would fall on the GC and demolition contractor
- GC is responsible for the day-to-day operations, coordination, and contracting
- Management of the demolition subcontract including change orders and invoicing is completed by GC

Disadvantages

- Cost increases as GC will have a markup on the demolition contractor cost
- Access to demolition contractor is through GC

The best circumstance for using this approach is if PGE prefers to avoid risks associated with cost, schedule, and NOVs, would like the option to staff the project with the right specialty resources as desired, and has the budget for the additional GC cost.

1.5.4 Management Strategy Summary

The three management strategies are summarized in Table 1-5.

Table 1-5. Management Strategy Summary

	Option 1	Option 2	Option 3
Description	PGE contracts directly with a demolition contractor as the	PGE contracts directly with a demolition contractor and	PGE uses a general contractor to contract and

Table 1-5. Management Strategy Summary

	Option 1	Option 2	Option 3
	general contractor (GC) and manages the work with only PGE staff.	uses an owner's engineer (OE) to assist in managing the work. PGE has the option to use the OE as needed in the delivery of the work.	manage the work. PGE will maintain core program personnel to manage the contract with the general contractor and has the option to provide onsite plant staff to support the construction management of the D&D.
Management Process and Roles	The owner will contract directly with the demolition contractor and will be responsible for managing demolition activities performed by the demolition contractor. The owner will discuss activities, progress, schedule, obstacles, and mitigation with the demolition contractor. The owner will verify invoicing by the demolition contractor. The demolition contractor will work directly for the owner and will be managed onsite by the owner's staff. Change orders will be handled directly between the owner and the demolition contractor.	The owner will contract directly with the demolition contractor and the OE. The OE will be responsible for managing demolition activities performed by the demolition contractor. The OE will act as the owner's liaison for onsite activities. The OE will discuss activities, progress, schedule, obstacles, and mitigation with the owner and the demolition contractor. The OE will verify invoicing by the demolition contractor to the owner. The contractor will work directly for the owner but will be managed onsite by the OE. Change orders will be handled directly between the owner and the demolition contractor and change management may be handled directly by the OE with the owner's approval.	The GC will contract directly with the demolition contractor. The owner will contract directly with the GC. The GC will be responsible for managing demolition activities performed by the demolition contractor. The GC will be responsible for onsite activities. The GC will discuss activities, progress, schedule, obstacles, and mitigation with the demolition contractor. The GC will verify invoicing by the demolition contractor and complete the payment. The contractor will work directly for the GC and will be managed onsite by the GC. Change orders will be handled directly between the GC and the demolition contractor and change management may be handled directly by the GC with the owner's approval.
Advantages	• One contract to manage • No intermediate contractor; allows PGE direct access to the demolition contractor • Cost savings from no markup by GC on demolition contractor • Utilizes key plant personnel during D&D	• Cost savings from no markup by OE on demolition contractor • Utilizes key plant personnel during D&D • Allows PGE to provide key specialty professionals as desired • Provides PGE with direct contractual access to the demolition contractor	• Places the risk (safety, compliance, price, and schedule) on the GC and demolition contractor • Utilizes key plant personnel during D&D • Allows PGE to provide key specialty professionals as desired • GC monitors the site activities for permit, safety, and environmental compliance to avoid notices of violation (NOVs) or citations; NOVs would fall on the GC and demolition contractor • GC is responsible for the day-to-day operations,

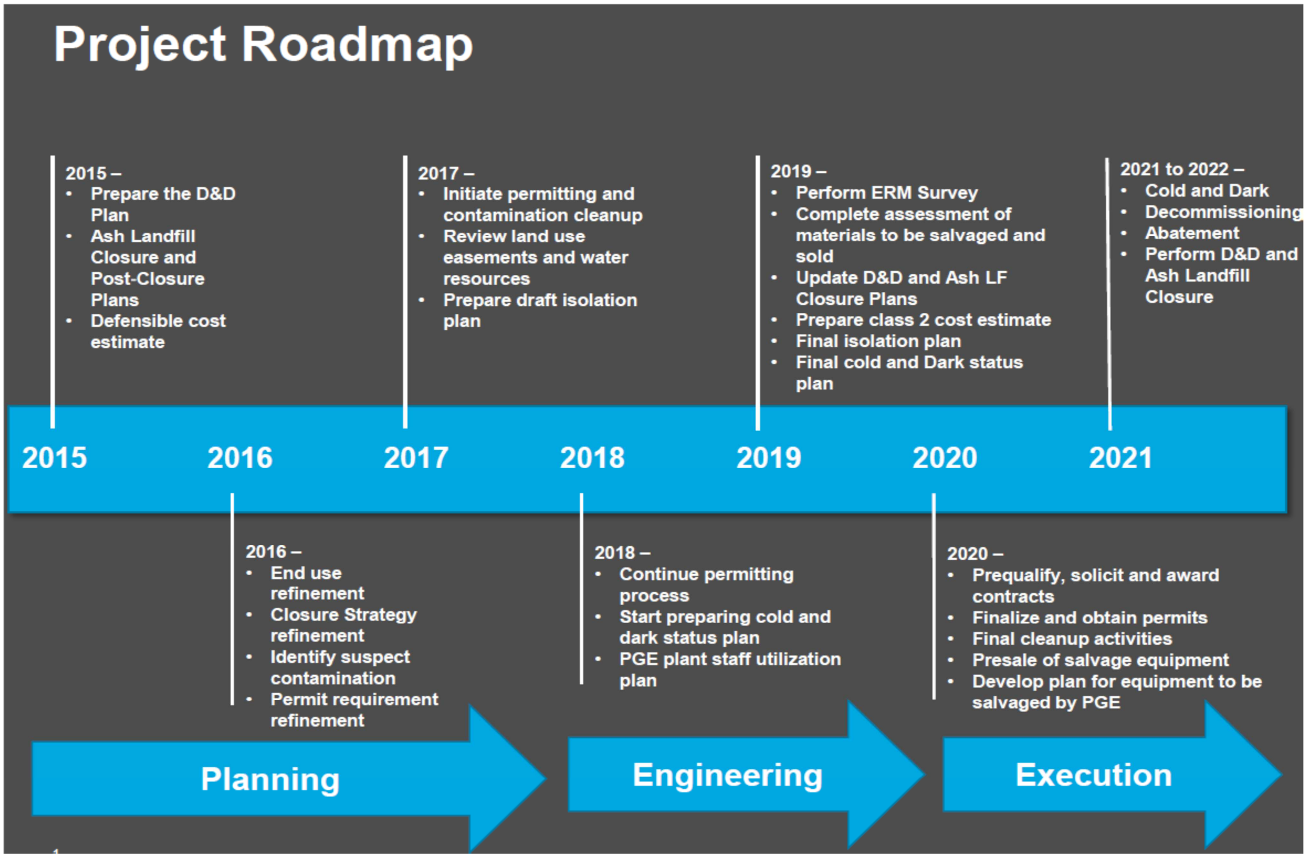
Table 1-5. Management Strategy Summary

	Option 1	Option 2	Option 3
			coordination, and contracting • Management of the demolition subcontract including change orders and invoicing is completed by GC
Disadvantages	• PGE assumes risk through direct contracts with demolition contractor • Requires management of the demolition subcontract, including change orders and invoicing • Requires full-time specialty professionals within PGE to manage • Requires close monitoring of site activities for permit, safety, and environmental compliance to avoid NOVs or citations; NOVs could fall on PGE as the owner	• PGE assumes risk through direct contracts with demolition contractor • Requires specialty professionals within PGE to manage contractor • PGE manages the demolition subcontract, including change orders and invoicing • Risk of mixing PGE and OE is that important components could be missed and any delays cause impacts on other components; can be managed through clearly defined roles and responsibilities • PGE (and/or OE as determined by PGE) required to closely monitor the site activities for permit, safety, and environmental compliance to avoid NOVs or citations; these could fall on PGE as the owner and GC	• Cost increases as GC will have a markup on the demolition contractor cost • Access to demolition contractor is through GC
The best circumstance for using this approach	If PGE can accept risks, staff the project with the right specialty resources on a full-time basis, and establish good site presence to oversee the scope of work for permit, safety, and environmental compliance	If PGE can accept all risks, staff the project with the right specialty resources on a full-time basis, and establish a committed, knowledgeable site presence to oversee the scope of work for permit, safety, and environmental compliance; staffing could be accomplished by using the OE for select offsite and onsite management of demolition activities to reduce the number of PGE resources required to manage the project	If PGE prefers to avoid risks associated with cost, schedule, and NOVs, would like the option to staff the project with the right specialty resources as desired, and has the budget for the additional GC cost

1.6 Schedule

The demolition of the existing BPP is currently planned for early 2021. The personnel power, equipment, and schedule information presented in this section assume means and methods that would be employed in today's marketplace (calendar year 2015). Future technological advancements or regulatory changes may render some of these assumptions obsolete.

It is anticipated that these activities will occur between January 2016 and December 2020. The predemolition activities and schedule are shown in the illustration below.



Project Roadmap

2015 –
- Prepare the D&D Plan
- Ash Landfill Closure and Post-Closure Plans
- Defensible cost estimate

2016 –
- End use refinement
- Closure Strategy refinement
- Identify suspect contamination
- Permit requirement refinement

2017 –
- Initiate permitting and contamination cleanup
- Review land use easements and water resources
- Prepare draft isolation plan

2018 –
- Continue permitting process
- Start preparing cold and dark status plan
- PGE plant staff utilization plan

2019 –
- Perform ERM Survey
- Complete assessment of materials to be salvaged and sold
- Update D&D and Ash LF Closure Plans
- Prepare class 2 cost estimate
- Final isolation plan
- Final cold and Dark status plan

2020 –
- Prequalify, solicit and award contracts
- Finalize and obtain permits
- Final cleanup activities
- Presale of salvage equipment
- Develop plan for equipment to be salvaged by PGE

2021 to 2022 –
- Cold and Dark
- Decommissioning
- Abatement
- Perform D&D and Ash Landfill Closure

Figure 1-3, Baseline Schedule, presents the detailed schedule for the predemolition activities, demolition, and restoration of the BPP site.

SECTION 2

Planning, Engineering, and Execution

This section describes the planning, engineering, and execution activities required to get the BPP to cold and dark status in early 2021 and the proposed timing of these activities.

2.1 Planning

Among the activities planned for 2016 and 2017 is implementation of this closure strategy. Planning activities associated with the closure strategy are as follows:

- Completing the D&D Plan
- Identifying the adjoining landowner and easements
- Establishing permitting strategy and requirements, and initiating the permitting process
- Determining the existing permit inventory and permit closeout strategy
- Identifying the existing facility to remain
- Refining the end use strategy and options
- Identifying the stakeholders, including regulatory agencies, and engaging them in ongoing communication

As part of the planning phase, CH2M recommends identifying how accounting and budgets for asset retirement will be configured, and how costs are captured and reported.

2.1.1 Decommissioning and Demolition Plan

The D&D Plan (CH2M, 2015) is critical to meeting the process requirements for taking the BPP offline and completing D&D. The Draft D&D Plan was developed in October 2015 to describe the process and sequence of the activities to be completed between 2020 and 2023. The D&D Plan contains the following elements:

- Background and Site Operations
- Objectives
- Key Assumptions and Considerations
- Contract Documents and Bid Process
- Predemolition Activities
- Demolition-Specific Scope of Work

2.1.2 Landowners and Easements

This task consists of the identification of landowners and easements adjoining the BPP. These could include private residences, railroads, transmission and pipeline rights-of-way, and public lands. Early identification will help avoid unexpected roadblocks before D&D commences.

2.1.3 Permitting Requirements and Initiation

Activities regulated by agencies include demolition activities, lead-based paint (LBP) abatement, asbestos abatement, aboveground storage tank (AST) and underground storage tank (UST) removal, hazardous and solid waste management and disposal, land-disturbing activities, water discharge, and activities that would discharge sediment/fill into a waterway, including the Carty Reservoir. The activities and agency-specific requirements identified in the following sections are not all-inclusive because the methodologies and intended efforts of a future selected demolition contractor cannot be fully predicted, nor can future changes in regulatory requirements.

2.1.3.1 Agency-specific Requirements

Requirements such as permits, approvals, notifications, and plans are unique to each regulatory agency. Table 2-1, Permit Responsibility Matrix, shows the regulatory requirements organized by federal, state, and local agencies, and specifies who is responsible for complying with a specific requirement. Because actual demolition work is tentatively planned to occur no earlier than 2021, other regulations could be enacted, or those identified in Table 2-1 could be altered, superseded, or eliminated.

Table 2-1. Regulatory Matrix

Regulatory Agency	Regulation Title	Regulation Details	Responsible Party
Federal			
United States Environmental Protection Agency (USEPA)	Waste	Hazardous waste will be managed in accordance with the Large Quantity Generator standards in Oregon Administrative Rule (OAR) 340-102.	Demolition contractor
	Material Management	Oil (including recovered oil and oil/fuel used by construction equipment) will be stored and otherwise managed in accordance with the Clean Water Act (40 *Code of Federal Regulations* [CFR] 112).	Demolition contractor
		If more than 1,320 gallons of oil will be stored at the facility for the D&D activities, a Spill Prevention, Control and Countermeasures Plan will be prepared, as required under 40 CFR 112.	Demolition contractor
		Used oil will be managed in accordance with 40 CFR 279 (and 40 CFR 112, if applicable). Based on demolition of similar power plants, it is assumed that more than 55 gallons of used oil (including non-polychlorinated biphenyls (PCB) transformer oil) will be generated during decommissioning.	Demolition contractor
		Electrical equipment and materials such as light ballasts containing ≥50 parts per million (ppm) PCBs will be managed and disposed of in accordance with the Toxic Substance Control Act (TSCA) regulations (40 CFR 761).	Demolition contractor
		Ozone-depleting substances will be removed by technicians certified through a USEPA-approved program, in accordance with 40 CFR Part 82.	Demolition contractor
	Coal Combustion Residual (CCR) Rule	The Rule regulates the disposal of CCR as solid waste under Subtitle D of the Resource Conservation and Recovery Act. The Rule sets forth national minimum criteria for existing and new CCR landfills and surface impoundments, and lateral expansions to landfills and impoundments.	PGE
U.S. Fish and Wildlife Service (USFWS)	Migratory Birds	Structures to be demolished will be inspected for active migratory bird nests. Structures (or equipment) with active nests will not be disturbed, in compliance with the Migratory Bird Treaty Act.	Demolition contractor

Table 2-1. Regulatory Matrix

Regulatory Agency	Regulation Title	Regulation Details	Responsible Party
U.S. Army Corps of Engineers (USACE)	Section 404 Clean Water Act	Joint Permit Application for removal or fill in U.S. navigable waters	PGE (if needed)
State			
Oregon Department of Environmental Quality (ODEQ)	Air Emissions	Facility will be inspected and asbestos-containing material (ACM) removed/abated, packaged, transported, and disposed of in accordance with OAR 340-248, including: • Facility will be inspected/surveyed to identify ACM and ACM will be abated prior to demolition. • Inspections and abatement will be conducted by ODEQ-accredited personnel. • Air emissions during ACM abatement will be prevented and mitigated. • Abatement or demolition contractor will provide 10-day notice and pay applicable fees prior to ACM abatement <u>or</u> demolition to ODEQ.	PGE for the inspection and demolition contractor for the abatement
		Fugitive emissions from demolition or grading activities will be minimized and mitigated as required in OAR 340-208.	Demolition contractor
	Stormwater	Complete the ODEQ National Pollutant Discharge Elimination System (NPDES) #1200-C Permit Application Form to obtain coverage under the NPDES General Stormwater Discharge Permit for Construction Activities (Permit #1200-C).	Demolition Contractor
		As required, complete the Land Use Compatibility Statement (LUCS) and obtain signoff of the LUCS by the local planning authority.	PGE
		Develop an Erosion and Sediment Control Plan (ESCP)	Demolition Contractor
		Submit the completed Permit Application form, LUCS, and ESCP to the ODEQ Eastern Region Office.	Demolition Contractor
		Pay applicable initial and annual permit fees.	Demolition Contractor
		If it is determined that more than five (5) or more acres will be disturbed, the project is subject to public review. A public review period of 14 calendar days will begin after ODEQ has determined that the application is complete.	Demolition Contractor
	Noise	Demolition activities will comply with ODEQ noise requirements for a New Source Located on Previously Used Sites (OAR 340-0035).	Demolition contractor
	Waste	Hazardous waste will be managed in accordance with the Large Quantity Generator standards in OAR 340-102.	Demolition contractor
		Universal waste will be handled in accordance	Demolition contractor

Table 2-1. Regulatory Matrix

Regulatory Agency	Regulation Title	Regulation Details	Responsible Party
		with OAR 340-113. Based on demolition of similar power plants, it is assumed that less than 11,000 pounds (i.e., small quantity) of universal waste will be generated during decommissioning and that ODEQ notification of universal waste activity is not required. Universal waste will be transported to a universal waste destination facility, and not land disposed.	
		Used oil will be managed in accordance with OAR 340-111. Based on demolition of similar power plants, it is assumed that more than 55 gallons of used oil (including non-PCB transformer oil) will be generated during decommissioning, and that used oil will be transported using an ODEQ-registered used oil transporter.	Demolition contractor
		Electrical equipment and materials such as light ballasts containing ≥50 ppm PCBs will be managed and disposed of in accordance with the TSCA regulations (where applicable, OAR 340-110).	Demolition contractor
		Anticipated nonhazardous waste will be handled and disposed as required by ODEQ (OAR 340-093), including but not limited to: • Construction and demolition debris will be recycled or put to beneficial use in accordance with OAR 340-093 and OAR 340-090-0005, to the extent possible. See also Morrow County Ordinances. • Friable ACM waste will be disposed of in accordance with OAR 340-248-0280. • Equipment with radioactive sources (e.g., smoke detectors and exit signs) will be returned to the manufacturer or disposed appropriately at a permitted facility.	Demolition contractor
	Water	Joint Permit Application to Department of State Lands (DSL) for removal or fill below the ordinary high water mark.	PGE
Local			
Morrow County	Solid Waste Ordinance	9.010. Conditions for Exemptions to Requirement for Solid Waste Disposal License	PGE
	Recycling	Chapter 4 – Solid Waste Management Plan: Morrow County is required to meet a 20 percent recovery rate	Demolition contractor

2.1.3.2 General Assumptions

- Oregon Administrative Rule (OAR) 340-093-0260(1) – A beneficial use determination is not needed for the following:

  - (a) Disposal of solid waste that is exempt from permit requirements under OAR, chapter 340, divisions 93 or 96. OAR 340-093-0030 – Definitions. "Construction and Demolition Waste" means solid waste resulting from the construction, repair, or demolition of buildings, roads and other structures, and debris from the clearing of land, but does not include clean fill when separated from other construction and demolition wastes and used as fill materials or otherwise land disposed. Such waste typically consists of materials including concrete, bricks, bituminous concrete, asphalt paving, untreated or chemically treated wood, glass, masonry, roofing, siding, plaster; and soils, rock, stumps, boulders, brush and other similar material.

- No subsurface work will occur except for UST removal to access underground utilities, and to remove six areas of impacted soils. Foundations, roads, rail lines, and parking areas remain.
- Only electrical equipment such as ballast will contain >50 ppm polychlorinated biphenyls (PCBs) – i.e., PCB equipment as defined in the TSCA, in 40 CFR 761.3.
- No pesticides will be encountered during D&D activities.
- Portions of the facility that will be demolished do not provide habitat to protected species (other than potentially providing habitat to migratory birds).
- Greater than 1 acre will be disturbed during D&D activities.

2.1.4 Existing Permit Inventory and Closeout Strategy

A detailed list of existing permits for the BPP and the process for transferring permits to the Carty Plant or closing out permits that have reached the end of their life cycle are as follows:

- The Oregon Title V air permit number 25-0016-TV-01 will need to be modified to remove BPP and associated emission sources.
- The NPDES permit (Oregon Water Pollution Control Facility Permit 100189, File number 70975) will need to be modified to remove BPP-specific wastewater streams, as well as the Ash Landfill.
- The Boardman domestic water system ID 90513 will need to be modified to remove BPP-specific items.

2.1.5 Existing Facilities to Remain

Before, during, and after completion of the D&D work, certain existing facilities within the BPP site must remain in operation and undisturbed by contractor activity. Adequate care and caution must be exercised to delineate and protect these existing facilities and ensure that provided services are not impaired by any D&D action. Items to remain and that require protection include the following:

- Backup transformer and substation with 7.2-kilovolt feed
- Domestic water well; cut and cap BPP feed leaving main feed for Carty Plant undisturbed
- Monitoring wells
- Communication line
- Construction buss power
- Sewage ponds
- Firehouse
- Intake pump house structure
- Helicopter pad
- Tower road
- Back entrance
- Reservoir and dams
- Carty Plant circulation water piping

As required by the Occupational Safety and Health Administration (OSHA), existing stairs and handrails must remain in place to ensure safe access during the project. Any handrail removed or modified to enable equipment demolition will be restored to an as-found, safe condition as part of the work. These handrails may be removed upon final interior inspection as part of the final demolition.

2.1.6 End Use

The current end use plan is to remove select structures to the ground and leave foundations, roads, parking areas, and railroads in place. The excavated areas will be backfilled and the site graded to drain so water does not pond. No obstructions will be present above grade that could pose harm to vehicles or personnel travelling across the site.

End use refinement should occur in 2017 to determine what additional, if any, planning, permitting, engineering, and stakeholder involvement may be necessary. The end use operations and maintenance should be identified and evaluated for long-term needs and budgeting.

2.1.7 Stakeholder Relations and Engagement

There are three types of stakeholders for the BPP D&D program: Internal PGE, External Active, and External Information. The list of stakeholders (developed by PGE) is shown in Table 2-2.

Table 2-2. List of Stakeholders

Internal PGE	External Active	External Information
Legal	Oregon Department of Environmental Quality	International Brotherhood of Electrical Workers
Communications	Morrow County	Oregon Department of Energy
Environmental Services	Idaho Power	City of Boardman
Substation Operators	Bonneville Power Administration	United States Fish and Wildlife Service
Power Supply	Suppliers	The Nature Conservancy
Human Resources	Boardman Rural Fire Department	United States Army Corps of Engineers
Power Operations	Oregon Department of Health	RD Offet Farms
Asset Accounting	Federal Aviation Administration	Boeing
Rates and Regulatory Affairs		Public Utility Commission
IT		Boardman Utility Board
Carty Power Plant		Industrial Customers for Northwest
Labor Relations		Oregon Water Resources
		U.S. Environmental Protection Agency Region 10
		Sierra Club, PEAK, Columbia Riverkeepers
		Morrow County Sheriff
		U.S. Navy

The internal PGE stakeholders are being engaged in the process as closure planning is developed. The active external stakeholders will be engaged early in the closure planning process as information becomes available pertaining to their interests. The external stakeholders engaged for informational purposes will be notified once the closure process is developed and the internal PGE stakeholders have determined the release of information is appropriate. External stakeholder engagement will begin in 2016.

A formal stakeholder and community relations plan should be considered for the project. Planning for stakeholder and community relations in advance offers the public a means of staying informed with the appropriate information.

Before demolition activities begin, PGE may provide courtesy notices to nearby stakeholders, businesses, and residents to inform them of the demolition activities and general schedule, and to identify efforts that will be made to limit impacts to the local community.

2.1.8 Regulatory Agency Communication

As described in Section 2.1.7, both active and information-only stakeholders have been identified for the project, including regulatory agencies. For the regulatory agencies that are active stakeholders, communications early and often will be important to keep the planning process on track and in compliance with existing rules and regulations.

Regulatory agency engagement and communications will begin in 2016 and will include the preparation and distribution of a project description. The project description will include details of the planned D&D and Ash Landfill closure and a schedule for the project. Subsequent meetings will be held to discuss the project and begin the dialogue of engagement.

2.2 Engineering

The engineering activities planned for 2018 and 2019 are summarized as follows:

- Developing the engineering activities for the Carty Plant isolation
- Updating the D&D Plan (CH2M HILL, 2015)
- Preparing a Cold and Dark Implementation Plan and Plant Staff Utilization Plan
- Performing an ERM survey and environmental assessment
- Preparing a Salvage Plan, closure engineering documents, and updated cost estimate

2.2.1 Carty Plant Isolation

Before the BPP goes cold and dark, several key systems that currently support the Carty Plant through the BPP will need to be isolated. The process for isolation will include preparing the engineering plans for the work, preparing an engineering estimate for the isolation, obtaining the funding for the isolation, solicitation of services and contracting, and completing the construction elements. The engineering plans for the Carty Plant isolation will be completed in early 2018 and will include the design plans, specifications, and engineering cost estimate. The design will include all elements required to isolate the Carty Plant from the existing systems of the BPP.

The Carty Plant isolation must consider the following:

- Electrical currently is obtained through the power block. Carty to pull from switchyard or 230-kilovolt line.
- Communication microwaves need to be relocated. Need early start for planning. Fiber optics will require PGE IT service.
- Service water needs to be screened.
- Existing ponds will be used for sewage.
- Domestic water will be connected upstream of Boardman. Need to transfer ownership to Carty.
- Fire station is independent. Fire building will need electrical from Carty.
- Helicopter pad will remain. Need to consider ambulance and EMT service.
- Service termination will occur for trash, water, and other services.

- Carty Plant circulation water pipes will be protected during demolition.
- Tower Road maintenance transfer to Carty Plant will occur.
- Management of the reservoir and dams by PGE will continue.
- Carty Plant may reuse the two evaporation ponds.

2.2.1.1 Electrical

The Carty Plant will require power to start up the plant and the power will be acquired from a local provider. The Carty Plant will require the current electric feed through the BPP to be rerouted through the switchyard or 230-kilovolt line and protection of the reroute during the demolition activities. The existing electrical line that feeds the Fire Station will need to be terminated. A new service line will be required from the Carty Plant feed and sequenced to avoid interruption to the service.

2.2.1.2 Communications

Communications for the Carty Plant are through the microwaves that are currently on the BPP. These will be removed and reinstalled at the Carty Plant. The fiber optic lines currently supporting the BPP will require rerouting and terminations to avoid impacts to the Carty Plant operations. This will require PGE IT personnel to start planning early for the work.

2.2.1.3 Circulation and Domestic Water

The Existing Intake Structure Pump House will require modifications for the service water screens to be relocated and installed to support the Carty Plant intake water. The circulation water pipes will need to be protected during demolition to avoid a disruption to the Carty Plant operation. Additionally, the domestic water will need to be connected to support the Carty Plant upstream of the BPP. Wastewater Ponds

The existing wastewater ponds will need to be connected to the Carty Plant service line and a shutoff valve installed so the existing service line from the BPP can be terminated and flanged.

2.2.1.4 Ambulance and EMT Service

The ambulance and EMT service is provided by BPP and will need to be transferred to the Carty Plant before the BPP goes offline.

2.2.1.5 Service Termination

BPP services such as trash and domestic water will need to be terminated upon shutdown. The Carty Plant will set up its own services.

2.2.1.6 Tower Road Maintenance

Tower Road is currently maintained by the BPP. The maintenance will be transferred to the Carty Plant prior to shutdown.

2.2.1.7 Carty Reservoir Management

The Carty Reservoir is currently managed by the BPP. The management will be transferred to the Carty Plant before shutdown.

2.2.2 Decommissioning and Demolition Plan

The D&D Plan (CH2M, 2015) will be updated periodically and will include revisions to the list of assumptions, end use, permit requirements, and schedule.

2.2.3 Cold and Dark Implementation Plan

A Cold and Dark Implementation Plan will be prepared in 2018 and will include the scope of work required to take the BPP offline, drain and de-energize systems, empty vessels, tanks, and piping (except for residual which will be the responsibility of the demolition contractor), and prepare the BPP for abatement.

2.2.4 Plant Staff Utilization Plan

A Plant Staff Utilization Plan will be prepared in 2018 and will include details on how the existing plant staff will be utilized during the planning for cold and dark implementation. Plant personnel with the most detailed knowledge of the power block, support systems, and Ash Landfill operations will be best suited for these roles. The plan will present roles and responsibilities and will suggest the personnel to be utilized.

2.2.5 Environmentally Regulated Material Survey

An ERM survey will be performed in early 2019 to identify and quantify the following ERM materials:

- Asbestos-containing material
- Universal waste
- Lead-based paint
- Hazardous waste
- Radiological waste

The ERM survey will consist of the following:

- Review existing asbestos survey information to determine the amount of sampling that will be required. Collect sufficient samples to characterize all potential asbestos-containing building materials that have not already been identified.
- Conduct destructive sampling to ensure identification of all asbestos-containing materials. This includes, but is not limited to, tearing up floor coverings, removing ceiling tiles and wall coverings, punching large holes in walls, and verifying if floor tile or mastic runs under walls. Maintain control over potential release of asbestos fibers. Clean up debris created during each sampling event.
- Conduct destructive sampling as required to ensure identification of lead-containing materials.
- Conduct sampling and identification of hazardous materials other than asbestos and lead.
- Inventory fluorescent tubes and estimate the number of suspect PCB-containing ballasts (two ballasts for every two tubes) and other universal waste.
- Inventory all radiation sources. These sources are located at multiple locations throughout BPP, including but not limited to the feeders, crusher building, distribution bins, transfer points, coal dust collectors, lower well, reclaim pits, dumper pit, and belt conveyor and feeder.
- Prepare separate scale drawings for the asbestos assessment results and lead assessment results.
- Prepare and submit a written survey report.
- The ERM survey will be performed in accordance with local, state, and federal regulations, including but not limited to the following:
  - U.S. Department of Labor, OSHA
    - Occupational Exposures to Asbestos in All Industries Except Construction Work (as defined in 29 CFR 1910.12(b))

    - Suspect PCB/Uncontrolled Hazardous Waste Site Work (29 CRF 1910.120)
    - Respiratory Protection (29 CFR 1910.134)
    - Access to Employee Exposure and Medical Records (29 CFR 1910.20)
    - Hazard Communication (29 CFR 1910.1200)
    - Specifications for Accident Prevention Signs and Tags (29 CFR 1910.145)
    - OSHA General Industry Lead Standard (29 CFR 1910.1025)
    - OSHA Construction Industry Lead Standard (29 CFR 1910.134)
  - U.S. Environmental Protection Agency (USEPA)
    - National Emission Standards for Hazardous Air Pollutants (40 CFR 61)
    - Training Requirements of the Asbestos Hazard Emergency Response Act Regulation (40 CFR 763)

The ERM survey contractor will need to verify the current local, state, and federal regulations prior to conducting the survey.

2.2.6 Environmental Site Assessment

An environmental site assessment (ESA) will be performed in 2018 or earlier to assess any environmental consequences (positive or negative) prior to preparing the contract documents. The purpose of the assessment is to ensure that PGE considers the environmental impacts of the project. The ESA involves a review of records, a site inspection, and interviews with plant personnel and PGE professional staff that have background knowledge of the construction, operations, and maintenance of the BPP. While sampling and laboratory analysis are not always included in this phase, they should still be conducted by an environmental professional trained in the appropriate standards. The review of plant records and interviews may take a lot of time. To ensure a quality assessment, allow sufficient time for the process.

Contamination can result from activities that took place on the site. Contamination could also come from activities at a nearby property. The records and interviews will be the best sources for this information. Public records are available regarding the locations of properties that have been classified as contaminated by federal or state regulations. Depending on their proximity to BPP, contamination could have made its way onto the BPP property.

If an ESA identifies potential contamination of the site by hazardous materials, additional sampling may be conducted. Among the tests that may be performed are the following:

- Surficial soil and water samples
- Subsurface soil borings
- Groundwater monitoring well installation, sampling, and analysis (may be appropriate on neighboring properties as well to determine the presence of contamination)
- Sampling of dry wells, floor drains, and catch basins
- Transformer/capacitor sampling for PCBs
- Geophysical testing for buried tanks and drums
- Testing of USTs

Historical spills and land use data indicate six locations where impacted soil may exist and environmental remediation potentially is needed—the shooting range berm, lube oil shack, transformer oil spill, demineralization tank, auto repair shop, and fuel oil tanks. Table 2-3 lists and describes the six areas and the potential action. Locations, descriptions, estimated quantities, and actions were provided by PGE. If PGE encounters groundwater contamination before the start of D&D activities, the area should be addressed.

Table 2-3. List of Environmental Remediation Areas

Area	Location	Description	Action
Shooting Range Berm	Along the side of a soil stockpile located northeast of the Power Block	Approximately 200 cubic yards (CY) of material is expected to be impacted with bullet rounds	Will be excavated and the soil disposed of at an approved offsite disposal facility. No backfill is required as the unimpacted portion of the stockpile will be used as backfill for the demolition activities.
Lube Oil Shack	Adjacent to the Lube Oil Shack	An oil spill at the lube oil shack that was previously cleaned up. It is anticipated that approximately 100 CY of petroleum-impacted soil remains.	The remaining impacted soil will be excavated and the soil disposed of at an offsite approved disposal facility. The excavated area will be backfilled with clean concrete or soil and graded to match existing adjacent grades.
Transformer Oil Spill	Substation	A transformer oil spill at the substation that was previously cleaned up. It is anticipated that approximately 100 CY of petroleum-impacted soil remains.	The remaining impacted soil will be excavated and the soil disposed of at an offsite approved disposal facility. The excavated area will be backfilled with clean concrete or soil and graded to match existing adjacent grades.
Demineralization Tank (Oil Spill)	Adjacent to the Demineralization Tank	An oil spill at the demineralization tank that was previously cleaned up. It is anticipated that approximately 200 CY of petroleum impacted soil remains.	The remaining impacted soil will be excavated and the soil disposed of at an offsite approved disposal facility. The excavated area will be backfilled with clean concrete or soil and graded to match existing adjacent grades.
Auto Repair Shop	Adjacent to the Auto Repair Shop	An oil spill at the auto repair shop that was previously cleaned up. It is anticipated that approximately 200 CY of petroleum-impacted soil remains.	The remaining impacted soil will be excavated and the soil disposed of at an offsite approved disposal facility. The excavated area will be backfilled with clean concrete or soil and graded to match existing adjacent grades.
Fuel Oil Tank	Under the Fuel Oil Tank	There is no known spill or leak at the fuel oil tank; however, the tank is not situated in secondary containment and it is anticipated that some spills may have occurred in the past.	Approximately 100 CY of impacted soil may be excavated and the soil disposed of at an offsite approved disposal facility. The excavated area will be backfilled with clean concrete or soil and graded to match existing adjacent grades.

2.2.7 Salvage Plan

A Salvage Plan is targeted for preparation in mid-2019. The plan will include details on how equipment and components may be salvaged for use by PGE at other plants or sold for reuse by others. The plan will evaluate the economics of salvage, including the equipment and components in the D&D.

2.2.8 Closure Engineering Documents

Closure engineering documents are targeted for preparation in mid-2019. The documents will include plans and specifications for bringing the plant to a status of cold and dark, preparing for the demolition, performing the demolition and closure of the Ash Landfill, and restoring the site. Additionally, a scope of work will be prepared to summarize the plans and specifications intended for use in the bid documents to be prepared early in 2019.

The closure engineering documents may be prepared as a single document or multiple documents, depending on PGE's decision on executing the work. The advantages of a single document (and disadvantages of multiple documents) are the reduced cost and timeframe for preparing the documents during the bid process. The primary advantage of multiple documents (and disadvantage of a single document) is they allow more flexibility in how the work will be scheduled and contracted.

2.2.9 Cost Estimate

An updated cost estimate should be prepared in 2019 based on updated assumptions and the planned end use of the property. The cost estimate should be a Class 2 estimate. Class 2 estimates are generally prepared to form a detailed control baseline against which all project work is monitored in terms of cost and progress control. For contractors, this class of estimate is often used as the "bid" estimate to establish contract value.

Class 2 estimates typically are prepared as the detailed control baseline against which all actual costs and resources will now be monitored for variation to the budget. They form a part of the change/ variation control program and involve a high degree of deterministic estimating methods. Class 2 estimates are prepared in great detail, and often involve tens of thousands of unit cost line items. For those areas of the project still undefined, an assumed level of detailed takeoff (forced detail) may be developed to use as line items in the estimate instead of relying on factoring methods.

Typical accuracy ranges for Class 2 estimates are -5 to -15 percent on the low side, and +5 to +20 percent on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed the typical in unusual circumstances.

2.3 Execution

The execution activities for 2020 and 2021 include preparing an Execution Plan and contract documents, developing the bid process details, and conducting the presale and salvage of equipment and components.

2.3.1 Execution Plan

The Execution Plan will be prepared in early 2020 and will detail the process PGE follows to manage the demolition. This process will be the decision process for program management strategies outlined in Section 1.5. Depending on the option chosen, PGE will need to determine what resources are available to support the management, execution, and oversight of the contractors.

2.3.2 Contract Documents

Prequalification of contractors and preparation of contract documents will be completed early in 2020. A prequalified group of contractors will be solicited for interested in the demolition of the BPP and closure of the Ash Landfill. Prequalification will include review of experience, resource availability, safety, and environmental compliance records. Contract documents including an RFP will be prepared for solicitation of bids. The types of contracting options include firm-fixed price, time and materials, and engineering, procurement, and construction (EPC). Additionally, a combination of contract types should be considered, including cost sharing and recycled material credits paid directly to PGE. The advantages and disadvantages of the contracting options are presented below.

2.3.2.1 Firm-fixed Price

Firm-fixed price contracts provide for a price which normally is not subject to any adjustment. Firm-fixed price contracts typically are negotiated where reasonably definite specifications are available, and costs can be estimated with reasonable accuracy. A fixed price contract places minimum administrative burden on contracting parties, but subjects a contractor to maximum risk arising from full responsibility for all cost escalations. It provides a contractor maximum incentive to control costs and perform effectively and imposes minimum administrative burden upon contracting parties. The main disadvantage is that a contractor who gets into financial or schedule trouble may look for ways to minimize loss. This can result in extra effort by the owner to inspect work real time and document activities related to the work to provide a basis for claim evaluation.

2.3.2.2 Time and Materials

Time and materials contracts are used when both parties agree to pay predetermined unit rates. These contracts are used when an accurate estimate has been difficult to generate or where the schedule cannot be defined. This type of contract presents the highest risk for the owner and the most secure option for a contractor.

2.3.2.3 EPC

EPC is a common type of contracting agreement in the construction industry. The engineering and construction contractor will carry out the detailed engineering design of the project, procure all the equipment and materials necessary, and then construct to deliver a functioning asset to their clients. The EPC phase of the project is also known as the Execution phase, which normally follows what is known as a Front End Engineering Design or FEED phase. The FEED is a basic engineering design used as the basis for the EPC phase. The FEED can be divided into separate packages covering different portions of the project. The FEED packages are used as the basis for bidding on when the client offers the EPC work to the market. Typically the EPC contractor has to execute and deliver the project within an agreed time and budget, which places the risk for schedule and budget on that contractor. The disadvantages to the owner are the costs associated with the EPC contractor’s overhead and profit.

2.3.2.4 Cost Sharing

A cost-sharing contract is a cost-reimbursement contract in which the contractor receives no fee and is reimbursed only for an agreed-upon portion of its allowable costs. A cost-sharing contract may be used when the contractor agrees to absorb a portion of the costs, in the expectation of substantial compensating benefits. Cost sharing can also involve waste reduction and recycling where the contractor has incentive to reduce costs by employing techniques that will result in cost savings to the owner. The advantages to this type of contract are the incentive placed on the contractor to reduce costs with the disadvantage that the contractor may build in contingency for risk associated with market changes.

2.3.2.5 Recycled Material Credits

Recycled material credits are based on the actual value of materials sent to the scrap yards. The demolition contractor will price the cost of the demolition excluding the recycled material credits and perform all preparation and transport of the recycled materials, but the check for the recycled value is sent directly to the owner. The advantage to the owner is that they receive the current market value of the recycled material directly but with the disadvantage of fluctuating market values. With other contracting methods, demolition contractors often hold scrap until values are favorable; with this method, there is no incentive to do so.

2.3.2.6 Summary

Firm-fixed price and EPC usually provide the most advantages and least disadvantages to the owner and would be the recommended options to consider. However, if there is scope that cannot be clearly defined (for example, soil remediation), options for time and materials, cost sharing, and recycled material credits can be added to the firm-fixed price or EPC contracts. A mix of all the contract types is an option depending on the ultimate scope of work and amount of risk sharing the owner is willing to undertake.

2.3.3 Demolition and Landfill Closure Bid Process

The RFP with scope of work, plans, and specifications will be issued to the prequalified contractors. A bid walk will be conducted for the contractors shortly after the RFP has been issued and the contractors have had a chance to review the RFP. The bid walk will include a presentation of the scope of work, a site walk, and a question and answer session. After the bid walk, a deadline will be set for any follow-up questions. Questions will be answered and the answers will be distributed to all contractors for review and use. Once the bids are received, they will be evaluated based on the recommended criteria described below.

2.3.3.1 Lowest Price Technically Acceptable

Lowest Price Technically Acceptable (LPTA) contracts evaluate the price of the proposals solicited and identify the lowest one. Next, the LPTA contract evaluates the proposal’s technical approach against a bar for “acceptability.” A primary advantage is that when used appropriately, this approach can be speedy. The bar consists of evaluation factors pertaining to noncost criteria; however, discrimination among offerors on the basis of the criteria is not likely to occur. Offerors either clear or do not clear the bar.

The disadvantage is that not having any past performance may be deemed “acceptable,” meaning an offeror’s excellent past performance provides no relative advantage. If the bar is lower than it should be due to factors such as unclear or incomplete requirements for a service more complex than previously assumed, unexpected results may ensue, such as numerous change orders and cost overruns.

2.3.3.2 Best Value

Best Value contracts weight noncost factors such as past performance, risk aversion, reliability, or innovation as equally important if not more important than price. The main advantage is that the owner has the flexibility to trade off between noncost factors and price/cost factors and award the offeror who does not have the lowest price or does not rate the highest technically. The disadvantage is that the cost is usually higher than LPTA contracts.

2.3.3.3 Summary

Best Value contracts typically provide the most advantages and least disadvantages to the owner and are the recommended option for consideration. Although the cost may be higher, the level of certainty for project success is increased by a better understanding of the cost and noncost factors.

2.3.4 Demolition Permit Acquisition

Permits that can be obtained prior to demolition will be applied for and obtained in 2020. Permits that the contractor is required to obtain will be obtained once they are under contract. All permits should be in place early in 2021. A list of anticipated permits and the responsible party is shown in Table 2-1.

2.3.5 Presale and PGE Salvaged Equipment and Components

Options for selling or salvaging equipment and components for reuse include selling to a third party, turning over to the demolition contractor as part of the demolition, or removing (by PGE) for use at another facility.

An economic evaluation will be made prior to removal. This way the equipment can be loaded for transport immediately after removal to avoid handling it multiple times. Any equipment and components that are determined to be economically reusable by PGE or others will be identified. For PGE, the equipment will be tagged for removal prior to abatement. For all other economically reusable equipment, a list with a description and pictures will be developed and solicited for presale. The demolition contractor may assist in this process by identifying potential buyers.

Equipment that is determined to have a salvage value will be identified and included in the demolition contractor's scope of work. If turned over to the demolition contractor, the contractor will likely either resell whole or sell as scrap. If the equipment cannot be sold, it will be recycled when applicable or disposed of as a nonhazardous or hazardous waste.

The following types of equipment may be moved to another PGE site for redeployment or sold as salvage:

- Tanks
- Pumps
- Turbines
- Generators
- Transformers
- Control Equipment
- Motors
- Furnaces
- Boiler

The equipment and components that are sold as salvage will be transported offsite through the main gate by truck or by train. The quantities of this material have not been estimated in this Closure Strategy Plan because the future market value and desirability are not currently known.

SECTION 3

Predemolition Activities

The predemolition activities for the BPP D&D consist of engineering and construction of Carty Plant support system isolation; cold and dark implementation; decontamination; abatement and asset recovery; waste characterization, handling, transportation, and disposal planning; and recycled material quantities, disposition, and transport. Predemolition activities are scheduled for 2019 to 2021. The work will be performed by contractors licensed by the Oregon State Contractor's Licensing Board. This section describes the details and timing of these activities.

3.1 Engineering and Construction of Carty Plant Support System Isolation

A scope of work and RFP will be prepared and bids solicited based on the engineering plans for the Carty Plant isolation described in Section 2.2.1. Upon contracting the services, anticipated for 2019, the isolation will be completed.

3.2 Cold and Dark Implementation

The purpose of the cold and dark implementation is to reduce the amount of decontamination required, prepare the plant for abatement and demolition, and make the structure safe for demolition.

The BPP is scheduled to go offline on December 31, 2020, placing it in cold and dark status. Before the plant goes offline, a series of actions will be required, including using of as much of the onsite resources as possible (e.g., coal, fuels, chemicals, and process materials). The idea is to have as little of these resources left over as possible to reduce the volume of materials that will be handled as waste.

Once the plant goes offline, the systems will be secured through lockout/tag-out procedures, and the remaining systems, vessels, tanks, and piping will be drained to the extent possible. The remaining ash in the ash silos will be removed and placed in the Ash Landfill. Liquids and sludge from the waste and washwater ponds will be removed and disposed of, the evaporation ponds will be allowed to evaporate, and the coal yard settling basin will be emptied. Detailed instructions will be developed to describe the methods and procedures required to isolate and de-energize all electrical equipment in advance of removal, without interrupting systems that are to remain in place.

3.3 Decontamination

Decontamination activities at the BPP will be conducted in accordance with applicable regulations and are scheduled for early 2021. The decontamination contractor will prepare a Decontamination Plan prior to the initiation of activities. This plan will include a detailed description of the decontamination work to be conducted, along with a description of the methods and procedures to be employed.

Specific elements of the decontamination plan will address methodology and procedures, site preparation, required containment setup, engineering and work practice controls, personal protective equipment (PPE), waste labeling, waste storage/containerization, waste transport/disposal, personnel decontamination, and cleanup.

The decontamination will include the removal of all remaining liquids, gas, and solids from piping, tanks, vessels, equipment, and components. Decontamination will involve accessing the components by cutting, opening, etc. to allow the liquid, gas, and solids to be removed. This process requires careful planning and execution. Residual waste will be handled, stored, transported, and disposed of in accordance with local, state, and federal regulations. The abatement of existing facilities will be completed as follows:

- The decontamination scope of work will include performing surveys to locate, characterize, and remove quantities of environmentally hazardous and objectionable material. These data will be used by the contractor to establish implementation plans and to collect, package, and prepare for waste shipment. PGE will identify the appropriate waste profile to be used. Among the profiles are elevators and associated steel structures, boilers, tanks, pumps, preheaters, ductwork, conduit, evaporators, piping (e.g., containing fuels and oil that may require cleaning prior to removal to make safe), structural steel, stairs and handrails, and all other items within the limits of work.
- Cold methods will be used for “first-breaks” and creating “air-gaps” on equipment such as pipes, enclosed vessels, and tanks. PGE may complete this work in advance of turning the plant over to the demolition contractor. The advantage of PGE plant staff performing this work is their knowledge of the systems, which increases the safety and completeness of the work, and the cost savings of using plant staff. If the demolition contractor performs the work, PGE plant staff will confirm that systems are air gapped.
- Plumbing, electrical, and other utilities required to safely perform the work will be disconnected, capped, or cut prior to decontamination.
- Engineering will be completed as necessary to ensure any equipment and piping removed as part of the decontamination from the Power Plant structure is adequately supported and restrained during demolition in a manner that meets all applicable codes and requirements.
- As part of the decontamination and prior to demolition and removal, the pits, tunnels, and trenches within and adjacent to the turbine and boilers will be opened, inspected, cleaned, and made safe with the replacement of removed or repaired deck plates or handrails as appropriate. Material removed from the pits and trenches will be disposed of legally.

3.4 Abatement and Asset Recovery Process

Abatement activities at the BPP will be conducted in accordance with applicable regulations and are anticipated to be performed in mid-2021. The abatement contractor will prepare abatement plans prior to the initiation of activities. The plans will include detailed descriptions of the abatement work to be conducted, along with descriptions of the abatement methods and procedures to be utilized.

Specific elements of the abatement plans will address methodology and procedures, site preparation, required containment setup, engineering and work practice controls, PPE, worker exposure assessment (air monitoring), waste labeling, waste storage/containerization, waste transport/disposal, personnel decontamination, worker hygiene facilities, and general housekeeping and cleanup. Abatement of existing facilities will include the following actions:

- Asbestos-containing material (ACM), LBP (as required), universal waste, hazardous waste, and any other regulated waste will be removed and properly disposed of offsite.
- Friable and nonfriable insulation on mechanical systems and equipment, piping, heating, ventilation and air conditioning, electrical components and equipment, transite spark arrestors, switchgear protection, and transite electrical conduit will be removed, abated, and properly disposed of offsite.
- Lights, ballast, and universal waste (e.g., mercury-containing equipment, radiation point sources) will be removed and disposed of offsite.
- Any spills of hazardous materials such as mercury and PCBs during the disposition of abated materials will be completed.
- LBP removal and cleanup to support the dismantling and demolition activity will be managed.

- Asbestos fiber concentrations will be maintained below 0.01 fibers per cubic centimeter, greater than 5 microns in length, for all samples taken to allow these areas to be considered "clean" and "acceptable for occupancy." When Transmission Electron Microscope analysis is used, clearance levels must meet 29 CFR Part 1926.1101.

3.5 Waste Characterization, Handling, Transportation, and Disposal

Waste generated during the demolition of the BPP will likely be characterized as one of the solid or liquid waste types shown in Table 3-1. Table A-1 in Appendix A provides a detailed basis for the estimated quantities.

Table 3-1. Waste Types, Estimated Quantity, and Disposition

Waste Type	Quantity	Disposition	Basis of Estimate
Solid	***Tons***		
Nonhazardous Construction Debris	6,630	Waste Management Columbia Ridge, Arlington, Oregon	See Table A-1 in Appendix A. Table A-1 is based on actual waste amounts from a similar project.
Soil	1,200		Allowance based on previous CH2M experience on similar projects.
Sludge	24,440		Allowance based on previous CH2M experience on similar projects.
Universal Waste	14		Allowance based on previous CH2M experience on similar projects.
Asbestos-containing Material	1,580		See Table A-1 in Appendix A. Amount arrived at based on previous estimate of 530,000 square feet of transite and 260,000 square feet of asbestos-containing roofing and flooring.
Lead-based Paint	20		Allowance based on need to remove paint before hot cutting. Survey needs to be performed.
Non-Resource Conservation and Recovery Act (RCRA) Hazardous	1,000		Allowance – survey needs to be performed.
RCRA Hazardous	500		Allowance – survey needs to be performed.
Toxic Substance Control Act (TSCA) Regulated Material	5		Allowance – survey needs to be performed.
Liquid	***Gallons***		
Nonhazardous flush water	27,130	Veolia, Portland, Oregon	See Table A-1 in Appendix A. Amount arrived at based on tank volume estimates. 10% volume flush water assumed.
Non-RCRA Hazardous	1,415,000		Allowance – survey needs to be performed.
TSCA Regulated Material	1,000		Allowance – survey needs to be performed.

Note: The actual disposal facilities will be determined at the time of the demolition. Waste Management and Veolia disposal facilities were used for this Closure Strategy Plan because of their proximity to BPP and responsiveness to waste disposal cost inquiries.

Waste types and quantities for ACM were estimated based on the 2006 ACM survey (Jenkin, 2006) and the remaining waste quantities were based on review of as-built drawings and site reconnaissance by CH2M cost estimators. Additionally, beneficial use of waste materials was considered and evaluation for repermitting the Ash Landfill to accept some of the waste should be completed. The advantage to onsite disposal in the Ash Landfill is a significant cost savings for PGE. The disadvantage is the time and level of effort that may be involved in repermitting.

If offsite disposal is used, waste will be hauled by truck or train from the site to the appropriate disposal facility. Trucks will enter and leave the site from the main gate. Trains will enter and leave on the rail spur that enters the BPP. The trucks will be loaded at the site either from temporary stockpiles or directly from the demolition activities. Water spraying may be implemented to suppress potential dust while loading. Trucks will be covered with tarps before leaving the site.

Prior to offsite disposal of any waste, a waste approval package for each waste stream will be prepared. This package will include a waste profile identifying the generator of the waste, analytical summary table(s) applicable to the waste, land disposal restrictions notification for any hazardous waste, a completed waste manifest, and any other applicable information necessary for PGE to complete its review of the disposal package and signature as the generator. The signed profile will then be submitted to the offsite facility for acceptance and approval. Once the approval letter is received from the offsite facility, transportation can be scheduled. Each load of waste material will be manifested prior to leaving the site. Each load of material leaving the site will be documented on a waste tracking Log allowing future waste disposal verification and reconciliation against the log to confirm the load reached its final destination.

The generator and the transporter must sign the manifest before the load of waste leaves the site. A copy of the manifest will be retained onsite for tracking purposes. The original signed manifest will be returned to the address of the generator. For estimating the number of trucks required, the quantity of waste is estimated in cubic yards (CY) and converted to tons as follows:

- Asbestos – 1 CY equals 1 ton
- Refractory – 1 CY equals 2 tons
- Lead-based paint – 1 CY equals 2 tons
- Construction debris – 1 CY equals 1 ton
- Asphalt – 1 CY equals 2 tons
- Concrete – 1 CY equals 2 tons
- Metals – 1 CY equals 2 tons

The demolition activities will require materials to be transported offsite. The export materials will include salvage equipment and components, recycled material, and waste for disposal. It is anticipated that approximately 2,200 total truckloads will transport waste and recycled materials offsite based on an average of 17 CY of solid waste per truck and 10,000 gallons of liquid waste per truck. For the 22-month (240 days of trucking) schedule, this is an average of nine trucks per day. Additionally, trains may be used for a portion or all of the material transport offsite.

3.5.1 Clean Construction and Demolition Debris

An estimated 6,600 CY of construction and demolition (C&D) debris will be generated as part of the demolition activities. All waste that is characterized as nonhazardous C&D debris may be transported to and disposed of at Waste Management Columbia Ridge Landfill in Arlington, Oregon.

3.5.2 Non-Resource Conservation and Recovery Act Hazardous Waste

Non-Resource Conservation and Recovery Act (RCRA) hazardous waste includes the waste identified under the RCRA in 40 CFR 261, Subparts C and D. Non-RCRA hazardous waste generated during the demolition activities will include asbestos, refractory waste, soil, and other waste identified during the demolition. This waste is currently accepted at the Waste Management Columbia Ridge Landfill in Arlington, Oregon.

3.5.3 RCRA Hazardous Waste

RCRA hazardous waste generated during the demolition activities will include LBP chips, lead waste from paint-stripping activities, and lead removed from batteries (nonuniversal waste batteries). This waste currently is accepted at the Waste Management Columbia Ridge Landfill in Arlington, Oregon.

3.5.4 Universal Waste

The following types of universal waste may be generated during the BPP demolition activities:

- Batteries containing the nickel-cadmium and small, sealed, lead-acid batteries that are found in many common items in the business and home setting, such as those used in electronic equipment, mobile telephones, portable computers, and emergency backup lighting.
- Mercury-containing equipment, including devices or a part of a device that contains elemental mercury integral to its function (e.g., thermostats, switches, and pressure or vacuum gauges that contain mercury).
- Lamps including fluorescent tubes and bulbs, high-intensity discharge lamps, sodium vapor lamps, and any other type of lamps that exhibit a characteristic of a hazardous waste. Any electric lamp that contains added mercury, whether or not it exhibits a hazardous waste characteristic, is a universal waste.

Universal waste must be shipped to a “destination facility” that treats, disposes of, or recycles a particular category of universal waste in compliance with the applicable universal waste requirements of Oregon.

3.5.5 TSCA-regulated Materials

Any light ballast identified as “PCB-Containing,” ballast without a label, or ballast that contains a leaking capacitor will be disposed offsite as PCB bulk product waste:

- In an incinerator approved under TSCA
- In a chemical waste landfill approved under TSCA
- In a RCRA-permitted hazardous waste landfill

3.5.6 Radiological

A total of 52 radioactive material sources are located at the BPP, including radioactive materials in the form of Cesium 137. Sealed sources are used at the BPP by authority of Oregon Radioactive Material License Number ORE-90735.

The radioactive sources are at multiple locations throughout the BPP, including but not limited to the feeders, crusher building, distribution bins, transfer points, coal dust collectors, lower well, reclaim pits, dumper pit, and belt conveyor. All known radioactive sources will be returned to their manufacturer. In the event that the manufacturer cannot be located, the radioactive sources will be securely containerized and disposed of using a specialty waste disposal service.

General waste leaving the site should be monitored for radioactivity to avoid rejection at the disposal facility.

3.6 Recycled Material Quantities, Disposition, and Transport

This section describes the types of materials to be recycled with anticipated quantities, and the handling, disposition, and transport. The D&D Plan (CH2M, 2015) provides a detailed description of all recyclable materials, including chlorofluorocarbons and oils.

3.6.1 Recycled Metals

Materials that will be generated during demolition activities and can be recycled include metal consisting of fencing, tanks, support beams, piping, miscellaneous building materials, electronic and process equipment, and components. Additionally, wood, plastic, electrical components, and other miscellaneous materials may be recycled depending on the economic value. The recycle types, estimated quantities, and disposition for scrap metal recyclers that accept materials for recycling are shown in Table 3-2. Table A-1 in Appendix A provides a detailed basis for the estimated quantities.

Table 3-2. Recycle Types, Estimated Quantity, and Disposition

Recycle Type	Quantity (tons)	Disposition	Basis of Estimate
Ferrous Metal	21,570	Rivergate Scrap, Portland, Oregon	See Table A-1 in Appendix A. Based on actual waste amounts from a similar project.
Nonferrous Metal	136		See Table A-1 in Appendix A. Based on actual waste amounts from a similar project.
Electronic Equipment	100		See Table A-1 in Appendix A. Based on actual waste amounts from a similar project.
Process Equipment	442		See Table A-1 in Appendix A. Based on actual waste amounts from a similar project.
High-value Alloys	4,413		See Table A-1 in Appendix A. Based on actual waste amounts from a similar project.

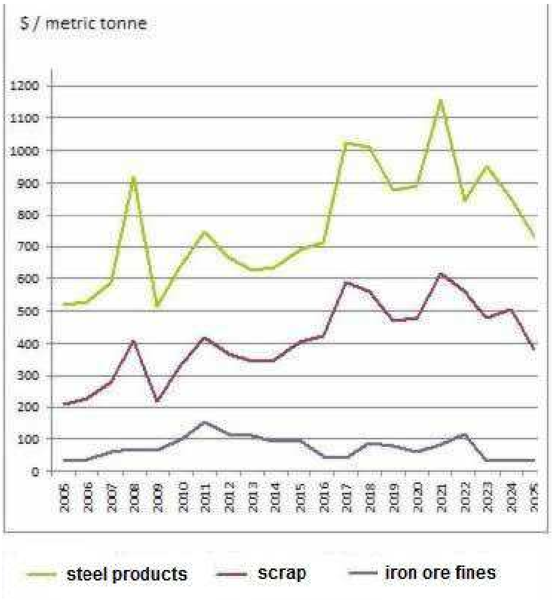
Note: The actual recycling facility will be determined at the time of the demolition. Rivergate Scrap was used for this Closure Strategy Plan because of its proximity to BPP and responsiveness to scrap value inquiries.

3.6.2 High-value Alloys

High-value alloys that will be generated during the demolition activities and can be recycled include 4,413 tons of metal consisting of stainless steel and admiralty brass from the condensers. Table 3-2 shows the recycle types, estimated quantities, and disposition for recyclers that accept scrap metal for recycling.

3.6.3 Recycled Metal Forecasts

Recycled metal values are based on worldwide supply and demand and change daily. Recycle values are difficult to predict in the future owing to the changing marketplace for scrap metals. The illustration below shows the forecasted price in US Dollars between 2015 and 2025 by metric ton. The price forecasts shown in this illustration are estimates. Actual pricing can only be determined at the time of recycling.



Source: www.steelonthenet.com/price-forecasts.html
Data supplied by James F. King. Chart date: March 2014

Note: Prices are annual averages. All forecasts are in nominal US $ terms. Steel product price is a weighted average of prices for plate, HR coil, CR coil, galvanized, rebar, merchant bar, wire rod, and sections. Scrap prices describe fob prices, European port (Rotterdam). Iron ore prices are for 64% Fe sinter fines $/ton, dry CFR China spot basis. Forecasts for high-value alloys should parallel steel prices except starting at $740/ton in 2015 and at approximately $940/ton in 2021.

SECTION 4

Demolition Methods and Sequencing

This section contains an evaluation of the three potential demolition methods and a description of the work sequence prior to demolition.

4.1 Demolition Methodology Evaluation

The following three methods of demolition of the main steel frames of the support structures were evaluated:

- Use of explosives
- Top-down surgical dismantling
- Felling

The demolition methodology evaluation is summarized in Table 4-1.

Table 4-1. Demolition Methodology Evaluation Summary

Demolition Method	Cost	Advantages	Disadvantages
	Lowest cost	Through the use of explosives, many labor hours are saved and the chance of injury is significantly reduced as personnel are not inside the structure during demolition. Explosives also allow workers to drop the structure and then use mechanical methods to cut up and segregate the pieces to reduce the amount of manual performed at elevations. This increases production and reduces the risk of injury to workers having to cut and torch.	The use of explosives has its issues with public relations, permitting, and planning. Additionally, weather conditions must be favorable to use this method. Planning for weather is critical. High winds and hot and dry weather are not favorable. Cool weather with higher humidity and calm conditions are required. Ideally use of explosives is best when a light cool mist is present to minimize dust.
Top-down Surgical Dismantling	Highest cost	This method requires multiple picks using a crane and a considerable level of effort to prepare each section for removal. Workers can bring sections of the structure to ground level and then use mechanical methods to cut up and segregate the pieces to reduce the amount of manual labor. This increases production and reduces the risk of injury to workers having to cut and torch at ground level. This method produces the least amount of dust.	This method has the longest schedule requirements and does include work inside the structure while preparing individual sections for removal. Additionally, weather conditions must be favorable to use this method. Planning for weather is critical. High winds are not favorable. Calm winds are required when picks are performed.
Felling	Middle cost	Felling requires the structure to be prepared by cutting structural supports in a manner that allows a large piece of equipment (D9 dozer or larger) with cables attached to pull the structure over. Workers can bring the entire structure to ground level and then use mechanical methods to cut up and segregate the pieces to reduce the amount of manual labor. This increases production and reduces the risk of injury to workers having to cut and torch at ground level.	The felling approach requires work inside the structure while preparing individual sections for felling including making the final cuts immediately before pulling the structure over. Additionally, weather conditions must be favorable to use this method. Planning for weather is critical. High winds and hot and dry weather are not favorable. Cool weather with higher humidity and calm conditions are required. Ideally felling is best when a light cool mist is present to minimize dust.

On the basis of cost, safety, effectiveness, and efficiency evaluation criteria, the use of explosives is the recommended means of demolition for the power block structure.

4.2 Sequencing of Work

Project work will be performed in a sequenced manner with emphasis on safety, quality, efficiency, and effectiveness. The entire demolition process must be organized and coordinated precisely to assure these considerations. For the purpose of this Closure Strategy Plan and ROM cost estimate, it is assumed that the first sequence of tasks will be to obtain all permits necessary to perform the demolition, establish work and demolition laydown areas, and demo the craft labor parking areas.

Once permits are obtained, the plant will be prepared for demolition by removing hazardous materials and salvage materials. The tanks and vessels will be decommissioned and the plant shut down. PGE will purge all systems. In the next sequence, demolition of all remaining structures will occur. Following demolition, the next sequence will encompass transport and disposal of waste, recycled materials, and salvaged equipment. The final sequence will consist of final grading and site restoration. The actual demolition sequence may differ depending on the demolition contractor or demolition program manager selected by PGE. However, the sequence outlined in this Closure Strategy Plan and ROM cost estimate is based on logical assumptions made by CH2M experience with similar projects.

A comprehensive RFP package (or set of packages) needs to be assembled and distributed to prequalified bidders. Upon contract award and with all permits in place, the following tasks will be completed in a generalized conceptual sequence:

- Verify that decommissioning and plant shutdown has occurred.
- Establish stormwater controls per an approved stormwater permit.
- Remove any residual waste (nonhazardous and hazardous) from tanks, vessels, equipment, and from spills.
- Perform asbestos and LBP abatement.
- Remove residual coal from coal yard and place in Ash Landfill (if it can be permitted) or dispose of offsite.
- Demolish/dismantle support structures including buildings and warehouse. Remove plant structure including boilers and stacks.
- Remove and backfill wastewater ponds and discharge channel.
- Crush concrete for use as backfill.
- Leftover concrete rubble and other debris could be placed in the Ash Landfill if repermitted.
- Abandon underground utilities (except stormwater systems). Cap all piping and conduits left in place.
- Remove intake pumps and piping from intake building.
- Abandon utility trenching and associated piping. Cut and cap lines.
- Cut and fill the section of discharge pipe under the divider dike in Carty Reservoir.
- Complete backfill and grading of the site using onsite soils and crushed concrete.
- Complete site restoration including environmental remediation.

Figure 4-1 depicts the assumed post-demolition site conditions.

SECTION 5

Ash Landfill Closure

Closure and post-closure plans for the Ash Landfill have been prepared separately to present the activities that will be conducted and the procedures that will be followed to close the Ash Disposal Area (also known as the Ash Landfill). Closure and post-closure will occur in accordance with USEPA's Final Coal Combustion Residual (CCR) Rule (Rule). The Rule was published in the Federal Register on April 17, 2015, and becomes effective on October 19, 2015. The Rule regulates the disposal of CCR as solid waste under Subtitle D of RCRA and sets forth national minimum criteria for existing CCR landfills.

The Rule specifies the following closure criteria for CCR landfill units: (1) requirements for preparing closure plans; (2) requirements for clean closure and closure in place of a CCR unit, including design criteria for final cover systems; (3) timeframes for commencing and completing final closure activities; and (4) closure certification requirements. Specific closure requirements for CCR landfills are listed in §257.101 to §257.103 of the Rule. The Ash Landfill will be closed by leaving the CCR in place in accordance with the closure performance standards specified in §257.102(d).

The final cover system for the Ash Landfill will be designed and constructed to minimize infiltration and erosion and will have lower permeability than the underlying soil. The thickness of the cover layers and soil characteristics will be determined during final design of the cover. They will meet the minimum cover requirements of §257.102(d), consisting of (bottom to top):

- Minimum 18-inch-thick soil infiltration layer of select earthen materials with permeability of no greater than $1x10^{-5}$ centimeters per second
- Minimum 6-inch-thick erosion layer of either earthen materials capable of sustaining plant growth or, on the roadways, crushed gravel to resist wind and water erosion.

In accordance with §257.102, closure must commence no later than 30 days after the date that the landfill receives the known final receipt of waste or 2 years after not receiving any waste (although extensions are possible). Closure construction must be completed within 6 months of commencing closure activities as required by the Rule. Extensions for closure may be allowed if it can be demonstrated that closure is not feasible within the required timeframes because of factors beyond the facility's control. If such a demonstration is necessary, a demonstration narrative will be placed into the BPP's operating record.

Closure is anticipated to occur in 2021, following retirement of the BPP. A preliminary closure construction schedule, illustrating the sequencing and anticipated duration of closure activities, is shown in Table 5-1.

Table 5-1. Preliminary Closure Construction Schedule – Ash Disposal Area

Task	Task Completion Timeframe
Last Known Receipt of Waste	To be determined
Preparation of Notification of Intent to Close Landfill	+30 days
Commence Closure: Site Preparation and Mobilization (Set Temporary Controls)	+30 days
Waste Contouring and Subgrade Preparation (Top of Waste)	+15 days
Final Cover Low-Permeability Soil Placement	+30 days
Final Cover Erosion Protection Layer	+15 days
Installation of Permanent Drainage Structures	+15 days

Table 5-1. Preliminary Closure Construction Schedule – Ash Disposal Area

Task	Task Completion Timeframe
Completion of Roadways	+15 days
Seeding/Planting of Vegetation (as applicable)	+10 days
Closure Certification/Notification and Deed Notation	+30 days

Immediately following closure of the landfill, the 30-year post-closure care period will commence. Post-closure will be complete in 30 years unless assessment monitoring is occurring, at which point post-closure care will be extended until the landfill returns to detection monitoring. A notification of post-closure care period completion will be prepared no later than 60 days following the completion of post-closure care verifying that the post-closure has been completed. The certification will be provided by a qualified professional engineer verifying that completion has occurred in accordance with this plan and the Rule. Record keeping and compliance are considered complete once the certification has been placed in the operating record, as required in §257.105. Notification is complete once notice of completion is given to the State Director and posted on a public Web site, as required by §257.105.

SECTION 6

Nonregulated Risks and Potential Mitigation Measures

A series of nonregulated risks have been identified based on available data for the BPP. Table 6-1 describes the nonregulated risks and potential mitigation methods.

Table 6-1. Risks and Mitigation Measures

Risk	Details	Potential Mitigation Methods
• Waste, Recycle, and Import Quantities – Impacted soil – Abatement material – Recycled material – Import soil – Volume of sludge in tanks	• An increase in waste and recycling quantities presents a significant risk. More-than-expected volumes of impacted soil may be encountered and require removal as part of the demolition activities. Areas of greatest concern are in the coal yard, unlined waste ponds, and underground storage tanks (USTs), all of which have the potential for encountering additional impacted soil. • Asbestos material has a tendency to swell when water is applied. Additionally, extra waste is generated as part of the abatement, including wrappings and personal protective equipment. Recycled material could be determined to be nonrecyclable as a result of contact with waste. This could affect concrete that may have spill staining, metal with LBP, or material in contact with PCBs. • If more existing soil is found to be impacted and not reusable as backfill or if the end grading requirements require additional soil, the quantity of soil may increase and affect the budget and schedule. • Lastly, it is difficult to estimate the exact amount of sludge that will be left in the aboveground storage tanks and USTs.	Mitigation measures to reduce the risk include the following: • Collect additional soil data adjacent to structures and underground piping that will be removed. • Include a contingency in the reserve for the transport and disposal of additional impacted soil. • To mitigate abatement quantities, perform update to the environmentally regulated material survey. • Assume some loss as a result of contamination. • Inspect material before demolition to limit the amount of commingling of these materials, reducing what is waste versus recyclable material.
• Resources – Personnel power availability – Equipment availability – Contractor availability – Disposal and recycling facilities – Truck and transport – Fuel availability and cost	• Risk associated with resources is significant. This project will consume a large labor force. Depending on the amount of other regional construction, a shortage of skilled local workers is possible. This project will require a relatively large amount of the equipment. Depending on the amount of other regional construction, a shortage of equipment is possible. • Depending on the economy, the number of available demolition contractors could be limited. This might not result in best value. As evidenced in the past, disposal and recycling facilities come and go. This could impact transportation, disposal, and recycling costs. • Additionally, this project will require a large amount of the truck and transport and train. Depending on the volume of other regional construction, a shortage of truck and transport is possible. This project will also consume a large	Mitigation measures to reduce the risk include the following: • Offer incentive plans to workers for longevity, safety, and quality. • Add contingency to cover mobilization and demobilization from outside areas. • Solicit Request for Proposal far in advance of work. • Prequalify in advance. • Purchase fuel at a predetermined rate in advance.

Table 6-1. Risks and Mitigation Measures

Risk	Details	Potential Mitigation Methods
	amount of the fuel. Depending on the amount of other fuel construction, a shortage of local fuel or delivery is conceivable. Additionally, increases in fuel prices, especially diesel, may significantly increase before the start of demolition.	
• Schedule – Delays caused by weather – Delays caused by resource unavailability – Delays caused by others	• Risk associated with schedule is significant. Adverse weather conditions could cause a delay in schedule. • Turnover of personnel is probable. Government, business, the public, and citizen groups could also impact the schedule. • Schedule is a risk as PGE and owner's engineer (OE) budgets are based on the demolition contractor's schedule. If their schedule goes long, there are cost impacts to PGE and the OE in managing the additional schedule.	Mitigation measures to reduce the risk include the following: • Prepare a contingency plan to staff up. • Offer incentive plans to workers for longevity, safety, and quality. • Add contingency funding. • Engage in effective public relations, meetings, and information updates.
• Safety – Working at elevations – Overtime hours – Working in confined space – Working around hazardous waste – Working around equipment	• Risk associated with safety is significant. Workers on platforms, in harnesses, at high elevations, and with limited ingress and egress can be a safety issue. • Stress from long hours and consecutive days worked is possible. • Cold and heat stress and atmosphere conditions can be immediately dangerous to life and health. • Struck by or in between and collisions with equipment are possible.	Mitigation measures to reduce the risk include the following: • Provide proper training, planning, and implementation of the demolition activities. • Know that staff rotations will be critical. • Ensure proper air circulation and PPE to mitigate the atmosphere concerns. • Provide for periodic training and avoidance of equipment so workers do not become complacent. • Enact traffic plans and traffic monitors to reduce injuries between equipment and workers. • Procure contractor with strong safety record.
• Miscellaneous Unknowns – What is buried and not known (unknown conditions) – Work in Carty Reservoir at the Divider Dike	• Risks associated with unknowns could be significant. Piping, structures, USTs, contaminated soil, and unexpected high groundwater may be encountered.	Mitigation measures to reduce this risk include the following: • Have a contingency plan in place and add contingency dollars to cover the plan. • Verify engineering specification is included as part of the demolition contractor's Final Demolition Work Plan. • Define exact method of extraction during the planning phase and plan/permit accordingly.

SECTION 7

Class 4 Budgetary Estimate

A Class 4 budgetary cost estimate has been prepared for the planning, engineering, predemolition, and demolition of the BPP and the Ash Landfill closure. This section describes the cost estimating methodology, ROM assumptions, and basis of estimate. Appendix A contains the Class 4 budgetary cost estimate details.

7.1 Cost Estimating Methodology

The cost estimates were completed using the commercially vended estimating software called Heavy Construction System Specialist. The estimates were prepared assuming work 5 days a week and 8 hours per day for the 240-working-day schedule.

The following reports were prepared and are included in Appendix A:

- Detailed Cost Report
- Basis of Estimate (Table A-1)
- Summary of Costs for Each Option (Table A-2)
- Summary of Costs by Month and Year (Table A-3)
- Project Resources by Price (Table A-4)

Table A-1 (located in Appendix A) presents a summary of these reports. Figure 7-1 presents a bar graph for the cost breakdown by year and month.

7.1.1 Detailed Cost Report

The basic detailed level of the estimate is called the Detailed Cost Report (DCR). This reports the details in cost without markup for fringe and profit. Tables A-2 to A-4 provide costs in price. The DCR is broken down into the identified items of work called “Bid Items,” which could be termed pay items. Bid items are sometimes further subdivided into appropriate activities. Each activity is estimated via a detailed level of effort method whereby all resources, personnel hours, personnel, materials, and expenses to accomplish that task are listed.

Resources are coded as follows:

- Labor is coded with an “alpha” prefix. For example, CAR corresponds to “Carpenter.” These rates are representative for the area and include labor, fringe benefits, payroll taxes, and insurance. The resource codes are as follows:
  - Resources coded with a “2” prefix are construction materials incorporated in the project.
  - Resources coded with a “3” prefix are construction expenses utilized during construction.
  - Resources coded with a “4” prefix are intended as all-inclusive subcontract amounts not estimated in detail.
  - Resources coded with an “8” prefix are construction equipment, including operating cost but not including the operator, which is considered labor.
  - Resources coded with “5, 6, and 7” prefixes are costs for the technical services and construction management contractor.
- Activities were staffed with an appropriate crew mix of labor, equipment, and materials and assigned duration in shifts or crew hours to arrive at a “cost” for the work.

7.2 Rough Order-of-Magnitude Assumptions

The ROM estimates were completed based on the demolition assumptions described in Section 1.3 of the D&D Plan (CH2M, 2015) and on the following ROM-specific assumptions:

- Labor is all local union labor, and no travel expenses have been included.
- PM/CM labor represents the cost to manage planning, engineering, execution and the demolition. This can be performed by a PGE team or a PM/CM contractor.
- All local labor and resources are available.
- Estimates are based on 2015 permit and regulatory requirements.
- Stated estimates are based on best and only data available in July 2015. Other data might exist; however, the data were not available to the project team during the preparation of this ROM estimate. It is suggested that the ROM estimate be revisited if additional and relevant data become available.
- Backfill quantities were based on 3-D models using commercially available satellite imagery (Google Earth. Because this estimate is not based on an actual land survey, backfill quantities could vary 25 to 50 percent.

Also see assumptions listed within each bid item of the detailed cost estimate located in Appendix A.

7.3 Basis of Estimate

The cost estimate for the schedule is based on 2015 dollars and the set of assumptions outlined in Section 1.3 of the D&D Plan (CH2M, 2015). This cost estimate is based on the best available data in September 2015. Additional data or future data could alter this cost estimate both in composition and in cost. This section provides the basis of the ROM cost estimate and a summary. Table A-1 contains a detailed breakdown of the basis of estimate.

7.3.1 Basis of Estimate

7.3.1.1 Demolition Labor

The crew size is anticipated to average 30 people, resulting in an average total labor cost per day of $10,000. Total labor-hours for the schedule (240 working days) are 22,113 hours. These hours do not take into consideration lost productivity resulting from the extensive amount of overtime that will be required. Total labor costs for the demolition are estimated at $2,400,000.

7.3.1.2 Contractor Supervision

In addition to the skilled labor, the demolition contractor will also provide supervision for the demolition activities. These will include health and safety, quality control, superintendent, compliance, and other supporting personnel. The average daily cost for the contractor supervision is $2,040. Total cost for contractor supervision is $490,000.

7.3.3.3 PGE or PM/CM

The level of effort for the PGE or PM/CM 240-working day schedule cost estimate presents a breakdown of effort and labor rates in detail. An estimated 14,000 hours will be required at an estimated cost of $1,400,000.

7.3.3.4 Equipment

The maximum quantity of onsite equipment anticipated during demolition activities is 20 (excluding service vehicles), with an average of 15 pieces of equipment for the duration of the project. The equipment is expected to be working 5 days a week during the approximately 240 working days it will take to complete the work. The average cost per day is $20,000. Total equipment costs for the demolition are estimated at $4,800,000. The estimate for all work is based on 2015 dollars with no demolition contractor's markup.

7.3.3.5 Work Plans

The work plans for the project are as follows:

- Health and Safety Plan
- Demolition Work Plan
- Traffic Control Plan
- Noise Monitoring Plan
- Stormwater Pollution Prevention Plan
- Environmental Protection Plan
- Waste Management Plan
- Air Monitoring Plan
- Grading Plan
- Recycling Plan
- Quality Control Plan

The estimated cost to prepare the work plans is $35,000.

7.3.3.6 Permits

Permits have been estimated to cost $23,000, excluding bonds.

7.3.3.7 Waste Characterization/Profile

Waste characterization and profiling has been estimated at $50,000.

7.3.3.8 Recycling

It is estimated that the following recycled materials will be generated as part of the demolition activities:

- 21,568 tons of ferrous metal to be recycled (-$1,790,144)
- 110 tons of nonferrous metal to be recycled (-$11,288)
- 100 tons of electronics to be recycled (-$195,300)
- 442 tons of process equipment to be recycled ($-85,306)
- 4,413 tons of high-value metal to be recycled ($-3,058,210)

The total value for recycling and reuse is estimated at $5,140,247.

7.3.3.9 Export Transportation and Disposal

It is estimated that the following solid and liquid waste and material will be generated as part of the abatement and demolition activities:

Solid

- 24,438 tons of sludge from spills, ponds, and USTs ($1,011,538)
- 1,200 tons of soil from remediation areas ($117,700)
- 6,630 tons of C&D ($251,940)
- 14 tons of universal waste ($57,000)
- 1,580 tons of ACM ($60,040)
- 1,000 tons of Non-RCRA Hazardous ($26,000)
- 20 tons of LBP ($8,000)
- 500 tons of RCRA hazardous ($100,000)

- 5 tons of TSCA regulated material ($10,000)

Liquid

- 27,100 gallons of nonhazardous flush water ($54,200)
- 37,000 gallons of non-RCRA hazardous ($37,000)
- 170,500 gallons of non-TSCA ($170,500)
- 1,000 gallons of TSCA regulated material ($10,000)

The total cost for waste transportation and disposal is estimated at $1,744,918.

7.3.4 Summary

As discussed in Section 1.4 (Planning and Engineering Closure Management Strategies), the Closure Strategy Plan presents estimated prices based on three options. Table A-2 (Appendix A) presents the cost estimate for each option broken down into bid items for the planning, engineering, execution, predemolition, demolition, management, soil cleanup, Ash Landfill closure, and credit for the salvage and recycling. Table A-3 presents the cost for Options 1 and 2 by month and year.

The estimated costs of Options 1 and 2 is $18,760,544, respectively, and the estimated cost of Option 3 is $21,854,263. Options 1 and 2 estimated costs are the same based on PGE direct contracting for both options and because the costs to manage the D&D would be similar whether PGE manages the work or contracts a PM/CM to manage the work. The difference in Option 3 is that the GC contracted by PGE would have costs associated with managing the D&D, would be taking on the risk associated with managing and delivery the D&D, and would mark up the demolition contractor' costs. Appendix A presents the detailed estimating reports for the collective options.

SECTION 8

References

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Figures

Appendix A

Class 4 Budgetary Cost Estimate Details

Insert Table A-1 – Detailed Cost Report and Basis of Estimate

(PDF of Excel 11x17 file)

Table A-2. Summary of Costs for Each Option
PGE Boardman, Oregon Unit 1 Demolition

Option 1 PGE directly contracts with demolition company and hires consultant to oversee the work
Option 2 PGE directly contracts with demolition company and oversees the work
Option 3 PGE contracts with consultant who in turn contracts and manages demolition company

Bid Item	Description	Takeoff Quantity	Units	Option 1 Total	Option 2 Total	Option 3 Total
1010100	**PLANNING**					
1010110	Closure Strategy	1	LS	$49,660	$49,660	$49,660
1010120	Permitting Requirements and Initiation	1	LS	$18,314	$18,314	$18,314
1010130	Existing Permit Inventory and Closeout Strategy	1	LS	$16,274	$16,274	$16,274
1010140	Refine End Use	1	LS	$18,251	$18,251	$18,251
1010150	Stakeholder Relations and Engagement	1	LS	$13,689	$13,689	$13,689
1010160	Regulatory Agency Communications	1	LS	$14,939	$14,939	$14,939
1010170	Carty Plant Isolation	1	LS	$44,315	$44,315	$44,315
1010199	**SUBTOTAL PLANNING**			**$175,441**	**$175,441**	**$175,441**
1110100	**ENGINEERING**					
1110110	Carty Plant Isolation Engineering	1	LS	$41,805	$41,805	$41,805
1110120	Decommissioning and Demolition Plan	1	LS	$28,105	$28,105	$28,105
1110130	Cold and Dark Status Plan	1	LS	$38,280	$38,280	$38,280
1110140	Plant Staff Utilization Plan	1	LS	$13,249	$13,249	$13,249
1110150	Environmentally Regulated Material Survey	1	LS	$120,789	$120,789	$120,789
1110160	Environmental Assessment	1	LS	$35,980	$35,980	$35,980
1110170	Salvage Plan	1	LS	$17,689	$17,689	$17,689
1110180	Closure Engineering Documents	1	LS	$25,999	$25,999	$25,999
1110190	Cost Estimate	1	LS	$21,924	$21,924	$21,924
1110199	**SUBTOTAL ENGINEERING**			**343,819**	**343,819**	**$343,819**
1210000	**EXECUTION**					
1210110	Execution Plan	1	LS	$26,267	$26,267	$26,267
1210120	Contract Documents	1	LS	$54,218	$54,218	$54,218
1210130	Demolition and Closure Bid Process	1	LS	$36,825	$36,825	$36,825
1210140	Obtain Permits	1	LS	$23,237	$23,237	$23,237
1210150	Presale and PGE Salvaged Equipment	1	LS	$13,424	$13,424	$13,424
1210199	**SUBTOTAL EXECUTION**			**$153,972**	**$153,972**	**$153,972**
	Subtotal Planning			**$673,231**	**$673,231**	**$673,231**
1310000	**PREDEMOLITION**					**0.15**

Table A-2. Summary of Costs for Each Option

PGE Boardman, Oregon Unit 1 Demolition

Option 1 PGE directly contracts with demolition company and hires consultant to oversee the work
Option 2 PGE directly contracts with demolition company and oversees the work
Option 3 PGE contracts with consultant who in turn contracts and manages demolition company

Bid Item	Description	Takeoff Quantity	Units	Option 1 Total	Option 2 Total	Option 3 Total
1310110	Cold and Dark Implementation	1	LS	$49,868	$49,868	$57,349
1310120	Decontamination	1	LS	$146,597	$146,597	$168,587
1310130	Abatement and Asset Recovery Process					
1310131	• Asbestos	1	LS	$4,264,880	$4,264,880	$4,904,612
1310132	• Lead Based Paint	1	LS	$67,301	$67,301	$77,396
1310133	• Universal Waste and Other Hazardous Waste	1	LS	$88,046	$88,046	$101,253
1310134	• Asset Recovery	1	LS	-		
1310140	Waste Characterization, Handling, Transportation,					
1310141	• Clean Construction and Demolition Debris	1	LS	$304,322	$304,322	$349,971
1310142	• Non-RCRA Hazardous Waste	1	LS	$115,125	$115,125	$132,393
1310143	• RCRA Hazardous Waste	1	LS	$329,858	$329,858	$379,337
1310144	• Universal Waste	1	LS	$44,754	$44,754	$51,467
1310145	• TSCA Regulated Materials	1	LS	$11,844	$11,844	$13,621
1310150	Recycle Material Handling					
1310151	• Recycle Metals Processing	1	LS	$401,713	$401,713	$461,971
1310199	**SUBTOTAL PREDEMOLITION**			**$5,824,309**	**$5,824,309**	**$6,697,956**
1410000	**DEMOLITION**					
1410110	Planning Documents	1	LS	$35,532	$35,532	$40,862
1410120	Stormwater Controls and BMP	1	LS	$33,418	$33,418	$38,431
1410130	Mobilization	1	LS	$65,970	$65,970	$75,866
1410140	Aboveground Storage Tanks	1	LS	$174,905	$174,905	$201,141
1410150	Underground Storage Tanks	1	LS	$260,284	$260,284	$299,326
1410160	Settling Lagoon System	1	LS	$254,823	$254,823	$293,047
1410170	Coal Yard Concrete Settling Basin for Clarifier	1	LS	$104,963	$104,963	$120,708
1410180	Evaporation Ponds	1	LS	$1,007,284	$1,007,284	$1,158,377
1410190	Wash water Pond	1	LS	$64,791	$64,791	$74,509
1410200	Support Structures					
1410201	• Administration Building	1	LS	$39,843	39,843	45,820

Table A-2. Summary of Costs for Each Option
PGE Boardman, Oregon Unit 1 Demolition

Option 1 PGE directly contracts with demolition company and hires consultant to oversee the work
Option 2 PGE directly contracts with demolition company and oversees the work
Option 3 PGE contracts with consultant who in turn contracts and manages demolition company

Bid Item	Description	Takeoff Quantity	Units	Option 1 Total	Option 2 Total	Option 3 Total
1410202	• Guard Shack	1	LS	$6,224	6,224	7,158
1410203	• Eight Warehouse Buildings	1	LS	$149,413	149,413	171,825
1410204	• Lube Oil Building	1	LS	$9,800	$9,800	$11,270
1410205	• Vehicle Maintenance Building	1	LS	$9,961	$9,961	$11,455
1410206	• Fire Pump house	1	LS	$9,961	$9,961	11,455
1410207	• Rail Car Unloading Facility	1	LS	$139,452	$139,452	$160,370
1410208	• Transfer Structure	1	LS	$229,818	$229,818	$264,291
1410209	• Air Quality Control Building	1	LS	$99,937	$99,937	$114,927
1410210	Precipitator Structure and Blower House	1	LS	$505,575	$505,575	$581,412
1410220	Chimney	1	LS	$294,377	$294,377	$338,533
1410230	Conveyor System	1	LS	$703,363	$703,363	$808,868
1410240	Intake Structure	1	LS	$80,176	$80,176	$92,203
1410250	Discharge Structure and Channel	1	LS	$128,603	$128,603	$147,893
1410260	Coal Yard	1	LS	$719,017	$719,017	$826,869
1410270	Electrical Switchyard	1	LS	$291,345	$291,345	$335,046
1410280	Transmission Lines	1	LS	-	-	-
1410290	Fly Ash Silo and Dome	1	LS	$197,056	$197,056	$226,615
1410300	Power Block	1	LS	$1,660,450	$1,660,450	$1,909,518
1410310	Underground Piping and Utilities	1	LS	$87,020	$87,020	$100,073
1410315	Concrete Removal - All Areas	1	LS	$548,014	$548,014	$630,216
1410320	Concrete Processing - Backfill Material	1	LS	$179,907	$179,907	$206,893
1410330	Backfill and Grading - concrete and onsite soil us	1	LS	$153,893	$153,893	$176,977
1410340	Site Restoration	1	LS	$373,089	$373,089	$429,053
1410350	Demobilization	1	LS	$65,970	$65,970	$75,866
1410360	As-Builts	1	LS	$38,754	$38,754	$44,567
1410399	**SUBTOTAL DEMOLITION**			**$8,722,991**	**$8,722,991**	**$10,031,439**
1510000	**MANAGEMENT COSTS**					
1510110	Contractor Project Management cost	1	LS	$2,009,381	$2,009,381	$2,310,788
1510120	CH2M or other Consultant cost (labor and contractor	1	LS	$2,306,122		$2,306,122

Table A-2. Summary of Costs for Each Option

PGE Boardman, Oregon Unit 1 Demolition

Option 1 PGE directly contracts with demolition company and hires consultant to oversee the work
Option 2 PGE directly contracts with demolition company and oversees the work
Option 3 PGE contracts with consultant who in turn contracts and manages demolition company

Bid Item	Description	Takeoff Quantity	Units	Option 1 Total	Option 2 Total	Option 3 Total
1510130	PGE costs to oversee	1	LS	$296,640	$2,602,762	$296,640
1510199	SUBTOTAL MANAGEMENT COSTS			$4,612,143	$4,612,143	$4,913,550
1610000	**SOIL CLEANUP**					
1610110	Shooting Range Berm	1	LS	$94,689	$94,689	$108,893
1610120	Lube oil shack	1	LS	$11,958	$11,958	$13,752
1610130	Transformer Spill	1	LS	$42,516	$42,516	$48,893
1610140	Demil Tank Oil Spill	1	LS	$27,934	$27,934	$32,124
1610150	Auto Repair Shop Spill	1	LS	$16,117	$16,117	$18,534
1610160	Fuel Oil Tank Spill	1	LS	$16,117	$16,117	$18,534
1610199	SUBTOTAL SOIL CLEAN-UP			$209,331	$209,331	$240,731
1710000	**ASH LANDFILL CLOSURE**					
1710100	Ash Landfill Closure	1	LS	$527,211	$527,211	$606,293
1710199	SUBTOTAL ASH LANDFILL CLOSURE			$527,211	$527,211	$606,293
1810100	**Subcontractor General Conditions**	**1**	**LS**	**$3,331,574**	**$3,331,574**	**$3,831,310**
1910100	TBD	1	LS	-		
2999999	**TOTAL ALL PLANNING and DEMOLITION**			**$23,900,791**	**$23,900,791**	**$26,994,510**
3000000	**METALS RECYCLING**					
3000100	Ferrous Metals Recycling	1	LS	($1,790,144)	($1,790,144)	($1,790,144)
3000200	Non-Ferrous Metals Recycling	1	LS	($11,288)	($11,288)	($11,288)
3000300	Electronics Recycling	1	LS	($195,300)	($195,300)	($195,300)
3000400	Process Equipment Recycle	1	LS	($85,306)	($85,306)	($85,306)
3000500	High Value Metals Recycling	1	LS	($3,058,209)	($3,058,209)	($3,058,209)
3000999	**SUBTOTAL METALS RECYCLING**	**0**		**($5,140,247)**	**($5,140,247)**	**($5,140,247)**
	PGE Total After Metals Rebates			$18,760,544	$18,760,544	$21,854,263

Note:

This is not an offer for construction and/or project execution. Please note,-this Class 4 AACE Order of Magnitude cost estimate is assumed to represent the actual installed cost within the range of - 30 percent to + 50 percent of the total costs indicated. The cost estimate has been prepared for guidance in project evaluation and implementation from the information available at the time of the estimate. The final costs of the project will depend on actual labor and material costs, and competitive market conditions, implementation schedule, and other variable factors.

Table A-3 Summary of Costs by Month and Year
(PDF of Excel 11x17 file)

Table A-4 Project Resources by Price
(PDF of Excel 11x17 file)

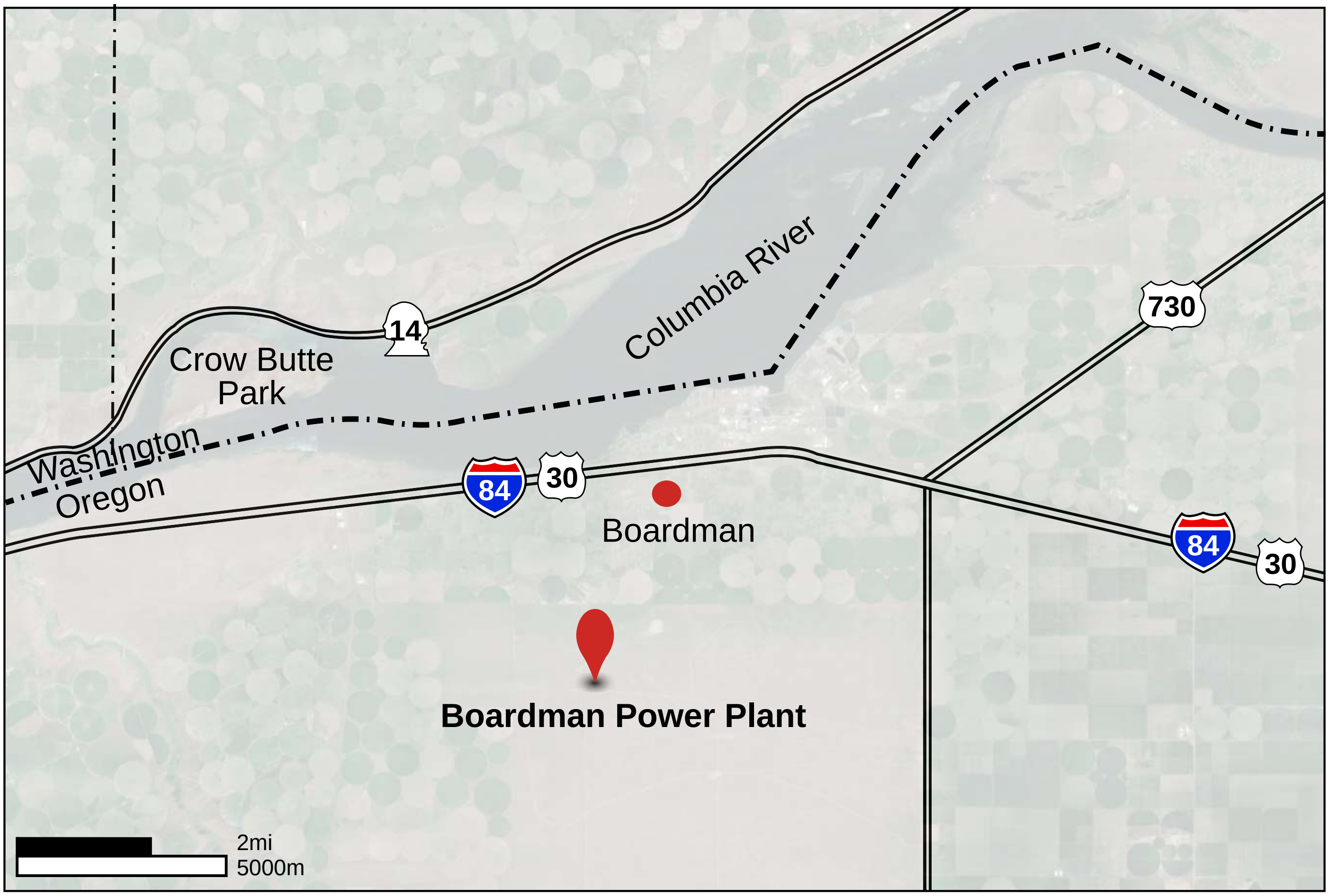

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Figure 1-1
Location Map
Boardman Power Plant Closure Strategy Plan
Boardman, Oregon

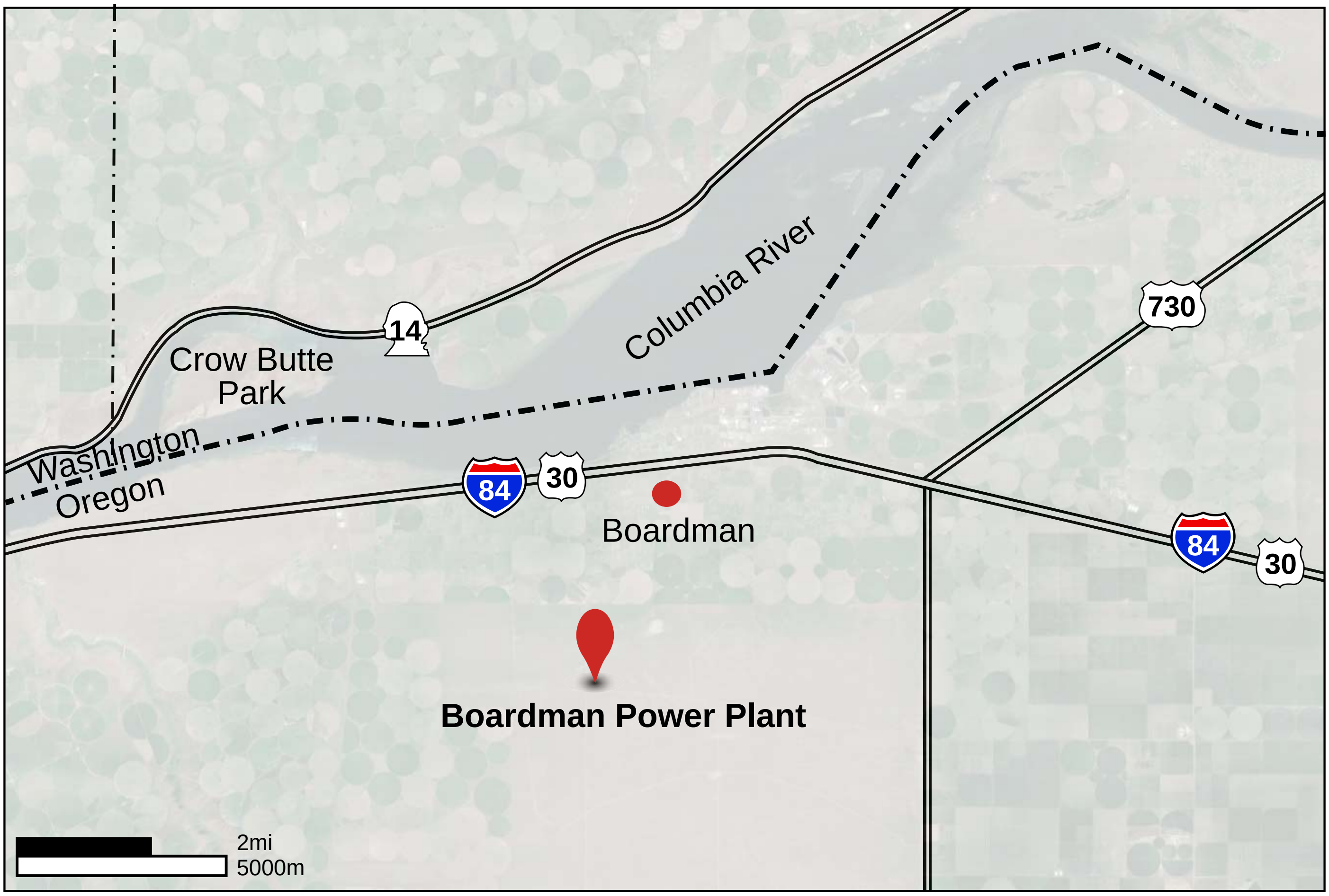

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Figure 1-1
Location Map
Boardman Power Plant Decommissioning and Demolition Plan
Boardman, Oregon

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Figure 1-2
Boardman Power Plant Site
Boardman Power Plant Closure Strategy Plan
Boardman, Oregon

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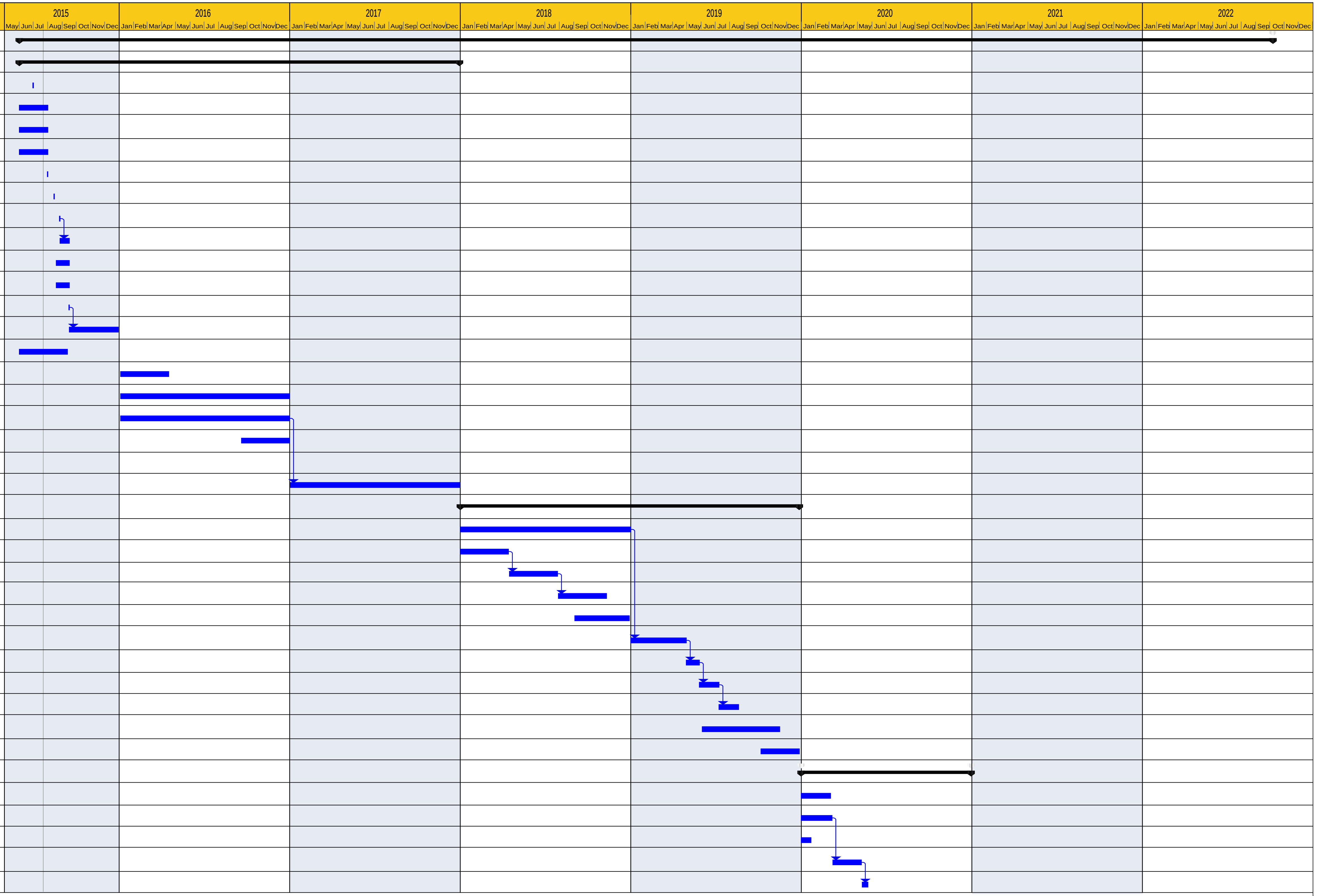
Figure 1-2
Boardman Power Plant Site
Boardman Power Plant Decommissioning Planning
Boardman, Oregon

ch2m:

ID	Task Name	Duration	Start	Finish
1	D&D Process	1920 days	Mon 6/1/15	Fri 10/7/22
2	Planning	675 days	Mon 6/1/15	Fri 12/29/17
3	Meeting to discuss D&D and Closure Plans	1 day	Tue 6/30/15	Tue 6/30/15
4	Prepare Draft D&D Plan	45 days	Mon 6/1/15	Fri 7/31/15
5	Prepare Draft Ash LF Closure/Post Closure Plan	45 days	Mon 6/1/15	Fri 7/31/15
6	Prepare Draft Class 4 Budgetary Estimate	45 days	Mon 6/1/15	Fri 7/31/15
7	Submit Draft D&D Plan	1 day	Fri 7/31/15	Fri 7/31/15
8	Submit Draft Closure and Post Closure Plan and Estimate	1 day	Fri 8/14/15	Fri 8/14/15
9	Meeting to discuss Draft D&D and Closure Plans	1 day	Wed 8/26/15	Wed 8/26/15
10	Prepare Final D&D Plan	14 days	Thu 8/27/15	Tue 9/15/15
11	Prepare Final Ash LF Closure/Post Closure Plan	20 days	Wed 8/19/15	Tue 9/15/15
12	Prepare Final Class 4 Budgetary Estimate	20 days	Wed 8/19/15	Tue 9/15/15
13	Submit Final D&D and Closure Plans	1 day	Tue 9/15/15	Tue 9/15/15
14	Prepare Draft Closure Strategy	75 days	Wed 9/16/15	Tue 12/29/15
15	Identify Permitting Requirements	75 days	Mon 6/1/15	Fri 9/11/15
16	Refine End Use	75 days	Mon 1/4/16	Fri 4/15/16
17	Engage Stakeholders	260 days	Mon 1/4/16	Fri 12/30/16
18	Begin Communication with Regulatory Agencies	260 days	Mon 1/4/16	Fri 12/30/16
19	Prepare Draft Isolation Plan for Carty	75 days	Mon 9/19/16	Fri 12/30/16
20	Request Funding for Isolation Engineering and Const	1 day	Mon 5/1/17	Mon 5/1/17
21	Initiate Permitting	260 days	Mon 1/2/17	Fri 12/29/17
22	Engineering	520 days	Mon 1/1/18	Fri 12/27/19
23	Continue Permitting Process	261 days	Mon 1/1/18	Mon 12/31/18
24	Prepare Engineering Plans for Isolation	75 days	Mon 1/1/18	Fri 4/13/18
25	Update D&D Plans	75 days	Mon 4/16/18	Fri 7/27/18
26	Prepare Draft Cold and Dark Status Plan	75 days	Mon 7/30/18	Fri 11/9/18
27	PGE Boardman Plant Staff utilization Plan	85 days	Mon 9/3/18	Fri 12/28/18
28	Perform Carty Isolation	85 days	Tue 1/1/19	Mon 4/29/19
29	Perform Comprehensive ERM Survey	20 days	Tue 4/30/19	Mon 5/27/19
30	Perform Environmental Assessment	30 days	Tue 5/28/19	Mon 7/8/19
31	Prepare Salvage Plan	30 days	Tue 7/9/19	Mon 8/19/19
32	Prepare Engineering Documents for Closure	120 days	Mon 6/3/19	Fri 11/15/19
33	Update Cost Estimate	60 days	Mon 10/7/19	Fri 12/27/19
34	Execution	260 days	Wed 1/1/20	Tue 12/29/20
35	Finalize Execution Plan	45 days	Wed 1/1/20	Tue 3/3/20
36	Prepare Contract Documents	48 days	Wed 1/1/20	Fri 3/6/20
37	Prequalify Demolition Contractors	15 days	Wed 1/1/20	Tue 1/21/20
38	Solicit Bids	45 days	Mon 3/9/20	Fri 5/8/20
39	Bid Evaluation and Shortlist	10 days	Mon 5/11/20	Fri 5/22/20

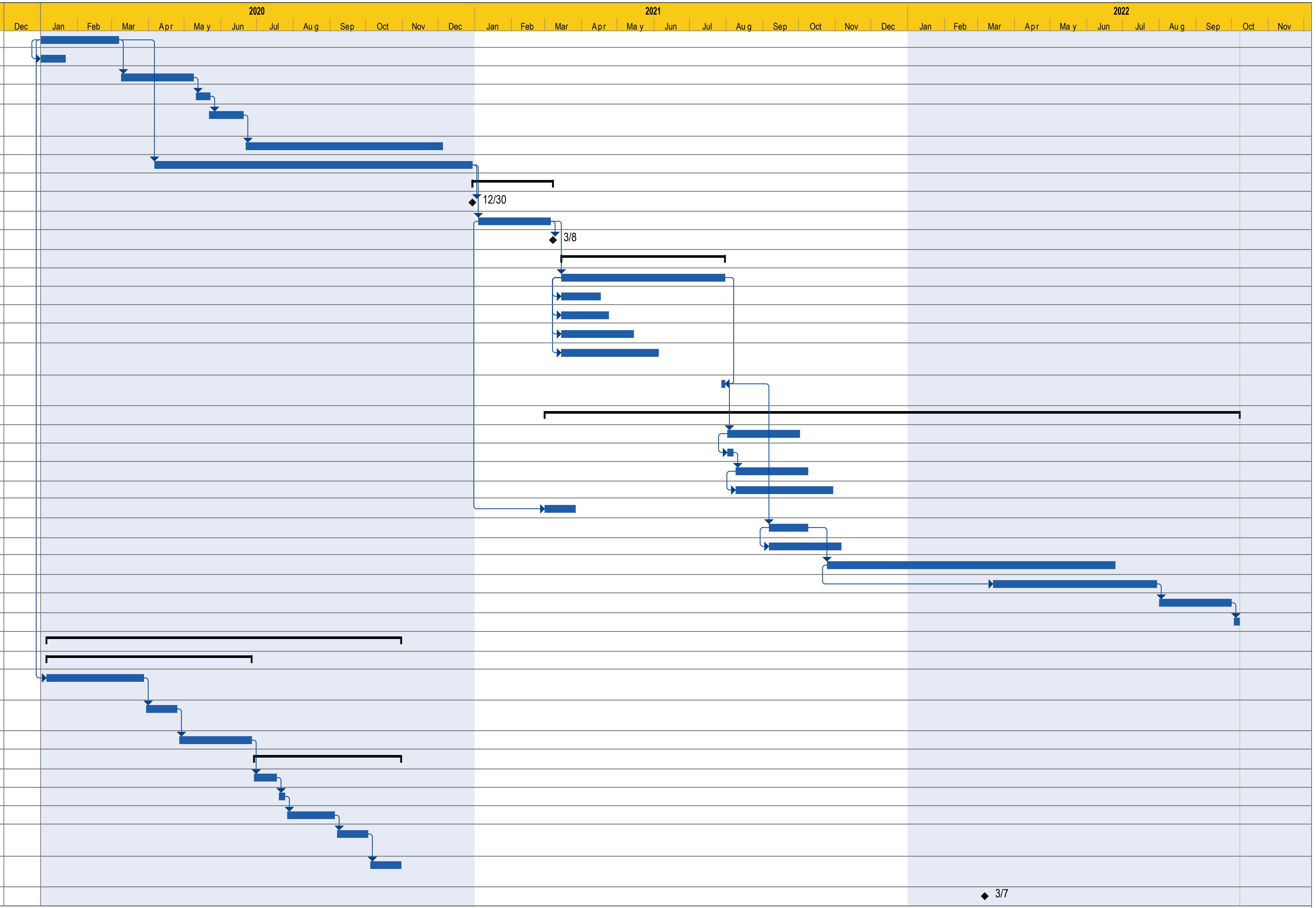


Project: Boardman PreDemo Planning
Date: Wed 7/22/15

Task
Split
Milestone ◆
Summary
Project Summary
External Tasks
External Milestone ◆
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup ◆
Manual Summary ◆
Start-only
Finish-only
External Tasks ◇
External Milestone
Progress
Deadline

Figure 1-3
Baseline Schedule
Boardman Power Plant Closure Strategy Plan
Boardman, Oregon

ID	Task Name	Duration	Start	Finish
1	Prepare Contract Documents	48 days	Wed 1/1/20	Fri 3/6/20
2	Prequalify Demolition Contractors	15 days	Wed 1/1/20	Tue 1/21/20
3	Solicit Bids	45 days	Mon 3/9/20	Fri 5/8/20
4	Bid Evaluation and Shortlist	10 days	Mon 5/11/20	Fri 5/22/20
5	Select Demo Contractor and Award Contract	21 days	Fri 5/22/20	Fri 6/19/20
6	Finalize and Obtain Permits	120 days	Mon 6/22/20	Fri 12/4/20
7	Prepare for cold and dark	192 days	Mon 4/6/20	Tue 12/29/20
8	**Cold and Dark Status**	48 days	Wed 12/30/20	Mon 3/8/21
9	Plant Goes Offline	0 days	Wed 12/30/20	Wed 12/30/20
10	Decommissioning	45 days	Mon 1/4/21	Fri 3/5/21
11	Transfer to Demo Contractor	0 days	Mon 3/8/21	Mon 3/8/21
12	**Abatement**	100 days	Mon 3/15/21	Fri 7/30/21
13	ACM Abatement	100 days	Mon 3/15/21	Fri 7/30/21
14	LBP Removal and Stabilization	25 days	Mon 3/15/21	Fri 4/16/21
15	Universal Waste Removal	30 days	Mon 3/15/21	Fri 4/23/21
16	Hazardous Waste Removal	45 days	Mon 3/15/21	Fri 5/14/21
17	Removal of residuals from Tanks and Systems	60 days	Mon 3/15/21	Fri 6/4/21
18	Final Clearance Sampling and Certification	3 days	Wed 7/28/21	Fri 7/30/21
19	**Demolition**	420 days	Mon 3/1/21	Fri 10/7/22
20	Structure Preparation	45 days	Mon 8/2/21	Fri 10/1/21
21	Install SWPPP Required BMPs	5 days	Mon 8/2/21	Fri 8/6/21
22	Pond Removals and Backfill	45 days	Mon 8/9/21	Fri 10/8/21
23	Coal Yard Cleanup and Cover	60 days	Mon 8/9/21	Fri 10/29/21
24	Final Materials into Ash Landfill	20 days	Mon 3/1/21	Fri 3/26/21
25	UST Removal	25 days	Mon 9/6/21	Fri 10/8/21
26	Support Structure Demo	45 days	Mon 9/6/21	Fri 11/5/21
27	Power Block Demo	175 days	Mon 10/25/21	Fri 6/24/22
28	Underground Utility Demo	100 days	Mon 3/14/22	Fri 7/29/22
29	Site Restoration and Grading	45 days	Mon 8/1/22	Fri 9/30/22
30	Seeding and Erosion Controls	5 days	Mon 10/3/22	Fri 10/7/22
31	**Ash Landfill Closure**	215 days	Mon 1/6/20	Fri 10/30/20
32	**Engineering and Permitting**	125 days	Mon 1/6/20	Fri 6/26/20
33	Prepare Engineering Documents for Closure	60 days	Mon 1/6/20	Fri 3/27/20
34	Permitting - ODEQ Approval to Construct	20 days	Mon 3/30/20	Fri 4/24/20
35	Bid and Award Contract	45 days	Mon 4/27/20	Fri 6/26/20
36	**Construction**	90 days	Mon 6/29/20	Fri 10/30/20
37	Contractor Submittals/Mob/Survey	15 days	Mon 6/29/20	Fri 7/17/20
38	Install Stormwater BMPs	5 days	Mon 7/20/20	Fri 7/24/20
39	Initial Grading and Contours	30 days	Mon 7/27/20	Fri 9/4/20
40	Import Cover Material and Placement	20 days	Mon 9/7/20	Fri 10/2/20
41	Topsoil Placement/Soil Stabilization/Storm Water Controls	20 days	Mon 10/5/20	Fri 10/30/20
42	**Demolition and LF Closure Complete**	0 days	Mon 3/7/22	Mon 3/7/22



Project: PGE_Boardman_D Tue 9/29/15 Plan_Figu
Date: Tue 9/29/15

Task	▬	Summary	┌─┐	Inactive Milestone	◇	Duration-only	▬	Start-only	[	External Milestone	◆	Manual Progress	─
Split	┄	Project Summary	┌─┐	Inactive Summary	┌─┐	Manual Summary Rollup	▬	Finish-only	]	Deadline	⬇		
Milestone	◆	Inactive Task	▭	Manual Task	▬	Manual Summary	┌─┐	External Tasks	▬	Progress	─		

SCALE

300 Feet

Figure 1-3
Baseline Schedule
Boardman Power Plant Decommissioning and Demolition Plan
Boardman, Oregon

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Figure 3-1
Post Demolition Site Conditions
Boardman Power Plant Decommissioning Planning
Boardman, Oregon

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Figure 4-1
Post Demolition Site Conditions
Boardman Power Plant Decommissioning Planning
Boardman, Oregon

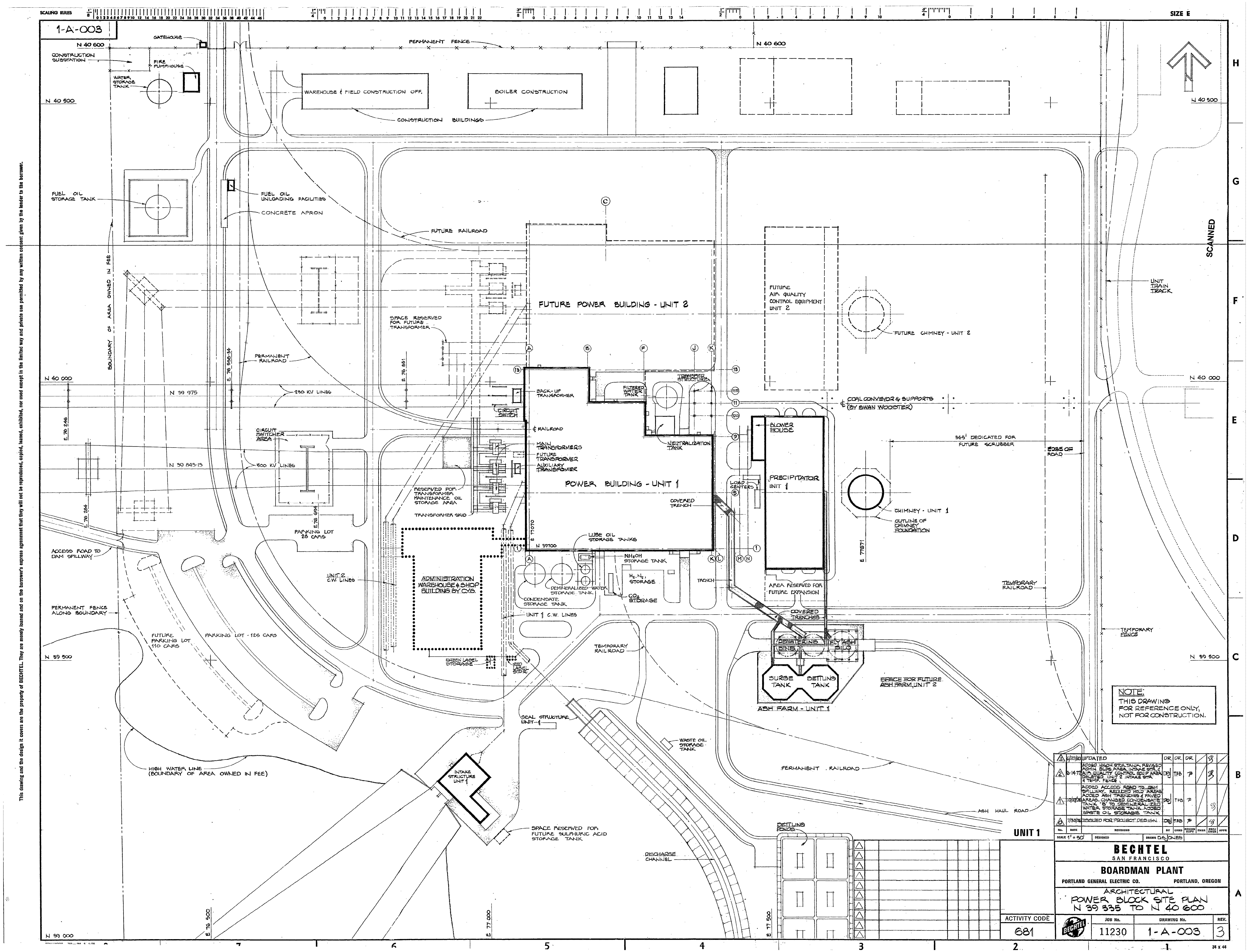

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Figure 5-1
Plant Layout
Boardman Power Plant Decommissioning and Demolition Plan
Boardman, Oregon

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SCALE

300 Feet

Figure 5-2
Aboveground and Underground Storage Tanks
Boardman Power Plant Decommissioning and Demolition Plan
Boardman, Oregon

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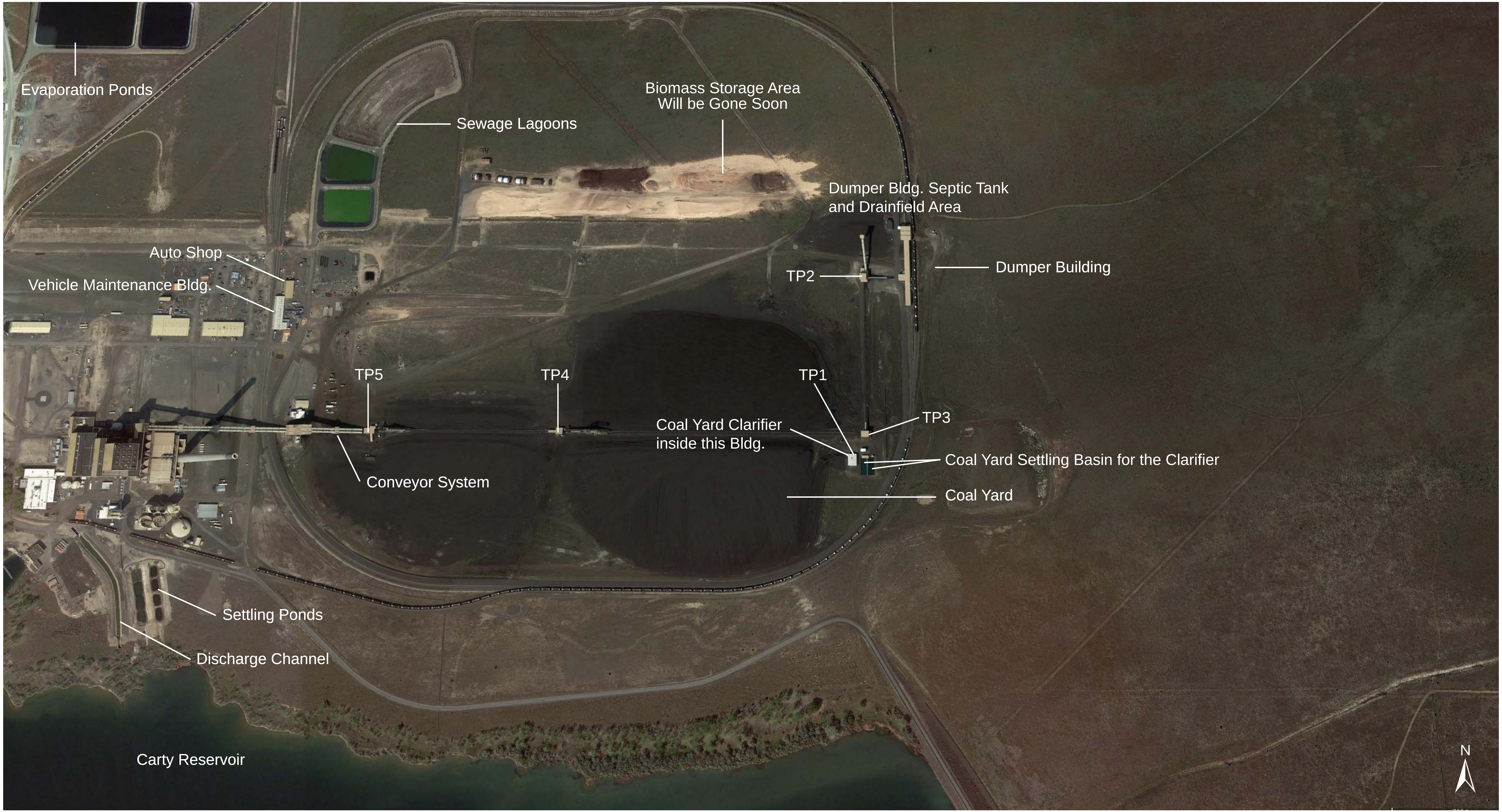
SCALE

200 Feet

Figure 5-3
South Pond Area and Structures
Boardman Power Plant Decommissioning and Demolition Plan
Boardman, Oregon



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SCALE

700 Feet

Figure 5-4
Coal Yard and Unloading Facility
Boardman Power Plant Decommissioning and Demolition Plan
Boardman, Oregon

Aerial image © 2015 Google Earth Annotation © 2015 CH2M HILL

SCALE

900 Feet

Figure 5-5
North Pond Area and Structures
Boardman Power Plant Decommissioning and Demolition Plan
Boardman, Oregon

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SCALE
100 Feet

Figure 5-6
North Area and Structures
Boardman Power Plant Decommissioning and Demolition Plan
Boardman, Oregon

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SCALE

300 Feet

Figure 5-7
Power Block and Support Structures
Boardman Power Plant Decommissioning and Demolition Plan
Boardman, Oregon

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SCALE

3000 Feet

Figure 5-8
Discharge Structure
Boardman Power Plant Decommissioning and Demolition Plan
Boardman, Oregon

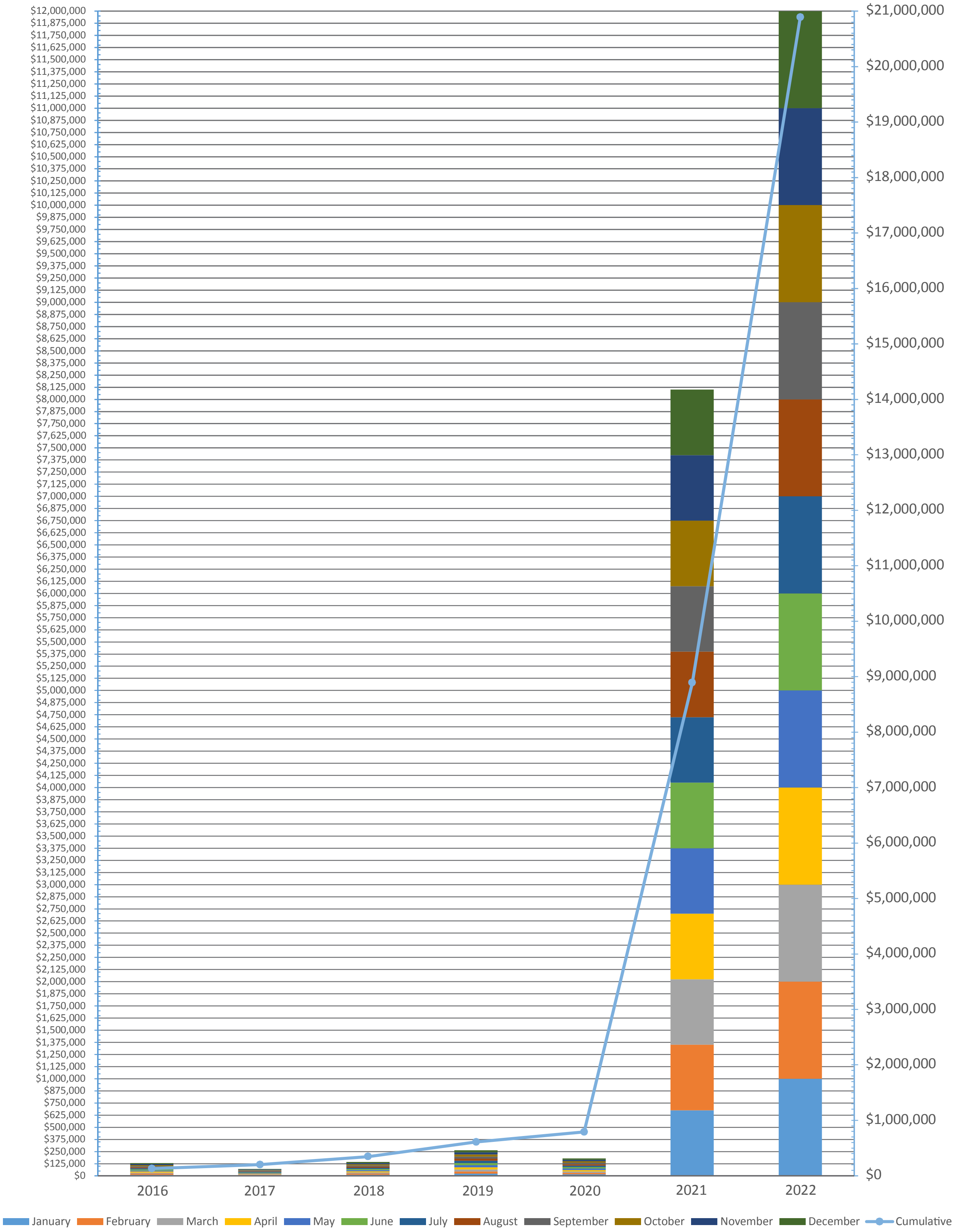

Figure 6-1
Spending Graph by Year and Month
Boardman Power Plant Closure Strategy Plan
Boardman, Oregon

EN0702151014PDX Fig_7-1_Spending_Graph_by_Year_and_Monthly_Closure_Strategy_Plan v01 9-14-15 rb

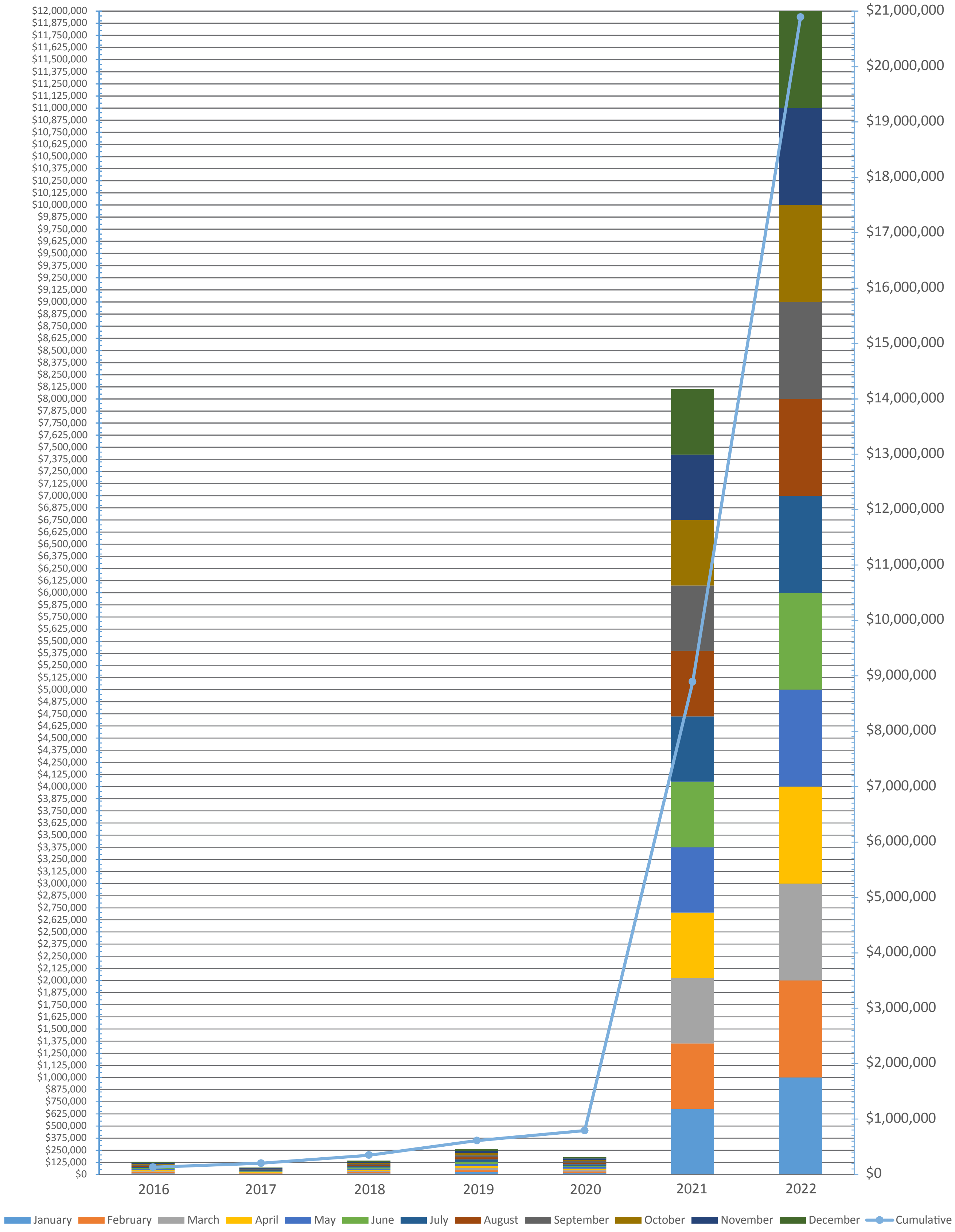

Figure 7-1
Spending Graph by Year and Month
Boardman Power Plant Closure Strategy Plan
Boardman, Oregon

Appendix A

Class 4 Budgetary Cost Estimate Details

Table A-1. Basis of Estimate

Totals

								296,357	1,415,036	151	24,438	30,025	60,050	19,676	24,438	26,882	27,133	48,873
	No. of Units	Unit	Dia (FT)	L (FT)	W (FT)	Area (SF)	Thickness/ Depth (FT)	Volume (CY)	Vol (GAL)	Density (Tons/CY)	Mass (TONS)	Concrete Vol (CY)	Concrete Mass (TONS)	Sludge Volume (CY)	Sludge Mass (TONS)	Mass with Agent (TONS)	Heel and Flush Water (GAL)	Backfill Vol (CY)
Admin Bidg				120	160	19200						-	-					
Admin Slab				120	160	19200	0.5	356		2		356	711					
Guard Shack				35	45	1575						-						
Guard Shack Slab				50	45	2250	0.5	42		2		42	83					
Eight Warehouse Buildings												-						
Warehouse 1				160	45	7200						-						
Warehouse 1 Slab				160	45	7200	0.5	133		2		133	267					
Warehouse 2				124	35	4340						-						
Warehouse 2 Slab				124	35	4340	0.5	80		2		80	161					
Warehouse 3				210	62	13020						-						
Warehouse 3 Slab				210	62	13020	0.5	241		2		241	482					
Warehouse 4				203	103	20909						-						
Warehouse 4 Slab				203	103	20909	0.5	387		2		387	774					
Warehouse 5				222	80	17760						-						
Warehouse 5 Slab				222	80	17760	0.5	329		2		329	658					
Warehouse 6				100	43	4300						-						
Warehouse 6 Slab				100	43	4300	0.667	106		2		106	212					
Warehouse 7				70	44	3080						-						
Warehouse 7 Slab				70	44	3080	0.5	57		2		57	114					
Warehouse 8				73	30	2190						-						
Warehouse 8 Slab				73	30	2190	0.5	41		2		41	81					
												-						
Lube Oil Building				40	30	1200						-						
Lube Oil Building Slab				40	30	1200	0.5	22		2		22	44					
Vehicle Maintenance Building				102	70							-						
Vehicle Maintenance Building Slab				102	70	7140	0.5	132		2		132	264					
Fire Pump House				40	30	1200						-						
Fire Pump House Slab				40	30	1200	0.5	22		2		22	44					
Rail Car Unloading Facilities												-						
Rail Car Unloading Facility Middle				75	60	4500						-						
Rail Car Unloading Facility Middle Slab				75	60	4500	1	167		2								
Rail Car Unloading Facility S				380	35	13300												
Rail Car Unloading Facility S Slab				380	35	13300	1	493		2								
Rail Car Unloading Facility Building				55	30	1650												

Table A-1. Basis of Estimate

Totals

								296,357	1,415,036	151	24,438	30,025	60,050	19,676	24,438	26,882	27,133	48,873
	No. of Units	Unit	Dia (FT)	L (FT)	W (FT)	Area (SF)	Thickness/ Depth (FT)	Volume (CY)	Vol (GAL)	Density (Tons/CY)	Mass (TONS)	Concrete Vol (CY)	Concrete Mass (TONS)	Sludge Volume (CY)	Sludge Mass (TONS)	Mass with Agent (TONS)	Heel and Flush Water (GAL)	Backfill Vol (CY)
Rail Car Unloading Facility Building Slab				55	30	1650	1	61		2								
Rail Car Unloading Facility Building Septic System				55	30	1650	1	61		2								
Rail Car Unloading Facility N Equipment				171	40	6840												
Rail Car Unloading Facility N Equipment Slab				171	40	6840	1	253		2								
Rail Car Unloading Facility N Equipment Berms				522	3	1566	0.5	29		2								
Total Railcar Unloading						26290												
Total Railcar Unloading Slabs						27856	1	1,032		2		1,032	2,063					
												-						
Coal Yard Settling Basin Structures												-						
Coal Yard Settling Basin Bldg 1				65	45	2925						-						
Coal Yard Settling Basin Bldg 1 Slab				65	45	2925	1	108		2		108	217					
Coal Yard Settling Basin Bldg 2				25	15	375						-						
Coal Yard Settling Basin Bldg 2 Slab				25	15	375	1	14		2		14	28					
Coal Yard Settling Basin Bldg 3				35	15	525						-						
Coal Yard Settling Basin Bldg 3 Slab				35	15	525	1	19		2		19	39					
Transfer Structure												-						
Rail Car Unloading Facility W				75	38	2850						-						
Rail Car Unloading Facility W Slab				75	38	2850	0.667	70		2		70	141					
Conveyor From Offloading			5	260		0						-						
Reject Conveyor			10	250	0	1000	0.667	25		2		25	49					
Conveyors				3600		0						-						
Conveyor Supports	180			15	10	100	1	667		2		667	1,333					
												-						
Air Quality Control Building												-						
Air Quality Control Building Slab												-						
Precipitator and Support Facilities												-						

Table A-1. Basis of Estimate

	No. of Units	Unit	Dia (FT)	L (FT)	W (FT)	Area (SF)	Thickness/ Depth (FT)	Volume (CY)	Vol (GAL)	Density (Tons/CY)	Mass (TONS)	Concrete Vol (CY)	Concrete Mass (TONS)	Sludge Volume (CY)	Sludge Mass (TONS)	Mass with Agent (TONS)	Heel and Flush Water (GAL)	Backfill Vol (CY)
Totals								296,357	1,415,036	151	24,438	30,025	60,050	19,676	24,438	26,882	27,133	48,873
Precipitator Structure				274	150	41100						-						
Precipitator Structure Slab				274	150	41100	2	3,044		2		3,044	6,089					
Ductwork on SE Corner of Precipitators				80	75	6000						-						
Ductwork on SE Corner of Precipitators Slab				80	75	6000	2	444		2		444	889					
Knockout Tank on S end			20			0	10		3,142			-						
Knockout Tank Structure on S end				25	25	625						-						
Knockout Tank Slab				25	25	625	2	46		2		46	93					
Blower House				30	46	1380						-						
Blower House Slab				30	46	1380	2	102		2		102	204					
Chimney																		
Chimney Feed Structures				208	30	6240						-						
Chimney OD Ave			40				300	13,963										
Chimney ID Ave			30				300	7,854										
Chimney Volume								6,109		2		6,109	12,217					
Chimney Slabs				60	60	3600	10	1,333		2		1,333	2,667					
Chimney Feed System Slabs				208	30	6240	2	462		2		462	924					
Total Chimney Concrete								15,758										
Conveyor System																		
Inclined Conveyor Feed System				240	40	9600												
Inclined Conveyor System Tubes	2	ea	12	1185								-						
Pulverizer Bldg				120	50	6000						-						
_____ Building N of Pulverizer Bldg				80	50	4000						-						
Conveyor System Support Structures	3	ea		40	20	2400						-						
Conveyor Feed System Slab				120	20	2400	2	178										
Pulverizer Slab				120	50	6000	2	444										
_____ Building N of Pulverizer Bldg Slab				80	50	4000	1	148										
Conveyor System Support Structures Slab	3	ea		40	20	2400	2	178										
Total Inclined Conveyor System Demo						22000												

Table A-1. Basis of Estimate

Totals

								296,357	1,415,036	151	24,438	30,025	60,050	19,676	24,438	26,882	27,133	48,873
	No. of Units	Unit	Dia (FT)	L (FT)	W (FT)	Area (SF)	Thickness/ Depth (FT)	Volume (CY)	Vol (GAL)	Density (Tons/CY)	Mass (TONS)	Concrete Vol (CY)	Concrete Mass (TONS)	Sludge Volume (CY)	Sludge Mass (TONS)	Mass with Agent (TONS)	Heel and Flush Water (GAL)	Backfill Vol (CY)
Total Inclined Conveyor System Slabs						14800		948		2		948	1,896					
Intake Structure																		
Intake Structure				80	75	6000						-						
Intake Structure Slab				80	75	6000	2	444		2		444	889					
Discharge Structure and Channel																		
Discharge Structure and Channel				100	30	3000	2	222		2		222	444					
Divider Dike Pipe			6	260	0	1040	6	231		2		231	462					
Coal Yards																		
Coal Yard W				1350	950	1282500	0	-						-				
Coal Yard E				1500	1650	2475000	0	-						-				
Coal Yard N				350	390	136500	0	-						-				
Total Coal Yards						3,894,000	0.333	48,026										
Electrical Switchyard												-						
Transmission Lines												-						
Fly Ash System																		
Fly Ash Silo	1	ea	50			1,963	40											
Fly Ash Dome			103			8,332						-						
Fly Ash Surge Tank			65			3,318	20	2,458	496,517									
Fly Ash Settling Tank			65			3,318	20	2,458	496,517									
Fly Ash Dewatering Bins	2	ea	45			3,181	10	1,178	237,976									
Fly Ash Main Slab				165	150	21,382	2	1,584		2		1,584	3,168					
Fly Ash Dome Slab				103		8,332	2	617		2		617	1,234					
Total Fly Ash System Demo						11,781												
Total Fly Ash System Slabs						29,715												
Power Block (Unit 1)																		
Power Block West	1	ea		240	140	33600						-						
Power Block Slab West	1	ea		240	140	33600	2	2,489		2		2,489	4,978					
Power Block East	1	ea		260	205	53300						-						
Power Block Slab East	3	ea		260	205	53300	2	3,948		2		3,948	7,896					
Power Block North 1	1	ea		135	95	12825						-						
Power Block Slab North 1	1	ea		135	95	12825	2	950		2		950	1,900					

Table A-1. Basis of Estimate

Totals

								296,357	1,415,036	151	24,438	30,025	60,050	19,676	24,438	26,882	27,133	48,873
	No. of Units	Unit	Dia (FT)	L (FT)	W (FT)	Area (SF)	Thickness/ Depth (FT)	Volume (CY)	Vol (GAL)	Density (Tons/CY)	Mass (TONS)	Concrete Vol (CY)	Concrete Mass (TONS)	Sludge Volume (CY)	Sludge Mass (TONS)	Mass with Agent (TONS)	Heel and Flush Water (GAL)	Backfill Vol (CY)
Power Block North 2	1	ea		105	60	6300						-						
Power Block Slab North 2	1	ea		105	60	6300	2	467		2		467	933					
Power Block Coal Feed	1	ea		87	35	3045						-						
Power Block Slab Coal Feed	1	ea		87	35	3045	2	226		2		226	451					
Total Power Block						109070												
Total Power Block Slab						109070												
Pits and Trenches																		
Pyrite Trench									-								-	
Bottom	1	ea		70	10	700	1	26		2		26	52					
Walls (3 ft high)				140	20	480	0.5	9		2		9	18					
Ash Pit									-								-	
Bottom	1	ea		50	50	2500	1	93		2		93	185					
Walls (3 ft high)				100	100	2000	1	74		2		74	148					
Condensor Pit									-								-	
Bottom	1	ea		50	50	2500	1	93		2		93	185					
Walls (3 ft high)				100	100	2000	1	74		2		74	148					
Stabilization Tank									-								-	
Bottom	1	ea		47	17	799	1	30		2		30	59					
Walls (3 ft high)				94	34	1152	1	43		2		43	85					
Underground Piping and Utilities												-						
Concrete Processing – all concrete to be used as backfill												-						
Backfill and Grading – concrete and onsite soil used as backfill												-						
Ponds and Impoundments																		
Evap Pond - West (10 AC) (Top Area)	1	ea		860	580	498800	0.5	9,237		1	9,237			9,237	9,237	10,161	at water line	0
Evap Pond - West (10 AC) BackfillAssumes 2:1 slopes, 10 ft deep (Bot Area)	1	ea		820	540	442800		-			-							0
Evap Pond Backfill							2	34,853										1,291
Evap Pond - East (2 AC) (Top Area)	1	ea		260	190	49400	0.5	915		1	915			915	915	1,006	at water line	-
Evap Pond -East (2 AC) BackfillAssumes 2:1 slopes, 10 ft deep (Bot Area)	1	ea		220	150	33000		-			-							-

Table A-1. Basis of Estimate

Totals

								296,357	1,415,036	151	24,438	30,025	60,050	19,676	24,438	26,882	27,133	48,873
	No. of Units	Unit	Dia (FT)	L (FT)	W (FT)	Area (SF)	Thickness/ Depth (FT)	Volume (CY)	Vol (GAL)	Density (Tons/CY)	Mass (TONS)	Concrete Vol (CY)	Concrete Mass (TONS)	Sludge Volume (CY)	Sludge Mass (TONS)	Mass with Agent (TONS)	Heel and Flush Water (GAL)	Backfill Vol (CY)
Evap Pond Backfill							2	3,031										112
Sewage Lagoon - North																		
Top Area	1	ea		750	300	225000	0.5	4,167		1.5	6,250			4,167	6,250	6,875	at water line	0
Bottom Area				710	260	184600												
Sewage Lagoon - North Backfill							10	75,728.56										2,805
Sewage Lagoon - Middle																		-
Top Area	1	ea		265	192	50880	0.5	942		1.5	1,413			942	1,413	1,555	at water line	0
Bottom Area				225	152	34200												
Sewage Lagoon - North Backfill							10	15,653.64										580
Sewage Lagoon - South																		-
Top Area	1	ea		260	190	49400	0.5	915		1.5	1,372			915	1,372	1,509	at water line	0
Bottom Area				220	150	33000												
Sewage Lagoon - North Backfill							10	15,157.50										561
Settling Lagoons	2	ea		288	40	11520	5	2,133		1.5	3,200			2,133	3,200	3,520	at water line	
Settling Lagoon Backfill	1	ea																
Top Area	2	ea		288	40	11520												
Bottom Area				268	30	8040												
Washwater Pond Backfill							10	3,602.96										3,603
Coal Yard Concrete Settling Basin	1	ea		90	70	6300	5	1,167		1.5	1,750			1,167	1,750	1,925	at water line	
Settling Lagoon Backfill	1	ea																
Top Area	1	ea		90	70	6300	10	2,333										2,333
Washwater Pond	1	ea		52	52	2704	2	200		1.5	300			200	300	330	at water line	
Washwater Pond Backfill	1	ea																
Top Area				85	85	7225												
Bottom Area				50	50	2500												
Washwater Pond Backfill							15	2,587.96										2,588
Aboveground Storage Tanks	No. of Units	Unit	Dia (FT)	L (FT)	W (FT)	Area (SF)	Thickness/ Depth (FT)	Volume (CY)	Vol (GAL)	Density (Tons/CY)	Mass (TONS)	Concrete Vol (CY)	Concrete Mass (TONS)	Sludge Volume (CY)	Sludge Mass (TONS)	Mass with Agent (TONS)		Backfill Vol (CY)
AST South Side of Power Block (Condensate)	1	ea	40				30		37,699								5,654.87	
AST Slab						1257	3	140		2		140	279					
AST Berms				0	0	0	0	-		2		-	-					

Table A-1. Basis of Estimate

											Totals							
								296,357	1,415,036	151	24,438	30,025	60,050	19,676	24,438	26,882	27,133	48,873
	No. of Units	**Unit**	**Dia (FT)**	**L (FT)**	**W (FT)**	**Area (SF)**	**Thickness/ Depth (FT)**	**Volume (CY)**	**Vol (GAL)**	**Density (Tons/CY)**	**Mass (TONS)**	**Concrete Vol (CY)**	**Concrete Mass (TONS)**	**Sludge Volume (CY)**	**Sludge Mass (TONS)**	**Mass with Agent (TONS)**	**Heel and Flush Water (GAL)**	**Backfill Vol (CY)**
AST South Side of Power Block (Demineralized Water)	1	ea	40				30		37,699								5,654.87	
AST Slab						1257	3	140		2		140	279					
AST Berms				0	0	0	0	-		2		-	-					
AST Adjacent to Power Block (Fuel Oil Storage)	2	ea	15				15		5,301								795.22	
AST Slab				45	30	1350	3	150		2		150	300					
AST Berms				90	60	450	0.5	8		2		8	17					
NH4OH Storage Tank S of Power Block	1	ea	10				10		785	gal							117.81	
AST Slab				12	12	144	2	11		2		11	21					
AST Berms				24	24	72	0.5	1		2		1	3					
AST Adjacent to Coal Pulverizer Bldg (Fuel Oil)	2	ea	5				20		785	gal							117.81	
AST Slab				25	15	375	2	28		2		28	56					
AST Berms				50	30	240	0.5	4		2		4	9					
AST West side of plant at Entrance Road (Fuel Oil Storage)	1	ea	45				30		47,713	gal							7,156.94	
AST Slab				105	105	11025	3	1,225		2		1,225	2,450					
AST Berms				210	210	1260	0.5	23		2		23	47					
AST West side of plant at Entrance Road (Water Storage)	1	ea	40				20		25,133	gal							3,769.91	
AST Slab						1257	3	140		2		140	279					
AST Berms				0	0	0	0	-		2		-	-					
AST North side of Power Block (Filtered Water Tank)	1	ea	40				20		25,133	gal							3,769.91	
AST Slab						1257	3	140		2		140	279					
AST Berms				0	0	0	0	-		2		-	-					
AST N of Inclined Conveyor Feed (Fuel Oil Tank)	1	ea	9				10		636	gal							95.43	
AST Slab				16	16	256	2	19		2		19	38					
AST Berms				16	16	256	0.5	5		2		5	9					
AST at Coal Yard Setting Basin (Fuel Oil Tank)	1	ea	10				10		785	gal							117.81	

Table A-1. Basis of Estimate

											Totals							
								296,357	1,415,036	151	24,438	30,025	60,050	19,676	24,438	26,882	27,133	48,873
	No. of Units	Unit	Dia (FT)	L (FT)	W (FT)	Area (SF)	Thickness/ Depth (FT)	Volume (CY)	Vol (GAL)	Density (Tons/CY)	Mass (TONS)	Concrete Vol (CY)	Concrete Mass (TONS)	Sludge Volume (CY)	Sludge Mass (TONS)	Mass with Agent (TONS)	Heel and Flush Water (GAL)	Backfill Vol (CY)
AST Slab				12	12	144	2	11		2		11	21					
AST Berms				24	24	72	0.5	1		2		1	3					
AST at Rail Car Offloading (U/KTank)	1	ea	8				10		503	gal							75.40	
AST Slab				12	12	144	2	11		2		11	21					
AST Berms				24	24	72	0.5	1		2		1	3					
AST near Rail Car Offloading (U/KTank)	1	ea	8				10		503	gal							75.40	
AST Slab				12	12	144	2	11		2		11	21					
AST Berms				24	24	72	0.5	1		2		1	3					
Ash Landfill Closure Assumptions	1	ea																
Top Area				1840	640	1177600												
Bottom Area				2000	800	1600000												
Ash Landfill CY When Complete							40	2,049,505										
Ash Landfill Surface Area and volume of fill soil						472500	2	945,000										35,000
Asbestos Containing Materials																		
Transite Siding - BV Estimated Amount (needs to be confirmed)						530000				4	1060							
Asbestos Containing Roofing, flooring, ceiling, sealants, mastics - BV Estimate (needs to be confirmed)						260000												

Switch Yard

Rail Removal

General Grading

Reclaim and Dosposal Estimate

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	Hersey		Scale-Up	Estimate		Est Unit Cost 2020	Est. Metals Rebate 2020
	TN		TN	TN			
Ferrous Metals	701	70.67%	23834	21,568	64.79%	130	2,803,786
Electronic Equipment	17	1.71%	578	100	0.30%	2000	200,000
Process Equipment	13	1.31%	442	442	1.33%	240	106,080
Non-Ferrous Metals	4	0.40%	136	136	0.41%	130	17,680
High Value Metals	62	6.25%	2108	4,413	13.26%	740	3,265,760

Table A-1. Basis of Estimate

Totals

	No. of Units	Unit	Dia (FT)	L (FT)	W (FT)	Area (SF)	Thickness/ Depth (FT)	Volume (CY)	Vol (GAL)	Density (Tons/CY)	Mass (TONS)	Concrete Vol (CY)	Concrete Mass (TONS)	Sludge Volume (CY)	Sludge Mass (TONS)	Mass with Agent (TONS)	Heel and Flush Water (GAL)	Backfill Vol (CY)
								296,357	**1,415,036**	**151**	**24,438**	**30,025**	**60,050**	**19,676**	**24,438**	**26,882**	**27,133**	**48,873**
General Debris	195	19.66%		6630			6630	19.92%										
	992	1		33728			33,289				$ 6,393,306							

SUMMARY OF OPTIONS COSTS
PGE Boardman, Oregon Unit 1 Demolition

Option 1 PGE directly contracts with demolition company and hires consultant to oversee the worl
Option 2 PGE directly contracts with demolition company and oversees the worl
Option 3 PGE contracts with consultant who in turn contracts and manages demolition compan

Biditem	Description	Takeoff Quantity	Units	Option 1 Total	Option 2 Total	Option 3 Total
1010100	**PLANNING**					
1010110	Closure Strategy	1	LS	$ 49,660	$ 49,660	$ 49,660
1010120	Permitting Requirements and Initiation	1	LS	$ 18,314	$ 18,314	$ 18,314
1010130	Existing Permit Inventory and Closeout Strategy	1	LS	$ 16,274	$ 16,274	$ 16,274
1010140	Refine End Use	1	LS	$ 18,251	$ 18,251	$ 18,251
1010150	Stakeholder Relations and Engagement	1	LS	$ 13,689	$ 13,689	$ 13,689
1010160	Regulatory Agency Communications	1	LS	$ 14,939	$ 14,939	$ 14,939
1010170	Carty Plant Isolation	1	LS	$ 44,315	$ 44,315	$ 44,315
1010199	**SUBTOTAL PLANNING**			**$ 175,441**	**$ 175,441**	**$ 175,441**
1110100	**ENGINEERING**					
1110110	Carty Plant Isolation Engineering	1	LS	$ 41,805	$ 41,805	$ 41,805
1110120	Decommissioning and Demolition Plan	1	LS	$ 28,105	$ 28,105	$ 28,105
1110130	Cold and Dark Status Plan	1	LS	$ 38,280	$ 38,280	$ 38,280
1110140	Plant Staff Utilization Plan	1	LS	$ 13,249	$ 13,249	$ 13,249
1110150	Environmentally Regulated Material Survey	1	LS	$ 120,789	$ 120,789	$ 120,789
1110160	Environmental Assessment	1	LS	$ 35,980	$ 35,980	$ 35,980
1110170	Salvage Plan	1	LS	$ 17,689	$ 17,689	$ 17,689
1110180	Closure Engineering Documents	1	LS	$ 25,999	$ 25,999	$ 25,999
1110190	Cost Estimate	1	LS	$ 21,924	$ 21,924	$ 21,924
1110199	**SUBTOTAL ENGINEERING**			**$ 343,819**	**$ 343,819**	**$ 343,819**
1210000	**EXECUTION**					
1210110	Execution Plan	1	LS	$ 26,267	$ 26,267	$ 26,267
1210120	Contract Documents	1	LS	$ 54,218	$ 54,218	$ 54,218
1210130	Demolition and Closure Bid Process	1	LS	$ 36,825	$ 36,825	$ 36,825
1210140	Obtain Permits	1	LS	$ 23,237	$ 23,237	$ 23,237
1210150	Presale and PGE Salvaged Equipment	1	LS	$ 13,424	$ 13,424	$ 13,424
1210199	**SUBTOTAL EXECUTION**			**$ 153,972**	**$ 153,972**	**$ 153,972**
	Subtotal Planning			**$ 673,231**	**$ 673,231**	**$ 673,231**
1310000	**PREDEMOLITION**					**0.15**
1310110	Cold and Dark Implementation	1	LS	$ 49,868	$ 49,868	$ 57,349
1310120	Decontamination	1	LS	$ 146,597	$ 146,597	$ 168,587
1310130	Abatement and Asset Recovery Process					
1310131	o Asbestos	1	LS	$ 4,264,880	$ 4,264,880	$ 4,904,612
1310132	o Lead Based Paint	1	LS	$ 67,301	$ 67,301	$ 77,396
1310133	o Universal Waste and Other Hazardous Waste	1	LS	$ 88,046	$ 88,046	$ 101,253
1310134	o Asset Recovery	1	LS	$ -		
1310140	Waste Characterization, Handling, Transportation,					
1310141	o Clean Construction and Demolition Debris	1	LS	$ 304,322	$ 304,322	$ 349,971
1310142	o Non-RCRA Hazardous Waste	1	LS	$ 115,125	$ 115,125	$ 132,393
1310143	o RCRA Hazardous Waste	1	LS	$ 329,858	$ 329,858	$ 379,337
1310144	o Universal Waste	1	LS	$ 44,754	$ 44,754	$ 51,467
1310145	o TSCA Regulated Materials	1	LS	$ 11,844	$ 11,844	$ 13,621
1310150	Recycle Material Handling					
1310151	o Recycle Metals Processing	1	LS	$ 401,713	$ 401,713	$ 461,971
1310199	**SUBTOTAL PREDEMOLITION**			**$ 5,824,309**	**$ 5,824,309**	**$ 6,697,956**

Biditem	Description	Takeoff Quantity	Units	Option 1 Total	Option 2 Total	Option 3 Total
1410000	**DEMOLITION**					
1410110	Planning Documents	1	LS	$ 35,532	$ 35,532	$ 40,862
1410120	Stormwater Controls and BMP	1	LS	$ 33,418	$ 33,418	$ 38,431
1410130	Mobilization	1	LS	$ 65,970	$ 65,970	$ 75,866
1410140	Aboveground Storage Tanks	1	LS	$ 174,905	$ 174,905	$ 201,141
1410150	Underground Storage Tanks	1	LS	$ 260,284	$ 260,284	$ 299,326
1410160	Settling Lagoon System	1	LS	$ 254,823	$ 254,823	$ 293,047
1410170	Coal Yard Concrete Settling Basin for Clarifier	1	LS	$ 104,963	$ 104,963	$ 120,708
1410180	Evaporation Ponds	1	LS	$ 1,007,284	$ 1,007,284	$ 1,158,377
1410190	Wash water Pond	1	LS	$ 64,791	$ 64,791	$ 74,509
1410200	Support Structures					
1410201	o Administration Building	1	LS	$ 39,843	$ 39,843	$ 45,820
1410202	o Guard Shack	1	LS	$ 6,224	$ 6,224	$ 7,158
1410203	o Eight Warehouse Buildings	1	LS	$ 149,413	$ 149,413	$ 171,825
1410204	o Lube Oil Building	1	LS	$ 9,800	$ 9,800	$ 11,270
1410205	o Vehicle Maintenance Building	1	LS	$ 9,961	$ 9,961	$ 11,455
1410206	o Fire Pump house	1	LS	$ 9,961	$ 9,961	$ 11,455
1410207	o Rail Car Unloading Facility	1	LS	$ 139,452	$ 139,452	$ 160,370
1410208	o Transfer Structure	1	LS	$ 229,818	$ 229,818	$ 264,291
1410209	o Air Quality Control Building	1	LS	$ 99,937	$ 99,937	$ 114,927
1410210	Precipitator Structure and Blower House	1	LS	$ 505,575	$ 505,575	$ 581,412
1410220	Chimney	1	LS	$ 294,377	$ 294,377	$ 338,533
1410230	Conveyor System	1	LS	$ 703,363	$ 703,363	$ 808,868
1410240	Intake Structure	1	LS	$ 80,176	$ 80,176	$ 92,203
1410250	Discharge Structure and Channel	1	LS	$ 128,603	$ 128,603	$ 147,893
1410260	Coal Yard	1	LS	$ 719,017	$ 719,017	$ 826,869
1410270	Electrical Switchyard	1	LS	$ 291,345	$ 291,345	$ 335,046
1410280	Transmission Lines	1	LS	$ -	$ -	$ -
1410290	Fly Ash Silo and Dome	1	LS	$ 197,056	$ 197,056	$ 226,615
1410300	Power Block	1	LS	$ 1,660,450	$ 1,660,450	$ 1,909,518
1410310	Underground Piping and Utilities	1	LS	$ 87,020	$ 87,020	$ 100,073
1410315	Concrete Removal - All Areas	1	LS	$ 548,014	$ 548,014	$ 630,216
1410320	Concrete Processing - Backfill Material	1	LS	$ 179,907	$ 179,907	$ 206,893
1410330	Backfill and Grading - concrete and onsite soil us	1	LS	$ 153,893	$ 153,893	$ 176,977
1410340	Site Restoration	1	LS	$ 373,089	$ 373,089	$ 429,053
1410350	Demobilization	1	LS	$ 65,970	$ 65,970	$ 75,866
1410360	As-Builts	1	LS	$ 38,754	$ 38,754	$ 44,567
1410399	**SUBTOTAL DEMOLITION**			**$ 8,722,991**	**$ 8,722,991**	**$ 10,031,439**
1510000	**MANAGEMENT COSTS**					
1510110	Contractor Project Management cost	1	LS	$ 2,009,381	$ 2,009,381	$ 2,310,788
1510120	CH2M or other Consultant cost (labor and contractc	1	LS	$ 2,306,122		$ 2,306,122
1510130	PGE costs to oversee	1	LS	$ 296,640	$ 2,602,762	$ 296,640
1510199	**SUBTOTAL MANAGEMENT COSTS**			**$ 4,612,143**	**$ 4,612,143**	**$ 4,913,550**
1610000	**SOIL CLEANUP**					
1610110	Shooting Range Berm	1	LS	$ 94,689	$ 94,689	$ 108,893
1610120	Lube oil shack	1	LS	$ 11,958	$ 11,958	$ 13,752
1610130	Transformer Spill	1	LS	$ 42,516	$ 42,516	$ 48,893
1610140	Demil Tank Oil Spill	1	LS	$ 27,934	$ 27,934	$ 32,124
1610150	Auto Repair Shop Spill	1	LS	$ 16,117	$ 16,117	$ 18,534
1610160	Fuel Oil Tank Spill	1	LS	$ 16,117	$ 16,117	$ 18,534
1610199	**SUBTOTAL SOIL CLEAN-UP**			**$ 209,331**	**$ 209,331**	**$ 240,731**
1710000	**ASH LANDFILL CLOSURE**					
1710100	Ash Landfill Closure	1	LS	$ 527,211	$ 527,211	$ 606,293
1710199	**SUBTOTAL ASH LANDFILL CLOSURE**			**$ 527,211**	**$ 527,211**	**$ 606,293**

Biditem	Description	Takeoff Quantity	Units	Option 1 Total	Option 2 Total	Option 3 Total
1810100	Subcontractor General Conditions	1	LS	$ 3,331,574	$ 3,331,574	$ 3,831,310
1910100	TBD	1	LS	$ -		
2999999	**TOTAL ALL PLANNING and DEMOLITION**			**$ 23,900,791**	**$ 23,900,791**	**$ 26,994,510**
3000000	**METALS RECYCLING**					
3000100	Ferrous Metals Recycling	1	LS	$ (1,790,144)	$ (1,790,144)	$ (1,790,144)
3000200	Non-Ferrous Metals Recycling	1	LS	$ (11,288)	$ (11,288)	$ (11,288)
3000300	Electronics Recycling	1	LS	$ (195,300)	$ (195,300)	$ (195,300)
3000400	Process Equipment Recycle	1	LS	$ (85,306)	$ (85,306)	$ (85,306)
3000500	High Value Metals Recycling	1	LS	$ (3,058,209)	$ (3,058,209)	$ (3,058,209)
3000999	**SUBTOTAL METALS RECYCLING**	**0**		**$ (5,140,247)**	**$ (5,140,247)**	**$ (5,140,247)**
	PGE Total After Metals Rebates			**$ 18,760,544**	**$ 18,760,544**	**$ 21,854,263**

This is not an offer for construction and/or project execution. Please note, this Class 4 AACE Order of Magnitude cost estimate is assumed to represent the actual installed cost within the range of - 30 percent to + 50 percent of the total costs indicated. The cost estimate has been prepared for guidance in project evaluation and implementation from the information available at the time of the estimate. The final costs of the project will depend on actual labor and material costs, and competitive market conditions, implementation schedule, and other variable factors.

Table A.3 SUMMARY OF COSTS BY MONTH AND YEAR
PGE Boardman, Oregon Unit 1 Demolition

Biditem	Description	Takeoff Quantity	Units	Total Costs	Start Date	End Date	Duration (Months)	Cost Per Month
1010100	**PLANNING**				06/01/15	12/29/17		
1010110	Closure Strategy	1	LS	$ 49,660	09/16/15	12/29/15	4	$ 12,415
1010120	Permitting Requirements and Initiation	1	LS	$ 18,314	06/01/15	09/11/15	4	$ 4,579
1010130	Existing Permit Inventory and Closeout Strategy	1	LS	$ 16,274	06/01/15	09/11/15	4	$ 4,069
1010140	Refine End Use	1	LS	$ 18,251	01/04/16	04/15/16	4	$ 4,563
1010150	Stakeholder Relations and Engagement	1	LS	$ 13,689	01/04/16	12/30/16	12	$ 1,141
1010160	Regulatory Agency Communications	1	LS	$ 14,939	01/04/16	12/30/16	12	$ 1,245
1010170	Carty Plant Isolation	1	LS	$ 44,315	09/19/16	12/30/16	4	$ 11,079
1010199	**SUBTOTAL PLANNING**			**$ 175,441**				
					Start Date	**End Date**	Duration (Months)	Cost Per Month
1110100	**ENGINEERING**				01/01/18	12/27/19		
1110110	Carty Plant Isolation Engineering	1	LS	$ 41,805	01/01/19	04/29/19	4	$ 10,451
1110120	Decommissioning and Demolition Plan	1	LS	$ 28,105	04/16/18	07/27/18	4	$ 7,026
1110130	Cold and Dark Status Plan	1	LS	$ 38,280	07/30/18	11/09/18	5	$ 7,656
1110140	Plant Staff Utilization Plan	1	LS	$ 13,249	09/03/18	12/28/18	4	$ 3,312
1110150	Environmentally Regulated Material Survey	1	LS	$ 120,789	04/30/19	05/27/19	2	$ 60,394
1110160	Environmental Assessment	1	LS	$ 35,980	05/28/19	07/08/19	3	$ 11,993
1110170	Salvage Plan	1	LS	$ 17,689	07/09/19	08/19/19	2	$ 8,844
1110180	Closure Engineering Documents	1	LS	$ 25,999	06/03/19	11/15/19	6	$ 4,333
1110190	Cost Estimate	1	LS	$ 21,924	10/07/19	12/27/19	3	$ 7,308
1110199	**SUBTOTAL ENGINEERING**			**$ 343,819**				
					Start Date	**End Date**	Duration (Months)	Cost Per Month
1210000	**EXECUTION**				01/01/20	12/29/20		
1210110	Execution Plan	1	LS	$ 26,267	01/01/20	03/03/20	3	$ 8,756
1210120	Contract Documents	1	LS	$ 54,218	01/01/20	03/06/20	3	$ 18,073

Table A.3 SUMMARY OF COSTS BY MONTH AND YEAR
PGE Boardman, Oregon Unit 1 Demolition

Biditem	Description	Takeoff Quantity	Units	Total Costs	Start Date	End Date	Duration (Months)	Cost Per Month
1210130	Demolition and Closure Bid Process	1	LS	$ 36,825	01/01/20	06/19/20	6	$ 6,137
1210140	Obtain Permits	1	LS	$ 23,237	06/22/20	12/04/20	7	$ 3,320
1210150	Presale and PGE Salvaged Equipment	1	LS	$ 13,424	06/15/20	07/24/20	2	$ 6,712
1210199	**SUBTOTAL EXECUTION**			**$ 153,972**				
	Subtotal Planning			**$ 673,231**				
					Start Date	**End Date**	Duration (Months)	Cost Per Month
1310000	**PREDEMOLITION**				12/30/20	03/08/21		
1310110	Cold and Dark Implementation	1	LS	$ 49,868	01/04/21	03/05/21	3	$ 16,623
1310120	Decontamination	1	LS	$ 146,597	01/04/21	03/05/21	3	$ 48,866
1310130	Abatement and Asset Recovery Process				03/15/21	07/30/21		
1310131	o Asbestos	1	LS	$ 4,264,880	03/15/21	07/30/21	5	$ 852,976
1310132	o Lead Based Paint	1	LS	$ 67,301	03/15/21	04/16/21	2	$ 33,650
1310133	o Universal Waste and Other Hazardous Waste	1	LS	$ 88,046	03/15/21	04/23/21	2	$ 44,023
1310134	o Asset Recovery	1	LS	$ -				
1310140	Waste Characterization, Handling, Transportation,							
1310141	o Clean Construction and Demolition Debris	1	LS	$ 304,322	03/15/21	05/14/21	3	$ 101,441
1310142	o Non-RCRA Hazardous Waste	1	LS	$ 115,125	03/15/21	06/04/21	4	$ 28,781
1310143	o RCRA Hazardous Waste	1	LS	$ 329,858	03/15/21	05/14/21	3	$ 109,953
1310144	o Universal Waste	1	LS	$ 44,754	03/15/21	05/14/21	3	$ 14,918
1310145	o TSCA Regulated Materials	1	LS	$ 11,844	03/15/21	05/14/21	3	$ 3,948
1310150	Recycle Material Handling							
1310151	o Recycle Metals Processing	1	LS	$ 401,713	03/15/21	06/04/21	4	$ 100,428
1310199	**SUBTOTAL PREDEMOLITION**			**$ 5,824,309**				
					Start Date	**End Date**	Duration (Months)	Cost Per Month

Table A.3 SUMMARY OF COSTS BY MONTH AND YEAR
PGE Boardman, Oregon Unit 1 Demolition

Biditem	Description	Takeoff Quantity	Units	Total Costs	Start Date	End Date	Duration (Months)	Cost Per Month
1410000	**DEMOLITION**				03/01/21	10/07/22		
1410110	Planning Documents	1	LS	$ 35,532	08/02/21	10/01/21	3	$ 11,844
1410120	Stormwater Controls and BMP	1	LS	$ 33,418	08/02/21	08/06/21	1	$ 33,418
1410130	Mobilization	1	LS	$ 65,970	07/26/21	07/30/21	1	$ 65,970
1410140	Aboveground Storage Tanks	1	LS	$ 174,905	08/02/21	10/01/21	3	$ 58,302
1410150	Underground Storage Tanks	1	LS	$ 260,284	09/06/21	10/08/21	2	$ 130,142
1410160	Settling Lagoon System	1	LS	$ 254,823	08/02/21	10/01/21	3	$ 84,941
1410170	Coal Yard Concrete Settling Basin for Clarifier	1	LS	$ 104,963	08/09/21	10/29/21	3	$ 34,988
1410180	Evaporation Ponds	1	LS	$ 1,007,284	08/09/21	10/08/21	3	$ 335,761
1410190	Wash water Pond	1	LS	$ 64,791	08/09/21	10/08/21	3	$ 21,597
1410200	Support Structures				09/06/21	11/05/21		
1410201	o Administration Building	1	LS	$ 39,843	09/06/21	09/21/21	1	$ 39,843
1410202	o Guard Shack	1	LS	$ 6,224	09/06/21	09/18/21	1	$ 6,224
1410203	o Eight Warehouse Buildings	1	LS	$ 149,413	09/06/21	10/01/21	2	$ 74,706
1410204	o Lube Oil Building	1	LS	$ 9,800	09/06/21	09/16/21	1	$ 9,800
1410205	o Vehicle Maintenance Building	1	LS	$ 9,961	09/06/21	09/16/21	1	$ 9,961
1410206	o Fire Pump house	1	LS	$ 9,961	09/06/21	09/16/21	1	$ 9,961
1410207	o Rail Car Unloading Facility	1	LS	$ 139,452	09/06/21	10/16/21	2	$ 69,726
1410208	o Transfer Structure	1	LS	$ 229,818	09/06/21	11/05/21	3	$ 76,606
1410209	o Air Quality Control Building	1	LS	$ 99,937	09/06/21	10/06/21	2	$ 49,968
1410210	Precipitator Structure and Blower House	1	LS	$ 505,575	10/25/21	06/24/22	9	$ 56,175
1410220	Chimney	1	LS	$ 294,377	10/25/21	06/24/22	9	$ 32,709
1410230	Conveyor System	1	LS	$ 703,363	10/25/21	06/24/22	9	$ 78,152
1410240	Intake Structure	1	LS	$ 80,176	10/25/21	06/24/22	9	$ 8,908
1410250	Discharge Structure and Channel	1	LS	$ 128,603	10/25/21	06/24/22	9	$ 14,289
1410260	Coal Yard	1	LS	$ 719,017	08/09/21	10/29/21	3	$ 239,672
1410270	Electrical Switchyard	1	LS	$ 291,345	11/01/21	11/12/21	1	$ 291,345
1410290	Fly Ash Silo and Dome	1	LS	$ 197,056	11/15/21	12/25/21	2	$ 98,528
1410300	Power Block	1	LS	$ 1,660,450	10/25/21	06/24/22	9	$ 184,494

Table A.3 SUMMARY OF COSTS BY MONTH AND YEAR
PGE Boardman, Oregon Unit 1 Demolition

Biditem	Description	Takeoff Quantity	Units	Total Costs	Start Date	End Date	Duration (Months)	Cost Per Month
1410310	Underground Piping and Utilities	1	LS	$ 87,020	03/14/22	07/29/22	5	$ 17,404
1410315	Concrete Removal - All Areas	1	LS	$ 548,014	04/04/22	06/24/22	3	$ 182,671
1410320	Concrete Processing - Backfill Material	1	LS	$ 179,907	04/25/22	06/24/22	3	$ 59,969
1410330	Backfill and Grading - concrete and onsite soil us	1	LS	$ 153,893	10/03/22	10/07/22	1	$ 153,893
1410340	Site Restoration	1	LS	$ 373,089	08/01/22	09/30/22	2	$ 186,545
1410350	Demobilization	1	LS	$ 65,970	10/03/22	10/07/22	1	$ 65,970
1410360	As-Builts	1	LS	$ 38,754	10/03/22	10/07/22	1	$ 38,754
1410399	**SUBTOTAL DEMOLITION**			**$ 8,722,991**				

					Start Date	End Date	Duration (Months)	Cost Per Month
1510000	**MANAGEMENT COSTS**				06/01/15	10/07/22		
1510110	Contractor Project Management cost	1	LS	$ 2,009,381	06/01/15	10/07/22	89	$ 22,577
1510120	CH2M or other Consultant cost (labor and contracto	1	LS	$ 2,306,122	06/01/15	10/07/22	89	$ 25,911
1510130	PGE costs to oversee	1	LS	$ 296,640	06/01/15	10/07/22	89	$ 3,333
1510199	**SUBTOTAL MANAGEMENT COSTS**			**$ 4,612,143**				

					Start Date	End Date	Duration (Months)	Cost Per Month
1610000	**SOIL CLEANUP**							
1610110	Shooting Range Berm	1	LS	$ 94,689	08/02/21	09/30/21	2	$ 47,345
1610120	Lube oil shack	1	LS	$ 11,906	10/01/21	10/30/21	1	$ 11,906
1610130	Transformer Spill	1	LS	$ 42,331	11/01/21	12/16/21	2	$ 21,165
1610140	Demil Tank Oil Spill	1	LS	$ 27,812	12/19/21	01/30/22	2	$ 13,906
1610150	Auto Repair Shop Spill	1	LS	$ 16,046	02/02/22	02/28/22	1	$ 16,046
1610160	Fuel Oil Tank Spill	1	LS	$ 16,046	03/01/22	03/27/22	1	$ 16,046
1610199	**SUBTOTAL SOIL CLEAN-UP**			**$ 208,831**				

Table A.3 SUMMARY OF COSTS BY MONTH AND YEAR

PGE Boardman, Oregon Unit 1 Demolition

Biditem	**Description**	**Takeoff Quantity**	**Units**		**Total Costs**	**Start Date**	**End Date**	Duration (Months)		Cost Per Month
								Duration		Cost Per
						Start Date	**End Date**	(Months)		Month
1710000	**ASH LANDFILL CLOSURE**					01/04/21	10/29/21			
1710100	Ash Landfill Closure	1	LS	$	527,211	01/04/21	10/29/21	10	$	52,721
1710199	**SUBTOTAL ASH LANDFILL CLOSURE**			**$**	**527,211**					
								Duration (Months)		Cost Per Month
1810100	Subcontractor General Conditions	1	LS	$	3,331,574	06/01/15	10/07/22	89	$	37,433
1910100	TBD	1	LS	$	-					
2999999	**TOTAL ALL PLANNING and DEMOLITION**			**$**	**23,900,291**					
								Duration		Cost Per
						Start Date	**End Date**	(Months)		Month
3000000	**METALS RECYCLING**					03/01/21	07/29/22			
3000100	Ferrous Metals Recycling	1	LS	$	(1,790,144)	03/01/21	06/11/21	4	$	(447,536)
3000200	Non-Ferrous Metals Recycling	1	LS	$	(11,288)	06/14/21	09/24/21	4	$	(2,822)
3000300	Electronics Recycling	1	LS	$	(195,300)	09/27/21	12/31/21	4	$	(48,825)
3000400	Process Equipment Recycle	1	LS	$	(85,306)	01/03/22	04/15/22	4	$	(21,327)
3000500	High Value Metals Recycling	1	LS	$	(3,058,209)	04/18/22	07/27/22	4	$	(764,552)
3000999	**SUBTOTAL METALS RECYCLING**	**0**		**$**	**(5,140,247)**					
	PGE Total After Metals Rebates			**$**	**18,760,044**					

Table A.3 SUMMARY OF COSTS BY MONTH AND YEAR

PGE Boardman, Oregon Unit 1 Demolition

Biditem	Description	Takeoff Quantity	Units	Total Costs	Start Date	End Date	Duration (Months)	Cost Per Month

This is not an offer for construction and/or project execution. Please note, this Class 4 AACE Order of Magnitude cost estimate is assumed to represent the actual installed cost within the range of - 30 percent to + 50 percent of the total costs indicated. The cost estimate has been prepared for guidance in project evaluation and implementation from the information available at the time of the estimate. The final costs of the project will depend on actual labor and material costs, and competitive market conditions, implementation schedule, and other variable factors.

FINAL

Decommissioning and Demolition Plan for the Boardman Power Plant in Boardman, Oregon

Purchase Order – C0050-0000012668

Prepared for

Portland General Electric
121 SW Salmon Street, 3WTCBR06
Portland, OR 97204

November 2015

ch2m

7 West 6th Avenue
Helena, Montana 59601

Contents

Acronyms and Abbreviations

ACM	asbestos-containing material
ACBM	asbestos-containing building material
AMP	Air Monitoring Plan
AST	aboveground storage tank
BMP	best management practice
BPP	Boardman Power Plant
C&D	construction and demolition
CFR	*Code of Federal Regulations*
CH2M	CH2M HILL Engineers, Inc.
CY	cubic yard
D&D Plan	Decommissioning and Demolition Plan
DOT	Department of Transportation
EPP	Environmental Protection Plan
ERM	environmentally regulated material
ft^2	square foot
HEPA	high-efficiency particulate arrestance
LBP	lead-based paint
NMP	Noise Monitoring Plan
NPE	Negative Pressure Enclosure
OAR	Oregon Administrative Rule
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyls
PGE	Portland General Electric
PPE	personal protective equipment
ppm	parts per million
PVC	polyvinyl chloride
QA/QC	quality assurance and quality control
QC	quality control
RCRA	Resource Conservation and Recovery Act
RFP	Request for Proposal
RMA	Return Material Authorization
RMP	Recycling Management Plan
SWPPP	Stormwater Pollution Prevention Plan

TCP	Traffic Control Plan
TSCA	Toxic Substance Control Act
TSI	thermal system insulation
USEPA	United States Environmental Protection Agency
UST	underground storage tank
WMP	Waste Management Plan

Executive Summary

Portland General Electric (PGE) has tasked CH2M HILL Engineers, Inc. (CH2M) with preparing a Decommissioning and Demolition (D&D) Plan and Class 4 cost estimate to support the planning and preparation for the potential demolition of the Boardman Power Plant (BPP) in Boardman, Oregon. The BPP is a 617-megawatt coal-fired facility located adjacent to Carty Reservoir on Six Mile Canyon, approximately 13 miles south-southwest of Boardman, Oregon. The plant was constructed in the late 1970s and was placed into operation on August 3, 1980. The plant is scheduled to stop burning coal on December 31, 2020. The demolition and closure are referred to herein as the project.

The project will occur in three phases: planning, engineering, and execution. Activities will commence in 2015 and are targeted to end in 2023. The planning phase will occur between 2015 and 2017 and will include preparation of a Closure Strategy Plan, development of a strategy for the end use of the property, initiation of the permit process, and preparation of a draft plan for the isolation of the Carty Plant. The engineering phase will occur in 2018 and 2019 and will include continuation of permitting and closure strategy, preparation of a plan to take the plant cold and dark, performing an environmentally regulated material survey and environmental assessment, updating the D&D Plan and cost estimate, assessing salvage options, and preparing the engineering plans for the Carty Plant isolation. The execution phase will occur between 2020 and 2023 and will include prequalifying contractors, preparing a Request for Proposal, soliciting bids for the demo and Ash Landfill closure, and contracting.

The execution phase encompasses predemolition and demolition activities. The predemolition activities consist of completing the isolation of the Carty Plant, performing an environmentally regulated material survey, placing the BPP into cold and dark status, performing the decontamination and abatement, and completing the asset recovery. The demolition activities consist of demolition of all structures not designated for protection to ground level and leaving all foundations, roads, parking areas, rail lines, and transmission lines in place, grading the site to a stable site condition, and closing the Ash Landfill.

Key assumptions and considerations have been identified as a basis for the D&D scope of work. They are listed in Section 1 (Introduction). Responsibility for the various components of the D&D has been assigned, as described in Section 4 (Scope of Work).

An evaluation of waste and recycle types and quantities has been performed based on a review of existing data provided by PGE. Waste and recycle types include asbestos-containing materials, lead-based paint, universal wastes, hazardous and nonhazardous wastes, and construction and demolition wastes. Waste minimization techniques have been planned to maximize the amount of material that can be recycled and beneficial reuse of concrete and existing site soil for backfill has been evaluated to reduce the volume of materials requiring offsite disposal. Correspondingly, these efforts will minimize the quantity of materials imported for backfill. Materials that will be recycled include ferrous and nonferrous metal, electronic and process equipment, and high-value alloys, all of which will be decisively tracked to assure maximum benefit to PGE.

Demolition methods for the power block removal have been evaluated and summarized based on identified advantages and disadvantages, including the use of explosives, top-down surgical dismantling, and felling. On the basis of cost, safety, effectiveness, and efficiency evaluation criteria, use of explosives is the recommended means of demolition for the power block structure.

The work will be performed in a sequenced manner taking into consideration safety, quality, efficiency, and effectiveness. The entire demolition process must be organized and coordinated precisely to assure these considerations are met. The first step in the sequence is to obtain all permits necessary to perform the demolition. The tanks and vessels will be decommissioned and the plant shut down with all systems purged by PGE. The exact sequence of work will be finalized during the permitting and preparation of the final D&D Plan and supporting documents. Some activities will be completed in parallel or intermittently.

SECTION 1

Introduction

Portland General Electric (PGE) has tasked CH2M HILL Engineers, Inc. (CH2M) to prepare a Decommissioning and Demolition (D&D) Plan to support the planning and preparation for the demolition of the Boardman Power Plant (BPP) in Boardman, Oregon. The BPP is located adjacent to Carty Reservoir on Six Mile Canyon, approximately 13 miles south-southwest of Boardman, Oregon (Section 34, Township 3N, Range 24E, Willamette meridian) (Figure 1-1, Location Map). The BPP consists of a single-unit, 617-megawatt, coal-fired facility. Construction began in February 1976 and commercial operation commenced on August 3, 1980. The BPP is scheduled to stop burning coal on December 31, 2020.

The background, objectives, key assumptions and considerations, and a proposed schedule are detailed in this section. Photographs of the BPP are located in Appendix A, Site Photographs.

1.1 Background

The BPP site is located between Six Mile Canyon and Poverty Ridge adjacent to the north side of the Carty Reservoir. The plant site encompasses approximately 200 acres south of the Columbia River (Figure 1-2, Boardman Power Plant Site). The site topography is relatively flat and marked by flat ridges with gentle slopes descending into the shallow canyon. The terrain features sparse vegetation with sagebrush, thistle, juniper, and sand wind-eroded soil (Bechtel, 1982).

A new gas-fired power plant (Carty Plant) is currently under construction northwest of the BPP. The Carty Plant is scheduled to go online in 2016.

1.2 Objectives

The primary objectives of the D&D Plan are to provide both general and specific information to be used for the planning, budgeting, and eventual demolition of the BPP. The Plan describes an option for how the demolition will occur, the sequence it will follow, what equipment and personnel power will be required, what material will be brought onto the site, types and volumes of material and waste that will leave the site, and what can be salvaged for resale or recycling. The D&D Plan has been prepared using best professional judgment and best management practices (BMPs) that have been proven at similar facilities within the United States.

The D&D Plan is based on the key objective that demolition of the BPP will utilize waste diversion techniques intended to maximize recycling and reduce the volume of material requiring offsite transport and disposal. However, the selected demolition contractor will choose the actual methods and techniques employed during demolition of BPP and they could vary from those described in this D&D Plan. The D&D Plan will be a key document used in competitively procuring a qualified subcontractor to implement D&D at BPP and net PGE the best value possible.

1.3 Key Assumptions and Considerations

This D&D Plan has been prepared based on key assumptions and considerations generated to accommodate the anticipated end use once the demolition is complete. Table 1-1 provides the key assumptions and considerations.

Table 1-1. Key Assumptions and Considerations

General	Concrete will be obtained from turbine pedestal, concrete blocks, four concrete floors in power block, chimney, miscellaneous on-soil pile, pulverizer pedestal, crusher building (four floors), SR2 and 3 counterweights, trenches on west side and north and south side of track between TP-4 and TP-5, and conveyor counterweight.
	Unlined settling ponds will be cleaned out and material placed in ash landfill by PGE before demolition. Two ponds total ¼ acre. Expect large rock at bottom.
	Fly Ash Storage Dome and silos will be empty.
	Material excavated for the construction of the two lined evaporation ponds will be reused as backfill. Ponds may be reused. The price to remove and backfill is an independent item. Need to isolate at valves.
	Concrete debris in evaporation pond soil stockpile will be crushed and used as backfill.
	Onsite soil from borrow sources will be used as practical.
	Sluice bottom-handling system contains 1 million gallons.
	Coal wash system contains approximately 1 million gallons of water, including sump basin clarifier.
	10-acre evaporation pond was unlined for 30 years prior to lining in 2007. Two-acre pond has always been lined.
	Tanks and systems will be drained except for some residual.
	Two lined sewage lagoons will remain for use by Carty Plant.
	Rail line will be left in place.
	Microwave on power block structure will be reused.
	Parking lots and paved areas will be left in place.
Demolition	Structures will be demolished down to existing grade.
	Underground tanks and associated piping will be decommissioned per Oregon Department of Environmental Quality (ODEQ) requirements.
	All buildings will be demolished (except Rural Fire Station).
	Discharge structure will be left in place and the section that goes under divider dike will be isolated by plugging and filling with engineered fill.
	Intake structure will be protected and all pumps and screens will be removed. Fire protection system will be included in demolition (this could change). Assume this will be last to be removed so it is available during demo.
	Small washwater pond for decontaminated water will be demolished and backfilled.
	Concrete settling basin for clarifier in coal yard will be removed and backfilled.
	Two steel underground storage tanks for oil/water separator (one pre- and one post-treatment) will be removed and backfilled.
	Lube oil shack with holding tanks for oil and grease will be removed.
	Site will be graded post-demolition so that water does not pond and will be left in a stable condition.

1.4 Schedule

The demolition of the existing BPP is currently planned to start in early 2021. The personnel power, equipment, and schedule information that follows assumes demolition means and methods that would be employed in today's marketplace (calendar year 2015). Future technological advancements or regulatory changes may render some of these assumptions obsolete.

The demolition schedule presented in this D&D Plan is for PGE's use in planning and budgeting. The schedule is based on the various assumptions noted in this D&D Plan.

Planning, engineering, and execution of predemolition activities will occur between January 2016 and December 2020. The Closure Strategy Plan (CH2M, 2015) focuses on the main closure strategy and this D&D Plan focuses on the planning related to the contractor prequalification and bid process and the predemolition activities.

The decommissioning, abatement, demolition, and site restoration are planned to occur over a 22-month timeframe. The schedule shows these activities occurring between January 2021 and October 2022. Figure 1-3, Baseline Schedule, presents the schedule for the predemolition activities, demolition, and restoration of the BPP site.

SECTION 2

Planning

This section describes the planning activities required to get the BPP to cold and dark status in early 2021. These activities are planned to be completed between 2015 and 2017, well in advance of December 31, 2020, when BPP is scheduled to go offline.

2.1 Bidder Prequalification

Prequalification of contractors and preparation of contract documents should be completed early in 2020. A prequalified group of contractors will be solicited for interested in the demolition of the BPP and closure of the Ash Landfill. Prequalification should include review of experience, resource availability, safety, and environmental compliance records. Contract documents including a Request for Proposal (RFP) will be prepared for solicitation of bids.

2.2 Demolition and Landfill Closure Bid Process

The demolition and Ash Landfill closure bid process should follow PGE's existing procurement procedures and the processes recommended in this section. The RFP will be submitted to the prequalified bidders with the scope of work, plans, and specifications. A mandatory bid walk should be conducted shortly after the RFP has been issued and after the bidders have had adequate time to review it. The bid walk should include a presentation of the scope of work, a discussion of key contract terms, a site walk, and a question and answer session. After the bid walk, a deadline should be set for any follow-up questions. Questions should be answered and distributed to each bidder. Bids are recommended to include both a cost proposal and a technical proposal. Bid evaluation and selection method options are summarized in this section.

2.2.1 Technical Proposal

The bidders should summarize their qualifications and technical approach in a technical proposal. The technical proposal should be comprehensive enough to demonstrate their understanding of the project requirements and provide enough information to evaluate the bids. It is recommended that the technical proposals follow a uniform organizational to aid evaluation. Recommended topics for the technical proposal are listed in Table 2-1. This list should be refined and finalized during the engineering phase.

Table 2-1. Proposed Technical Proposal Topics

Topics	Topics
Proposed demolition tasks	Company safety statistics
Proposed sequencing of work	Proposed organizational chart and key personnel
Detailed schedule	Qualifications for key personnel
Anticipated challenges and proposed solutions	Key subcontractors and their qualifications
List of required permits, notices, approvals, and other regulatory requirements	List of similar projects completed by the company with references
Company qualifications and licensing	

2.2.2 Bid Evaluation and Selection

It is recommended that proposals be evaluated based on the elements shown in Table 2-1 and the pricing. In addition, after evaluating the proposals and before awarding the contract, it is recommended that PGE interview the top one to three bidders. It is recommended that the bidding approach be discussed and refined during the planning and engineering phases. Three potential bid evaluation methods are summarized below.

2.2.2.1 Lowest Price Technically Acceptable

Lowest Price Technically Acceptable (LPTA) contracts evaluate the price of the proposals solicited and identify the lowest one. Next, the LPTA contract evaluates the proposal's technical approach against a bar for "acceptability." A primary advantage is that when used appropriately, this approach can be speedy. The bar consists of evaluation factors pertaining to noncost criteria; however, discrimination among offerors on the basis of the criteria is not likely to occur. Offerors either clear or do not clear the bar.

The disadvantage is that not having any past performance may be deemed "acceptable," meaning an offeror's excellent past performance provides no relative advantage. If the bar is lower than it should be due to factors such as unclear or incomplete requirements for a service more complex than previously assumed, unexpected results may ensue, such as numerous change orders and cost overruns.

2.2.2.2 Best Value

Best Value contracts weight noncost factors such as past performance, risk aversion, reliability, or innovation as equally important if not more important than price. The main advantage is that the owner has the flexibility to trade off between noncost factors and price/cost factors and award the offeror who does not have the lowest price or does not rate the highest technically. The disadvantage is that the cost is usually higher than LPTA contracts.

2.2.2.3 Summary

Best Value contracts typically provide the most advantages and least disadvantages to the owner and are the recommended options for consideration. Although the cost may be higher, the level of certainty for project success is increased by a better understanding of the cost and noncost factors.

SECTION 3

Predemolition Activities

The predemolition execution activities for the BPP D&D consist of engineering and construction of Carty Plant support system isolation; performance of an environmentally regulated material survey (ERM); cold and dark implementation; decontamination; abatement and asset recovery; waste characterization, handling, transportation, and disposal planning; and recycled material handling, transportation, and planning. It is anticipated that these activities will occur between January 2018 and December 2020. Predemolition activities at the BPP will be conducted in accordance with applicable regulations and will be performed by contractors licensed by the Oregon State Contractor's Licensing Board. These activities are briefly discussed below and presented in detail in the Closure Strategy Plan (CH2M, 2015).

3.1 Engineering and Construction of Carty Plant Support System Isolation

The Carty Plant is a gas-fired power plant currently under construction northwest of the BPP. Before the BPP goes cold and dark, several key systems that currently support the Carty Plant through the BPP will need to be isolated. The process for isolation will include preparing the engineering plans for the work, preparing an engineering estimate for the isolation, obtaining the funding for the isolation, solicitation of services and contracting, and completing the construction elements. The engineering plans for the Carty Plant isolation are planned to be completed in early 2018 and will include the design plans, specifications, and engineering cost estimate. The design will include all elements required to isolate the Carty Plant from the existing systems of the BPP.

3.2 Performance of Environmentally Regulated Material Survey

An ERM survey is planned to be performed in early 2019 to identify and quantify the following ERM materials:

- Asbestos-containing material (ACM)
- Universal waste
- Lead-based paint (LBP)
- Hazardous waste
- Radiological waste

The ERM survey contractor will need to verify the current local, state, and federal regulations before conducting the survey.

3.3 Cold and Dark Implementation

The purpose of the cold and dark implementation is to reduce the amount of decontamination that is required, prepare the plant for abatement and demolition, and make the structure safe for demolition.

The BPP is scheduled to go offline on December 31, 2020, placing it in cold and dark status. Before the plant goes offline in 2020, a series of actions will be required, including using of as much of the onsite resources as possible (e.g., coal, fuels, chemicals, and process materials). The idea is to have as little of these resources left over as possible to reduce the volume of materials that will be handled as waste.

Once the plant goes offline, the systems will be secured through lockout/tag out procedures, and the remaining systems, vessels, tanks, and piping will be drained to the extent possible. The remaining ash in the ash silos will be removed and placed in the Ash Landfill. Liquids and sludge from the waste and washwater ponds will be removed and disposed of, the evaporation ponds will be allowed to evaporate, and the coal yard settling basin will be emptied. Detailed instructions will be developed to describe the methods and procedures required to isolate and de-energize all electrical equipment in advance of removal, without interrupting systems that are to remain in place.

3.4 Decontamination

The decontamination contractor will prepare a Decontamination Plan prior to the initiation of activities. This plan will include a detailed description of the decontamination work to be conducted, along with a description of the methods and procedures to be employed.

Specific elements of the decontamination plan will address methodology and procedures, site preparation, required containment setup, engineering and work practice controls, personal protective equipment (PPE), waste labeling, waste storage/containerization, waste transport/disposal, personnel decontamination, and cleanup.

The decontamination will include the removal of all remaining liquids, gas, and solids from piping, tanks, vessels, equipment, and components. Decontamination will involve accessing the components by cutting, opening, etc. to allow the liquid, gas, and solids to be removed. This process requires careful planning and execution. Residual waste will be handled, stored, transported, and disposed of in accordance with local, state, and federal regulations. Typical procedures for the abatement of existing facilities are listed below.

- The decontamination scope of work will include performing surveys to locate, characterize, and remove quantities of environmentally hazardous and objectionable material. The data will be used by the contractor to establish implementation plans and to collect, package, and prepare for waste shipment. PGE will identify the appropriate waste profile to be utilized. This includes elevators and associated steel structures, boilers, tanks, pumps, preheaters, ductwork, conduit, evaporators, piping, including the piping containing fuels and oil that may require cleaning prior to removal to make safe, structural steel, stairs and handrails, and all other items within the limits of work. Should PGE elect to perform these activities in advance, some cost savings associated with reduced subcontractor costs may be realized.
- Cold methods will be used for “first-breaks” and creating “air-gaps” on equipment such as pipes, enclosed vessels, and tanks. PGE may complete this work in advance of turning the plant over to the demolition contractor. The advantage of PGE plant staff performing this work is their knowledge of the systems, which increases the safety and completeness of the work. Additionally, there could be cost savings using plant staff. If the demolition contractor performs the work, PGE plant staff should oversee the work to ensure all systems are air gapped.
- Plumbing, electrical, and other utilities required to safely perform the work will be disconnected, capped, or cut prior to decontamination.
- Engineering will be completed as necessary to ensure any equipment and piping removed as part of the decontamination from the Power Plant structure is adequately supported and restrained during demolition in a manner that meets all applicable codes and requirements.
- As part of the decontamination and prior to demolition and removal, the pits, tunnels, and trenches within and adjacent to the turbine and boilers will be opened, inspected, cleaned, and made safe with the replacement of removed or repaired deck plates or handrails as appropriate. Material removed from the pits and trenches will be disposed of legally.

3.5 Abatement and Asset Recovery Process

Abatement activities at the BPP will be conducted in accordance with all applicable regulations and are anticipated to be performed in mid-2021. The work will be performed by contractors licensed by the Oregon State Contractor's Licensing Board. The abatement contractor will prepare abatement plans prior to the initiation of activities. These plans will include a detailed description of the abatement work to be conducted, along with a description of the abatement methods and procedures to be employed.

Specific elements of the abatement plans will address methodology and procedures, site preparation, required containment setup, engineering and work practice controls, PPE, worker exposure assessment (air monitoring), waste labeling, waste storage/containerization, waste transport/disposal, personnel decontamination, worker hygiene facilities, and general housekeeping and cleanup. Abatement of existing facilities will typically include the following actions:

- ACM, LBP (as required), universal waste, hazardous waste, and any other regulated waste will be removed and properly disposed of offsite.
- Friable and nonfriable insulation on mechanical systems and equipment, piping, heating, ventilation and air conditioning, electrical components and equipment, transite spark arrestors, switchgear protection, and transite electrical conduit will be removed, abated, and properly disposed of offsite.
- Lights, ballast, and universal waste (e.g., mercury-containing equipment, radiation point sources) will be removed and disposed of offsite.
- Any spills of hazardous materials such as mercury and polychlorinated biphenyls (PCBs) during the disposition of abated materials will be completed.
- LBP removal and cleanup to support the dismantling and demolition activity will be managed.

Waste types and quantities for ACM were estimated based on the 2006 ACM survey performed by Doug Jenkin and the remaining waste quantities based on review of as-built drawings and site reconnaissance as part of the CH2M cost estimate in the Closure Strategy Plan (CH2M, 2015). Additionally, beneficial use of waste materials was considered.

3.5.1 Asbestos

Before plant demolition activities begin, ACM will be identified and abated. A sampling program to update the previous asbestos surveyed performed by Doug Jenkin in April 2006 (Jenkin, 2006) will be completed to confirm the 2006 survey and to investigate the presence or absence of ACM in other plant materials. Materials investigated will include flooring tile and mastic, acoustical ceilings, drywall and plaster, asbestos-cement products (e.g., transite siding), roofing and flashings, packing, gaskets, and caulking. Removal will take place in enclosures under negative air pressure, or by use of glove bags. All abatement work will be monitored by an independent consultant, who will observe the work for compliance with regulations, and will conduct air monitoring on a daily basis. It is anticipated that 1,580 tons of in-place ACM will be generated during the abatement based on the previous asbestos surveyed performed by Doug Jenkin in April 2006 (Jenkin, 2006). The asbestos survey is included in Appendix B.

Specifications for stripping, removal, and disposal portions of the abatement work will conform to the current regulatory standards and the procedures determined during the planning and design phases. Typical procedures for asbestos abatement are listed below.

Vinyl Floor Tile and Associated Mastic (Nonfriable and Friable ACM) Regulated Work Areas will be demarcated using barrier tape and required asbestos signage of 6-mil polyethylene (poly) sheeting will be placed over openings, doors/entrances, walls, and ceiling (when mechanical means are used to remove ACM). Negative air machines will be installed and exhausted to the building exterior, creating a Negative Pressure Enclosure (NPE). All workers inside Containment will wear appropriate PPE.

Using manual means and wet methods, Vinyl Floor Tile will be lifted and placed into 6-mil poly bags, which will then be sealed and labeled. Hudson or airless sprayers will be used to keep materials adequately wet during the removal process. Once tile is removed, razor scrapers or a “Scrape-A-Way” blade attached to floor buffers will be used to lift the bulk of the ACM mastic, or the “Bead-blasting” method will be used. Mastic remover solvent will be applied to perimeter edges. Rags and absorbents will be used to lift liquid and detail clean floors. Surfaces will be encapsulated following removal. Occupational Safety and Health Administration (OSHA) air monitoring will be performed during abatement activities.

Regulated Work Areas for the Friable Acoustical Ceiling Materials will be demarcated using barrier tape and required asbestos signage. The 6-mil poly sheeting will be placed over openings, doors/entrances, walls and floors, prior to removal. Negative air machines will be installed and exhausted to the building exterior, creating a NPE. Using manual means and wet methods, Acoustical Ceiling materials will be placed into prelabeled, 6-mil poly bags, sealed, double-bagged, and properly labeled, including United States Environmental Protection Agency (USEPA) Identification Number(s). After material has been removed, the substrate will be detail-cleaned to remove any residual ACM, and surfaces will then be encapsulated. OSHA Personnel Exposure Air monitoring will be performed during abatement activities.

Each regulated work area for friable thermal system insulation (TSI) will be demarcated using barrier tape and required asbestos signage. The poly sheeting will be placed over openings, doors/entrances, walls and floors, prior to removal. Negative air machines will be installed and exhausted to building exterior, creating a localized Negative Air, or the NPE. Using manual means and wet methods, TSI will be “glove-bagged” over drop-cloth poly. Boiler/Tank Insulation removal will be completed via gross removal inside the Containment area. ACM will be placed into prelabeled, 6-mil poly bags, sealed, double-bagged, and properly labeled, including USEPA Identification Numbers. After material is removed, the substrate will be detail-cleaned to remove any residual ACM, and surfaces will be encapsulated. Workers will wear the appropriate PPE and OSHA Personnel Exposure Air Monitoring will be performed during removal and detail-cleaning.

Work areas will be demarcated via barrier tape and required signage for asbestos-containing building material (ACBM) reported to contain less than one percent asbestos, which include interior drywall walls, window putty, and ceiling tile mastic. Walls will be removed via mechanical means and poly sheeting drop cloths may be placed below ACBM, for the drywall removal using wet methods, before placing into bags or directly into a poly-lined Construction Debris bin. As necessary, high-efficiency particulate arrestance (HEPA) vacuums will be used to detail clean areas. Workers will wear the appropriate PPE and OSHA Personnel Exposure Air Monitoring will be performed during removal and detail-cleaning.

ACM roofing and siding will be manually removed, then bagged or lowered to the ground via enclosed chutes. Roof penetration mastic and all materials will be kept adequately wet while being abated. An enclosed chute may be erected to allow for bulk removal of roofing, loaded directly into open-top bins lined with poly sheeting. Final cleaning will be accomplished by wetting/misting any remaining material, prior to placing directly into single, clear poly bags. As necessary, HEPA vacuums will be used to final clean and detail the roof substrate. OSHA Personnel Exposure Air monitoring will be performed during the abatement. A five-point safety harness with lanyard(s) will be used by each worker during elevated work, and the Fall Protection system and equipment to be used will comply with OSHA requirements.

3.5.2 Lead-based Paint

Surface coatings will be tested either by an X-ray fluorescence process, or through sampling and laboratory analysis. Flaking or peeling LBP will be removed or encapsulated prior to demolition. The waste product generated during removal will be collected, containerized, and transported offsite for disposal. Should flame cutting or welding be required on surfaces coated with LBP, the LBP will be removed beforehand using appropriate safety measures. It is anticipated that 20 tons of lead waste (LBP and stripping materials) will be generated during the demolition based on CH2M experience on similar type projects.

It is assumed that demolition debris that contains firmly adhered LBP (e.g., concrete debris with LBP) will not be a hazardous waste, and will be managed as nonhazardous debris.

Regulated Work Areas will be established prior to the removal of damaged LBP materials identified, which will be demarcated using barrier tape and required LEAD-Danger signage. Poly sheeting will be placed under surfaces adjacent to damaged LBP, which will be removed via manual means and wet-methods. Upon completion of removal, the substrate with Lead-Barrier Compound will be thoroughly encapsulated, to stabilize the existing surface(s) prior to building demolition by others, as required. Workers will wear appropriate PPE and OSHA Personnel Exposure Monitoring will be performed during the work.

All packaged material will be taken directly from the load-out area to poly-lined bins. The LBP will be transport as waste under manifest to federal- and state-approved facilities. The generator’s copy of the manifest will be provided to the designated point of contact. Throughout the project, a waste manifest log will be maintained. Upon completion of work, manifests will become a part of a final closeout report.

3.5.3 Universal Waste and Other Hazardous Waste

Located throughout the BPP are various building components that are regulated under the USEPA, Title 40 *Code of Federal Regulations* (CFR). These items are defined as universal waste and require proper handling and waste management. The following protocols provide typical means and methods of handling such materials as part of the abatement and demolition activities.

3.5.3.1 Mercury-containing Items

The item containing mercury will be isolated and the wires clipped or housing dismantled. The glass ampoules will be removed and then be placed in spill-proof plastic containers containing absorbent media. When personnel have removed all mercury-containing items from the facility, the remaining void space in the container will be filled with absorbent. The lid will then be secured and the drum labeled with the generator information and proper shipping name. The mercury waste stream will be staged for eventual transportation and disposal to a PGE-approved disposal facility. Mercury waste will be labeled with a standard “HAZARDOUS WASTE” label, with the description of “Mercury Contained in Manufactured Articles, 8, UN2809, P.G.III, (Mercury).” This labeling and manifest description will be required for any shipment of mercury waste.

3.5.3.2 Freon Removal

The specific items (i.e., air conditioning units) containing freon in the form of chlorofluorocarbons will be located and accessed for recovery. A licensed Refrigeration Technician will perform any evacuation activities, confirm evacuation has been completed, and leave valves open signifying recovery has been completed.

3.5.3.3 Self-Luminous Exit Signs

Self-luminous Self-Power Lighting exit signs will be removed and packaged per the manufacturer’s recommendation. The unit will be unbolted from the wall. No attempt will be made to open the body of the exit sign and precautions will be taken by personnel to ensure that the sign is not dropped. Removed exit signs will be placed into manufacture-provided boxes suitable for the shipping of the devices. The boxes will contain up to approximately 10 devices. Each device will be placed into a sealable plastic bag as recommended by the manufacturer. Shipment of these devices will involve the acquisition of a

Return Material Authorization (RMA) number provided by the manufacturers. This RMA number is considered to be the acceptance and tracking number by the manufacturer. In the event that the manufacturer cannot be located, the exit signs will be securely containerized and disposed of using a specialty waste disposal service.

3.5.3.4 Smoke Detector Removal

As with the self-luminous exit signs, the smoke detectors to be removed will be packaged per the manufacturer's recommendation. The removed smoke detectors will be placed into manufacture-provided boxes suitable for shipping. The box will contain approximately 35 to 40 devices. Each device will be placed into a sealable plastic bag as recommended by the manufacturer. Shipment of these devices will involve the acquisition of a RMA number provided by the manufacturers. This RMA number will be considered the acceptance and tracking number by the manufacture. Similarly, should the manufacture not be available, the abatement contractor will utilize a specialty waste disposal service to properly dispose of smoke detectors.

3.5.3.5 Lead Acid/NiCad Batteries

Any batteries to be removed will be located and the housing cover opened for access. The removed batteries will be staged at the temporary waste storage area for segregation and packaging. Packaging will consist of placement of the undamaged batteries onto wooden pallets. If a battery is found to be cracked, leaking, or if the integrity of the battery is potentially impaired, it will be containerized in designated poly drums or containers at the temporary waste storage area, for eventual consolidation and shipment offsite. All drums will be packaged and labeled according to state or federal requirements. All personnel handling lead acid batteries will be outfitted with appropriate safety gear including but not limited to chemical-resistant polyvinyl chloride (PVC) knee boots, PVC Tyvek Suits, PVC gloves, and hard-hats with goggles and face shield. Any spills will be neutralized with baking soda and water.

3.5.3.6 Fluorescent Bulbs and HID Lamps

Rolling scaffolding or ladders will be used to support workers on single-story floors. For ceilings of greater height, a motorized lift will be utilized to assist in retrieving light tubes and other lighting fixtures. The tubes and lamps will be removed and placed in Transport, Storage, and Disposal Facility-supplied storage boxes or fiber drums. The box/drum will be sealed, placed on pallets, and secured to the pallet with stretch wrap. Full pallets will be transported via forklift to the temporary waste storage area. Boxes will be marked with the customer name and address, and a packing list will be attached to the container. During fluorescent light removal, if any tubes break, personnel will gather the broken items and place them in a plastic container. Plastic containers will then be consolidated in a Department of Transportation (DOT) 17H, 55- gallon steel drum and properly profiled per federal or state regulations.

3.5.3.7 PCB and Non-PCB Ballasts

Lighting ballasts will be removed and containerized for offsite recycling. Although non-PCB containing ballasts can be considered general construction debris, each ballast contains a small amount of di-electric fluid. The fluid is non-PCB containing, but should be managed properly through recycling and not shipped to a local landfill as debris. Ballasts will be removed by unbolting the item from the light fixture housing and consolidated in a DOT 17H, 55-gallon steel drum(s). When counting ballasts during lab packing, care should be taken to ensure that no more than 150 small ballasts are placed into a 55-gallon drum. All lab packing will occur in accordance with federal, state, and local regulations. Ballasts will be staged for eventual offsite recycling at a PGE-approved disposal facility.

Drums containing PCB ballasts will be labeled with a standard "HAZARDOUS WASTE" label, and the description of "R.Q. Environmentally Hazardous Substance Solid, N.O.S., 9, NA3077, P.G.III, (Polychlorinated Biphenyls)" and "CAUTION CONTAINS PCBs." This labeling and manifest description will be required for any shipment of drummed PCB-containing ballasts.

3.5.3.8 Oil-containing Equipment

Oil-containing equipment may include any equipment known to have previously contained hydraulic motor or cooling oil. Equipment to be addressed may include but is not limited to the following:

- Elevators
- Electric motors on conveyors
- Pumps
- Diesel-operated compressors and generators
- Transformers

A passenger elevator is located in the BPP and will require removal of the hydraulic fluid currently contained in the elevator's holding tank, turbine controls, and other equipment. Personnel will utilize mechanical (metal or plastic) hand pumps to facilitate oil removal. The oil will be pumped directly into the DOT 17H, 55-gallon steel drum(s), which will be located adjacent to the work area during oil transfer to reduce spillage. Containers will be sealed prior to being moved or transported. Absorbent and/or spill containment booms will be available onsite during oil removal and transfer as a contingency in case of spillage. Drummed hydraulic fluid will be profiled and recycled at a PGE-approved recycling facility. Similarly, other equipment containing hydraulic or motor oil will be drained and properly disposed or recycled prior to facility demolition. Electrical transformers located in the project area will be sampled to assure they are non-PCB.

3.5.3.9 Radiation Sources

A total of 52 radioactive material sources are located at the BPP, including radioactive materials in the form of Cesium 137 sealed sources used at the BPP by authority of Oregon Radioactive Material License ORE-90735 (Appendix C) (Boardman Fixed Gauges Source Inventory [PGE, 2015]).

These sources are located at multiple locations throughout BPP including but not limited to the feeders, crusher building, distribution bins, transfer points, coal dust collectors, lower well, reclaim pits, dumper pit, and belt conveyor and feeder. All radioactive sources will be returned to their manufacturer. In the event that the manufacturer cannot be located, the exit signs will be securely containerized and disposed of using a specialty waste disposal service.

3.5.4 Asset Recovery Evaluation

An economic evaluation will be made prior to removal. This way the equipment can be loaded for transport immediately after removal to avoid handling it multiple times. Any equipment and components that are determined to be economically reusable by PGE or others will be identified. For PGE, the equipment will be tagged for removal prior to abatement. For all other economically reusable equipment, a list with a description and pictures will be developed and solicited for presale. The demolition contractor may assist in this process by identifying potential buyers.

Equipment that is determined to have a salvage value will be identified and included in the demolition contractor's scope of work. If turned over to the demolition contractor, the contractor will likely either resell whole or sell as scrap. If the equipment cannot be sold, it will be recycled when applicable or disposed of as a nonhazardous or hazardous waste.

The following types of equipment may be moved to another PGE site for redeployment or sold as salvage:

- Tanks
- Pumps
- Turbines
- Generators
- Transformers

- Control Equipment
- Motors
- Furnaces
- Boiler

The equipment and components that are sold as salvage will be transported offsite through the main gate by truck or by train. The quantities of this material have not been estimated as part of this D&D Plan because the future market value and desirability are not known.

3.6 Waste Characterization, Handling, Transportation, and Disposal

Waste generated during the demolition of the BPP is anticipated to fall into one of the following waste categories:

- Nonhazardous Construction Debris
- Universal Waste
- Non-Resource Conservation and Recovery Act (RCRA) Hazardous
- RCRA Hazardous
- Toxic Substance Control Act (TSCA) Regulated Material
- Radiological

Waste will be hauled by truck or train from the site to the appropriate disposal facility. Trucks will enter and leave the site from the main gate. Trains will enter and leave on the rail spur that enters the BPP. The trucks will be loaded at the site either from temporary stockpiles or directly from the demolition activities. Water spraying may be implemented to suppress potential dust while loading. Trucks will be covered with tarps prior to leaving the site.

Prior to offsite disposal of any waste, a waste approval package for each waste stream will be prepared. This package will include a waste profile identifying the generator of the waste, analytical summary table(s) applicable to the waste, land disposal restrictions notification for any hazardous waste, a completed waste manifest, and any other applicable information necessary for PGE to complete its review of the disposal package and signature as the generator. The signed profile will then be submitted to the offsite facility for acceptance and approval. Once the approval letter is received from the offsite facility, transportation can be scheduled. Each load of waste material will be manifested prior to leaving the site.

The generator and the transporter must sign the manifest prior to the load of waste leaving the site. A copy of the manifest will be retained onsite for tracking purposes. The original signed manifest will be returned to the address of the generator. The Traffic Control Plan (TCP) will identify transport routes and times for the materials.

3.6.1 Clean Construction and Demolition Debris

An estimated 6,600 cubic yards (CY) of construction and demolition (C&D) debris will be generated as part of the demolition activities. All waste that is characterized as nonhazardous C&D debris may be transported to and disposed of at Waste Management Columbia Ridge Landfill in Arlington, Oregon.

3.6.2 Non-Resource Conservation and Recovery Act Hazardous Waste

Non-RCRA hazardous waste includes the waste identified under the RCRA in 40 CFR 261, Subparts C and D. Non-RCRA hazardous waste generated during the demolition activities may include asbestos, refractory waste, soil, and other waste identified during the demolition. This waste is currently accepted at the Waste Management Columbia Ridge Landfill in Arlington, Oregon.

3.6.3 RCRA Hazardous Waste

RCRA hazardous waste generated during the demolition activities may include LBP chips, lead waste from paint stripping activities, and lead removed from batteries (nonuniversal waste batteries). This waste currently is accepted at the Waste Management Columbia Ridge Landfill in Arlington, Oregon.

3.6.4 Universal Waste

The following types of universal waste may be generated during the BPP demolition activities:

- Batteries containing the nickel-cadmium and small, sealed, lead-acid batteries that are found in many common items in the business and home setting, such as those used in electronic equipment, mobile telephones, portable computers, and emergency backup lighting.
- Mercury-containing equipment including devices or a part of a device that contains elemental mercury integral to its function (e.g., thermostats, switches, and pressure or vacuum gauges that contain mercury).
- Lamps including fluorescent tubes and bulbs, high-intensity discharge lamps, sodium vapor lamps, and any other type of lamps that exhibit a characteristic of a hazardous waste. Any electric lamp that contains added mercury, whether or not it exhibits a hazardous waste characteristic, is a universal waste.

Universal waste must be shipped to a “destination facility” that treats, disposes of, or recycles a particular category of universal waste in compliance with the applicable universal waste requirements of Oregon.

3.6.5 Toxic Substance Control Act-regulated Materials

Any light ballast identified as “PCB-Containing,” ballast without a label, or ballast that contains a leaking capacitor will be disposed of offsite as PCB bulk product waste:

- In an incinerator approved under the TSCA
- In a chemical waste landfill approved under TSCA
- In a RCRA permitted hazardous waste landfill

3.7 Recycled Material Quantities, Disposition, and Transport

This section details the types of materials to be recycled, and anticipated quantities, disposition, and transport.

3.7.1 Recycled Metals

Materials that will be generated during demolition activities and can be recycled include metal consisting of fencing, tanks, support beams, piping, miscellaneous building materials, electronic and process equipment, and components. Additionally, wood, plastic, electrical components, and other miscellaneous materials may be recycled depending on the economic value. Recycled and salvaged materials will be loaded and secured on trucks or train from the centralized staging areas. The material will be transported offsite through the main gate.

3.7.2 High-value Alloys

High-value alloys that will be generated during the demolition activities can be recycled, including metal consisting of stainless steel and admiralty brass from the condensers.

3.8 Facilities to Remain

Before, during, and after completion of the D&D work, certain existing facilities within the BPP site must remain in operation and undisturbed by contractor activity. Adequate care and caution must be exercised to protect these existing facilities and ensure that provided services are not impaired by any D&D action. Items to remain and that require protection include the following:

- Backup transformer and substation 7.2-kilovolt feed
- Domestic water well; cut and cap Boardman feed leaving main feed for Carty undisturbed
- Monitoring wells
- Communication line
- Construction buss power
- Sewage ponds
- Firehouse
- Intake pump house structure
- Helicopter pad
- Tower road
- Back entrance
- Reservoir and dams
- Carty circulation water piping
- Existing stairs and handrails must remain in place to ensure safe access until actual demolition of that area commences.

SECTION 4

General Scope of Work

This section describes the general scope of work for demolition activities. Topics addressed are an evaluation of the demolition methodology; materials, equipment, and services responsibilities; stormwater controls; and a general and detailed description of the work to be performed and the sequencing of that work.

4.1 Demolition Methodology Evaluation

The following three methods of demolition of the main steel frames of the support structures were evaluated:

- Use of explosives
- Top-down surgical dismantling
- Felling

4.1.1 Use of Explosives

The use of explosives is a controlled, cost-effective, efficient, and safe method for demolition. Through the use of explosives, many labor-hours are saved and the chance of injury is significantly reduced as personnel are not inside the structure during demolition. Explosives allow the worker to drop the structure and then use mechanical methods to cut up and segregate the pieces to reduce the amount of manual labor and reduce the amount of manual labor performed at elevations. This increases production and reduces the risk of injury from workers having to cut and torch. However, the use of explosives also has its issues with public relations, permitting, and planning. Additionally, weather conditions must be favorable to use this method. Planning for weather is critical. High winds and hot and dry weather are not favorable. Cool weather with higher humidity and calm conditions are required. Ideally use of explosives is best when a light cool mist is present to minimize dust.

4.1.2 Top-down Surgical Approach

The top-down surgical approach is a controlled, cost-effective, efficient, and safe method for demolition. The method requires multiple picks using a crane and a considerable level of effort to prepare each section for removal. Workers can bring sections of the structure to ground level and then use mechanical methods to cut up and segregate the pieces to reduce the amount of manual labor. This increases production and reduces the risk of injury from workers having to cut and torch at ground level. However, the top-down surgical approach has the longest schedule requirements and does include work inside the structure while preparing individual sections for removal. Additionally, weather conditions must be favorable to use this method. Planning for weather is critical. High winds are not favorable. Calm winds are required when picks are performed.

4.1.3 Felling

Felling is a controlled, cost-effective, and relatively safe method for demolition. This method requires the structure to be prepared by cutting structural supports in a manner that allows large pieces of equipment (D9 dozer or larger) with cables attached to pull the structure over. Felling also allows workers to bring the entire structure to ground level and then use mechanical methods to cut up and segregate the pieces to reduce the amount of manual labor. This increases production and reduces the risk of injury from workers having to cut and torch at ground level. However, the felling approach requires work inside the structure while preparing individual sections for felling including making the final cuts immediately before pulling the structure over. Additionally, weather conditions must be favorable to use this method. Planning for weather is critical. High winds and hot and dry weather are not favorable. Cool weather with higher humidity and calm conditions are required. Ideally use of explosives is best when a light cool mist is present to minimize dust.

4.2 Materials, Equipment, and Services Responsibilities

This section outlines the material, equipment, and services responsibilities of the owner and contractor.

4.2.1 Materials, Equipment, and Services Provided by PGE

PGE will furnish or cause to be furnished to the contractor, without cost to the contractor, material, permanent equipment, or permanent services for, or in connection with, performance of the work. Unless specifically set forth, the contractor will provide all other material, permanent equipment, or permanent services required for the work.

The following work affecting direct performance of the work is provided "by others" at no expense to the contractor:

- PGE will furnish, or cause to be furnished, to the contractor, without cost to contractor, the following items for, or in conjunction with, the performance of the work:
  - Access to the work site
  - Location for contractor trailer facilities
  - Access to a construction water source (contractor is responsible for hooking to and disconnecting from the source) or equivalent
  - Available as-built drawings
- Parking facilities (no plug-ins) will be available. PGE will not be financially responsible for any damage or unlawful acts to any contractor equipment or private vehicles parked in designated parking areas.
- Limited roughly graded space adjacent to the construction site will be available for temporary facilities and storage of material and equipment. (No storage facilities or protective coverings of any kind will be furnished by PGE.)

4.2.2 Materials, Equipment, and Services Provided by Contractor

The supply, installation, provision, maintenance, repair, and final removal of all temporary facilities and utilities, necessary for full and complete performance of the work, will be the sole responsibility of the contractor.

Such items will include, but not necessarily be limited to, those listed below. The contractor will have the sole responsibility to identify and provide all required temporary facilities and utilities to perform the work. The type of facilities, move-in and move-out dates, and locations on the work site will be subject to and in accordance with the review and approval of PGE. The contractor is responsible for the following:

- Environmental permits and similar agency requirements.
- Coordination of all trucking transported services with designated trucking firm. Trucking transport services will be provided by the contractor. The contractor will have responsibility to ensure that landfill acceptance requirements and DOT requirements are met. Transport begins only after sign-off by an authorized PGE representative and authorized transporter representative.
- Transport and disposal of all boiler firebricks if determined to contain hazardous materials. The contractor will be responsible to dismantle, package, and load all firebrick.

- Transport and disposal of all environmentally hazardous and regulated waste material to an authorized site.
- Connections to and disconnections from water supply.
- Temporary facility and laydown area, including the maintenance of contractor's laydown, storage, and work areas, as well as roads within such areas. Upon demobilization, that portion of the site previously occupied by contractor's temporary facilities and laydown area will be returned to its preconstruction condition or better. This requirement will also apply to all temporary roads, and parking and laydown areas.
- The provision, operation, and maintenance of sanitary systems, industrial systems, storm drainage and utility sewage systems for contractor's temporary facilities and construction area sanitary facilities is the responsibility of contractor including collection, holding, processing and disposal.
- Adequate weatherproof for storage of materials, tools, and equipment that are subject to damage by weather. The location of storage compounds must be agreed on with PGE before storage of materials commences. Such compounds will be maintained for the storage of the approved materials and for no other purpose.
- Construction Power. Includes connections to and disconnections, transforming to lower voltage and distribution. Construction power is for the joint use of all contractors engaged at the work site. Onsite generation of power is allowed provided that such power is obtained through the use of properly permitted, installed, and acoustically insulated diesel electric generating units.
- No weight will be imposed on any electric cable, and no staging, ladder, or similar equipment will rest against or be attached to it. Temporary power cables in use by contractor must be positioned so that they do not cause a tripping hazard.

The contractor is also responsible for the following:

- **Temporary Facility Area Power, Lighting, and Heating Supply**. All electrical installations within temporary buildings will be in accordance with the National Electric Code. Any temporary electrical device 480-V AC or above must be inspected and approved by PGE prior to use. This includes connections to and disconnections from PGE-provided construction power supply, transforming to lower voltage and distribution.

  Before contractor plugs in any electrical appliance to any plug socket belonging to PGE it will ensure that the appliance is in good condition and is fitted with a suitable cable including fully rated and insulated neutral conductor and protective ground conductor.
- **Construction Water**. The contractor will provide all temporary water distribution supply lines and water storage facilities. The contractor will distribute and convey water in an efficient and orderly way. Leaks and waste will be minimized and care will be exercised to eliminate the buildup and dispersal of mud resulting from leaks, spills, and truck-loading operations.
- **Potable Water**. The supply of potable water. Distribution to points of consumption in appropriate receptacles accompanied by suitable drinking vessels.
- **Testing Water**. The contractor will provide all distribution, supply lines, and water storage facilities. The contractor will distribute and convey water in an efficient and orderly way. Leaks and waste will be minimized and care will be exercised to eliminate the buildup and dispersal of mud resulting from leaks, spills, and truck-loading operations. Water will not be discharged to any drainage system without approval of PGE.
- **Temporary Buildings**. The contractor will provide, operate, maintain, and dispose of all temporary buildings, including change rooms.

Sanitary facilities in buildings will be operated with running water and effluent will be collected and temporarily stored in holding tanks for removal by pump trucks. Chemical toilets may be utilized outside of buildings. All chemical toilets will be cleaned and serviced daily. Industrial sewage from the contractor's temporary construction facilities and operations will be collected in holding tanks for disposal by pump trucks. The contractor will provide and operate his sewage facilities in a manner that eliminates health risks, and obnoxious odors.

- **Fuels and lubricants**. Oils, greases, and similar materials must be stored in nonflammable bins or buildings or in a fenced compound remote from other combustible materials.

  “No smoking” signs will be provided by the contractor and prominently displayed in areas where flammable materials are stored. Additionally, the contractor will provide and maintain suitable fire extinguishers in such areas.

  The contractor will provide all fuel for heating, ventilation, and air conditioning of Temporary Facilities (unless these are run using free issue power).

- **Compressed Air and Gases**. The contractor will be responsible for supply of all compressed air and gasses as needed to support demolition activities. No use of existing plant compressed air will be allowed. Storage and use of compressed gases and associated tanks will be in accordance with appropriate safety regulations.

- **Temporary Roads and Parking**. The contractor will be responsible for providing and maintaining all roads and parking areas deemed necessary by the contractor for access, and parking in Temporary Facilities areas, construction areas, and between areas. The contractor-provided roads and parking areas will be constructed to provide for adequate safe movement of light and heavy vehicles, and equipment. The contractor's temporary roads will be constructed in a manner ensuring the avoidance of damage to all permanent roads, facilities, and underground structures. The contractor will maintain his temporary roads and parking areas regularly, and will water all his roads as a dust abatement measure. The contractor will remove and restore areas occupied by Temporary roads and parking areas upon completion of the work.

- **Material Handling and Rigging**. The contractor will provide and operate all cranes and other necessary equipment for handling, hauling, unloading, and receiving, as well as contractor-supplied materials, tools, and equipment. Additional, the contractor is responsible for the following:

  - Supply, erection, maintenance and dismantling of scaffolding and other means of access to the work
  - All specified methods of Nondestructive Examination
  - Weather protection of the work and any methods required to allow continuation of the work during periods of inclement weather.
  - Small tools
  - All standard expendable or consumable construction items and supplies
  - Temporary lighting
  - Provision and operation to allow the work to be performed in a safe manner regardless of ambient lighting conditions
  - Personal protective equipment

- **Permits for Temporary Facilities**. The contractor is solely responsible for obtaining all permits, licenses, and government approvals for his temporary facilities that are located within and outside the Project boundaries. It is the contractor's sole responsibility to ensure that these facilities are provided, operated, maintained, and disposed of in accordance with all laws and regulations.

- **Signage**. The contractor will provide project signs for traffic control, and direction, and for identifying project areas. Signage will be based where possible on International signage standards and conventions. Where roads are closed on a temporary basis, flagging personnel will be provided to control traffic flow.
- **Contractor Vehicles**. Transportation facilities on- and offsite. Only contractor's company vehicles, as approved by PGE, will be allowed onsite. Outside parking areas will be designated for workers.
- **First aid Facilities**. The contractor will provide OSHA-compliant first aid facilities.
- **Reporting Requirements and Coordination Meetings**
  - Contractor will promptly submit the reports.
  - At the weekly coordination meeting, the contractor will provide a written report showing actual personnel-hours expended versus planned and scheduled progress versus actual progress, giving details of work completed in relation to the approved schedule, together with a 2-week “look-ahead” that provides details of how the work will be completed. The meeting will also include a discussion of health and safety and quality issues and status.
  - CR at these meetings must have the authority to make decisions and commitments on behalf of the contractor.
  - Report will be submitted to coincide with a mutually scheduled weekly progress meeting. An updated detail schedule will be submitted in the event of an agreed schedule change.
- **Inspection Quality Control and Quality Assurance**

The contractor will be responsible for the performance of all quality control requirements including inspection and testing activities.

- **Water Usage**

The demolition activities in and around the BPP structures will require water for decontamination as well as dust control. The volume of water is significant enough that three options have been evaluated:

- Use of the Domestic Water System
- Use of the Evaporation Ponds
- Use of water from Carty Reservoir

Based on this evaluation, use of water from the Carty Reservoir may be the most economical option and has the capacity to supply sufficient water for the entire project.

4.3 Stormwater Controls

Stormwater/runoff management controls will be utilized to prevent surface water from entering or exiting the work area. Before beginning demolition activities, the existing stormwater receptors (e.g., catch basins, drains, and channels) at or near the site will be located and protected to prevent releases into them. Temporary controls may include placing waterproof covers over receptacles, berms, or straw wattles upgradient of the site, or other means to prevent surface water from entering or exiting the work area. These temporary controls will be inspected daily to ensure proper placement and integrity.

4.4 General Description and Sequencing of Work

This section outlines the general information for the project, required planning documents, and the sequencing of the work.

4.4.1 General

The purpose of this section is to describe general requirements that will be expected of the demolition contractor.

All work will be performed in accordance with applicable requirements of the OSHA Construction Industry Standards and PGE's project/site safety requirements. The contractor will provide PGE the opportunity to review and object to any portion of contractor safety programs, abatement and demolition plans, work plans, and other submittals. PGE is not required to review or approve such submittals, and PGE review does not relieve the contractor of the sole responsibility for the identification and use of appropriate activities, procedures, and methods of performing the work nor for compliance with the requirements of all local, state, and federal laws and regulations governing the work. The contractor will provide the following general items:

- Contractor will establish, publish, and enforce a site-specific safety program that meets federal, state, and PGE BPP requirements.
- Contractor will provide worker orientation, supply and maintain contractor- and worker-supplied safety equipment, and have and maintain adequate equipment related to fire protection within work zones.
- Contractor will obtain all contractor licenses necessary to perform the subject work in the State of Oregon.
- Contractor will perform jobsite administration including submittals, record keeping, licenses, safety, drug and alcohol testing, medical surveillance program, and all other requirements to maintain a safe and efficient project.
- Contractor will provide transportation and disposal of all recyclable and scrap metals and general construction debris. Contractor will evaluate the use of rail transportation for material and equipment delivery and transportation of materials and equipment offsite to the maximum extent possible.
- Contractor will be responsible for extraction, dismantlement, demolition, rigging, transportation, and disposal of all equipment and materials removed as part of the demolition work. Contractor will have responsibility for any sales tax liability associated with sale of any equipment and material.
- Contractor will be required to coordinate the work with all onsite contractors during the work, specifically testing, electrical, mechanical/piping, structural, and concrete contractors.
- Contractor will not be permitted to use explosives without prior approval and the appropriate permits.
- Burning debris and rubbish will not be permitted.
- Contractor will take appropriate measures to avoid accumulating dust in work areas. Contractor will be responsible for keeping haul roads and work areas watered so as not to cause nuisance dusting of plant facilities during the contract.
- Contractor is responsible to notify PGE if it comes into contact with any hazardous materials that may impact the safety of employees or that may provide an environmental hazard. Contractor is responsible for the review of PGE-provided ERM survey (once completed). Contractor is not to proceed with work until authorized.
- Contractor will provide HAZWOPER-trained crafts persons as required to execute the work.
- Contractor will assume the responsibility of maintaining a daily field log for recording and archiving the daily activities pertinent to the project. At a minimum, the daily activity reports will include such

items as the daily attendance of the site-assigned personnel and visitors, site entry logs, use of PPE, quality issues and inspection, visitor logs, daily air monitoring and sampling data, equipment usage logs, environmental survey information, safety and health incident reports, types and quantities of materials excavated and removed from the site, and transactions of asset sales. A comprehensive and customized project documentation profile will be created and maintained for retention and archiving. These logs and reports will be made available for review by PGE at all times.

- Contractor to obtain analytical laboratory results of bulk sampling, ambient air sampling, and OSHA-required monitoring for all abatement work. Laboratory results will be made available to PGE and archived for completion of the Project Closure Report. Daily air monitoring reports will be posted and distributed for review and analysis on a 24-hour turnaround basis as required by the applicable regulatory agencies.
- Within 30 days of completion of the work, the contractor will prepare a Project Closure Report that documents all site activities. The report will detail daily site activities, dismantlement, demolition, and asset recovery and sales activity, safety and health incidents, and any regulatory or quality compliance violations. The Project Closure Report will also include such evidence as methodologies employed for the decommissioning activities, equipment usage, and various sampling protocols and results. The report will be inclusive of, but not limited to, a Project Operations Summary, financial reports, summary of analytical data, air-monitoring reports, bulk sampling reports, shipping documentation, weight slips, quantities of waste materials removed from the site, daily weather conditions, daily supervisors field logs and diary, waste manifests, certificates of disposal, asset transactions or sales and site sampling data.
- All areas being demolished will be protected by the contractor via existing fire hydrants, as well as hand-held fire extinguishers during demolition. In the event the existing system is inoperable or removed due to demolition activities, temporary hose lines must be placed in service by contractor.
- Contractor will provide engineering and studies as necessary during the course of the work to confirm the structural integrity of structures and buildings is maintained as demolition progresses.
- Before demobilization of the project, the contractor and PGE will perform final walks of the decommissioned and dismantled area to verify the scope of work has been satisfied and the area has been rendered safe for reoccupancy.

4.4.2 Planning Documents

Planning documents will be prepared by the selected demolition contractor as part of the predemolition activities for the demolition of the BPP. These plans will serve as a guide for conducting the demolition in an efficient, effective, and compliant manner. The plans outline the policies and procedures that will be implemented to minimize the impacts to the environment, public, and local community. The plans will provide the procedures for regulatory compliance, as well as means and methods for waste minimization and diversion. The primary planning documents are detailed in the following sections.

4.4.2.1 Demolition Work Plan

The Demolition Work Plan will serve as the general plan that outlines the demolition activities, procedures, methodology, chronology, and schedule. The work plan will additionally address project management, personnel, monitoring, and reporting requirements.

4.4.2.2 Traffic Control Plan

The TCP will address project-specific information for vehicular control relating to the demolition-related field activities at the BPP. The purpose of the TCP is to provide guidelines and procedures for traffic control and flow on and around the BPP while construction activities are in progress. A TCP will have to be in place for demolition, excavation, grading, decontamination, waste treatment, waste hauling, and restoration.

The TCP will discuss the locations of major ingress and egress at the BPP, major onsite and offsite roads that will be used by project personnel vehicles for heavy equipment mobilization and demobilization, and material transportation to and from the BPP. The TCP also discusses traffic routes, major roadways, circulation patterns, and volumes and numbers of various vehicles that are expected at BPP during specific project activities. The TCP will be tailored to meet the threshold requirements specified in the Noise Monitoring Plan (NMP).

4.4.2.3 Noise Monitoring Plan

The NMP will address project-specific information for noise control relating to the field activities at the BPP. The purpose of the NMP is to provide guidelines and procedures for noise control and monitoring on and around the BPP while demolition activities are in progress. Demolition activities will include demolition, excavation, grading, decontamination, waste treatment, waste hauling, and restoration, all of which will generate noise and require monitoring.

Noise will be monitored and engineering controls implemented as required. The proximity of adjacent environmentally sensitive habitats requires that noise controls be implemented. These controls might include limiting work during certain hours, days, or months.

The purpose of this plan is to provide information regarding the following topics:

- Submittals required to monitor and control noise
- Construction limitation (noise levels and equipment operations)
- Receptor locations to be monitored and monitoring equipment to be used
- Noise reduction measures needed to meet noise level limitations
- Monitoring and noise reduction equipment and materials needed to achieve noise level limitations
- Construction methods to demonstrate compliance with noise monitoring and control requirements

4.4.2.4 Stormwater Pollution Prevention Plan

The stormwater pollution prevention plan (SWPPP) for construction activities presents the measures to be implemented to minimize sediment and other pollutants in stormwater discharges during demolition activities at the BPP. The project will consist of the demolition of the power plant and its associated structures and systems. The demolished materials will be segregated and stockpiled onsite. Soil from onsite borrow sources will be reused onsite as backfill and graded to existing grade.

The SWPPP has two major objectives:

1. Identify the sources of sediment and other pollutants that affect the quality of stormwater discharges.
2. Describe the implementation of practices to reduce sediment and other pollutants in stormwater discharges during construction activities. The SWPPP contains BMPs that address source reduction.

The SWPPP will comply with the requirements of the National Pollutant Discharge Elimination System program—specifically, the General Construction Activity Stormwater Permit program. Regulated sites, including “site grading over 1 acre,” are generally required to develop a SWPPP and a Stormwater Monitoring Sampling, and Reporting Program.

The following are elements of the SWPPP:

- Site Description
- BMPs to be Implemented for Construction Activities
- BMPs to be Implemented for Erosion and Sediment Control

- Nonstormwater Management
- Waste Management and Disposal
- Implementation of Other Approved Plans
- Post-construction (demolition) Controls
- Site Inspections and Monitoring
- Responsible Personnel
- Personnel Training
- Certification of Compliance
- SWPPP Review and Modifications

The BMPs will provide measures and controls necessary to mitigate potential pollutant sources. The SWPPP will include supporting site maps, plans, details, along with site-specific inspection and monitoring reporting forms. The demolition contractor will be responsible for the application of the SWPPP as part of the permitting process.

4.4.2.5 Environmental Protection Plan

The Environmental Protection Plan (EPP) presents information regarding the environmental management program to be conducted for this project. The purpose of this plan is to present the environmental regulatory requirements for the construction activities. The EPP will help ensure that activities associated with the environmental management program at the facility are conducted in a systematic and well-documented manner. The EPP also details environmental compliance procedures and waste management, as well as regulatory, procedural, and training requirements associated with conducting demolition activities.

4.4.2.6 Waste Management Plan

The purpose of the Waste Management Plan (WMP) is to present the waste management practices and procedures to be followed for the types and quantities of waste expected to be generated during the demolition activities, and to establish procedures to maximize the recycling, reuse, and diversion of materials generated during the demolition of BPP. The WMP identifies waste management activities conducted during the storage and the preparation and disposal of waste (including waste characterization, packaging, storage, and management while in storage). The transportation and disposition of waste materials at appropriate disposal and recycling facilities are also included. The WMP provides information on how waste, including potentially hazardous waste associated with demolition activities, will be managed and disposed of with efficiency. In addition, a secondary goal is to ensure that waste minimization practices are followed, to the extent practical, to reduce the volume of waste that will be generated, stored, and removed from the site for disposal. However, the actual methods and techniques employed during demolition of BPP will be the choice of the demolition contractor selected to conduct the demolition.

BMPs will be used and materials and equipment will be slated for recycling or reuse when economically practical. Waste reduction and minimization will be a priority.

4.4.2.7 Air Monitoring Plan

The Air Monitoring Plan (AMP) will be implemented to ensure that air emission control measures used onsite are effective and to monitor the air quality concentrations of the pollutants resulting from the proposed demolition project. Morrow County ordinance and Oregon Administrative Rule (OAR) 340-208 will be required to address potential emissions of fugitive and asbestos-containing dust during excavation and other soil handling activities. OAR 340-208 will specify engineering controls (moisture conditioning of soil), appropriate PPE, and monitoring equipment (high-volume samples, personal monitoring) to be used as appropriate.

The demolition activities will involve demolition, excavation, stockpiling, loading, offsite disposal, and recycling of materials consisting of metal, equipment, and waste. An ambient air monitoring station will be established at the site to perform real-time monitoring of wind speed, direction, barometric pressure, and temperature during demolition and earth-moving activities. Air samples will be collected at the monitoring station and will be analyzed for the airborne contaminants of concern. The results of the air quality sampling will be used to determine if there are any air quality compliance concerns or if modifications to the demolition activities are needed. The meteorological data for the general project area, particularly wind speed and direction, will be used to decide on the proper locations of the air monitoring stations.

The AMP will be prepared to ensure that activities associated with the air sampling program at the facility are performed using the USEPA document 40 CFR, Part 53, for particulate matter of less than 10 microns, total suspended particulates.

The purpose of this plan is to provide information regarding the following systems and procedures:

- Air quality monitoring system
- Meteorological monitoring system
- Operation and maintenance procedures
- Quality assurance and quality control (QA/QC) procedures to be instituted by the air quality program
- Procedures for documentation of activities and data reporting

4.4.2.8 Recycling Management Plan

The Recycling Management Plan (RMP) will be prepared by the select demolition contractor as part of the work plan documents. The RMP will contain the following information:

- Recycling materials by type and quantity
- Local vendors who will accept the recycling materials
- Handling and transportation process
- Waste diversion techniques
- Compliance requirements

4.4.2.9 Quality Control Plan

The Quality Control (QC) Plan will be required to establish the basic objectives of contractor's Quality Control System. These objectives include the following:

- Ensure that all work adheres strictly to requirements of the contract and governing agencies where the work is being performed.
- Maintain QC procedures to ensure that tasks performed will comply with the contract.
- Prevent deficiencies through preconstruction quality control coordination.
- Detect and correct deficiencies in a timely manner.
- Provide an auditable record of all tests, inspections, procedures, nonconformance, and corrections, and any other pertinent data as required.
- Verify compliance with contractor's QC procedures, including those QC procedures of subcontractors and suppliers.
- Provide a basis of measuring contractor's performance for input to Company's Contractor Resource Database.

The Quality Control Plan will be prepared by the demolition contractor as part of the work plan documents.

4.4.2.10 Health and Safety Plan

The Health and Safety Plan will be prepared by the select demolition contractor as part of the work plan documents. The Health and Safety Plan provides safe work practices and control measures used to reduce or eliminate potential hazards. These practices and controls are to be implemented by the party in control of either the site or the particular hazard. Contractors and employees must remain aware of the hazards affecting them regardless of who is responsible for controlling the hazards. The contractor performs the applicable pre-emergency planning tasks before starting field activities and coordinates emergency response all onsite parties, the facility, and local emergency-service providers as appropriate. These planning tasks include the following:

- Review the facility emergency and contingency plans where applicable.
- Determine what onsite communication equipment is available (e.g., two-way radio, air horn).
- Determine what offsite communication equipment is needed (e.g., nearest telephone, cell phone).
- Confirm and post emergency telephone numbers, evacuation routes, assembly areas, and route to hospital; communicate the information to onsite personnel.
- Field Trailers: Post “Exit” signs above exit doors, and post “Fire Extinguisher” signs above locations of extinguishers. Keep areas near exits and extinguishers clear.
- Review changed site conditions, onsite operations, and personnel availability in relation to emergency response procedures.
- Where appropriate and acceptable to the client, inform the emergency room, ambulance, and emergency response teams of anticipated types of site emergencies.
- Designate one vehicle as the emergency vehicle; place hospital directions and map inside; keep keys in ignition during field activities.
- Inventory and check site emergency equipment, supplies, and potable water.
- Communicate emergency procedures for personnel injury, exposures, fires, explosions, and releases.
- Rehearse the emergency response plan before site activities begin, including driving route to hospital.
- Brief new workers on the emergency response plan.

4.4.3 Sequencing of Work

Project work will be performed in a sequenced manner with emphasis on safety, quality, efficiency, and effectiveness. The entire demolition process must be organized and coordinated precisely to assure these considerations. For the purpose of this Closure Strategy Plan and ROM cost estimate, it is assumed that the first sequence of tasks will be to obtain all permits necessary to perform the demolition and establish work and demolition laydown areas.

Once permits are obtained, the plant will be prepared for demolition by removing hazardous materials and salvage materials. The tanks and vessels will be decommissioned and the plant shut down. PGE will purge all systems. In the next sequence, demolition of all remaining structures will occur. Following demolition, the next sequence will encompass transport and disposal of waste, recycled materials, and salvaged equipment. The final sequence will consist of final grading and site restoration. The actual demolition sequence may differ depending on the demolition contractor or demolition program manager selected by PGE. However, the sequence outlined in this Closure Strategy Plan and ROM cost estimate is based on logical assumptions made by CH2M experience with similar projects.

A comprehensive RFP package (or set of packages) needs to be assembled and distributed to prequalified bidders. Upon contract award and with all permits in place, the following tasks will be completed in a generalized conceptual sequence:

- Verify that decommissioning and plant shutdown has occurred.
- Establish stormwater controls per an approved stormwater permit.
- Remove any residual waste (nonhazardous and hazardous) from tanks, vessels, equipment, and from spills.
- Perform asbestos and LBP abatement.
- Remove residual coal from coal yard and place in Ash Landfill (if it can be permitted) or dispose of offsite.
- Demolish/dismantle support structures including buildings and warehouse. Remove plant structure including boilers and stacks.
- Remove and backfill wastewater ponds and discharge channel.
- Crush concrete for use as backfill.
- Abandon underground utilities (except stormwater systems). Cap all piping and conduits left in place.
- Remove intake pumps and piping from intake building leaving Carty infrastructure in place.
- Abandon utility trenching and associated piping. Cut and cap lines.
- Cut and fill the section of discharge pipe under the divider dike in Carty Reservoir.
- Complete backfill and grading of the site using onsite soils and crushed concrete.
- Complete site restoration including environmental remediation.

SECTION 5

Demolition-Specific Description of Work

This section describes the demolition work to be performed. The procedures described in this section are largely based on projects with a similar scope and not on project-specific engineering. Figure 5-1 shows the BPP layout. Appendix D contains the as-builts used to define the description of work.

5.1 Mobilization

Mobilization for demolition will occur upon completion of the decommissioning and abatement. Mobilization will include bringing equipment and personnel to the BPP, establishing the BMPs and engineering controls, set up laydown areas for equipment and material segregation, and establish support trailers.

5.2 Aboveground Storage Tanks

Residual liquids and sludge will be removed from the aboveground storage tanks (ASTs) (Figure 5-2). The ASTS will be decontaminated. Those that cannot be salvaged will be demolished and the metal recycled. Table 5-1 identifies and describes the ASTs to be demolished.

Table 5-1. Aboveground Storage Tanks

AST	Location	Capacity (gallons)	Construction	Comments
Fuel Oil Storage Tank T-014	Northwest of the power block	450,000	Welded steel	The bottom and sides extending up to 3 feet of the tank interior are lined with coal tar epoxy. The roof and sides above the overflow are painted with inorganic zinc. The exterior is coated with vinyl. The foundation for the tank is an oil-sand pad. The tank is elevated on approximately 8-foot-high berm and topped with a 6-foot concrete wall secondary containment. Inside the containment, the tank rests on a circular concrete base.
Water Storage Tank T-005	East of the fire water/domestic water pump house, by the main gate	300,000	Welded steel	The foundation for the tank is concrete. The interior is coated with epoxy. Occasionally the tank is treated with sodium hypochlorite, 50 parts per million (ppm) to kill biological growth. The domestic water is chlorinated to 1 ppm as it is delivered from the tank to the plant potable water system. It does not contain 12½ percent sodium hypochlorite.
Intake Pump house Tank T-025	East of the intake structure	6,000	Polyethylene tank	The foundation for the tank is concrete. It rests on a polyethylene pad inside a concrete secondary containment. This is the bulk tank for sodium hypochlorite injection of circulation and service water systems.
Surge Tank T-074	South of ‘A’ dewatering bins	Approximately 40-foot depth (bottom half a cone) by 40-foot diameter	Welded steel	The foundation for the tank is concrete. Columns that support the tank rest on are concrete.
Settling Tank	South of the ‘B’	dimensions	Welded steel	The foundation for the tank is concrete.

Table 5-1. Aboveground Storage Tanks

AST	Location	Capacity (gallons)	Construction	Comments
T-073	dewatering bin	and configurations are similar to the surge tank		
Condensate Storage Tank T-002	South of the power block	300,000	Welded steel	The interior is lined with Plasite 7155H. The exterior is coated with vinyl. The foundation for the tank is an oil-sand pad. The tank rests on a concrete base
Demineralization Storage Tank T-001	South of the power block	300,000	Welded steel	The interior is lined with Plasite 7155H. The exterior is coated with vinyl. The foundation for the tank is an oil-sand pad. The tank rests on a concrete base.
Lube Oil Storage Tanks T-103A and T-103B	South of the power block and adjacent to the condensate storage tanks	Two 15,000-gallon	Welded steel	The roof and sides above the overflow are painted with inorganic zinc. The exterior is coated with vinyl. The tanks are encircled by a 4-foot-high concrete wall with an oil-sand pad serving as a foundation for the tanks. The overflow is internal to the tank at the seam between the roof and the sidewall. The inside epoxy coating is all the way up the sidewalls. Both tanks rest on their own concrete base inside the secondary containment wall. Dirty oil means fresh off the delivery tanker. Clean oil means filtered several times after delivery before being allowed into the turbine lube oil tank and system. Do not think “bad oil” is in the dirty tank.
Ammonium Hydroxide Tank T-026	South of the power block and north the lube oil storage tanks	8,000	Welded steel	The interior of the tank is not lined. The tank is supported on saddles which rest on a concrete pad. The tank is associated with the condensate and feed water chemical control. Contains 30 percent aqua ammonia solution.
Filtered Water Storage Tank T-003	East of the control complex area of the power block	450,000	Welded steel	The interior of the tank is lined with Plasite 7155H. The exterior is coated with vinyl. The foundation for the tank is an oil-sand pad. The tank is associated with the pretreatment water facilities. Tank rests on a concrete base.
Neutralization Tank T-021	North of the boiler area of the power block and adjacent to the filtered water storage tank	165,000	Welded steel	Approximately 10 feet of the tank is below grade. The sump is constructed of concrete and its interior is lined with Stonliner epoxy. The sump is associated with the liquid waste treatment and disposal system.
Flush Water Reclaim Tank T-061	On the ground floor of the power block in the northwest section	40,000	Welded steel	The foundation for the tank is concrete, epoxy lined.
Acid Tank T-026	On the ground floor of the power block in the northwest section	16,000	Welded steel	The foundation for the tank is concrete.

Table 5-1. Aboveground Storage Tanks

AST	Location	Capacity (gallons)	Construction	Comments
Caustic Tank T-027	On the ground floor of the power block in the northwest section	16,000	Welded steel	The foundation for the tank is concrete, heat traced, insulated, and lagged.
Neutralization Chemical Mixing Tank T-021	On the ground floor of the power block in the northwest section	2,000	Welded carbon steel	The foundation for the tank is concrete. Used to mix dilute soda ash for raising the pH of the neutralization sump before discharge. Only used once or twice.
Atmospheric Blowdown Tank T-042	On the ground floor of the power block in the east central section	3,000	Welded steel	The foundation for the tank is concrete.
Main T/G Lube Oil Tank T-053	On the ground floor of the power block in the southwest section	10,000	Welded steel	The foundation for the tank is concrete.
Coal Yard Clarifier T-3	Located inside the Clarifier Building	30 feet in diameter, 20 feet high with cone-shaped bottom	Welded steel	Mainly above ground. 30 inches below grade because it was erected on the floor of an existing sludge pad-drying pit. All epoxy coated inside and out.

Note:

Dewatering bins A and B, surge tank, settling tank, bottom hopper, sumps, and piping for this system total approximately 1,000,000 gallons as a closed-loop circulating system.

5.3 Underground Storage Tanks

Residual liquids and sludge will be removed from the underground storage tanks (USTs) (Figure 5-2). The USTs will be decontaminated. Those that cannot be salvaged will be demolished and the metal recycled. Table 5-2 identifies and describes the USTs to be demolished.

Table 5-2. Underground Storage Tanks

UST	Location	Capacity (gallons)	Construction	Comments
Diesel T-151	North of the coal yard	15,000	Welded Steel	Double-wall tank for secondary containment/leak detection.
Gas T-152	North of the coal yard	10,000	Welded Steel	Double-wall tank for secondary containment/leak detection.
Oil/water Separator Recovered Oil Holding Tank T-081	South of the Power Block	10,000	Welded steel	The foundation for the tank is concrete. The oil/water separator itself is an underground installation made of two cells. Each is about 500 gallons and associated with weirs to let water bypass while oil is routed to T-081.
Guard Shack Septic Tank	Behind the guard shack	500	Concrete	Also includes a drain field.
Dumper Building	Located west of the	500	Concrete	Also includes a drain field.

Table 5-2. Underground Storage Tanks

UST	Location	Capacity (gallons)	Construction	Comments
Septic Tank	dumper building			
Stabilization UST T-106		About 20-foot width by 40-foot depth by 8-foot height	Concrete	Acts to settle solids from power block and DSI system washdown water before it is routed to the oil/water separator.
Fuel Spill UST	Located across the road from the fuel oil storage tank	5,000	Concrete	This is a sump associated with the fuel oil storage tank and the fuel oil transfer station for transfer from truck to storage.

5.4 Settling Lagoon System

Two unlined settling ponds consisting of four cells in each are located south of the surge and settling tanks, east of the discharge channel, and north of Carty Reservoir (Figure 5-3). The ponds are used for ash farm overflow. The bottoms of the ponds are lined with large riprap and sediment is located above. If possible, the ponds will be cleaned out as part of the cold and dark implementation and the material will be taken to the Ash Landfill for disposal or otherwise properly disposed of at an offsite, approved facility.

5.5 Discharge Channel

The discharge channel consists of a single, concrete-lined channel that starts south of the power block (Figure 5-3) and goes underground into the discharge pipe that enters Carty Reservoir. The discharge pipe is anchored on the bottom until it enters and runs through the divider dike to the discharge structure. The discharge channel concrete will be broken up and the concrete stockpiled for potential reuse as backfill. The excavation will be backfilled and graded to match existing grades.

5.6 Coal Yard Concrete Settling Basin for Clarifier

The coal yard concrete settling basin for the clarifier is located adjacent to the clarifier east of the coal yard (Figure 5-4). The concrete will be broken up and the concrete stockpiled for potential reuse as backfill. The excavation will be backfilled and graded to match existing grades.

5.7 Evaporation Ponds

Two evaporation ponds are used to collect and evaporate high total dissolved solid waste, including acid and caustic regenerants from polisher and demineralizer regenerations. The ponds are located northeast of the Carty Plant (Figure 5-5). The large pond is 10 acres in size and was unlined for approximately 30 years before liners were installed in 2007. The 2-acre pond is located immediately east of the 10-acre pond and has always been lined.

The two ponds will be drained and the water used for dust control. The liners will be removed and disposed of offsite. The ponds will be backfilled and the area graded to match existing adjacent grades.

5.8 Washwater Pond

The washwater pond is used to collect and evaporate washwater from the auto shop and rail car repair shop. The pond is lined and retains oil and grease from steam-cleaning rolling stock for repairs. The washwater pond is located south of the sewage lagoons and east of Warehouse 6. The pond is approximately ¼ acre in size and is unlined. The washwater pond will be drained and backfilled and the area graded to match existing adjacent grades.

5.9 Support Structures

The support structures used to support the BPP operation are located throughout the plant (Figures 5-3, 5-6, 5-7, and 5-8). The support structures consist of the warehouses, administration building, and miscellaneous buildings. These structures first will be abated and then will be demolished and the material recycled as economically feasible. The demolition material will be segregated and the C&D either sent to the Ash Landfill (if it can be permitted) or disposed of at an approved offsite landfill. The metal will be recycled and the concrete processed and sampled for reuse as backfill onsite.

5.10 Administration Building

The administration building is a 6,000-square foot (ft^2) structure located north of Warehouse 1 (Figure 5-7). The building will be demolished to grade and the foundation left in place. The materials will be segregated as C&D and recyclable materials. All projects above the slab will be removed to flush with the foundation. The area around the structure will be graded to match existing surrounding grades.

5.11 Guard Shack

The guard shack is a 100-ft^2 structure located at the main gate (Figure 5-5). The building will be demolished to grade and the foundation left in place. The materials will be segregated as C&D and recyclable materials. All projects above the slab will be removed to flush with the foundation. The area around the structure will be graded to match existing surrounding grades.

5.12 Warehouse Buildings

The warehouse buildings consist of the following:

- Warehouse 1 is an approximate 20,000-ft^2 structure located south of the administration building and connected through a hallway (Figure 5-7).
- Warehouse 2 and coal yard shop is an approximate 12,600-ft^2 structure located south of the boneyard (Figure 5-6).
- Warehouse 3 (contractor offices and shop) is an approximate 16,000-ft^2 structure located south of the boneyard (Figure 5-6).
- Warehouse 4 is an approximate 6,000-ft^2 structure located east of the dewatering bins (Figure 5-3).
- Warehouse 5 (sheet metal shop, offices, and record storage) is an approximate 10,000-ft^2 structure located east of the domestic water tank (Figure 5-5).
- Warehouse 6 is an approximate 240-ft^2 structure.
- Warehouse 7 is an approximate 500-ft^2 structure.

The buildings will be demolished to grade and the foundation left in place. The materials will be segregated as C&D and recyclable materials. All projects above the slab will be removed to flush with the foundation. The area around the structure will be graded to match existing surrounding grades.

5.13 Lube Oil Building

The lube oil building is an approximate 1,200-ft^2 structure located north of warehouse 4 (Figure 5-7). The building will be demolished to grade and the foundation left in place. The materials will be segregated as C&D and recyclable materials. All projects above the slab will be removed to flush with the foundation. The area around the structure will be graded to match existing surrounding grades.

5.14 Vehicle Maintenance Building

The vehicle maintenance building is an approximate 7,500-ft^2 structure located east of Warehouse 2 (Figure 5-7). The building will be demolished to grade and the foundation left in place. The materials will be segregated as C&D and recyclable materials. All projects above the slab will be removed to flush with the foundation. The area around the structure will be graded to match existing surrounding grades.

5.15 Auto Shop

The Auto Shop is an approximate 2,800-ft^2 structure located north of the vehicle maintenance building (Figure 5-6). The building will be demolished to grade and the foundation left in place. The materials will be segregated as C&D and recyclable materials. All projects above the slab will be removed to flush with the foundation. The area around the structure will be graded to match existing surrounding grades.

5.16 Dumper Building

The dumper building is an approximate 20,000-ft^2 structure located northeast of the coal yard (Figure 5-5). The building will be demolished to grade and the foundation left in place. The materials will be segregated as C&D and recyclable materials. All projects above the slab will be removed to flush with the foundation. The area around the structure will be graded to match existing surrounding grades.

5.17 Air Quality Control Building

The air quality control building is an approximate 8,000-ft^2 structure located east of the power block (Figure 5-7). The Air Quality Control System consists of the flue gas emissions collecting equipment, the induced draft fans, the chimney, and associated ductwork. The equipment is located east of the boiler area outside the power block.

The collection of the particulate matter in the flue gas emissions from the steam generator is performed by a cold-side electrostatic precipitator. Flue gases are exhausted from the steam generator and out to the chimney by four induced-draft fans which are installed outside, east of the power block between the precipitator and chimney. The fans are double width, double inlet, with inlet vanes and outlet discharge dampers. Primary control of fan discharge is through automatic control of the variable inlet vanes. The fans are direct driven by a motor and are equipped with a turning gear opposite the motor driven end to facilitate rotation of the rotor to prevent shaft bowing caused by leakage of hot flue gases through the dampers. The fan housing is split to permit removal of the rotor without dismantling the ductwork. Monorails are provided for maintenance. Each fan and associated driver is supported on reinforced concrete spread-footing foundations founded into Elephant Mountain basalt flow formation.

The building will be demolished to grade and the foundation left in place. The materials will be segregated as C&D and recyclable materials. All projects above the slab will be removed to flush with the foundation. The area around the structure will be graded to match existing surround grades.

5.18 Precipitator Structure

The precipitator structure is an approximate 31,200- ft^2 structure located east of the power block (Figure 5-7). The building will be demolished to grade and the foundation left in place. The materials will be segregated as C&D and recyclable materials. All projects above the slab will be removed to flush with the foundation. The demolition material will be segregated and the C&D either sent to the Ash Landfill (if it can be permitted) or disposed of at an approved offsite landfill. The metal will be recycled and the concrete processed and sampled for reuse as backfill onsite. The area around the structure will be graded to match existing surround grades.

5.19 Fly Ash Blower House

The fly ash blower house is an approximate 9,600-ft^2 structure located northwest of the power block (Figure 5-2). The building will be demolished to grade and the foundation left in place. The materials will be segregated as C&D and recyclable materials. All projects above the slab will be removed to flush with the foundation. The demolition material will be segregated and the C&D either sent to the Ash Landfill (if it can be permitted) or disposed of at an approved offsite landfill. The metal will be recycled and the concrete processed and sampled for reuse as backfill onsite. The area around the structure will be graded to match existing surround grades.

5.20 Stack

The stack is located east of the power block (Figure 5-7) and is a 656-foot-tall, freestanding, outer-reinforced concrete chimney shell and a high-strength alloy steel liner. The stack will be demolished by dropping to the ground via explosives or by felling. Explosives are the safest and easiest means of demolition. Once on the ground, the concrete will be processed and the alloy steel liner segregated and recycled. The demolition material will be segregated and the C&D either sent to the Ash Landfill (if it can be permitted) or disposed of at an approved offsite landfill. The metal will be recycled and the concrete processed and sampled for reuse as backfill onsite. A detailed description of the stack is provided immediately below (Bechtel, 1982).

The stack shell has a 51-foot outside diameter at the bottom. The top 75 feet of the shell exterior has three coats of Bitumastic paint. The steel liner has a 22-foot diameter and a thickness of ¼-inch minimum. The liner is designed for the weight of a future interior coating. The liner is supported immediately above the two breeching connections and expansion is upwards with lateral supports. The top 30 feet of the liner, hood, and flashing is stainless steel. Insulation is attached to the outer surface of the liner to retain the heat within the liner and to reduce the temperature in the annular space between the liner and the shell. The annular space between the liner and the shell provides access to the aircraft obstruction lights, service platforms, and inspection.

The annular space between the shell and the liner is fitted with a ladder that extends from grade to the top of the shell with rest platforms spaced at 100-foot intervals, and also an elevator which extends from grade to the intermediate platform used for flue gas emissions monitoring and testing. The elevator is rated for a load capacity of 2,000 pounds and is equipped with an intercommunication set.

Platforms are located in the stack as follows:

- Grade - 696'-6"; Obstruction lights - 912'-6"; Emission testing - 1001'-6"; Obstruction lights - 1127'-6"; Obstruction lights - 1337'-6"
- The platform at elevation 1337'-6" is located outside. All other platforms are located in the annular space. Doors are provided in the shell to service the high-intensity aircraft obstruction lights.
- The platform at elevation 1001'-6 serves as the flue gas monitoring and testing platform for opacity and USEPA sampling. Doors are provided in the shell to permit the use of the probes associated with sampling.

Service lighting and convenience outlets are provided at the platforms. A painter's trolley is located at the top of the stack. A lightning protection system is provided. The obstruction lighting control cabinet and miscellaneous power distribution panels are located in the base of the stack.

The interconnecting ductwork interconnects the equipment from the air heater outlet to the stack inlet. The flue gas leaving the primary air heaters is ducted to the flues, leaving the secondary air heaters such that a common duct is provided from each pair of primary and secondary air heaters to a common duct upstream of the precipitator inlet. The gases leaving the precipitator are again collected in a common duct which connects to the four induced-draft fans. A common duct is provided for each pair of induced fan discharges. The two common ducts connect to the stack liner 180 degrees apart.

5.21 Conveyor System

The conveyor system is located east of the power block (Figure 5-5) and consists of the following components:

- Coal Yard Control Building
- Conveyor
- Stacker/Reclaimer
- TP-1 to TP-5

The demolition material will be segregated and the C&D either sent to the Ash Landfill (if it can be permitted) or disposed of at an approved offsite landfill. The metal will be recycled and the concrete processed and sampled for reuse as backfill onsite.

5.22 Intake Structure Pump House

The intake structure pump house is an approximate 2,500-ft^2 structure with a deep-ribbed, insulated metal siding exterior. The intake structure is located south of the power block on the north edge of Carty Reservoir (Figure 5-7). It consists of the following components:

- Intake structure assembly (to remain)
- Two trash racks
- Two traveling screens with spry pipes and nozzles
- Screen wash control panel
- Chlorine distribution system

The intake building and intake structure assembly will remain. The interior components of the building listed above will be removed.

5.23 Discharge Structure and Piping

The concrete discharge structure connects the open channel section to the submerged discharge pipe (Figure 5-8). The concrete discharge structure has a concrete apron to accommodate the energy dissipation required between the channel water surface and the Reservoir water surface. The piping from the discharge channel is anchored on the bottom of Carty Reservoir, where it enters and runs through the divider dike connecting to the discharge structure on the south end of the dike. The section of the discharge pipe that runs through the divider dike will be breached and grouted closed. The upstream side of the pipe will be plugged. A detailed description of the discharge line is provided immediately below (Bechtel, 1982).

The discharge lines are 96-inch-diameter steel and concrete pipe. Steel is used at the terminal intake structure and condenser. The steel pipe is internally coated. Underground steel pipe is externally coated and wrapped, except under the power block slab where it is encased in concrete.

Eighty-four-inch-diameter submerged fiberglass reinforced pipe is used to transport the circulating water from the discharge structure to the Reservoir. The water is discharged on the south side of the divider dike underneath the water surface and is directed to the east end of the Reservoir in order to maximize the length of time and flow in the Reservoir for cooling purposes.

The circulating water discharge pipe from the condenser flows into a concrete seal structure. The concrete seal structure consists of a short forebay, weir, and apron. The weir elevation is set to maximize the siphon effect and minimize pumping power. The apron is designed to accommodate the energy dissipation of the flow over the weir prior to the open apron section.

The water discharge piping has two 72-inch-diameter lines from the outlet water boxes of the condensers. These lines are provided with locally controlled motor-operated valves at the water box outlet. These two lines merge into a single 96-inch-diameter conduit below ground and extend to the seal structure. Overflow from the seal structure returns to the reservoir via the discharge channel and discharge structure. From the discharge structure, the water is routed to the opposite side of the divider dike in the reservoir by a submerged 90-degree-diameter pipe.

Section 5.28.1 discussed the details of the circulation water system related to the discharge pipe.

5.24 Coal Yard

The coal yard is located east of the chimney (Figure 5-4) and consists of approximately 10 acres of coal storage. It is anticipated that 4 inches of coal will remain as part of the BPP demolition. The remaining coal and coal/soil mix will be removed and placed in the Ash Landfill (if it can be permitted) or disposed of at an approved offsite facility.

The depression left from the remnants coal removal will be backfilled and graded with either crushed concrete or soil from an onsite borrow source.

5.25 Boardman Switchyard

The Boardman switchyard is located west of the power block (Figure 5-8) and consists of transformers and switches for the electrical distribution for the BPP. The transformers, switches, and equipment will be removed and either resold or recycled. The 500-kilovolt line from the power block to the switchyard’s first disconnect will be removed.

The metal will be recycled and the concrete processed and sampled for reuse as backfill onsite.

5.26 Fly Ash Silo and Dome

The fly ash silo and dome is located south and east of the power block (Figure 5-7) to receive bottom ash and fly ash from their associated systems and to provide a means of unloading the ash into mobile vehicles for final disposal. The silo and dome will be demolished to grade leaving the foundations in place. The ground around the silo and dome is paved and the foundation of the silo and dome will be left in place.

The demolition material will be segregated and the C&D either sent to the Ash Landfill (if it can be permitted) or disposed of at an approved offsite landfill. The metal will be recycled and the concrete processed and sampled for reuse as backfill onsite. A detailed description of the fly ash silo and dome is provided immediately below (Bechtel, 1982).

The bottom ash system consists of two dewatering bins, a settling tank, and a surge tank. A closed loop recirculation water system is provided to minimize water makeup and plant water disposal requirements. The fly ash system consists of a silo to receive the dry ash blown into the silo pneumatically. The tanks are elevated to provide both truck and rail clearance.

The fly ash silo unloader room, the dewatering bins' enclosure, and the valve enclosure have walls of insulated metal siding and roofs of insulated metal roofing. The surge and settling tanks' enclosure have walls of insulated metal siding flashed to the exterior tank surfaces at the top. The roof between the two tanks is metal decking, insulation, and built-up roofing.

5.27 Power Block

The power block consists of the turbine area, auxiliary service area, boiler area, control room area complex, coal transfer structure, and auxiliary bay, which divide the turbine and boiler areas (Figure 5-7).

The structure will be demolished by first performing all necessary abatement. The abatement is discussed in Section 3. Following the abatement, the components that can be safely and economically removed will be taken out until the structure is relatively free to begin the structural demolition.

The demolition may be accomplished several ways, including implosion, top-down surgical disassembly by rigging and cutting the supports or pulling over (after making strategic preparations).

All components that can be salvaged and resold will be removed and stockpiled separately from the other material. The electrical components will be segregated for salvage, recycling, or disposal. The piping will be cleaned, removed, and recycled when feasible. The power block will be demolished to grade leaving the foundations in place. The demolition material will be segregated and the C&D either sent to the Ash Landfill (if it can be permitted) or disposed of at an approved offsite landfill. The metal will be recycled and the concrete processed and sampled for reuse as backfill onsite.

5.28 Underground Piping and Utilities

The underground piping and utilities to be demolished will include the circulation water lines, fire protection lines, domestic water lines, sewage lines, communication, and electrical distribution lines. This section describes the line and demolition requirements.

5.28.1 Circulation Water Pipes

The major components of the circulating water system consist of the Carty Reservoir, the intake structure, the circulating water piping, the seal structure, the discharge structure, and the chlorination system. The top of the circulation water pipes will be exposed and busted up on top to allow the piping to be backfilled with crushed concrete. Once the piping is backfilled the excavation will be backfilled with the same soil removed to expose the piping.

The yard fire protection is a closed loop, 12-inch ductile iron, mortar-lined pipe, with hydrants located approximately every 250 feet on the loop. Located at strategic points in the yard area are fire protection equipment housings for firefighting equipment. There are two sources of supply to the loop; one being the motor driven f ire pump located in the intake structure and the other being a diesel driven pump located in the pump house northwest of the power block. A 300,000-gallon water storage tank is provided to supply water to the diesel driven pump. The tank is mounted on a ring-wall concrete foundation enclosing an oil-sand pad (Bechtel, 1982).

The underground piping will be exposed, cut, and capped and the location of the areas capped will be surveyed and placed on as-builts. The soil cover removed to expose the piping will be used to backfill the excavated areas. The existing 300,000-gallon tank will be left in place (at this time) while the Carty Plant fire protection system isolation is engineered.

5.28.2 Piping

Multiple piping utilities serve the BPP, among them sewage, domestic water, and fuel.

The sewage system is provided to collect liquid waste from the power and administration buildings. Sewage flows from these buildings through 6-inch-diameter gravity lines to a lift station where it is pumped to sewage stabilization lagoons. Coal-handling area sewage effluent flows directly into the sewage lagoons. The sewage, after chlorination, is discharged into a nearby evaporation pond where it collects in the winter and evaporates in the summer. The sewage line will be exposed at each inlet and capped. The location immediately upstream of the connection from the Carty Plant will be isolated and the downstream end of the BPP line capped. The location of the areas capped will be surveyed and placed on as-builts. The soil cover removed to expose the piping will be used to backfill the excavated areas. The lift stations will be abandoned in place and the bottom broken up so water does not collect. The lift station will then be backfilled with crushed concrete or soil from an onsite borrow source.

The domestic water line will be exposed at each inlet and capped. The location immediately upstream of the connection from the Carty Plant will be isolated and the downstream end of the BPP line capped. The location of the areas capped will be surveyed and placed on as-builts. The soil cover removed to expose the piping will be used to backfill the excavated areas.

Fuel piping will be identified, exposed, and cleaned. Once the piping is cleaned, it will be capped, surveyed, and placed on as-builts. The soil cover removed to expose the piping will be used to backfill the excavated areas.

All piping 4-inches in diameter and greater will be filled with a flowable fill.

5.28.3 Miscellaneous Utilities

Multiple utilities serve the BPP, among them electrical, communication, and computer lines. The miscellaneous utilities will be exposed and the lines terminated and left in place. The areas of the terminations will be surveyed and placed on as-builts. The soil cover removed to expose the utilities will be used to backfill the excavated areas.

5.29 Concrete Processing

Concrete removed as part of the demolition will be staged and sampled per the USEPA Standard Operating Procedure for sampling porous materials. The purpose is to verify and document that the concrete, when processed, is acceptable to be used as backfill. Sources of concrete include the turbine pedestal, concrete blocks, four concrete floors in power block, chimney, miscellaneous on-soil pile, pulverized pedestal, crusher building (four floors), SR2 and 3 counterweights, trenches on the west side and north and south side of the track between TP-4 and TP-5, and the conveyor counterweight.

The concrete will be placed into a concrete crusher that includes a magnet used to remove the rebar and other metal reinforcement. The concrete will be processed to a size of 2-inch minus, which is small enough to minimize voids and settlement once placed as backfill.

5.30 Ash Landfill

The Ash Landfill (Figure 5-8) may be used for the disposition of some of the materials generated as part of the demolition including the C&D, ash residual, concrete that cannot be used as backfill, and remnant coal and soil mix from the coal yard (if it can be repermitted). If the material cannot be permitted for disposal in the Ash Landfill, it will be sent offsite for disposal at an approved disposal facility. If this material can be permitted to be disposed of in the Ash Landfill, approximately 32,230 tons (21,480 cubic yards) of waste would not require offsite transportation and disposal. This includes the following:

- 6,630 tons of nonhazardous waste
- 1,200 tons of soil
- 24,400 tons of sludge

The Ash Landfill will be closed per the CCR rule, which is discussed in the closure and post-closure plans that accompany this D&D Plan. The final cover will be graded to drain surface water from the cover, and the top slope will have a grade of not less than 3.5 percent. The proposed final grades will be designed to accommodate surface water drainage from the completed landfill after anticipated settlement and to minimize erosion of the final cover soil.

5.31 Soil Remediation

Soil remediation may be performed at potential six locations—the shooting range berm, lube oil shack, transformer area, demineralization tank, auto repair shop, and fuel oil tanks. This section describes these areas and the proposed mitigation.

5.31.1 Shooting Range Berm

The shooting range is located along the west side of a soil stockpile created from excavation of the evaporation pond. Approximately 200 CY of material is expected to be impacted with bullet rounds and as a mitigation measure, will be excavated and the soil disposed of at an approved offsite disposal facility. No backfill is required as the nonimpacted portion of the stockpile will be used as backfill for the demolition activities.

5.31.2 Lube Oil Shack

There is documentation of an oil spill at the lube oil shack that was previously cleaned up. It is anticipated that approximately 100 CY of petroleum-impacted soil remains. As a mitigation measure, the remaining impacted soil will be excavated and the soil disposed of at an offsite approved disposal facility. The excavated area will be backfilled with clean concrete or soil and graded to match existing adjacent grades.

5.31.3 Transformer Spill

There is documentation of a transformer oil spill at the substation that was previously cleaned up. It is anticipated that approximately 100 CY of petroleum-impacted soil remains. As a mitigation measure, the remaining impacted soil will be excavated and the soil disposed of at an offsite approved disposal facility. The excavated area will be backfilled with clean concrete or soil and graded to match existing adjacent grades.

5.31.4 Demineralization Tank Oil Spill

There is documentation of an oil spill at the demineralization tank that was previously cleaned up. It is anticipated that approximately 200 CY of petroleum impacted soil remains. As a mitigation measure, the remaining impacted soil will be excavated and the soil disposed of at an offsite approved disposal facility. The excavated area will be backfilled with clean concrete or soil and graded to match existing adjacent grades.

5.31.5 Auto Repair Shop

There is documentation of an oil spill at the auto repair shop that was previously cleaned up. It is anticipated that approximately 200 CY of petroleum-impacted soil remains. As a mitigation measure, the remaining impacted soil will be excavated and the soil disposed of at an offsite approved disposal facility. The excavated area will be backfilled with clean concrete or soil and graded to match existing adjacent grades.

5.31.6 Fuel Oil Tank

There is no known spill or leak at the fuel oil tank; however, the tank is not situated in secondary containment and it is anticipated that some spills may have occurred in the past. As a mitigation measure, approximately 100 CY of impacted soil may excavated and the soil disposed of at an offsite approved disposal facility. The excavated area will be backfilled with clean concrete or soil and graded to match existing adjacent grades.

5.32 Backfill and Grading

The demolition areas will be backfilled using the existing soil onsite to the extent possible. Additionally, the concrete from the demolition activities will be used as backfill as part of the final grading at the site; imported backfill material is not anticipated at this time. Areas that were backfilled will be surveyed and placed on as-built drawings.

During the engineering phase, a finish grading plan will be developed to manage stormwater. Once final grading is completed, erosion control measures will be placed to prevent erosion and displacement of the final grading soils. Grass seed will be distributed across the new soil areas prior to the rainy season so it is naturally watered to inspire growth.

5.33 Site Security

Once the backfill and grading is complete, the site will be prepped for nonuse by securing any gates and fencing that limits access onto the site. All remaining structures or support systems will be secured.

5.34 Demobilization

Demobilization of equipment and resources will begin once substantial completion is met and all punch list items and site restoration is complete.

5.35 As-Builts

As-built drawings should be completed to document the surveyed location of the remaining foundations, areas that were backfilled, and locations where piping and utilities were terminated.

SECTION 6

References

Bechtel. 1982. *Boardman Plant Data*. Volume 1.

Jenkin, Doug. 2006. *Asbestos Survey*. Prepared for Portland General Electric, Portland, Oregon. April 28.

Portland General Electric (PGE). 2015. *Boardman Fixed Gauges Source Inventory*.

Figures

Appendix A
Site Photographs

Appendix B
Asbestos Survey

Appendix C
Boardman Fixed Gauges Source Inventory

Appendix D
As-Built Drawings

Appendix A
Site Photographs

Circulation Water Discharge on south side of the divider dike

BCP from west end of the divider dike (630 Mw clear stack)

BCP from west end of the divider dike (630 Mw clear stack)

Divider dike from its west end

South half of the reservoir from the west end of the divider dike

Looking at the West Dam from the west end of the divider dike

Looking west from the west end of the divider dike

Intake Structure from the divider dike

Carty gas plant construction beyond the north shore of the reservoir

West Settling Pond

Settling Ponds, west & east, gravel ribbon is a French drain to keep surface runoff from eroding the pond walls

More of the settling ponds- sump pumps are in the pill box to the right

Discharge channel looking upstream

Discharge channel looking down into the outfall structure

Outfall structure

Outfall structure

Settling ponds sump pumps A & B

West settling pond looking north

View from the intake structure looking NE

View from the intake structure looking NNE, l <-> r, warehouse, condensate storage tank, demineralized storage tank

Warehouse end of the admin bldg.

NE wall of the intake structure bldg.

Intake structure bldg.

Trona silos and DSI facility with reservoir make up valve pit in the foreground

Service Water pump/motor (B&C pumps) inside the Intake Structure Building

Electric fire water pump (in red)

A&B Circulation water travelling screens inside the intake structure bldg.

Intake bldg. air receiver and trash basket pit for travelling screens. Cribbing in the foreground.

NaOCl tank for chlorination for Circulation and Service water, 6000 gal, polyethylene

Service water travelling screen and trash rack rake

Log Boom made of steel pipe (wave breaker)

Laydown yard by the intake structure

10 Acre, dry, tertiary sewage seepage lagoon

Wash water pond, polypropylene lined

Rail car repair shop viewed from the north

Rail car repair shop viewed from the north

Crusher bldg.

Coal Yard Control Room and shower facilities (left behind pole)

Rural Fire District Bldg (to remain)

10 Acre lined evaporation pond, north of the plant

Dike between 10 Ac evaporation pond and 2 Ac evaporation pond. There is a French drain type leak detection drain below the base of the dike

10 Ac lined evaporation pond looking from the north shore

2 Acre lined evaporation pond

Stacker/Reclaimer #3 looking from the west

East end of the coal yard, looking at TP-2 from the south

View from the dumper bldg. looking WSW

View from the dumper bldg. looking WSW

Dumper Bldg

surfactant tank (abandoned in place)

East view of BCP from the coal yard rail loop

Main Transformers – west view of BCP

Main shop

Show and tell display

Main Turbine Lube Oil reservoir

Turbine lube oil purification skid

Condensate transfer pumps

Condensate pit (south view)

South Feed Pump Turbine

FPT lube oil reservoir

Aux Cooling Water Heat Exchangers (A,B,C,&D)

South view of Broadway, electric start up feed pump on the left

West Bottom Ash Hopper area

West Bottom Ash Hopper area

Pulverizer and stairway

PA duct overhead in north pulverizer row

PA Fan inlets

FD Fan inlets

COPCO soot blowing air compressors (currently a backup system)

Forced draft fan motor on its pedestal

North fan room roll up door w/ barrels of Therminol 55 for the fan room air heating system

North pulverizer row

Boiler chemical injection skid. l <_> r, ½ of the Ammonium Hydroxide tank, Hydrazine tank, Phosphate tank, Aux Boiler tank

Sodium Hydroxide tank (left near ground), Sulfuric Acid tank (center), Soda Ash tank on the right

Condensate polisher system skid

Filtered water storage tank (left), PAC silo (center), Neutralization sump (right).

Neutralization sump (there is as much underground as there is above ground)

Aux Boiler stack

Power block roof with ventilation fans

Mass blowdown pipes and the chimney (656 foot tall)

Chimney, coal yard rail loop, stacker/reclaimers (2), crusher bldg., long tubes (coal belt protection)

Eastern half of the reservoir, divider dike in the center, ash disposal pit (far away), one settling pond, top of the fly ash silo (two bag houses on top)

l <-> r, coal yard maintenance shop w/ boneyard, rail car repair shop, biomass storage, dumper bldg., two lined sewage lagoons

From the roof looking east at the coal yard, lube oil shack in lower right corner

From the roof looking north, lined evaporation ponds, gas plant construction

Oil storage tank (peaked roof), Fire water storage tank (dome roof), sheet metal shop/MPC bldg. (long), and gas plant construction

Roof of coal D-Bin, l <-> r Contractor (D&Z) bldg., warehouses, coal yard repair shop, rail car repair shop, bone yard, sewage lagoons

Ash farm, settling ponds, Trona silos & DSI injection system bldgs., circulation water discharge channel

Ash handling facility, fly ash silo, dome, and load out silo, settling ponds, reservoir, ash disposal pit, beautiful eastern Oregon horizon

Western end of the reservoir with intake structure in foreground

Trona silo baghouses, settling ponds, discharge channel

Circulation water discharge seal structure, lay down yard and storage CONEX boxes

Intake structure and intake channel

Deaerator (DA) storage tank (9th floor)

DA heater on top, DA storage tank below

Downcomers from the steam drum to the bottom headers of the water walls

Hot and Cold Reheat lines

Spring hanger in front of a coal silo

Coal gallery wall on the left, boiler on the right

Coal silo

Coal silo cone, sloped part is stainless

Primary Air preheat

Secondary Air preheat

ESP access catwalk

ESP inlet nozzles, B1 & B2, T/R sets on the catwalk

ESP inlet nozzles, B2 & B3

Turbine deck overhead trolley crane

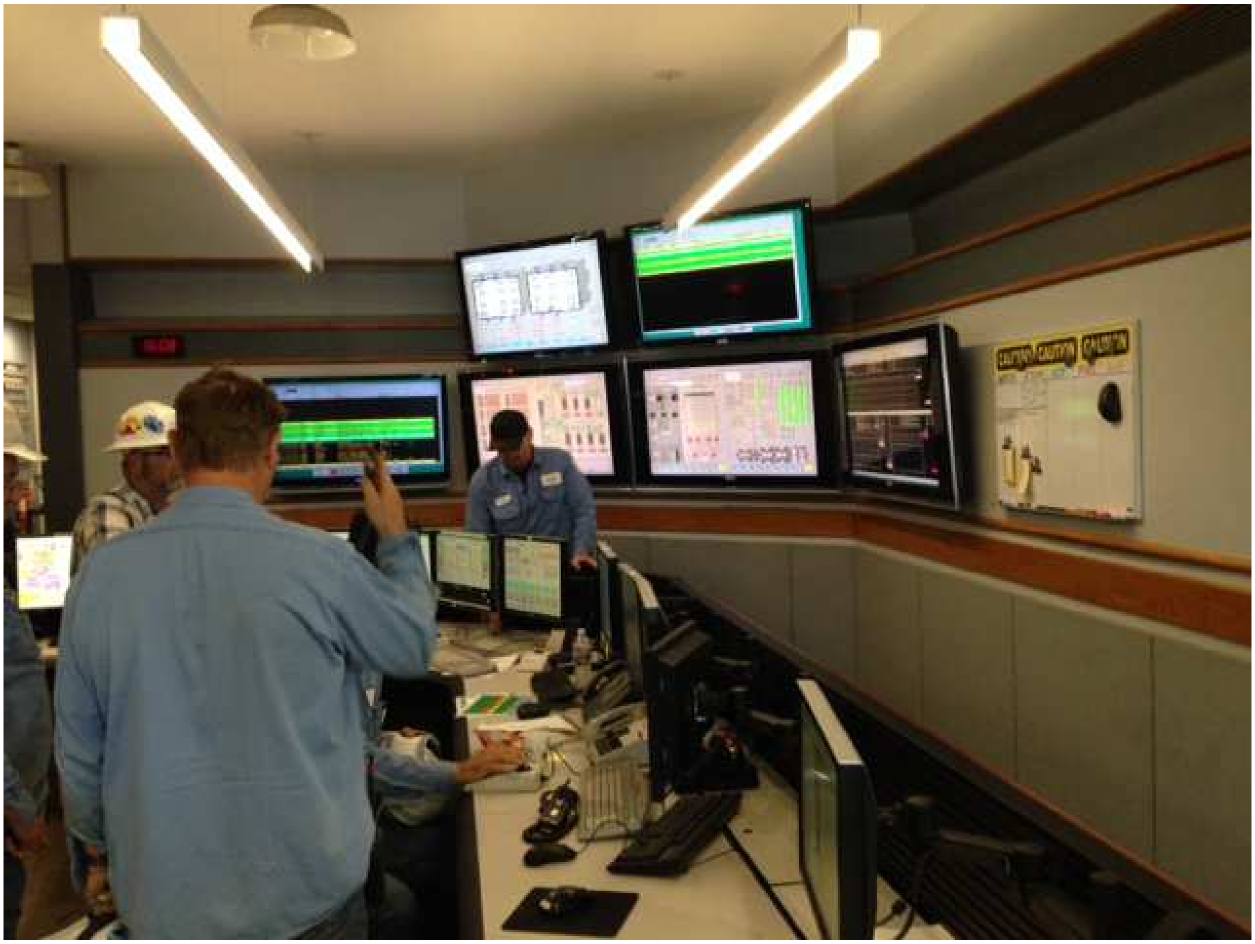
Generator and exciter enclosures

Turbine deck. l <-> r HP/IP turbine, LP1 turbine, LP2 turbine, generator, exciter

Turbine deck. FWH #3 on the right, pipe race on the left

Looking down through the crane bay at switch gear on the second floor

Looking down through the crane bay, pulverizer wheel repair on the ground floor, generator stator cooling water skid on the second floor



Control Room

Control Room

7.2 Kv breakers for big motors everywhere

Breakers

2d floor, FPT on the left

2d floor, more breakers, HALON bottles at the end wall

Crane bay, rigging a pulverizer wheel

Feed pump turbine (FPT)

Appendix B
Asbestos Survey

ASBESTOS SURVEY

PREPARED FOR:

PORTLAND GENERAL ELECTRIC
121 SW SALMON STREET
PORTLAND, OREGON 97204

DOUG JENKIN
INDUSTRIAL HYGIENIST
SAFETY & HEALTH RESOURCES

LOCATION:

BOARDMAN COAL PLANT
73334 TOWER ROAD
BOARDMAN, OREGON 97818

APRIL 28, 2006

FORENSIC ANALYTICAL PROJECT #: PE1648

ASBESTOS SURVEY

PREPARED FOR:

PORTLAND GENERAL ELECTRIC
121 SW SALMON STREET
PORTLAND, OREGON 97204

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Location:

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APRIL 28, 2006

FORENSIC ANALYTICAL PROJECT NO. PE1648

PREPARED BY:

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Fax 503/595.1006

Dan Rouse
AHERA Asbestos Inspector# 1017207

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INTRODUCTION

INTRODUCTION

Forensic Analytical, Inc. performed a survey to identify asbestos-containing building materials at the Boardman Coal Plant located at 73334 Tower Road, Boardman, Oregon. The survey was conducted on March 14 and 15, 2006 by Dan Rouse and Todd Kreuter at the direction of Doug Jenkin of PGE. The facility was occupied at the time of inspection.

The purpose of the survey was to identify suspect asbestos-containing materials and collect samples for laboratory analysis to meet CFR 29 1910.1001(j)(2)(i), OSHA General Industry Standard - Asbestos. This section of the standard states that "Building and facility owners shall determine the presence, location, and quantity of asbestos-containing materials and/or presumed asbestos-containing materials at the work site. Employers and building and facility owners shall exercise due diligence in complying with these requirements to inform employers and employees about the presence and location of asbestos-containing materials and presumed asbestos-containing materials."

The inspection consisted of visual and tactile examination of all accessible areas of the site. Destructive sampling techniques were not used to find potential hidden layers of suspect asbestos-containing materials and additional asbestos-containing materials may be present in interstitial spaces, inaccessible areas of the property, or below grade. If additional potential asbestos-containing materials are identified that are not listed in this report, the materials should be assumed to contain asbestos until sampling and analysis proves otherwise. Samples of observed suspected asbestos-containing materials were collected in accordance with the Asbestos Hazard Emergency Response Act (AHERA) protocol and submitted for laboratory analysis to Forensic Analytical in Hayward, California, a NVLAP accredited laboratory.

Any materials that contain more than 1% Asbestos are considered asbestos-containing materials by regulation (40 CFR 763). The results indicate asbestos-containing materials were detected at the site above the 1% threshold. Individual results can be found in Section 2 of this report. Laboratory analytical data and chain of custody documentation are included in Section 4 of this report.

Previous sample data is included in the sample inventory section as well as in the photo log. Specific material locations and quantities were not provided in the previous survey data. Most materials sampled previously are concealed in equipment (gaskets, packing, etc.) and could not be quantified.

Materials assumed to contain asbestos in this report were done so due to inaccessibility or potential damage to the material due to the sampling techniques required. The siding on a majority of the buildings is identified as "Galbestos" on the drawings provided. This material is known to contain asbestos and for that reason was not sampled.

This document is not to be used for asbestos abatement specifications. Prior to any demolition or renovation of the buildings, an asbestos abatement project design should be completed specifying the type, location, and quantity of asbestos containing materials to be removed. All identified ACM must be removed by a licensed asbestos abatement contractor or in-house certified asbestos workers prior to demolition or renovation activities. Any ACM removed from the site must be disposed of in accordance with all Federal, State and local regulations.

LIMITATIONS

The findings, conclusions, and recommendations provided by Forensic Analytical are indicative of conditions that existed at the time of the investigation and are subject to the limitations and variability associated with the investigation methodology. Forensic Analytical's reports are not intended to guarantee that the subject sites are or are not free from conditions that could pose a threat to human health, safety, or the environment. Forensic Analytical does not warrant that adherence to its recommendations will prevent inspection, citation, or penalty from regulatory agencies or will relieve PGE from any liability related to hazardous materials.

Please feel free to contact our office with any questions at 503/595-1001.

Respectfully submitted,

Dan Rouse
Director - Environmental Services Division
Forensic Analytical Specialties, Inc.
Portland, Oregon

ASBESTOS SAMPLE INVENTORY

PGE – BOARL. .AN COAL PLANT – 73334 TOWER RD., BOARDMAN, OREGON
APRIL 28, 2006
FORENSIC ANALYTICAL PROJECT #PE1648

ASBESTOS SURVL.
SAMPLE INVENTORY
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SAMPLE #	MATERIAL DESCRIPTION	SAMPLE LOCATION	MATERIAL LOCATION	ASB. % & TYPE	QUANTITY	CONDITION
BOARD-1	Wall Texture	AWS - Admin Area	-	ND	-	-
BOARD-2	Wall Texture	AWS - Admin Area	-	ND	-	-
BOARD-3	Wall Texture	AWS - Admin Area	-	ND	-	-
BOARD-4	Ceiling Tile, 2' x 2' Fissured w/ Pinholes	AWS - Admin Area	-	ND	-	-
BOARD-5	Drywall & Joint Compound	AWS - Admin Area, Janitor's Closet	-	ND	-	-
BOARD-6	Cementitious Floor Material, Tan	AWS - Admin Area, Stairwell	-	ND	-	-
BOARD-7	Floor Tile, 12" x 12" Tan w/ Brown Specks and Black Mastic	AWS - Lunch Room	AWS - Training Storage, Lunchroom Kitchen, Electrical Office, Mechanical Supervisors Office, Material Control Coordinators Office (under carpet), Warehouse Office, Safety Office	2 - Chrysotile Tile 5 - Chrysotile Mastic	1,860 sq. ft.	Fair
BOARD-8	Ceiling Tile, 12" x 12" Textured and Brown Adhesive	AWS - Mechanical Supervisors Office	-	ND	-	-
BOARD-9	Duct Seam Compound	AWS - Mechanical Room under Admin Area	-	ND	-	-
BOARD-10	Pipe Insulation Seam Compound	AWS - Mechanical Room under Admin Area	-	ND	-	-
BOARD-11	Pipe Insulation Seam Compound	AWS - Mechanical Room under Admin Area	-	ND	-	-
BOARD-12	Pipe Fitting Insulation	AWS - Mechanical Room near Warehouse	-	ND	-	-
BOARD-13	Pipe Fitting Insulation	AWS - Mechanical Room near Warehouse	-	ND	-	-
BOARD-14	Pipe Fitting Insulation	AWS - Mechanical Room near Warehouse	-	ND	-	-
BOARD-15	Ceiling Tile, 2' x 4' Gouged w/ Pinholes	AWS - Men's Locker Room	-	ND	-	-
BOARD-16	Insulation Board at Thermocouple	Powerblock - 912 North Side	-	ND	-	-
BOARD-17	Boiler Insulation at Inspection Door	Powerblock - 894 West Side	-	ND	-	-
BOARD-18	Gasket at Inspection Door	Powerblock - 894 West Side	-	ND	-	-

ND - No asbestos detected
* This material was previously sampled by PGE.
All quantities are approximate and are not to be used for bidding purposes.

SAMPLE #	MATERIAL DESCRIPTION	SAMPLE LOCATION	MATERIAL LOCATION	ASB. % & TYPE	QUANTITY	CONDITION
BOARD-19	Boiler Insulation at Inspection Door	Powerblock - 881 North Side	-	ND	-	-
BOARD-20	Rigid Pipe Insulation	Powerblock - 856 South Blower TK-51	-	ND	-	-
BOARD-21	Spray-on Coating	Powerblock - Roof Exhaust Fan over Deaerator	Powerblock - Roof Exhaust Fans	2 - Chrysotile	6,000 sq. ft. (20 Fans)	Fair
BOARD-22	Spray-on Coating	Powerblock - Roof Exhaust Fan over Deaerator	Powerblock - Roof Exhaust Fans	2 - Chrysotile	6,000 sq. ft. (20 Fans)	Fair
BOARD-23	Spray-on Coating	Powerblock - Roof Exhaust Fan over Deaerator	Powerblock - Roof Exhaust Fans	2 - Chrysotile	6,000 sq. ft. (20 Fans)	Fair
BOARD-24	Rigid Pipe Insulation	Powerblock - 847 South Blower IK35	-	ND	-	-
BOARD-25	Pipe Fitting Insulation	Powerblock - 847 at Column D 2 40	-	ND	-	-
BOARD-26	Duct Seam Compound	Powerblock - North Dust Collector Bag House Exhaust System	-	ND	-	-
BOARD-27	Caulk on Metal Wall	Powerblock - Fan Room East of Bag House	-	ND	-	-
BOARD-28	Spray-on Insulation	Powerblock - North Dust Collector Control House	-	ND	-	-
BOARD-29	Spray-on Insulation	Powerblock - North Dust Collector Control House	-	ND	-	-
BOARD-30	Spray-on Insulation	Powerblock - North Dust Collector Control House	-	ND	-	-
BOARD-31	Boiler Insulation at Inspection Door	Powerblock - 815 North Side	-	ND	-	-
BOARD-32	Rigid Pipe Insulation	Powerblock - 815 North Side, near D G 55	-	ND	-	-
BOARD-33	Rigid Tank Insulation	Powerblock - 809 DA Storage Tank	-	ND	-	-
BOARD-34	Rigid Tank Insulation	Powerblock - 809 DA Storage Tank	-	ND	-	-
BOARD-35	Rigid Tank Insulation	Powerblock - 809 DA Storage Tank	-	ND	-	-
BOARD-36	Caulking on Burner	Powerblock - 798, H4 Burner	-	ND	-	-

ND - No asbestos detected
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All quantities are approximate and are not to be used for bidding purposes.

SAMPLE #	MATERIAL DESCRIPTION	SAMPLE LOCATION	MATERIAL LOCATION	ASB. % & TYPE	QUANTITY	CONDITION
BOARD-37	Gasket	Powerblock - 788 East Economizer Grizzly/Feeder Door	Powerblock - 788 East Economizer Grizzly/Feeder Door	70 - Chrysotile	5 @ 2 sq. ft. ea.	Fair
BOARD-38	Caulking at Exterior Door	Powerblock - Near Column K 5 75	-	Trace - Chrysotile	-	-
BOARD-39	Rigid Tank Insulation	Powerblock - Feed Water Heater #6	-	ND	-	-
BOARD-40	Rigid Tank Insulation	Powerblock - Feed Water Heater #6	-	ND	-	-
BOARD-41	Rigid Tank Insulation	Powerblock - Feed Water Heater #6	-	ND	-	-
BOARD-42	Rigid Insulation	Powerblock - West and East Side Lower Intercept (on Turbine)	-	ND	-	-
BOARD-43	Rigid Insulation	Powerblock - West and East Side Lower Intercept (on Turbine)	-	ND	-	-
BOARD-44	Rigid Insulation	Powerblock - West and East Side Lower Intercept (on Turbine)	-	ND	-	-
BOARD-45	Rigid Insulation	Powerblock - Steam Chest (on Turbine)	-	ND	-	-
BOARD-46	Rigid Insulation	Powerblock - Steam Chest (on Turbine)	-	ND	-	-
BOARD-47	Rigid Insulation	Powerblock - Steam Chest (on Turbine)	-	ND	-	-
BOARD-48	Rigid Pipe Insulation	Powerblock - Pipes near Steam Chest	-	ND	-	-
BOARD-49	Rigid Pipe Insulation	Powerblock - Pipes near Steam Chest	-	ND	-	-
BOARD-50	Rigid Pipe Insulation	Powerblock - Pipes near Steam Chest -	-	ND	-	-
BOARD-51	Coating on Column	Powerblock - Column C9	-	ND	-	-
BOARD-52	Coating on Column	Powerblock - Column B9	-	ND	-	-
BOARD-53	Coating on Column	Powerblock - Column D9	-	ND	-	-
BOARD-54	Floor Tile, 12" x 12" Beige w/ Specks and Black Mastic	Powerblock - Cable Spreading Room	Powerblock - Cable Spreading Room	2 - Chrysotile Tile 5 - Chrysotile Mastic	1,690 sq. ft.	Fair

ND - No asbestos detected
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PGE – BOAR AN COAL PLANT – 73334 TOWER RD., BOARDMAN, OREGON
APRIL 28, 2006
FORENSIC ANALYTICAL PROJECT #PE1648

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SAMPLE INVENTORY

SAMPLE #	MATERIAL DESCRIPTION	SAMPLE LOCATION	MATERIAL LOCATION	ASB. % & TYPE	QUANTITY	CONDITION
BOARD-55	Gasket on PA Fan	Powerblock - South Side (by Outboard Bearing)	Powerblock - South Side (by Outboard Bearing)	70 - Chrysotile	4 @ 2 sq. ft. ea.	Fair
BOARD-56	Foam Tank Insulation	Intake Structure - Sodium Hypochlorite Tank	-	ND	-	-
BOARD-57	Foam Tank Insulation	Intake Structure - Sodium Hypochlorite Tank	-	ND	-	-
BOARD-58	Foam Tank Insulation	Intake Structure - Sodium Hypochlorite Tank	-	ND	-	-
BOARD-59	Crack Compound	Ash Hopper Structure	-	ND	-	-
BOARD-60	Drywall & Joint Compound	Warehouse #4	-	ND	-	-
BOARD-61	Drywall & Joint Compound	Warehouse #4	-	ND	-	-
BOARD-62	Drywall & Joint Compound	Warehouse #4	-	ND	-	-
BOARD-63	Floor Material, Tan Streaked	Powerblock - Control Room	-	ND	-	-
BOARD-64	Ceiling Tile, 2' x 4' Heavy Textured	Powerblock - Lab	-	ND	-	-
BOARD-65	Stainless Countertop Undercoating, Black	Powerblock - Lab	-	ND	-	-
BOARD-66	Floor Tile, 12" x 12" Beige Streaked and Black Mastic	Powerblock - Hallway near Lab	Powerblock - Hallway near Lab, Control Room	2 - Chrysotile Tile 5 - Chrysotile Mastic	750 sq. ft.	Good
BOARD-67	Drywall & Joint Compound	Powerblock - Lab	-	ND	-	-
BOARD-68	Drywall & Joint Compound	Powerblock - Instrument Shop	-	ND	-	-
BOARD-69	Drywall & Joint Compound	Powerblock - Hallway near Lab	-	ND	-	-
BOARD-70	Drywall & Joint Compound	CPL Classroom Building	CPL Classroom Building	ND #71 and #72 are additional samples of this material and contain asbestos.	~30,000 sq. ft.	Fair
BOARD-71	Drywall & Joint Compound	CPL Classroom Building	CPL Classroom Building	ND Drywall 2 - Chrysotile Joint Compound	~30,000 sq. ft.	Fair
BOARD-72	Drywall & Joint Compound	CPL Classroom Building	CPL Classroom Building	ND Drywall 2 - Chrysotile Joint Compound	~30,000 sq. ft.	Fair

ND - No asbestos detected
* This material was previously sampled by PGE.
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SAMPLE #	MATERIAL DESCRIPTION	SAMPLE LOCATION	MATERIAL LOCATION	ASB. % & TYPE	QUANTITY	CONDITION
BOARD-73	Ceiling Tile, 2' x 4' Gouged w/ Pinholes	CPL Classroom Building - Hallway		ND		
BOARD-74	Ceiling Tile, 2' x 4' Rough Textured	CPL Classroom Building - East Office		ND		
BOARD-75	Drywall & Joint Compound	PMR Building	PMR Building	ND Drywall 2 - Chrysotile Joint Compound	~28,000 sq. ft.	Fair
BOARD-76	Drywall & Joint Compound	PMR Building	PMR Building	ND Drywall 2 - Chrysotile Joint Compound	~28,000 sq. ft.	Fair
BOARD-77	Drywall & Joint Compound	Warehouse #2	Warehouse #2	ND #79 is an additional sample of this material and contains asbestos.	~30,000 sq. ft.	Fair
BOARD-78	Drywall & Joint Compound	Warehouse #2	Warehouse #2	ND #79 is an additional sample of this material and contains asbestos.	~30,000 sq. ft.	Fair
BOARD-79	Drywall & Joint Compound	Warehouse #2	Warehouse #2	ND Drywall 2 - Chrysotile Joint Compound	~30,000 sq. ft.	Fair
BOARD-80	Floor Tile, 12" x 12" Tan w/ Brown Streaks and Black Mastic	Guard Shack	-	ND	-	-
BOARD-81	Drywall & Joint Compound	Old Guard Shack	Old Guard Shack	ND Drywall 2 - Chrysotile Joint Compound	300 sq. ft.	Fair
BOARD-82	Drywall & Joint Compound	Old Guard Shack	-	ND #81 is an additional sample of this material and contains asbestos.	300 sq. ft.	Fair
BOARD-83	Drywall & Joint Compound	Railcar Maintenance Shop	-	ND	-	-
BOARD-84	Drywall & Joint Compound	Railcar Maintenance Shop	-	ND	-	-

ND - No asbestos detected
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All quantities are approximate and are not to be used for bidding purposes.

PGE – BOARL .AN COAL PLANT – 73334 TOWER RD., BOARDMAN, OREGON
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SAMPLE INVENTORY
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SAMPLE #	MATERIAL DESCRIPTION	SAMPLE LOCATION	MATERIAL LOCATION	ASB. % & TYPE	QUANTITY	CONDITION
BOARD-85	Sprayed-on Fireproofing	Railcar Maintenance Shop	-	ND	-	-
BOARD-86	Sprayed-on Fireproofing	Railcar Maintenance Shop	-	ND	-	-
BOARD-87	Drywall & Joint Compound	Gas Pump Building	-	ND	-	-
BOARD-88	Sheet Vinyl, Patterned	North Vacant Trailer	-	ND	-	-
BOARD-89	Wall/Ceiling Panel	North Vacant Trailer	-	ND	-	-
BOARD-90	Sheet Vinyl, Tan Square Patterned	Middle Two Vacant Trailers	-	ND	-	-
BOARD-91	Ceiling Panel	Middle Two Vacant Trailers	-	ND	-	-
BOARD-92	Drywall	Middle Two Vacant Trailers	-	ND	-	-
BOARD-93	Sheet Vinyl, Brown Square Patterned	South Vacant Trailer	South Vacant Trailer	70 - Chrysotile	200 sq. ft.	Poor
BOARD-94	Floor Tile, 12" x 12" Blue Specked and Black Mastic	Coal Yard Control House	-	ND	-	-
BOARD-95	Floor Tile (2nd Layer under #94) and Black Mastic	Coal Yard Control House	Coal Yard Control House	2 - Chrysotile Tile ND Mastic	540 sq. ft.	Fair
BOARD-96	Duct Seam Tape	Coal Yard Control House	-	ND	-	-
BOARD-97	Ceiling Tile, 2' x 2' Gouged w/ Pinholes	Coal Yard Control House	-	ND	-	-
BOARD-98	Floor Tile, 12" x 12" Beige Specked and Tan Mastic	Coal Yard Lunchroom Building	-	ND	-	-
BOARD-99	Ceiling Tile, 2' x 4' Gouged w/ Pinholes	Coal Yard Lunchroom Building	-	ND	-	-
BOARD-100	Drywall & Joint Compound	Coal Yard Lunchroom Building	-	ND	-	-
BOARD-101	Sheet Vinyl, Tan Pebble Patterned	Coal Yard Lunchroom Building	-	ND	-	-
BOARD-102	Sheet Vinyl, Grey Pebble Patterned	Coal Yard Lunchroom Building	-	ND	-	-
BOARD-103	Drywall & Joint Compound	Coal Yard Lunchroom Building	-	ND	-	-
BOARD-104	Drywall & Joint Compound	Coal Yard Lunchroom Building	-	ND	-	-
BOARD-105	Wall Texture	Coal Yard Lunchroom Building	-	ND	-	-

ND - No asbestos detected
* This material was previously sampled by PGE.
All quantities are approximate and are not to be used for bidding purposes.

SAMPLE #	MATERIAL DESCRIPTION	SAMPLE LOCATION	MATERIAL LOCATION	ASB. % & TYPE	QUANTITY	CONDITION
BOARD-106	Wall Texture	Coal Yard Lunchroom Building	-	ND	-	-
BOARD-107	Wall Texture	Coal Yard Lunchroom Building	-	ND	-	-
BOARD-108	Sink Undercoating, Black	Coal Yard Lunchroom Building	-	ND	-	-
BOARD-109	Rigid Foam Insulation	Conveyor Control House - Tank	-	ND	-	-
BOARD-110	Rigid Foam Insulation	Conveyor Control House - Tank	-	ND	-	-
BOARD-111	Rigid Foam Insulation	Conveyor Control House - Tank	-	ND	-	-
BOARD-112	Duct Seam Tape	Railcar Dump House - Restroom	-	ND	-	-
BOARD-113	Floor Tile, 12" x 12" Brown w/ White Specks and Black Mastic	Railcar Dump House - Control Room	Railcar Dump House - Control Room	2 - Chrysotile Tile 5 - Chrysotile Mastic	240 sq. ft.	Fair
BOARD-114	Ceiling Tile, 2' x 4' Fissured w/ Pinholes	Railcar Dump House - Control Room	-	ND	-	-
BOARD-115	Coating on CMU	MCC near Railcar Dump House - Exterior	-	ND	-	-
BOARD-116	Coating on CMU	MCC near Railcar Dump House - Exterior	-	ND	-	-
BOARD-117	Coating on CMU	MCC near Railcar Dump House - Exterior	-	ND	-	-
Assumed	Galbestos Siding	N/A	Intake Structure, Powerblock, Ash Hopper Buildings, Conveyor Control Houses and Associated Buildings, Railcar Dump Building, West End of Precipitator Building, Crusher Building	~~Assumed~~ 70% CHRYSOTILE	530,000 sq. ft.	Fair
Assumed	Sprayed-on Fireproofing	N/A	AWS Shop Area - Above Weld Shop	~~Assumed~~ ND	~1,000 sq. ft.	Fair

ND - No asbestos detected
* This material was previously sampled by PGE.
All quantities are approximate and are not to be used for bidding purposes.

SAMPLE #	MATERIAL DESCRIPTION	SAMPLE LOCATION	MATERIAL LOCATION	ASB. % & TYPE	QUANTITY	CONDITION
Assumed	Gaskets and Packing Material	N/A	Fire Pump House, Powerblock, Precipitator Building, Intake Structure, Ash Hopper, Crusher, Railcar Dump Building	Assumed	Unknown	Unknown
Assumed	Transite Lab Hood	N/A	Lab	Assumed	50 sq. ft.	Fair
Assumed	Transite Lab Table	N/A	Instrument Shop, Warehouse #2 - East End	Assumed	120 sq. ft.	Good
Assumed	Roofing Materials	N/A	All Buildings with Asphaltic Roofing Materials	Assumed	Not Quantified	Fair
*BD-1	Sheet Rock	Rail Car Maint. Bldg., Office	-	ND		
*BD-2	Spray on Insulation	Rail Car Maint. Bldg., NE Corner	-	ND		
*BD-3	Wall Insulation	Garage, NW Corner Wall	-	ND		
*BD-4	Sheet Rock	Fuel Shack	-	ND		
*BD-5	Sheet Rock	Coal Yd. Repair, Back Storage Area	-	ND		
*BD-6	Ceiling Tile	Foster Wheeler, Office	-	ND		
*BD-7	Sheet Rock	Foster Wheeler, Office	-	ND		
*BD-8	Ceiling Tile	Foster Wheeler, Kitchen	-	ND		
*BD-9	HVAC Duct Tape	AWS, Fan Room	-	ND		
*BD-10	Insulation	AWS, Fan Room, Hot Water Rtn. Line	-	ND		
*BD-11	Roof Sealant	AWS, Roof	AWS, Roof	10 - Chrysotile	Not Quantified	Fair
*BD-12	Roof Shingle	AWS, Roof	-	ND	-	-
*BD-13	Roof Shingle	AWS, Roof	-	ND	-	-
*BD-14	HVAC Duct Tape	AWS, Mechanical Rm.	-	ND	-	-
*BD-15	Ceiling Tile	Warehouse Office	-	ND	-	-
*BD-16	Floor Tile	Warehouse Office	See Sample #BOARD 7	5 - Chrysotile	See Sample #BOARD 7	Fair
*BD-17	Floor Tile	J. Brace Office	See Sample #BOARD 7	3 - Chrysotile	See Sample #BOARD 7	Fair
*BD-18	Ceiling Tile	Mech. Maint. Foreman Office	-	ND		
*BD-19	Floor Tile	Mech. Maint. Foreman Office	See Sample #BOARD 7	5 – Chrysotile	See Sample #BOARD 7	Fair
*BD-20	Ceiling Tile	Admin Office, Print Rm.	-	ND	-	-

ND - No asbestos detected
* This material was previously sampled by PGE.
All quantities are approximate and are not to be used for bidding purposes.

PGE – BOARL AN COAL PLANT – 73334 TOWER RD., BOARDMAN, OREGON
APRIL 28, 2006
FORENSIC ANALYTICAL PROJECT #PE1648

ASBESTOS SURVL.
SAMPLE INVENTORY
PAGE 9 OF 12

SAMPLE #	MATERIAL DESCRIPTION	SAMPLE LOCATION	MATERIAL LOCATION	ASB. % & TYPE	QUANTITY	CONDITION
*BD-21	Wall Texture	Admin Office, Center Wall	-	ND	-	-
*BD-22	Sheet Rock	Admin Office, Wall	-	ND	-	-
*BD-23	Shower Tile	Admin Bldg.. Men's Shower	-	ND	-	-
*BD-24	Soffit Above Stalls	Admin Bldg., Men's room	-	ND	-	-
*BD-25	Sheet Rock	AWS, Gasket Storage Room	-	ND	-	-
*BD-26	Shingle "Step"	Power Bldg., Roof	-	ND	-	-
*BD-27	Roofing	Power Bldg., Roof	-	ND	-	-
*BD-28	Ceiling Tile	Control Room	-	ND	-	-
*BD-29	Floor Tile	Control Room	See Sample #BOARD 66	3 – Chrysotile	See Sample #BOARD 66	Fair
*BD-30	Wall Tile	Control Room, Bathroom	-	ND	-	-
*BD-31	Floor Tile	Chem Lab	-	ND	-	-
*BD-32	Sink Undercoat	Chem Lab	-	ND	-	-
*BD-33	Composite Board Used for Hood Liner	Chem Lab, Hood	Chem Lab, Hood	10 - Chrysotile	80 sq. ft	Fair
*BD-34	Sheet Rock	Control Room, Hallway	-	ND	-	-
*BD-35	Floor Tile	Aux Panel & Cable Spreading Rm	-	ND	-	-
*BD-36	Insulation on Girders	Power Bldg, Ground Floor	-	ND	-	-
*BD-37	Ceiling Tile	Reclaim Electrical Bldg., Control Room	-	ND	-	-
*BD-38	Floor Tile	Reclaim Electrical Bldg., Control Room	Reclaim Electrical Bldg., Control Room	5 – Chrysotile	Not Quantified	Fair
*BRD-GASK-01	Gasket	Not Given	Assume all Gaskets Contain Asbestos until Proven Otherwise	70 - Chrysotile	Not Quantified	Unknown
*BRD-GASK-02	Gasket	Not Given	-	ND	-	-
*BRD-GASK-03	Gasket	Not Given	Assume all Gaskets Contain Asbestos until Proven Otherwise	70 - Chrysotile	Not Quantified	Unknown
*BRD-GASK-04	Gasket	Not Given	-	ND	-	-

ND - No asbestos detected
* This material was previously sampled by PGE.
All quantities are approximate and are not to be used for bidding purposes.

SAMPLE #	MATERIAL DESCRIPTION	SAMPLE LOCATION	MATERIAL LOCATION	ASB. % & TYPE	QUANTITY	CONDITION
*BRD-GASK-05	Gasket	Not Given	-	ND	-	-
*BRD-GASK-06	Gasket	Not Given	Assume all Gaskets Contain Asbestos until Proven Otherwise	80 - Chrysotile	Not Quantified	Unknown
*BRD-GASK-07	Gasket	Not Given	-	ND	-	-
*BRD-GASK-08	Gasket	Not Given	-	ND	-	-
*BRD-GASK-09	Gasket	Not Given	-	ND	-	-
*BRD-GASK-10	Gasket	Not Given	-	ND	-	-
*BRD-GASK-11	Gasket	Not Given	-	ND	-	-
*BRD-GASK-12	Gasket	Not Given	Assume all Gaskets Contain Asbestos until Proven Otherwise	55 - Chrysotile	Not Quantified	Unknown
*BDMN-1-05	Gasket	Not Given	Assume all Gaskets Contain Asbestos until Proven Otherwise	93 – Chrysotile	Not Quantified	Unknown
*BDMN-2-05	Gasket	Not Given	Assume all Gaskets Contain Asbestos until Proven Otherwise	87 - Chrysotile	Not Quantified	Unknown
*BDMN-02	Gasket	Rapper Room, North Precipitator	Assume all Gaskets Contain Asbestos until Proven Otherwise	45 – Chrysotile	Not Quantified	Unknown
*BDMN-03	Gasket	Rapper Room, North Precipitator	Assume all Gaskets Contain Asbestos until Proven Otherwise	43 – Chrysotile	Not Quantified	Unknown
*BDMN-04	Gasket	Rapper Room, North Precipitator	Assume all Gaskets Contain Asbestos until Proven Otherwise	55 – Chrysotile	Not Quantified	Unknown
*BDMN-05	Gasket	Rapper Room, North Precipitator	Assume all Gaskets Contain Asbestos until Proven Otherwise	65 – Chrysotile	Not - Quantified	Unknown
*BDMN-06	Gasket	Rapper Room, North Precipitator	-	ND	-	-
*BDMN-07	Gasket	Rapper Room, North Precipitator	Assume all Gaskets Contain Asbestos until Proven Otherwise	85 – Chrysotile	Not Quantified	Unknown
*BDMN-08	Gasket	Rapper Room, North Precipitator	Assume all Gaskets Contain Asbestos until Proven Otherwise	25 – Chrysotile	Not Quantified	Unknown
*BDMN-09	Gasket	Rapper Room, North Precipitator	-	ND	-	-

ND - No asbestos detected
* This material was previously sampled by PGE.
All quantities are approximate and are not to be used for bidding purposes.

SAMPLE #	MATERIAL DESCRIPTION	SAMPLE LOCATION	MATERIAL LOCATION	ASB. % & TYPE	QUANTITY	CONDITION
*BDMN-10	Not Given	Parts in Warehouse	-	ND	-	-
*BDMN-11	Not Given	Parts in Warehouse	-	ND	-	-
*BDMN-12	Not Given	Parts in Warehouse	-	ND	-	-
*BDMN-13	Not Given	Parts in Warehouse	-	ND	-	-
*BRD GASK-01	Gaskets	Not Given	Assume all Gaskets Contain Asbestos until Proven Otherwise	70 - Chrysotile	Not Quantified	Unknown
*BRD GASK-02	Gaskets	Not Given	-	ND	-	-
*BRD GASK-03	Gaskets	Not Given	Assume all Gaskets Contain Asbestos until Proven Otherwise	45 - Chrysotile	Not Quantified	Unknown
*BRD GASK-04	Gaskets	Not Given	-	ND	-	-
*BRD GASK-05	Gaskets	Not Given	-	ND	-	-
*BRD GASK-06	Gaskets	Not Given	Assume all Gaskets Contain Asbestos until Proven Otherwise	80 - Chrysotile	Not Quantified	Unknown
*BRD GASK-07	Gaskets	Not Given	-	ND	-	-
*BRD GASK-08	Gaskets	Not Given	-	ND	-	-
*BRD GASK-09	Gaskets	Not Given	-	ND	-	-
*BRD GASK-10	Gaskets	Not Given	-	ND	-	-
*BRD GASK-11	Gaskets	Not Given	-	ND	-	-
*BRD GASK-12	Gaskets	Not Given	Assume all Gaskets Contain Asbestos until Proven Otherwise	55 - Chrysotile	Not Quantified	Unknown
*05-Hpul-1	Not Given	Not Given	Not Given	55 - Chrysotile	Not Quantified	Unknown
*05-Hpul-2	Not Given	Not Given	Not Given	8 - Chrysotile	Not Quantified	Unknown
*05-Hpul-3	Not Given	Not Given	Not Given	93 - Chrysotile	Not Quantified	Unknown
*05-Hpul-4	Not Given	Not Given	Assume all Gaskets Contain Not Given until Proven Otherwise	47 - Chrysotile	Not Quantified	Unknown
*05-Hpul-5	Not Given	Not Given	Not Given	73 - Chrysotile	Not Quantified	Unknown
*05-Hpul-6	Not Given	Not Given	-	ND	-	-
*PSC0005-01	Not Given	Not Given	Not Given	57 - Chrysotile	Not Quantified	Unknown

ND - No asbestos detected
* This material was previously sampled by PGE.
All quantities are approximate and are not to be used for bidding purposes.

PGE – BOARDMAN COAL PLANT – 73334 TOWER RD., BOARDMAN, OREGON
APRIL 28, 2006
FORENSIC ANALYTICAL PROJECT #PE1648

SAMPLE #	MATERIAL DESCRIPTION	SAMPLE LOCATION	MATERIAL LOCATION	ASB. % & TYPE	QUANTITY	CONDITION
*#1 Bleeder Trip Valve Gasket	Valve Gasket	Not Given	Not Given	13 - Chrysotile	Not Quantified	Unknown
*#1 John Crane Packing	Packing	John Crane	John Crane	33 - Chrysotile	Not Quantified	Unknown
*#1 Wedge	Wedge	Turbine Generator	Turbine Generator	18 – Chrysotile ND	Not Quantified	Unknown
*#2 Buss Lead	Buss Lead	Turbine Generator	Turbine Generator	ND ND	-	-
*#2 Precipitator Pipe Insulation	Pipe Insulation	Precipitator	-	ND	-	-
*#3 Dog House	Interior Insulation	Interior Exciter Doghouse	-	ND	-	-
*001-BDMN-04	Door Gasket	Pulverizer "D"	Pulverizer "D"	45 - Chrysotile	Not Quantified	Unknown
*001-BDMN-04	Gasket	Pulverizer Door	Pulverizer Door	45 - Chrysotile	Not Quantified	Unknown
*05-Chiller RC1	Gasket	Chiller	Chiller	57 - Chrysotile	Not Quantified	Unknown
*5-11 BDMN	14" Sluice Line Top Dewater Bin	2% Quartz Mineral & Other Fibers	-	ND	-	-
*BD-001	Not Given	Crusher Elevator	-	ND	-	-
*BDMN 01-6-27-01	BSO Gasket	Pulverizer	-	60 - Chrysotile	Not Quantified	Unknown
*BDMN-01-6-1-01	Gasket	Generation Plant	-	80 - Chrysotile	Not Quantified	Unknown
*BDMN-1-05	Gasket	Auxiliary Boiler	-	90 - Chrysotile	Not Quantified	Unknown
*BDMN-2-05	Gasket	Auxiliary Boiler	-	87 - Chrysotile	Not Quantified	Unknown
*DOG-HOUSE-001	Insulation in Dog House	Dog House	-	ND	-	-
*P4E0669-01	Insulation	Behind interior wall of Exciter Dog House	Behind interior wall of Exciter Dog House	57 - Chrysotile	Not Quantified	Unknown
*Sample #1	Gasket	P/N VCG 19777-1 G-3	Assume all Gaskets Contain Not Given until Proven Otherwise	57 - Chrysotile	Not Quantified	Unknown
*Sample #2	Gaskets/Seal	United Conveyor	Assume all Gaskets Contain Not Given until Proven Otherwise	38 - Chrysotile	Not Quantified	Unknown

ND - No asbestos detected
* This material was previously sampled by PGE.
All quantities are approximate and are not to be used for bidding purposes.

PHOTO LOG

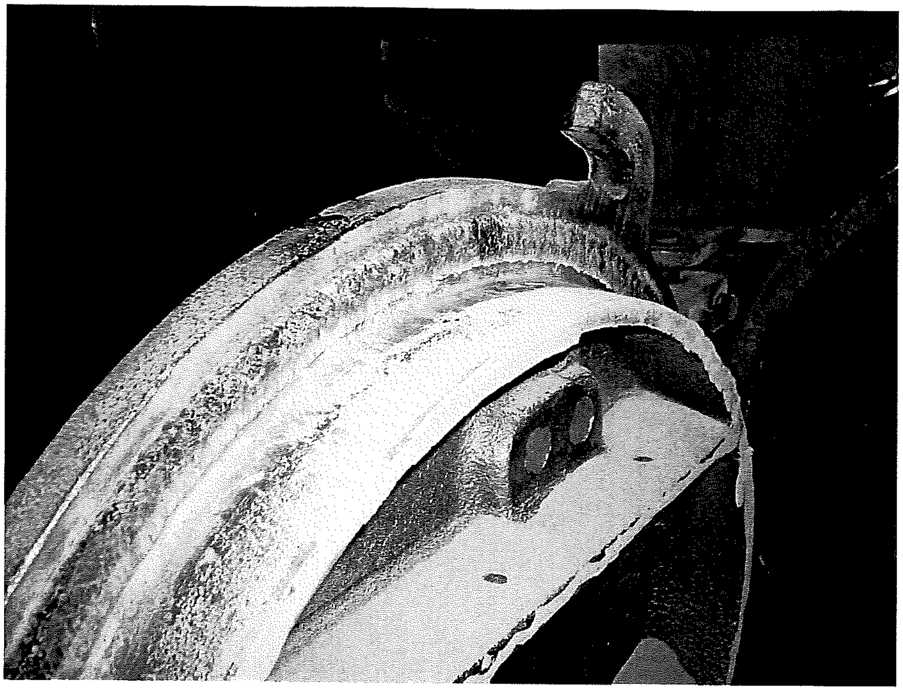
Photo Log

The photographs shown in this section are from the Forensic Analytical field work. Photographs of previously identified ACM are also included in this section. ACM not shown in photographs are also listed. All photographs of previously identified ACM from prior surveys follow the Forensic Analytical photographs.

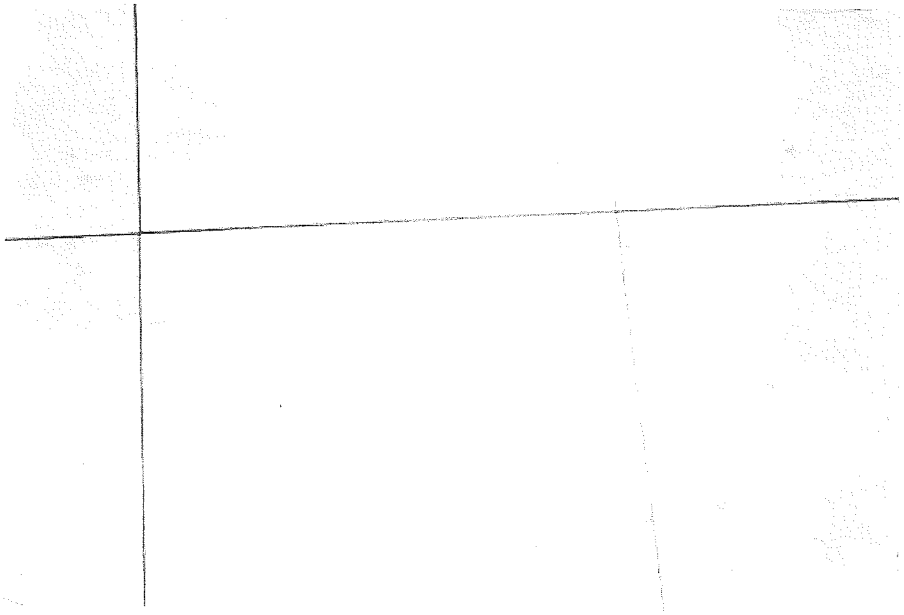
BOARD-7 Floor Tile, 12" x 12" Tan w/ Brown Specks and Black Mastic

BOARD-21,22,23 Spray-on Coating

BOARD-37 **Gasket on Grizzly Feeder Door**



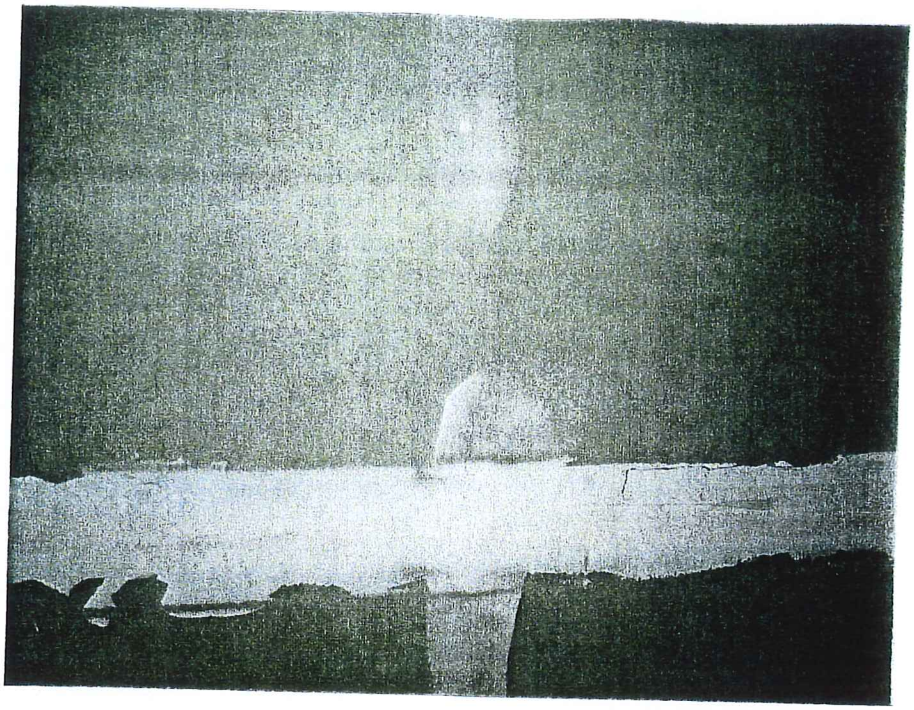
BOARD-54 **Floor Tile, 12" x 12" Beige w/ Specks and Black Mastic**



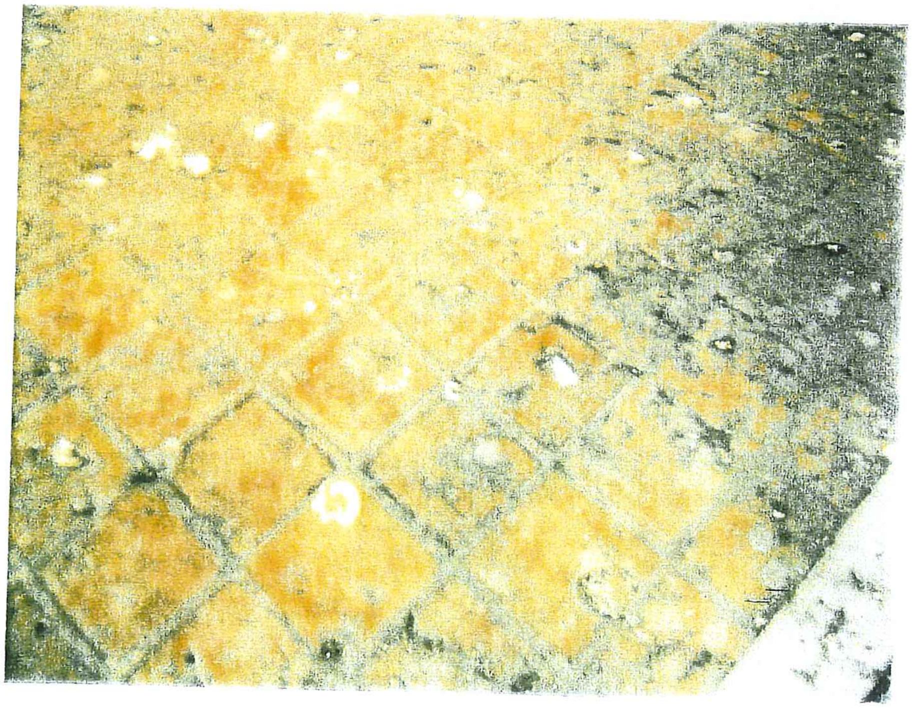
BOARD-55 Gasket on PA Fan

BOARD-66 Floor Tile, 12" x 12" Beige Streaked and Black Mastic

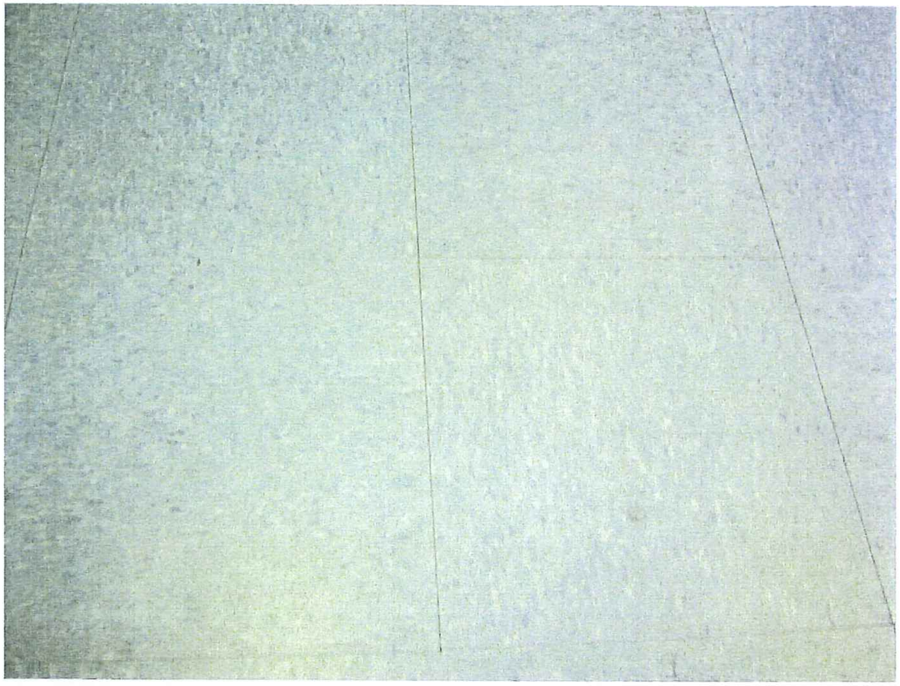
BOARD-71,72,75,76, 79, 81 Drywall w/ Asbestos-Containing Joint Compound



BOARD-93 Sheet Vinyl, Brown Square Patterned

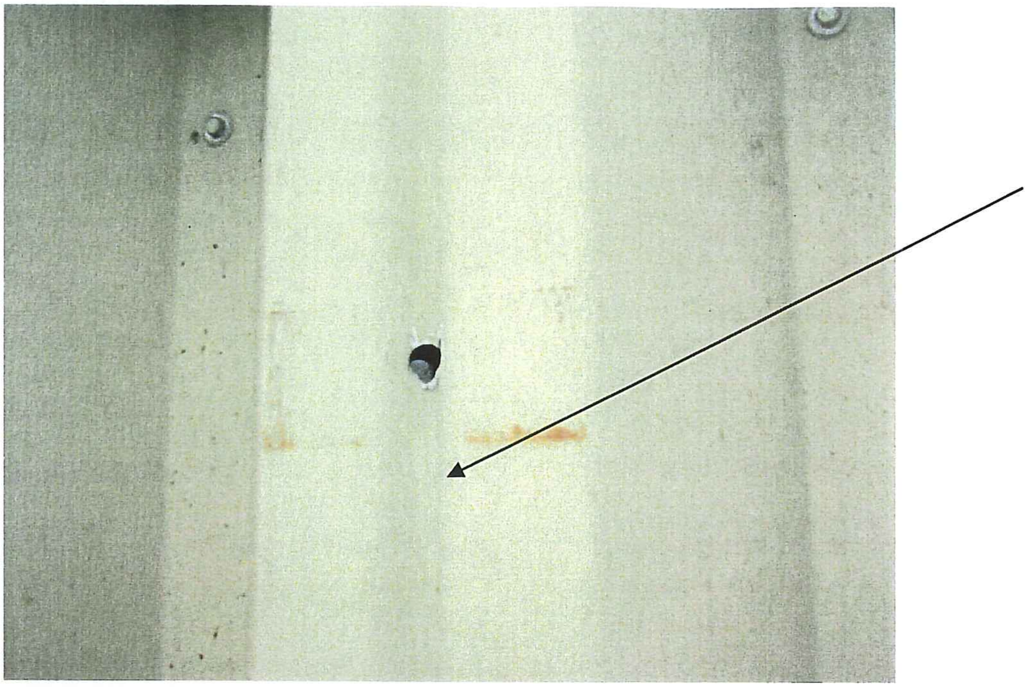


BOARD-95 Floor Tile (2^{nd} Layer under Shown Floor Tile)



BOARD-113 Floor Tile, 12" x 12" Brown w/ White Specks and Black Mastic

Galbestos Siding (Assumed) - Only Siding w/ Ridge is Asbestos-Containing



Transite Lab Tables (Assumed)

Materials not Shown:

Sprayed-on Fireproofing (Assumed) - Above Weld Shop in AWS

Gaskets and Packing Material Throughout Plant (Assumed)

Building: AWS Building. **Sample Number**: BD-11 **Date**: 11-12-96

Location: Roof **Material:** Roofing sealant

Asbestos Content: 10% Chrysotile Asbestos

Comments:

Building: AWS **Sample Number**: BD-16 **Date**: 11-12-96

Location: Warehouse Office **Material**: Floor tile

Asbestos Content: 5% Chrysotile Asbestos

Comments:

Building: AWS

Sample Number: BD-17

Date: 11-12-96

Location: Jean Brace Office

Material: Floor tile (beneath carpet)

Asbestos Content: 3% Chrysotile

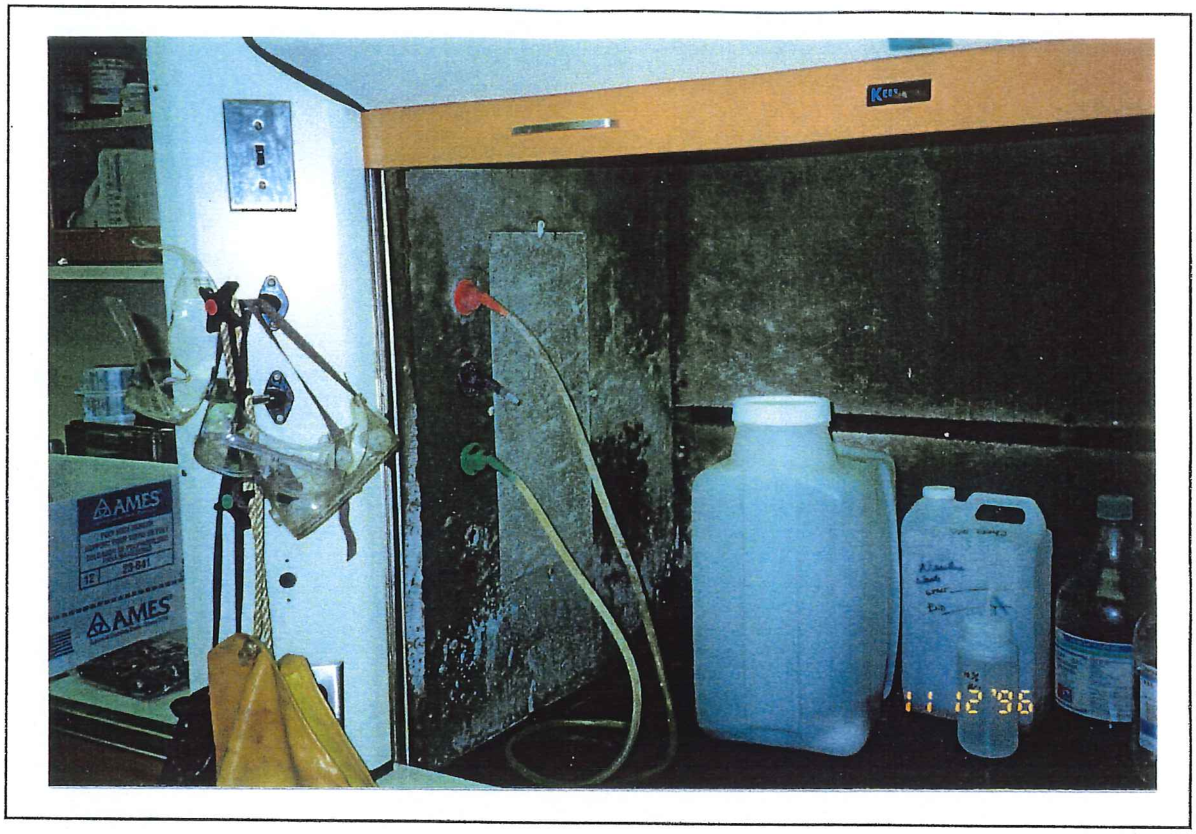
Comments:

Building: Power Building **Sample Number**: BD-29 **Date**: 11-13-96

Location: Control Room - hallway **Material**: Floor tile (beneath carpeting as well as exposed)

Asbestos Content: 3% Chrysotile Asbestos

Comments:



Building: Power Building **Sample Number**: BD-33 **Date**: 11-13-96

Location: Chem Lab - Hood **Material**: Composite board liner

Asbestos Content: 10% Chrysotile Asbestos

Comments:

Building: Reclaim Electrical Bldg. **Sample Number**: BD-38 **Date**: 11-13-96

Location: Control Room **Material**: Floor tile

Asbestos Content: Layer 1, gray, is less than 1% Chrysotile Asbestos
Layer 2, black, has 5% Chrysotile Asbestos
Total fibers is less than 1% Chrysotile Asbestos

Comments: Same tile is in the Dumper Control Room

LABORATORY ANALYTICAL DATA AND CHAIN OF CUSTODY RECORD

Forensic Analytical

Final Report

Bulk Asbestos Analysis

(EPA Method 600/R-93-116, Visual Area Estimation)

Portland General Electric
Doug Jenkins
1WTC0607
121 SW Salmon St.
Portland, OR 97204

Client ID: A31110
Report Number: B082898
Date Received: 03/15/06
Date Analyzed: 03/19/06
Date Printed: 03/20/06
First Reported: 03/20/06

Job ID/Site: Multiple Facilities, Portland Metro

Date(s) Collected: 03/14/2006

FASI Job ID: PE1648
Total Samples Submitted: 117
Total Samples Analyzed: 117

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
BOARD-1	10502296						
Layer: White Non-Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
BOARD-2	10502297						
Layer: White Non-Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
BOARD-3	10502298						
Layer: White Non-Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
BOARD-4	10502299						
Layer: Off-White Fibrous Material			**ND**				
Layer: Foil			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (2 %) Fibrous Glass (90 %)							
BOARD-5	10502300						
Layer: White Drywall			**ND**				
Layer: White Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (10 %) Fibrous Glass (5 %)							
BOARD-6	10502301						
Layer: Tan Cementitious Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							

Report Number: B082898
Date Printed: 03/20/06

Client Name: Portland General Electric

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
BOARD-7	10502302						
Layer: Tan Tile		Chrysotile	2 %				
Layer: Black Mastic		Chrysotile	5 %				
Total Composite Values of Fibrous Components:		**Asbestos (2%)**					
Cellulose (Trace)							
BOARD-8	10502303						
Layer: Beige Fibrous Tile			**ND**				
Layer: Paint			**ND**				
Layer: Brown Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (2 %) Fibrous Glass (90 %)							
BOARD-9	10502304						
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
BOARD-10	10502305						
Layer: White Semi-Fibrous Material			**ND**				
Layer: Yellow Adhesive			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (30 %)							
BOARD-11	10502306						
Layer: White Semi-Fibrous Material			**ND**				
Layer: White Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (30 %) Fibrous Glass (5 %)							
BOARD-12	10502307						
Layer: Beige Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (35 %) Fibrous Glass (20 %)							
BOARD-13	10502308						
Layer: Beige Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (35 %) Fibrous Glass (20 %)							
BOARD-14	10502309						
Layer: Beige Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (35 %) Fibrous Glass (20 %)							
BOARD-15	10502310						
Layer: Grey Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (25 %) Fibrous Glass (45 %)							

Report Number: B082898
Date Printed: 03/20/06

Client Name: Portland General Electric

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
BOARD-16	10502311						
Layer: Off-White Fibrous Material			ND				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (60 %) Fibrous Glass (5 %) Wollastonite (30 %)							
BOARD-17	10502312						
Layer: Grey Non-Fibrous Material			ND				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
BOARD-18	10502313						
Layer: White Fibrous Material			ND				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (99 %)							
BOARD-19	10502314						
Layer: Red Non-Fibrous Material			ND				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
BOARD-20	10502315						
Layer: White Non-Fibrous Material			ND				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
BOARD-21	10502316						
Layer: Black Mastic		Chrysotile	2 %				
Total Composite Values of Fibrous Components:		**Asbestos (2%)**					
Cellulose (Trace)							
BOARD-22	10502317						
Layer: Black Mastic		Chrysotile	2 %				
Total Composite Values of Fibrous Components:		**Asbestos (2%)**					
Cellulose (Trace)							
BOARD-23	10502318						
Layer: Black Mastic		Chrysotile	2 %				
Total Composite Values of Fibrous Components:		**Asbestos (2%)**					
Cellulose (Trace)							
BOARD-24	10502319						
Layer: Off-White Semi-Fibrous Material			ND				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (15 %) Synthetic (10 %)							
BOARD-25	10502320						
Layer: Off-White Semi-Fibrous Material			ND				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (20 %) Fibrous Glass (10 %)							

Report Number: B082898
Date Printed: 03/20/06

Client Name: Portland General Electric

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
BOARD-26	10502321						
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
BOARD-27	10502322						
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
BOARD-28	10502323						
Layer: Grey Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (80 %)							
BOARD-29	10502324						
Layer: Grey Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (80 %)							
BOARD-30	10502325						
Layer: Grey Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (80 %)							
BOARD-31	10502326						
Layer: Red-Brown Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
BOARD-32	10502327						
Layer: Off-White Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (30 %) Fibrous Glass (10 %)							
BOARD-33	10502328						
Layer: White Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (30 %) Fibrous Glass (10 %)							
BOARD-34	10502329						
Layer: White Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (30 %) Fibrous Glass (10 %)							
BOARD-35	10502330						
Layer: White Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (30 %) Fibrous Glass (10 %)							

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
BOARD-36	10502331						
Layer: Black Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (35 %)							
BOARD-37	10502332						
Layer: Light Grey Fibrous Material		Chrysotile	**70 %**				
Total Composite Values of Fibrous Components:		**Asbestos (70%)**					
Cellulose (20 %)							
BOARD-38	10502333						
Layer: Grey Non-Fibrous Material		Chrysotile	**Trace**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (Trace)							
BOARD-39	10502334						
Layer: Grey Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (5 %) Fibrous Glass (50 %)							
BOARD-40	10502335						
Layer: Grey Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (5 %) Fibrous Glass (50 %)							
BOARD-41	10502336						
Layer: Grey Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (5 %) Fibrous Glass (50 %)							
BOARD-42	10502337						
Layer: White Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (90 %)							
BOARD-43	10502338						
Layer: White Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (90 %)							
BOARD-44	10502339						
Layer: White Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (90 %)							
BOARD-45	10502340						
Layer: Beige Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (10 %) Fibrous Glass (45 %)							

Report Number: B082898
Date Printed: 03/20/06

Client Name: Portland General Electric

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
BOARD-46	10502341						
Layer: White Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (90 %)							
BOARD-47	10502342						
Layer: Beige Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (10 %) Fibrous Glass (45 %)							
BOARD-48	10502343						
Layer: Off-White Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (5 %) Fibrous Glass (5 %)							
BOARD-49	10502344						
Layer: Off-White Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (5 %) Fibrous Glass (5 %)							
BOARD-50	10502345						
Layer: Off-White Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (5 %) Fibrous Glass (5 %)							
BOARD-51	10502346						
Layer: Off-White Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (15 %)							
BOARD-52	10502347						
Layer: Off-White Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (15 %)							
BOARD-53	10502348						
Layer: Off-White Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (15 %)							
BOARD-54	10502349						
Layer: White Tile		Chrysotile	**2 %**				
Layer: Black Mastic		Chrysotile	**5 %**				
Total Composite Values of Fibrous Components:		**Asbestos (2%)**					
Cellulose (Trace)							
BOARD-55	10502350						
Layer: Light Grey Fibrous Material		Chrysotile	**70 %**				
Total Composite Values of Fibrous Components:		**Asbestos (70%)**					
Cellulose (20 %)							

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Date Printed: 03/20/06

Client Name: Portland General Electric

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
BOARD-56	10502351						
Layer: Light Yellow Foam			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
BOARD-57	10502352						
Layer: Light Yellow Foam			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
BOARD-58	10502353						
Layer: Light Yellow Foam			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
BOARD-59	10502354						
Layer: Off-White Non-Fibrous Material			**ND**				
Layer: Black Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (40 %) Synthetic (10 %)							
BOARD-60	10502355						
Layer: White Drywall			**ND**				
Layer: White Skimcoat/Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (20 %) Fibrous Glass (10 %)							
BOARD-61	10502356						
Layer: White Drywall			**ND**				
Layer: White Skimcoat/Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (20 %) Fibrous Glass (10 %)							
BOARD-62	10502357						
Layer: White Drywall			**ND**				
Layer: White Skimcoat/Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (20 %) Fibrous Glass (10 %)							
BOARD-63	10502358						
Layer: Tan Tile			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							

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Date Printed: 03/20/06

Client Name: Portland General Electric

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
BOARD-64	10502359						
Layer: Light Grey Fibrous Tile			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (2 %) Fibrous Glass (90 %)							
BOARD-65	10502360						
Layer: Black Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
BOARD-66	10502361						
Layer: White Tile		Chrysotile	**2 %**				
Layer: Black Mastic		Chrysotile	**5 %**				
Total Composite Values of Fibrous Components:		**Asbestos (2%)**					
Cellulose (Trace)							
BOARD-67	10502362						
Layer: Off-White Skimcoat/Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
BOARD-68	10502363						
Layer: Off-White Skimcoat/Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
BOARD-69	10502364						
Layer: Off-White Skimcoat/Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
BOARD-70	10502365						
Layer: White Drywall			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (5 %) Fibrous Glass (5 %)							
BOARD-71	10502366						
Layer: White Drywall			**ND**				
Layer: Off-White Skimcoat/Joint Compound		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (20 %) Fibrous Glass (10 %)							

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Date Printed: 03/20/06

Client Name: Portland General Electric

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
BOARD-72	10502367						
Layer: White Drywall			**ND**				
Layer: Off-White Skimcoat/Joint Compound		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (20 %) Fibrous Glass (10 %)							
BOARD-73	10502368						
Layer: Beige Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (35 %) Fibrous Glass (45 %)							
BOARD-74	10502369						
Layer: Off-White Fibrous Tile			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (2 %) Fibrous Glass (90 %)							
BOARD-75	10502370						
Layer: White Drywall			**ND**				
Layer: Off-White Skimcoat/Joint Compound		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (20 %) Fibrous Glass (10 %)							
BOARD-76	10502371						
Layer: White Drywall			**ND**				
Layer: Off-White Skimcoat/Joint Compound		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (20 %) Fibrous Glass (10 %)							
BOARD-77	10502372						
Layer: White Drywall			**ND**				
Layer: White Skimcoat/Joint Compound			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (20 %) Fibrous Glass (10 %)							
BOARD-78	10502373						
Layer: White Drywall			**ND**				
Layer: White Skimcoat/Joint Compound			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (20 %) Fibrous Glass (10 %)							
BOARD-79	10502374						
Layer: White Drywall			**ND**				
Layer: Off-White Skimcoat/Joint Compound		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (20 %) Fibrous Glass (10 %)							

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Date Printed: 03/20/06

Client Name: Portland General Electric

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
BOARD-80	10502375						
Layer: White Tile			**ND**				
Layer: Black Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
BOARD-81	10502376						
Layer: White Drywall			**ND**				
Layer: Off-White Skimcoat/Joint Compound		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (20 %) Fibrous Glass (10 %)							
BOARD-82	10502377						
Layer: White Skimcoat/Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
BOARD-83	10502378						
Layer: White Drywall			**ND**				
Layer: White Skimcoat/Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (20 %) Fibrous Glass (10 %)							
BOARD-84	10502379						
Layer: White Drywall			**ND**				
Layer: White Skimcoat/Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (20 %) Fibrous Glass (10 %)							
BOARD-85	10502380						
Layer: Grey Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (85 %)							
BOARD-86	10502381						
Layer: Grey Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (85 %)							
BOARD-87	10502382						
Layer: White Drywall			**ND**				
Layer: White Skimcoat/Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (20 %) Fibrous Glass (10 %)							

Report Number: B082898
Client Name: Portland General Electric
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Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
BOARD-88	10502383						
Layer: Tan Sheet Flooring			**ND**				
Layer: Fibrous Backing			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (20 %) Fibrous Glass (5 %) Synthetic (10 %)							
BOARD-89	10502384						
Layer: Tan Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (95 %)							
BOARD-90	10502385						
Layer: Grey Sheet Flooring			**ND**				
Layer: Fibrous Backing			**ND**				
Layer: Yellow Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (25 %) Synthetic (10 %)							
BOARD-91	10502386						
Layer: Tan Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (95 %)							
BOARD-92	10502387						
Layer: White Drywall			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (10 %) Fibrous Glass (5 %)							
BOARD-93	10502388						
Layer: Brown Sheet Flooring			**ND**				
Layer: Fibrous Backing		Chrysotile	**70 %**				
Layer: Brown Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (25%)**					
Cellulose (5 %)							
BOARD-94	10502389						
Layer: Blue Tile			**ND**				
Layer: Black Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
BOARD-95	10502390						
Layer: Tan Tile		Chrysotile	**2 %**				
Layer: Black Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (2%)**					
Cellulose (Trace)							

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Client Name: Portland General Electric **Date Printed:** 03/20/06

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
BOARD-96	10502391						
Layer: White Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (45 %)							
BOARD-97	10502392						
Layer: Beige Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (35 %) Fibrous Glass (45 %)							
BOARD-98	10502393						
Layer: White Tile			**ND**				
Layer: Yellow Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
BOARD-99	10502394						
Layer: Beige Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (35 %) Fibrous Glass (45 %)							
BOARD-100	10502395						
Layer: White Drywall			**ND**				
Layer: White Skimcoat/Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (20 %) Fibrous Glass (10 %)							
BOARD-101	10502396						
Layer: Off-White Sheet Flooring			**ND**				
Layer: Fibrous Backing			**ND**				
Layer: Yellow Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (20 %) Fibrous Glass (5 %)	Synthetic (10 %)						
BOARD-102	10502397						
Layer: Light Grey Sheet Flooring			**ND**				
Layer: Fibrous Backing			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (20 %) Fibrous Glass (5 %)	Synthetic (10 %)						
BOARD-103	10502398						
Layer: White Drywall			**ND**				
Layer: White Skimcoat/Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (20 %) Fibrous Glass (10 %)							

Report Number: B082898
Date Printed: 03/20/06

Client Name: Portland General Electric

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
BOARD-104	10502399						
Layer: White Drywall			**ND**				
Layer: White Skimcoat/Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (20 %) Fibrous Glass (10 %)							
BOARD-105	10502400						
Layer: White Skimcoat/Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
BOARD-106	10502401						
Layer: White Skimcoat/Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
BOARD-107	10502402						
Layer: White Skimcoat/Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
BOARD-108	10502403						
Layer: Black Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Synthetic (3 %)							
BOARD-109	10502404						
Layer: Black Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
BOARD-110	10502405						
Layer: Black Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
BOARD-111	10502406						
Layer: Black Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
BOARD-112	10502407						
Layer: White Semi-Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (40 %)							

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Date Printed: 03/20/06

Client Name: Portland General Electric

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
BOARD-113	10502408						
Layer: Brown Tile		Chrysotile	2 %				
Layer: Black Mastic		Chrysotile	5 %				
Total Composite Values of Fibrous Components:		**Asbestos (2%)**					
Cellulose (Trace)							
BOARD-114	10502409						
Layer: Beige Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (35 %) Fibrous Glass (45 %)							
BOARD-115	10502410						
Layer: Black Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (15 %)							
BOARD-116	10502411						
Layer: Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
ARD-117	10502412						
Layer: Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							

Jim Flores

James Flores, Laboratory Supervisor, Hayward Laboratory

Note: Limit of Quantification ('LOQ') = 1%. 'Trace' denotes the presence of asbestos below the LOQ. 'ND' = 'None Detected'.

Forensic Analytical

BULK SAMPLE REQUEST FORM

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Client: PGE		Sampled by: Dan Rouse	PM: DKR	Date: 3-14-06
Contact: Doug Jenkin	Phone: 503-464-7289	Special Instructions: Email results to eariza, scallin@forensica.com	
Site: Multiple Facilities, Portland Metro		Turnaround Time: Rush / 24 Hour / 3-Day ✓	Due Date & Time: 3-20-06 @ 10 AM
Client No.: A31110	FSD No.: PE1648	Analysis: [✓ PLM Standard] / Point Count / Flame AA (Pb) / Other:	

Sample Number	Material Description	Sample Location	Friable	Cond.	Quantity
Board - 1	WALL TEXTURE	AWS - Admin Area	~~2Y~~		
2	↓	↓ ↓			
3	↓	↓ ↓			
4	CT, 2'x2' F/A	↓ ↓	~~2N~~		
5	DW+J	↓ - ↓ - Janitor's Closet			
6	Cementitious Fit, TAN	↓ ↓ - Stairwell	~~2Y~~		
7	FT, 12" x 12" TAN w/ Brown specks (BLK)	AWS Lunch Room Quantity on Picture			
8	CT, 12" x 12" TEXT. + ADHESIVE (Brown)	AWS - Med. Sup. office	~~2N~~		
9	Duct Seam Compound	↓ - Meds Rm under Admin			
10	Fiberous Seam Comp.	↓ - " 1 Prev. Sample "			

WB - Wallboard JC - Joint Compound FT - Floor Tile FTM - Floor Tile Mastic BBM - Baseboard Mastic
RSF - Resilient Sheet Flooring CT - Ceiling Tile SAAM - Spray-Applied Acoustical Material WT - Wall Texture

Friable Yes/No Good Fair/Poor

Shipped via: Fed Ex Airborne UPS US Mail Courier XXX Drop Off Other:

Relinquished by: Dan Rouse
Date & Time: 3-14-06 @ 5:00 PM

Received by: 3/15
Date & Time:

Condition Acceptable Yes No

Forensic Analytical

BULK SAMPLE REQUEST FORM

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Client: PGE		Sampled by: PM: DKR	Date:
Contact: Doug Jenkin	Phone: 503-464-7289	Special Instructions: Email results to eriza, scallin@forensica.com	
Site: Multiple Facilities, Portland Metro		Turnaround Time: Rush 24 Hour 3-Day	Due Date & Time:
Client No.: A31110	ESD No.: PE1648	Analysis: PLM Standard / Point Count / Flame AA (Pb) / Other:	

Sample Number	Material Description	Sample Location	Friable	Cond.	Quantity
Board - 11	Pipe ins. Seam Coupd	AWS - Mech. Rm under Admin			-
12	Pipe Fitting	↓ - Mech Rm ~~off~~ near Warehouse			
13	↓	↓ ↓ ↓ ↓ ↓			
14	↓	↓			
15	CT, 2'x4' G/P	↓ - Men's Locker Room			24x60
16	Insulation Board @ Therm Couple	Power Block - 17th Floor 912 Deck North Side - 1 on 1 on	South Side [illegible] Side @ H3[illegible]		8 eq.
17	Boiler Ins. @ Inspection Door	- 894 West Side			
18	Gasket @ " "	" " "			
19	Boiler Ins @ Insp. Door	- 881 North Side			
20	Rigid Pipe Ins.	↓ - 856 Soot Blower TK-51			

WB Wallboard JC - Joint Compound FT Floor Tile FTM Floor Tile Mastic BBM - Baseboard Mastic
RSF Resilient Sheet Flooring CT Ceiling Tile SAAM Spray-Applied Acoustical Material WT Wall Texture

Friable: Yes / No Cond: Good / Fair / Poor

Shipped via: Fed Ex Airborne ___ UPS ___ US Mail Courier XXX Drop Off ___ Other: ______

Relinquished by: ______

Date & Time:

Received by: RF 3/15

Date & Time:

Condition Acceptable Yes No

Forensi

BULK SAMPLE REQUEST FORM

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Sampled by: PM: DKR Date:

oug Jenkin Phone: 503-464-7289

Special Instructions: Email results to eariza, scallin@forensica.com

e: Multiple Facilities, Portland Metro

Turnaround Time: Rush 24 Hour 3-Day Due Date & Time:

Client No.: A31110 ESD No.: PE1648

Analysis: PLM Standard / Point Count / Flame AA (Pb) / Other:

Sample Number	Material Description	Sample Location	Friable	Cond.	Quantity
BoARD - ~~21~~	Spray on Coating	Power Block - Roof Exhaust FAN ON Oiler Deaerator (off 8th Floor)			300 [illegible]
~~22~~	↓	↓ - ↓			
~~23~~	↓	- ↓			
~~24~~	Rigid Pipe Ins	↓ - 817 Soot Blower IK35			
~~25~~	Pipe Fitting	- 817 @ Column D 2 40			
~~26~~	Duct Seam Compound	↓ - NORTH Dust Collector BAG ~~Fan~~ House Exhaust System			
~~27~~	CAulk on METAL WAll	↓ FAN Room EAST of BAG House			
~~28~~	Spray on Insulation	N Dust Collector Control House			
~~29~~	↓	↓			500 [illegible]
~~30~~	↓	↓ ↓			

WB - Wallboard JC - Joint Compound FT - Floor Tile FTM - Floor Tile Mastic BBM Baseboard Mastic
RSF - Resilient Sheet Flooring CT - Ceiling Tile SAAM - Spray-Applied Acoustical Material WT Wall Texture

Friable: Yes / No Cond.: Good / Fair / Poor

Shipped via: Fed Ex Airborne UPS US Mail Courier XXX Drop Off Other:

Relinquished by:

Date & Time:

Received by: BJ 3/15

Date & Time

Condition Acc

Forensic Analytical

BULK SAMPLE REQUEST FORM

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Client: PGE		Sampled by:	PM: DKR Date.
Contact: Doug Jenkin	Phone: 503-464-7289	Special Instructions: Email results to eariza, scallin@forensica.com	
Site: Multiple Facilities, Portland Metro		Turnaround Time: Rush 24 Hour 3-Day	Due Date & Time:
Client No.: A31110	ESD No.: PE1648	Analysis: PLM Standard / Point Count / Flame AA (Pb) / Other:	

Sample Number	Material Description	Sample Location		Friable	Cond.	Quantity
Boards – ~~31~~	Boiler Ins. @ Interior Door	Power Plant – 815	North Side			·
~~32~~	Rigid Pipe ins.	↓ 815	" " Near D6			
~~33~~	Rigid tank ins	↓ 809	DA Storage Tank			
~~34~~	↓	↓	↓			
~~35~~						
~~36~~	Caulking on Burner	↓ 798	– 4/4 Burner			32 Burners 12 ea.
~~37~~	Gasket	↓ 788	Economizer Grizzly/Feeder Desk			20 each 1/4ft
~~38~~	Caulking @ Exterior Door	↓ Near Column K5,75				
~~39~~	Rigid tank ins	Feed Water heater #6 :				
~~40~~	" " "	↓	↓			

WB - Wallboard JC - Joint Compound FT - Floor Tile FTM - Floor Tile Mastic BBM - Baseboard Mastic
RSF - Resilient Sheet Flooring CT - Ceiling Tile SAAM - Spray-Applied Acoustical Material WT - Wall Texture

Friable Yes/No Cond.: Good/Fair/Poor

Shipped via: ___ Fed Ex Airborne ___ UPS ___ US Mail Courier XXX Drop Off ___ Other: ________

Relinquished by: ________

Date & Time:

Received by: BR 3/15

Date & Time:

Condition Acceptable Yes No

Forensic Analytical

BULK SAMPLE REQUEST FORM

Page 5 of 12

Client: PGE	Sampled by: PM: DKR Date:
Contact: Doug Jenkin Phone: 503-464-7289	Special Instructions: Email results to eariza, seallin@forensica.com
Site: Multiple Facilities, Portland Metro	Turnaround Time: Rush ☐ 24 Hour ☐ 3-Day ☐ Due Date & Time:
Client No.: A31110 ESD No.: PE1648	Analysis: PLM Standard / Point Count / Flame AA (Pb) / Other:

Sample Number	Material Description	Sample Location	Friable	Cond.	Quantity
BmBD - 41	Rigid Pipe ins	Powerblock Feedwater heater #6			
42	Rigid ins	W + E side Lower intercept (on Turbine)			
43	↓	↓			
44					
45	Rigid ins	Steam chest (turbine)			
46	↓	↓ ↓			
47					
48	Rigid Pipe ins	Pipes Near Steam chest			
49	↓	↓			
50					

WB – Wallboard JC Joint Compound FT Floor Tile FTM Floor Tile Mastic HBM Baseboard Mastic
REF - Resilient Sheet Flooring CT - Ceiling Tile SAAM - Spray-Applied Acoustical Material WT - Wall Texture

Friable: Yes / No Cond.: Good / Fair / Poor

Shipped via: ___ Fed Ex ___ Airborne ___ UPS ___ US Mail ___ Courier XXX Drop Off ___ Other: ______

Relinquished by: ______

Date & Time: ______

Received by: KB 3/15

Date & Time: ______

Condition Acceptable Yes No

Forensic Analytical

696' - 933'

BULK SAMPLE REQUEST FORM

Page 6 of 12

Client: PGE
Contact: Doug Jenkin Phone: 503-464-7289
Site: Multiple Facilities, Portland Metro
Client No.: A31110 ESD No.: PE1648

Sampled by:
PM: DKR Date:
Special Instructions: Email results to earixa, scallin@forensica.com
Turnaround Time: Rush ; 24 Hour ; 3-Day ; Due Date & Time:
Analysis: PLM Standard / Point Count / Flame AA (Pb) / Other:

Sample Number	Material Description	Sample Location	Friable	Cond.	Quantity
Doreh ~~S1~~	Coating on Column	Powerblock — C9 (Column)			~1000'
~~S2~~	↓	↓ D9			
~~S3~~		D9			
~~S4~~	FT, 12x12 Beige w/ mastic (BLK)	↓ — Cable Spreading Room			29,458
~~S5~~	Gasket on PA FAN	↓ South Side (by Outboard Bearing)			28 ea
~~S6~~	TANK Insulation				1111
~~S7~~		Intake Structure — Sodium Hypochlorite Tank			
~~S8~~	↓	↓ ↓			
~~S9~~	Crack Compound	Ash Hopper			200'
~~S10~~	DWTS	WArehouse 4			

WB - Wallboard JC - Joint Compound FT - Floor Tile FTM - Floor Tile Mastic CBM - Baseboard Mastic
RSF - Resilient Sheet Flooring CT - Ceiling Tile SAAM - Spray-Applied Acoustical Material WT - Wall Texture

Friable: Yes / No Cond.: Good / Fair / Poor

Shipped via: _ Fed Ex _ Airborne _ UPS _ US Mail _ Courier XXX Drop Off _ Other:

Relinquished by:
Date & Time:

Received by: CR 3/15
Date & Time:

Condition Acceptable Yes No

Forensic Analytical

BULK SAMPLE REQUEST FORM

Page 7 of 12

Client: PGE		Sampled by:	PM: DKR Date:
Contact: Doug Jenkin	Phone: 503-464-7289	Special Instructions:	Email results to eariza, scallin@forensica.com
Site: Multiple Facilities, Portland Metro		Turnaround Time:	Rush / 24 Hour / 3-Day / Due Date & Time:
Client No.: A31110	ESD No.: PE1648	Analysis:	PLM Standard / Point Count / Flame AA (Pb) / Other:

Sample Number	Material Description	Sample Location	Friable	Cond.	Quantity
Bord - 61	DW+J	Warehouse 4			
62	↓	↓ 4			
63	FM, TAN Streaked	Powerhouse Control Rm			
64	CT, 2'x4' Heavy Textured	↓ LAB			
65	Stainless Countertop undercoating	↓ LAB			
66	FT, 12X12 beige Streaked w/ white	↓ Hallway Near LAB			
67	DW+J	LAB			
68	DW+J	Instrument Shop			
69	DW+J	↓ ~~[illegible]~~ Hallway Near LAB			
70	DW+J	CPL Classroom Building			

WB - Wallboard JC - Joint Compound FT - Floor Tile FTM - Floor Tile Mastic BBM - Baseboard Mastic
RSF - Resilient Sheet Flooring CT - Ceiling Tile SAAM - Spray-Applied Acoustical Material WT - Wall Texture

Friable: Yes / No Good / Fair / Poor

Shipped via: ___ Fed Ex Airborne ___ UPS ___ US Mail ___ Courier XXX Drop Off ___ Other:

Relinquished by:

Date & Time:

Received by: 3/15

Date & Time:

Condition Acceptable Yes No

Forensic Analytical

BULK SAMPLE REQUEST FORM

Page 8 of 12

Client: PGE

Contact: Doug Jenkin Phone: 503-464-7289

Site: Multiple Facilities, Portland Metro

Client No.: A31110 ESD No.: PE1648

Sampled by:

PM: DKR

Date:

Special Instructions: **Email results to cariza, scallin@forensica.com**

Turnaround Time: Rush 24 Hour 3-Day

Due Date & Time:

Analysis: PLM Standard / Point Count / Flame AA (Pb) / Other:

Sample Number	Material Description	Sample Location	Friable	Cond.	Quantity
Bord - 71	DW+J	CPL Classroom Building			
72	↓	↓			
73	CT, 2'X4' G/P	↓ - Hallway			
74	CT, 2'X4' Rough textured	↓ - ~~[illegible]~~ office			8X20
75	DW+J	PMR Building (Formerly Fossil [illegible])			
76	↓	↓			
77	DW+J	Warehouse #2			
78	↓	↓			
79	↓	↓			
80	FT, 12x12 Tan w/ [illegible] + BL MAS	Guard Shack			20 [illegible]

WB - Wallboard JC - Joint Compound FT - Floor Tile FTM - Floor Tile Mastic BBM - Baseboard Mastic
RSF - Resilient Sheet Flooring CT - Ceiling Tile SAAM - Spray-Applied Acoustical Material WT - Wall Texture

Friable Yes / No Cond.: Good / Fair / Poor

Shipped via: ___ Fed Ex ___ Airborne ___ UPS ___ US Mail ___ Courier XXX Drop Off ___ Other:

Relinquished by:

Date & Time:

Received by: 3/15

Date & Time:

Condition Acceptable Yes No

Forensic Analytical

BULK SAMPLE REQUEST FORM

Page 9 of 12

Client: PGE		Sampled by:	PM: DKR Date:
Contact: Doug Jenkin	Phone: 503-464-7289	Special Instructions:	Email results to earizo, scallin@forensica.com
Site: Multiple Facilities, Portland Metro		Turnaround Time:	Rush 24 Hour 3-Day Due Date & Time:
Client No.: A31110	ESD No.: PE1648	Analysis:	PLM Standard / Point Count / Flame AA (Pb) / Other:

Sample Number	Material Description	Sample Location	Friable	Cond.	Quantity
Brd-81	DW+J	OLD Guard Shack			300
82	DW+J	" " "			
83	↓	Rail Car Maint. Shop			
84	↓				
85	FP				
86	FP	↓			
87	DW+J	Gas Pump building			150
88	SV, Patterned	North Trailer 400			
89	Wall/ceiling Panel	↓			
90	SV, Tan Square Pattern	Middle the Trailers 300			

WB - Wallboard JC - Joint Compound FT - Floor Tile FTM - Floor Tile Mastic BBM - Baseboard Mastic
RSF - Resilient Sheet Flooring CT - Ceiling Tile SAAM - Spray-Applied Acoustical Material WT - Wall Texture

Friable Yes/No Good/Fair/Poor

Shipped Via: __ Fed Ex Airborne __ UPS US Mail __ Courier XXX Drop Off __ Other:

Relinquished by:

Date & Time:

Received by: RK 3/15

Date & Time:

Condition Acceptable Yes No

Forensic Analytical

BULK SAMPLE REQUEST FORM

Page 10 of 12

Client: PGE
Contact: Doug Jenkin Phone: 503-464-7289
Site: Multiple Facilities, Portland Metro
Client No.: A31110 ESD No.: PE1648

Sampled by: PM: DKR Date:
Special Instructions: **Email results to cariza, scallin@forensica.com**
Turnaround Time: Rush / 24 Hour / 3-Day Due Date & Time:
Analysis: PLM Standard / Point Count / Flame AA (Pb) / Other:

Sample Number	Material Description	Sample Location	Friable	Cond.	Quantity
Board-91	1 Ceiling Panel	Middle 2 Trailers			·
92	DW	↓			
93	SV, Br Square Patt	South Trailer			[illegible]
94	FT, 12x12 Blue Streaked + Mastic	Coalyard Control House			18x30
95	FT (2nd) + Black Mastic	↓			18x30
96	Duct Seam Tape	↓			1
97	CT, 2'x2' G/P	↓			18x30
98	FT, 12x12 Beige Streaked +	Coal Yard Lunchroom Building (16.0)	(16.0) (9.0)	(6.2) (40.5)	(20x20)(20x18) (5x4)(16x12)
99	CT, 2'x4' G/P	↓			
100	Dw+J	↓			

WB - Wallboard JC - Joint Compound FT - Floor Tile FTM - Floor Tile Mastic BBM - Baseboard Mastic
RSF - Resilient Sheet Flooring CT - Ceiling Tile SAAM - Spray-Applied Acoustical Material WT - Wall Texture

Friable: Yes / No Cond.: Fair / Poor

Shipped via: __ Fed Ex __ Airborne __ UPS __ US Mail __ Courier XXX Drop Off __ Other:

Relinquished by:
Date & Time:

Received by: 3/15
Date & Time:

Condition Acceptable Yes No

Forensic Analytical

BULK SAMPLE REQUEST FORM

Page 11 of 12

Client: PGE

Contact: Doug Jenkin Phone: 503-464-7289

Site: Multiple Facilities, Portland Metro

Client No.: A31110 ESD No.: PE1648

Sampled by: PM: DKR Date:

Special Instructions: Email results to eariza, scallin@forensica.com

Turnaround Time: Rush 24 Hour 3-Day Due Date & Time:

Analysis: PLM Standard / Point Count / Flame AA (Pb) / Other:

Sample Number	Material Description	Sample Location	Friable	Cond.	Quantity
Board – 101	SV, TAN Pebble Pattern	Coalyard Lunchroom Building			(6'.14) (20x12)
102	SV, Grey Pebble Pattern	↓			(13.16) (2x23)
103	DW+T				
104	DW+T				
105	WAll Texture				
106	↓				
107					
108	Sink Undercoating, black	↓			
109	Rigid Foam insulation	Conveyor Control House			
110	↓	↓			

WB - Wallboard JC - Joint Compound FT - Floor Tile TFM - Floor Tile Mastic BBM - Baseboard Mastic
RSF - Resilient Sheet Flooring CT - Ceiling Tile SAAM - Spray Applied Acoustical Material WT - Wall Texture

Friable Yes / No Cond. Good / Fair / Poor

Shipped via: ___ Fed Ex ___ Airborne ___ UPS ___ US Mail ___ Courier XXX Drop Off Other:

Relinquished by:

Date & Time:

Received by: 3/15

Date & Time:

Condition Acceptable Yes No

Forensic Analytical

BULK SAMPLE REQUEST FORM

Page 12 of 12

Client: PGE	Sampled by: P.M. DKR Date:
Contact: Doug Jenkin Phone: 503-464-7289	Special Instructions: **Email results to cariza, scallin@forensica.com**
Site: **Multiple Facilities, Portland Metro**	Turnaround Time: Rush 24 Hour 3-Day Due Date & Time:
Client No.: A31110 ESD No.: PE1648	Analysis: PLM Standard / Point Count / Flame AA (Pb) / Other:

Sample Number	Material Description	Sample Location	Friable	Cond.	Quantity
Board - 111	Rigid Foam ins.	Conveyor Control House			
112	Duct Seam Tape	Railcar Dump House - Restroom			16.15
113	FT, Dxd Bt w/ [illegible] & mas	- Control Rm			
114	9, 2'x4' F/P	" "			
115	Coating on CMU	MCC New Dumphouse			
116					
117					

WE - Wallboard JC - Joint Compound FT - Floor Tile FTM - Floor Tile Mastic BBM - Baseboard Mastic
RSF - Resilient Sheet Flooring CT - Ceiling Tile SAAM - Spray-Applied Acoustical Material WT - Wall Texture

Friable Yes / No Good / Fair / Poor

Shipped via: ___ Fed Ex ___ Airborne ___ UPS ___ US Mail ___ Courier XXX Drop Off ___ Other: ___

Relinquished by: ___

Date & Time: ___

Received by: 3/15

Date & Time: ___

Condition Acceptable Yes No

BULK SAMPLE ASBESTOS ANALYSIS

Client: North Creek Analytical
9405 SW Nimbus
Beaverton, OR 97008
Site: P4E0438

Report Date: 05/17/2004
Date Analyzed: 05/11/2004
Client No: 02095
Page No.: 1 of 2
Project No: 042769

Client Sample ID: P4E0438-01
Lab ID: AB-042769

	LAYER 1	LAYER 2	LAYER 3	LAYER 4
	Red-Painted	Brown Hard-Glued Fibrous	Black Hard-Glued Fibrous	Yellow Hard-Glued Fibrous
Percent of Sample:	50 %	10 %	20 %	20 %
Asbestos Mineral Fibers				
Chrysotile	18 %	-	-	-
TOTAL % ASBESTOS FIBERS:	**18 %**	**NAD**	**NAD**	**NAD**
Other Fibers				
Fibrous Glass	-	70 %	-	55 %
Cellulose	20 %	-		-
Matrix	Misc	Misc	Misc	CaC03
	-	-	-	Mastic

INSIDE ~~GE~~ TURBINE
WEDGE

Comments: Layers 1 and 3 ashed.

Client Sample ID: P4E0438-02
Lab ID: AB-042770

	LAYER 1	LAYER 2
	White Cloth/Glue	White Fibrous
Percent of Sample:	35 %	65 %
Asbestos Mineral Fibers		
TOTAL % ASBESTOS FIBERS:	**NAD**	**NAD**
Other Fibers		
Fibrous Glass	25 %	-
Synthetic	-	99 %
Matrix	Misc	Misc

Buss LEAD

NO ASBESTOS DETECTED

Comments: Sample container labelled "buss lead connection".

BULK SAMPLE ASBESTOS ANALYSIS

Client: North Creek Analytical
9405 SW Nimbus
Beaverton, OR 97008

Site: PGE Coal Plant, Boardman

Report Date: 05/17/2004
Date Analyzed: 05/11/2004
Client No: 02095
Page No.: 2 of 2
Project No: 042769

Client Sample ID: P4E0438-03	LAYER 1	LAYER 2
Lab ID: AB-042771	Gray Paint	White Insulation
Percent of Sample:	20 %	80 %
Asbestos Mineral Fibers		
TOTAL % ASBESTOS FIBERS:	**NAD**	**NAD**
Other Fibers		
Matrix	Paint mica	mica Misc

INTERIOR
Exciter DOG House

NO ASBESTOS DETECTED

Comments: Subsamples of both layers ashed.

Reviewed by: ______________________
Approved Signatory

Analyst(s):
Lisa Jones

This laboratory successfully participates in the American Industrial Hygiene Association Bulk Asbestos Analytical Testing Program.
Testing method is per 40 CFR 763 Subpart F, Appendix A, PLM. "NAD" is No Asbestos Detected.
Asbestos consists of the following minerals: chrysotile, amosite, crocidolite, tremolite, actinolite, anthophyllite.
Small diameter fibers such as those found in vinyl floor tiles, may not be detected by PLM.
Asbestos detection interferences may result from material binders.
Qualitative and quantitative TEM analysis may be recommended for difficult samples.
Quantitative analysis by PLM point count or TEM is recommended for samples testing at < or = to 1% asbestos.
This report pertains only to the samples listed on the report. Sample analysis is for asbestos only. Non-asbestos sample constituents reported may not be definite. Report considered valid only when signed by analyst.

nca
North Creek Analytical, Inc.
Environmental Laboratory Network
www.ncalabs.com

North Creek Pkwy N, Suite 400, Bothell, WA 98011-8223 (425) 420-9200 FAX 420
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776 (509) 924-9200 FAX 924
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132 (503) 906-9200 FAX 906 9210
20332 Empire Avenue, Suite F-1, Bend, OR 97701-5711 (541) 383-9310 FAX 382-7588

CHAIN OF CUSTODY REPORT

Work Order #: 74E0433

CLIENT: PGE
REPORT TO: C.L. McCartney
ADDRESS: 121 SW Salmon 3WTC-BR
Portland, Oregon. 97204
PHONE: 503-464-8383 FAX:
PROJECT NAME: BOARDMAN
PROJECT NUMBER:
SAMPLED BY: C.L. McCartney

INVOICE TO: PGE
PGES
P.O. NUMBER:

TURNAROUND REQUEST in Business Days*

Organic & Inorganic Analyses
☐ 10 ☐ 7 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 [✓ ☐ <1]
STD.

Petroleum Hydrocarbon Analyses
☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐ <1
STD.

OTHER Please Specify

*Turnaround Requests less than standard may incur Rush Charges.

REQUESTED ANALYSES

	CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	Asbestos												MATRIX (W, S, O)	# OF CONT.	COMMENTS	NCA WO ID
1.	#1 Wedge	5/10/04 11:30															Field Testing	
2.	#2 Buss Lead	" "																
3.	#3 DogHouse	" "																
4.																		
5.																		
6.																		
7.																		
8.																		
9.																		
10.																		
11.																		
12.																		
13.																		
14.																		
15.																		

RELINQUISHED BY: CLM
PRINT NAME: C. McCartney FIRM: PGE DATE: 5/10/04 TIME: 11:30
RECEIVED BY:
PRINT NAME: LISA JONES FIRM: Jones LAB DATE: 5/10/04 TIME: 11:30
RELINQUISHED BY:
PRINT NAME: FIRM: DATE: TIME:
RECEIVED BY:
PRINT NAME: FIRM: DATE: TIME:
ADDITIONAL REMARKS:
TEMP:
PAGE OF
COC REV 3/01

DEC- 3-96 TUE 10:37 AM OREGON ANALYTICAL LAB FAX NO. 5035901404 P. 2

Nov-27-96 09:03A Clayton-Seattle 206 763 7364 P.02

1 503 590 1404

Clayton Environmental Consultants **LABFAX**

Log # 18732
ANALYZED BY Crystal Wright
ON 11/24/96
Job / PO # PGE8131

Client: Oregon Analytical Laboratory
Location: Boardman Site

SAMPLE #: 70-8400-13418 LAB#: 18732-1 SAMPLE LOCATION: BD-1
SOURCE : Not Noted

No Asbestos Detected

LAYERED — Layers Homogenized for Analysis

Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
		Cellulose	30	Filler & Binder	50
		Glass Fiber	10	Paint	10

Description: White paint on tan papery layer with white chalky powder

Note:

SAMPLE #: 70-8400-13419 LAB#: 18732.2 SAMPLE LOCATION: BD-2
SOURCE : Not Noted

No Asbestos Detected

HOMOGENEOUS

Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
		Cellulose	10	Filler & Binder	45
		Mineral Wool	45		

Description: Gray fibrous powdery material

Note:

SAMPLE #: 70-8400-13420 LAB#: 18732.3 SAMPLE LOCATION: BD-3
SOURCE : Not Noted

No Asbestos Detected

HOMOGENEOUS

Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
		Mineral Wool	100		

Description: Yellow fibrous material

Note:

PRELIMINARY REPORT
Laboratory Data Sheet is for lab use and faxing only. The final report will follow in the mail.
Verified by:

Clayton Environmental Consultants **LABFAX**

Log # 18732
ANALYZED BY Crystal Wright
ON 11/24/96
Job / PO # PGE8131

Client: Oregon Analytical Laboratory
Location: Boardman Site

SAMPLE #: 70-8400-13421 LAB#: 18732.4 SAMPLE LOCATION: BD-4
SOURCE : Not Noted

No Asbestos Detected

Layers Homogenized for Analysis

LAYERED

Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
		Cellulose	40	Filler & Binder	50
		Glass Fiber	10		

Description: Tan papery layer with white powdery material

Note:

SAMPLE #: 70-8400-13422 LAB#: 18732.5 SAMPLE LOCATION: BD-5
SOURCE : Not Noted

No Asbestos Detected

Layers Homogenized for Analysis

LAYERED

Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
		Cellulose	35	Filler & Binder	55
		Glass Fiber	10		

Description: Tan papery layer with white powdery material

Note:

SAMPLE #: 70-8400-13423 LAB#: 18732.6 SAMPLE LOCATION: BD-6
SOURCE : Not Noted

No Asbestos Detected

HOMOGENEOUS

Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
		Cellulose	30	Filler & Binder	10
		Mineral Wool	52	Perlite	5
				Paint	3

Description: Beige fibrous compressed material with paint

Note:

PRELIMINARY REPORT
Laboratory Data Sheet is for lab use and faxing only. The final report will follow in the mail.
Verified by:

Nov-27-96 09:03A Clayton-Seattle 206 763 7364 P.04

Clayton Environmental Consultants **LABFAX**

Log # 18732
ANALYZED BY Crystal Wright
ON 11/24/96
Job / PO # PGE8131

Client: Oregon Analytical Laboratory
Location: Boardman Site

SAMPLE #: 70-8400-13424 LAB#: 18732.7 SAMPLE LOCATION: BD-7
SOURCE : Not Noted

No Asbestos Detected

Layers Homogenized for Analysis

LAYERED

Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
		Cellulose	30	Paint	20
		Glass Fiber	10	Filler & Binder	40

Description: Off-white paint on tan papery layer with white chalky powder

Note:

SAMPLE #: 70-8400-13425 LAB#: 18732.8 SAMPLE LOCATION: BD-8
SOURCE : Not Noted

No Asbestos Detected

HOMOGENEOUS

Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
		Cellulose	30	Paint	3
		Mineral Wool	52	Filler & Binder	10
				Perlite	5

Description: Beige fibrous compressed material with paint

Note:

SAMPLE #: 70-8400-13426 LAB#: 18732.9 SAMPLE LOCATION: BD-9
SOURCE : Not Noted

No Asbestos Detected

HOMOGENEOUS

Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
		Cellulose	45	Filler & Binder	55

Description: White coating on woven layer

Note:

PRELIMINARY REPORT
Laboratory Data Sheet is for lab use and faxing only. The final report will follow in the mail.
Verified by: Cal Bolton

Clayton Environmental Consultants **LABFAX**

Log # 18732
ANALYZED BY Crystal Wright
ON 11/24/96
Job / PO # PGE8131

Client: Oregon Analytical Laboratory
Location: Boardman Site

SAMPLE #:70-8400-13427 LAB#: 18732.10 SAMPLE LOCATION BD-10
SOURCE : Not Noted

No Asbestos Detected		HOMOGENEOUS			
Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
		Cellulose	10	Filler & Binder	55
		Mineral Wool	15		

Description: White coating with woven layer and yellow fibrous material

Note:

SAMPLE #:70-8400-13428 LAB#: 18732.11 SAMPLE LOCATION: BD-11
SOURCE : Not Noted

Asbestos Containing		HOMOGENEOUS			
Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
Chrysotile	10			Asphalt Filler & Binder	90

Description: Gray coating on black asphaltic material

Note:

SAMPLE #:70-8400-13429 LAB#: 18732.12 SAMPLE LOCATION: BD-12
SOURCE : Not Noted

No Asbestos Detected		HOMOGENEOUS			
Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
		Glass Fiber	30	Asphalt Filler & Binder	40
		Cellulose	10	Mineral Granules	20

Description: White mineral granules on black fibrous material

Note:

PRELIMINARY REPORT
Laboratory Data Sheet is for lab use and faxing only. The final report will follow in the mail.
Verified by:

Clayton Environmental Consultants **LABFAX**

Log # 18732
ANALYZED BY Crystal Wright
ON 11/24/96
Job / PO # PGE8131

Client: Oregon Analytical Laboratory
Location: Boardman Site

SAMPLE #: 70-8400-13430 LAB#: 18732.13A SAMPLE LOCATION: BD-13
SOURCE : Not Noted
LAYERED SAMPLE: NESHAP and AHERA regulations require layers be analyzed and reported separately.

No Asbestos Detected LAYER 1

Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
		Glass Fiber	30	Asphalt Filler & Binder	40
		Cellulose	10	Mineral Granules	20

Description: White mineral granules on black fibrous material

Note:

SAMPLE #: 70-8400-13430 LAB#: 18732.13B SAMPLE LOCATION: BD-13
SOURCE : Not Noted

Asbestos Containing LAYER 2

Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
Chrysotile	10			Asphalt Filler & Binder	90

Description: White mineral granules on black fibrous material

Note:

SAMPLE #: 70-8400-13431 LAB#: 18732.14 SAMPLE LOCATION: BD-14
SOURCE : Not Noted

No Asbestos Detected HOMOGENEOUS

Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
		Cellulose	60	Filler & Binder	40

Description: White coating on woven layer

Note:

PRELIMINARY REPORT
Laboratory Data Sheet is for lab use and faxing only. The final report will follow in the mail.
Verified by:

Clayton Environmental Consultants **LABFAX.**

Log #18732
ANALYZED BY Crystal Wright
ON 11/24/96
Job / PO # PGE8131

Client: Oregon Analytical Laboratory
Location: Boardman Site

SAMPLE #: 70-8400-13432 LAB#: 18732.15 SAMPLE LOCATION: BD-15
SOURCE : Not Noted

No Asbestos Detected		HOMOGENEOUS			
Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
		Cellulose	30	Filler & Binder	10
		Mineral Wool	50	Perlite	10

Description: Beige fibrous compressed material

Note:

SAMPLE #: 70-8400-13433 LAB#: 18732.16 SAMPLE LOCATION: BD-16
SOURCE : Not Noted
LAYERED SAMPLE: NESHAP and AHERA regulations require layers be analyzed and reported separately.

Asbestos Containing		LAYER 1			
Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
Chrysotile	5			Vinyl Filler and Binder	95

Description: Tan tile with white streaks and black asphaltic mastic

Note: Insufficient mastic for analysis

SAMPLE #: 70-8400-13434 LAB#: 18732.17 SAMPLE LOCATION: BD-17
SOURCE : Not Noted

Asbestos Containing		HOMOGENEOUS			
Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
Chrysotile	3			Vinyl Filler and Binder	97

Description: Tan tile with white streaks

Note:

PRELIMINARY REPORT
Laboratory Data Sheet is for lab use and faxing only. The final report will follow in the mail.
Verified by:

Clayton Environmental Consultants LABFAX

Log # 18732
ANALYZED BY Crystal Wright
ON 11/24/96
Job / PO # PGE8131

Client: Oregon Analytical Laboratory
Location: Boardman Site

SAMPLE #:70-8400-13435 LAB#: 18732.18 SAMPLE LOCATION: BD-18
SOURCE : Not Noted

No Asbestos Detected

HOMOGENEOUS

Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
		Mineral Wool	50	Filler & Binder	10
		Cellulose	30	Perlite	10

Description: Gray fibrous compressed material

Note:

SAMPLE #:70-8400-13436 LAB#: 18732.19 SAMPLE LOCATION: BD-19
SOURCE : Not Noted

Asbestos Containing

HOMOGENEOUS

Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
Chrysotile	5			Vinyl Filler and Binder	95

Description: Tan floor tile

Note:

SAMPLE #:70-8400-13437 LAB#: 18732.20 SAMPLE LOCATION: BD-20
SOURCE : Not Noted

No Asbestos Detected

HOMOGENEOUS

Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
		Cellulose	30	Filler & Binder	10
		Mineral Wool	57	Paint	3

Description: Beige fibrous material with paint

Note:

PRELIMINARY REPORT
Laboratory Data Sheet is for lab use and faxing only. The final report will follow in the mail.
Verified by: ___

Clayton Environmental Consultants **LABFAX**

Log # 18732
ANALYZED BY Crystal Wright
ON 11/24/96
Job / PO # PGE8131

Client: Oregon Analytical Laboratory
Location: Boardman Site

SAMPLE #: 70-8400-13437 LAB#: 18732.21 SAMPLE LOCATION: BD-21
SOURCE : Not Noted

No Asbestos Detected		HOMOGENEOUS			
Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
				Mineral Filler & Binder	70
				Paint	30

Description: Off-white paint on coarse powder

Note:

SAMPLE #: 70-8400-13439 LAB#: 18732.22A SAMPLE LOCATION: BD-22
SOURCE : Not Noted
LAYERED SAMPLE: NESHAP and AHERA regulations require layers be analyzed and reported separately.

No Asbestos Detected		LAYER 1			
Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
				Mineral Filler & Binder	100

Description: Off-white coarse powdery material

Note:

SAMPLE #: 70-8400-13439 LAB#: 18732.22B SAMPLE LOCATION: BD-22
SOURCE : Not Noted

No Asbestos Detected		LAYER 2			
Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
		Cellulose	40	Filler & Binder	50
		Glass Fiber	10		

Description: Tan papery layer with white chalky powder

Note:

PRELIMINARY REPORT
Laboratory Data Sheet is for lab use and faxing only. The final report will follow in the mail.
Verified by:

DEC- 5-96 TUE 10:40 AM OREGON ANALYTICAL LAB FAX NO. 5035901404

Nov-27-96 09:06A Clayton-Seattle 206 763 7364

Clayton Environmental Consultants **LABFAX**

Log # 18732
ANALYZED BY Crystal Wright
ON 11/24/96
Job / PO # PGE8131

Client: Oregon Analytical Laboratory
Location: Boardman Site

SAMPLE #: 70-8400-13440 LAB#: 18732.23 SAMPLE LOCATION: BD-23
SOURCE : Not Noted

No Asbestos Detected

HOMOGENEOUS

Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
				Mineral Filler & Binder	100

Description: White hard chunl

Note:

SAMPLE #: 70-8400-13441 LAB#: 18732.24 SAMPLE LOCATION: BD-24
SOURCE : Not Noted

No Asbestos Detected

HOMOGENEOUS

Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
				Paint	25
				Mineral Filler & Binder	75

Description: Off-white paint on coarse material

Note:

SAMPLE #: 70-8400-13442 LAB#: 18732.25 SAMPLE LOCATION: BD-25
SOURCE : Not Noted

No Asbestos Detected

HOMOGENEOUS

Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
		Cellulose	15	Filler & Binder	70
		Glass Fiber	15		

Description: White chalky powder

Note:

PRELIMINARY REPORT
Laboratory Data Sheet is for lab use and faxing only. The final report will follow in the mail.
Verified by:

Clayton Environmental Consultants **LABFAX**

Log # 18732
ANALYZED BY Crystal Wright
ON 11/24/96
Job / PO # PGE8131

Client: Oregon Analytical Laboratory
Location: Boardman Site

SAMPLE #: 70-8400-13443 LAB#: 18732.26 SAMPLE LOCATION: BD-26
SOURCE : Not Noted

No Asbestos Detected HOMOGENEOUS

Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
		Cellulose	10	Asphalt Filler & Binder	40
		Glass Fiber	5	Mineral Granules	15

Description: White mineral granules on black asphaltic material

Note:

SAMPLE #: 70-8400-13444 LAB#: 18732.27 SAMPLE LOCATION: BD-27
SOURCE : Not Noted

No Asbestos Detected HOMOGENEOUS

Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
		Glass Fiber	15	Asphalt Filler & Binder	85

Description: Black brittle asphaltic material

Note:

SAMPLE #: 70-8400-13445 LAB#: 18732.28 SAMPLE LOCATION: BD-28
SOURCE : Not Noted

No Asbestos Detected HOMOGENEOUS

Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
		Mineral Wool	52	Filler & Binder	10
		Cellulose	35	Paint	3

Description: Gray fibrous compressed material

Note:

PRELIMINARY REPORT
Laboratory Data Sheet is for lab use and faxing only. The final report will follow in the mail.
Verified by:

Clayton Environmental Consultants **LABFAX**

Log # 18732
ANALYZED BY Crystal Wright
ON 11/24/96
Job / PO # PGE8131

Client: Oregon Analytical Laboratory
Location: Boardman Site

SAMPLE #: 70-8400-13446 LAB#: 18732.29 SAMPLE LOCATION: BD-29
SOURCE : Not Noted
LAYERED SAMPLE: NESHAP and AHERA regulations require layers be analyzed and reported separately.

Asbestos Containing — LAYER 1

Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
Chrysotile	3			Vinyl Filler and Binder	97

Description: Tan tile with white streaks and black asphaltic mastic

Note: Insufficient mastic for analysis

SAMPLE #: 70-8400-13447 LAB#: 18732.30 SAMPLE LOCATION: BD-30
SOURCE : Not Noted

No Asbestos Detected — HOMOGENEOUS

Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
				Filler & Binder	100

Description: White hard chunk

Note:

SAMPLE #: 70-8400-13448 LAB#: 18732.31 SAMPLE LOCATION: BD-31
SOURCE : Not Noted

No Asbestos Detected — HOMOGENEOUS

Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
				Vinyl Filler and Binder	100

Description: White pliable vinyl

Note:

PRELIMINARY REPORT
Laboratory Data Sheet is for lab use and faxing only. The final report will follow in the mail.
Verified by:

Clayton Environmental Consultants **LABFAX**

Log # 18732
ANALYZED BY Crystal Wright
ON 11/24/96
Job / PO # PGE8131

Client: Oregon Analytical Laboratory
Location: Boardman Site

SAMPLE #: 70-8400-13449 LAB#: 18732.32 SAMPLE LOCATION: BD-32
SOURCE : Not Noted

No Asbestos Detected

		HOMOGENEOUS			
Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
				Asphalt Filler & Binder	100

Description: Black pliable asphaltic material

Note:

SAMPLE #: 70-8400-13450 LAB#: 18732.33 SAMPLE LOCATION: BD-33
SOURCE : Not Noted

Asbestos Containing

		HOMOGENEOUS			
Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
Chrysotile	10			Mineral Filler & Binder	90

Description: Gray hard chunk with fibers

Note:

SAMPLE #: 70-8400-13451 LAB#: 18732.34 SAMPLE LOCATION: BD-34
SOURCE : Not Noted

No Asbestos Detected

		HOMOGENEOUS			
Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
		Glass Fiber	15	Filler & Binder	70
		Cellulose	15		

Description: White chalky powder

Note:

PRELIMINARY REPORT
Laboratory Data Sheet is for lab use and faxing only. The final report will follow in the mail.
Verified by:

Clayton Environmental Consultants **LABFAX**

Log # 18732
ANALYZED BY Crystal Wright
ON 11/24/96
Job / PO # PGE8131

Client: Oregon Analytical Laboratory
Location: Boardman Site

SAMPLE #: 70-8400-13452 LAB#: 18732.35 SAMPLE LOCATION: BD-35
SOURCE : Not Noted

No Asbestos Detected

HOMOGENEOUS

Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
				Vinyl Filler and Binder	100

Description: Tan floor tile

Note:

SAMPLE #: 70-8400-13453 LAB#: 18732.36 SAMPLE LOCATION BD-36
SOURCE : Not Noted

No Asbestos Detected

HOMOGENEOUS

Asbestos	Asbestos %	non-asbestos fibers	% other fibers	nonfibrous components	nonfibrous %
				Filler & Binder	100

Description: White hard chunks

Note:

~~SAMPLE #: 70-8400-13409 LAB#: 18732.37 SAMPLE LOCATION:~~ ~~BD-37~~ #1
~~SOURCE : Not Noted~~

~~No Asbestos Detected~~

~~HOMOGENEOUS~~

~~Asbestos~~	~~Asbestos %~~	~~non-asbestos fibers~~	~~% other fibers~~	~~nonfibrous components~~	~~nonfibrous %~~
		~~Cellulose~~	~~60~~	~~Filler & Binder~~	~~40~~

~~Description: Orange coating on woven layer~~

~~Note:~~

PRELIMINARY REPORT
Laboratory Data Sheet is for lab use and faxing only. The final report will follow in the mail.
Verified by:

Oregon Analytical Laboratory

OAL

BULK ASBESTOS ANALYSIS

ENVIRONMENTAL SCIENCES
3WTC-BR

CHUCK MCCARTNEY

REPORT DATE: 96-12-12
REVIEW BY: S. CASSELL
PROGRAM DIRECTOR
ANALYZED BY: S. LEMAY/S. CASSELL
ANALYST
LOG DATE: 96-12-05

PO NO.: PN:BOARDMAN

THE FOLLOWING SAMPLES WERE ANALYZED FOLLOWING EPA METHOD 600/M4-82-020 USING POLARIZED LIGHT MICROSCOPY WITH DISPERSION STAINING. THE REPORTED PERCENTAGES ARE ON A WEIGHT/WEIGHT BASIS IN THE SAMPLE.
THIS TEST REPORT RELATES ONLY TO THE ITEMS TESTED.

SAMPLE ID: BD-37
OAL ID: 70-8400-13467
SAMPLE IS: HOMOGENEOUS
SAMPLE COLOR IS: WHITE/OFF-WHITE
NONFIBROUS MATERIALS: PERLITE,SHOT,GLASS SHARDS,BINDER,PAINT
FIBER CONTENT OF SAMPLE:

10 %	CELLULOSE
50 %	GLASS WOOL

SAMPLE ID: BD-38
OAL ID: 70-8400-13468
SAMPLE IS: NONHOMOGENEOUS
SAMPLE COLOR IS: GRAY/BLACK
NONFIBROUS MATERIALS: CACO3,SERPENTINITIC MINERALS,MASTIC
FIBER CONTENT OF SAMPLE:

LAYER NO 1. GRAY:	<1 %	CHRYSOTILE ASBESTOS
	<1 %	CELLULOSE
LAYER NO 2. BLACK:	5 %	CHRYSOTILE ASBESTOS
	<1 %	CELLULOSE
TOTAL PERCENT FIBERS	<1 %	CHRYSOTILE ASBESTOS
	<1 %	CELLULOSE

ACCREDITATION

Certificate of Completion

This is to certify that

Dan K. Rouse

has satisfactorily completed
4 hours of refresher training as an

Asbestos Building Inspector

to comply with the training requirements of
TSCA Title II / 40 CFR 763 (AHERA)

Certificate Number: 1017207

Instructor
EPA Provider Cert. Number: 1085

ARGUS PACIFIC
SAFETY • TRAINING • INDUSTRIAL HYGIENE

Aug 10, 2005
Date(s) of Training
Exam Score: NA
Expiration Date: Aug 10, 2006

Argus Pacific, Inc. • 1900 W. Nickerson, Suite 315 • Seattle, Washington • 98119 • (206) 285.3373 • fax (206) 285.3927

Certificate of Completion

This is to certify that

Todd Kreuter

has satisfactorily completed
4 hours of refresher training as an

Asbestos Building Inspector

to comply with the training requirements of
TSCA Title II / 40 CFR 763 (AHERA)

Certificate Number: 1017819

Instructor
EPA Provider Cert. Number: 1085

ARGUS PACIFIC
SAFETY • TRAINING • INDUSTRIAL HYGIENE

Sep 7, 2005
Date(s) of Training
Exam Score: NA
Expiration Date: Sep 7, 2006

Argus Pacific, Inc. • 1900 W. Nickerson, Suite 315 • Seattle, Washington • 98119 • (206) 285.3373 • fax (206) 285.3927

BOARDMAN
POWER HOUSE
SIDING

Final Report

Forensic Analytical

Bulk Asbestos Analysis

(EPA Method 600/R-93-116, Visual Area Estimation)

Portland General Electric
Doug Jenkin
121 SW Salmon St.(1 WTC 06-07)

Portland, OR 97204

Client ID: L1028
Report Number: B120184
Date Received: 01/02/09
Date Analyzed: 01/07/09
Date Printed: 01/07/09
First Reported: 01/07/09

Job ID/Site: Boardman Coal Plant

Date(s) Collected: 12/30/2008

FASI Job ID: L1028
Total Samples Submitted: 5
Total Samples Analyzed: 5

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
BOA08-1230A	10829627						
Layer: Paint			**ND**				
Layer: Black Felt		Chrysotile	**70 %**				
Layer: Metal			**ND**				
Layer: Black Felt		Chrysotile	**70 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (14%)**					
Cellulose (65 %)							
OA08-1230B	10829628						
Layer: Paint			**ND**				
Layer: Black Felt		Chrysotile	**70 %**				
Layer: Metal			**ND**				
Layer: Black Felt		Chrysotile	**70 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (14%)**					
Cellulose (65 %)							
BOA08-1230C	10829629						
Layer: Paint			**ND**				
Layer: Black Felt		Chrysotile	**70 %**				
Layer: Metal			**ND**				
Layer: Black Felt		Chrysotile	**70 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (14%)**					
Cellulose (65 %)							
BOA08-1230D	10829630						
Layer: Paint			**ND**				
Layer: Black Felt		Chrysotile	**70 %**				
Layer: Metal			**ND**				
Layer: Black Felt		Chrysotile	**70 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (14%)**					
Cellulose (65 %)							

Report Number: B120184
Date Printed: 01/07/09

Client Name: Portland General Electric

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
BOA08-1230E	10829631						
Layer: Paint			**ND**				
Layer: Black Felt		Chrysotile	**70 %**				
Layer: Metal			**ND**				
Layer: Black Felt		Chrysotile	**70 %**				
Layer: Paint			**ND**				

Total Composite Values of Fibrous Components: **Asbestos (14%)**
Cellulose (65 %)

Jim Flores

James Flores, Laboratory Supervisor, Hayward Laboratory

Note: Limit of Quantification ('LOQ') = 1%. 'Trace' denotes the presence of asbestos below the LOQ. 'ND' = 'None Detected'.

PGE ASBESTOS BULK SAMPLE CHAIN OF CUSTODY FORM

Date 30 December 2008

Send Results to:

Safety & Health Resources – Industrial Hygiene. (S&HR-IH)
Portland General Electric Company
121 SW Salmon St, 1WTC0607
Portland OR 97204
Phone: 503—464-7289, Fax: 503-464-8455

AND

NAME OF PERSON REQUESTING RESULTS: Doug Jenkin, Portland General Electric
ADDRESS
CITY STATE ZIP
PHONE FAX

IH REQUEST NO.

SAMPLED BY: Deborah Warren

SPECIAL INSTRUCTIONS: None

PHONE:

TURNAROUND TIME: ☐ RUSH ☒ STANDARD (7-10 DAYS) ☐ OTHER DUE DATE AND TIME:

E-MAIL ADDRESS: *(if applicable)* Doug.Jenkin@pgn.com

SITE LOCATION: Boardman Coal Plant

TYPE OF ANALYSIS: ☒ PLM (STANDARD) ☐ POINT COUNT ☐ TEM ☐ OTHER

Sample No.²	Lab ID No.	HA No.	Material Description³	Material Location	Sample Location	Quantity		Friable		Condition¹				
						Sq Ft	Lin Ft	Yes	No	E	G	F	P	U
BOA081230A		1	0-PB Bldg Siding	Bldg Siding Grd	PB S Grd Level			☐	☒	☐	☒	☐	☐	☐
BOA081230B		1	0-PB Bldg Siding	Bldg Siding 7th	PB NW Corner 7th Flr Roof			☐	☒	☐	☒	☐	☐	☐
BOA081230C		1	0-PB Bldg Siding	Bldg Siding 11th	PB 11th Flr Roof South			☐	☒	☐	☒	☐	☐	☐
BOA081230D		1	0-PB Bldg Siding	Bldg Siding 19th	PB 19th Flr Roof NE			☐	☒	☐	☒	☐	☐	☐
BOA081230E		1	0-PB Bldg Siding	Scraps	Sheet Metal Shop Waste Pile			☐	☒	☐	☒	☐	☐	☐
								☐	☐	☐	☐	☐	☐	☐
								☐	☐	☐	☐	☐	☐	☐
								☐	☐	☐	☐	☐	☐	☐

SHIPPED VIA: ☐ **INTEROFFICE MAIL** ☒ **COURIER** ☐ **DROP OFF** **OTHER**

Sample Chain of Custody	Date/Time	Lab Information	Comments
SAMPLE RELINQUISHED BY Deborah Warren	12/30/08 1130	LAB NAME FAL SAMPLE RECEIVED BY Bp 1/2/9 10AM Upmail	

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¹ Excellent, Good, Fair, Poor, Unknown
² For information on how to determine/develop Sample ID Numbers see reverse side of this page
³ WB=Wallboard, JC=Joint Compound, FT=Floor Tile, FTM=Floor Tile Mastic, BBM=Baseboard Mastic, RSF=Resilient Sheet Flooring, CT=Ceiling Tile, SAAM=Spray-Applied Acoustical Material, WT=Wall Texture, O=Other

Appendix C
Boardman Fixed Gauges Source Inventory

BOARDMAN GENERATING PLANT
FIXED GAUGES INVENTORY

Device Serial #	Detector Tag #	Cs-137 mCi	Plant Location
1100	N/A	0.1	Feeder 5411-3 – South Farthest West
1101	N/A	0.1	Feeder 5411-2 – South Middle West
1102	N/A	0.1	Feeder 5411-5 – North Farthest West
1103	N/A	0.1	Feeder 5411-4 – North Middle West
1104	N/A	0.1	Feeder 5411-6 – North Farthest East
1105	N/A	0.1	Feeder 5411-7 – North Middle East
1106	N/A	0.1	Feeder 5411-1 – South Farthest East
1107	N/A	0.1	Feeder 5411-8 – South Middle East
B1435	R2-LVS	20	Crusher Building Floor #6 - North
B1436	R3-LVS1	20	Crusher Building Floor #1 - North
B1437	R4-LVS1	20	Crusher Building Floor #1 – South
B1438	R5-LVS	20	Distribution Bin – Top North
B1439	R6-LVS	20	Distribution Bin – Top South
B1440	R7-LVS	20	Transfer Point #5 South
B1441	R8-LVS	20	Crusher Building Floor #6 - South
B1608	1LS-4714A	20	Coal Dust Collector
B1609	1LS-4714B	20	Coal Dust Collector
B1610	1LS-4715B	20	Coal Dust Collector
B1611	1LS-4715A	20	Coal Dust Collector
B1857	U1-LVS	20	Transfer Point #1
B1858	U4-LVS	20	Lowering Well
B1859	U3-LVS	20	Transfer Point #3
B1860	U2-LVS	20	Transfer Point #2
B1443	RA7-LVS	50	Reclaim Pit #2 – East
B1444	RB7-LVS	50	Reclaim Pit #2 – West
B1862	UA3-LVS	50	Reclaim Pit #1 – East
B1863	UB3-LVS	50	Reclaim Pit #1 – West
B1864	UA1-LVS	50	Dumper Pit – North
B1865	UB1-LVS	50	Dumper Pit
B1866	UC1-LVS	50	Dumper Pit
B1867	UD1-LVS	50	Dumper Pit
B1868	UE1-LVS	50	Dumper Pit – South

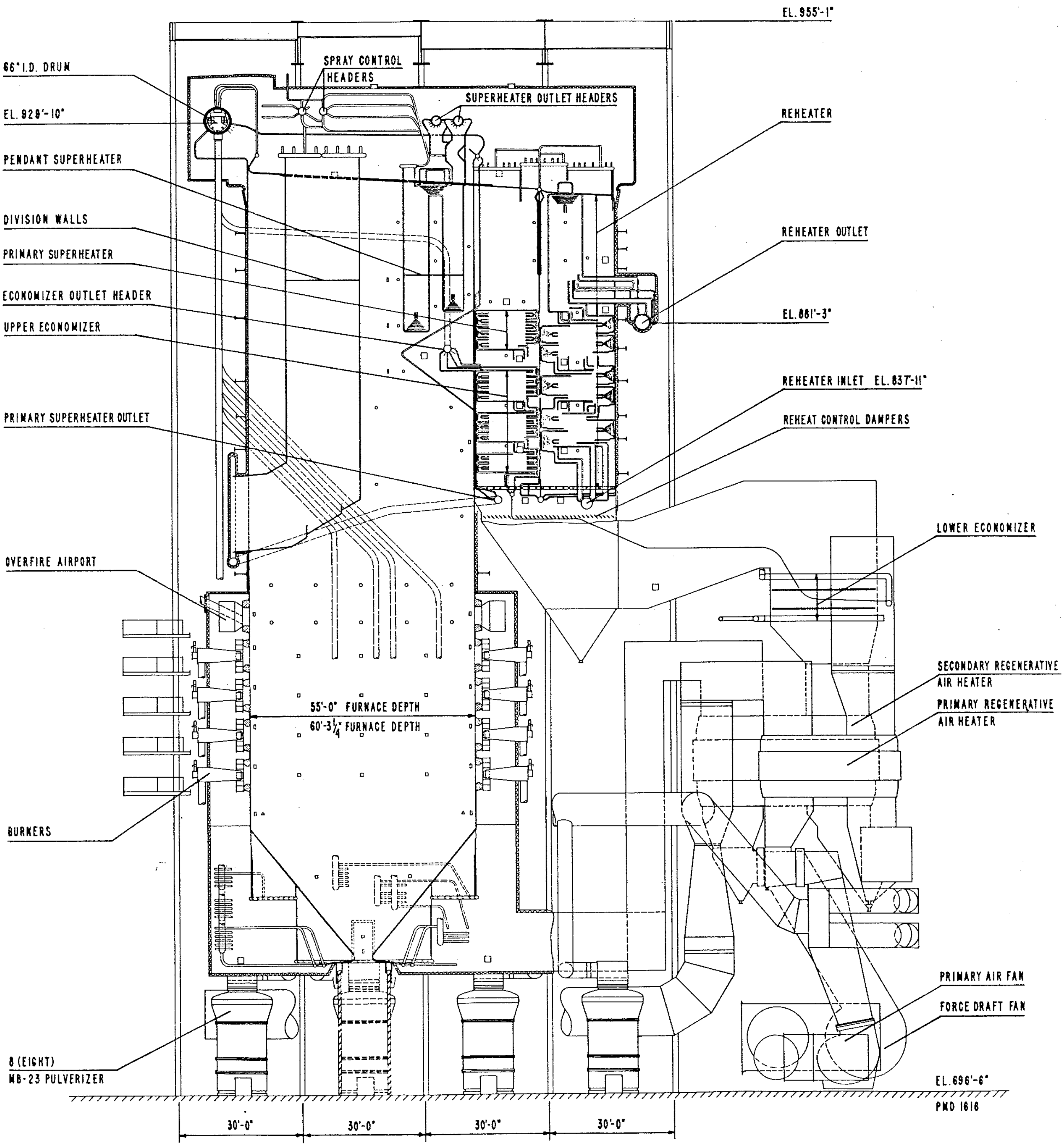
Device Serial #	**Detector Tag #**	**Cs-137 mCi**	**Plant Location**
B1869	VF1-LVS	50	Crusher Building Floor #4.5 - East
B1870	VF2-LVS	50	Crusher Building Floor #4.5 - West
B1881	1LS-3104A	50	Belt Conveyor R12A
B1882	1LS-3103B	50	Belt Feeder R11B
B1883	1LS-3104B	50	Belt Conveyor R12B
B1884	1LS-3103A	50	Belt Feeder R11A
B1871	C1-LVS	100	Crusher Building Floor #2.5 - East
B1872	C2-LVS	100	Crusher Building Floor #2.5 - West
B1873	1LS-3108A	100	Belt Conveyor R16A
B1875	1LS-3106B	100	Belt Conveyor R14B
B1876	1LS-3107B	100	Belt Conveyor R15B
B1877	1LS-3107A	100	Belt Conveyor R15A
B1878	1LS-3105A	100	Belt Conveyor R13A
B1879	1LS-3108B	100	Belt Conveyor R16B
B1880	1LS-3105B	100	Belt Conveyor R13B
B1885	1LS-3106A	100	Belt Conveyor R14A
B1445	CB1-LVS2	200	Crusher Building Floor #4.5
B1874	R1-LVS	200	Transfer Point #5
B1886	Y1-LVS	200	Transfer Point #4
B1118	CB1-LVS1	500	Crusher Building Floor #5

All devices with serial numbers beginning with “B” are Texas Nuclear Corp (TNC) Model Number 5192 level detection gauges, except device B1118 (500 mCi) is a TNC Model Number 5193 level detection gauge. The sealed sources in each device are TNC Model Number 570-57157C.

The eight 0.1 mCi containing devices are Berthold Systems, Inc. (BSI) Model Number NW-301 gamma gauges. The sealed sources in each device are BSI Model Number BSI39002.

Appendix D
As-Built Drawings

FOSTER WHEELER



Name . . IDAHO POWER COMPANY - PORTLAND GENERAL ELECTRIC COMPANY . . . . Design Pressure . . 2,900/750 psig . . . .
Location BOARDMAN, OREGON - BOARDMAN PLANT - UNIT NO. 1 . . . . Final Steam Temperature . 1005/1005F . . . . . .
No. of Units . . 1 . . . . . Contract No. 2-79-2821 . . . . . Date . April, 1980 . . . . . Capacity 3,825,000 lb/hr Type . . Reheat . . . . . .

LOCATION OF INSTRUMENT AND CONTROL EQUIPMENT CONNECTIONS

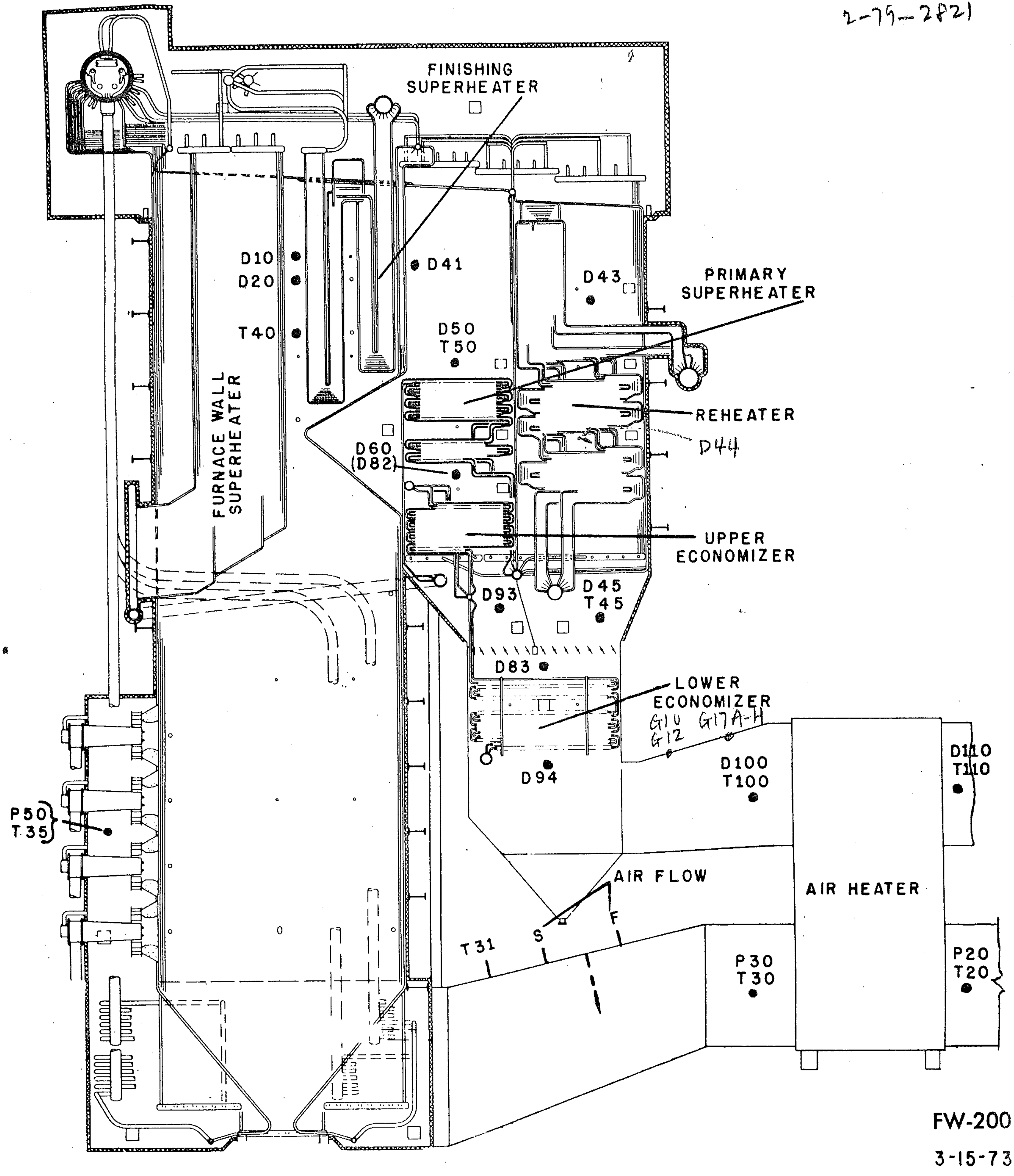
AS RECOMMENDED BY THE PROCESS MEASUREMENT AND CONTROL SECTION OF SCIENTIFIC APPARATUS MAKERS ASSOCIATION
AND AMERICAN BOILER MANUFACTURERS ASSOCIATION

PG 10.6

FOSTER WHEELER CORP. REHEAT UNIT PARALLEL ARRANGEMENT

TYPICAL

IDAHO
(BOARDMAN)
2-79-2821



FW-200

3-15-73

FOSTER WHEELER CORPORATION

SUMMARY PERFORMANCE SHEET

Purchaser IDAHO POWER COMPANY - PORTLAND GENERAL ELECTRIC CO.
Location BOARDMAN, OREGON
Design pressure 2,900/750

Contract No. 2-79-2821
Date April, 1980
Dwg. No.

Fuel				
Steam @ S.H.O.	M lb hr	2490	3460	3825
Aux. & sootblr steam @ div. wall	M lb hr	430	430	430
Pressure superheater outlet	psi	2445	2490	2620
Temperature steam superheater outlet	F	1005	1005	1005
Pressure	psi	2511	2607	2760
Reheat steam	M lb hr	2259	3125	3450
Temperature steam entering reheater	F	588	640	648
Temperature steam leaving reheater	F	1005	1005	1005
Pressure steam entering reheater	psi	439	585	645
Pressure steam leaving reheater	psi	421	559	616
Temp feed entering unit	F	449	481	492
Temp feed leaving econ.	F	540	594	606
Temp air entering air heater	F	80	80	80
Temp air leaving air heater (secondary)	F	636	703	728
Temp gas leaving furnace	F	1600	1779	1820
Temp gas leaving econ./entering air htr	F	700	784	810
Temp gas leaving air heater	F	245	275	285
Temp gas leaving air heater	F			
Ditto corrected for leakage	F	229	257	268
Excess air entering air heater	%	20	20	20
Wet gas entering air heater	M lb/hr	4187	5440	5896
Wet gas leaving air heater	M lb/hr	4738	6057	6515
Air entering air heater	M lb/hr	4277	5453	5866
Air leaving air heater	M lb/hr	3726	4841	5247
Draft in furnace	in. H_2O	0.10	0.10	0.10
Gas side loss thru boiler	in. "			
Gas side loss thru suphtr. & rehtr.	in. "	2.40	3.20	3.71
Gas loss thru economizer	in. "			
Gas side loss thru airheater	in. "	3.83	6.30	7.60
Gas side loss thru flues	in. "	0.71	1.21	1.40
Total gas side loss thru FW scope	in. "	7.04	10.81	12.81
Air side loss thru air heater	in. H_2O	2.12	3.65	4.20
Air side loss thru ducts	in. "	1.88	3.25	3.74
Air side loss thru burners	in. "	3.00	2.78	3.20
Air side loss, thru measuring device	in. "	0.54	0.93	1.07
Air side loss, steam coil	in. "	0.54	0.93	1.07
Total air side loss thru FW scope	in. "	8.08	11.54	13.28
Total air & gas loss FW scope	in. H_2O	15.12	22.35	26.09
Pressure loss Econ. inlet. to SHO	psi	90	155	185
Fuel burned	M lb/hr or cfm	500.4	649.6	704.0
Liberation	Btu/hr x cu ft.	7177	9318	10,098
Furn. cooling Factor	Btu/hr x sq. ft.	45,198	58,675	63,588
Heat Losses.				
Dry gas	%	3.83	4.54	4.77
Hydrogen and moisture in fuel	%	8.50	8.61	8.64
Moisture in air	%	0.10	0.11	0.12
Unburned combustible	%	0.30	0.20	0.20
Radiation	%	0.23	0.18	0.17
Unaccounted for and mfrs. margin	%	1.50	1.50	1.50
Total losses	%	14.46	15.14	15.40
Efficiency	%	85.54	84.86	84.60

Each unit will include the following
Convection surface 5,806 sq ft
Walls in furnace 41,580 sq ft
Radiant superheater 45,460 sq ft
Convection superheater 50,500 sq ft
Reheater I. 127,660 sq ft
Reheater II. sq ft
Economizer 93,388 sq ft
Air heater 1,145,600 sq ft

Total furnace volume 559,100 cu ft
Total furnace surface 88,790 sq ft
Firing equipment
Superheat control by
Performance based on fuel specified below:

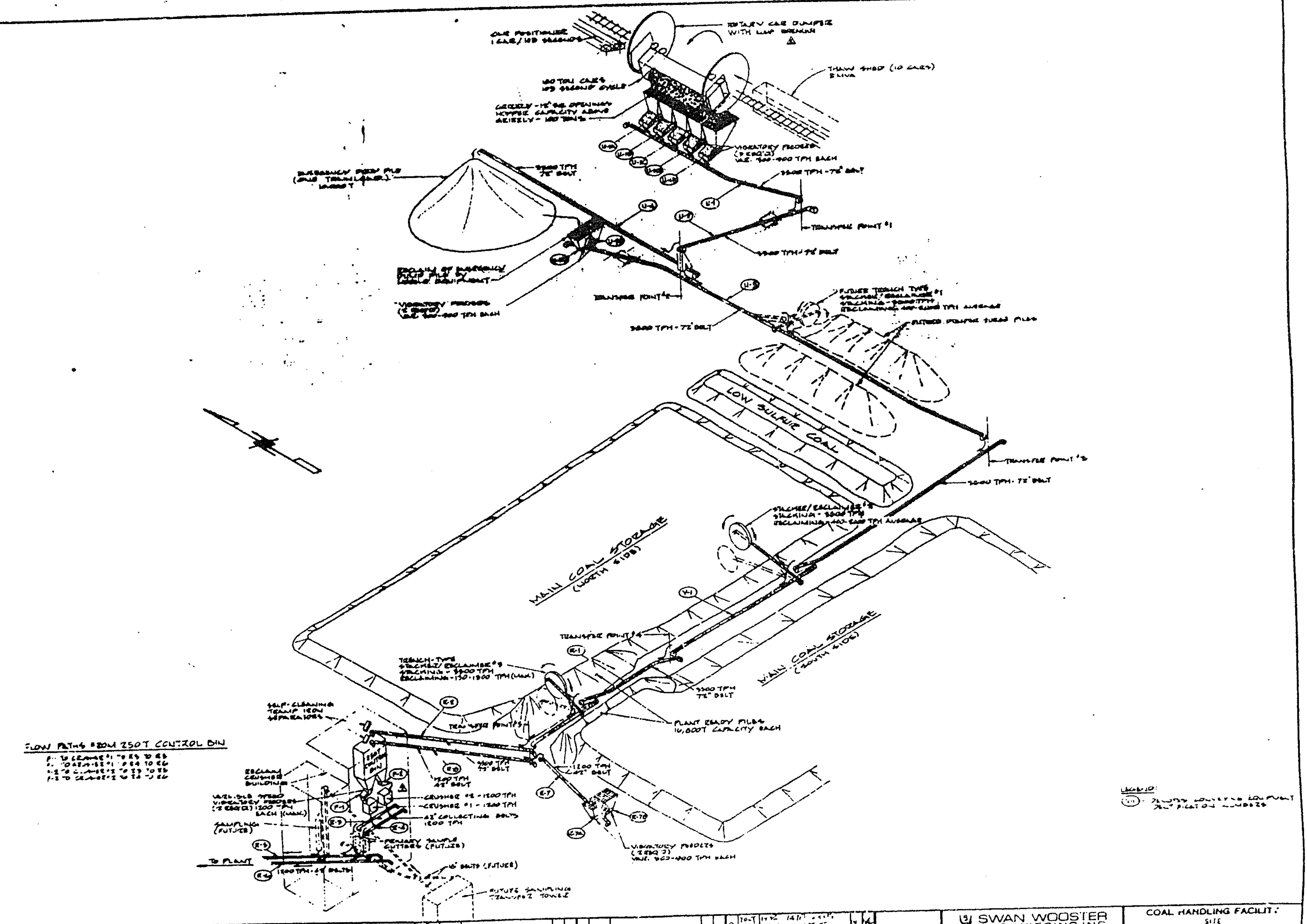
SOLID
Kind AMAX
Grindability 63-53
Size 1¼"x0" Max moisture
Prox. Analysis Per Cent
Moisture 30.4
Volatile matter 31.2
Fixed carbon 32.0
Ash 6.4
Fusion temp. of ash 2228 RED/2288 OxID

LIQUID
Kind #2 Fuel Oil
Gravity API @ 60°F 31.5
Req'd viscosity at burner @ 110°F 35.6
Oil press. at burner 120
Air press. at burner 150

GASEOUS
Kind
Sp gr relative to air
Gas pr at burner in. Hg
Gas temp at burner F

ULTIMATE ANALYSIS
Fuel AMAX
Per cent by Weight
Ash 6.40
S 0.48
H_2 3.40
C 47.85
CH_4
C_2H_4
C_2H_6
CO
CO_2
SO_2
H_2O 30.40
N_2 0.62
O_2 10.83
Btu/lb. 8020 as received
Btu/cu ft at 60 F-30 in. Hg.

Steam Temp. Control Range From 2,490,000 lb/hr. To 3,825,000 lb/hr. Guarantee Point 3,825,000 lb/hr.



FLOW PATHS FROM 250T CONTROL BIN

LEGEND:

SWAN WOOSTER
ENGINEERING INC.

BOARDMAN PLANT
PORTLAND GENERAL ELECTRIC CO.
PORTLAND OREGON

COAL HANDLING FACILITY
SITE
FLOW DIAGRAM

E7470

EQUIPMENT DIVISION

TUBE DATA NATURAL CIRCULATION UNITS

SECT. 01 DEPT. 156
CLASS CI PAGE 15.1
REV. 1 DATE 12-10-76

CUSTOMER: IDAHO POWER CO. (BOARDMAN)
ISSUED BY: ED GHALI

CONTRACT NO. 2-79-2821
RETURN MASTER TO: B. GILL

DESIGNATION	DESCRIPTION	TUBE SIZE	MATERIAL	REVISIONS
AA	ECONOMIZER LWR.	2" O.D. x .197"MW	SA-178-C	MK 31 & 2
AB	ECONOMIZER UPR.	2½" O.D. x .250"MW	SA-210-A1 MK 3	MK 30 + 1 MK 3
AC	ECONOMIZER			
AD	ECONOMIZER			
AE	ECONOMIZER			
AF	ECONOMIZER			
AG	ECONOMIZER			
AH	ECONOMIZER			
BA	FURN. F.W. LWR.	3" O.D. x .314"MW	SA-210-C MK 5	MK 6 + MK 1
BB	FURN. F.W. UPR.	3" O.D. x .277" MW	SA-210-C MK 6	MK 7 + 2
BC	FURN. F.W.			
BD	FURN. F.W.			
BE	FURN. F.W.			
BF	FURN. R.W. LWR.	3" OD x .314"MW	SA-210-C MK 5	(1) 12-10-76
BG	FURN. R.W. UPR.	3½" OD x .332"MW MK 12	SA-210-C MK 8	(1) 12-10-76 MK 7
BH	FURN. R.W. SUPP'T.	4" OD x .674"MW	SA-210-C MK 4	(1) 12-10-76
BJ	FURN. R.W.			
BK	FURN. R.W.			
BL	FURN. R.W.			
BM	FURN. S.W. LWR.	3" O.D. x .314"MW	SA-210-C	MK 5
BN	FURN. S.W. UPR.	3" O.D. x .277"MW	SA-210-C	MK 6
BP	FURN. S.W.			
BQ	FURN. S.W.			
BR	FURN. S.W.			
BS	FURN. FEEDERS FRONT	6-5/8"OD SCH 160 PIPE	SA-106-B	
BT	FURN. FEEDERS REAR	6-5/8"OD SCH 160 PIPE	SA-106-B	(1) 12-10-76
BU	FURN. FEEDERS SIDE	6-5/8"OD SCH 160 PIPE	SA-106-B	(1) 12-10-76
BV	FURN. FEEDERS			
BW	FURN. RISERS FW	3" O.D. x .254"MW	SA-210-C	
BX	FURN. RISERS RW	5-9/16"ODx.450"MW	SA-210-C	
BY	FURN. RISERS SW	3" O.D. x .254"MW	SA-210-C	
BZ	FURN. RISERS			

1	12-10-76	E.G.		RELOC[illegible] "BH" & "BJ" TO "BF", "BG" & "BH" RE[illegible]LY - ADDED "BT" & "BU"	

TUBE DATA NATURAL CIRCULATION UNITS

SECT. 01 DEPT. 56
CLASS C1 PAGE T5.2
REV. 1 DATE 12-10-76

CUSTOMER: IDAHO POWER CO. (BOARDMAN) CONTRACT NO. 2-79-2821
ISSUED BY: ED GHALI RETURN MASTER TO: B. GILL

DESIGNATION	DESCRIPTION	TUBE SIZE	MATERIAL	REVISIONS
CA	STEAM SUPPLY	5" O.D. x .481"MW	SA-210-A1	
CB	STEAM SUPPLY			
CD	FURN. ROOF & CONVECTION	2" O.D. x .200"MW	SA-213-T11	
CE	FURN. ROOF			
CF	FURN. ROOF			
CG	FURN. ROOF			
CH	HRA ROOF	1-3/4"OD x .216"MW	SA-213-T2	(1) 12-10-76
CJ	HRA ROOF			
CK	HRA ROOF			
CL	HRA ROOF			
CM	HRA REAR WALL UPPER	1-3/4"OD x .216"MW	SA-213-T2	MK 36 & 18
CN	HRA REAR WALL LOWER	1-3/4"OD x .216"MW	SA-178-C	MK 37 & 19
CP	HRA REAR WALL			
CQ	HRA REAR WALL			
CR	PARTITION WALL UPPER	1-3/4"OD x .190"MW	SA-213-T2	MK 20 + 38
CS	PARTITION WALL LOWER	1-3/4"OD x .190"MW	SA-178-C MK 27	MK 51 + 25
CT	PARTITION WALL SUPPORT	2¼" O.D. x .455"MW	SA-213-T2	MK 28 A MK
CU	PARTITION WALL			
CV	PARTITION WALL			
CW	PARTITION WALL			
CX	HRA SIDE WALL FRONT (UPR)	1-3/4"ODx.190"MW	SA-213-T2 MK 26	(1) 12-10-76
CY	HRA SIDE WALL REAR (UPR)	1-3/4"ODx.190"MW	SA-213-T2 MK 26	(1) 12-10-76
CZ	HRA SIDE WALL FRONT & REAR (LWR)	1-3/4"ODx.190"MW	SA-178-C MK 27	(1) 12-10-76
DA	HRA SIDE WALL 1st TUBE ONLY	2¼" OD x .440"MW	SA-213-T2	(1) 12-10-76
DB	HRA SIDE WALL			
DC	HRA SIDE WALL			
DE	HRA S.W. TRANSFER DISTR.	4" O.D. x .400" MW	SA-210-A1	
DF	HRA S.W. TRANSFER			
DG	HRA COLLECTING	4" O.D. x .400" MW	SA-210-A1	
DH	HRA COLLECTING			
DJ	DIV. WALL RISERS	6-5/8" O.D.x.703"MW	SA-213-T2	
DK	DIV. WALL RISERS			
DL	FIN. SUPHTR. TRANSFER	6-5/8" O.D.x.703"MW	SA-213-T2	
DM	FIN. SUPHTR. TRANSFER			

REV. NO.	DATE	BY	INDENT.	DESCRIPTION	REMARKS
1	12-10-76	E.G.		M CHANGED FOR "CH" - REARRGNT. "CE" TO "CX" "CY", "CZ" & "DA".	

EQUIPMENT DIVISION

TUBE DATA NATURAL CIRCULATION UNITS

SECT. 01 DEPT. 156
CLASS CI PAGE 15.3
REV. 2 DATE 1-5-77

CUSTOMER: IDAHO POWER CO. (BOARDMAN)
ISSUED BY: ED GHALI

CONTRACT NO. 2-79-2821
RETURN MASTER TO: B. GILL

DESIGNATION	DESCRIPTION	TUBE SIZE	MATERIAL	REVISIONS
EA	PRIM. SUPHTR. INLET	2½'' OD x .320''MW	SA-210-A1	MK 40
EB	~~PRIM. SUPHTR.~~			
EC	~~PRIM. SUPHTR.~~	~~2½'' OD x .381''MW~~	~~SA-210-1A~~	(1) 12-10-76
ED	~~PRIM. SUPHTR.~~ MK 29	~~2½'' OD x .281''MW~~	~~SA-213-T11~~	~~(1) 12-10-76~~ MK 29
EF	PRIM. SUPHTR. INLET			
EG	PRIM. SUPHTR. INLET			
EH	PRIM. SUPHTR. INLET			
EJ	PRIM. SUPHTR. INLET			
EK	PRIM. SUPHTR. OUTLET	2-1/8''OD x.239''MW	SA-213-T11 UPR	MK 43 + 21
EL	PRIM. SUPHTR. OUTLET	2-1/8''OD x.225''MW	SA-213-T2 LWR	MK 44 + 22
FA	DIVISION WALL	2¼'' OD x .397''MW	SA-213-T22 MK 15	(2) 1-5-77 MK 10
FB	DIVISION WALL	2¼'' OD x .364''MW	SA-213-T22	(2) 1-5-77
FC	DIVISION WALL	2¼'' OD x .308''MW	SA-213-TP304H	MK 11 + 17
FD	DIVISION WALL			
FE	DIVISION WALL			
FG	DIVISION WALL			

2	1-5-77	J.G.		A" WAS .364"MW & "FB" WAS .397"	MW.
1	12-10-76	E.G.		PLACED "EB" & "EC" BY "EC" & "ED" RESPECTIVELY	

EQUIPMENT DIVISION

TUBE DATA NATURAL CIRCULATION UNITS

SECT. 01 DEPT. 156
CLASS CI PAGE 15.4
REV. 2 DATE 7-27-77

CUSTOMER: IDAHO POWER CO. (BOARDMAN)
ISSUED BY: ED GHALI

CONTRACT NO. 2-79-2821
RETURN MASTER TO: B. GILL

DESIG-NATION	DESCRIPTION	TUBE SIZE	MATERIAL	REVISIONS
GA	REHEATER INLET	2-3/4"OD x .180"MW	SA-178-A	
GB	REHEATER	2½" OD x .180"MW	SA-213-T2	
GC	REHEATER	2¼" OD x .180"MW	SA-213-T2	
GD	REHEATER	2¼" OD x .180"MW	SA-213-T11	
GE	REHEATER	2¼" OD x .180"MW	SA-213-T22	MK 23 & 13
GF	REHEATER	2¼" OD x .206"MW	SA-213-T22 MK 16	MK 24 & 14
GH	REHEATER	2" OD x .191"MW	SA-213-T22	(1) 12-10-76
GJ	REHEATER OUTLET	2" OD x .180"MW	SA-213-T22	(1) 12-10-76
GK	REHEATER	2-3/4" OD x .180"MW	SA-213-T2	(2) 7-27-77
GL	REHEATER			
GM	REHEATER			
GN	REHEATER			
GP	REHEATER			
GQ	REHEATER			

MK 25 A,B,C,D, & 25 & 15

2	7-27-77	MJD		Added GK	
1	12-10-76	E.G.		DO TUBE SIZE & MATL. TO GJ"	

EQUIPMENT DIVISION

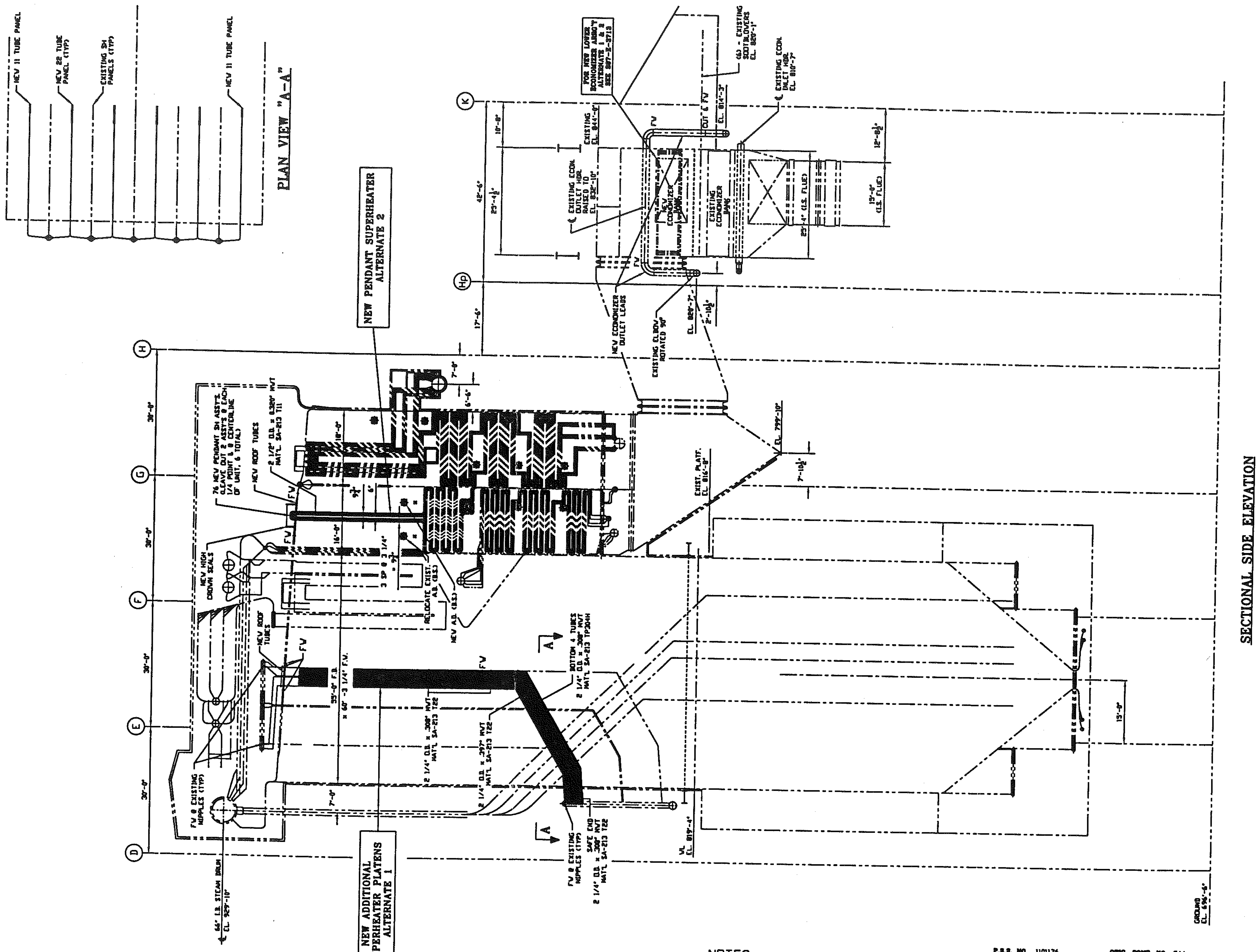
TUBE DATA NATURAL CIRCULATION UNITS

SECT. 01 DEPT. 156
CLASS C1 PAGE 15.5
REV. 0 DATE 11/19/76

CUSTOMER: IDAHO POWER CO. (BOARDMAN)
CONTRACT NO. 2-79-2821
ISSUED BY:
RETURN MASTER TO:

DESIGNATION	DESCRIPTION	TUBE SIZE	MATERIAL	REVISIONS
(INLET) HA	PLATEN & FIN. SUPHTR.	2½" O.D.✓ x .406"MW✓	SA-213-T22✓	
HB	PLATEN & FIN. SUPHTR.	2½" O.D.✓ x .308"MW✓	SA-213-TP304H✓	
HC	PLATEN & FIN. SUPHTR.	2½" O.D.✓ x .420"MW✓	SA-213-T22✓	
HD	PLATEN & FIN. SUPHTR.	2½" O.D.✓ x .406"MW✓	SA-213-T22✓	
HE	PLATEN & FIN. SUPHTR.	2½" O.D.✓ x .499"MW✓	SA-213-T22✓	MK 48 & 23
HF	PLATEN & FIN. SUPHTR.	2" O.D.✓ x .266"MW✓	SA-213-TP304H✓	MK 29 & 49
HG	PLATEN & FIN. SUPHTR.	2" O.D.✓ x .290"MW✓	SA-213-TP304H✓	
HH(OUT)	PLATEN & FIN. SUPHTR.	2½" O.D.✓ x .499"MW✓	SA-213-T22✓	
HJ	PLATEN & FIN. SUPHTR.			
HK	PLATEN & FIN. SUPHTR.			
HL	PLATEN & FIN. SUPHTR.			

S97-E-3712 REVISION



NOTES:

1. ALL CLEARANCE DIMENSIONS ARE APPROXIMATE.
2. THIS PROPOSAL DRAWING IS BASED ON A PRELIMINARY DESIGN; FINAL DESIGN MAY DICTATE REARRANGEMENT OR RELOCATION OF MISCELLANEOUS EXISTING EQUIPMENT AND IS NOT INCLUDED IN OUR PROPOSAL. MAJOR STRUCTURAL AND BOILER COMPONENT CLEARANCES HAVE BEEN ACCOUNTED FOR.
3. THIS DRAWING WAS PREPARED WITHOUT KNOWING ALL OF THE EXISTING SITE CONDITIONS. INTERFERENCES MAY ALTER THIS ARRANGEMENT.

P.S.R. NO. 1101176
ORIG. CONT. NO. F.W.

ABB

ABB CE SERVICES, INC.
200 GREAT POND DRIVE
WINDSOR, CONNECTICUT

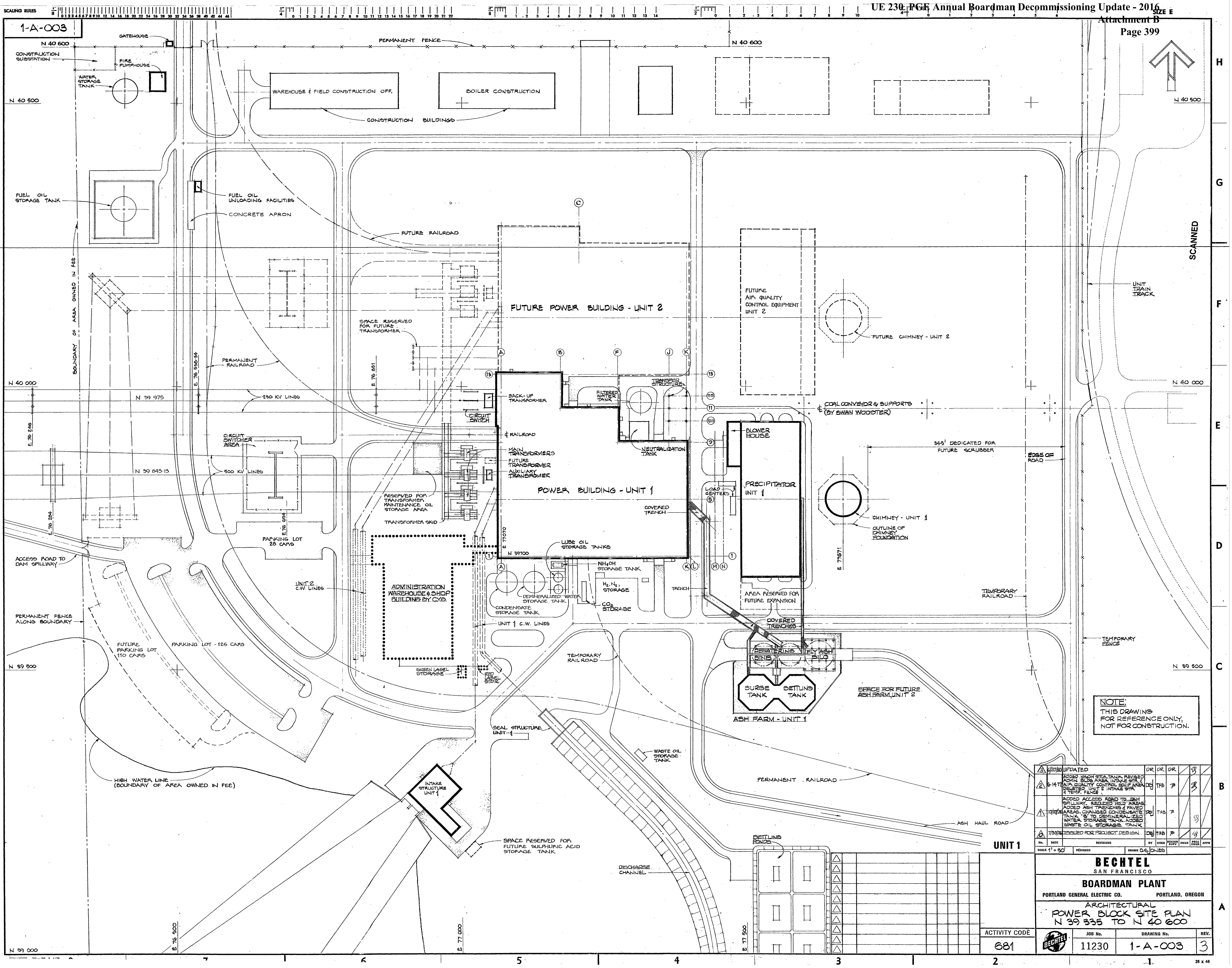
PROPOSAL DRAWING

Drawn By R.E.T. \ L.L.B.
Date 1/23/97
Checked By
Date
Approved By J. ROGERS
Date 2/21/97

GENERAL ARRG'T. - SIDE ELEVATION
BOILER MODIFICATION
For PORTLAND GENERAL ELECTRIC CO.
BOARDMAN COAL PLANT
UNIT NO. 1

FILE NAME S97E3712
DIRECTORY UTIL/97/1101176
Scale 1/8" = 1'-0"
Dwg. No. S97-E-3712-00

SERVICES



NOTE:
THIS DRAWING
FOR REFERENCE ONLY,
NOT FOR CONSTRUCTION.

No.	DATE	REVISIONS	BY	CHKD	DESIGN SUPV	ENGR	PROJ ENGR	APPR
3	6/20/80	UPDATED	DR	DR	DR		SB	
2	6-14-77	ADDED NH4OH STOR. TANK. REVISED ADMIN. BLDG AREA, INTAKE STR, & AIR QUALITY CONTROL EQUIP AREA. DELETED UNIT 2 INTAKE STR & TEMP. FENCE	DS	TFB	P		SB	
1	10/27/76	ADDED ACCESS ROAD TO DAM SPILLWAY. REDUCED HOLD AREAS. ADDED ASH TRENCHES & PAVED AREAS. CHANGED CONDENSATE TANK "B" TO DEMINERALIZED WATER STORAGE TANK. ADDED WASTE OIL STORAGE TANK	DS	TFB	P		SB	
0	7/30/76	ISSUED FOR PROJECT DESIGN	DS	TFB	P		SB	

SCALE 1" = 50' DESIGNED DRAWN D.S. JONES

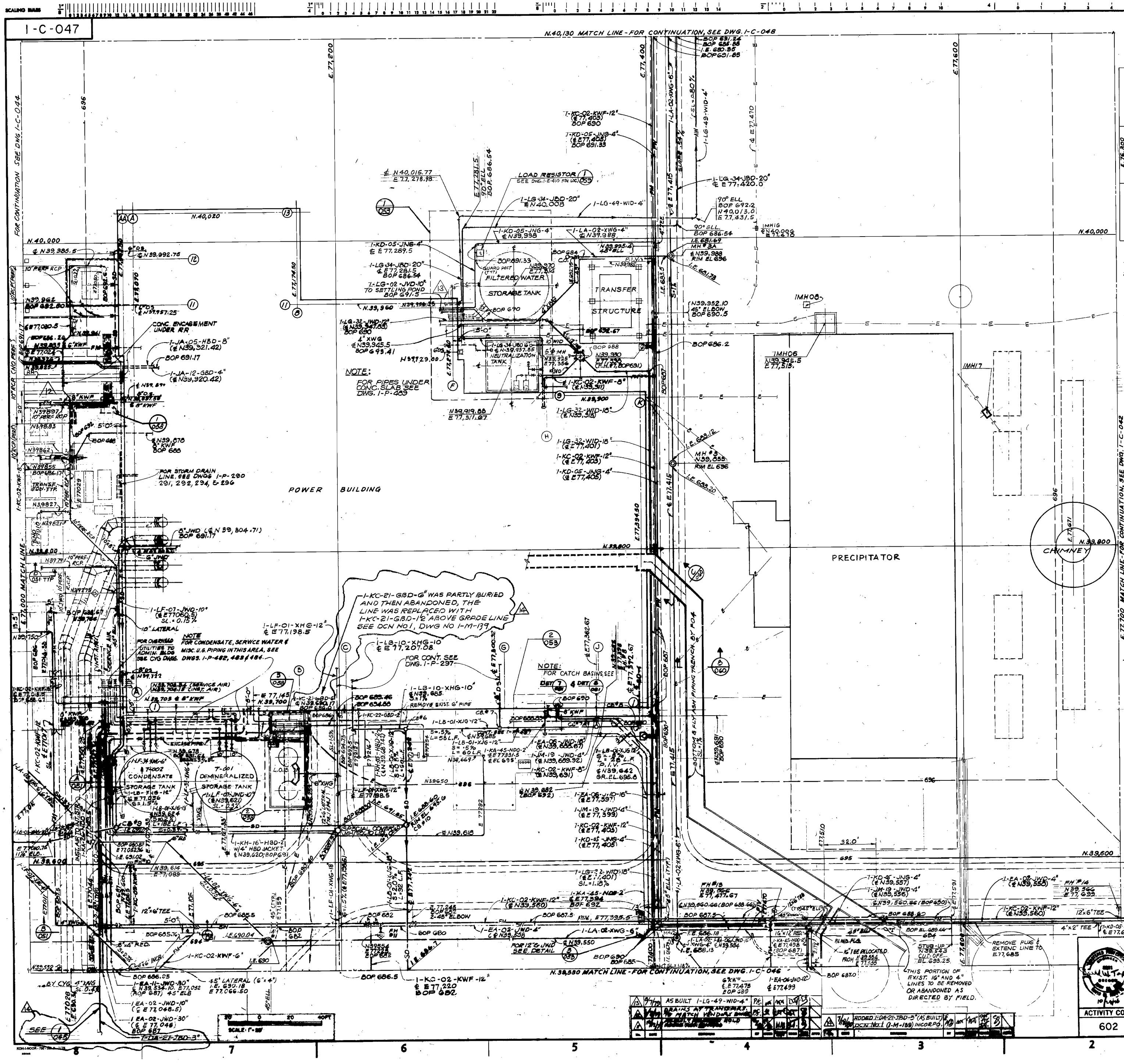
BECHTEL
SAN FRANCISCO

BOARDMAN PLANT
PORTLAND GENERAL ELECTRIC CO. PORTLAND, OREGON

ARCHITECTURAL
POWER BLOCK SITE PLAN
N 39 335 TO N 40 600

ACTIVITY CODE	JOB No.	DRAWING No.	REV.
681	11230	1-A-003	3

34 x 44



N.40,730

AREA 1 1-C-035	AREA 6 1-C-048	AREA 7 1-C-041
AREA 2 1-C-044	AREA 5 1-C-047	AREA 8 1-C-042
AREA 3 1-C-045	AREA 4 1-C-046	AREA 9 1-C-043

N.38,930

KEY PLAN

NOTES:
1. FOR GENERAL NOTES, SEE DWG. 1-C-035
2. FOR (SD) CATCH BASIN TABLE, SEE DWG. 1-C-051

REVISION 11 NOTES - AS BUILT -

1. RELOCATED 6" OILY WASTE AS SHOWN ROUTED 1-KA-45-NDD 2" AROUND F.H. #13
2. REVISED 1-KD-05-JNG 4" RELOCATED 45° OFF-SET FROM N39,696 TO N39,571.25
3. REVISED 1-KC-02-KWF 12" RELOCATED 45° OFF-SET FROM N39,696 TO N39,562.50
4. RELOCATED 1-KH-16-HBD 2" W/4" HBD JACKET FROM N39,620 TO N39,618
5. RELOCATED 1-LF-07-JWD 10" FROM E77,053.50 TO E77,052.36
6. 1-KD-05-JNG 4" ADDED 45° OFF-SET @ N39,996.40 AND RELOCATED 45° OFF-SET FROM N39,386 TO N39,952.10
7. ADDED DETAIL 3/055, ADDED INST. & SERVICE AIR RISERS, RELOCATED 6"KWF.

REVISION 4 NOTES

1. CHANGED 1-LG-03 WID-12" TO 10" AND ADDED 5'ϕ MH. CHANGED 1-LG-03 WID-12" FROM MH. TO SETTLEMENT POND TO WID-18".
2. ADDED SECTIONS C/051 & D/051 & 1/053
3. REV. 8"XHG TO 8"XWG AT TRANSFORMER AREA.
4. CHANGED 1-EA- -JWD-3" TO 4"
5. CORRECTED 1-KA- JBD-3" CONN. POINT
6. ADDED 6"XWG CONDENSATE STORAGE DRAINS.
7. CHANGED N39,627 TO N39,621 & N39,623 TO N39,618.
8. REV. 4" XWG ROUTING AT TRANSFER STRUCTURE.

SCANNED

REVISION 3 NOTES

1. ADDED SYSTEM DESIGNATION TO ALL LINE NUMBERS.
2. ADDED FUEL OIL, HYDROGEN, INST. AIR AND TRANSFORMER AREA DRAIN LINES.

REFERENCE DRAWINGS:
1-C-035 FINISH GRADING - UTILITIES - AREA 1
1-C-042 " " " - AREA 8
1-C-044 UTILITIES - AREA 2
1-C-046 " - AREA 4
1-C-048 " - AREA 6
1-P-482 POWER BLDG. - UNDERGROUND PROCESS PIPING - PLAN - SHEET 1
1-P-483 " " - " " " - " - SHEET 2
1-P-484 " " - " " " - " - SHEET 3

11 CONTINUED BELOW

No.	DATE	REVISIONS	BY	CHKD	[illegible]	ENGR	[illegible]	APPR
10	4/4/78	~~ADD. BACK-UP X'FORMER AREA DRAIN; REMOVED "HOLD" ON 2" AIR LINE; REV. AS NOTED.~~	[illegible]	LL	MAS	DT	ES	
9	10/3/77	~~REVISE STORM DRAIN & OILY WASTE LINES PER CYG INTERFACE CONNECTIONS AND INCORPORATED DCN #1~~	[illegible]	LL	MAS	DT	ES	
8	8/8/77	ADDED CYG ADMIN. BLDG. STORM DRAIN, SAN. SEWER & OILY WASTE LINES; REV. TRANSF AREA DRAIN PIPE SIZE	FAB	LL	MAS	DT	ES	
7	5/25/77	RELOC. FH #10, 13 AND 14; ~~REVISED AS NOTED~~	[illegible]	LL	MAS	DT	ES	
6	4/1/77	DELETED CB'S #1 TO #5; MOVED CB'S #6 TO #8 TO N39,685; RELOC. JBD-20"; REV. PIPES @ NEUTR. TK.; REV. AS NOTED	ET	LL	MAS	DT	ES	
5	2/28/77	MOVED SAN. SEWER EAST TO E77,415; ADDED CO_2 & N_2 LINES	SIB	LL	DT	DT	JC/ES	
4	1/21/77	SEE REVISION 4 NOTES	[illegible]	LL	MAS	DT	JC/ES	
3	12/15/76	GENERAL REVISION AND REISSUED FOR BUILDING PERMIT	[illegible]	LL	MAS	DT	[illegible]	
2	12/6/76	REV. PRECIPITATOR TO AIR QUALITY CONT. EQUIP. ISSUED FOR BLDG PERMIT	MHS	LL	MAS	DT	ES	
1	10/29/76	ISSUED FOR CONSTRUCTION	[illegible]	LL	MAS	DT	ES	
0	10/14/76	ISSUED FOR BIDS, ASH TRENCH SD LINE & CB, & RET. WALL	MHS	LL	MAS	DT	ES	

No.	DATE	REVISIONS	BY	CHKD	[illegible]	ENGR	[illegible]	APPR
13	8/7/79	AS BUILT 1-LG-49-WID-4"	P.S.	[illegible]	[illegible]	DT	ES	
12	[illegible]	DRAINS AT TRANSFMRS. TO MATCH VENDORS DWGS.	PS	[illegible]	[illegible]	DT	[illegible]	
11	[illegible]	~~AS BUILT; REMOVED HOLD~~ [illegible]	[illegible]	[illegible]	MM	DT	[illegible]	

No.	DATE	REVISIONS	BY	CHKD	[illegible]	ENGR	[illegible]	APPR
14	7/19/90	ADDED 1-DA-21-JBD-3" (AS BUILT) DCN No.1 (1-M-139) INCORPO.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	

SCALE 1" = 20' DESIGNED DRAWN L.N.A. 4/L/11

BECHTEL
SAN FRANCISCO

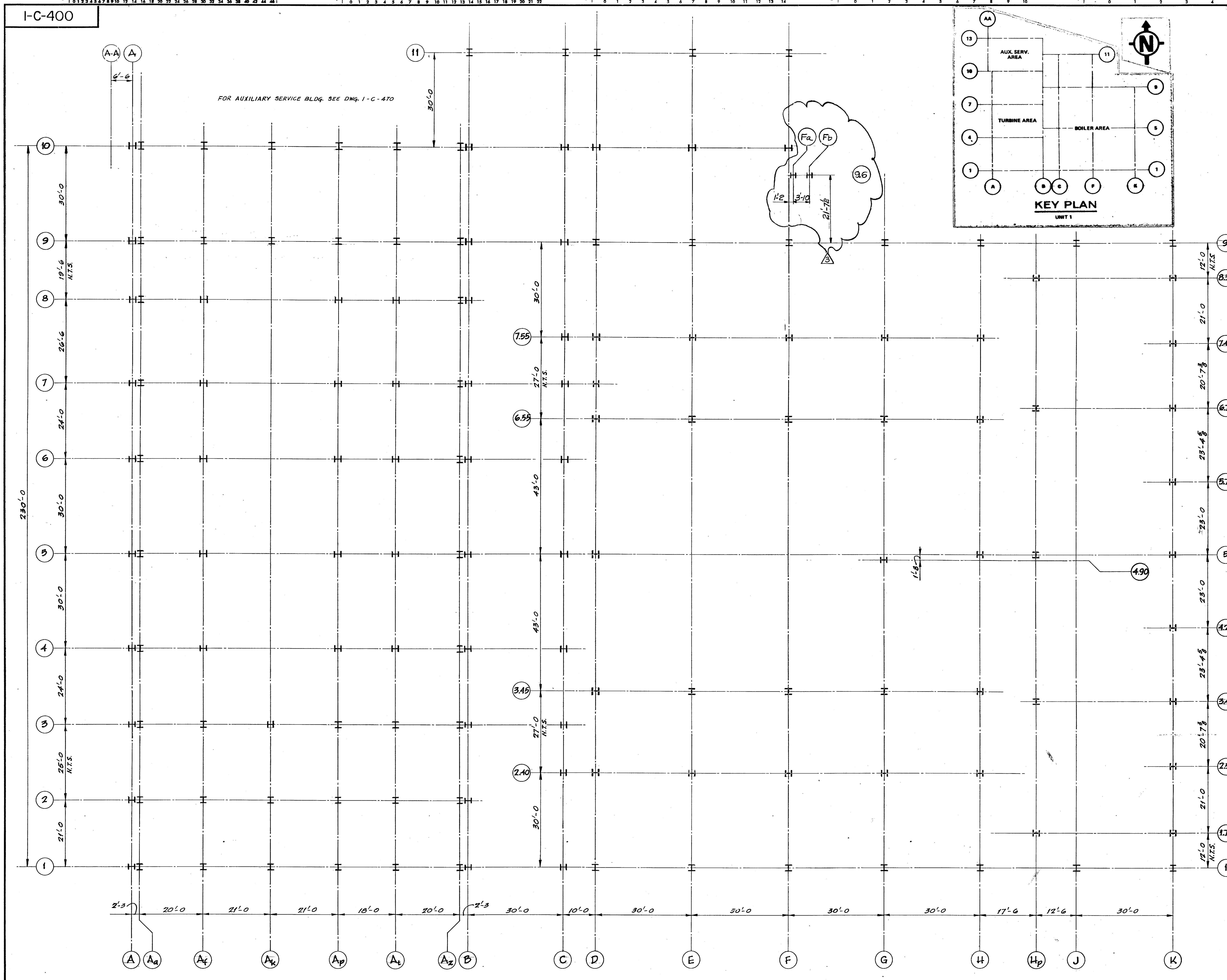
BOARDMAN PLANT
PORTLAND GENERAL ELECTRIC CO. PORTLAND, OREGON

CIVIL • UTILITIES - AREA 5

ACTIVITY CODE		JOB No.	DRAWING No.	REV.
602		11230	1-C-047	14

34 x 44

SIZE E



GENERAL NOTES

1. SEE PART VII (SECTIONS 1, 2 AND 3) OF DOCUMENT Nº 11230-F34, FOR THE FURNISHING, DETAILING FABRICATING AND ERECTING OF STRUCTURAL STEEL.
2. FABRICATOR SHALL DESIGN AND DETAIL ALL CONNECTIONS NOT SHOWN ON THE DRAWINGS.
3. WHERE NOT OTHERWISE SHOWN OR NOTED ON THE DRAWINGS:
   - a) SHOP CONNECTIONS FOR BEAMS SHALL BE PER AISC, TABLE I (USE MAXIMUM NUMBER OF BOLT ROWS POSSIBLE) WITH 7/8"ϕ A-325 F BOLTS (A-490F BOLTS IF ABSOLUTELY NECESSARY) OR EQUIVALENT WELDS.
   - b) SHOP CONNECTIONS FOR BRACING SHALL PREFERABLY BE MADE USING WELDS.
   - c) ALL FIELD CONNECTIONS SHALL BE MADE USING 7/8"ϕ A-325F BOLTS (A-490F BOLTS IF ABSOLUTELY NECESSARY).
   - d) BOTH SHOP AND FIELD CONNECTIONS FOR GIRTS, PURLINS, DOOR AND WINDOW FRAMING AND MISCELLANEOUS LIGHT FRAMING SHALL BE MADE USING 3/4"ϕ A-307 BOLTS.
   - e) THE MINIMUM THICKNESS OF GUSSET AND STIFFENER PLATES SHALL BE 3/8". THIS THICKNESS MAY BE REDUCED IN CONNECTIONS INVOLVING GIRTS, PURLINS AND MISCELLANEOUS FRAMING, BUT IN NO CASE SHALL IT BE LESS THAN 1/4".
4. LOADS SHOWN ON BRACINGS (AND OTHER MEMBERS ACTING PARTLY AS BRACINGS) CONSTITUTE ACTUAL LOADS AND SHOULD NOT BE REDUCED. DIRECTION OF LOAD WILL BE INDICATED THUS: (+) FOR TENSION AND (−) FOR COMPRESSION. WHERE BOTH AXIAL AND VERTICAL (OR HORIZONTAL) LOADS OCCUR, THE DRAWINGS WILL GIVE THE MAGNITUDE OF THESE LOADS AND THE CONNECTIONS SHOULD BE DETAILED FOR COMBINED ACTION, USING THE SAME CONNECTING ELEMENTS. GENERALLY, AXIAL LOADS ARE SHOWN ON THE ELEVATIONS AND VERTICAL LOADS ARE SHOWN ON THE PLANS. IF A MEMBER IS NOT SHOWN ON ANY ELEVATION AND CARRIES AXIAL LOAD, THIS INFORMATION WILL BE CALLED OUT ON THE PLANS IN THE FOLLOWING MANNER:
   V = VERTICAL LOAD
   A = AXIAL LOAD
5. ALL STRUTS WITH HORIZONTAL WEBS MARKED THUS (*), SHALL HAVE THREE 2" DIA. CLEAN OUT HOLES AT THE CENTERLINE OF THE WEB AND SPACED TYPICALLY AS SHOWN ON THE DRAWINGS. STRUTS LESS THAN 12'-0 LONG SHALL REQUIRE ONLY TWO CLEAN OUT HOLES.
6. ALL COLUMNS SHALL BE MILLED FOR FULL BEARING AT THE BASE PLATES AND AT THE SPLICES.
7. SPECIAL CARE SHOULD BE TAKEN IN MAJOR BRACING CONNECTIONS THAT THE LOADS INDICATED BE TRANSFERRED THROUGH THE INTERSECTION OF THE CENTERS OF GRAVITY OF THE CONVERGING MEMBERS. IF THIS IS NOT POSSIBLE, THE MEMBERS AND THE CONNECTION SHOULD BE DESIGNED FOR THE REQUIRED ECCENTRICITY.
8. CONNECTIONS NOTED THUS: Ⓜ SHOULD FULLY DEVELOP THE CONVERGING MEMBERS BY DIRECT WELDING OR BY A SHEAR AND MOMENT CONNECTION.
9. WHEREVER SLOTTED HOLES ARE INDICATED THE BOLTS ARE TO BE TIGHTENED TO A SNUG FIT AND AND THREADS SPOILED.
10. REFER TO ARCHITECTURAL DRAWINGS FOR ADDITIONAL CLIPS AND FRAMING REQUIRED AT DOORS, LOUVERS, DUCT OPENINGS, ETC.
11. MEMBERS SHOWN THUS: (— — — — —) TO BE SUPPLIED BY OTHERS.
12. FOR CONNECTIONS TO STRUCTURAL STEEL PROVIDED BY OTHERS, FABRICATOR MUST MATCH BOLT HOLES AS DETAILED ON DRAWINGS 1-C-436 AND 1-C-437.

No.	DATE	REVISIONS	BY	CHKD	DESIGN SUPV	ENGR	PROJ ENGR	APPR
△								
3	6/26/79	ADDED COLS, LINE (9.6)	EMD		WW			
2	3/7/77	~~ISSUED FOR CONSTRUCTION.~~		ETS	WW			
1	12/3/76	ISSUED FOR BLDG. PERMIT	MHS		WW			
0	9-24-76	ISSUED FOR BID.	WW	EM	WW			

SCALE 3/32" = 1'-0 DESIGNED WW DRAWN Zweifel CHIEF ENGR

UNIT 1

BECHTEL
SAN FRANCISCO

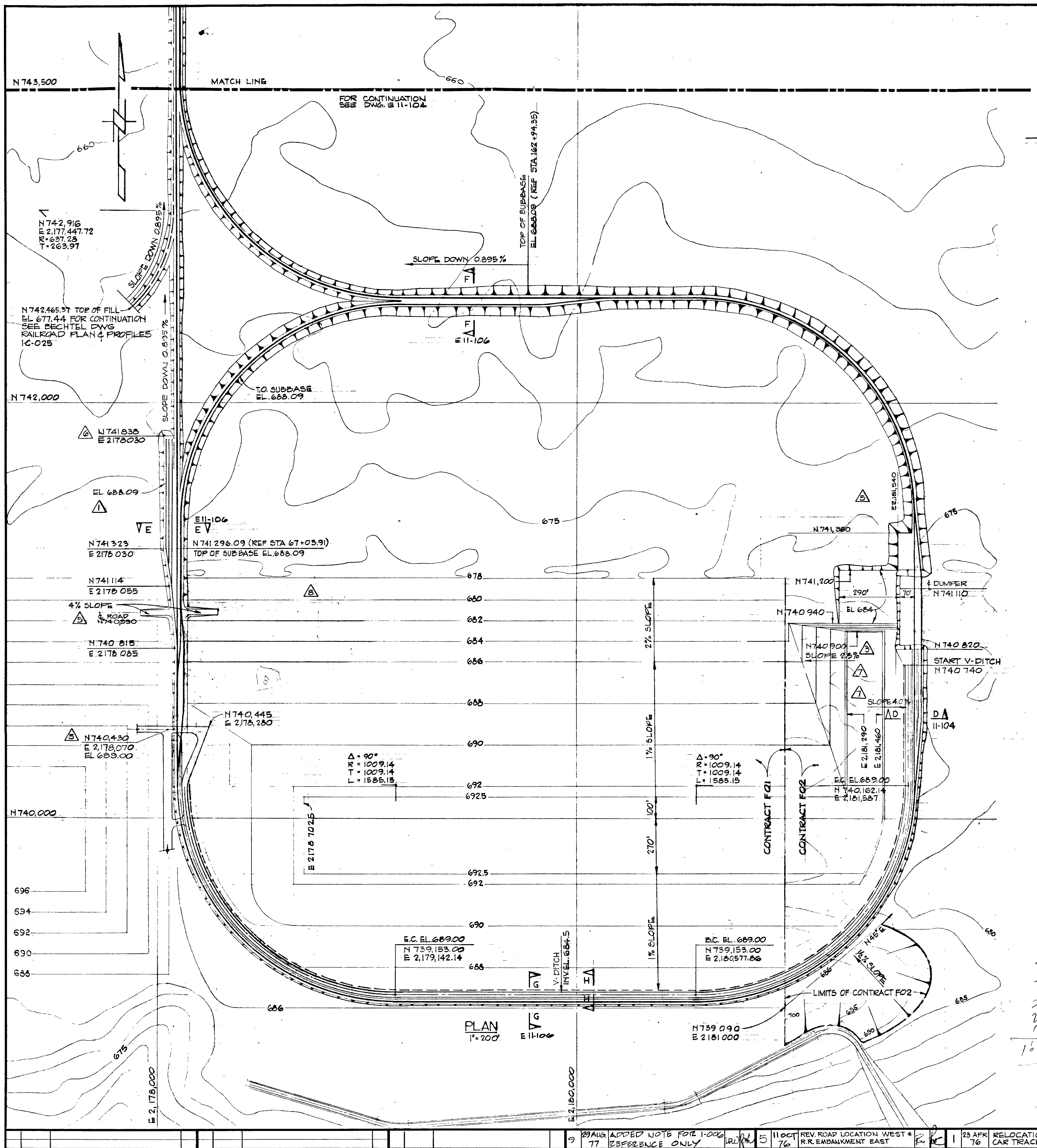
BOARDMAN PLANT
PORTLAND GENERAL ELECTRIC CO. PORTLAND, OREGON

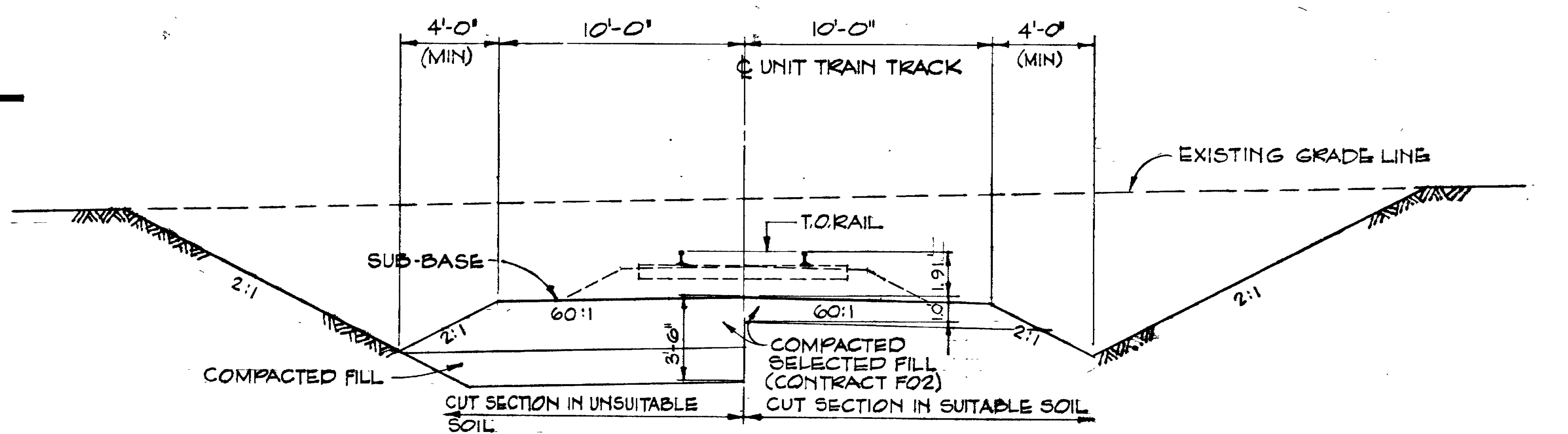
STRUCTURAL STEEL ●
POWER BUILDING
COLUMN LAYOUT

8391
DAVID W. TAPPING
12/3/76

ACTIVITY CODE	JOB No.	DRAWING No.	REV.
634	11230	1-C-400	3

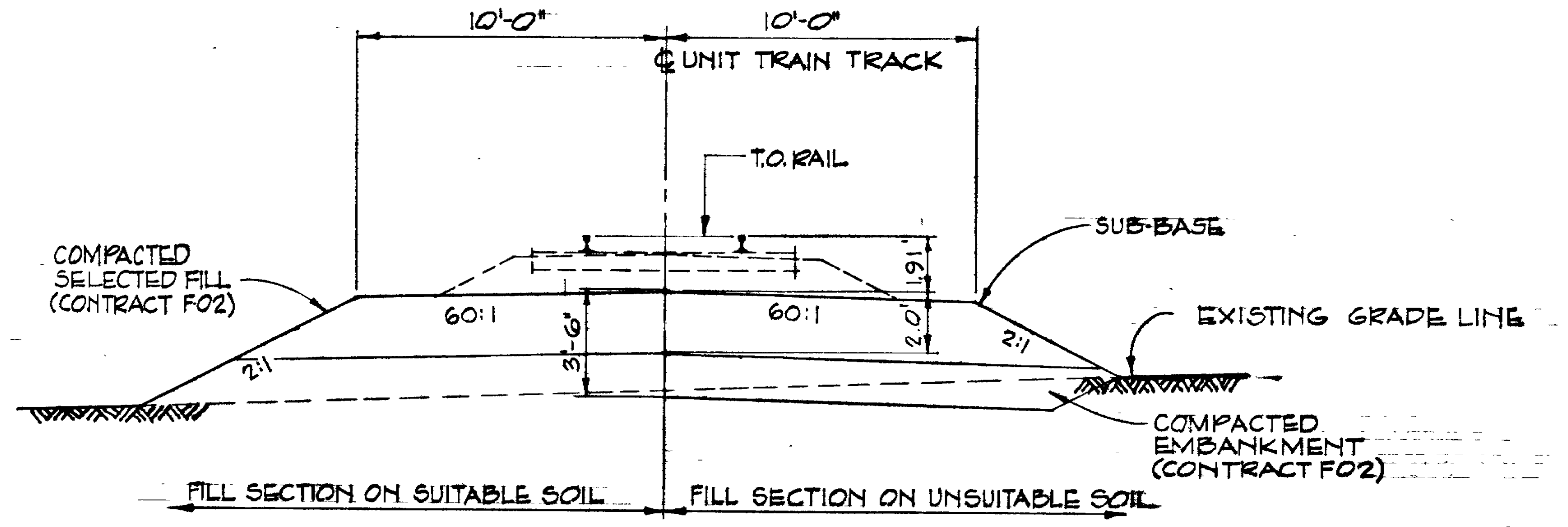
SCANNED





TYPICAL CUT SECTION

1/4" = 1'-0"



TYPICAL FILL SECTION

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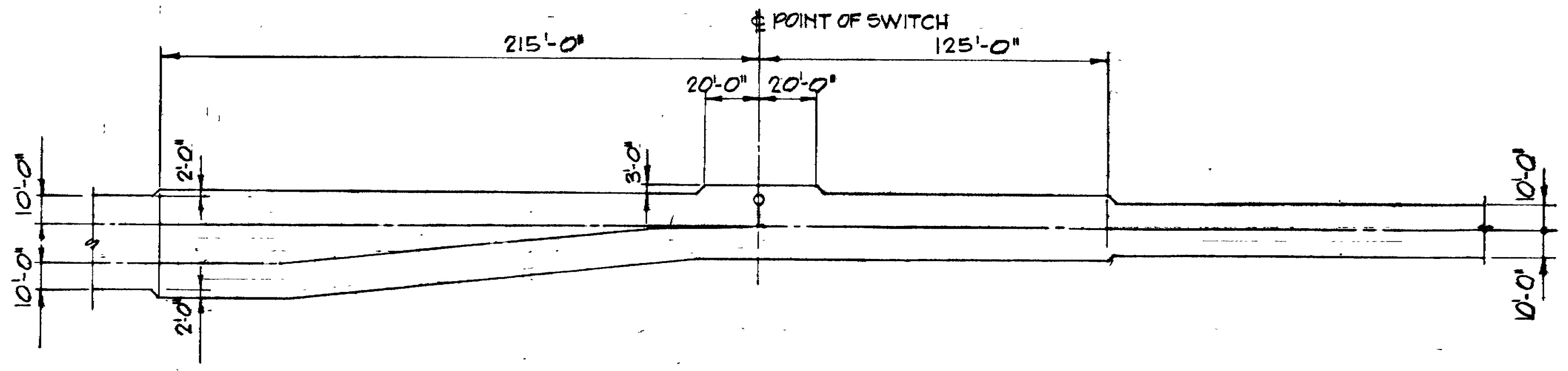

TYPICAL EMBANKMENT WIDENING AT TURNOUTS

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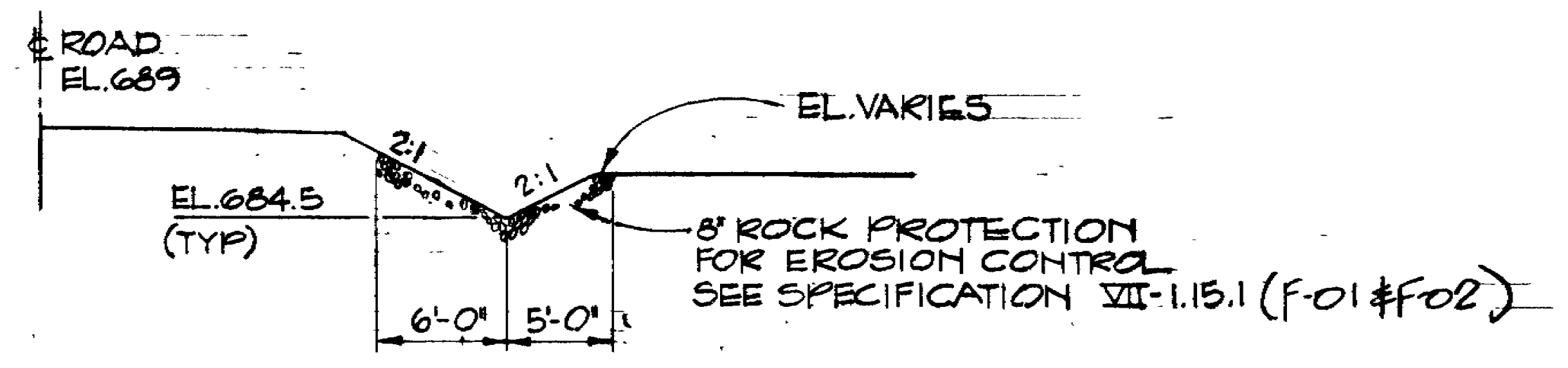


H-H

1/8" = 1'-0"

NOTES
1) FOR GENERAL NOTES SEE DWG. E 11-104

⑨ FOR CONTRACT 7470-1-006
REFERENCE ONLY

DWG. No.	REFERENCE	No.
13 102	RAILWAY LAYOUT-PLAN & PROFILES SH.3	4
13 101	RAILWAY LAYOUT-PLAN & PROFILES SH.2	3
11 106	SITE GRADING-PLAN & SECTIONS SH.3	2
11 104	SITE GRADING-PLAN & SECTIONS SH.1	1

REV.	DATE	REVISION	BY	CH'D.
9	29 AUG 77	ADDED NOTE FOR 1-006 REFERENCE ONLY	LDW	RWC
8	12 APR 77	REVISED PARKING AREA TO MATCH "AS BUILTS"		
7	30 NOV 76	REV. GRADE SLOPES	LDW	VMI
6	11 NOV. 76	EXTEND STORAGE SPURS	CJM	VMI
5	11 OCT 76	REV. ROAD LOCATION WEST & R.R. EMBANKMENT EAST		
4	17 SEPT 76	ISSUED AS REFERENCE FOR 7470-1-003 CONT.		
3	27 AUG 76	REVISED SLOPES @ T.P.2 (N 740 900)	FPH	
2	11 JUN 76	APPROVED FOR CONSTRUCTION	FFH	
1	23 APR 76	RELOCATION OF RESERVE CAR TRACKS	MLJ	
0	9 MAR 76	FOR BID PURPOSES ONLY	MLJ	
B	13 JAN 76	CLIENTS REVIEW AS PART OF F02	MLJ	
A	5 DEC 75	FOR COMMENTS ONLY	MLJ	

REGISTERED PROFESSIONAL ENGINEER 6154 OREGON JULY 12, 1963 ROBERT W. CAIN

SWAN WOOSTER ENGINEERING INC.
CONSULTING ENGINEERS PORTLAND OREGON

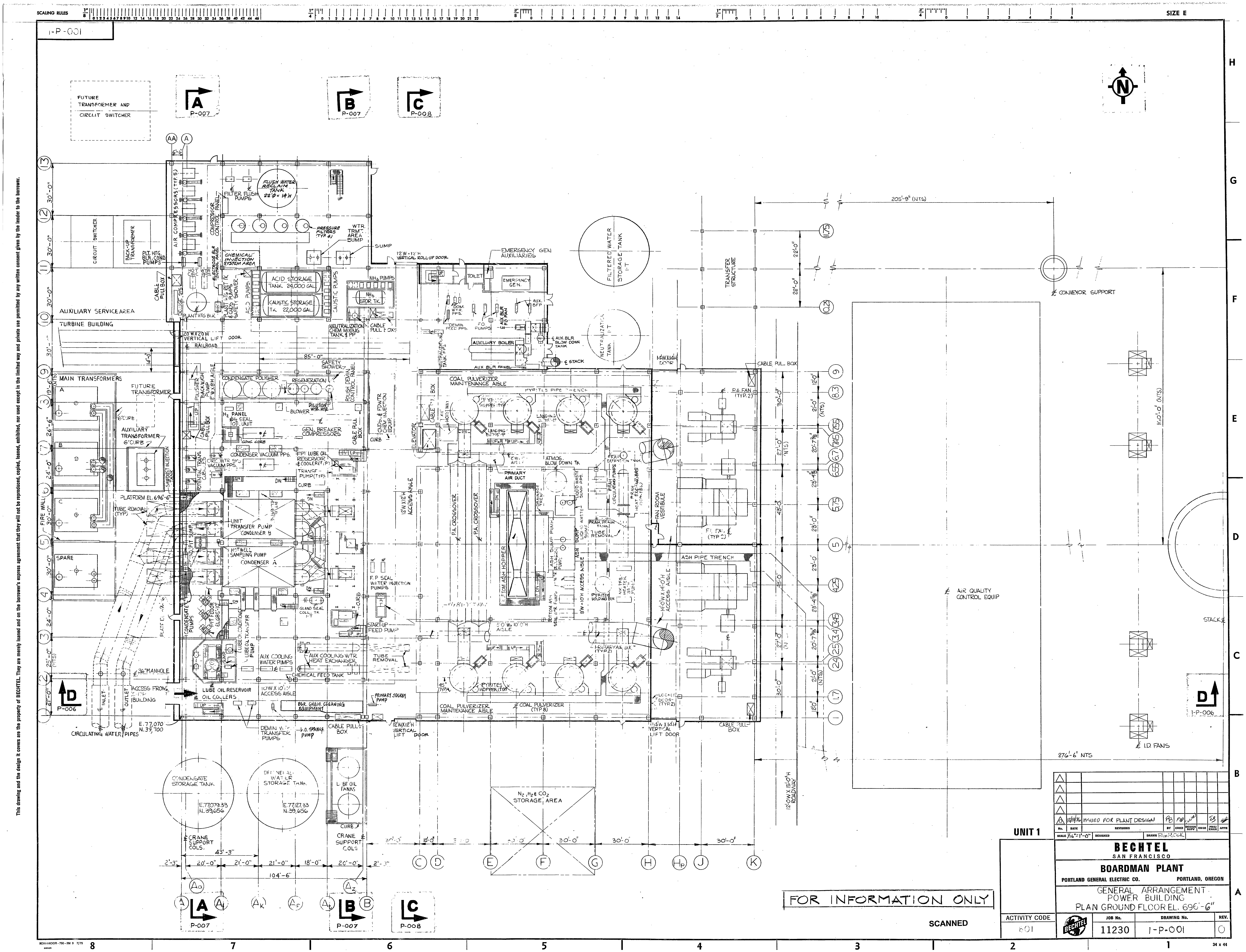
BOARDMAN PLANT
PORTLAND GENERAL ELECTRIC CO.
PORTLAND OREGON

COAL HANDLING FACILITY
SITE GRADING
PLAN & SECTIONS SH.2

		DAY	MO.	YR.
SCALE	AS SHOWN			
DESIGNED	F.F.H	11	6	76
DRAWN	MLJ	11	6	76
CHECKED		11	6	76
APPROVED	RWC	11	6	76

DRAWING NUMBER E7470 11-105
REV. ⑨

C&F, INC., PORTLAND, OREGON PRINTED ON 1000H CLEARPRINT



No.	DATE	REVISIONS	BY	CHKD	DESIGN SUPV	ENGR	PROJ ENGR	APPR
△								
△								
△								
△								
0	12/13/76	ISSUED FOR PLANT DESIGN	PB	PID	WW		EB	

SCALE 1/16"=1'-0" DESIGNED DRAWN P.G. MOCK

BECHTEL
SAN FRANCISCO

BOARDMAN PLANT
PORTLAND GENERAL ELECTRIC CO. PORTLAND, OREGON

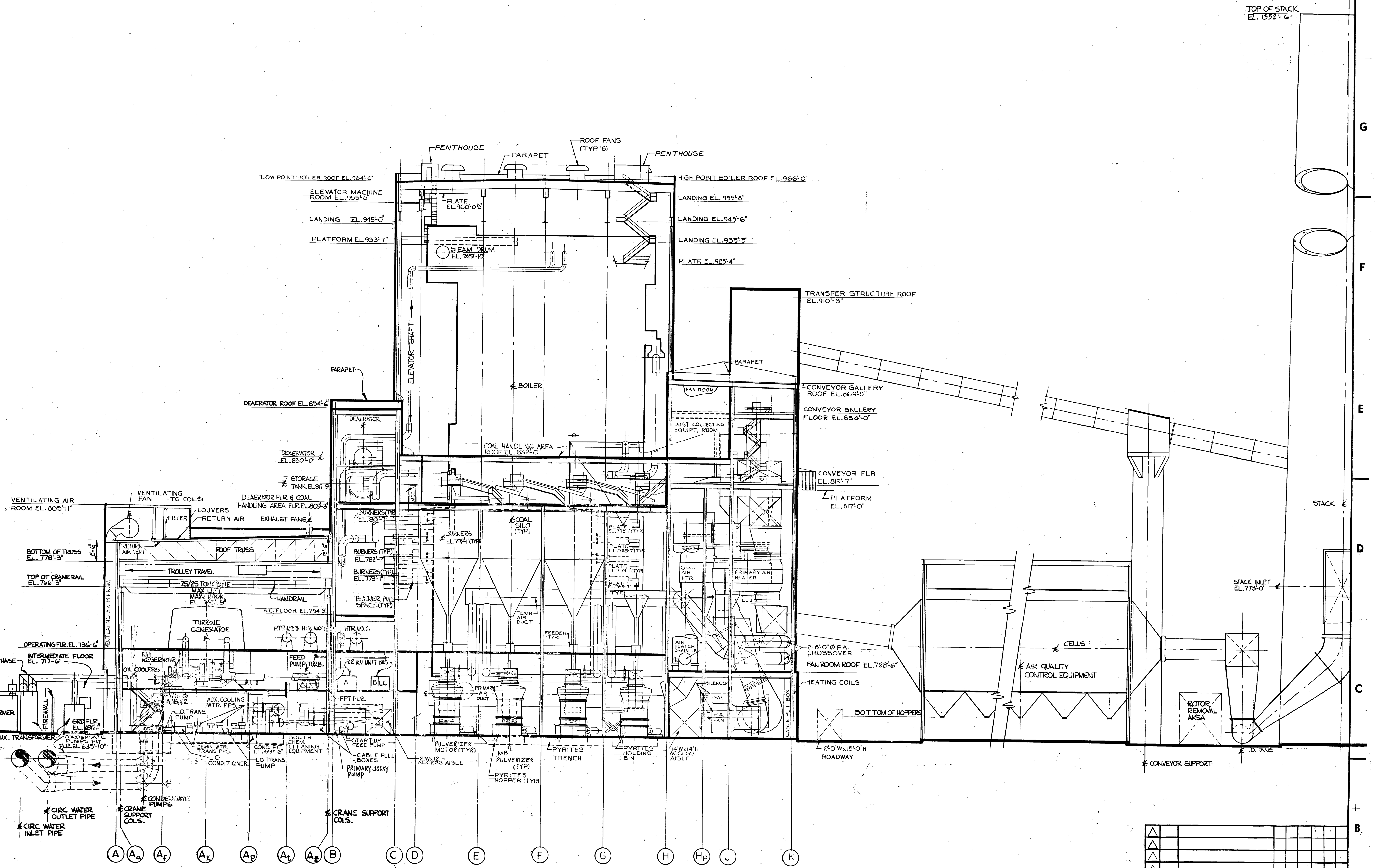
GENERAL ARRANGEMENT
POWER BUILDING
PLAN GROUND FLOOR EL. 696'-6"

ACTIVITY CODE	JOB No.	DRAWING No.	REV.
801	11230	1-P-001	0

1-P-006

SCALING RULES

SIZE E



FOR INFORMATION ONLY

UNIT 1

No	DATE	REVISIONS	BY	CHKD	DESIGN SUPV	ENGR	PROJ ENGR	APPR
△								
△								
△								
△								
△0	12/13/76	ISSUED FOR PLANT DESIGN	PB	PID				

SCALE 1/16" = 1'-0"
DESIGNED
DRAWN P. MOCK

BECHTEL
SAN FRANCISCO

BOARDMAN PLANT
PORTLAND GENERAL ELECTRIC CO. PORTLAND, OREGON

GENERAL ARRANGEMENT
POWER BUILDING
GENERAL SECTION D-D

ACTIVITY CODE	JOB No.	DRAWING No.	REV.
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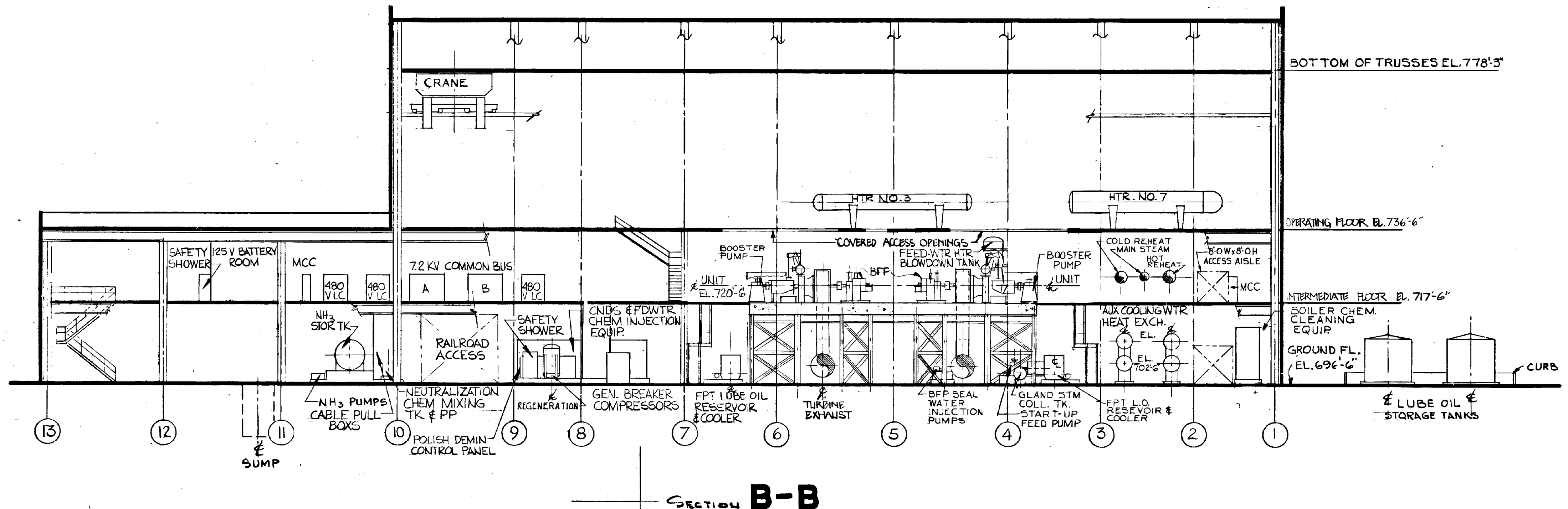
34 x 44

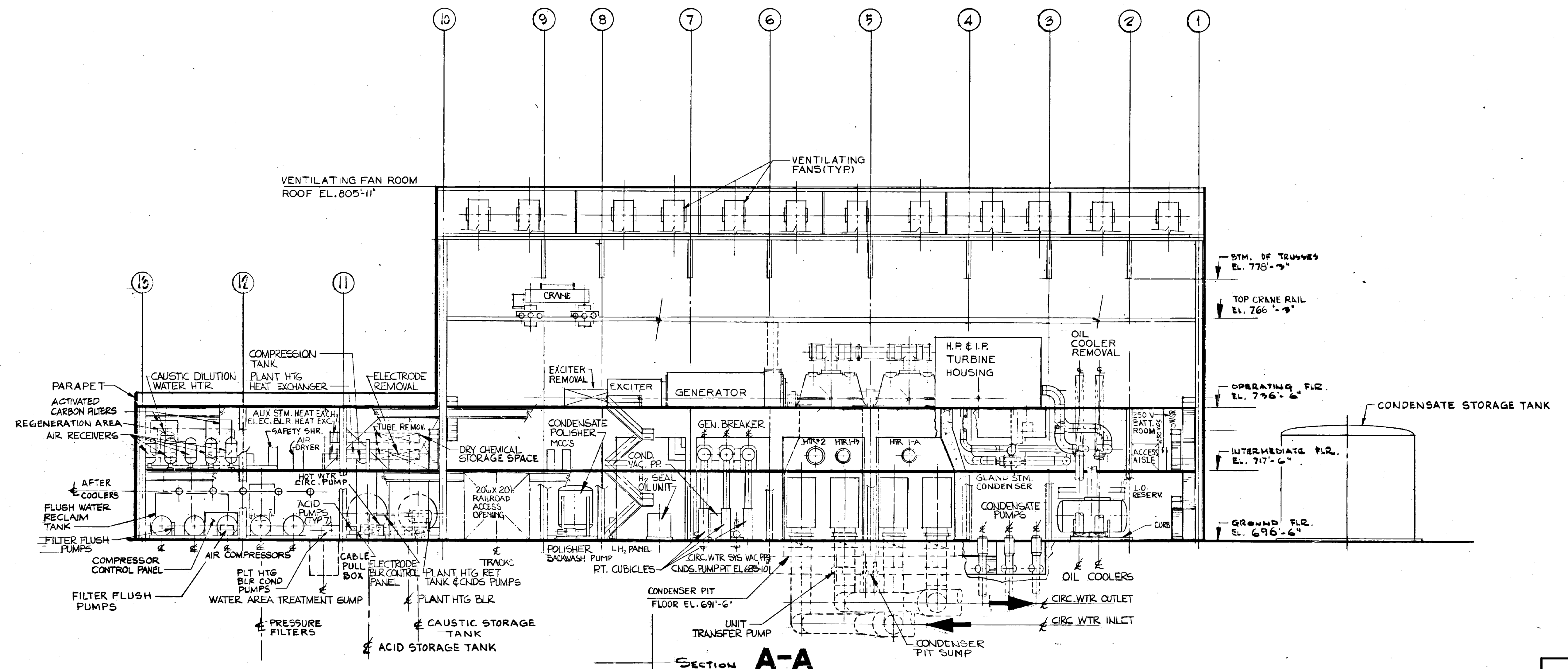
SIZE E

1-P-007



SECTION B-B

LOOKING EAST



SECTION A-A

LOOKING EAST

FOR INFORMATION ONLY

UNIT 1

No.	DATE	REVISIONS	BY	CHKD	DESIGN SUPV	ENGR	PROJ ENGR	APPR
△								
△								
△								
△								
0	12/13/76	ISSUED FOR PLANT DESIGN	RB	PID	CWW		EJ	

SCALE 1/16" = 1'-0"
DESIGNED
DRAWN T. SMITH

BECHTEL
SAN FRANCISCO

BOARDMAN PLANT
PORTLAND GENERAL ELECTRIC CO. PORTLAND, OREGON

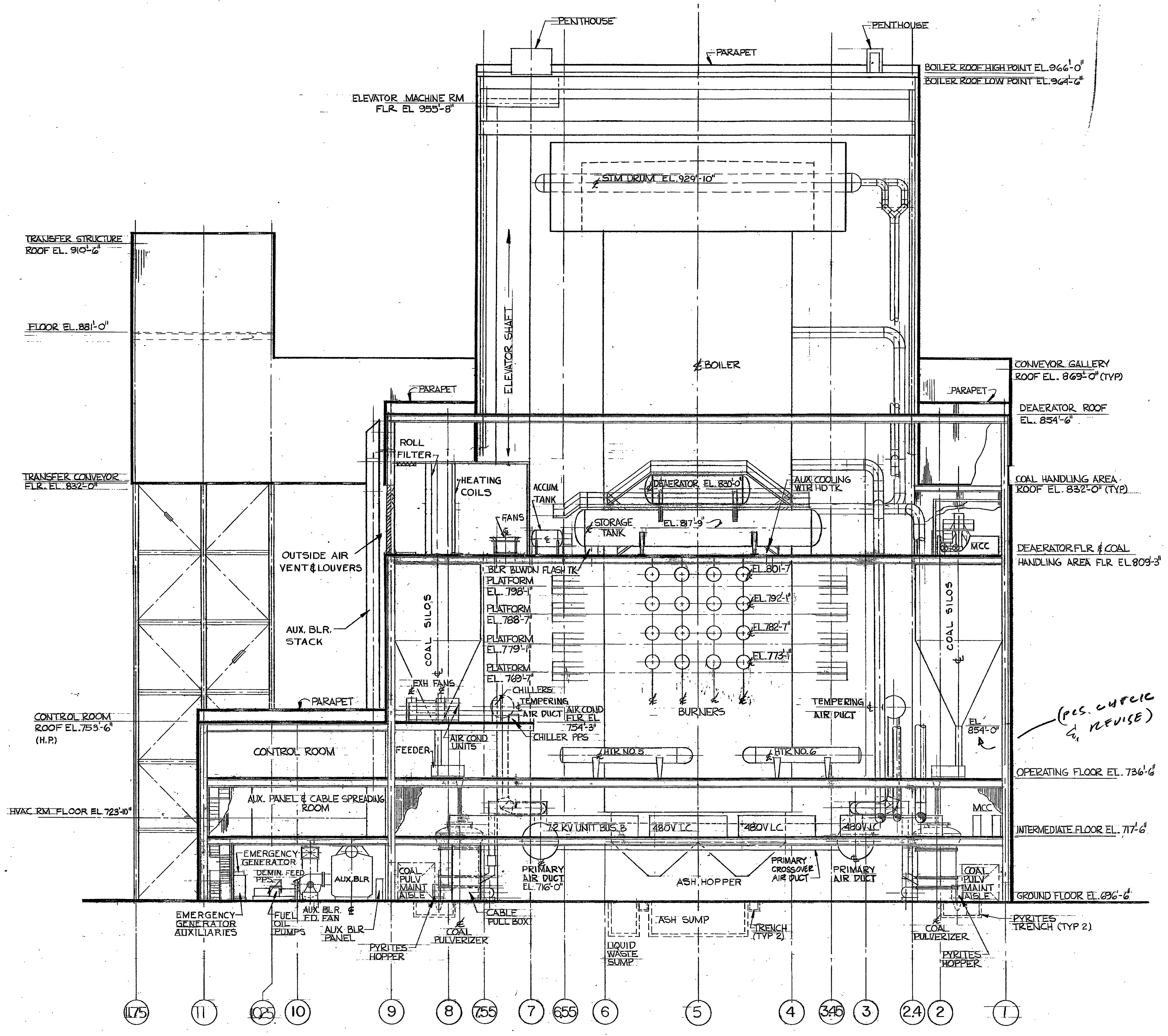
GENERAL ARRANGEMENT
POWER BUILDING
SECTIONS A-A & B-B

ACTIVITY CODE	JOB No.	DRAWING No.	REV.
801	11230	1-P-007	0

34 x 44

SIZE E

1-P-008



FOR INFORMATION ONLY

SCANNED

UNIT 1

No.	DATE	REVISIONS	BY	CHKD	DESIGN SUPV	ENGR	PROJ ENGR	APPR
△								
△								
△								
△								
0	12/13/76	ISSUED FOR PLANT DESIGN	PB	PID				

SCALE 1/16"=1'-0" DESIGNED DRAWN T.SMITH

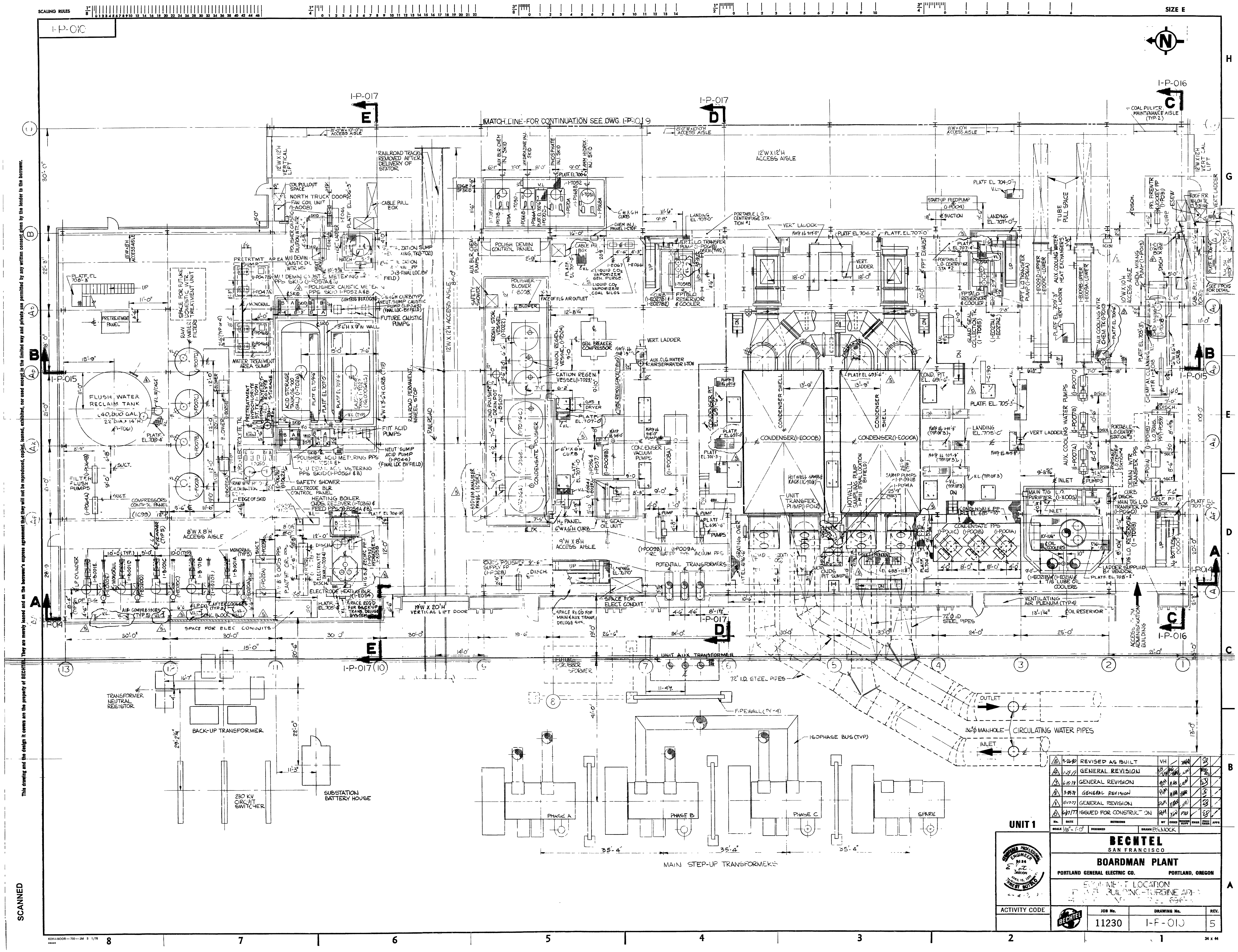
BECHTEL
SAN FRANCISCO

BOARDMAN PLANT
PORTLAND GENERAL ELECTRIC CO. **PORTLAND, OREGON**

GENERAL ARRANGEMENT
POWER BUILDING
SECTION C-C

ACTIVITY CODE	JOB No.	DRAWING No.	REV.
801	11230	1-P-008	0

34 x 44



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SCANNED

No.	DATE	REVISIONS	BY	CHKD	DESIGN SUPV	ENGR	PROJ ENGR	APPR
5	9-26-80	REVISED AS BUILT	VH		MHQ			
4	1-29-79	GENERAL REVISION	JB VH	MHQ				
3	6-15-78	GENERAL REVISION	PGM	MHQ				
2	3-29-78	GENERAL REVISION	PGM	MHQ	MHQ			
1	10-17-77	GENERAL REVISION	PGM	MHQ				
0	6/17/77	ISSUED FOR CONSTRUCTION	PGM		PID			

SCALE 1/8" = 1'-0"
DESIGNED
DRAWN P.G. MOCK

BECHTEL
SAN FRANCISCO

BOARDMAN PLANT
PORTLAND GENERAL ELECTRIC CO. PORTLAND, OREGON

EQUIPMENT LOCATION
POWER BUILDING-TURBINE AREA
[illegible] EL 696'-[illegible]

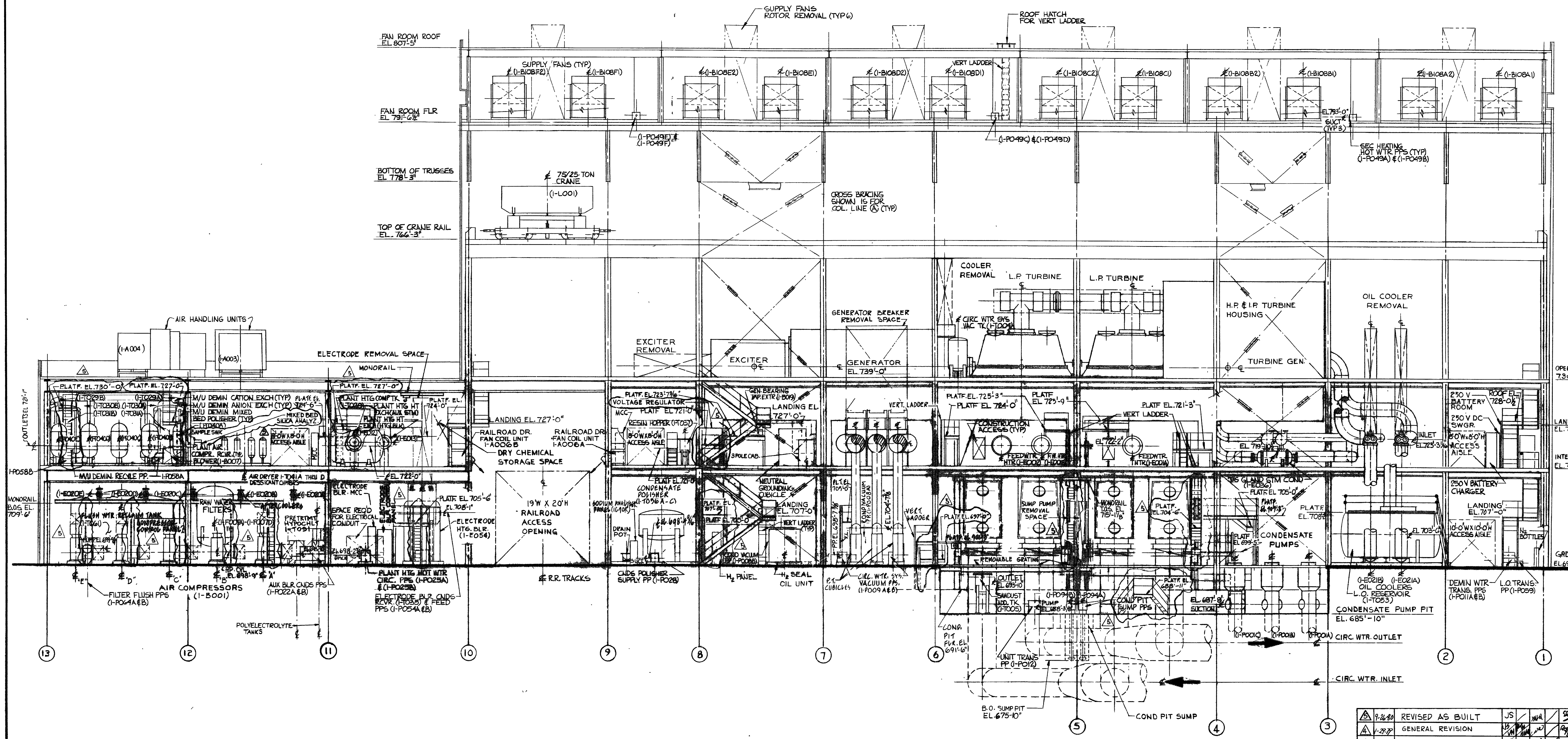
REGISTERED PROFESSIONAL ENGINEER 9126 OREGON APRIL 15, 1977 ERNEST SOTELO

ACTIVITY CODE

JOB No.	DRAWING No.	REV.
11230	I-F-010	5

34 x 44

1-P-014



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4	1-29-79	GENERAL REVISION	JS VH		CWW			
3	6-15-78	GENERAL REVISION		WAR	CWW		SB	
2	3-29-78	GENERAL REVISION		WAR	WAR		SB	
1	10-17-77	GENERAL REVISION	RB	WAR	CWW		SB	
0	6/17/77	ISSUED FOR CONSTRUCTION		WAR	PW		SB	

SCALE 1/8" = 1'-0"
DESIGNED
DRAWN W. JACKSON

BECHTEL
SAN FRANCISCO

BOARDMAN PLANT
PORTLAND GENERAL ELECTRIC CO. **PORTLAND, OREGON**

EQUIPMENT LOCATION
POWER BUILDING-TURBINE AREA
SECTION A-A

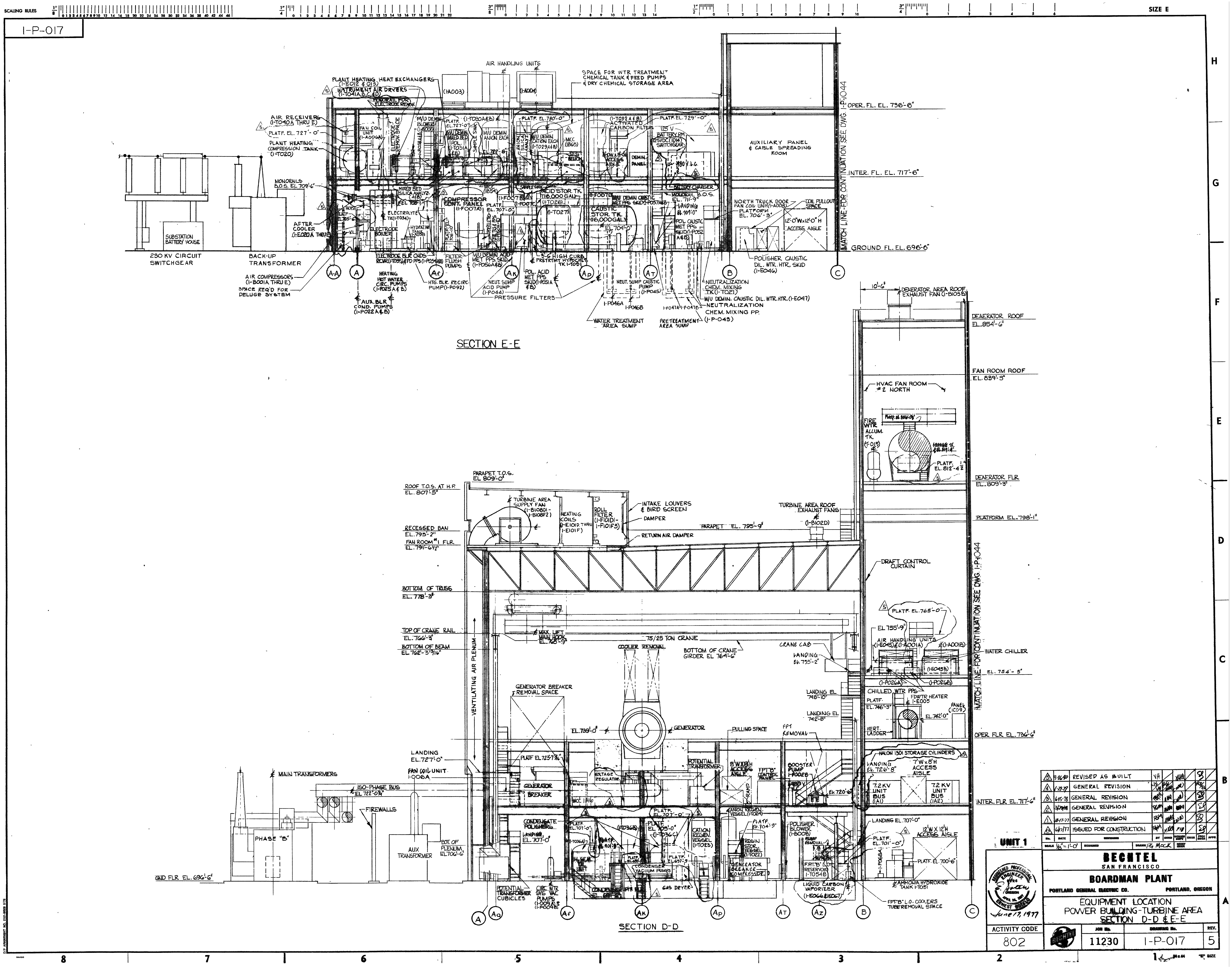
REGISTERED PROFESSIONAL ENGINEER OREGON
APRIL 15, 1977
ERNEST SOTELO
E Sotelo
June 17, 1977

ACTIVITY CODE	JOB No.	DRAWING No.	REV.
802	11230	1-P-014	5

SIZE E

34 x 44

1-P-017



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4	1-29-79	GENERAL REVISION	VS VH	PGM MHQ	CWW		RT/ES	
3	6-15-78	GENERAL REVISION	PGM	MHQ	CWW		SS	
2	3/29/78	GENERAL REVISION	PGM	MHQ	MHQ		SS	
1	10-17-77	GENERAL REVISION	PGM	MHQ	CWW		SS	
0	6/17/77	ISSUED FOR CONSTRUCTION	PGM	MHQ	PJB		SS	

UNIT 1

SCALE 1/8" = 1'-0"
DESIGNED
DRAWN PG MOCK
CHIEF ENGR

REGISTERED PROFESSIONAL ENGINEER 2726 OREGON APRIL 15, 1977 ERNEST SOTELO
June 17, 1977

BECHTEL
SAN FRANCISCO

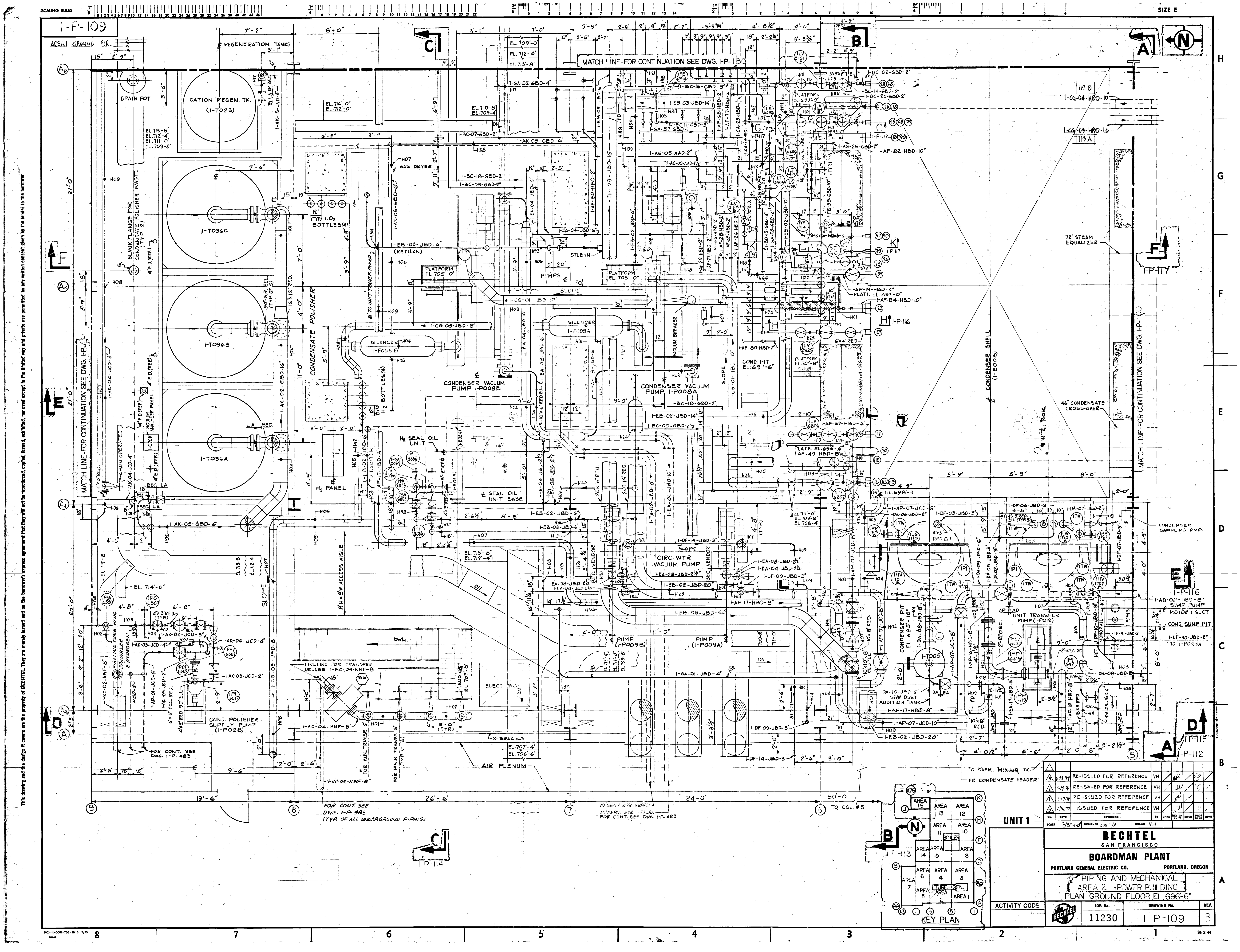
BOARDMAN PLANT
PORTLAND GENERAL ELECTRIC CO. PORTLAND, OREGON

EQUIPMENT LOCATION
POWER BUILDING-TURBINE AREA
SECTION D-D & E-E

ACTIVITY CODE	JOB No.	DRAWING No.	REV.
802	11230	1-P-017	5

24 x 44 "E" SIZE

SCANNED



No.	DATE	REVISIONS	BY	CHKD	DESIGN SUPV	ENGR	PROJ ENGR	APPR
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2	9-12-78	RE-ISSUED FOR REFERENCE	VH					
1	3-17-78	RE-ISSUED FOR REFERENCE	VH					
0	10/31/77	ISSUED FOR REFERENCE	VH					

SCALE 3/8"=1'-0" DESIGNED VH DRAWN VH

BECHTEL
SAN FRANCISCO

BOARDMAN PLANT
PORTLAND GENERAL ELECTRIC CO. PORTLAND, OREGON

PIPING AND MECHANICAL
AREA 2 -POWER BUILDING
PLAN GROUND FLOOR EL. 696'-6"

ACTIVITY CODE

JOB No.	DRAWING No.	REV.
11230	1-P-109	3

34 x 44

FIRST ISSUE – REVISION 0

Closure Plan
Ash Disposal Area
PGE Boardman Power Plant

Prepared for

Portland General Electric

September 2015

ch2m

2020 SW 4th Avenue, Suite 300
Portland, Oregon 97201

74519

Michelle Langdon

AUG. 4, 2011

EXP. 12-31-16

This document was prepared under direct supervision of Michelle Langdon, PE,
a registered civil engineer in the State of Oregon, in accordance with
40 *Code of Federal Regulations* 257.104.

Contents

Acronyms and Abbreviations

§	section of the Final CCR Rule
BPP	Boardman Power Plant
CCR	Coal Combustion Residual
cm/sec	centimeter(s) per second
DEQ	Oregon Department of Environmental Quality
Rule	U.S. Environmental Protection Agency Final CCR Rule
yd^3	cubic yard(s)

Introduction

This *Closure Plan* presents the activities that will be conducted and the procedures that will be followed to close the Ash Disposal Area (also known as the Ash Landfill) at the Portland General Electric (PGE) Boardman Power Plant (BPP) in Boardman, Oregon. Closure will occur in accordance with the U.S. Environmental Protect Agency's Final Coal Combustion Residual (CCR) Rule (Rule). The Rule was published in the Federal Register on April 17, 2015 and becomes effective on October 19, 2015. The Rule regulates the disposal of CCR as solid waste under Subtitle D of the Resource Conservation and Recovery Act. The Rule sets forth national minimum criteria for existing and new CCR landfills and surface impoundments, and lateral expansions to landfills and impoundments.

This closure plan becomes effective once it is finalized, sealed by a qualified professional engineer, and placed, by PGE, in the facility's operating record. In accordance with Section 257.105(i) of the Rule, the plan must be placed in the operating record as it becomes available, but not later than October 17, 2016, per 257.102(a). Additionally, within 30 days of placing the plan in the operating record, PGE must post the plan on a publicly accessible Web site and notify the State Director (Oregon Department of Environmental Quality [DEQ]) in accordance with Section (§) 257.106(i) and §257.107(i) of the Rule, respectively.

1.1 Closure Criteria

The Rule includes the following closure criteria for CCR landfill units: (1) requirements for preparing closure plans; (2) requirements for clean closure and closure in place of a CCR unit, including design criteria for final cover systems; (3) timeframes for commencing and completing final closure activities; and (4) closure certification requirements. Specific closure requirements for CCR landfills are listed in §257.101 to §257.103 of the Rule.

1.2 Site Description

PGE owns and operates the Ash Disposal Area at the 617-megawatt BPP. The BPP is located approximately 12 miles south of the Columbia River near the town of Boardman, Oregon. The main plant is located north of the Carty Reservoir and the Ash Disposal Area is located on the south side of the Carty Reservoir (Exhibit 1). The Ash Disposal Area is approximately 43 acres in size and is used for disposal of surplus and off-spec fly ash and bottom ash materials generated by the BPP that are not otherwise beneficially used.

The disposal area is located on gently sloping ground with elevations ranging from approximately 715 feet above mean sea level on the south end to approximately 695 feet on the north end. The natural ground is "hummocky," which is typical of dune sand topography in this area. Dune sands are apparent today on the north end of the disposal area.[1] The Ash Disposal Area is located in Section 33, Township 2 North, Range 24 East, just southwest of the City of Boardman, Oregon.

The Ash Disposal Area operates under the Water Pollution Control Facilities permit (No. 100189) issued by DEQ. Site use is restricted to BPP operations. The landfill is scheduled to continue to receive ash waste until the BPP is retired in 2020.

---

[1] Shannon & Wilson, Inc. 1979. *Geotechnical Investigation Ash Disposal Area Boardman Plant Unit #1*. September.

Exhibit 1-1. PGE Boardman Power Plant Site Map

Closure Plan

The Ash Disposal Area will be closed by leaving the CCR in place in accordance with the closure performance standards, as specified in §257.102(d). The landfill will be closed in a manner that will achieve the following:

1. *Control, minimize or eliminate, to the maximum extent feasible, post-closure infiltration of liquids into the waste and releases of CCR, leachate, or contaminated runoff to the ground, surface waters or to the atmosphere*
2. *Preclude the probability of future impoundment of water, sediment, or slurry*
3. *Include measures that provide for major slope stability to prevent the sloughing or movement of the final cover system during closure and post-closure care period*
4. *Minimize the need for further maintenance of the CCR unit*
5. *Be completed in the shortest amount of time consistent with recognized and generally accepted good engineering practices*

2.1 Closure Process Narrative Description

2.1.1 Final Cover System

The final cover system for the Ash Disposal Area will be designed and constructed to minimize infiltration and erosion and will have lower permeability than the underlying soil. The thickness of the cover layers and soil characteristics will be determined during final design of the cover. However, they will meet the minimum cover requirements of §257.102(d), consisting of (bottom to top):

- Minimum 18-inch-thick soil infiltration layer of select earthen materials with permeability of no greater than $1x10^{-5}$ centimeters per second[2]
- Minimum 6-inch-thick erosion layer of either earthen materials capable of sustaining plant growth or, on the roadways, crushed gravel to resist wind and water erosion.

The conceptual final closure plan is presented in Figure 1. The final cover will be designed to accommodate settling and subsidence in order to maintain cover integrity. A written certification will be provided by a qualified professional engineer certifying that the design meets the requirements of the Rule at the time of final closure design.

PGE retains the option to install an alternative final cover system instead of the prescriptive cover (such as an evapotranspiration cover), provided that the alternative cover is equivalent to the prescriptive cover, in accordance with §257.102(d)(3) (ii).

---

[2] The Rule requires that the permeability of the final cover system be less than or equal to the permeability of the bottom liner system or natural subsoils present, or a permeability no greater than $1x10^{-5}$ centimeters per second (cm/sec), whichever is less. In accordance with the *Geotechnical Investigation Ash Disposal Area Boardman Plant Unit #1* (Shannon & Wilson, September 1979), the construction of the dikes for the Ash Disposal Area was recommended to be stripped of topsoil, leveled, and compacted. There is no specific reference to the preparation of the subgrade within the dike areas for ash disposal. As such, it is assumed that this is natural subsoils of loess and dune sand soils. The assumed permeability of these natural soils is expected to be less than the minimum requirement of $1x10^{-5}$ cm/sec. Loess soils (silty sand with very little clay) are expected to have a hydraulic conductivity ranging from $1x10^{-3}$ cm/sec to $1x10^{-4}$ cm/sec. Therefore, the infiltration layer for the final cover system will have a permeability no greater than $1x10^{-5}$ cm/sec in accordance with the Rule.

2.1.2 Methods and Procedures

2.1.2.1 Final Grading

The final cover will be graded to drain surface water from the cover, and the top slope will have a grade of not less than 3.5 percent. The proposed final grades will be designed to accommodate surface water drainage from the completed landfill after anticipated settlement and to minimize erosion of the final cover soil.

2.1.2.2 Final Cover System Installation

Final cover installation generally will be completed in the following steps:

1. Preparing the site and contractor mobilization including temporary facilities and controls
2. Installing temporary sediment and erosion control measures
3. Preparing the subgrade (top of waste) in all areas identified for closure to shape slopes and grades and to facilitate construction of subsequent closure activities
4. Placing the infiltration layer soils to meet the minimum requirements
5. Placing the erosion layer and seeding and planting of native vegetative cover including applying fertilizer and implementing weed deterrent control measures (as necessary)
6. Installing permanent drainage control features (for example, ditches, culverts)
7. Completing roadways
8. Final cleanup and contractor demobilization

2.2 Estimate of Largest Area of Required Closure

In accordance with §257.102, the estimated largest area of Ash Disposal Area that would require final cover at any time during the active life of the landfill if the site was closed is approximately 43 acres. Figure 1 shows a site plan with the final closure cover grades and stormwater features. This acreage corresponds to the maximum area of the site planned for waste fill (that is, the entire landfill footprint already in use).

2.3 Coal Combustion Residual Waste Inventory

In accordance with §257.102(b), the total estimate of the maximum CCR waste that would ever be present onsite during the active life of the Ash Landfill is approximated at 838,000 cubic yards (yd^3).The current estimate of waste in-place is 538,000 yd^3 based on PGE's May 2015 ground survey. The closure grades as shown in Figure 1 (attached) project an additional 300,000 yd^3 of airspace available, for a total estimate of 838,000 yd^3. A final volumetric waste survey will be conducted as part of the final closure design.

2.4 Slope Stability

The concept design for the Ash Disposal Area final cover system consists of side slopes and a top deck slope of 3.5 percent. These slopes are relatively shallow for these types of cover systems and are expected to be stable. The final design certification for closure of the Ash Disposal Area will ensure that it is closed in a manner that will provide for major slope stability to prevent the sloughing or movement of the final cover system during closure and throughout the post-closure care period, as specified in §257.102(d).

2.5 Stormwater Management and Control

Drainage control at the landfill during closure will be achieved by the proposed final grading plan and stormwater control system as shown in Figure 1. The grades have been designed to drain surface water from the cover to the perimeter stormwater ditch system surrounding the landfill. Stormwater will be conveyed in the ditches to a stormwater retention/evaporation pond or directly into Carty Reservoir located in the western portion of the site. These measures will reduce the probability of future impoundment of water, sediment, or slurry within the Ash Disposal Area.

2.6 Schedule

In accordance with §257.102, closure must commence no later than 30 days after the date that the landfill receives the known final receipt of waste or 2 years after not receiving any waste (although extensions are possible). Closure construction must be completed within 6 months of commencing closure activities as required by the Rule. Extensions for closure may be allowed if it can be demonstrated that closure is not feasible within the required timeframes because of factors beyond the facility's control. If such a demonstration is necessary, a demonstration narrative will be placed into the BPP's operating record.

Closure is anticipated to occur in 2021, following retirement of the BPP. A preliminary closure construction schedule, illustrating the sequencing and anticipated duration of closure activities, is shown in Table 2-1.

Table 2-1 Preliminary Closure Construction Schedule – Ash Disposal Area
Portland General Electric Boardman Power Plant

Task	Task Completion Timeframe[a]
Last Known Receipt of Waste	TBD
Preparation of Notification of Intent to Close Landfill[b]	+30 days
Commence Closure: Site Preparation and Mobilization (Set Temporary Controls)	+30 days
Waste Contouring and Subgrade Preparation (Top of Waste)	+15 days
Final Cover Low-Permeability Soil Placement	+30 days
Final Cover Erosion Protection Layer	+15 days
Installation of Permanent Drainage Structures	+15 days
Completion of Roadways	+15 days
Seeding/Planting of Vegetation (as applicable)[c]	+10 days
Closure Certification/Notification and Deed Notation	+30 days [d, e]

[a] Timeframes are provided in approximated calendar days. Expected Last Known Receipt of Waste is to be determined (TBD) based on the final waste placement in the Ash Disposal Area as part of the Boardman Power Plant retirement schedule and demolition activities. Plant retirement is scheduled for December 31, 2020. Dates shown build on the Last Known Receipt of Waste date, currently TBD. Actual dates and durations for construction will depend on weather, contractor availability, and other such variables.

[b] Notification of intent to close is required no later than the date closure is initiated. Notification must include the certification from the qualified professional engineer for the design of the final cover system as required by §257.102(d)(3)(iii). Notification must be placed in the facility's operating record, and within 30 days posted on the publicly accessible Web site and notice sent to the State Director.

[c] Seeding and vegetation establishment will be adjusted to align with the growing season. Temporary erosion controls will be used as needed to prevent erosion of the erosion protection layer.

[d] Per §257.102(h), within 30 days of completing closure, PGE must complete a certified notice of closure completion by a qualified professional engineer and place it in the facility's operating record. The notification is complete once it has been posted on PGE's publicly accessible Web site. The State Director must be notified within 30 days (§257.106(i) and §257.107(i)) of posting.

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[e] Notation on the deed of the property in perpetuity to notify any potential purchaser that the property has been used as a CCR unit and its use is restricted under the post-closure care requirements in accordance with §257.104(d)(1)(iii). Notation of deed must be done following completion of closure. Within 30 days of recording the notation on the deed to the property, PGE must prepare a notification stating that the notation has been recorded. The notification is completed when it has been placed in the facility's operating record. Notification to the State Director is required within 30 days of recording the notation on the deed. PGE must also post this on their publicly accessible Web site within 30 days.

Figure

SHEET NOTES

1. EXISTING GROUND SURVEY PROVIDED BY PGE, MAY 2015.

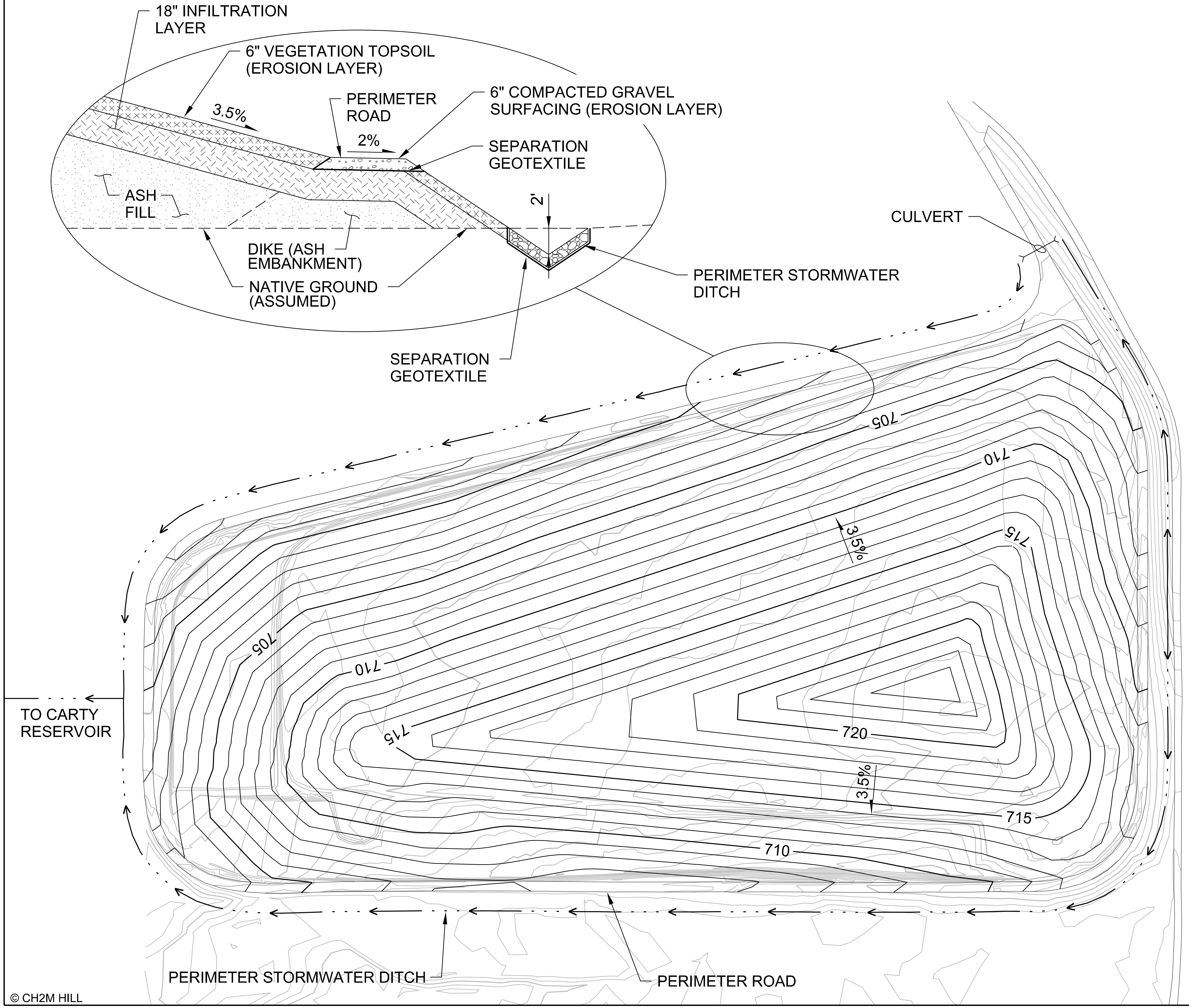

FIGURE 1
CONCEPTUAL FINAL COVER DESIGN

PGE BOARDMAN POWER PLANT
ASH DISPOSAL AREA

FIRST ISSUE – REVISION 0

Post-Closure Care Plan
Ash Disposal Area
PGE Boardman Power Plant

Prepared for

Portland General Electric

September 2015

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AUG. 4, 2011
EXP. 12-31-16

This document was prepared under direct supervision of Michelle Langdon, PE, a registered civil engineer in the State of Oregon, in accordance with 40 *Code of Federal Regulations* 257.104.

Contents

Exhibit

Acronyms and Abbreviations

§	section of the Final CCR Rule
BPP	Boardman Power Plant
CCR	Coal Combustion Residual
Rule	U.S. Environmental Protection Agency Final CCR Rule

Introduction

This *Post-Closure Care Plan* presents the activities that will be conducted and the procedures that will be followed for post-closure care following closure of the Ash Disposal Area (also known as the Ash Landfill) at the Portland General Electric (PGE) Boardman Power Plant (BPP) in Boardman, Oregon. Post-closure care will occur in accordance with the U.S. Environmental Protection Agency's Final Coal Combustion Residual (CCR) Rule (Rule). The Rule was published in the Federal Register on April 17, 2015, and becomes effective on October 19, 2015. The Rule regulates the disposal of CCR as solid waste under Subtitle D of the Resource Conservation and Recovery Act. The Rule sets forth national minimum criteria for existing and new CCR landfills and surface impoundments, and lateral expansions to landfills and impoundments.

This plan becomes effective once it is finalized, sealed by a qualified professional engineer, and placed, by PGE, in the facility's operating record. In accordance with Section 257.105(i) of the Rule, the plan must be placed in the operating record as it becomes available, but not later than October 17, 2016, per 257.102(a). Additionally, within 30 days of placing the plan in the operating record, PGE must post the plan on a publicly accessible Web site and notify the State Director (Oregon Department of Environmental Quality [DEQ]) in accordance with Section (§) 257.106(i) and §257.107(i) of the Rule, respectively.

1.1 Closure Criteria

The Rule includes the following closure criteria for CCR landfill units: (1) requirements for preparing closure plans; (2) requirements for clean closure and closure in place of a CCR unit, including design criteria for final cover systems; (3) timeframes for commencing and completing final closure activities; and (4) closure certification requirements. Specific closure requirements for CCR landfills are listed in §257.101 to §257.103 of the Rule.

1.2 Site Description

PGE owns and operates the Ash Disposal Area at the 617-megawatt BPP. The BPP is located approximately 12 miles south of the Columbia River near the town of Boardman, Oregon. The main plant is located north of the Carty Reservoir and the Ash Disposal Area is located on the south side of the Carty Reservoir (Exhibit 1-1). The Ash Disposal Area is approximately 43 acres in size and is used for disposal of surplus and off-spec fly ash and bottom ash materials generated by the BPP that are not otherwise beneficially used.

The disposal area is located on gently sloping ground with elevations ranging from approximately 715 feet above mean sea level on the south end to approximately 695 feet on the north end. The natural ground is "hummocky," which is typical of dune sand topography in this area. Dune sands are apparent today on the north end of the disposal area.[1] The Ash Disposal Area is located in Section 33, Township 2 North, Range 24 East, just southwest of the City of Boardman, Oregon.

The Ash Landfill operates under the Water Pollution Control Facilities permit (No. 100189) issued by the Oregon Department of Environmental Quality. Site use is restricted to BPP operations. The landfill is scheduled to continue to receive ash waste until the BPP is retired in 2020.

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[1] Shannon & Wilson, Inc. 1979. *Geotechnical Investigation Ash Disposal Area Boardman Plant Unit #1*. September.

Exhibit 1-1. PGE Boardman Power Plant Site Map

Post-Closure Care

Long-term monitoring and maintenance of the Ash Landfill will be done in accordance with the post-closure care maintenance requirements as specified in §257.104. Following closure of the landfill, post-closure care will be conducted and will consist of the following:

1. Maintaining the integrity and effectiveness of the final cover system, including making repairs to the final cover as necessary to correct the effects of settlement, subsidence, erosion, or other events, and preventing run-on and runoff from eroding or otherwise damaging the final cover.
2. Maintaining the groundwater monitoring system and monitoring according to §§257.90 through 257.98.
3. Conducting the post-closure care period for 30 years, except if operating under the assessment monitoring program in accordance with §257.95. The post-closure care period will be extended until returning to detection monitoring in accordance with §257.95.
4. Ensuring post-closure use of the property does not disturb the integrity of the final cover system or any other components of the containment system or post-closure monitoring systems.

2.1 Final Cover System Monitoring and Maintenance Activities

The final cover system for the Ash Landfill will be inspected to maintain the integrity and effectiveness of the cover and monitoring systems.

2.1.1 Erosion Control

The vegetated cap will be inspected to ensure that proper drainage slopes are maintained, erosion and scouring of the surface are not occurring, and bare spots in the vegetation are corrected. The cover system will be inspected quarterly for the first 2 years of the post-closure care period and annually thereafter. Inspections will also occur after substantial rainfall events that could cause erosion. Additionally, the road surfacing over the cap areas will be inspected to ensure rutting and potholing of the surface is not occurring. Mowing of the cap may be necessary within the first 2 years after closure to enhance the vegetated stand. Because the Ash Landfill is located in a dry climate, the cap vegetation is not expected to require long-term mowing. If areas of erosion, scouring, rutting, or sparse vegetation occur, repairs will be made.

2.1.2 Groundwater Monitoring

Groundwater monitoring will be conducted in accordance with the CCR groundwater monitoring plan. The integrity of the wells will be inspected during each sampling event to ensure the wells can be accessed and used to effectively retrieve groundwater samples. Inspection will include the well locks and caps, well identifications, bollards, and access. Repairs to the wells will be made as needed.

2.1.3 Stormwater

Stormwater features, including ditches and culverts, will be inspected semiannually to ensure proper drainage of stormwater. Inspections will also occur after substantial rainfall events in which erosion could be encountered. Inspections will include culvert integrity, culvert inlet and outlet armoring, ditch drainage slopes and channel geometry, and the riprap armoring of the stormwater ditches. Repairs to the stormwater features will occur as needed.

2.1.4 Site Access Controls

Access to the Ash Landfill site will be restricted through the use of existing access gates to the PGE property, signage in the vicinity of the ash disposal area, and/or signage at other potential property access points. The integrity of these security features will be inspected annually and repaired as needed.

2.2 Post-Closure Contact Information

PGE will maintain ownership and responsibility of the Ash Landfill site. The contact information is as follows:

General Manager of Environment Licensing Services
Portland General Electric
121 SW Salmon Street, 3WTCBR05
Portland, OR 97204
Phone: 503-464-8000

2.3 Post-Closure Care Planned Uses

No reuse of the closed Ash Landfill is planned. If a beneficial reuse of the site is identified, the post-closure plan will be amended to ensure site activities associated with site use maintain the integrity and effectiveness of the final cover system and groundwater monitoring systems.

2.4 Schedule

Immediately following closure of the landfill, the 30-year post-closure care period will commence. Post-closure will be complete in 30 years unless assessment monitoring is occurring, at which point post-closure care will be extended until the landfill returns to detection monitoring. A notification of post-closure care period completion will be prepared no later than 60 days following the completion of post-closure care verifying that the post-closure has been completed. The certification will be provided by a qualified professional engineer verifying that completion has occurred in accordance with this plan and the Rule. Recordkeeping and compliance are considered complete once it has been placed in the operating record, as required in §257.105. Notification is complete once notice of completion is given to the State Director and posted on a public Web site, as required by §257.105.