GWF ENERGY LLC

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October 10th, 2008

Mr. Ron Yasny
Compliance Project Manager
California Energy Commission
1516 Ninth Street, MS-2000
Sacramento, CA 95814-5512

Re: Petition for Amendment to Henrietta Peaker Project (01-AFC-18)

Dear Mr. Yasny:

GWF Energy LLC (GWF), as project owner, petitions the California Energy Commission (CEC) to amend the license for the Henrietta Peaker Plant (HPP) [01-AFC-18], issued January 31, 2002]. GWF is proposing to modify the existing HPP nominal 95-megawatt (MW) simple-cycle power plant, by converting the facility into a combined-cycle power plant with a nominal 25 MW (net) of additional generating capacity. The modifications to the facility will be referred to as GWF Henrietta Combined-Cycle Power Plant (GWF Henrietta), and will have a new nominal generating capacity of 120 MW net.

This petition is being submitted to modify the HPP by removing the two existing oxidation catalyst and SCR systems, adding two new once through steam generators (OSTGs) including a new oxidation catalyst system and SCR system within each OTSG for emission control, adding one new 25 MW net steam turbine generator, adding one new auxiliary boiler to support start-up of the combined-cycle power plant, and adding one new air cooled condenser for heat rejection. Further, this petition seeks to revise a number of the HPP conditions of certification.

A major advantage of the proposed conversion is the enhancement in electric generation efficiency created by the conversion, an approximate 24 percent increase in fuel efficiency, and a substantial reduction in emissions per MW-hr generated. In addition, GWF Henrietta will retain the capability and option to operate in a simple-cycle configuration. When operated in simple-cycle mode, the OTSG will not generate steam but the SCR and oxidation catalyst will continue to operate. Simple-cycle operation is expected to be equal to or less than 1,350 hours per year. The reason for retaining the option to operate in simple-cycle configuration is to preserve the plant's current 10-minute start capability to provide the Cal-ISO with rapid response peak generation resources.

The CEC Siting Regulations require a discussion of the necessity for the proposed revision to the HPP project and whether the modification is based on information known by the petitioner during the certification proceeding (Title 20, CCR, Sections 1769 [a][1][B], and [C]). These proposed changes are based on information that became known to the petitioner after the HPP was certified. These changes are needed to allow GWF to respond to market demand for additional efficient power generation beyond the term of GWF's existing DWR contract. The additional power will support California's growing energy demands, especially during peak summer conditions, which will have a beneficial impact on the public pursuant to Title 20, CCR, Sections 1769 [a][1][G].

We are hopeful that this amendment can be reviewed and processed as soon as possible. Please contact me at (925) 431-1443, David Stein, CH2M HILL at (510) 587-7787, or Jennifer Scholl, CH2M HILL at (805) 568-0650 if you have any questions regarding these materials.

Sincerely,

Doug Wheeler
Vice President
GWF Energy LLC

Enclosure

cc: David Stein, CH2M HILL
Mark Kehoe, GWF Energy LLC

Petition for License Amendment

Henrietta Peaker Plant (01-AFC-18) License Amendment for Conversion to GWF Henrietta Combined-cycle Power Plant

Kings County, California

October 2008

Submitted to

California Energy Commission

Submitted by

GWF Energy LLC

With Technical Assistance by

CH2MHILL

Contents

Section Page

Attachments

Tables

Figures

Executive Summary

GWF Energy LLC (GWF), as project owner, petitions the California Energy Commission (CEC) to amend the license for the Henrietta Peaker Plant (HPP) [01-AFC-18], issued January 31, 2002]. GWF is proposing to modify the existing HPP nominal 95-megawatt (MW) simple-cycle power plant, by converting the facility into a combined-cycle power plant with a nominal 25 MW (net) of additional generating capacity. A major advantage of the proposed conversion is the enhancement in electric generation efficiency created by the conversion, an approximate 24 percent increase in fuel efficiency, and a substantial reduction in emissions per MW-hr generated. The modifications to the facility will be referred to hereinafter as GWF Henrietta Combined-Cycle Power Plant (GWF Henrietta) with a new nominal generating capacity for this site of 120 MW net.

ES.1 Project Background

GWF Henrietta is located in Kings County, south of the City of Lemoore as shown on the regional setting map Figure 1-1. GWF Henrietta will occupy 9.86 acres that will be fenced within the existing GWF owned 20-acre parcel adjacent to the existing PG&E 70-kV Henrietta Substation. GWF Henrietta will retain the capability to operate in a simple-cycle configuration. New once-through steam generators (OTSGs) will be installed to allow the plant to be operated in its current simple-cycle configuration with no steam generation but with the selective catalytic reduction (SCR) and oxidation catalyst in operation, or to operate as a combined-cycle power plant generating an additional 25 MW of power with new proposed emission limits.

ES.2 Historical Background on Existing HPP CEC License

On August 23, 2001, GWF submitted an Application for Certification (AFC) to the CEC to develop a nominal 95 megawatt (MW) simple-cycle power plant that consisted of two GE LM-6000 natural gas fired combustion turbine generator (CTG) units and supporting systems in the vicinity of Lemoore in Kings County. The HPP was certified on January 31, 2002. The conditions of certification (COCs) were amended on July 28, 2003. The HPP was constructed and placed in service on July 1, 2002. It has been operating as a “peaker” to provide the critical peak energy requirements of the State of California under terms and conditions of a Power Purchase Agreement with the California Department of Water Resources.

ES.3 Project Description Overview

Major components and features of the proposed GWF Henrietta project include:

- Addition of two (2) new OTSGs, each receiving the exhaust from one of the existing General Electric LM6000 CTGs. The OTSGs will be vertical flow boilers with rectangular stacks that will be 91.5 feet tall, by 13 feet wide, by 8.9 feet long.

- Demolition and removal of the two existing oxidation catalyst and SCR systems, including the existing 85-foot stacks.
- Addition of a new oxidation catalyst system within each OTSG to control CO emissions to outlet concentration not to exceed 3 ppmvd at 15 percent O_2 and VOC emissions to outlet concentration not to exceed 2 ppmvd at 15 percent O_2 during simple-cycle and combined-cycle operation.
- Addition of a new SCR system within each OTSG reusing the existing aqueous ammonia storage system to control NO_x emissions not to exceed 2 ppmvd at 15 percent O_2 during combined-cycle operation and 2.5 ppmvd at 15% O2 during simple-cycle operation.
- Addition of a new 25 MW (net) condensing steam turbine generator (STG) with associated lube oil cooler.
- Addition of a new 74-foot tall by 120-foot long by 84-foot wide Air Cooled Condenser (ACC) for system heat rejection.
- The addition of a new 42 MMBtu/hr auxiliary boiler with an approximate overall height of 20 feet. The stack will be approximately 4 feet in diameter and 30 feet in height.
- Modification of the existing natural gas distribution system within the existing HPP for the new GWF Henrietta auxiliary boiler.
- Onsite modifications to the water piping, fire protection, and the storm water drainage collection systems.
- Replacement of the existing HPP storm water retention basin for storm water management. The new basin will be larger than the existing basin by approximately 2,200 cubic yards and relocated to the east side of the site expanding the existing fence line. Cut and fill from the retention basin relocation will be retained onsite and incorporated into filling the existing basin and final facility grading.
- Addition of a new water treatment building to house required equipment for boiler feed water makeup water.
- Modification of the wastewater treatment system to optimize water supply requirements and minimize off-site wastewater disposal.
- Increase in water consumption of approximately 8 AFY for OTSG feed water makeup and the lube oil cooler makeup.
- No change to the existing water supply or service connection from the Westlands Water District (WWD) and Kings County.
- Addition of a generator step-up transformer and circuit breaker into the existing onsite 70-kV switchyard to transmit the STG power output to the PG&E grid.
- No change to the existing site access.
- Temporary disturbance of 4.52 acres for construction laydown and parking on a previously disturbed portion of the 20.0-acre parcel that is outside of the existing plant fence line, but previously used for construction laydown and parking during the

construction of HPP. The 4.52 acres would be surrounded with temporary construction fencing for security measures.

- Permanent disturbance associated with the ACC, OTSGs, STG package, and storm water basin relocation would expand the 7-acre site to a total of 9.86 acres as shown on Figure 1-2; this is based on the additional 2.86 acres that will be permanently disturbed by GWF Henrietta. The increase in permanently disturbed areas would occur within the GWF owned 20-acre parcel.

GWF Henrietta will retain the capability and option to operate in a simple-cycle configuration. When operated in simple-cycle mode, the OTSG will not generate steam but the SCR and oxidation catalyst will continue to operate. Simple-cycle operation is expected to be equal to or less than 1,350 hours per year. The reason for retaining the option to operate in simple-cycle configuration is to preserve the plant's current 10-minute start capability to provide the Cal-ISO with rapid response peak generation resources.

Emission limits for simple-cycle operation will remain the same as those currently permitted for the HPP except for the following emission limit reductions:

CO - will be reduced from 6 ppmvd to 3 ppmvd at 15 percent O_2; and

NO_x - will be reduced from 3.6 ppmvd to 2.5 ppmvd at 15 percent O_2.

ES.4 License Amendment Organization

This License Amendment is comprised of the following sections and contents:

Section 1.0: An overview of the Amendment, the necessity for the proposed change, and the consistency of the changes with the CEC Decision certifying the facility.

Section 2.0: A complete description of the proposed modifications, including updated drawings.

Section 3.0: An assessment of the potential environmental effects of the proposed changes in terms of 14 environmental discipline areas.

Section 4.0: A discussion of proposed revisions to the HPP Conditions of Certification.

Section 5.0: A discussion of how the modification affects the public.

Section 6.0: A list of property owners potentially affected by the modification.

Section 7.0: A discussion of the potential effect on nearby property owners, the public and the parties in the application proceedings.

Section 8.0: A list of the references used in the preparation of this Amendment. All figures referenced in the text are located at the end of each section.

ES.5 Summary of Environmental Analysis

Pursuant to the CEC's siting regulations contained in Title 20, California Code of Regulations, section 1769 *et seq*., this supplemental analysis for an amendment to the HPP Final Decision (CEC, 2002) addresses all the requirements necessary for a determination of the potential environmental impacts of the proposed project modifications and whether any such impacts would require new or revised COCs in order to reduce any impacts to a level of insignificance. Fourteen areas of possible environmental impacts were examined. A complete description of this analysis is presented in Section 3.0. In many cases, this analysis is based on information previously incorporated into the record for the approved HPP; these documents are incorporated by reference for this License Amendment:

TABLE ES-1
GWF Henrietta - Documents Incorporated by Reference

Document	Citation	Topic Addressed
California Energy Commission (CEC). 2003. Commission Order Approving Project Modification, Henrietta Peaker Project (HPP). July.	(CEC, 2003)	Approval of the Minor Amendment Petition.
California Energy Commission (CEC). 2002. Final Decision on the Henrietta Peaker Project Application for Certification. January.	(CEC, 2002)	Final Commission Decision on AFC; Approved with Conditions.
California Energy Commission (CEC). 2001. Staff Assessment of the Henrietta Peaker Project Application for Certification. December.	(CEC, 2001)	CEC Staff's Assessment of the HPP AFC.
GWF Energy, LLC. 2003. Petition for Minor Air Quality Amendment, Henrietta Peaker Project (HPP).	(GWF, 2003)	Petition to amend six of the Air Quality COCs; reducing PM_{10} emission limits, simplifying the emissions tracking for startups and shutdowns, and eliminating the restriction on the number of startups and shutdowns.
GWF Energy, LLC. 2001a. Application for Certification (AFC), Henrietta Peaker Project (HPP), Kings County, California. Prepared by URS Consultants. August.	(GWF, 2001a)	AFC
GWF Energy, LLC. 2001b. Application for Certification (AFC) Supplement, Henrietta Peaker Project (HPP), Kings County, California. Prepared by URS Consultants. August.	(GWF, 2001b)	AFC Supplement; addresses data adequacy comments.

Therefore, the Applicant requests that information from the CEC proceedings from HPP, 01-AFC-18, be incorporated by reference in this proceeding California Code of Regulations [CCR 1704 (a)(2)]. A Reference CD containing all applicable background material is included as Attachment G.

Because GWF Henrietta will result in limited construction and operational changes within the existing HPP site, the assessment conducted in Section 3.0 indicates that adoption of the Amendment will not result in any significant, unmitigated adverse environmental impacts.

Similarly, GWF Henrietta will continue to comply with all applicable laws, ordinances, regulations and standards (LORS). In addition, the Applicant believes that the findings and conclusions contained in the HPP Final Decision granting certification of the HPP are still applicable to the project, as revised. A discussion of proposed revisions to the existing HPP COCs is included in Section 4.0.

ES.6 Applicant Contact Information

The primary contacts for this petition for license amendment are provided below:

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1.0 Introduction

1.1 Background

GWF Energy LLC hereby petitions to amend the license for the Henrietta Peaker Plant (HPP) (01-AFC-18). Figure 1-1 shows the project location and regional setting. This Amendment describes the following changes in the design, construction, and operation of the project:

- Addition of two (2) new OTSGs, each receiving the exhaust from one of the existing General Electric LM6000 CTGs. The OTSGs will be vertical flow boilers with rectangular stacks that will be 91.5 feet tall, by 13 feet wide, by 8.9 feet long.
- Demolition and removal of the two existing oxidation catalyst and SCR systems, including the existing 85-foot stacks.
- Addition of a new oxidation catalyst system within each OTSG to control CO emissions to outlet concentration not to exceed 3 ppmvd at 15 percent O_2 and VOC emissions to outlet concentration not to exceed 2 ppmvd at 15 percent O_2 during simple-cycle and combined-cycle operation.
- Addition of a new SCR system within each OTSG reusing the existing aqueous ammonia storage system to control NO_x emissions not to exceed 2 ppmvd at 15 percent O_2 during combined-cycle operation and 2.5 ppmvd at 15% O2 during simple-cycle operation.
- Addition of a new 25 MW (net) condensing steam turbine generator (STG) with associated lube oil cooler.
- Addition of a new 74-foot tall by 120-foot long by 84-foot wide Air Cooled Condenser (ACC) for system heat rejection.
- The addition of a new 42 MMBtu/hr auxiliary boiler with an approximate overall height of 20 feet. The stack will be approximately 4 feet in diameter and 30 feet in height.
- Modification of the existing natural gas distribution system within the existing HPP for the new GWF Henrietta auxiliary boiler.
- Onsite modifications to the water piping, fire protection, and the storm water drainage collection systems.
- Replacement of the existing HPP storm water retention basin for storm water management. The new basin will be larger than the existing basin by approximately 2,200 cubic yards and relocated to the east side of the site expanding the existing fence line. Cut and fill from the retention basin relocation will be retained onsite and incorporated into filling the existing basin and final facility grading.
- Addition of a new water treatment building to house required equipment for boiler feed water makeup water.

- Modification of the wastewater treatment system to optimize water supply requirements and minimize off-site wastewater disposal.
- Increase in water consumption of approximately 8 AFY for OTSG feed water makeup and the lube oil cooler makeup.
- No change to the existing water supply or service connection from the Westlands Water District (WWD) and Kings County.
- Addition of a generator step-up transformer and circuit breaker into the existing onsite 70-kV switchyard to transmit the STG power output to the PG&E grid.
- No change to the existing site access.
- Temporary disturbance of 4.52 acres for construction laydown and parking on a previously disturbed portion of the 20.0-acre parcel that is outside of the existing plant fence line, but previously used for construction laydown and parking during the construction of HPP. The 4.52 acres would be surrounded with temporary construction fencing for security measures.
- Permanent disturbance associated with the ACC, OTSGs, STG package, and storm water basin relocation would expand the 7-acre site to a total of 9.86 acres as shown on Figure 1-2; this is based on the additional 2.86 acres that will be permanently disturbed by GWF Henrietta. The increase in permanently disturbed areas would occur within the GWF owned 20.0-acre parcel

This Amendment contains all of the required information pursuant to the CEC Siting Regulations CCR Title 20, Section 1769, Post Certification Amendments and Changes. The information necessary to fulfill the requirements of Section 1769 is contained in Sections 1.0 through 6.0 as summarized in Table 1-1.

TABLE 1-1
Informational Requirements for Post-Certification Amendments and Changes

Section 1769 Requirement	Section of Petition Fulfilling Requirement
(A) A complete description of the proposed modifications, including new language for any conditions that will be affected	Section 2.0—Proposed modifications Section 4.0—A discussion of proposed revisions to the HPP COCs
(B) A discussion of the necessity for the proposed modifications	Section 1.3
(C) If the modification is based on information that was known by the petitioner during the certification proceeding, an explanation why the issue was not raised at that time	Section 1.3
(D) If the modification is based on new information that changes or undermines the assumptions, rationale, findings, or other bases of the final decision, an explanation of why the change should be permitted	Sections 1.4, 3.1 to 3.15, and Section 4.0
(E) An analysis of the impacts the modification may have on the environment and proposed measures to mitigate any significant adverse impacts	Section 3.1 to 3.15

TABLE 1-1
Informational Requirements for Post-Certification Amendments and Changes

Section 1769 Requirement	Section of Petition Fulfilling Requirement
(F) A discussion of the impact of the modification on the facility's ability to comply with applicable laws, ordinances, regulations, and standards	Section 3.1 to 3.15
(G) A discussion of how the modification affects the public	Section 5.0
(H) A list of property owners potentially affected by the modification	Section 6.0
(I) A discussion of the potential effect on nearby property owners, the public and the parties in the application proceedings.	Section 7.0

1.2 Ownership of GWF Henrietta

GWF Energy LLC will construct, own, and operate GWF Henrietta. GWF Energy LLC is owned by PSEG Global LLC and Harbert Power Corporation. GWF Energy LLC currently operates three peaker projects in Hanford, Lemoore, and Tracy, California with a combined generation capacity of approximately 362 MW. All of the electricity produced by the three facilities is sold to the California Department of Water Resources under a 10-year contract.

1.3 Necessity of Proposed Changes

The CEC Siting Regulations require a discussion of the necessity for the proposed amendment to the HPP Final Decision and whether the revision is based on information known by the petitioner during the certification proceeding (Title 20, CCR, Sections 1769 [a][1][B], and [C]). These proposed changes are based on information that became known to the petitioner after the HPP was certified. These changes are needed to allow GWF to respond to market demand for additional efficient power generation beyond the term of GWF's existing DWR contract. GWF will expand electrical power generation by converting the existing HPP power generation to a more efficient operating design. The additional power will support California's growing energy demands, especially during peak summer conditions, which will have a beneficial impact on the public pursuant to Title 20, CCR, Sections 1769 [a][1][G]. A major advantage of the proposed conversion is the enhancement in electric generation efficiency created by the conversion, an approximate 24% increase in fuel efficiency, and a substantial reduction in emissions per MW-hr generated.

1.4 Consistency of Changes with Certification

The Siting Regulations also require a discussion of the consistency of the proposed project revision with applicable LORS and whether the modifications are based upon new information that changes or undermines the assumptions, rationale, findings, or other bases of the final decision (Title 14, CCR Section 1769 [a][1][D]). If the project is no longer consistent with the certification, the Amendment must provide an explanation why the modification should be permitted.

This Amendment modifies the basis for the HPP Final Decision (CEC, 2002). Based on the analysis presented in Section 3.0, the project will comply with all applicable LORS and will not cause any significant, unmitigated environmental impacts. Any necessary modifications to COCs are addressed at the end of each section of the environmental analysis.
A discussion of proposed revisions to COCs are included in Section 4.0.

1.5 Summary of Environmental Impacts

The CEC Siting Regulations require that an analysis be conducted to address the potential impacts GWF Henrietta may have on the environment and propose measures to mitigate any potentially significant adverse impacts (Title 20, CCR, Section 1769 [a][1][E]). The regulations also require a discussion of the impact of GWF Henrietta on the facility’s ability to comply with applicable LORS (Section 1769 [1][a][F]). Section 3.0 of this Amendment includes a discussion of the potential environmental impacts associated with GWF Henrietta, as well as a discussion of the consistency of the modification with LORS. For discipline areas affected by the proposed revisions to the HPP, Section 3.0 also includes any information necessary to update environmental baseline information to reflect significant changes in baseline conditions that may have occurred. Section 3.0 concludes that there will be no significant environmental impacts associated with implementing the actions specified in the Amendment and that the project as modified will comply with all applicable LORS.

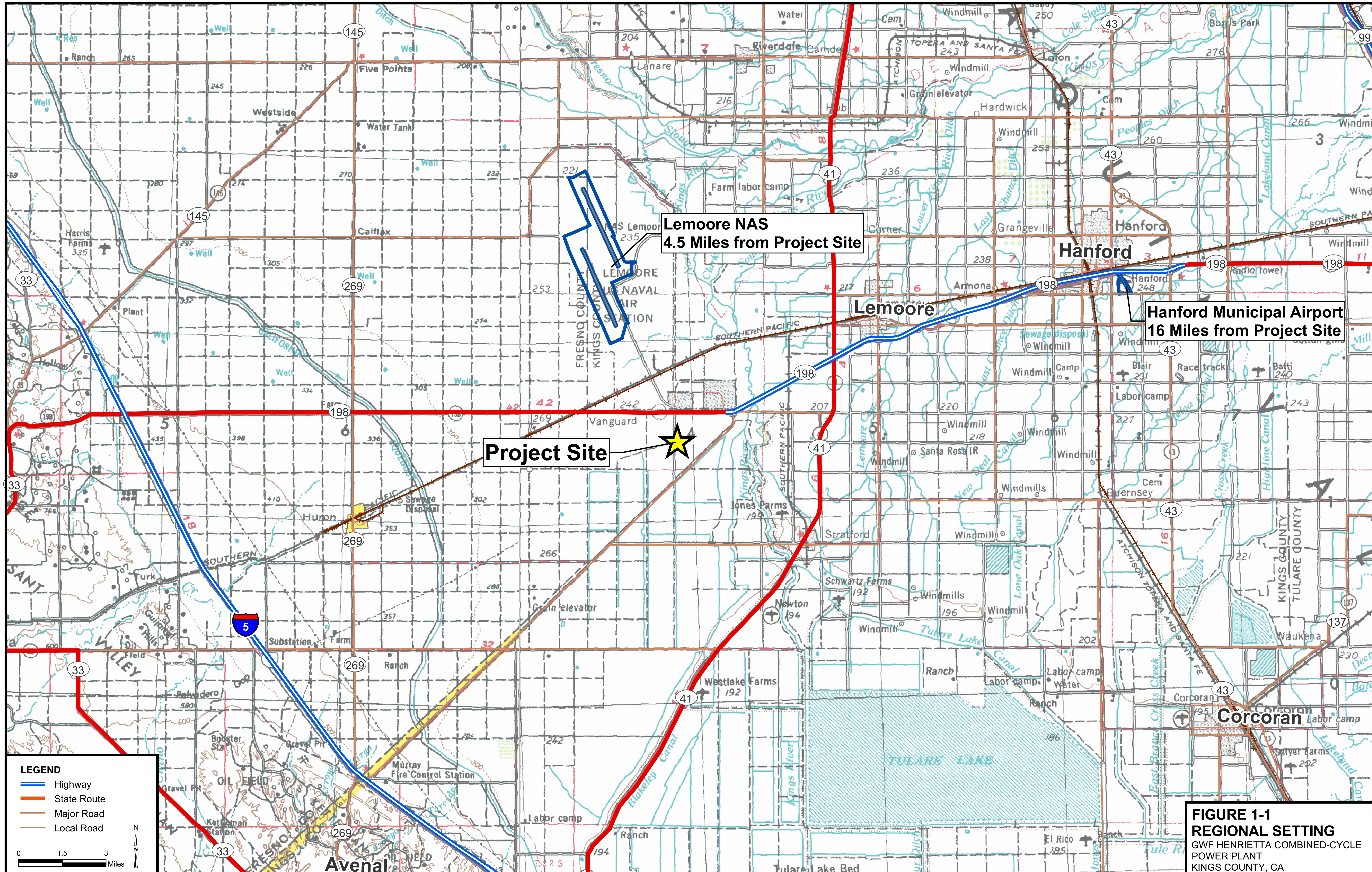

FIGURE 1-1
REGIONAL SETTING
GWF HENRIETTA COMBINED-CYCLE POWER PLANT
KINGS COUNTY, CA

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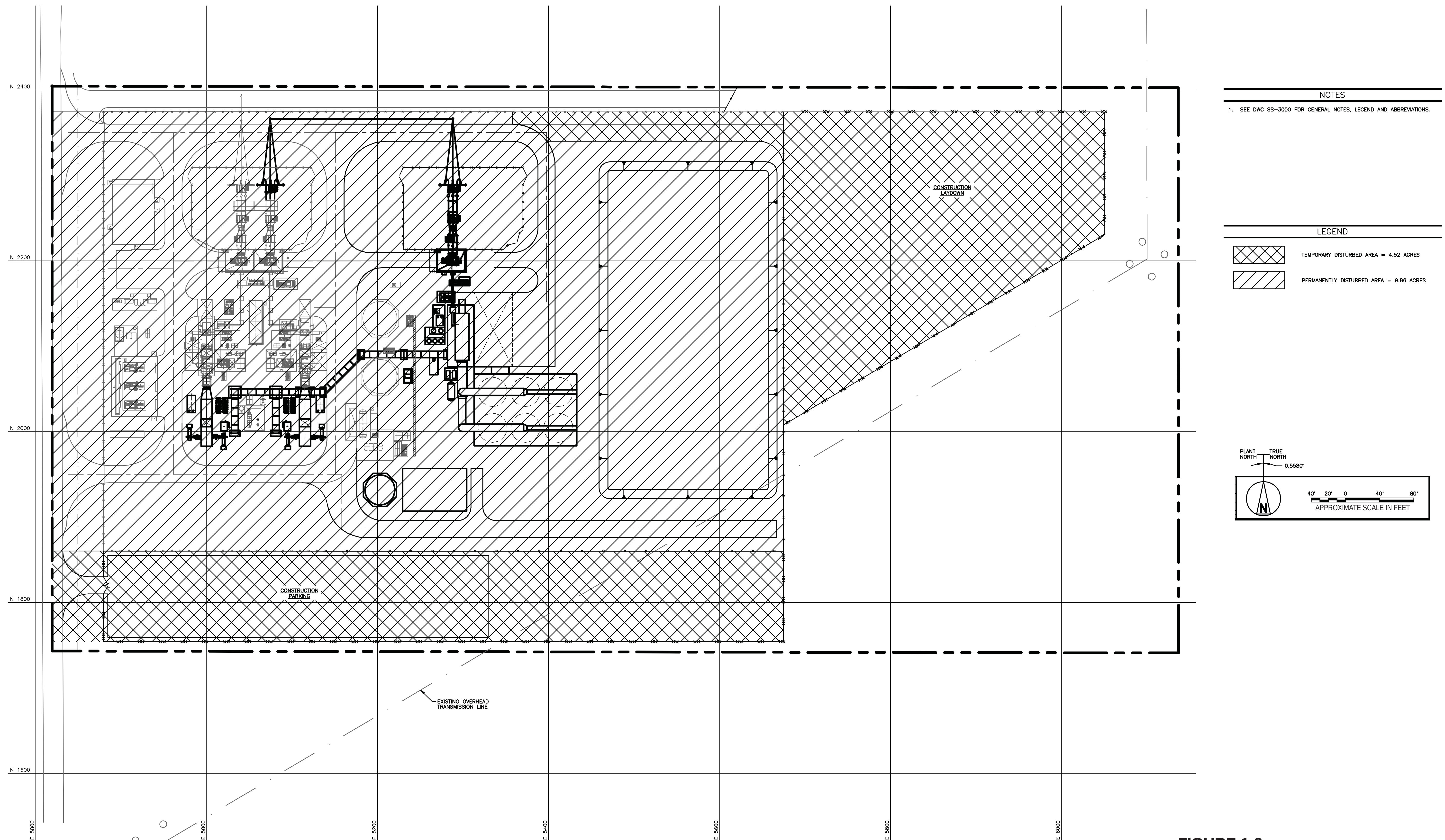


FIGURE 1-2
DISTURBED AREAS
GWF HENRIETTA COMBINED-CYCLE POWER PLANT
KINGS COUNTY, CA

CH2MHILL

2.0 Project Description

2.1 Introduction

On August 23, 2001, GWF submitted an Application for Certification (AFC) to the CEC to develop a nominal 95 MW simple-cycle power plant that consisted of two GE LM-6000 natural gas fired combustion turbine generator (CTG) units and supporting systems in the vicinity of the City of Lemoore in Kings County. The project known as the Henrietta Peaker Plant (HPP) [01-AFC-18] was approved and certified on January 31, 2002. The HPP was constructed and placed in service on July 1, 2002. It has been operating as a “peaker” to provide the critical peak energy requirements of the State of California under terms and conditions of a Power Purchase Agreement with the California Department of Water Resources.

GWF proposes to modify the existing HPP to create a dual-function power plant, by replacing the existing selective catalytic reduction (SCR) equipment with a “once through steam generator (OTSG)” unit that contains SCR to each CTG and adding a steam turbine generator unit with a nominal 25 MW, net, of additional generating capacity. The modifications to the facility will be referred to hereinafter as GWF Henrietta Combined-Cycle Power Plant (GWF Henrietta) with a new nominal generating capacity of 120 MW net.

2.1.1 Project Summary and Background

GWF Henrietta will occupy 9.86-acres that will be fenced within the existing GWF owned 20-acre parcel adjacent to the PG&E 70-kV Henrietta Substation in Kings County as shown on Figure 1-1. GWF Henrietta will have the ability to be operated in the “simple-cycle” mode without steam generation retaining the current emission limits, with the exception that the carbon monoxide (CO) would be reduced to 3.0 ppmvd at 15 percent O_2. When additional power is requested by the California Independent System Operators (CAISO) GWF Henrietta would utilize the OTSGs to produce steam for the 25 MW steam turbine generator. During the “combined-cycle” operations there would be no supplementary firing of natural gas in the OTSGs. Operating in the combined-cycle mode would reduce the emissions from the CTGs as discussed in Section 3.1, Air Quality. GWF Henrietta will create an additional 2.86 acres of permanent disturbance due to the necessary relocation of the Storm Water Retention Basin.

2.1.2 Major Components of Proposed GWF Henrietta

Major components and features of GWF Henrietta are described in Section 1.1.

GWF Henrietta will retain the capability and option to operate in a simple-cycle configuration. When operated in simple-cycle mode, the OTSG will not generate steam but the SCR and oxidation catalyst will continue to operate. Simple-cycle operation is expected to be equal to or less than 1,350 hours per year. The reason for retaining the option to operate in simple-cycle configuration is to preserve the plant’s current 10-minute start capability to provide the Cal-ISO with rapid response peak generation resources.

Emission limits for simple-cycle operation will remain the same as those currently permitted for the HPP except for the following emission limit reductions:

CO - will be reduced from 6 ppmvd to 3 ppmvd at 15 percent O_2; and

NO_x - will be reduced from 3.6 ppmvd to 2.5 ppmvd at 15 percent O_2.

2.2 Generating Facility Description, Design, and Operation

This subsection describes GWF Henrietta's facility design and operation.

2.2.1 Site Arrangement and Layout

The GWF Henrietta site layout drawing and general arrangement are shown on Figure 2-1. The typical elevation views shown on Figures 2-2 illustrate the location and size of GWF Henrietta. GWF Henrietta would be visually compatible with the existing industrial and agricultural setting of the surrounding area. The visual simulations with and without GWF Henrietta are included in Section 3.12 Visual Resources. The textual descriptions of the appearance and the architectural treatments to be employed in GWF Henrietta are also provided in Section 3.12.

2.2.2 Process Description

GWF Henrietta would consist of two existing General Electric (GE) LM6000 PC Sprint CTGs equipped with water injection for control of NO_x, power augmentation, and evaporative cooling for cooling of the CT air inlet. Two OTSGs will utilize the exhaust heat from the CTGs to generate steam and each will be equipped with an aqueous ammonia-type SCR system to control NO_x and an oxidation catalyst to control CO and VOCs. Steam from the two OTSGs will flow through a 25 MW (net) condensing STG. Cooling of the steam cycle would utilize a new ACC.

The OTSG exhaust gases will each discharge through a rectangular stack that is 13 feet in width and 8.9 feet in length. The stack height is 91 feet, 6 inches above grade. Approximately 2.5 total MW will be consumed by the internal electrical demands of the plant, resulting in an additional net plant output of 25 MW. GWF Henrietta is expected to operate up to 8,000 hours per year (excluding start-ups and shutdowns), including up to 1,350 hours per year in a simple-cycle configuration and 6,650 hours in combined-cycle configuration. The heat balances for power plant base load operation are presented on Figures 2-3A, 2-4A, 2-5A. The three cases evaluated are at 15, 63, and 115 degrees Fahrenheit (°F).

Associated equipment includes emission control systems necessary to meet the proposed emission limits while operating in the combined-cycle configuration. Oxides of Nitrogen (NO_x) emissions will not exceed 2 ppmvd, corrected to 15 percent O_2 by a combination of water injection into the CTG combustor and a SCR system. Carbon monoxide (CO) emissions from the CTG will be controlled with an oxidation catalyst to 3 ppmvd or less at 15 percent O_2. Volatile organic compounds (VOCs) will be controlled to 2 ppmvd or less at 15 percent O_2 using the same oxidation catalyst. Ammonia (NH_3) slip will be controlled to 5 ppmvd during combined-cycle operations. When the CTGs are dispatched in simple-cycle mode the emissions from each CTG will meet the current emissions limits utilizing the SCR and oxidation catalyst systems with the exception of NO_x and CO which will be reduced to 2.5 ppmvd and 3 ppmvd at 15 percent O_2, respectively.

2.2.2.1 Generating Facility Cycle

The HPP is based on a simple-cycle (Brayton) configuration. CTG combustion air flows through an inlet air filter and evaporative cooler and associated air inlet ductwork, is compressed, and then flows to the CTG combustion section. Natural gas fuel is injected into the compressed air in the combustion section and then ignited. Water is injected in the combustor to reduce NO_x formation, into the compressor to increase power production, and into the CTG inlet for evaporative cooling. The hot combustion gases expand through the turbine section of the CTG, causing it to rotate and drive the electric generator and CTG compressors.

GWF Henrietta will allow the simple-cycle units to be operated as either a simple- or combined-cycle plant by installing OTSGs to capture the waste heat from the CTG (bottoming cycle). The hot CTG exhaust gases will flow through an OTSG to produce super-heated steam. The combined steam flow from both OTSGs will drive a single new 25 MW (net) steam turbine generator. Low pressure steam from the steam turbine generator will exhaust to a new ACC, where it will be condensed and converted from the steam phase to the water phase and returned to the OTSGs as boiler feed water, closing the bottoming cycle portion of the plant.

2.2.2.2 Combustion Turbine Generators, Heat Recovery Steam Generators, Steam Turbine Generator, and Condenser

Electricity will be produced by the two existing CTGs and the single, new STG. The following subsections describe the major components of the generating system.

2.2.2.3 Combustion Turbine Generators (CTG)

This equipment is unchanged from the HPP Final Decision (CEC, 2002) and will consist of two natural gas-fired General Electric LM6000 CTGs equipped with water injection and evaporative inlet air coolers, generating nominal 95 MW as described in Section 1.0 of the HPP AFC (GWF, 2002).

2.2.2.4 Once Through Steam Generators (OTSG)

The OTSGs will recover heat from the exhaust gases of the CTGs to convert de-mineralized feed-water, into high pressure steam. There will be one OTSG per existing CTG. Each OTSG will be a continuous tube heat exchanger in which preheating, evaporation, and superheating of the feed water will take place consecutively. Within the OTSG, tubes will be mounted in parallel and will be joined by headers. This will provide a common inlet for feed water and a common outlet for steam. Water will be forced through the tubes by a boiler feed water pump. The water will change phase as it flows through the circuit of tubes and will exit the OTSG as superheated steam. Each OTSG will be of a 2-pressure configuration (high pressure and low pressure). The following support systems will be incorporated into the overall OTSG design.

- SCR, CO, and VOC oxidation catalysts as described in Section 2.2.11 of this Section.

- Aqueous ammonia injection grid and vaporizer skid for use with the SCR. The existing aqueous ammonia storage system will continue to be used to supply the new SCR.
- Boiler feed water pumps.

2.2.2.5 Steam Turbine Generator (STG)

Steam generated in the OTSGs will be routed to a new two-pressure STG. The steam turbine will extract the thermal energy from the pressurized steam and convert it to mechanical work. The generator, which will be coupled to the steam turbine, will convert the mechanical work into 13.8-kV electricity. The electric power will be routed through a generator breaker and transformed to 70-kV AC electricity through the Generator Step-Up Transformer (GSU). After the STG, the steam will exit through the low pressure turbine exhaust and into the ACC.

The STG will consist of a high pressure and low pressure turbine and will be of a two case multiple shaft design. It will be coupled to an electric generator with an approximate rated size of 32 MVA. The STG set will be supported by auxiliary systems that include the following:

- Lubricating Oil System – consisting of a tank, heater, and pumps
- Lube Oil Cooler consisting of a fin-fan cooler in parallel with a wet surface air cooler (WSAC)
- Hydraulic Oil System – consisting of a tank, and pumps
- Exciter, Automatic Voltage Regulator, and Power System Stabilizer
- STG controls system
- Gland Steam System
- Generator Breaker

2.2.2.6 Air Cooled Condenser (ACC)

There will be one ACC with sufficient surface area to reject heat from the steam cycle to the atmosphere. The ACC will be elevated and support by a steel structure to ensure adequate air flow. The ACC will consist of the following components and auxiliary systems:

- Approximately 6 modules each of which will contain an A-frame fin and tube heat exchanger and a two speed electrical fan assembly.
- Steam transfer duct from the exhaust outlet of the turbine to the ACC.
- Steam supply distribution headers and condensate drain headers on the ACC.
- Drain piping and storage tank for condensate collection.
- Forwarding pumps to convey condensate back to the OTSG feed water system.
- A dedicated Motor Control Center (MCC).

- An air removal system either by ejectors or liquid ring vacuum pump to maintain adequate ACC vacuum.
- Addition of noise attenuation to reduce sound levels from fans, pumps, and ejectors, as necessary.

2.2.2.7 Auxiliary Boiler

A natural gas fired 42 MMBtu/hr auxiliary steam boiler would be used to generate warming steam for steam turbine casings and steam piping systems during preparation for the start-up of the combined-cycle power plant. The auxiliary boiler would have a 30 foot tall, 48 inch diameter stack and fitted with 6 ppm low-NO_x burner technology.

2.2.3 Major Electrical Equipment and Systems

The electrical energy generated by GWF Henrietta will be delivered to the PG&E electrical transmission/distribution grid. GWF Henrietta will generate its own auxiliary loads, including pumps, fans, control systems, and general facility loads such as lighting, heating, and air conditioning. Some power will also be converted from alternating current (AC) to direct current (DC) for use as backup power for control systems and other uses. The following sections describe the transmission system and GWF Henrietta's internal electrical systems.

2.2.3.1 AC Power—Transmission

Power will be generated by the STG at 13.8-kV. An overall single-line diagram of the facility's electrical system is shown on Figure 2-6. The 13.8-kV generator output will be connected to an oil-filled generator step-up transformer, which will increase the voltage to 70-kV. Surge arresters will be provided at the high-voltage bushings to protect the transformers from surges on the 70-kV system caused by lightning strikes or other system disturbances. The transformer will be set on concrete pads within a containment area designed to contain the transformer oil in the event of a leak or spill. The high-voltage side of the step-up transformer would be connected to the plant's 70-kV switchyard. Power would then flow to PG&E's 70-kV Henrietta Substation which is adjacent to the GWF Henrietta site.

2.2.3.2 AC Power—Distribution to Auxiliaries

Auxiliary power to the STG power block will be distributed at 480 volts AC by expansion of the existing 480-volt low-voltage (LV) switchgear lineup through the addition of 480V switchgear. Primary power to the additional switchgear will be supplied by one 60-Hz, two-winding unit auxiliary transformers, which will reduce the voltage at the low side of the generator step-up transformers from 13.8-kV to 480 volts. The transformer will be the outdoor oil-filled type. The 480-volt system will be high-resistance grounded to minimize the need for individual ground fault detection. The 480-volt, wye-connected, LV side of the new auxiliary transformer will be connected to the 480-volt switchgear through a normally closed main breaker. The 13.8-kV, delta-connected, high-voltage (HV) side of the unit auxiliary transformers will be connected through a breaker to the isolated phase bus duct between the generator breaker and the LV side of the generator step-up transformers. This connection will allow the switchgear to be powered from the auxiliary transformer with the

STGs on- or off-line. The auxiliary transformer will be provided with an off-load tap changer on the HV side.

The 480-volt switchgear will provide power through a feeder breaker to the 480-volt MCC. The MCC will distribute power to smaller 480-volt motors, to 480-volt power panels, and other intermediate 480-volt loads required for the STG power block, OTSG, and ACC. The MCCs will distribute power to 480- to 480/277-volt isolation transformers if 277-volt, single-phase lighting loads are to be served. The 480-volt power panels will distribute power to small 480-volt loads.

Power for the AC power supply (120-volt/208-volt) system will be provided by the 480-volt MCC and 480-volt power panels. Transformation of 480-volt power to 120/208-volt power will be provided by 480- to 120/208-volt, dry-type transformers.

2.2.3.3 125-Volt DC Power Supply System

The DC power supply system for STG loads will consist of one 125-volt DC battery bank, one 125-volt DC full-capacity battery charger, metering, ground detectors, and distribution panels. A 125-volt DC system will also be supplied as part of the STG unit. The existing 125-volt DC system will provide DC power for the additional equipment used in the expanded substation.

Under normal operating conditions, the battery chargers will supply DC power to the DC loads. The battery chargers will receive 480-volt, three-phase AC power from the AC power supply (480-volt) system and continuously charge the batteries while supplying power to the DC loads. The ground detection scheme will detect grounds on the DC power supply system.

Under abnormal or emergency conditions, when power from the AC power supply (480-volt) system is unavailable, the batteries will supply DC power to the system loads.

The 125-volt DC system will also be used to provide control power to the 4,160-volt switchgear, the 480-volt switchgear, critical control circuits, protective relays, and the emergency DC motors.

2.2.3.4 Uninterruptible Power Supply System

The additional equipment will be served by the existing equipment and remains unchanged from the HPP AFC (GWF, 2001a).

2.2.3.5 Electrical Clearances

High-voltage overhead transmission lines are composed of bare conductors connected to supporting structures by means of porcelain, glass, or polymer insulators. The air surrounding the energized conductor acts as the insulating medium. Maintaining sufficient clearances, or air space, around the conductors to protect the public and utility workers is paramount to the safe operation of the line. The safety clearance required around the conductors is determined by normal operating voltages, conductor temperatures, short-term abnormal voltages, windblown swinging conductors, contamination of the insulators, clearances for workers, and clearances for public safety. Minimum clearances are specified in the California Public Utility Commission (CPUC) General Order (GO) 95. Typically, clearances are specified for the following:

- Distances between energized conductors.
- Distances between energized conductors and supporting structures.
- Distances between energized conductors and other power or communication wires on the same supporting structure, or between other power or communication wires above or below the conductors.
- Distances from energized conductors to the ground and other features such as roadways, railroads, driveways, parking lots, navigable waterways, airports, etc.
- Distances from energized conductors and buildings and signs.
- Distances from energized conductors and other parallel power lines.
- GWF Henrietta design will satisfy all of the above criteria.

2.2.3.6 Audible Noise and Radio Interference

Corona may result in the production of audible noise from a transmission line. Corona is a function of the voltage of the line, the diameter of the conductor, and the condition of the conductor and suspension hardware. The electric field gradient is the rate at which the electric field changes and is directly related to the line voltage. Corona typically becomes a concern for transmission lines having voltages of 345-kV or more. Since GWF Henrietta will be generating electricity at 13.8-kV and connect at 70-kV, it is expected that no corona-related design issues will be encountered, and that the construction and operation of GWF Henrietta will not result in any significant increase in audible noise or radio interference.

2.2.3.7 Induced Currents and Hazardous/Nuisance Shocks

The 70-kV transmission interconnection will be designed and constructed in conformance with CPUC GO95 and Title 8 California Code of Regulations (CCR) 2700 requirements. Therefore, hazardous shocks are unlikely to occur as a result of GWF Henrietta construction or operation.

2.2.3.8 Electric and Magnetic Fields

Operating power lines, like the energized components of electrical motors, home wiring, lighting, and all other electrical appliances, produce electromagnetic fields (EMF). EMF produced by the AC electrical power system in the United States has a frequency of 60 Hertz (Hz), meaning that the intensity and orientation of the field changes 60 times per second. Considerable research has been conducted over the past 30 years on the possible biological and human health effects from EMF. This research has produced many studies that offer no uniform conclusions about potential harm of long-term exposure to EMF. In the absence of conclusive or evocative evidence, California has chosen not to specify maximum acceptable levels of EMF. Instead, California mandates a program of prudent avoidance whereby EMF exposure to the public is minimized by encouraging electric utilities to use low-cost techniques to reduce EMF levels. The construction and operation of the Project will not result in any significant increase in EMF levels.

2.2.4 Fuel System

This fuel system equipment is unchanged from that described in Section 2.0 of the HPP AFC. Consistent with the description in the HPP AFC, the CTGs will be designed to burn natural gas. Natural gas will continue to be delivered to the site via pipeline and pressurized onsite.

2.2.5 Water Supply and Use

This section describes the quantity of water required, the source of the water supply, water quality, and water treatment requirements. Water balance diagrams for operation at 63°F ambient air temperature and 60 percent relative humidity, and at 98°F ambient air temperature and 36 percent relative humidity, showing the various water requirements and estimated flow rates for the facility at annual average and peak daily conditions respectively, are presented in Figures 2-7 and 2-8.

The current HPP water usage is approximately 150 AFY. GWF Henrietta will require approximately 158 AFY. Control of NOx in the CTGs, makeup water supply for the evaporative coolers on the CTG air intake, and power augmentation of the CTGs will require 150 AFY. The two OTSGs and the STG lube oil cooler will require approximately 8 AFY, increasing the total water supply requirements to 158 AFY. The current HPP water supply is made up of two sources: (1) 200 ac-ft of State Water Project (SWP) surface water delivered from the California Aqueduct from Kings County by WWD and (2) 52 ac-ft of Central Valley Project (CVP) surface water delivered from the California Aqueduct by the Westlands Water District (WWD) from the existing service pipeline. Additionally, GWF has legal control of approximately 2,000 acre-feet of SWP entitlements associated with the Land Purchase Option Agreement held for 750 acres adjacent to GWF Henrietta. The Land Purchase Option Agreement is currently being revised to cover 950 acres of land and 2,600 acre-feet of SWP entitlements (this revised agreement will be submitted to the CEC under separate cover upon completion). GWF Henrietta's water supply will be composed of the three water supply sources listed above. The water supply agreements are included in Attachment E.

2.2.5.1 Water Requirements

Figure 2-7 shows a breakdown of the estimated annual average water requirements for GWF Henrietta based on annual average temperature of 63 °F. Figure 2-8 shows the estimated peak daily water requirements for GWF Henrietta based on a combined-cycle plant operating 24 hours per day at an ambient temperature of 98 °F.

2.2.5.2 Water Quality

An analysis of the water sources is provided in Section 3.10 (Soil and Water Resources).

2.2.5.3 Water Treatment

As mentioned previously, Figures 2-7 and 2-8 provide GWF Henrietta's water balance of the water treatment and distribution system. GWF Henrietta water use can be divided into the following two categories based on the quality required: (1) demineralized water (via the project's reverse osmosis system) for makeup to the steam cycle; and (2) service water for the plant, which includes all other miscellaneous uses. Equipment required to obtain these two levels of quality is described in the following paragraphs.

GWF Henrietta will include a water treatment system for treating the water supply, which will provide higher quality water suitable for use in the combustion turbine evaporative coolers, water injection system, and OTSG makeup. Water treatment will be performed through the use of a microfiltration system, a multistage reverse osmosis (RO) system, and a mobile de-mineralized trailer system. Demineralized water will be stored in an onsite tank. In addition, demineralized water will be used for CTG compressor washing. This water processing system will minimize the use of makeup water in the plant. Untreated supply water will be used for other purposes, such as in the service and fire water systems and the STG lube oil cooler.

Figures 2-9 and 2-10 include grading and drainage plans for GWF Henrietta, which illustrate storm water collection and disposal routes. All collected storm water will be routed to the detention pond on the east side of GWF property.

2.2.5.4 Demineralized Makeup-Water for the Steam Cycle

Demineralized water will be used for makeup-water for the steam cycle. Demineralized water will be produced from the raw water received from the WWD and stored in an existing 300,000-gallon demineralized water storage tank.

2.2.6 Plant Cooling Systems

The steam cycle heat rejection system will consist of low pressure steam ducting, ACC, and condensate collection system. Low pressure steam from the turbine will exhaust into the ACC where it is condensed to water for reuse in the steam cycle. The ACC is expected to have 6 cells which will consist of the ACC heat exchanger and electric fan. Air will flow through the ACC heat exchanger tubes carrying the steam exhaust providing the low temperature sink to enable steam to condense to a liquid.

An auxiliary cooling loop system will also be provided for the STG lube oil cooler, STG generator cooler, STG hydraulic control system, boiler feed pump lube oil, and seal water coolers. The auxiliary cooling water system will be closed loop consisting of a fin-fan heat exchanger in parallel with a wet surface air cooler (WSAC) for heat rejection.

2.2.7 Waste Management

Waste management is the process whereby all wastes produced at GWF Henrietta are properly collected, managed, treated off site, if necessary, and disposed of off site. Wastes include process and sanitary wastewater, solid non-hazardous waste and hazardous waste, both liquid and solid. Waste management is discussed in more detail in Sections 3.5 and 3.13.

2.2.7.1 Wastewater Collection, Treatment, and Disposal

The water-balance diagrams for GWF Henrietta are included as Figures 2-7 and 2-8. These Figures show the expected flow rates of the wastewater streams for both average annual ambient temperature (63 °F) and peak daily ambient temperature (98 °F). As illustrated, the primary wastewater discharge for the plant will be from the water RO treatment and demineralization systems. Oil waste streams from the oil-water separator and turbine wash-water will be collected in separate holding tanks and will also be periodically transported off site for recycle or disposal.

2.2.7.1.1 Reverse Osmosis Reject/Mixed Bed Demineralizer Disposal

Waste water that is generated as a result of the common demineralized water reverse osmosis system will be reclaimed and returned to the common raw water tank by a waste recovery system. The mixed bed polishing units will be regenerated off-site and will produce no liquid or solid wastes inside GWF Henrietta.

2.2.7.1.2 Plant Drains and Oil/Water Separator

The additional equipment will be served by the existing drains and equipment and remains unchanged from the description in Section 2.0 of the HPP AFC. As described in the AFC, contact storm water runoff associated with the operation and maintenance phase will be confined within the site and routed to an oil-water separator. The water from the separator will be used for makeup water and the recovered oil will be kept in a separate tank and disposed of off-site periodically. The drainage system has been designed to manage storm water runoff resulting from a maximum 10-day, 100-year rainfall event.

2.2.7.1.3 Storm Water Management

The existing HPP storm water retention basin will re-located and re-sized to accommodate GWF Henrietta as shown on Figure 1-2. The new basin will be expanded by approximately 2,200 cubic yards (relocating the basin to the east side of the site expanding the existing fence line). Cut from the retention basin relocation will be retained onsite and incorporated into filling the existing basin and final facility grading. With the exception of the relocated retention basin, storm water management practices remain unchanged from those described in the HPP AFC. Consistent with these practices, storm water runoff from equipment areas on the site will be routed to an oil-water separator for processing and recovery and controlled and contained within GWF Henrietta.

2.2.7.1.4 Solid Waste

The Solid Waste Management Plan described in the HPP AFC will be updated to include GWF Henrietta. GWF Henrietta will produce solid wastes typical of power generation facilities which are described in greater detail in the HPP AFC. These materials will be collected by a waste collection company and transported to a material recovery facility. A recycling program will be implemented for GWF Henrietta and remaining residues will be land filled. The Solid Waste Management Plan will cover both construction and operation of GWF Henrietta.

2.2.7.1.5 Hazardous Waste

Hazardous waste management plan remains described in the HPP AFC will be updated to include GWF Henrietta. Consistent with the AFC discussion, a number of measures will be used to properly manage and dispose of hazardous wastes generated by GWF Henrietta. Some of these measures include retaining licensed recycling contractors and providing hazardous materials and waste handling training to onsite workers.

2.2.7.1.6 Hazardous Materials

Hazardous Materials management remains unchanged from that described in the HPP AFC. As described in the AFC, all chemicals stored onsite for use in GWF Henrietta construction or operation will be kept in appropriate chemical storage facilities compliant with all applicable laws, ordinances, regulations and standards. Safety equipment such as showers and eye-washing stations will be provided in the vicinity of chemical storage and use areas. A revised list of the chemicals anticipated for use at GWF Henrietta is described in

Section 3.5.1 for the construction phase and in Table 3.5-1 for the operation and maintenance phase. These tables identify each chemical by type and intended use and estimate the quantity to be stored on site. Section 3.5 includes additional information on hazardous materials management and handling.

2.2.8 Emission Control and Monitoring

Air emissions from the combustion of natural gas in the CTG will be controlled using state-of-the-art systems. Emissions that will be controlled include NO_x, VOCs, and CO. To ensure that the systems perform correctly, continuous emissions monitoring systems (CEMs) will be installed on the OTSG stacks prior to release to the atmosphere. Section 3.1 Air Quality includes additional information on emission controls and monitoring. While operating in a simple-cycle configuration all emission limits will remain the same as identified in the original CEC license (01-AFC-18), except for the CO emission limits which will be reduced from 6 ppmvd to 3 ppmvd at 15 percent O_2 and NO_x that will be reduced from 3.6 to 2.5 ppmvd at 15 percent O_2. The emission limits mentioned in the following paragraphs only apply to the plant operating in "**combined-cycle**" configuration.

2.2.8.1 NO_x Emission Control

A SCR will be used to control NO_x concentrations in the exhaust gas emitted to the atmosphere to 2.0 or less ppmvd at 15 percent O_2 when operating in combined-cycle and 2.5 or less ppmvd at 15 percent O_2 when operating in simple-cycle. The SCR process will use aqueous ammonia. Ammonia slip, or the concentration of un-reacted ammonia in the exiting exhaust gas, will not exceed 5 ppmvd at 15 percent O_2 when operating in combined-cycle and 10 or less ppmvd at 15 percent O_2 when operating in simple-cycle. The SCR equipment will be located in the OTSG's. GWF Henrietta will continue to use the existing aqueous ammonia storage system, ammonia vaporization and injection system, and monitoring equipment and sensors.

2.2.8.2 Carbon Monoxide and Volatile Organic Compound Emission Control

CO and VOCs will be controlled using an oxidation catalyst located in the OTSGs. CO will be controlled to not exceed 3 ppmvd at 15 percent O_2, and VOCs will be controlled to not exceed 2 ppmvd at 15 percent O_2.

2.2.8.3 Particulate Emission Control

Particulate emissions will be controlled by using natural gas as the sole fuel for the CTGs. In addition, the CTGs will employ high-efficiency inlet air filtration to control fugitive dust.

2.2.8.4 Continuous Emission Monitoring Systems (CEMS)

The existing CEM systems will be used to sample, analyze, and record fuel gas flow rate, exhaust gas flow rate, NO_x and CO concentration levels, and percentage of O_2 in the stack exhaust gas. An existing SCR inlet NO_x analyzer will be used to calculate ammonia slip. This system will generate emission data reports in accordance with permit requirements and will send alarm signals to the plant control room when emission levels approach or exceed pre-selected limits.

2.2.9 Fire Protection

The fire protection system is designed to protect personnel and limit property loss and plant downtime in the event of a fire. An existing fire alarm system consisting of a control panel annunciator and an audible alarm will activate in the event of a plant fire. Untreated supply water from WWD will be used in the fire system and will be stored in onsite fire tanks. The existing system will be expanded to include the additional equipment and areas for GWF Henrietta.

The STG unit will be protected by a sprinkler system. Handheld fire extinguishers of the appropriate size, type, and rating will be located at code-approved intervals throughout the facility. Section 3.5 Hazardous Materials Management includes additional information on fire and explosion risk and Section 3.14 Worker Safety provides information on city and county fire protection capability.

2.2.10 Plant Auxiliaries

The following systems will support, protect, and control GWF Henrietta.

2.2.10.1 Lighting

Additions to the lighting system will be provided in the following areas:

- STG power block
- ACC
- Water Treatment building
- Transformer and switchgear additions
- Plant roads, and parking area additions

Lighting at GWF Henrietta will be maintained at levels necessary to meet security, operations and maintenance, and safety requirements. Security lighting will add to the HPP's overall safety. The illumination levels will be set in accordance with the latest edition of the *Illuminating Engineering Society (IES) Handbook* for power generating stations and comply with the COCs for the HPP (01-AFC-18). Generally, the lighting will be from fluorescent fixtures for interior applications and high-pressure sodium fixtures for exterior applications.

Emergency lighting will be provided in accordance with the NFPA. Emergency lighting fixtures will be incandescent and powered from the normal AC power source, with automatic transfer to the emergency backup batteries.

Exterior areas will use enclosed and gasketed high-pressure sodium fixtures suitable for the environment. All fixtures will be rigidly supported from a structure or from aluminum poles. All lighting will be appropriately shielded and directed inward to minimize offsite light and glare.

Lighting for outdoor locations will be controlled from local switches or photoelectric controllers. Indoor locations will be controlled from local switches.

2.2.10.2 Grounding

GWF Henrietta will include expansion of the existing grounding grid and lightning protection to the additional equipment and areas described in this document. Grounding cables will be bonded to the existing system and brought from the ground grid to connect to building steel, tanks, equipment, fences, and non-energized metallic parts of electrical equipment. Lightning protection will be furnished for buildings and structures in accordance with NFPA 780 or Underwriters Laboratories, Inc. (UL) 96 and 96A. Lightning protection requirements unique to the switchyard will be addressed as part of the electric transmission system in Section 2.2.5 Major Electrical Equipment and Systems.

2.2.10.3 Distributed Control System

The STG controls and monitoring will be integrated into the existing Supervisory Control System (SCS). The control system will provide modulating control, digital control, monitoring, and indicating functions for the respective plant power block systems. In general, the system will be capable of the following functions:

- Controlling the STG and supporting systems in a coordinated manner
- Controlling the ACC, water treatment equipment, and OTSG's
- Monitoring controlled plant equipment and process parameters and delivering this information to plant operators
- Providing control displays (printed logs, liquid crystal displays (LCD) for signals generated within the system or received from input/output (I/O)
- Providing consolidated plant process status information through displays presented in a timely and meaningful manner
- Providing alarms for out-of-limit parameters or parameter trends, displaying on alarm LCD(s), and recording on an alarm log printer
- Providing storage and retrieval of historical data

The exact control and monitoring functions may vary pending detailed design definition. The system is designed with sufficient redundancy to prevent a single device failure from significantly impacting overall plant control and operation. Critical control and safety systems will also have redundancy, as well as an uninterruptible power source.

Additional control and instrumentation design criteria may be found in Attachment A.2 – Design Criteria.

2.2.10.4 Cathodic Protection

GWF Henrietta's cathodic protection system will be an expansion of the system described in Section 1.0 of the HPP AFC. The cathodic protection system will be designed to control the electrochemical corrosion of designated metal piping buried in the soil. Either passive or impressed current cathodic protection will be provided depending up the corrosion potential and the soil characteristics on site.

2.2.10.5 Freeze Protection

GWF Henrietta's freeze protection system will be an expansion of system described in Section 1.0 of the HPP AFC. The freeze protection system will provide heat to various outdoor pipes, gauges, pressure switches, and other devices to protect them from freezing temperatures. The power supply for the freeze protection circuits will be controlled by an ambient temperature thermostat.

2.2.10.6 Service Air

The existing service air system, previously described in Section 1.0 of the HPP AFC, will be modified as part of GWF Henrietta to supply compressed air to additional project equipment. The service air system will supply compressed air to hose connections via distribution headers located at various points throughout the facility.

2.2.10.7 Instrument Air

The instrument air system for HPP will be modified to supply compressed air to additional GWF Henrietta equipment previously described.

2.2.11 Interconnection to Electrical Grid

The STG will be connected to an individual, dedicated, three-phase step-up transformer, which will be connected to the existing HPP's 70-kV switchyard. The switchyard will consist of an airbreak disconnect switch and SF6 circuit breakers. From the switchyard, the generated power will be transmitted into the PG&E substation adjacent to the facility. See Section 2.2.5 Major Electrical Equipment and Systems for additional information on the interconnection to the PG&E Henrietta Substation.

A system impact study (SIS) is currently being completed by Navigant Consulting and will be provided to CEC Staff as soon as it is available (expected completion in October 2008). Preliminary results from the SIS indicate that no physical modifications will be required beyond the first point of interconnection at the PG&E Henrietta Substation located adjacent to GWF Henrietta.

2.2.12 Project Construction

Construction of the generating facility, from site preparation and grading to commercial operation, is expected to take place from February 2011, to April 2012, for a total duration of 15 months of actual construction. Major milestones are listed in Table 2-1.

Access to GWF Henrietta will be from 25th Avenue. The onsite construction laydown area and a construction parking area are shown on Figure 2-11. It is anticipated that materials and equipment will be delivered to the site by truck.

The average and peak workforce on the project during construction will be approximately 87 and 157 respectively, including construction craft persons and supervisory, support, and construction management personnel (see Table 2-2).

Construction will be scheduled between 6 a.m. and 6 p.m., Monday through Saturday. Additional hours may be necessary to make up schedule deficiencies or to complete critical construction activities. During the start-up phase of the project, some activities will continue

24 hours a day, seven days a week. The construction period is scheduled to be 15 months in length. The peak construction workforce is expected to last from month 7 through month 12 of the construction period, with month 9 being the peak month.

Anticipated construction deliveries by truck, both standard and heavy haul, are presented in Table 2-3. The highest frequency of construction deliveries will occur during months 2 through 9, with the peak occurring in month 3.

TABLE 2-1
GWF Henrietta Major Construction Milestones

Activity	Date
Contractor Mobilization	Month 1
Site Preparation	Month 1
SCR Demolition	Month 1 - 2
Underground Piping	Month 2 - 5
Foundations	Month 2 - 7
Tank	Month 6 - 7
Pipe Rack	Month 6 - 10
Air Cooled Condenser	Month 8 - 12
Pipe	Month 7 - 12
Once Through Steam Generator	Month 9 - 11
Steam Turbine and Generator	Month 8 - 13
STG Enclosure	Month 12 - 13
Mechanical Equipment	Month 7 - 13
Electrical Equipment	Month 7 - 15
Substation	Month 8 - 11
Start-up and Commissioning	Month 13 - 15
Contractor De-mobilization	Month 15

TABLE 2-2
GWF Henrietta Construction Workforce by Trade by Month

Year	**2011**									**2012**						
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	
Craft/Trade	**Feb**	**March**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**March**	**Apr**	**Total Person Months**
Boilermakers									4	4	4	2				14
Carpenters	2	5	5	5	4	3	2	3								29
Cement Masons	1	2	2	2	2	2	2									13
Electricians						6	6	27	33	33	33	27	22	16	11	214
Insulators												3	3	3	3	12
Ironworkers		5	10	15	15	15	10	10	10	8	5					103
Laborers	3	5	10	10	10	8	6	9	6					4	3	74
Millwrights						3	7	10	15	12	10	7	5			69
Operators	3	6	6	6	6	6	5	4	5	5	5	5	5	5	5	77
Painters												2	2	3	2	9
Plumbers/Pipefitters						10	27	31	32	33	36	35	15	10		229
Teamsters	1	1	1	1	1	1	2	2	2	2	2	2	1	1	1	21
Indirect Craft	3	3	6	8	9	15	20	20	20	20	25	25	10	7	3	194
CM Staff	5	5	6	8	11	15	20	20	30	30	30	25	20	15	5	245
Total Site Staff	**18**	**32**	**46**	**55**	**58**	**84**	**107**	**136**	**157**	**147**	**150**	**133**	**83**	**64**	**33**	**1303**

TABLE 2-3
Anticipated Construction Deliveries, Standard Truck and Heavy Haul

Year					**2011**								**2012**			
Month	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	
Standard Truck Deliveries	**Feb**	**March**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**March**	**Apr**	**Total**
OTSG's							8	16	33	41	30					128
STG								2	6	8	7					23
Mechanical Equipment						25	38	58	79	46	58					304
Electrical Equipment & Materials					19	22	24	27	32	26	28	22	20	12	12	244
Piping, Supports, & Valves					11	26	28	36	38	36	39	29	28	29	38	338
Concrete & Rebar	148	184	326	227	191	135	80									1291
Steel/Architectural	16	18	27	24	19	10	5									119
Consumables & Supplies	21	26	36	39	44	44	46	46	42	38	32	27	24	23		488
Contractor Mobilization	4	4	3		2	3	3	3	3	3	2	1				31
Contractor Demobilization											5	8	10	8		31
Total	**189**	**232**	**392**	**290**	**286**	**265**	**232**	**188**	**233**	**198**	**201**	**87**	**82**	**72**	**50**	**2997**
Heavy Haul Deliveries																
OTSG's									5	7	3					15
STG's								6								6
Transformer's										1						1
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**6**	**5**	**8**	**3**	**0**	**0**	**0**	**0**	**22**
Total Truck Deliveries	**189**	**232**	**392**	**290**	**286**	**265**	**232**	**194**	**238**	**206**	**204**	**87**	**82**	**72**	**50**	**3019**

2.2.13 Generating Facility Operation

The number of new employees required for operations and maintenance of GWF Henrietta is projected to be 14. GWF Henrietta will retain the plant's current ability to operate up to 8,000 hours per year (excluding start-up and shutdowns); 1,350 hours per year in a simple-cycle configuration and 6,650 hours in a combined-cycle configuration.

2.2.14 Site Security

Security of the facilities will be maintained on a 24-hour basis. In the unlikely event that a temporary cessation of operations is required, a contingency plan will be implemented in conformance with applicable LORS for the protection of public health, safety, and the environment. Depending on the expected duration of the shutdown, the plan may include the removal of chemicals from storage tanks and other equipment and the safe shutdown of all equipment. All wastes will be disposed of according to applicable LORS. If the cessation of operations becomes permanent, decommissioning will be undertaken (see Section 2.4 Facility Closure).

2.3 Engineering

In accordance with CEC siting regulations, this subsection, together with the engineering attachments (Attachment A.2 Design Criteria) and other pertinent sections, including Section 2.0 Project Description; and Section 3.10 Water Resources Water Resources; presents information concerning the design and engineering of GWF Henrietta. These sections describe the design, reliability, and estimated thermal efficiency of the facility. The LORS applicable to the engineering of GWF Henrietta are provided in Attachment A.1 LORS along with a list of agencies that have jurisdiction, the contact persons within those agencies, and a list of the permits that will be required.

2.3.1 Facility Design

A detailed description of GWF Henrietta is provided in Section 2.2, Generating Facility Description, Design, and Operation. Design for safety is provided in Section 2.3.1.1, Facility Safety Design.

Geotechnical aspects for GWF Henrietta are based on available information, are discussed in Section 3.4, Geology and Paleontology.

Descriptions of the design criteria are included in the following attachments to the Amendment:

- Attachment A.2.1, Foundation and Civil Engineering
- Attachment A.2.2, Structural and Seismic Engineering
- Attachment A.2.3, Mechanical Engineering
- Attachment A.2.4, Control Engineering
- Attachment A.2.5, Electrical Engineering

Design and engineering information and data for the following systems are found in the following subsections of this amendment:

- **Power Generation**—See Section 2.2.2.2, Combustion Turbine Generators, Once Through Steam Generators, Steam Turbine Generator, and Condenser. Also see Attachment A and Sections 2.2.2 through 2.2.5, which describe the various plant auxiliaries.
- **Heat Dissipation**—See Section 2.2.6, Plant Cooling Systems and Attachment A.
- **Cooling Water Supply System**—See Section 2.2.5, Water Supply and Use and Attachment A.
- **Air Emission Control System**—See Section 2.2.8, Emission Control and Monitoring, and Section 3.1, Air Quality.
- **Waste Disposal System**—See Section 2.2.7 and Section 3.13, Waste Management.
- **Noise Abatement System**—See Section 3.7, Noise.
- **Switchyards/Transformer Systems**—See Section 2.2.3, Major Electrical Equipment and Systems; Section 2.2.3.1, AC Power-Transmission; and Attachment A.

2.3.1.1 Facility Safety Design

GWF Henrietta will be designed to maximize safe operation. Potential hazards that could affect the facility include earthquake, flood, and fire. Facility operators will be trained in safe operation, maintenance, and emergency response procedures to minimize the risk of personal injury and damage to the plant.

2.3.1.1.1 Natural Hazards

The potential natural hazard impacts related to GWF Henrietta are unchanged from those described in the HPP AFC. The site is located in a Seismic Risk Zone 3. The principal natural hazards associated with this site include earthquakes, floods and lightning strikes. Measures taken to protect against natural hazard related impacts include designing structures to meet the seismic requirements of the California Code of Regulations Title 24 and the 2007 California Building Code. The site is not located within the 100-year or 500-year floodplain.

2.3.1.1.2 Emergency Systems and Safety Precautions

This subsection discusses the fire protection systems, emergency medical services, and safety precautions to be used by project personnel. Section 3.9, Socioeconomics, includes additional information on area medical services, and Section 3.14, Worker Safety, includes additional information on safety for workers. Attachment A contains the design practices and codes applicable to safety design for the project. Compliance with these requirements will minimize project effects on public and employee safety.

2.3.1.1.3 Fire Protection Systems

The project will rely on both the onsite existing HPP fire protection systems and local fire protection services. The existing plant fire protections system will be expanded to provide fire protection for the added GWF Henrietta systems.

2.3.1.1.4 Onsite Fire Protection Systems

The HPP system will be expanded to protect equipment additions as mentioned previously. The fire protection systems will be designed to protect personnel and limit property loss and plant downtime in the event of a fire or explosion. The project will have the following fire protection systems:

- **Fire Protection System.** GWF Henrietta will expand the existing HPP fire system to protect the steam turbine, generator, lube oil system, ACC, and other auxiliary systems. The system would have fire detection sensors in all compartments. A sprinkler system would be installed to protect the steam turbine bearings and associated lube oil system.
- **Fire Hydrants.** This system will be expanded as necessary to protect new installed equipment and facilities and will supplement the plant fire protection system. Water will be supplied from the plant underground fire water system.
- **Fire Extinguisher.** The plant administrative building and other buildings will be equipped with portable fire extinguishers as required by the local fire department.
- **Local Fire Protection Services.** The fire protection services are unchanged from the HPP Final Decision and AFC project materials as described in the reference materials in Attachment G.

2.3.1.1.5 Personnel Safety Program

This program will be unchanged from that discussed in the HPP AFC and will incorporate GWF Henrietta. GWF Henrietta employees will be instructed in the safety regulations pertinent to their employment tasks. Safe working conditions, work practices and PPE requirements will be communicated following a set directive. GWF will implement both construction and operational health and safety programs. The construction and operational Safety Programs will include provisions to ensure compliance with requirements of Cal-OSHA's Injury and Illness Prevention Program (IIPP) (Title 8, California Code of Regulations [CCR], Section 1509 and 3203). Appropriate exposure monitoring will be conducted to evaluate potential employee exposures to hazardous/toxic materials. A Fire Protection and Prevention Program will be followed throughout all phases of construction and operation and will provide the specified firefighting equipment. An emergency action plan (EAP) will be developed for the construction and operations phase of GWF Henrietta. Finally, a variety of other written safety programs specific to both construction and operation related tasks will be established.

2.3.2 Facility Reliability

This subsection discusses the expected facility availability, equipment redundancy, fuel availability, water availability, and project quality control measures.

2.3.2.1 Facility Availability

GWF Henrietta's availability is expected to be in the range of 92 to 98 percent. GWF Henrietta will be designed for an operating life of 30 years. Reliability and availability projections are based on this operating life. However, it is conceivable that GWF Henrietta could operate for a longer period. Operation and maintenance (O&M) procedures will be consistent with standard industry practices to maintain the useful life of plant components.

2.3.2.2 Redundancy of Critical Components

The following subsections identify equipment redundancy as it applies to project availability. A summary of equipment redundancy is shown in Table 2-4. Final design could differ.

TABLE 2-4
Major Equipment Redundancy

Description	Number	Note
OTSGs	Two trains	No redundancy
STG	One train	No redundancy
Auxiliary Boiler	One train	No redundancy
ACC	One, 100 percent capacity	No redundancy
Compressed Air System	Two at 100 percent capacity	100 percent redundancy
STG Breaker	One	No redundancy
480V Auxiliary Transformers	One, 100 percent capacity	No redundancy
4160V Auxiliary Transformers	One per OTSG	No redundancy

2.3.2.2.1 Combined-cycle Power Block

Two separate CTG/OTSG trains will provide one STG with superheated steam to generate power. Each CTG will provide approximately 40 percent of the total combined-cycle power output. The exhaust gas from each CTG will be used to produce steam in the respective steam generation system. Thermal energy from the steam generation system will be converted to mechanical energy, and then electrical energy in the STG. The expanded steam from the STG will be condensed and recycled to the feed water system. The STG will contribute approximately 20 percent of total combined-cycle power output.

The major components of the combined-cycle power block consist of the following subsystems.

2.3.2.2.2 Combustion Turbine Generator Subsystems

The combustion turbine subsystems include the combustion turbine, inlet air filtration and evaporative coolers, generator and excitation systems, turbine lube oil system, hydraulic system, and turbine control and instrumentation. The combustion turbine will produce thermal energy through the combustion of natural gas and the conversion of the thermal energy into mechanical energy through rotation of the combustion turbine that drives the compressor and generator. Exhaust gas from the combustion turbine will be used to produce steam in the associated OTSG. The generator will be open air-cooled type.

The generator excitation system will be a solid-state static system. Combustion turbine control and instrumentation (interfaced with the DCS) will cover the turbine governing system, and the protective system.

2.3.2.2.3 Steam Generation Subsystems

The steam generation subsystems consist of the OTSG. The OTSG transfers heat from the CTG exhaust gas to feed water for steam production. This heat transfer produces steam at the pressures and temperatures required by the steam turbine. Each OTSG system consists of ductwork, heat transfer sections, an SCR system, an oxidation catalyst, and exhaust stack.

2.3.2.2.4 Steam Turbine Generator Subsystems

The steam turbine converts the thermal energy in the steam to mechanical energy to drive the STG. The basic subsystems include high pressure and low pressure steam turbines/gear boxes, auxiliary systems, turbine lube oil system, and generator/exciter system. The generator will be direct air-cooled.

The combined-cycle power block is served by the following balance-of-plant systems.

2.3.2.2.5 Supervisory Control System (SCS)

The existing SCS will be expanded to provide the following functions:

- Control the OTSGs, STG, and other systems in response to unit load demands (coordinated control)
- Provide control room operator interface
- Monitor plant equipment and process parameters and provide this information to the plant operators in a meaningful format
- Provide visual and audible alarms for abnormal events based on field signals or software-generated signals from plant systems, processes, or equipment

The SCS will have functionally distributed architecture comprising a group of similar redundant processing units linked to a group of operator consoles by redundant data highways. Each processor will be programmed to perform specific dedicated tasks for control information, data acquisition, annunciation, and historical purposes.

Plant operation will be controlled from the operator panel located in the control room. The operator panel will consist of two individual video/keyboard consoles. Each video/keyboard console will be an independent electronic package so that failure of a single package does not disable more than one video/keyboard.

2.3.2.2.6 Boiler Feed water System

The boiler feed water system transfers feed water to the OTSGs. The system will consist of two pumps per OTSG, each pump sized for 100 percent capacity for supplying one OTSG. The pumps will be multistage, horizontal, motor-driven with intermediate bleed-off, and will include regulating control valves, minimum flow recirculation control, and other associated piping and valves.

2.3.2.2.7 Condensate System

The condensate system will provide a flow path from the ACC condensate collection tank to boiler feed pumps. The condensate system will include two 100-percent capacity multistage, vertical, motor-driven condensate pumps.

2.3.2.2.8 Demineralized Water System

The demineralized water system will consist of an onsite water treatment system consisting of reverse osmosis arrays unit and mixed ion-exchange beds. Demineralized water will be stored in an existing 300,000-gallon demineralized water storage tank. The mixed beds will be leased mobile trailer-mounted units and will be regenerated off-site and will produce no liquid or solid wastes.

2.3.2.2.9 Power Cycle Makeup and Storage

The power cycle makeup and storage subsystem provides demineralized water storage and pumping capabilities to supply high-purity water for system cycle makeup and chemical cleaning operations. Major components of the system are the demineralized water storage tank, providing for more than a 6-hour supply of demineralized water at peak load, and two 100 percent capacity, horizontal, centrifugal cycle makeup water pumps.

2.3.2.2.10 Compressed Air

The compressed air system provides instrument air and service air to points of use throughout the facility. The existing compressed air system will be expanded to include two 100-percent capacity motor-driven air compressors, two 100-percent capacity air dryers with pre-filters and after filters, an air receiver, instrument air header, and service air header. All compressed air will be dried. A control valve will be provided in the service air header to prevent high consumption of service air from reducing the instrument air header pressure below critical levels.

2.3.2.2.11 Fuel Availability

Fuel will continue to be delivered through an existing system by Southern California Gas Company’s existing gas transmission distribution system. Capacity in the local system continues to be sufficient to supply GWF Henrietta. GWF Henrietta will continue to operate without a backup supply of natural gas, and if conditions warrant it, would be shut down until any natural gas outage is corrected and gas service restored.

2.3.2.2.12 Water Availability

The water supply for GWF Henrietta will continue to be SWP water from Kings County and CVP water, both delivered by Westlands Water District (WWD). The water supply for GWF Henrietta is discussed in more detail in Section 3.10 (Soil and Water Resources). Water for drinking purposes will be delivered by bottled water contractors, consistent with HPP AFC.

2.3.2.3 Project Quality Control

The objective of GWF Henrietta’s Quality Control Program is to ensure that appropriate quality measures are applied to all systems and components during design, procurement, manufacturing, construction, and operation. The goal of the Quality Control Program is to achieve the desired levels of safety, reliability, availability, operability, constructability, and maintainability for the generation of electricity.

Quality assurance for a system is obtained by applying appropriate controls to various activities. For example, the appropriate controls for design work are checking and review, and the appropriate controls for manufacturing and construction are inspection and testing. Appropriate controls will be applied to each project activity.

2.3.2.4 Project Stages

For quality assurance planning purposes, the project activities have been divided into the following nine stages that apply to specific periods of time during the project (these applicable design criteria are included in Attachment A.2):

- **Conceptual Design Criteria.** Activities such as definition of requirements and engineering analyses.
- **Detail Design.** Activities such as the preparation of calculations, drawings, and lists needed to describe, illustrate, or define systems, structures, or components.
- **Procurement Specification Preparation.** Activities necessary to compile and document the contractual, technical and quality provisions for procurement specifications for plant systems, components, or services.
- **Manufacturer's Control and Surveillance.** Activities necessary to ensure that the manufacturers conform to the provisions of the procurement specifications.
- **Manufacturer Data Review.** Activities such as review of manufacturers' drawings, data, instructions, procedures, plans, and other documents to ensure coordination of plant systems and components, and conformance to procurement specifications.
- **Receipt Inspection.** Inspection and review of product at the time of delivery to the construction site.
- **Construction/Installation.** Inspection and review of storage, installation, cleaning, and initial testing of systems or components at the facility.
- **System/Component Testing.** Actual operation of generating facility components in a system in a controlled manner to ensure that the performance of systems and components conform to specified requirements.
- **Plant Operation.** As the project progresses, the design, procurement, fabrication, erection, and checkout of each generating facility system will progress through the nine stages defined above.

2.3.2.5 Quality Control Records

The following quality control records will be maintained for review and reference:

- Project instructions manual
- Design calculations
- Project design manual
- Quality assurance audit reports
- Conformance to construction records drawings
- Procurement specifications (contract issue and change orders)
- Purchase orders and change orders
- Project correspondence

For procured component purchase orders, a list of qualified suppliers and subcontractors will be developed. Before contracts are awarded, the subcontractors' capabilities will be evaluated. The evaluation will consider suppliers' and subcontractors' personnel, production capability, past performance, and quality assurance program.

During construction, field activities are accomplished during the last two stages of the project: receipt inspection, construction/installation, system/component testing, and plant operations. The construction contractor will be contractually responsible for performing the work in accordance with the quality requirements specified by contract.

The subcontractors' quality compliance will be surveyed through inspections, audits, and administration of independent testing contracts.

A plant operation and maintenance program, typical for a project this size, will be implemented by GWF Henrietta to control operation and maintenance quality. A specific program for this project will be defined and implemented during initial plant start-up.

2.4 Facility Closure

The section provides information regarding the temporary or permanent closure for GWF Henrietta. This section provides the following related to facility closure for GWF Henrietta:

- A schedule for the development of a preliminary closure plan for closing GWF Henrietta facility when it ceases operations at the end of its useful life.
- A discussion of how facility closure will be accomplished in the event of premature or unexpected cessation of operations of GWF Henrietta facility prior to the end of its useful life.

Facility closure can be temporary or permanent. Temporary closure is defined as a shutdown for a period exceeding the time required for normal maintenance, including closure for replacement of the combustion turbines or other major equipment and systems. Causes for temporary closure may include a long-term disruption in the supply of natural gas or damage to the plant from natural disasters or emergency situations. Permanent closure is defined as a cessation in operations with no intent to restart operations owing to plant age, damage to the plant beyond repair, plant retirement, economic or commercial conditions, or other reasons. Section 2.4.1 discusses temporary facility closure; Section 2.4.2 discusses planned permanent facility closure, and Section 2.4.3 discusses unexpected permanent closure.

Facility closure for the generation facilities at GWF Henrietta can be grouped into the following categories: unexpected temporary cessation of operations, planned permanent cessation of operations, premature permanent cessation of operations, and unexpected permanent cessation of operations. Unexpected temporary cessation of operations occurs when a facility ceases operations suddenly and/or unexpectedly on a short-term basis, due to unplanned circumstances such as a natural disaster or other unexpected event or emergency. Planned permanent cessation of operations occurs when a facility is closed in a planned, orderly manner, such as at the end of its useful economic or mechanical life, or due to unfavorable economic conditions. Premature permanent cessation of operations may occur due to unforeseen circumstances such as a severe catastrophic event that damages the facility beyond economic repair, rapid technological advances that render the plant uncompetitive, or similar situations. Unexpected permanent cessation of operations occurs if the owner unexpectedly closes a facility permanently.

In the event of a permanent cessation of operations of GWF Henrietta, whether planned or unplanned, the Applicant will work closely with the CEC and other responsible agencies to assure that power plant equipment and facilities are removed, and the site restored to a condition acceptable to the CEC.

2.4.1 Unexpected Temporary Cessation of Operations

Unexpected temporary or short-term cessation of operations at a natural gas-fired power plant, such as GWF Henrietta, can result from a number of unforeseen circumstances. Conditions such as lack of fuel, oversupply of electricity, mechanical failure, or other factors may force units to be shut down temporarily. Natural disasters such as earthquakes or severe winter storms may also result in temporary shutdowns.

In the event of a short-term, unexpected temporary cessation of operations that does not involve facility damage, the Applicant will maintain GWF Henrietta in working condition so that GWF Henrietta is able to restart operations when the unexpected cessation of operations event is resolved or ceases to restrict operations. If there is a possibility of hazardous substances release, the Applicant will notify the CEC's compliance unit and appropriate local agencies in accordance with: (1) the applicable LORS in effect at the time; (2) the procedures set forth in GWF Henrietta's contingency plan elements described below; and (3) GWF Henrietta's facility Risk Management Plan.

In the event the temporary closure includes damage to the facility, and there is a release or threatened release of hazardous materials into the environment, the procedures set for GWF Henrietta's Risk Management Plan will be implemented. These procedures will include methods to control releases, notification of the CEC, applicable authorities and agencies and the public, emergency response, and training for GWF Henrietta plant personnel in responding to and controlling the release of hazardous materials. Once the immediate issue is resolved and the hazardous materials released are contained and cleaned up, temporary closure will proceed as described above for a temporary closure without a release of hazardous materials.

Depending on the expected duration of the temporary cessation of operations, chemicals may be drained from storage tanks and other equipment, and the integrity of the equipment and facilities will be maintained. The Applicant will handle and dispose of waste materials (hazardous and non hazardous) in accordance with the applicable LORS in effect at the time of unexpected temporary cessation of operations. The Applicant will maintain facility security procedures during temporary cessation of operations so GWF Henrietta is secure from trespass.

Prior to initiation of operations of GWF Henrietta, the Applicant will prepare an onsite contingency plan for GWF Henrietta and submit this plan to the CEC's compliance unit. The contingency plan will specifically address actions that will be implemented by the Applicant during temporary and unplanned or unexpected cessation of operations of GWF Henrietta. The plan will ensure that necessary steps to protect public health and safety, and mitigate potential environmental impacts, are taken in a timely manner in accordance with the applicable LORS in effect at the time. GWF Henrietta's contingency plan will include the following elements:

- Emergency response procedures and instructions for notification of, and coordination with, local emergency response agencies
- Procedures for taking immediate steps to secure the facility from trespassing and encroachment
- Procedures for safe shutdown and restart of equipment
- Procedures for dealing with hazardous materials and hazardous wastes within 90 days, including draining of tanks and equipment, and disposition of wastes
- Identification of applicable LORS in effect at the time
- Communication with the CEC, and responsible agencies regarding facility damage and compliance with LORS

The Applicant will periodically review GWF Henrietta's onsite contingency plan and will update the plan as necessary.

2.4.2 Planned Permanent or Premature Cessation of Operations

The anticipated life of the new combined-cycle units that will be installed by the Applicant as part of GWF Henrietta is a minimum of at least 30 years. Continued operation of GWF Henrietta beyond a minimum of 30 years is likely to be viable, especially with good maintenance practices and selective replacement of various plant equipment and components. Prior to planned permanent or premature cessation of operations of the new units at GWF Henrietta, the Applicant will prepare a closure plan as described below.

Depending on conditions at the time, the Applicant will decide whether to permanently close GWF Henrietta by decommissioning the units and removing all equipment and associated facilities or, if conditions warrant, the Applicant may decide to "mothball" GWF Henrietta for a period of time before making a final decision as to whether to restart the units, or to proceed with the permanently close GWF Henrietta. Future conditions that could affect planned or premature–permanent closure/decommissioning decisions are unknown at this time. It is, therefore, more appropriate to present the planned or premature, permanent closure to the CEC, and other responsible agencies when more information is available and when planned permanent or premature closure is imminent.

To ensure that permanent closure of GWF Henrietta will be completed in an environmentally acceptable manner that protects public health and safety, the Applicant will prepare and submit a closure/decommissioning plan to the CEC at least 12 months prior to initiation of planned closure/decommissioning. The plan will include the following:

- Proposed closure/decommissioning activities and schedule for GWF Henrietta and its associated facilities
- Identification and discussion of the impacts associated with the closure as well as appropriate mitigation measures, if necessary

- Applicable LORS, local/regional plans, and a discussion of conformance of the proposed closure/decommissioning activities with the LORS in effect at the time, and conformance with the COCs, and local/regional plans
- Activities necessary to restore the site if the plan requires removal of equipment and associated facilities
- Identification of any equipment to remain on site and a discussion regarding the future use of such facilities
- Associated costs of the proposed closure/decommissioning and the source of funds to pay for the closure/decommissioning
- Coordination with the CEC and other responsible agencies, including meetings and workshops, if necessary, to coordinate closure activities

In general, the Applicant will attempt to maximize the reuse and recycling of facility components during permanent closure/decommissioning activities for GWF Henrietta. If feasible, reusable equipment will be sold for reuse at other sites or relocated for use at other the Applicant facilities. Unsalvageable equipment and materials will be scrapped and recycled to the extent practical or disposed in accordance with the applicable LORS in effect at the time. Unused chemicals will be sold to the suppliers or to other purchasers or users. Equipment that contains chemicals will be drained and shut down to assure public health and safety, and to protect the environment. Non-hazardous wastes will be collected and disposed in appropriate landfills or waste collection facilities. Hazardous wastes will be disposed according to applicable LORS in effect at the time. The Applicant will secure the site 24 hours per day during closure/decommissioning activities at GWF Henrietta.

2.4.3 Unexpected Permanent Cessation of Operations

In the event of an unexpected permanent cessation of operations of GWF Henrietta, the Applicant will follow the procedures outlined in the HEP onsite contingency plan to assure that appropriate steps to mitigate public health and safety and environmental concerns are taken in a timely manner. As discussed above, prior to initiation of operations of GWF Henrietta, the Applicant will revised the existing contingency plan to incorporate GWF Henrietta and submit this plan to the CEC's compliance unit. The contingency plan will specifically address actions that will be implemented by the Applicant during unexpected permanent cessation of operations of the GWF Henrietta. The plan will ensure that necessary steps to protect public health and safety, and mitigate potential environmental impacts, are taken in a timely manner in accordance with the applicable LORS in effect at the time. GWF Henrietta's contingency plan will include the following elements:

- Emergency response procedures and instructions for notification of, and coordination with, local emergency response agencies
- Procedures for taking immediate steps to secure the facility from trespassing and encroachment
- Procedures for safe shutdown and start-up of equipment

- Procedures for dealing with hazardous materials and hazardous wastes within 90 days, including draining of tanks and equipment, and disposition of wastes
- Identification of applicable LORS in effect at the time
- Communication with the CEC, and responsible agencies regarding facility damage and compliance with LORS

The Applicant will periodically review GWF Henrietta's contingency plan and will update the plan as necessary.

In the event of an unexpected permanent cessation of operations of GWF Henrietta, the Applicant will notify the CEC and other responsible agencies. These agencies will be informed of the status of the unexpected permanent closure activities. Concurrently, the Applicant will prepare a permanent closure/decommissioning plan which will address the same issues as described above for the planned permanent closure/decommissioning plan. This plan will be developed in coordination with the CEC and other responsible agencies.

2.5 Laws, Ordinances, Regulations, and Standards

2.5.1 General Laws, Ordinances, Regulations, and Standards

The following LORS are generally applicable to the project:

- California Building Standards Code—2007
- Uniform Fire Code, Article 80
- Occupational Safety and Health Act—29 CFR 1910 and 29 CFR 1926
- Environmental Protection Agency—40 CFR 60, 40 CFR 75, 40 CFR 112, 40 CFR 302, 40 CFR 423, 40 CFR 50, 40 CFR 100, 40 CFR 260, 40 CFR 300, and 40 CFR 400
- California Code of Regulations—Title 8, Sections 450 and 750 and Title 24, 2001, Titles 14, 17, 19, 20, 22, 23, 26, and 27
- California Department of Transportation—Standard Specifications
- California Occupational Safety and Health Administration—Regulations and Standards
- California Business and Professions Code—Sections 6704, 6730, and 6736
- California Vehicle Code—Section 35780
- California Labor Code—Section 6500
- Federal Aviation Agency—Obstruction Marking and Lighting AC No. 70/7460-1H
- Kings County —Regulations and Ordinances

Codes and standards pertinent to GWF Henrietta are presented in Engineering LORS Attachment A.1 and relevant engineering design criteria in Attachment A.2. The applicable local LORS and local agency contacts involved in administration and enforcement are described below.

2.5.2 Local LORS

GWF Henrietta is located near Naval Air Station (NAS) Lemoore and the City of Lemoore, in an area zoned Exclusive Agriculture (AZ) which allows specified conditional uses including electrical generation and transmission facilities, and is therefore a conforming use. GWF Henrietta will be subject to all applicable regulations of Kings County (see Section 3.6, Land Use.)

2.6 Local Agency Contacts

Table 2-5 lists local agency contacts.

TABLE 2-5
Local Agency Contacts

Agency	Contact	Title	Telephone
Kings County Fire Department	Brandon Jones	Station #2 Captain	(559) 924-2626
Kings County Public Works/Building Department	Bill Zumwalt	Director of Planning and Building Inspection	(559) 582-3211 ext. 2686
Kings County Environmental Health	Tim Fillmore	Supervising Environmental Health Officer	(559) 584-1411 ext. 2629

2.7 Local Permits Required and Permit Schedule

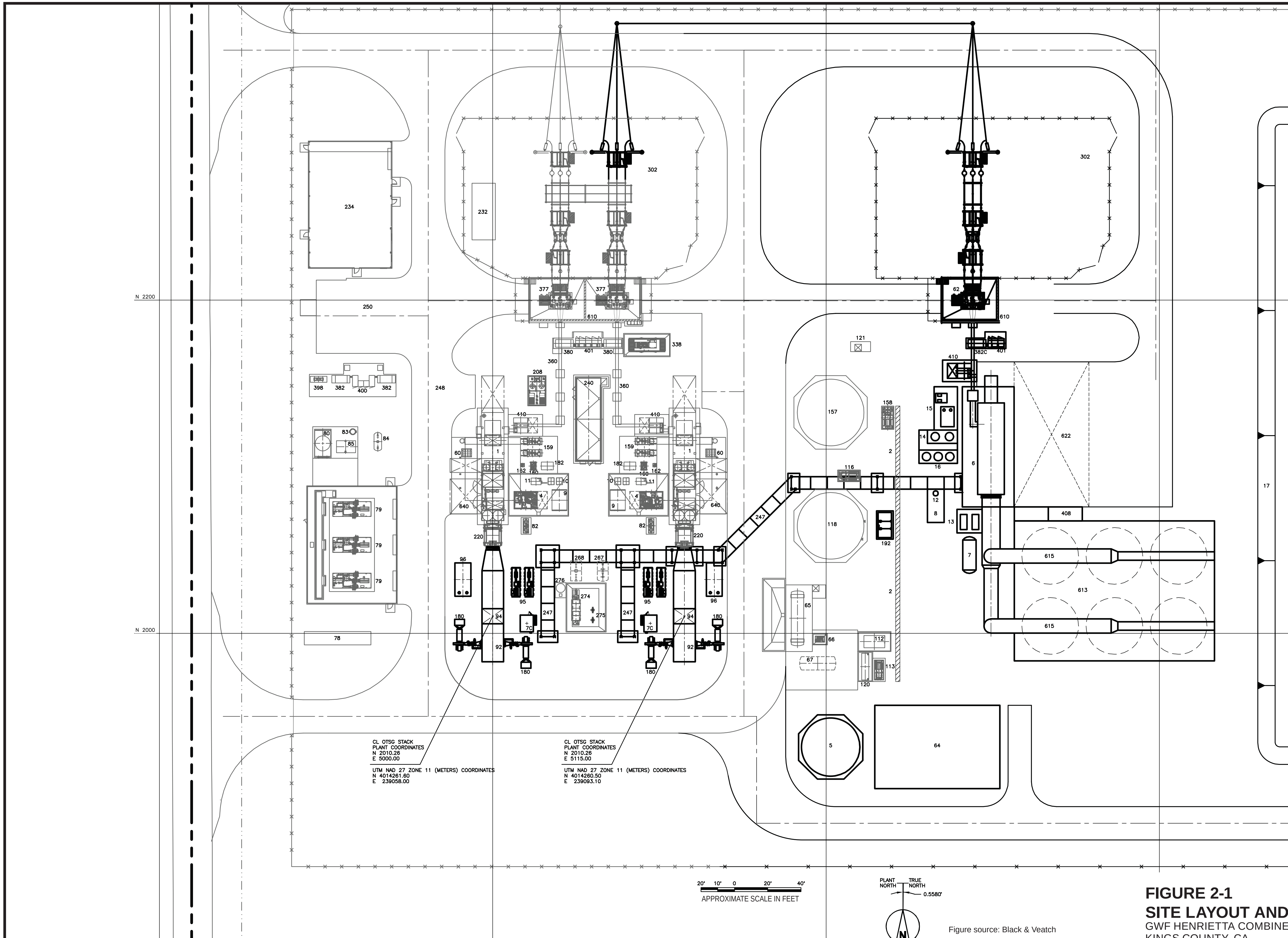
After the receipt of the approval of project design, several permits will be required and will be issued by the CEC assigned Chief Building Official (CBO). These are summarized in Table 2-6.

TABLE 2-6
Permits and Agency Contacts

Permit or Approval	Schedule	Agency Contact	Applicability
Approval of Grading Plan; issuance of construction, grading, and building permits	Minimum of 30 days prior to construction	Kings County Building Department - Bill Zumwalt, Director of Planning and Building Inspection	Site grading, and excavation at site or along linear project features within public right-of-way
Certificate of Occupancy	Completion of construction	Kings County Building Department - Bill Zumwalt, Director of Planning and Building Inspection	Occupancy of facilities once construction is completed.

2.8 Conditions of Certification

Refer to Section 4.0 for a discussion of proposed revisions to the COCs from HPP (01-AFC-18), for GWF Henrietta.



No.	COMPONENT NAME
1	COMBUSTION TURBINE LM6000
2	EXISTING PIPE RACK
4	AUXILIARY SKID
5	FIRE WATER TANK
6	STEAM TURBINE GENERATOR
7	CONDENSATE DRAIN TANK
7C	CONTINUOUS EMISSION MONITORING EQUIPMENT
8	AUXILIARY BOILER
9	FIN FAN LUBE OIL COOLER
10	FIN FAN CLUTCH LUBE OIL COOLERS
11	SSS CLUTCH LUBE OIL SKID
12	AUXILIARY BOILER STACK
13	CONDENSATE PUMPS
14	TURBINE LUBE OIL COOLING UNIT
15	STEAM TURBINE LUBE OIL UNIT
16	STEAM TURBINE LUBE OIL WSAC UNIT
17	STORMWATER RETENTION BASIN
60	CO2 BOTTLES
62	STEAM TURBINE SUBSTATION STEP–UP TRANSFORMER
63	NOT USED
64	WATER TREATMENT BUILDING
65	AMMONIA STORAGE TANK
66	AMMONIA FORWARDING PUMP SKID
67	AMMONIA SPILL CONTAINMENT TANK (BURIED)
78	FUEL GAS METERING STATION
79	FUEL GAS COMPRESSOR SKID
80	FUEL GAS COOLER
82	FUEL GAS FILTER
83	FUEL GAS ACCUMULATOR
84	FUEL GAS WASTE SUMP (BURIED)
85	FUEL GAS COALESCING FILTER
92	ONCE THROUGH STEAM GENERATOR (OTSG)
94	OTSG STACK
95	BOILER FEED PUMPS
96	COMBINED CYCLE AMMONIA SKID
112	POTABLE WATER TREATMENT SKID
113	RAW WATER BOOSTER PUMP SKID
116	RAW WATER FORWARDING PUMPS
118	RAW/FIRE WATER STORAGE TANK
120	RAW WATER TREATMENT SKID
121	SERVICE WATER BOOSTER PUMP SKID
157	DEMINERALIZED WATER STORAGE TANK
158	DEMINERALIZED WATER INJECTION FORWARDING PUMPS
159	WATER INJECTION BOOST PUMP SKID
160	SPRINT PERFORMANCE SKID
162	HIGH PRESSURE DEMIN. WATER FILTER SKID
180	TEMPERING AIR FANS
182	SPRAY MIST EVAP. COOLER PUMP SKID
191	FIRE CARTS (NOT SHOWN FOR CLARITY)
192	FIRE PUMP SKID
208	AIR COMPRESSOR SKID
220	ANTI–ICING HEAT EXCHANGER SYSTEM
232	ELECTRICAL BUILDING
234	ADMINISTRATION/MAINTENANCE BUILDING
240	POWER CONTROL MODULE
247	PIPE AND CABLE WAYS
248	ROAD
250	PARKING AREA
267	WASTE WATER WASH TANK (BURIED)
268	OILY WATER SUMP TANK (BURIED)
274	OIL/WATER SEPARATOR
275	OIL ABSORBENT FILTER
276	RAW WATER RETURN SKID
302	SUBSTATION
338	EMERGENCY DIESEL GENERATOR
360	NON–SEGREGATED BUS DUCT
377	MAIN SUBSTATION STEP–UP TRANSFORMER
380	AUXILIARY TRANSFORMER 13.8/480V
382	GAS COMPRESSOR TRANSFORMER 13.8/4160V
382C	TRANSFORMER 13.8/480V (COMBINED CYCLE)
398	480V GAS COMPRESSOR MCC
400	4160V DISTRIBUTION PANEL
401	480V DISTRIBUTION PANEL
408	AIR COOLED CONDENSER SWITCHGEAR
410	MEDIUM VOLTAGE SWITCH GEAR
610	TRANSFORMER FIRE WALL
613	AIR COOLED CONDENSER
615	STEAM DUCT
622	STEAM TURBINE MAINTENANCE AREA
640	ENGINE REMOVAL AREA

Figure source: Black & Veatch

FIGURE 2-1
SITE LAYOUT AND GENERAL ARRANGEMENT
GWF HENRIETTA COMBINED-CYCLE POWER PLANT
KINGS COUNTY, CA

CH2MHILL

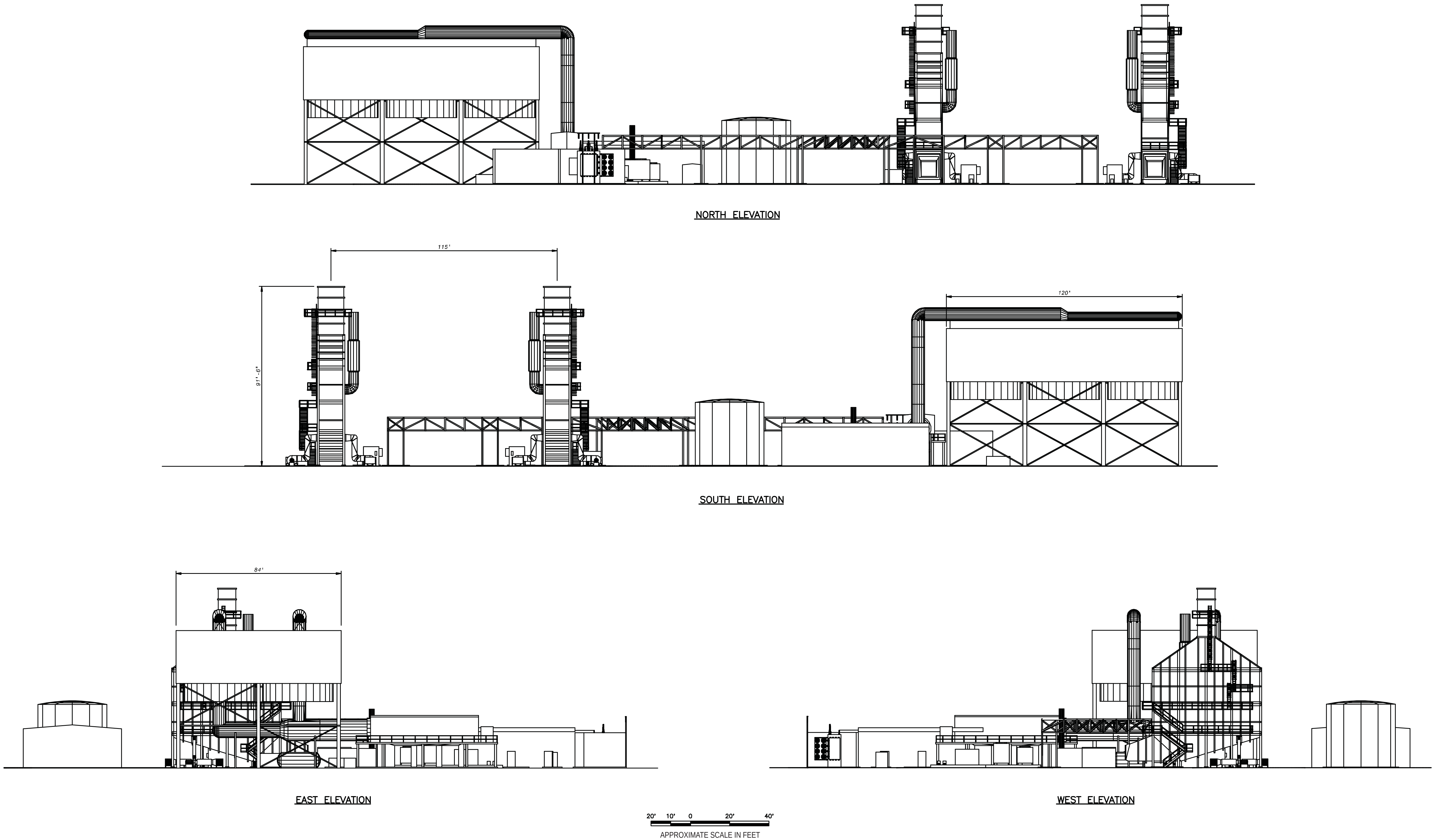
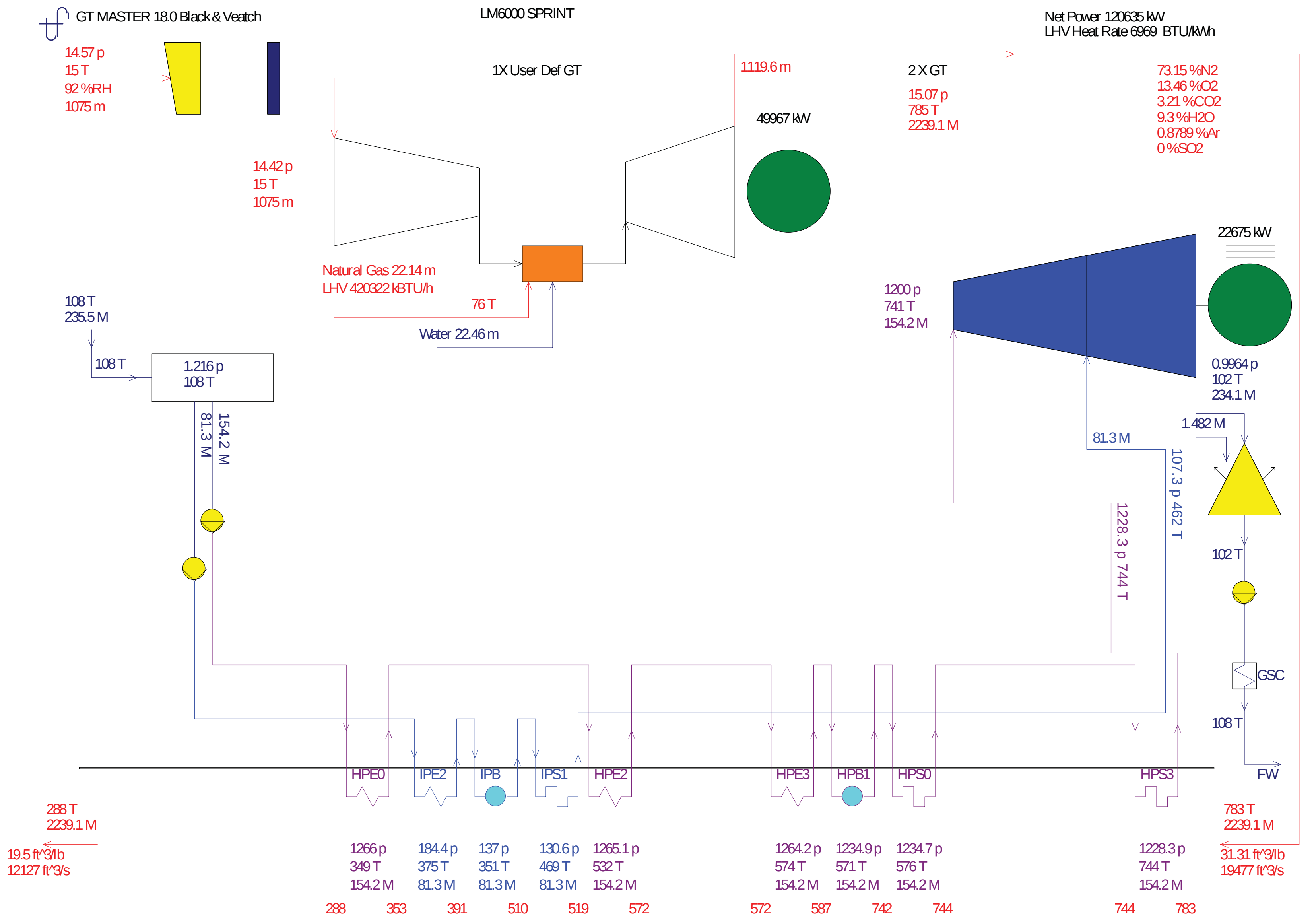


Figure source: Black & Veatch

FIGURE 2-2
PROJECT ELEVATIONS
GWF HENRIETTA COMBINED-CYCLE POWER PLANT
KINGS COUNTY, CA

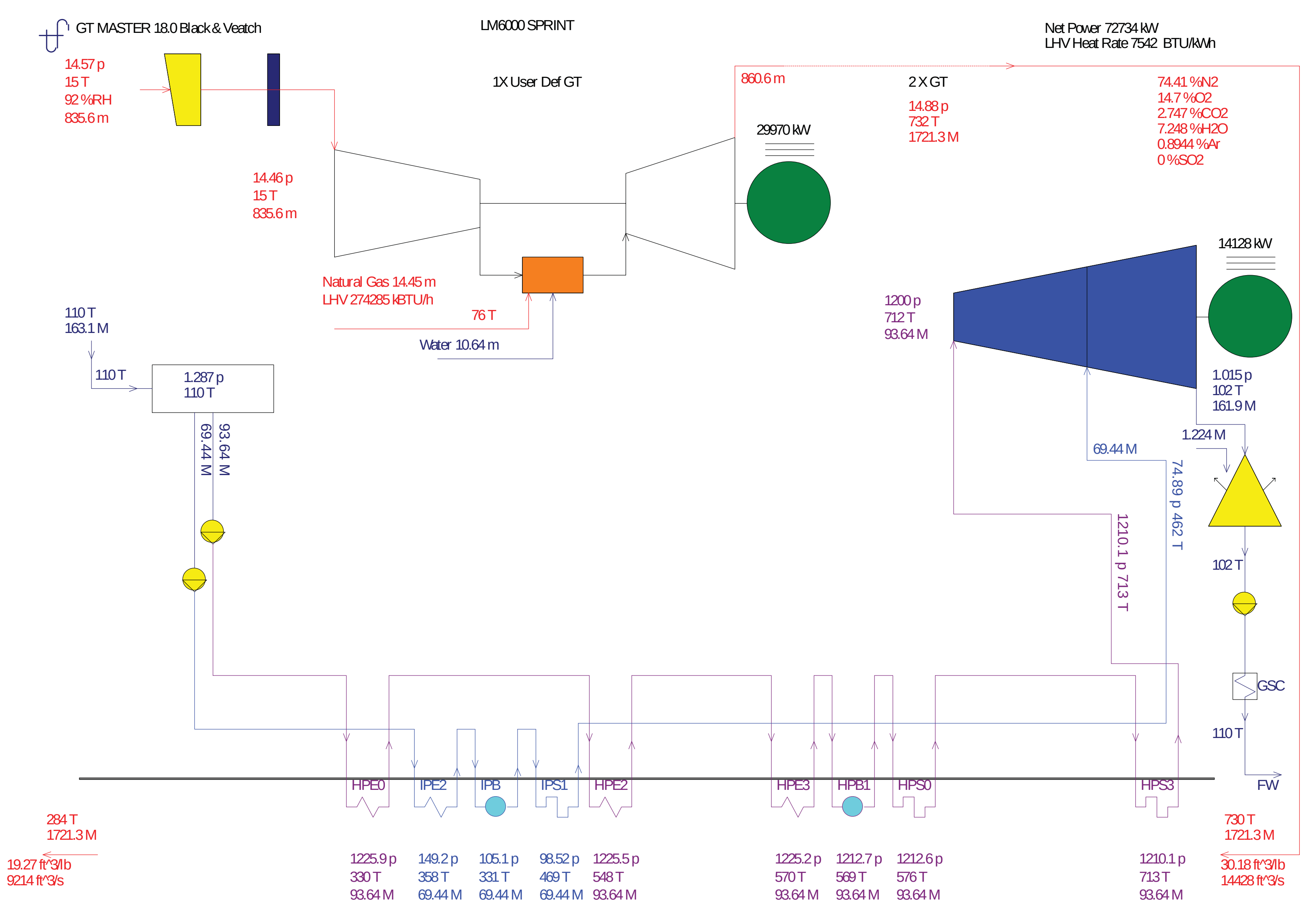
CH2MHILL

A. COLD DAY (15°), BASE LOAD



CASE #	AMBIENT TEMP, ° F	RH, %	NO. OF CTs	CT LOAD	EVAP COOLER, ON/OFF	FUEL	SPRINT, ON/OFF
1	15°	92	2	100%	OFF	GAS	OFF

B. COLD DAY (15°), 60% CTG LOAD



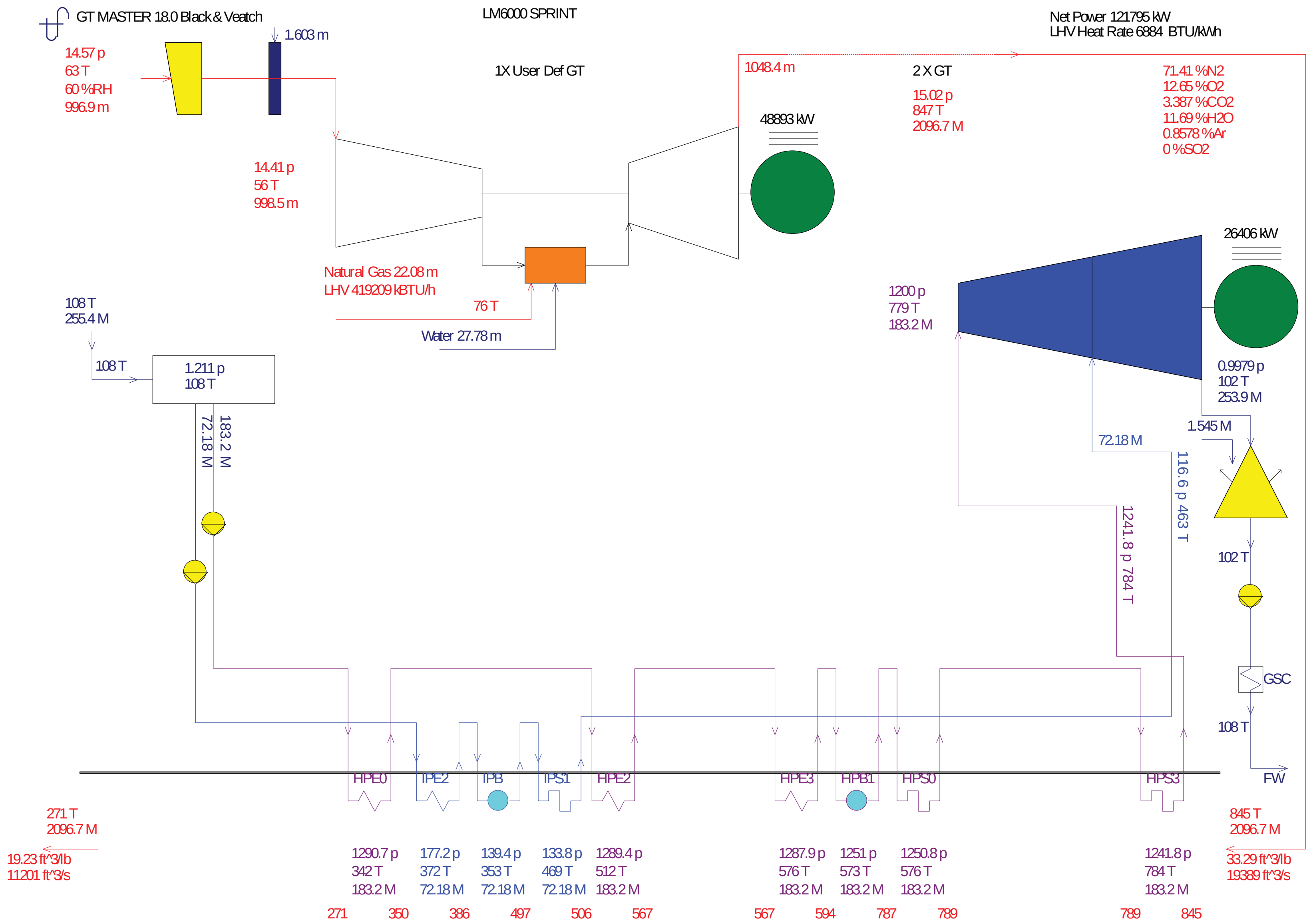
CASE #	AMBIENT TEMP, ° F	RH, %	NO. OF CTs	CT LOAD	EVAP COOLER, ON/OFF	FUEL	SPRINT, ON/OFF
2	15°	92	2	60%	OFF	GAS	OFF

Note: Conceptual heat balance only, not for guarantee.
Source: Black & Veatch, May 2008.

FIGURE 2-3
CONCEPTUAL HEAT BALANCE
COLD DAY (15°F)
GWF HENRIETTA COMBINED-CYCLE POWER PLANT
KINGS COUNTY, CA

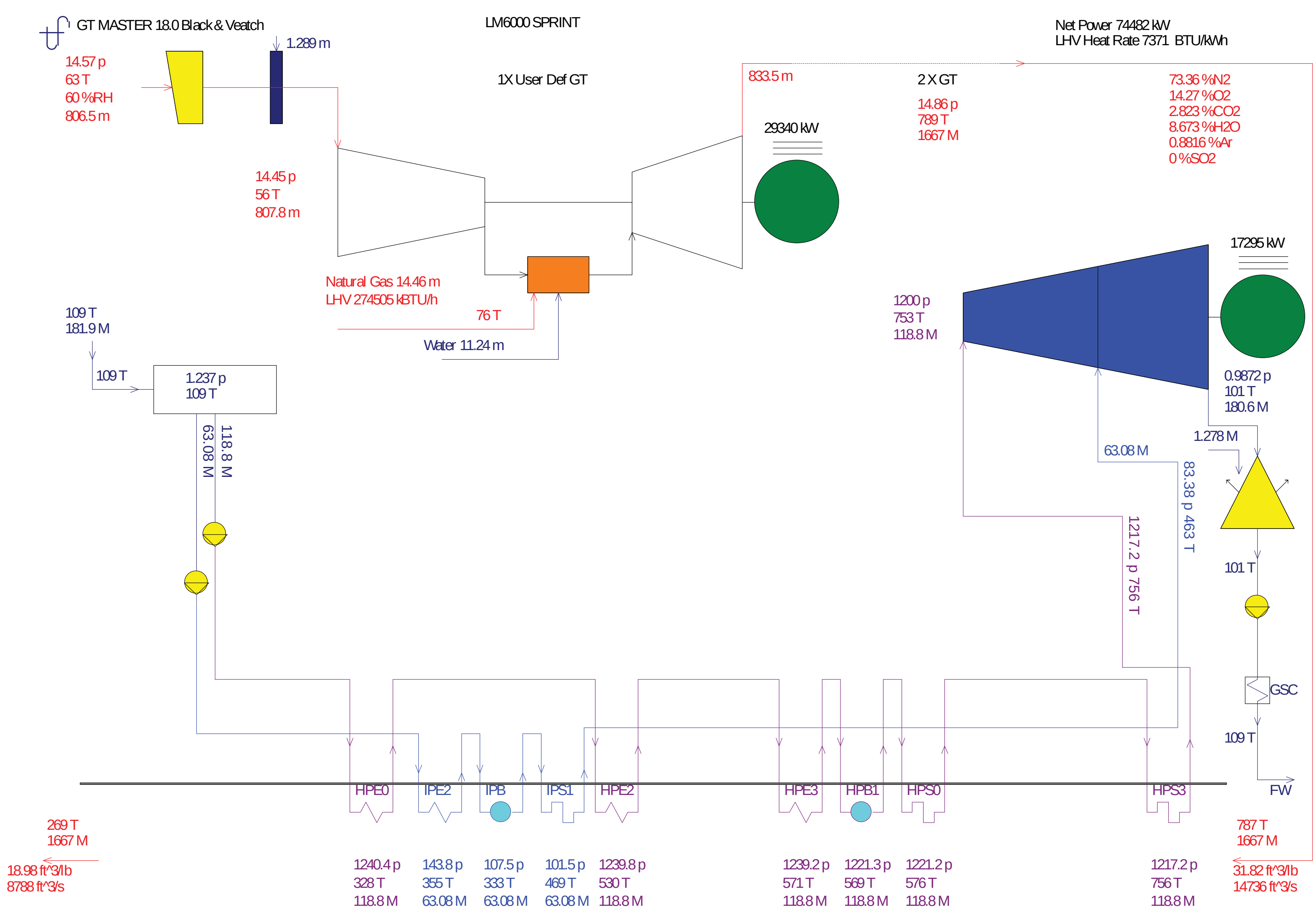
CH2MHILL

A. AVERAGE DAY (63˚), BASE LOAD



CASE #	AMBIENT TEMP, ° F	RH, %	NO. OF CTs	CT LOAD	EVAP COOLER, ON/OFF	FUEL	SPRINT, ON/OFF
3	63°	60	2	100%	ON	GAS	ON

B. AVERAGE DAY (63˚), 60% CTG LOAD



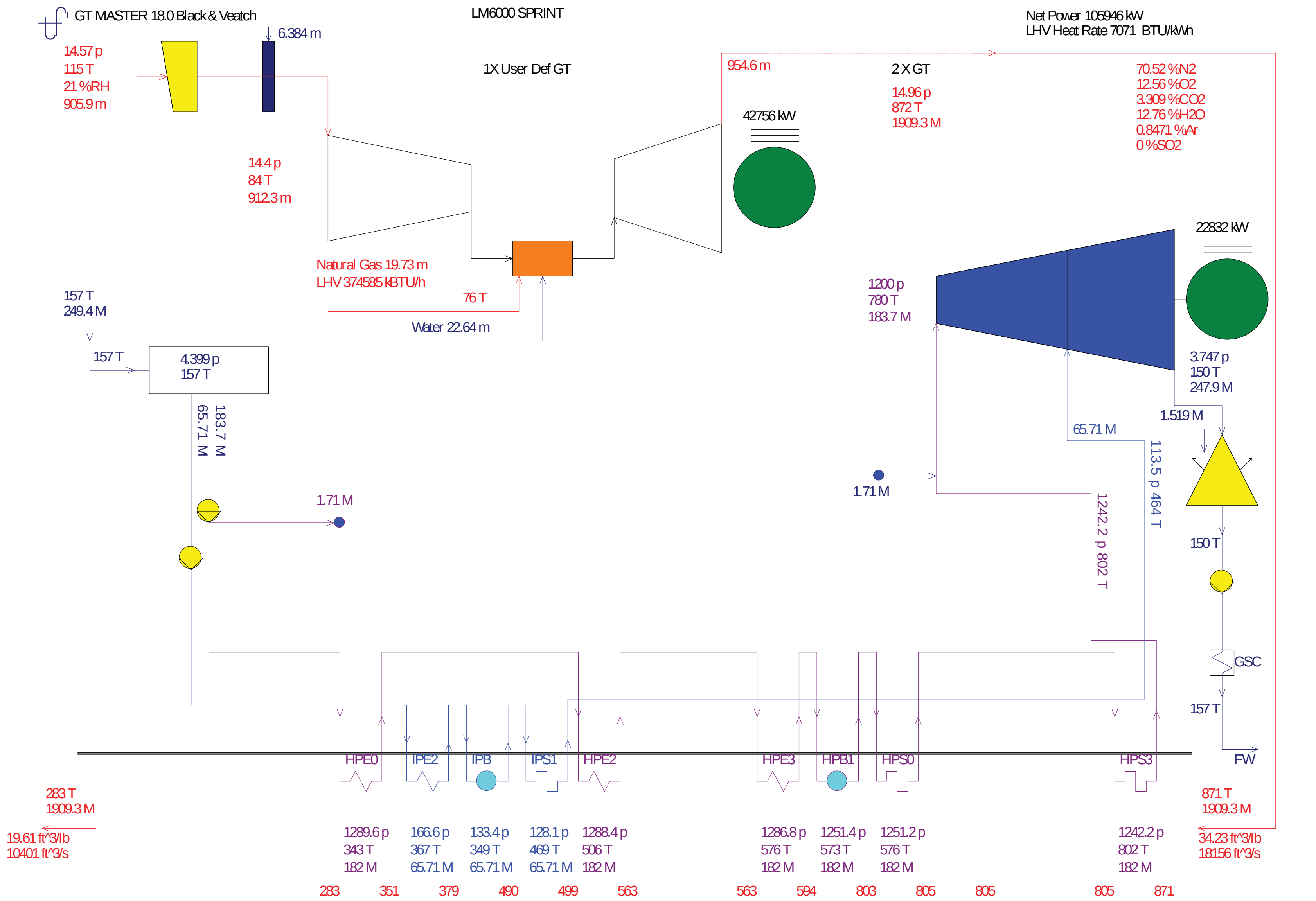
CASE #	AMBIENT TEMP, ° F	RH, %	NO. OF CTs	CT LOAD	EVAP COOLER, ON/OFF	FUEL	SPRINT, ON/OFF
4	63°	60	2	60%	OFF	GAS	OFF

Note: Conceptual heat balance only, not for guarantee.
Source: Black & Veatch, May 2008.

FIGURE 2-4
CONCEPTUAL HEAT BALANCE
AVERAGE DAY (63˚F)
GWF HENRIETTA COMBINED-CYCLE POWER PLANT
KINGS COUNTY, CA

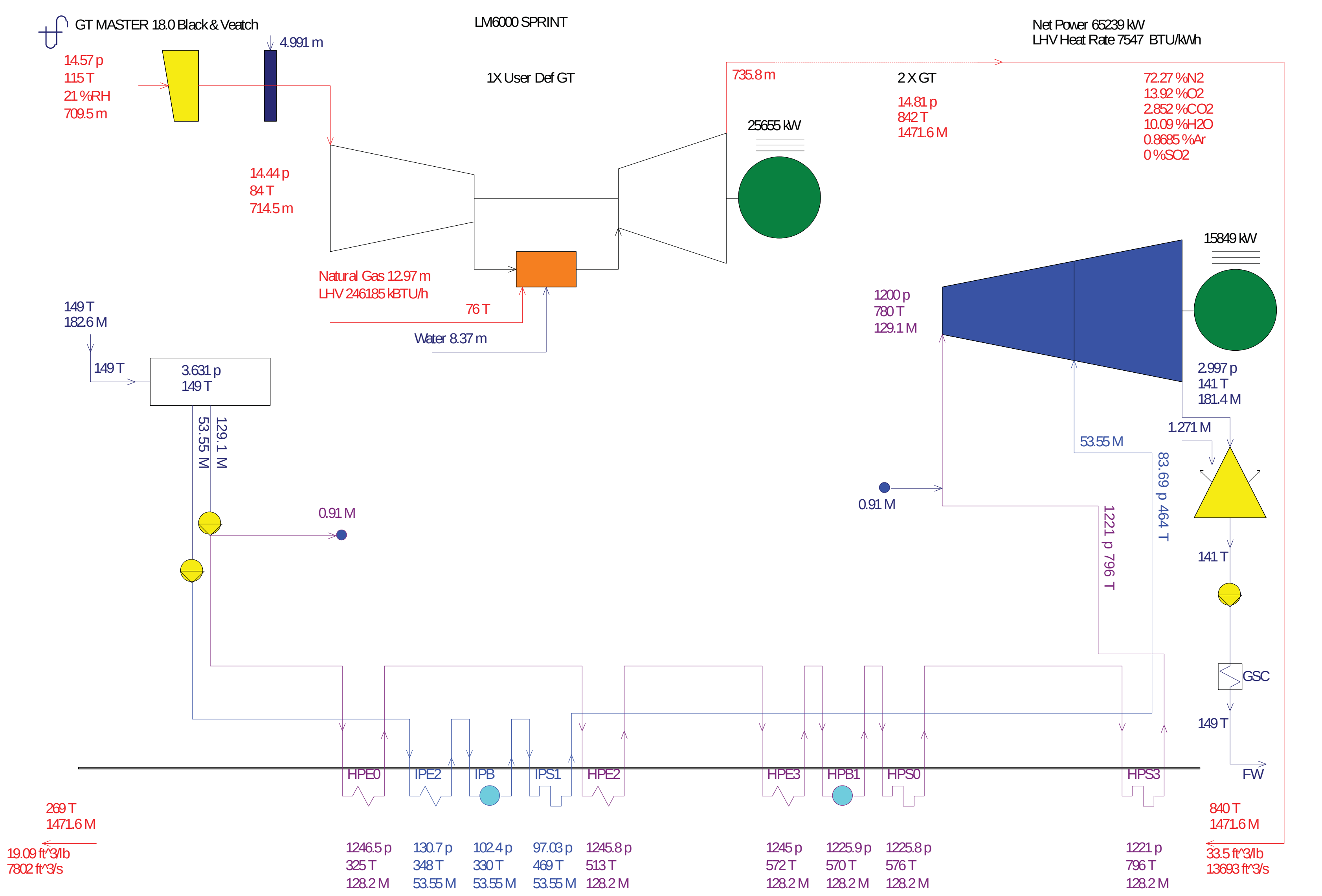
CH2MHILL

A. HOT DAY (115˚), BASE LOAD



CASE #	AMBIENT TEMP, ° F	RH, %	NO. OF CTs	CT LOAD	EVAP COOLER, ON/OFF	FUEL	SPRINT, ON/OFF
5	115°	21	2	100%	ON	GAS	ON

B. HOT DAY (115˚), 60% CTG LOAD



CASE #	AMBIENT TEMP, ° F	RH, %	NO. OF CTs	CT LOAD	EVAP COOLER, ON/OFF	FUEL	SPRINT, ON/OFF
6	115°	21	2	60%	ON	GAS	OFF

Note: Conceptual heat balance only, not for guarantee.
Source: Black & Veatch, May 2008.

FIGURE 2-5
CONCEPTUAL HEAT BALANCE
HOT DAY (115˚F)
GWF HENRIETTA COMBINED-CYCLE POWER PLANT
KINGS COUNTY, CA

CH2MHILL

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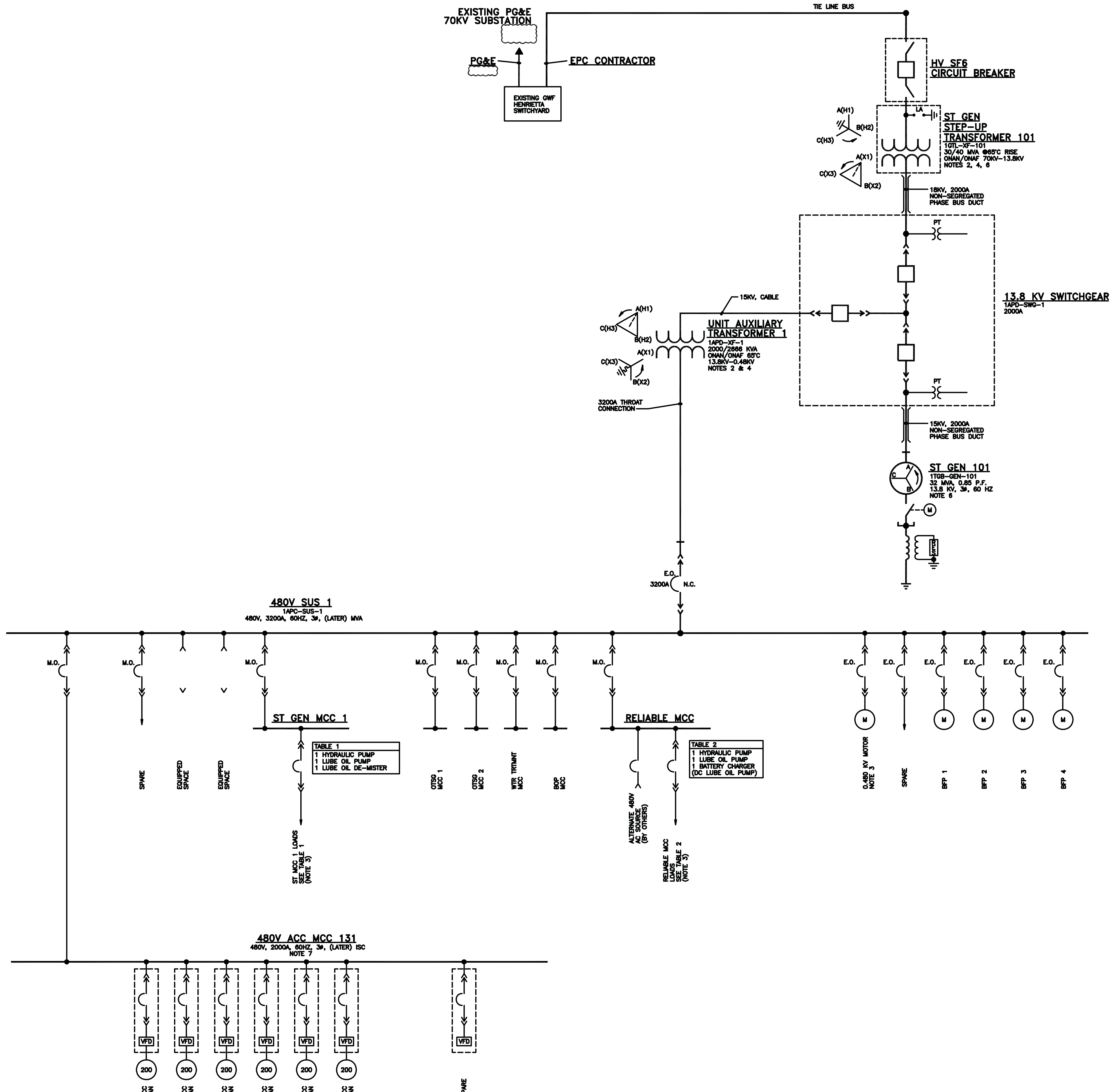
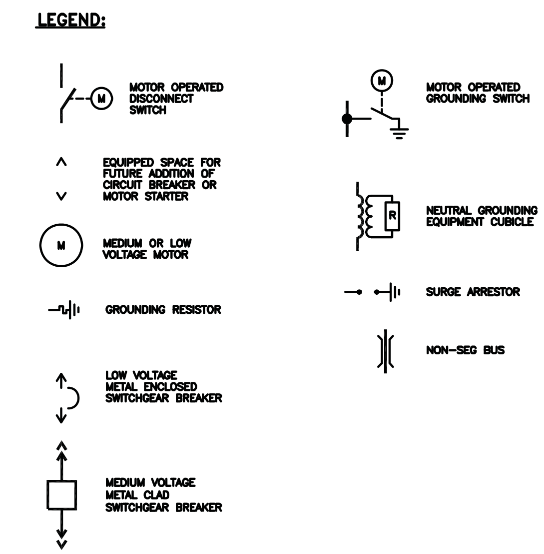




NOTES:

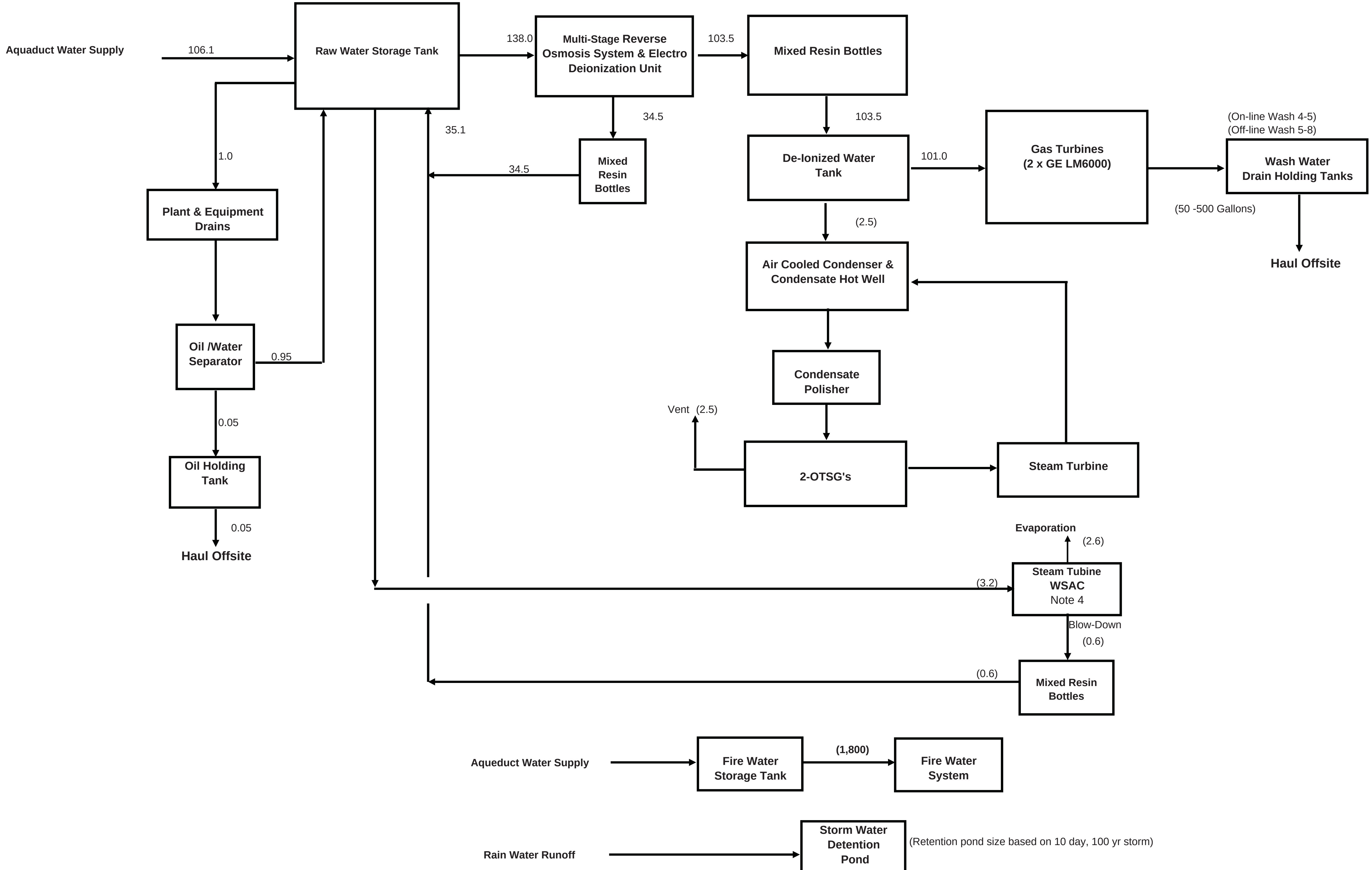
1. THE DESIGN SHOWN IS REPRESENTATIVE INFORMATION. THE NUMBER, SIZE AND NAMES OF INDIVIDUAL LOADS CONNECTED TO SWITCHGEAR, INCLUDING REQUIREMENTS FOR SPARES, WILL BE DETERMINED DURING DETAIL DESIGN. EQUIPMENT QUANTITY, INTERCONNECTIONS AND RATINGS WHERE INDICATED ARE PRELIMINARY AND SUBJECT TO CHANGE DURING DETAIL DESIGN AND SELECTION OF FINAL EQUIPMENT.
2. EXACT PHASE CONNECTIONS AND VECTOR ROTATION CONFIGURATION WILL BE DETERMINED BY EPC CONTRACTOR DURING DETAIL DESIGN. TRANSFORMER IMPEDANCE SHALL BE CALCULATED DURING DETAIL DESIGN BASED UPON SYSTEM AVAILABLE SHORT CIRCUIT CURRENT MOTOR STARTING VOLTAGE REQUIREMENTS AND EQUIPMENT FAULT CURRENT INTERRUPTION RATINGS.
3. QUANTITIES OF LOW VOLTAGE MOTORS ALONG WITH NAMEPLATE HORSEPOWER RATINGS SHALL BE DETERMINED DURING DETAIL DESIGN.
4. TRANSFORMER MVA CAPACITY CALCULATIONS SHALL INCLUDE PROVISIONS FOR SITE AMBIENT CONDITIONS INCLUDING TEMPERATURE AND ALTITUDE.
5. NOT USED
6. FINAL GENERATOR AND GENERATION TRANSFORMER MVA CAPACITY SHALL BE CALCULATED BY EPC CONTRACTOR BASED UPON ST UNIT OUTPUT AND UNIT AUXILIARY POWER CONSUMPTION.
7. POWER CIRCUIT AND DISTRIBUTION EQUIPMENT DEDICATED TO SUPPLY THE AIR COOLED CONDENSER (ACC). THE ACC SHALL BE SUPPLIED WITH A SINGLE-ENDED MCC AS INDICATED. FINAL NUMBER OF FANS CONNECTED TO SINGLE-ENDED MCC BUS SHALL BE DETERMINED BY EPC CONTRACTOR BASED ON FINAL DESIGN AND EQUIPMENT PURCHASED.
8. QUANTITIES OF MEDIUM AND LOW VOLTAGE SWITCHGEAR ALONG WITH KVA RATINGS SHALL BE DETERMINED DURING DETAIL DESIGN
9. NOT USED

ONE-LINE ABBREVIATIONS

N.C.	NORMALLY CLOSED
N.O.	NORMALLY OPEN
ST	STEAM TURBINE
XFMR	TRANSFORMER
OTSG	ONCE THROUGH STEAM GENERATOR
SUS	480 VOLT LOW VOLTAGE SECONDARY UNIT SUBSTATION
RES	RESISTOR
MCC	480 VOLT MOTOR CONTROL CENTER
BOP	BALANCE OF PLANT
IPB	ISOLATED PHASE BUS
N.I.S	NOT IN SCOPE
EXC	EXCITER
ACC	AIR COOLED CONDENSER
VFD	VARIABLE FREQUENCY DRIVE MODULE
ISC	SHORT CIRCUIT CURRENT INTERRUPTION RATING
GEN	GENERATOR
BFP	BOILER FEED PUMP
E.O.	ELECTRICALLY OPERATED
M.O.	MANUALLY OPERATED
PT	POTENTIAL TRANSFORMER

Figure source: Black & Veatch

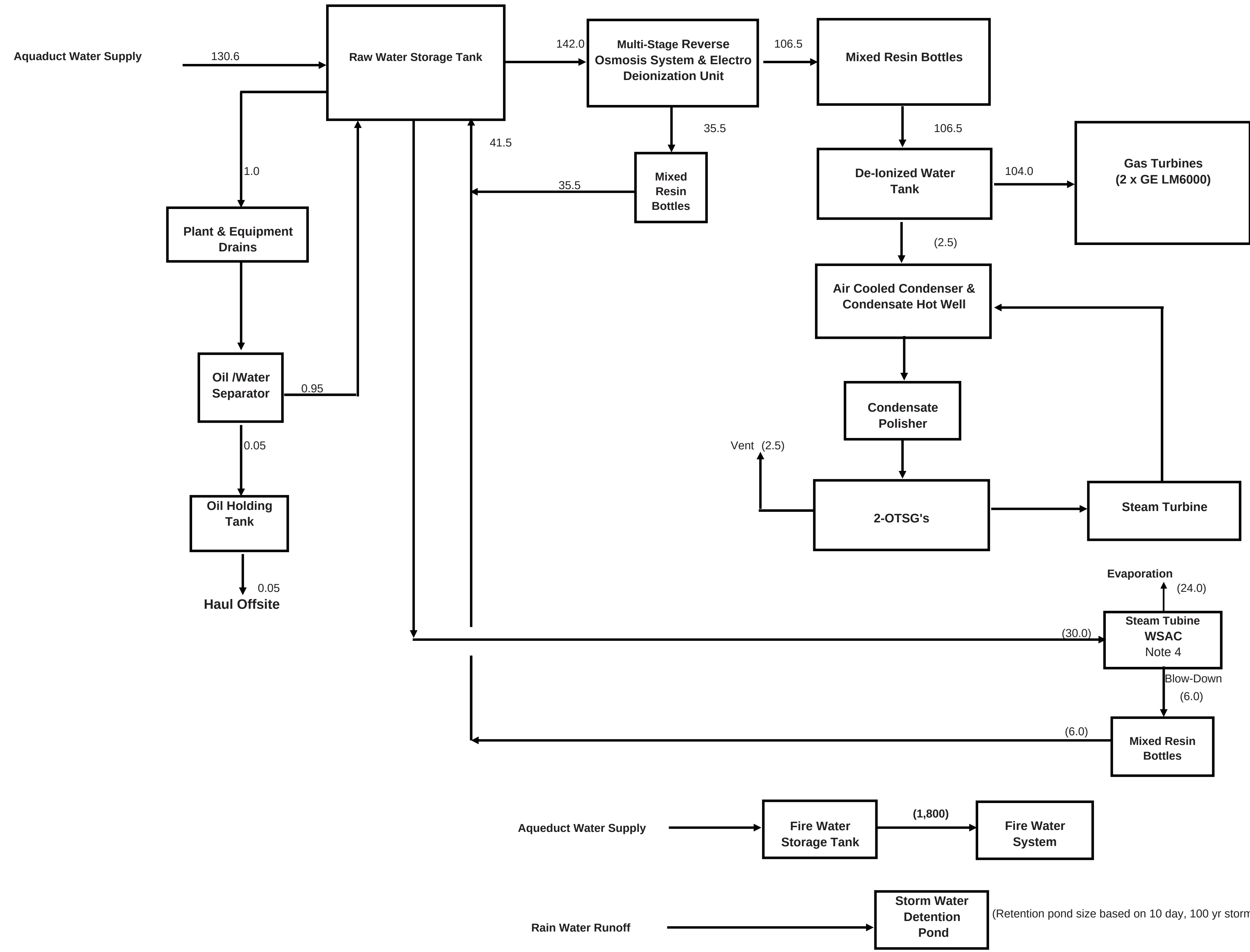
FIGURE 2-6
ELECTRICAL ONE-LINE DIAGRAM
GWF HENRIETTA COMBINED-CYCLE POWER PLANT
KINGS COUNTY, CA



Notes:
1. All water flow rates are in gallons per minute (gpm).
2. Flows indicated in parenthesis ( ) are intermittent.
3. OTSG steam venting is required for each startup and shut-down cycle.
4. The Wet Surface Air Cooler (WSAC) is expected to operate for no more than 850 hours annually when ambient temperatures are approximately 88ºF and above.

FIGURE 2-7
WATER BALANCE: AVERAGE ANNUAL @ 63˚F AND 60% RH
GWF HENRIETTA COMBINED-CYCLE POWER PLANT
KINGS COUNTY, CA

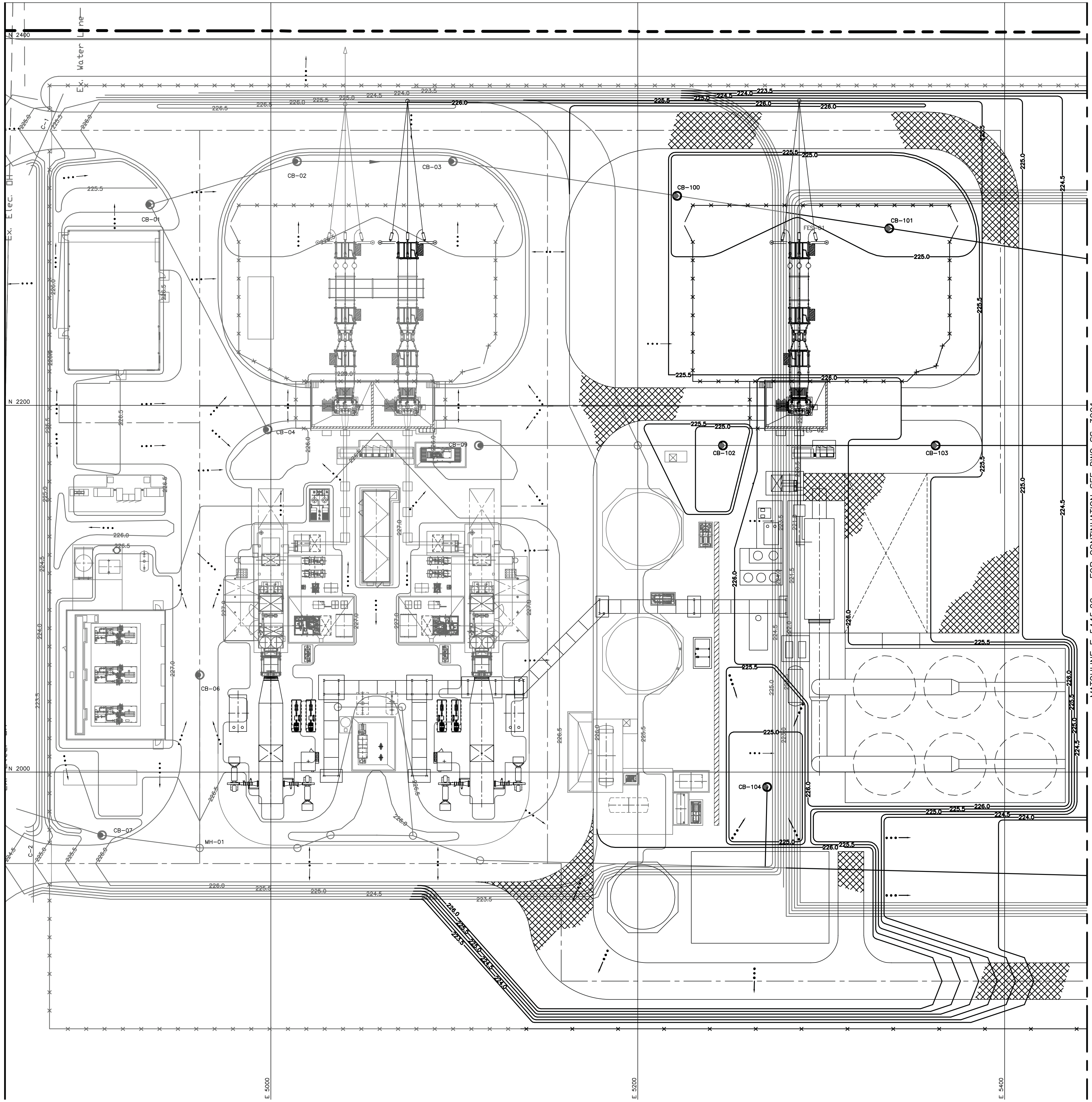
CH2MHILL



Notes:
1. All water flow rates are in gallons per minute (gpm).
2. Flows indicated in parenthesis ( ) are intermittent.
3. OTSG steam venting is required for each startup and shut-down cycle.
4. The Wet Surface Air Cooler (WSAC) is expected to operate for no more than 850 hours annually when ambient temperatures are approximately 88ºF and above.

FIGURE 2-8
WATER BALANCE: MAXIMUM DAILY @ 98˚F AND 30% RH
GWF HENRIETTA COMBINED-CYCLE POWER PLANT
KINGS COUNTY, CA

CH2MHILL



LEGEND

- NEW ASPHALT PAVEMENT
- NEW STRUCTURE
- NEW CONTOUR (225.0)
- EXISTING CONTOUR (220.0)
- PROPERTY LINE
- MATCH LINE
- NEW FENCE
- TEMPORARY CONSTRUCTION FENCE
- EXISTING FENCE
- SURFACE DRAINAGE FLOW INDICATOR
- PERSONNEL GATE
- SWING GATE
- CB-1 — CATCH BASIN
- MH-1 — MANHOLE
- NEW DRAINAGE PIPING
- EXISTING DRAINAGE PIPING
- EXISTING POWER POLE
- EXISTING LIGHT POLE
- 1 / 3000 — SECTION OR DETAIL NUMBER / DRAWING DESIGNATION NUMBER
- N 9500.00 — NORTHING COORDINATE
- E 5000.00 — EASTING COORDINATE

ABBREVIATIONS

APPROX — APPROXIMATE
ASPH — ASPHALT
BM — BENCH MARK
CB — CATCH BASIN
CHDPE — CORRUGATED HIGH DENSITY POLYETHYLENE
CCW — COUNTERCLOCKWISE
CJ — CONTRACTION JOINT
CL — CENTER LINE
CONC — CONCRETE
CW — CLOCKWISE
DIA — DIAMETER
DIP — DUCTILE IRON PIPE
DWG — DRAWING
EL — ELEVATION
EJ — EXPANSION JOINT
EXIST — EXISTING
FF — FINISHED FLOOR
HDPE — HIGH DENSITY POLYETHYLENE
HP — HIGH POINT
ID — INSIDE DIAMETER
INV — INVERT
MAX — MAXIMUM
MIN — MINIMUM
MSL — MEAN SEA LEVEL
NO — NUMBER
NTS — NOT TO SCALE
PC — POINT OF CURVATURE
PI — POINT OF INTERSECTION
PL — PROPERTY LINE
PT — POINT OF TANGENCY
PVI — POINT OF VERTICAL INTERSECTION
R — RADIUS
RCP — REINFORCED CONCRETE PIPE
REV — REVISION
R/W — RIGHT OF WAY
T/C — TOP OF CURB
T/P — TOP OF PAVEMENT
TOC — TOP OF CONCRETE
T/GRATE — TOP OF GRATE
TYP — TYPICAL

GENERAL NOTES

1. SEE DRAWING SS–1001 FOR SITE ARRANGEMENT.
2. LOCATIONS OF EXISTING ROADS AND UTILITIES ARE SUBJECT TO FIELD VERIFICATION BY THE CONTRACTOR.
3. CONSTRUCTION SEQUENCE SHALL BE SCHEDULED TO MINIMIZE UNCONTROLLED RUNOFF AND OFFSITE SEDIMENTATION DURING GRADING OPERATIONS. SILT FENCE SHALL BE INSTALLED IN EACH AREA BEFORE GRADING OPERATIONS BEGIN.
4. NEW CONTOURS AND SPOT ELEVATIONS SHOWN ON THE DRAWINGS INDICATE FINISH GRADE, TOP OF AGGREGATE SURFACING, CONCRETE PAVING OR TOP OF ASPHALT, UNLESS NOTED OTHERWISE. SUBTRACT MATERIAL THICKNESS ACCORDINGLY WHERE TOP OF SUBGRADE ELEVATION IS REQUIRED.
5. ALL SLOPES SHALL BE 3H:1V UNLESS NOTED OTHERWISE.
6. ANY CONSTRUCTION ACTIVITIES THAT TAKE PLACE OUTSIDE THE LIMITS OF THE SILT FENCE AND HAVE THE POTENTIAL FOR ERODED SOIL TO BE WASHED AWAY FROM THE AREA SHALL BE ENTIRELY ENCLOSED BY SILT FENCE PRIOR TO THE START OF ANY SUCH ACTIVITIES.
7. GRADE SHALL SLOPE UNIFORMLY BETWEEN FINISH SPOT ELEVATIONS AND CONTOURS SHOWN ON THE PLAN.
8. A SMOOTH VERTICAL TRANSITION SHALL BE PROVIDED AT ROAD INTERSECTIONS.
9. ANY DISTURBED PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITY TEMPORARILY CEASES FOR AT LEAST 21 DAYS SHALL BE TEMPORARILY MULCHED.
10. THE FOLLOWING DUST CONTROL PRACTICES SHALL BE IMPLEMENTED:

    PRE–CONSTRUCTION:

    AREAS WHERE EQUIPMENT WILL BE OPERATED SHALL BE PRE WETTED.
    MATERIAL EXCAVATED OR GRADED SHALL BE SUFFICIENTLY WATERED TO TO PREVENT EXCESSIVE AMOUNTS OF DUST. WATERING SHOULD OCCUR AT LEAST TWICE A DAY WITH COMPLETE COVERAGE, ONCE IN THE LATE MORNING AND AGAIN AFTER WORK IS COMPLETED FOR THE DAY.
    CLEARING, GRADING, EARTH MOVING, OR EXCAVATION ACTIVITIES SHALL CEASE DURING PERIODS OF HIGH WINDS GREATER THAN 20 MPH.
    MATERIALS THAT MAY CREATE DUST WILL BE WETTED PRIOR TO LOADING INTO TRANSPORT VEHICLES.
    AREAS DISTURBED BY CLEARING, EARTH MOVING, OR EXCAVATION ACTIVITIES SHALL BE MINIMIZED AT ALL TIMES.
    WHERE ACCEPTABLE TO THE FIRE DEPARTMENT, WEED CONTROL SHOULD BE ACCOMPLISHED BY MOWING INSTEAD OF DISCING, THEREBY LEAVING THE GROUND UNDISTURBED AND WITH A MULCH COVERING.

    DURING CONSTRUCTION:

    WHEEL WASHING SHALL OCCUR FOR LARGE MATERIAL MOVING VEHICLES PRIOR TO EXITING THE SITE.
    AFTER CLEARING, GRADING, EARTH MOVING, OR EXCAVATION OPERATIONS, DURING THE CONSTRUCTION PHASE, FUGITIVE EMISSIONS SHALL BE CONTROLLED BY THE FOLLOWING METHODS:
    NON–ACTIVE PORTIONS OF THE CONSTRUCTION SITE SHALL BE RESTRICTED FROM VEHICULAR MOVEMENT.
    ACTIVE PORTIONS OF THE SITE SHALL BE SUFFICIENTLY WATERED TO PREVENT EXCESSIVE AMOUNTS OF DUST.

    GENERAL FUGITIVE DUST:

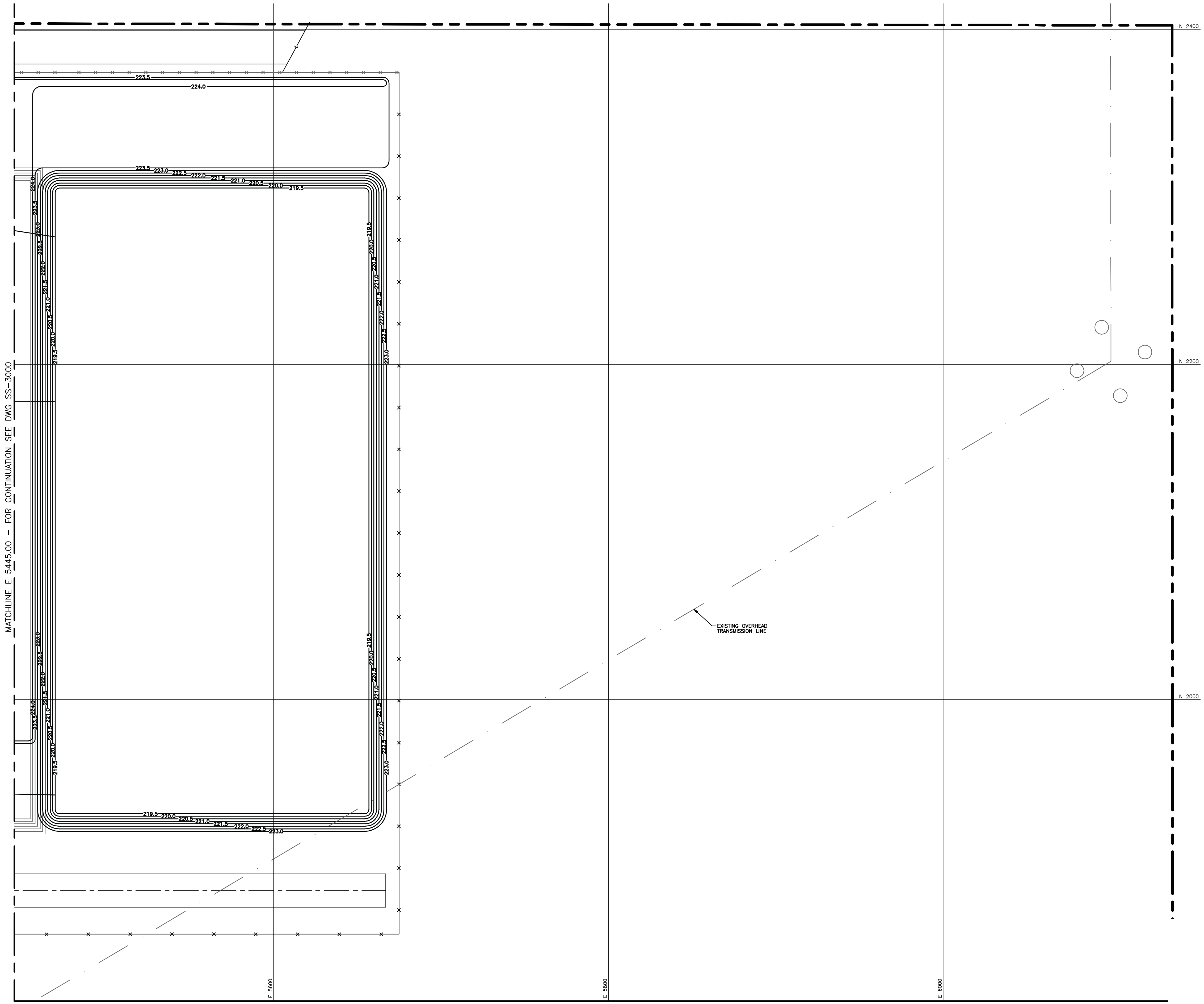
    AT ALL TIMES, FUGITIVE DUST EMISSIONS SHALL BE CONTROLLED USING THE FOLLOWING PROCEDURES:
    ON SITE VEHICLE SPEED SHALL BE LIMITED TO 15 MPH.
    AREAS WITH VEHICLE TRAFFIC SHALL BE WATERED PERIODICALLY FOR STABILIZATION OF DUST EMMISIONS.
    DURING ROUGH GRADING AND CONSTRUCTION, STREETS NEXT TO THE PROJECT SITE SHALL BE SWEPT AT LEAST ONCE A DAY, OR AS REQUIRED TO REMOVE SILT WHICH MAY HAVE ACCUMULATED FROM CONSTRUCTION ACTIVITIES.
    DURING ROUGH GRADING AND CONSTRUCTION, AN APRON INTO THE PROJECT SITE FROM ADJOINING PAVED ROADWAYS SHALL BE BUILT TO ACCESS THE SITE. THE APRON SHOULD BE PAVED OR WATERED AS REQUIRED.
11. SURFACE VEGETATION SHALL BE REMOVED COMPLETE WITH ROOTS TO A DEPTH OF NO LESS THAN 4 INCHES BELOW THE GROUND SURFACE.
12. PRIOR TO FILLING, THE SUBGRADE SHALL BE SCARIFIED AND COMPACTED IN ACCORDANCE WITH THE CONSTRUCTION SPECIFICATIONS.
13. FILL MATERIAL SHALL BE PLACED TO THE FINISH ELEVATIONS INDICATED ON THE DRAWINGS.
14. ADEQUATE SHEETING AND BRACING SHALL BE PROVIDED TO PROTECT AND MAINTAIN THE STABILITY OF PREVIOUSLY CONSTRUCTED STRUCTURES AND THE SIDES OF EXCAVATION AND TRENCHES UNTIL THEY ARE BACKFILLELD.
15. ADEQUATE DEWATERING EQUIPMENT SHALL BE PROVIDED TO REMOVE AND DISPOSE OF ALL SURFACE AND GROUND WATER ENTERING EXCAVATIONS AND OTHER PARTS OF THE WORK.
16. EXCAVATION, OVEREXCAVATION AND BACKFILL FOR INDIVIDUA FOUNDATIONS SHALL BE TO THE DIMENSIONS AND ELEVATIC CONCRETE FOOTINGS AS INDICATED ON THE DRAWINGS.

N

20' 10' 0 20' 40'
APPROXIMATE SCALE IN FEET

FIGURE 2-9
GRADING AND DRAINAGE
SHEET 1
GWF HENRIETTA COMBINED-CYCLE POWER PLANT
KINGS COUNTY, CA

CH2MHILL



NOTES

1. SEE DWG SS–3000 FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.

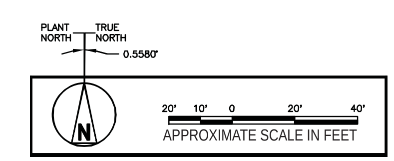
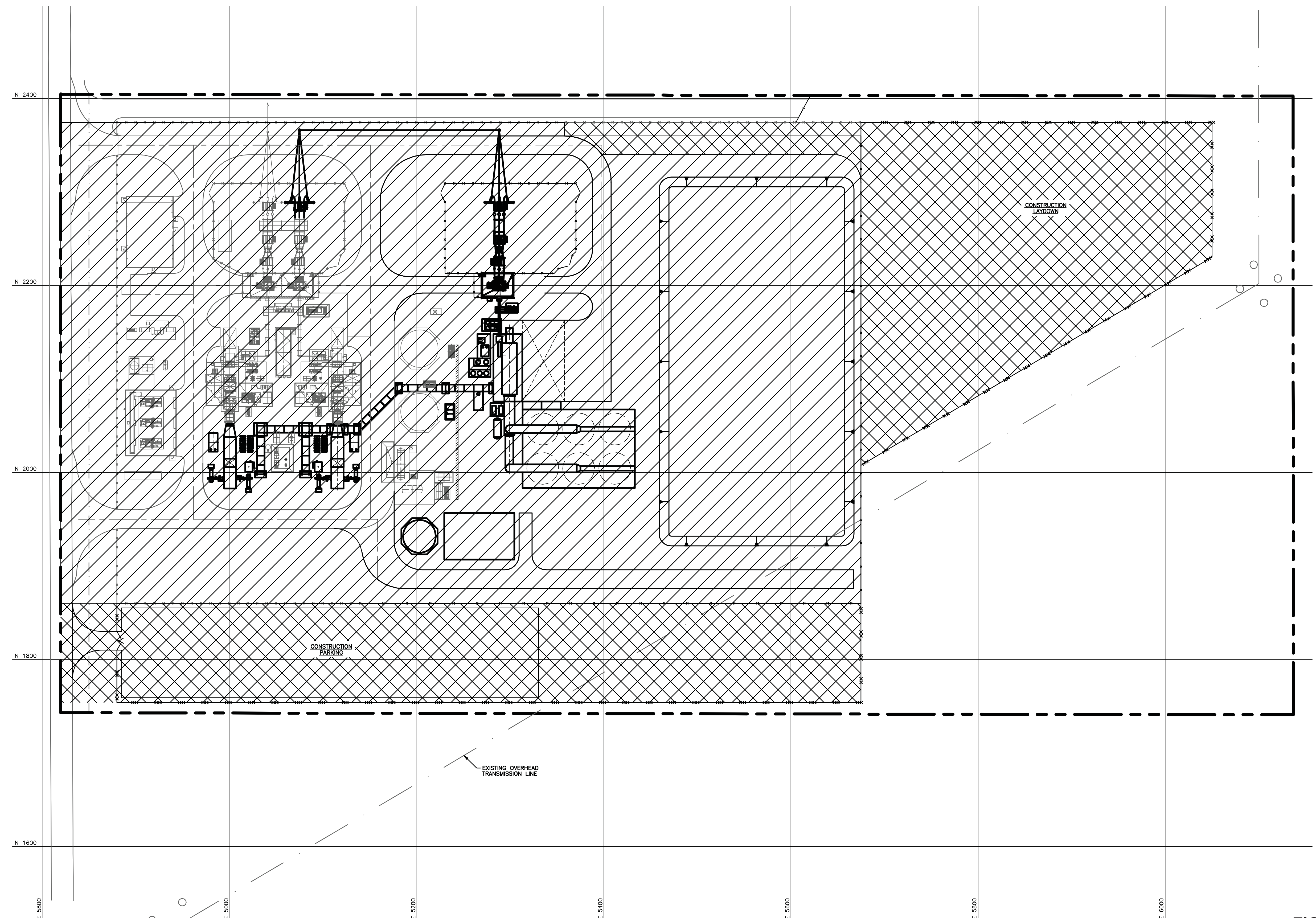


FIGURE 2-10
GRADING AND DRAINAGE SHEET 2

GWF HENRIETTA COMBINED-CYCLE POWER PLANT
KINGS COUNTY, CA

CH2MHILL



NOTES

1. SEE DWG SS-3000 FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS.

LEGEND

TEMPORARY DISTURBED AREA = 4.52 ACRES

PERMANENTLY DISTURBED AREA = 9.86 ACRES

PLANT NORTH

TRUE NORTH

0.5580°

40' 20' 0 40' 80'

APPROXIMATE SCALE IN FEET

FIGURE 2-11
DISTURBED AREAS
GWF HENRIETTA COMBINED-CYCLE POWER PLANT
KINGS COUNTY, CA

CH2MHILL

3.0 Environmental Analysis of Proposed Project Amendment

GWF Henrietta is contained within the HPP site and no additional ground-disturbing activities are expected, outside of the HPP site. In addition, the proposed changes will not require major changes in the construction workforce, equipment, or schedule. Therefore, impacts to environmental disciplines that analyzed impacts based on ground disturbance and construction workforce/equipment are expected to be the same as, or similar to, those analyzed during the licensing proceeding. This section presents an analysis of the impacts of the proposed project changes by resource area, including an update to the baseline setting in regards to each resource area, consideration of mitigation measures, a discussion of the project's consistency with LORS, and a discussion of proposed revisions to the existing HPP COCs.

3.1 Air Quality

GWF Henrietta, as described in Sections 1.0 and 2.0 of this document, would not involve substantial changes to the air quality findings and conclusions from the HPP Final Decision and supporting application and Staff Assessment materials. This analysis also provides an update of the environmental baseline for current air quality, new air quality modeling to address GWF Henrietta, and consistency of the project with San Joaquin Valley Air Pollution Control District regulations. Potential public health risks posed by emissions of toxic air contaminants, including ammonia, are addressed in Section 3.8, Public Health.

Pursuant to the CEC's siting regulations contained in Title 20, California Code of Regulations, section 1769 *et seq*., this supplemental analysis for the HPP addresses all the requirements necessary to make a determination of the potential environmental impacts of GWF Henrietta on air quality and whether such impacts would require new or revised COCs to reduce any impacts to a level of insignificance. The analysis is based on information previously incorporated into the record for the approved HPP and is hereby incorporated by reference for this Amendment and included on the Reference CD included as Attachment G.

3.1.1 Environmental Baseline Information

The ambient air quality standards, attainment designations, and the ambient background data have been updated since the approval of the HPP. The updated ambient air quality data provided in this amendment are based on data published by the Air Resources Board (ARB) (ADAM Web site), the San Joaquin Valley Air Pollution Control District (SJVAPCD e-mail dated August 21, 2008 from Glenn Reed), and the Environmental Protection Agency (EPA) (AIRS Web site). The ARB-certified monitoring stations closest to the project site are the Hanford-South Irwin Street monitoring station, the Corcoran-Patterson Avenue monitoring station, and the Fresno-First Street and Drummond Street monitoring stations.

The Hanford-South Irwin Street monitoring station is approximately 15 miles northeast of the project site. The Corcoran-Patterson Avenue monitoring station is approximately 21 miles southeast of the project site. The Fresno-First Street and Drummond Street monitoring stations are approximately 33 miles northeast of the project site.

Table 3.1-1 presents representative ambient air concentrations for the project area. NO_2 concentrations measured at the Hanford-South Irwin Street station have not exceeded either the state or federal standards. CO and SO_2 concentrations measured at the Fresno-First Street and Drummond Street Station have not exceeded either the state or federal standards. In 2006, the NAAQS for 1-hour ozone concentrations was revoked. The current state regulatory 1-hour ozone concentration standards were exceeded in both 2006 and 2007 at the Hanford-South Irwin monitoring station. The measured 8-hour ozone concentrations at this same site also exceeded the federal and state standards.

As shown in Table 3.1-1, PM_{10} concentrations measured at the Hanford-South Irwin monitoring station did not exceed the 24-hour PM_{10} NAAQS. However, the 24-hour state PM_{10} standards have been consistently exceeded each year during the past 3 years. The annual PM_{10} concentrations recorded at the Hanford-South Irwin monitoring station exceeded the annual state standards. The 24-hour $PM_{2.5}$ concentrations measured at the

Corcoran-Patterson Avenue station have exceeded NAAQS in each of the past 3 years. The annual $PM_{2.5}$ concentrations measured between 2005 and 2007 at the Corcoran-Patterson Avenue station exceeded both the annual federal and state standards.

In addition to criteria pollutants, greenhouse gases have also been added to the list of pollutants to be evaluated. Greenhouse gases include the following pollutants: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). Emissions of HFCs, PFCs, or SF_6 are expected to be insignificant for the proposed project. Therefore, the project impact assessment focused on the impacts from emissions of CO_2, CH_4, and N_2O.

TABLE 3.1-1
Background Air Concentrations for GWF Henrietta

Pollutant[a]	Averaging Time	CAAQS/NAAQS[b] (µg/m^3)	2005		2006		2007	
			ppm	µg/m^3	ppm	µg/m^3	ppm	µg/m^3
NO_2 [c]	1-hour	339 / —	0.072	135	**0.073**	**137**	0.058	109.1
	Annual	57 / 100	**0.012**	**22.6**	0.012	22.3	0.011	20.7
Ozone [c]	1-hour	180 / —	0.120	236	**0.127**	**249**	0.102	200.2
	8-hour	137 / 147	0.098	192.4	**0.101**	**198.3**	0.091	178.7
SO_2 [d]	1-hour	655 / —	NA	NA	NA	NA	0.13	**340.3**
	3-hour	— / 1300	NA	NA	NA	NA	0.075	**196.3**
	24-hour	105 / 365	NA	NA	NA	NA	0.031	**81.1**
	Annual	— / 80	NA	NA	NA	NA	0.007	**18.3**
CO [e]	1-hour	37,628 / 65,849	4.1	4,695	4.0	4,581	**4.4**	**5,039**
	8-hour	16,933 / 16,933	3.0	3,378	**3.3**	**3,791**	2.6	2,978
PM_{10} [c]	24-hour	50 /150	—	118	—	**150**	—	106
	Annual	20 / —		40		**46**		44
$PM_{2.5}$ [f]	24-hour	— / 35	—	**92.5**	—	74.2	—	75.0
	Annual	12 / 15		17.5		16.9		**18.4**

[a] Source: ARB, 2008a and EPA, 2008

[b] Source: ARB, 2008b

[c] Data is from the Hanford-South Irwin Street monitoring station

[d] Data is from the Fresno – First Street monitoring station

[e] Data is the highest value reported for the Fresno-First Street and Drummond Street monitoring stations

[f] Data is from the Corcoran-Patterson Avenue monitoring station

3.1.2 Environmental Analysis

3.1.2.1 Criteria Pollutant Emission Estimates

Criteria pollutant emission rates were calculated for three discrete phases of the project. The first phase would be the demolition of the two existing oxidation catalyst and selective catalytic reduction (SCR) systems, demolition of the associated exhaust stacks and construction of the new electrical generating components; the second phase would be commissioning activities; and the final phase would be operation. Hourly, daily, and annual criteria pollutant emissions were calculated based on a 15-month construction schedule, which includes up to 65 days of commissioning, and 8,541 annual hours of normal operations (including 379 hours of start-ups and 162 hours of shutdowns).

3.1.2.1.1 Demolition/Construction Phase

Short-term emissions would be generated from the demolition of the two existing oxidation catalyst and SCR systems and installation of the two new once through steam generators (OTSGs), the new 25 MW steam condensing turbine generator, the new air cooled condenser (ACC), and the new auxiliary equipment. The construction calculations were completed assuming 2.9 acres of the existing GWF-owned 20-acre parcel would be used for GWF Henrietta and an additional 4.5 acres would be temporarily disturbed for construction laydown and parking. The duration of the demolition and construction activities, including commissioning, is expected to be 15 months.

Maximum annual emissions were estimated using the numbers and type of construction equipment, numbers of heavy-duty trucks, and the construction workforce expected to be onsite each month of construction. It was conservatively assumed the construction equipment would operate 12 hours per day, 26 days per month. For the heavy-duty trucks, it was assumed the trucks would operate 26 days per month and travel one mile per day (excluding the water trucks which were assumed to travel five miles per day). The annual emissions also conservatively assume that each construction worker would commute separately to the site (the traffic analysis, however, assumed limited carpooling). The maximum annual construction emissions represent the 12-month period out of the 15-month construction schedule with the highest emissions. The 12-month period with the highest predicted emissions is the period from month 2 through month 13.

Because the water and natural gas pipelines and transmission infrastructure are already in place for the existing turbines, no modifications to the offsite linear facilities are expected to be required as part of the project.

The maximum annual construction emissions are presented in Table 3.1-2. The detailed emission calculations for construction are provided in Attachment C.

TABLE 3.1-2
Maximum Annual Construction Emissions

Construction Emission Source	Emissions (tons/yr)					
	NO_x	CO	VOC [a]	SO_x	PM_{10}	$PM_{2.5}$
Onsite Emissions [b, c]	10.5	6.1	1.7	0.012	2.8	0.9
Offsite Vehicle Emissions	0.10	0.42	0.014	0.00067	0.0055	0.0027
Maximum Total (tons/yr)	**10.6**	**6.5**	**1.8**	**0.012**	**2.8**	**0.9**

[a] Emission factors in URBEMIS and EMFAC are listed as reactive organic gases (ROG). For this analysis, it is assumed ROGs are equivalent to VOCs.

[b] Fugitive dust and construction equipment exhaust emissions were estimated using URBEMIS2007 v. 9.2.4 emission factors.

[c] Onroad exhaust emissions were estimated using EMFAC2007 v. 2.3 emission factors. Onroad emissions include emissions from re-entrained road dust. Re-entrained road dust emissions were estimated using AP-42, Ch. 13.2.1 (EPA, 2006).

3.1.2.1.2 Commissioning Phase

The duration of the commissioning phase for GWF Henrietta is expected to be approximately 65 days. During this period, GWF will ensure that emissions are reduced to the extent feasible by limiting equipment operation consistent with the equipment manufacturers' recommended intervals.

Short term NO_2 and CO emissions during the commissioning phase were estimated based on vendor data and best engineering estimates. The emission estimates are based on the estimated duration of each commissioning event, emission control efficiencies expected for each event, and turbine operating rates. The maximum hourly and event commissioning emission rates for NO_x and CO are presented in Table 3.1-3. The annual impacts for the commissioning phase were not evaluated because the commissioning phase is expected to be completed within 65 days. Maximum hourly emission rates for VOC, SO_2, PM_{10}, and $PM_{2.5}$ are expected to be equal to or lower than normal operating rates due to reduced loads during commissioning.

TABLE 3.1-3
Turbine Commissioning Emission Rate

Description	NO_x	CO
Maximum Hourly, lb/hr (per turbine)	52.0	40.5
Total Commissioning Period, tons (both turbines)	8.3	6.3

3.1.2.1.3 Operational Phase

GWF Henrietta would consist of two existing General Electric (GE) LM6000 PC Sprint CTGs, two new OTSGs used to generate steam, and a new 25 MW (net) STG. Steam cycle cooling will be accomplished by a new air cooled condenser (ACC). Additional cooling for the steam turbine lubricating oil will be provided by a 305 gallon per minute (GPM) wet surface air cooler (WSAC).

GWF Henrietta will retain the capability to operate in simple-cycle mode. Under simple-cycle operation, the OTSGs would be operated in a "dry" condition (no steam generation) and combustion turbine exhaust gas emissions would be controlled by the SCR and oxidation catalyst systems. The natural gas fuel system for the CTGs will remain unchanged.

GWF Henrietta will also include a new 42 MMBtu auxiliary boiler to minimize the duration of the combined-cycle start-up events of the facility, an existing 471 horsepower (hp) diesel fired emergency generator, and a new 460 hp diesel fired fire water pump.

Operational emission estimates were prepared for the start-up and shutdown mode and the steady-state operating mode. Emission estimates for these two operating modes are based on vendor data and engineering estimates. While operating in the simple-cycle mode, all emission limits will remain the same as identified in the existing SJVAPCD GWF HPP Title V permit (C-3929), except for the CO emission limits which will be reduced from 6 ppmvd to 3 ppmvd at 15 percent O_2 and NO_x emission limits that will be reduced from 3.6 to 2.5 ppmvd at 15 percent O_2.

A SCR will be used to control NO_x concentrations in the exhaust gas emitted to the atmosphere to 2 ppmvd or less at 15 percent O_2 while operating in combined-cycle mode. The SCR process will use aqueous ammonia. Ammonia slip, or the concentration of un-reacted ammonia in the exhaust gas, will be limited to 5 ppmvd or less at 15 percent O_2

while operating in combined- cycle mode and 10 ppmvd at 15 percent O_2 when operating in the simple-cycle mode. GWF Henrietta will continue to use the existing aqueous ammonia storage system, ammonia vaporization and injection system, and monitoring equipment and sensors.

CO and VOCs emissions will be controlled using an oxidation catalyst located in the OTSGs. CO would be controlled to 3 ppmvd or less at 15 percent O_2, and VOCs would be controlled to 2 ppmvd or less at 15 percent O_2 while operating under both combined- and simple-cycle modes.

Particulate and sulfur dioxide emissions will be controlled by using inherently low sulfur natural gas as the sole fuel for the LM6000 turbines. In addition, the LM6000 turbines will employ high-efficiency inlet air filtration to remove particulate matter from the inlet air.

Start-up and Shutdown Emissions

The maximum facility start-up and shutdown emission rates for both operating modes are presented in Table 3.1-4, on a pound per event (lb/event) basis. These emissions are based on vendor data. GWF Henrietta will have the ability to operate in either simple- or combined- cycle mode. Each turbine start-up would include a simple-cycle start-up. If the turbine transitions to combined-cycle operation then a combined-cycle start-up would occur and the total emissions for that start-up would be the sum of the simple-cycle and combined-cycle start-up emissions. Similarly each turbine shutdown includes a simple-cycle shutdown. A combined-cycle shutdown only occurs if the plant was operating in combined-cycle mode.

TABLE 3.1-4
LM6000 Start-up/Shutdown Emission Rates

	NO_x	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Simple-Cycle						
Start (lb/event) [a]	7.7	7.7	0.7	0.1	0.1	0.1
Stop (lb/event) [b]	7.7	7.7	0.7	0.1	0.2	0.2
Combined-Cycle						
Start (lb/event) [c]	6.1	1.8	0.5	0.3	2.2	2.2
Shutdown (lb/event) [d]	2.1	0.6	0.2	0.1	0.8	0.8

[a] Simple-cycle start is based on a 10-minute start cycle.

[b] Simple-cycle stop is based on a 10-minute stop cycle.

[c] Combined-cycle start is based on a 60-minute start cycle.

[d] Combined-cycle stop is based on a 20-minute stop cycle.

Steady-state Operating Emissions

GWF Henrietta's CTGs will have the capability of operating in either a simple-cycle or combined-cycle mode. As such, the emission concentrations for both modes differ slightly for NO_X. The turbine operational emission rates for steady-state operations have been estimated based on the combined maximum heat input rating and conservative estimates of annual operation. The emission rates for the LM6000 unit are shown in Table 3.1-5. Emission estimates are provided in Attachment C.

TABLE 3.1-5
Maximum Pollutant Emission Rates for the LM6000 Unit

	Simple-Cycle		Combined-Cycle	
Pollutant[a]	ppmvd @ 15% O_2	Emission Rate (lb/hr)[b]	ppmvd @ 15% O_2	Emission Rate (lb/hr)[b]
NO_x	2.5	4.2	2	3.4
CO	3	3.1	3	3.1
VOC	2	1.2	2	1.2
PM_{10} /$PM_{2.5}$ [c]	0.0009	2.2	0.0009	2.2
SO_2 [d]	<1	0.3	<1	0.3
Ammonia	10	6.2	5	3.1

[a] Maximum values are for each turbine and exclude start-ups and shutdowns.

[b] Based on the base load operating scenario at 15°F or 63°F.

[c] $PM_{10/2.5}$ concentrations are in units of grains per standard dry cubic feet. Emission rate assumes 100 percent of particulate matter emissions are emitted as PM_{10} and $PM_{2.5}$ and include both front and back half as defined in EPA Method 5.

[d] Assessed using 0.25 grains of sulfur per 100 cubic feet of natural gas.

The maximum fuel usage for the gas turbines was estimated based on the maximum turbine firing scenario at 15°F, 24 hours of operation per day, and 8,541 hours per year. The maximum fuel usage for the auxiliary boiler is based on 24 hours of operation per day, and 4,000 hours per year. See Table 3.1-6.

TABLE 3.1-6
Maximum Facility Fuel Use (MMBtu)

Period	Gas Turbine (each)	Auxiliary Boiler	Total Fuel Use (all units)
Per Hour	465	42	972
Per Day	11,165	1,008	23,338
Per Year	3,973,087	168,000	8,114,174

Maximum daily turbine emissions for simple-cycle operations are based on two simple-cycle start-up and shutdown events per turbine and approximately 23.3 hours of simple-cycle turbine operation at 100 percent load rate at 15°F. Maximum daily turbine emissions for combined- cycle operations are based on two combined-cycle start-ups and shutdowns per turbine and approximately 20.7 hours of simple-cycle turbine operation at 100 percent load rate at 15°F. Start-up SO_2 emission rates are based on a maximum expected hourly fuel sulfur level of 0.25 grains per 100 standard cubic feet of natural gas.

Maximum annual emissions were based on 1,350 hours of simple-cycle operation at 63°F, 6,650 hours of combined-cycle operation at 63°F, and 325 start-up and shutdown events. In evaluating annual emissions relative to start-up and shut down events, the combined cycle start up and shut down includes the simple cycle start-up and shut down, that is the simple cycle and combined cycle start up and shut down events are not additive. Annual SO_2

emissions are based on an expected annual fuel sulfur level of 0.25 grains per 100 standard cubic feet of natural gas.

The auxiliary boiler emissions were calculated based on the maximum heat input of 42 MMBtu and a high heating value of 1,005 Btu/scf. The daily and annual emission rates were based on 24 hours per day and 4,000 hours per year of operation, respectively.

Hourly WSAC emissions were calculated from the maximum design cooling water total dissolved solids (TDS) level of 1,100 ppm, 5 cycles of concentration, and a design cooling water recirculation rate of 305 gallons per minute. The annual WSAC emissions were calculated based on the maximum expected TDS concentration (based on 5 cycles of concentration), the tower's rated recirculation rate, a 0.005 percent efficient drift eliminator, and 850 hours per year operation.

The hourly diesel fired emergency firewater pump and the existing emergency generator emissions were estimated based on 60 minutes of continuous operation. The daily and annual emission rates were based on non-emergency (testing and operational maintenance) use of 24 hours per day and 50 hours per year of operation, respectively.

TABLE 3.1-7
GWF Henrietta Facility Emissions (Including Start-ups and Shutdowns Except as Noted)

	NO_x	SO_2	VOC	CO	$PM_{10}/PM_{2.5}$
Maximum Hourly Emissions – Simple-Cycle, lb/hr (excluding start-ups and shutdowns)					
Turbine (Both Turbines – Simple-Cycle)	8.5	0.66	2.4	6.2	4.4
Auxiliary Boiler	0.31	0.025	0.21	1.6	0.29
WSAC	--	--	--	--	0.0084
Existing Emergency Generator	4.9	0.005	0.04	0.12	0.03
Emergency Fire Pump	2.7	0.005	0.09	0.68	0.08
Total Project (lb/hr)	**16.4**	**0.70**	**2.7**	**8.6**	**4.8**
Maximum Hourly Emissions – Combined-Cycle, lb/hr (excluding start-ups and shutdowns)					
Turbine (Both Turbines –Combined-Cycle)	6.8	0.66	2.4	6.2	4.4
Auxiliary Boiler	0.31	0.025	0.21	1.6	0.29
WSAC	--	--	--	--	0.0084
Existing Emergency Generator	4.9	0.005	0.04	0.12	0.03
Emergency Fire Pump	2.7	0.005	0.09	0.68	0.08

TABLE 3.1-7
GWF Henrietta Facility Emissions (Including Start-ups and Shutdowns Except as Noted)

	NO_x	SO_2	VOC	CO	$PM_{10}/PM_{2.5}$
Total Project (lb/hr)	**14.7**	**0.70**	**2.7**	**8.6**	**4.8**
Maximum Facility Daily Emissions – Simple-Cycle, lb/day (including 2 start-ups and 2 shutdowns)					
Turbine (Both Turbines –Simple-Cycle)	260	16	62	206	104
Auxiliary Boiler	7.4	0.6	5.0	37.3	7.0
WSAC	--	--	--	--	0.2
Existing Emergency Generator	117	0.11	1.0	3.0	0.72
Emergency Fire Pump	65	0.11	2.1	16	1.9
Total Project (lb/day)	**449**	**17**	**70**	**262**	**114**
Maximum Facility Daily Emissions – Combined-Cycle, lb/day (including 2 start-ups and 2 shutdowns)					
Turbine (Both Turbines –Combined-Cycle)	236	16	60	200	106
Auxiliary Boiler	7.4	0.6	5.0	37.3	7.0
WSAC	--	--	--	--	0.2
Existing Emergency Generator	117	0.11	1.0	3.0	0.72
Emergency Fire Pump	65	0.11	2.1	16	1.9
Total Project (lb/day)	**425**	**17**	**68**	**256**	**116**
Maximum Annual Emissions, lbs/year					
Turbine Total (Simple- and Combined-Cycle)	71,994	5,530	9,364	40,366	37,418
Auxiliary Boiler	1,224	101	840	6,210	1,176
WSAC	--	--	--	--	7.2
Existing Emergency Generator	243	0.2	2.1	6.2	1.5
Emergency Fire Pump	139	0.2	*	34	4.0
Total Project (lb/yr)	**73,600**	**5,631**	**10,206**	**46,616**	**38,607**
Total Project (tpy)	**36.8**	**2.8**	**5.1**	**23.3**	**19.3**

*VOC emissions are included in the NO_x emission estimate for the emergency fire pump.

Greenhouse Gas Emission Estimates

Combustion of natural gas in the gas turbines and auxiliary boiler, and diesel fuel in the emergency generator and firewater pump engine would result in emissions of CO_2, CH_4 and N_2O. Greenhouse gas (GHG) emissions for normal facility operations were calculated based on the maximum fuel usage predicted for GWF Henrietta and emission factors contained in the CCAR General Reporting Protocol (CCAR, 2008). The emission factors used to estimate the greenhouse gas emissions are summarized in Attachment C. Emissions of CO_2, N_2O, and CH_4 resulting from operation of GWF Henrietta are presented in Table 3.1-8.

TABLE 3.1-8
Estimated Annual Greenhouse Gas Emissions from GWF Henrietta

	Estimated Emissions (metric tons/year)			
	CO_2	**CH_4**	**N_2O**	**CO_2e***
Turbines	421,624	47	1	422,855
Auxiliary Boiler	8,914	0.99	0.0168	8,940
Emergency Fire Pump	11	0.00034	0.00011	11
Existing Emergency Generator	11	0.00033	0.00011	11
Total Emissions	430,561	48	1	431,818

* CO_2e = CO_2-equivalent emissions; emissions of CH_4 and N_2O are expressed in terms of CO_2e based on their GHG warming potentials relative to CO_2 using standard CCAR protocol.

3.1.2.2 Air Quality Impact Analysis

3.1.2.2.1 Modeling Methodology for Evaluating Impacts on Ambient Air Quality

The air dispersion modeling was conducted based on guidance presented in the EPA's 40 CFR Part 51, *Guideline on Air Quality Models* (EPA, 2005), the SJVAPCD's *Guidance for Air Dispersion Modeling* (SJVAPCD, 2006), and the EPA-approved dispersion model, AERMOD (version 07026). The EPA's BPIP-Prime (Building Profile Input Program – Plume Rise Model Enhancement, dated 04274), was used to calculate the projected building dimensions required for AERMOD evaluation of impacts from building downwash. The source locations are specified for a Cartesian (x,y) coordinate system where x and y are distances east and north in meters, respectively. The Cartesian coordinate system used for these analyses is the Universal Transverse Mercator Projection (UTM), 1927 North American Datum (NAD 27). The NO_2 1-hour modeling was performed using the AERMOD ozone limiting method (OLM) model selection.

The CEC requires a minimum of 1 year of meteorological data approved by ARB or the local air pollution control district to be used in the air dispersion modeling analysis. SJVAPCD recommended the use of 2004 Hanford AERMET data set for the modeling effort. (personal communication Villalvazo, 2008). The background data in Section 3.1.1 (Environmental Baseline Information, Table 3.1-1) were added to the maximum background concentrations recorded over the most recent three years to evaluate the impacts of operation on ambient air quality.

Receptor and source base elevations were determined from U.S. Geological Survey (USGS) Digital Elevation Model (DEM) data using the 7½-minute format (i.e., 30-meter spacing between grid nodes). All coordinates were referenced to UTM NAD27, Zone 11.

Cartesian coordinate receptor grids were used to provide adequate spatial coverage surrounding the project area for assessing ground-level pollution concentrations, to identify the extent of significant impacts, and to identify maximum impact locations. The following grids were used to identify the areas of maximum concentration:

- Receptors extending from the property boundary out to 500 meters were spaced at 25-meter intervals
- 100-meter spacing from 500 meters to 1 km from the origin

- 500-meter spacing from beyond 1 km to 5 km from the origin
- 1,000-meter spacing from beyond 5 to 10 km from the origin

3.1.2.2.2 Modeling Scenarios and Source Data Used to Evaluate Impacts on Ambient Air Quality

Construction Impacts Analysis

The maximum daily emissions were calculated based on the highest monthly emissions total divided by the number of days of operation per month. Based on the 15-month construction schedule, emissions were divided into two categories: onsite exhaust; and fugitive dust. Emissions were modeled using four point sources within the construction zone. For exhaust emissions, the following parameters were used:

- stack height = 3 meters,
- stack diameter = 0.127 meters,
- exhaust temperature = 533K
- exit velocity = 18 m/s.

PM_{10} emissions from fugitive dust were modeled as an area source with a release height of 2.0 meters. The results of the construction modeling analysis are presented in Section 3.1.2.3.3. A detailed summary of the assumptions and emission factors used to estimate the emission rates are presented in Attachment C.

Commissioning Impacts Analysis

The maximum emission scenarios identified for the various phases of turbine commissioning were summarized by operating load and turbine configuration. From this list of emission scenarios, the maximum emission rates for each operating load and turbine configuration were identified. AERMOD was conducted using the parameters and emission rates presented in Table 3.1-9. The commissioning phase is expected to be completed within 65 days. Therefore, an annual analysis was not conducted. The auxiliary boiler, diesel-fueled engines, and WSAC emissions were not included as part of the turbine commissioning analysis. Additional details used to determine the maximum commissioning emissions are presented in Attachment C. A summary of the dispersion modeling input files are also presented in Attachment C.

TABLE 3.1-9
GWF Henrietta Commissioning Dispersion Modeling Scenarios

Scenarios	Turbines/ Modeling Load[a]	Emission Rates[b] (lb/hr)		
		1-Hr NO_x	1-Hr CO	8-Hour CO
Steam Blows	1 or 2 / 50%	52.0	20.9	20.9
Steam Blows	Both / 50%	39.0	18.2	18.2
Verify STG on Turning Gear; Establish Vacuum in ACC Ext Bypass Blowdown to ACC (combined blows) commence tuning on ACC Controls; Finalize Bypass Valve Tuning	1 or 2 / 100%	44.8	40.5	40.5

TABLE 3.1-9
GWF Henrietta Commissioning Dispersion Modeling Scenarios

Scenarios	Turbines/ Modeling Load[a]	Emission Rates[b] (lb/hr)		
		1-Hr NO_x	1-Hr CO	8-Hour CO
Verify STG on Turning Gear; Establish Vacuum in ACC Ext Bypass Blowdown to ACC (combined blows) commence tuning on ACC Controls; Finalize Bypass Valve Tuning	Both / 100%	44.8	40.5	40.5

[a] Exhaust parameters modeled for turbine loads <60 percent were based on the turbine exhaust parameters for the 60 percent load case.

[b] Emission rate given per turbine.

Operation Impacts Analysis

Exhaust parameters for the OTSG stacks, the auxiliary boiler, the new diesel-fired internal combustion engine (ICE) and the WSAC were based on information provided by the vendor. Turbine emissions and stack parameters, such as flow rate and exit temperature, would exhibit some variation with ambient temperature and operating load. Therefore, in order to evaluate the worst-case air quality impacts, dispersion modeling was conducted at base and 60 percent loads at the design-high (115°F), low (15°F), and weighted annual average ambient temperatures (63°F). Emission rates modeled for the start-up and shutdown and the normal operation of GWF Henrietta turbines were calculated based on vendor data and additional conservative assumptions of turbine performance. Emission rates modeled for the auxiliary boiler, diesel fired engines, and the WSAC were based on the hourly and annual emission rates presented in Section 3.1.2.1.

Source emission rates for the dispersion modeling are presented in Table 3.1-10. A summary of the source parameters and the UTM locations of each source are shown in Attachment C. The results of the modeling analysis are presented in the following section and Attachment C.

TABLE 3.1-10
Maximum Emission Rates Used for the AERMOD Dispersion Modeling Analysis

Pollutant	Simple-Cycle (per turbine) (lb/hr)	Combined-Cycle (per turbine) (lb/hr)	Auxiliary Boiler (lb/hr)	Existing Emergency Generator (lb/hr)	Fire Pump (lb/hr)	WSAC (lb/hr)
NO_2						
1-Hour	12.8	12.8	0.31	4.9	2.7	-
Annual	4.4	4.4	0.14	0.028	0.015	-
CO						
1-Hour	10.3	9.2	1.6	0.12	0.68	-
8-Hour	10.3	9.2	1.6	0.12	0.68	-
SO_2						
1-hour	0.33	0.33	0.025	0.0047	0.0048	-
3-hour	0.33	0.33	0.025	0.0047	0.0048	-
24-hour	0.33	0.33	0.025	0.0047	0.0048	-
Annual	0.32	0.32	0.012	0.000027	0.000027	-

TABLE 3.1-10
Maximum Emission Rates Used for the AERMOD Dispersion Modeling Analysis

Pollutant	Simple-Cycle (per turbine) (lb/hr)	Combined-Cycle (per turbine) (lb/hr)	Auxiliary Boiler (lb/hr)	Existing Emergency Generator (lb/hr)	Fire Pump (lb/hr)	WSAC (lb/hr)
PM_{10}						
24-hour	2.20	2.20	0.29	0.030	0.079	0.0084
Annual	2.14	2.14	0.13	0.00017	0.00045	0.00081
$PM_{2.5}$						
24-hour	2.20	2.20	0.29	0.030	0.079	0.0084
Annual	2.14	2.14	0.13	0.00017	0.00045	0.00081

Turbine emission rates are based on the following assumptions:

- The maximum 1 and 8-hour simple- and combined-cycle NO_x and CO emission rates are based on the worst case start-up emissions.
- The maximum 1-, 3-, and 24-hour simple- and combined-cycle SOx, PM10, and PM2.5 emission rate based on the worst case one-hour normal operating scenario emissions. (i.e. 100% load at 15°F or 63°F)
- SO_2 emissions were conservatively modeled assuming a fuel sulfur content of 0.25 grains of sulfur per 100 cubic feet of natural gas.
- Annual emission rate for NO_x, SO_x, PM_{10}, and $PM_{2.5}$ were based on 1,350 hours of simple-cycle base load operation and 6,650 hours of combined-cycle base load operation at 63°F, and 325 start ups and shutdowns.
- Annual NO_x emissions were conservatively modeled assuming a simple-cycle NO_x exhaust emission rate of 3.6 ppm. Based on revised performance guarantees, the NO_x emission rate will be lowered to 2.5 ppm. Therefore, the predicted annual NO_x concentrations would be less than or equal to the concentrations reported in Section 3.1.2.3.3 using the revised performance guarantees.

3.1.2.2.3 Modeling Results Compared to the Ambient Air Quality Standards

Construction Impacts Analysis

The results of this conservative analysis (Table 3.1-11) indicate that the maximum construction impacts combined with the background concentrations will not exceed the AAQSs for each of the criteria pollutants and averaging periods, with the exception of 1-hour NO_2 and $PM_{10/2.5}$. It should be noted that the construction modeling effort was very conservative - all construction emissions were concentrated into four virtual point sources, construction emissions are assumed to be steady-state (when in fact they are variable), worst–case background observed in the prior three-year period was used (irrespective of the hour of occurrence), and the OLM method does not account for kinetic limitations in the near-field conversion of NO to NO_2 that are likely to reduce the amount of NO_2 that can be formed from NO_x emissions (that are largely emitted as NO, not NO_2) in near-field where the model predicts high concentrations. When these factors are considered, it is unlikely that a violation of the 1-hr standard would occur. Furthermore, the predicted 1-hour NO_2, 24-hour PM_{10}, and annual PM_{10} concentrations are lower than the concentrations predicted in the original Commission proceeding and the selected PM_{10} and $PM_{2.5}$ background concentrations exceed the AAQSs without adding the modeled concentrations. Best available control techniques will also be used throughout the 15-month construction activity period, as required in SJVAPCD Regulation VIII, to further reduce the predicted impacts. As a result, the impacts from construction of GWF Henrietta are expected to be less than significant.

TABLE 3.1-11
Maximum Modeled Impacts from Construction and the Ambient Air Quality Standards

Pollutant	Averaging Period	Maximum Modeled Concentration ($\mu g/m^3$)	Background Concentration[a] ($\mu g/m^3$)	Total Predicted Concentration ($\mu g/m^3$)	State Standard ($\mu g/m^3$)	Federal Standard ($\mu g/m^3$)
NO_2	1-hour[b]	269	137	406	339	—
	Annual	18.4	22.6	41	57	100
SO_2	1-hour	0.46	340	340	655	—
	3-hour	0.30	196	196	—	1,300
	24-hour	0.09	81	81	105	365
	Annual	0.02	18.3	18.3	—	80
CO	1-hour	233	5,039	5,272	23,000	40,000
	8-hour	81	3,791	3,872	10,000	10,000
PM_{10}	24-hour	57.6	150	208	50	150
	Annual	11.9	46	58	20	—
$PM_{2.5}$	24-hour	7.7	92.5	100	—	35
	Annual	2.3	18.4	21	12	15

[a] Background concentrations were the highest concentrations monitored during 2005 through 2007.
[b] The maximum 1-hour NO_2 concentration is based on AERMOD OLM output.

Commissioning Impacts Analysis

Maximum impacts for SO_2, PM_{10}, and $PM_{2.5}$ are expected to be equal to or lower than normal operating rates due to reduced loads during commissioning. Table 3.1-12 presents a comparison of the maximum modeled GWF Henrietta commissioning NO_2 and CO impacts to the respective short-term AAQSs. The analysis excluded a comparison to the annual averaging period standards because commissioning will only occur once during GWF Henrietta's lifetime, and is expected to be completed within 65 days. The maximum facility NO_2 and CO impacts combined with the background concentration are less than the AAQSs. Therefore, impacts from commissioning would be less than significant.

TABLE 3.1-12
Turbine Commissioning Impacts Analysis—Maximum Modeled Impacts Compared to the Ambient Air Quality Standards
Simultaneous Turbine Emissions

Pollutant	Averaging Time	Maximum Modeled Concentration ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)[a]	Total Predicted Concentration ($\mu g/m^3$)	State Standard ($\mu g/m^3$)	Federal Standard ($\mu g/m^3$)
NO_2	1-hour[b]	57	137	194	339	—
CO	1-hour	52	5,039	5,091	23,000	40,000
	8-hour	32	3,791	3,823	10,000	10,000

[a] Background concentrations were the highest concentrations monitored during 2005 through 2007.
[b] The maximum 1-hour NO_2 concentration is based on AERMOD OLM output.

Operation Impacts Analysis

The highest modeled concentrations were used to demonstrate compliance with the AAQS. Table 3.1-13 presents a comparison of the maximum GWF Henrietta operational impacts to the AAQSs. Annual NO_x emissions were conservatively modeled assuming a simple-cycle NO_x exhaust emission rate of 3.6 ppm. Based on revised performance guarantees, the proposed NO_x emission rate has been lowered to 2.5 ppm. The one-hour NO_x results were not impacted by this revision to the simple-cycle NO_x performance because short-term impacts are based on worst-case emissions during start-up. Therefore, the predicted annual NO_2 concentrations would be less than or equal to the concentrations reported in Table 3.1-13 using the revised performance guarantees. SO_2 emissions were modeled assuming a fuel sulfur content of 0.25 grains of sulfur per 100 cubic feet of natural gas. Despite the conservative assumptions, the NO_2, SO_2, and CO concentrations combined with the background concentrations do not exceed the AAQSs. Therefore, GWF Henrietta would not cause or contribute to the violation of a standard, and the NO_2, SO_2, and CO impacts from operation would be less than significant.

For PM_{10} and $PM_{2.5}$, the background concentrations exceed the AAQSs without GWF Henrietta. As a result, the predicted project impact plus background also exceeds the AAQSs and the operation of GWF Henrietta would further contribute to an existing violation of the standard without mitigation. As discussed in Section 3.1.3, GWF Henrietta is proposing to fully offset project emissions of NO_x, PM_{10}, $PM_{2.5}$, and VOC. Therefore, the PM_{10} and $PM_{2.5}$ impacts from operation would be less than significant.

A complete list of off-property impacts for the multiple turbine operating scenarios is presented in Attachment C.

TABLE 3.1-13
GWF Henrietta Operation Impacts Analysis—Maximum Modeled Impacts Compared to the Ambient Air Quality Standards

Pollutant	Averaging Time	Maximum Modeled Concentration (µg/m^3)	Background Concentration (µg/m^3)[a]	Total Predicted Concentration (µg/m^3)	State Standard (µg/m^3)	Federal Standard (µg/m^3)
NO_2	1-hour [b]	201.4	137	338.4	339	—
	annual	2.3	22.6	24.9	57	100
SO_2	1-hour	1.9	340	342	655	—
	3-hour	1.3	196	197	—	1,300
	24-hour	0.91	81	82	105	365
	annual	0.17	18.3	19	—	80
CO	1-hour	127	5,039	5,166	23,000	40,000
	8-hour	87	3,791	3,878	10,000	10,000
PM_{10}	24-hour	11.6	150	162	50	150
	annual	2.0	46	48	20	—
$PM_{2.5}$	24-hour	11.6	92.5	104	—	35
	annual	2.0	18.3	20	12	15

[a]Background concentrations were the highest concentrations monitored during 2005 through 2007.

[b]Maximum 1-hour NO_2 facility impact is based on the AERMOD OLM output.

3.1.2.2.4 Cumulative Impact Analysis

The existing HPP facility impacts were offset for 8,000 hours of operation. GWF Henrietta is not expected to contribute to significant air quality impacts over the current HPP permitted emission limits. The increase in expected air emissions would be mitigated using NO_x reductions to offset increases in non-attainment pollutants. According to the Kings County Planning Department, there are no proposed or foreseeable developments planned in the immediate vicinity. Additionally, there are no sensitive receptors, such as residential uses and schools, within one mile of GWF Henrietta. Implementation of GWF Henrietta will not result in any individually significant impacts and the project will comply with applicable COCs and LORS. Therefore, GWF Henrietta will not contribute to any cumulative air quality impacts.

3.1.3 Mitigation Measures

3.1.3.1 Construction Mitigation

Construction impacts will be further reduced with the implementation of previous construction mitigation measures outlined in the HPP COCs included in Attachment B. With the implementation of these measures, air quality impacts from construction will be less than significant.

3.1.3.2 Operational Mitigation

The operational mitigation includes careful design of the project to include installing the best available control technology (BACT) to minimize air emissions. Air quality impacts have been further mitigated by providing emission offsets in excess of the quantity expected to be emitted. With the implementation of BACT and emission offsets, operational air quality impacts will remain less than significant. The remainder of this section describes the best available control technology analysis and the emission offset mitigation.

3.1.3.2.1 Emission Offsets

Emission Offset Applicability Analysis

Table 3.1-14 presents a summary of the SJVAPCD emission offset applicability requirements for GWF Henrietta. The post project emissions are compared with SJVAPCD Rule 2201 emission offset thresholds. Since post-project emissions of NO_x and $PM_{10/2.5}$ would exceed SJVAPCD Rule 2201 emission offset thresholds, GWF Henrietta is required to provide emission offsets for the amount of project emission change calculated for each of these pollutants in Table 3.1-14. Since post-project CO, VOC, and SO_2 emissions do not exceed the offset thresholds, there is no SJVAPCD requirement that the proposed project emissions change be offset for these pollutants.

TABLE 3.1-14
GWF Henrietta Emission Offset Applicability Analysis

Description	NO_x (lb)	CO (lb)	VOC (lb)	$PM_{10/2.5}$ (lb)	SO_2 (lb)
Post Project Potential to Emit[a]	73,600	46,616	10,206	38,607	5,631
SJVAPCD Reg 2201 Offset Thresholds	20,000	200,000	20,000	29,200	54,750
Emission Offsets Required By SJVAPCD Reg 2201[b]	Yes	No	No	Yes	No

[a] See emissions summary in Table 3.1-7.

[b] Offsets are required when Post-Project Potential to Emit exceeds the Rule 2201 thresholds listed above. Post-project CO, VOC, and SO_2 emissions do not exceed the thresholds of 200,000 lb/yr, 20,000 lb/yr, and 54,750 lb/yr, respectively and are therefore not subject to emission offset requirements under Rule 2201.

Evaluation of Proposed Mitigation

Table 3.1-15 presents a summary of the proposed mitigation for GWF Henrietta. When the HPP was originally permitted, SJVAPCD (and the CEC) required the surrender of emission reduction credits for all project emissions. Because the original HPP was fully offset, the project emissions change is calculated as the difference between the proposed post-project potential to emit and the currently permitted (and previously offset) emission levels. This calculation, reflected in the row titled "Project Emissions Change," shows that GWF Henrietta would result in an increase in PM_{10} emissions, which is subject to emission offset requirements under Rule 2201. Therefore, GWF Henrietta proposes to provide 15,725 pounds of the surplus NO_x mitigation (reflecting a ratio of NO_x to PM_{10} of 2.38:1) to offset the potential increase in PM_{10} emissions. Furthermore, GWF is proposing to provide mitigation for ozone precursors and is providing 4,518 pounds of surplus NO_x mitigation to offset the potential increase in VOC emissions (using a ratio of NO_x to VOC of 1:1). As shown in Table 3.1-15, SJVAPCD Rule 2201 does not require offsets for the increases in CO and SO_2 emissions.

TABLE 3.1-15
GWF Henrietta Mitigation Summary

Description	NO_x (lb)	CO (lb)	VOC (lb)	$PM_{10/2.5}$ (lb)	SO_2 (lb)
Post Project Potential to Emit[a]	73,600	46,616	10,206	38,607	5,631
Currently Permitted Emissions (2 Turbines)	99,020	43,660	5,688	32,000	5,280
Project Emissions Change[b]	-25,420	2,956	4,518	6,607	351
NO_x reduction for VOC increase @ 1:1 ratio (CEQA Mitigation)[c]	4,518	--	-4,518	--	--
NO_x reduction for PM10/2.5 increase @ 2.38:1 ratio[d]	15,725	--	--	-6,607	--
Net Emission Change with Proposed Mitigation	-5,177	2,956	0	0	351

[a] See Emissions summary in Table 3.1-7.

[b] Project Emissions Change = Post-Project Potential to Emit – HPP Currently Permitted Emissions

[c] Based on a NO_x to VOC interpollutant offset ratio of 1:1, a reduction of 4,518 lb of VOC is equivalent to a NO_x increase of 4,518 lb.

[d] Based on a NO_x to $PM_{10/2.5}$ interpollutant offset ratio of 2.38:1, a reduction of 6,607 lb of $PM_{10/2.5}$ is equivalent to a NO_x increase of 15,725 lb.

3.1.3.2.2 BACT Analysis

Applicable SJVAPCD BACT levels are presented in Table 3.1-16. SJVAPCD Rule 2201, 4.1.1 and 4.1.2 require the project to apply BACT for emission increases of VOC, NO_x, SO_2, PM_{10}, and CO that are greater than 2 lb/day per new or modified emissions unit. Rule 2201, 4.2.1 provides an exemption from the CO BACT requirement for emission units at stationary sources with a post project potential to emit of less than 200,000 pounds of CO per year. As presented in Table 3.1-16, BACT is required for VOC, NO_x, PM_{10}, SO_2, and CO, depending on the particular emission unit and the potential daily emissions by pollutant. The calculation of facility emissions is discussed in Section 3.1.2.1.

TABLE 3.1-16
BACT Requirements

Pollutant	Applicability Level	Permit Units Exceeding this Level	BACT Required?
VOC	2 lb/day/source	Turbine, Auxiliary Boiler, and Fire Pump Engine	Yes
NO_x	2 lb/day/source	Turbine, Auxiliary Boiler, and Fire Pump Engine	Yes
SO_2	2 lb/day/source	Turbine	Yes
PM_{10}	2 lb/day/source	Turbine and Auxiliary Boiler	Yes
CO	2 lb/day/source	Turbine, Auxiliary Boiler, and Fire Pump Engine	Yes*

Reference: SJVAPCD Rule 22201, 4.1.1 & 4.1.2

*Rule 2201, 4.2.1 provides an exemption from CO-BACT requirements for emission units at stationary sources with post project Potential to Emit of less than 200,000 pounds per year of CO.

BACT for NO_x emissions from the turbine will be achieved by the use of low NO_x emitting combustion equipment and post-combustion controls. The Applicant has selected a turbine equipped with water-injected NO_x combustors. The gas turbine will be designed to generate less than 25 parts per million by volume-dry (ppmvd) NO_x, corrected to 15 percent O_2, at the outlet of the engine. In addition, the turbine will be equipped with a post-combustion SCR system to further reduce NO_x emissions to 2.5 ppmvd at 15 percent O_2 when operating in the simple-cycle mode and 2.0 ppmvd or less at 15 percent O_2 while operating in combined-cycle mode (excluding start-ups and shutdowns). The current SJVAPCD BACT requirement for natural gas-fired, simple-cycle gas turbines <50 MW is 5 ppmvd, corrected to 15 percent O_2 over a 1-hour averaging period. The current SJVAPCD BACT requirement for natural gas-fired, combined-cycle gas turbines <50 MW is 2.5 ppmvd, corrected to 15 percent O_2 over a 1-hour averaging period. Therefore, GWF Henrietta will comply with BACT requirements for NO_x.

The auxiliary boiler will be equipped with ultra-low NO_x burners and will achieve a 6 ppm NO_x concentration (corrected to 3 percent O_2). The SJVAPCD BACT requirement for natural-gas-fired boilers with heat inputs greater than 20 MMBtu/hr is 9 ppmvd, corrected to 15 percent O_2 over a one-hour averaging period. Therefore, GWF Henrietta will meet the SJVAPCD BACT requirements for NO_x.

BACT for CO emissions from the turbine will be achieved by good combustor design and an oxidation catalyst. Good combustor design will result in low levels of combustion CO while maintaining very low NO_x formation. In addition, the project will use an oxidation catalyst system to further reduce CO emissions to 3 ppmvd, corrected to 15 percent O_2. The current SJVAPCD CO BACT requirement for natural gas-fired, simple-cycle and combined-cycle gas turbines <50 MW is 6 ppmvd, corrected to 15 percent $O_{2.}$ Therefore, GWF Henrietta will comply with BACT requirements for CO.

The natural gas-fired auxiliary boiler will be equipped with ultra-low emission burners and will achieve a 50 ppm CO concentration (corrected to 3 percent O_2). The SJVAPCD BACT requirement for natural gas-fired boilers with heat inputs greater than 20 MMBtu/hr is the use of natural gas as the primary fuel. Therefore, GWF Henrietta will meet the SJVAPCD BACT requirements for CO.

BACT for VOC emissions from combustion devices has historically been the use of good combustor design. With the use of the good combustor design and oxidation catalysts for GWF Henrietta, the VOC emissions leaving the stacks will not exceed 2 ppmvd, corrected to 15 percent O_2 for turbine operation at full load. The current SJVAPCD VOC achieved in practice BACT requirement for natural gas-fired simple-cycle gas turbines <50 MW and combined-cycle gas turbines < 50 MW is 2 ppmvd, corrected to 15 percent O_2 over a 3-hour averaging period. Therefore, GWF Henrietta will comply with BACT requirements for VOC.

The natural gas-fired auxiliary boiler will be equipped with ultra-low emission burners. The SJVAPCD BACT requirement for natural gas-fired boilers with heat inputs greater than 20 MMBtu/hr is the use of natural gas as the primary fuel. Therefore, GWF Henrietta will meet the SJVAPCD BACT requirements for VOC.

For the turbines, BACT for PM_{10} is inlet air filtration, use of natural gas, and mist eliminator filters on lubricating oil vents. The use of clean-burning gaseous fuel will result in minimal particulate emissions and the inlet air filtration will minimize combustion air particulate matter. The lubricating oil mist eliminator filters will also reduce particulate matter emissions. Therefore, GWF Henrietta will comply with BACT requirements for PM_{10}.

The natural gas-fired auxiliary boiler will be equipped with ultra-low emission burners. The SJVAPCD BACT requirement for natural gas-fired boilers with heat inputs greater than 20 MMBtu/hr is the use of natural gas as the primary fuel. Therefore, GWF Henrietta will meet the SJVAPCD BACT requirements for $PM_{10/2.5}$.

The turbines and auxiliary boiler will be fired exclusively with pipeline quality natural gas, which is inherently low in sulfur. The emergency fire pump will use diesel fuel with no more than 15 ppm by weight fuel sulfur. Therefore, GWF Henrietta will meet the SJVACPD BACT requirements for SO_2.

The proposed emergency engine for the fire pump will be a Tier III engine, and will have emissions less than the reviewed BACT determination levels. Therefore, the emergency diesel fire pump engine will meet the BACT requirements for all criteria pollutants.

3.1.4 Consistency with LORS

GWF Henrietta will be in compliance with all applicable LORS. See Table 3.1-17 below for a detailed list of the applicable Federal, State, and Local LORS and related compliance assessment.

3.1.5 Conditions of Certification

GWF Henrietta will require changes to the Air Quality COCs presented in the HPP Final Decision. GWF submitted an application to the SJVAPCD on August 1, 2008 for an Authority to Construct (ATC) for GWF Henrietta. As part of the ATC application review, the Applicant expects the SJVAPCD to issue a revised Determination of Compliance that will ensure compliance with applicable LORS. The revised ATC conditions, when issued by SJVAPCD, are expected to be incorporated into GWF Henrietta COCs.

TABLE 3.1-17
Applicable Federal, State, and Local Laws, Ordinances, Regulations, and Standards for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Strategy
Title 40 CFR Part 50	Establishes AAQS for criteria pollutants.	EPA Region IX, ARB, and SJVAPCD	The Applicant will conduct a dispersion modeling analysis to determine if the project will exceed the state or federal AAQS. The Applicant will comply with all SJVAPCD permit conditions limiting emissions and operations. Dispersion modeling indicates GWF Henrietta alone will not exceed the state or federal AAQS for the attainment pollutants.
Title 40 CFR Parts 52, PSD	The PSD program allows new sources of air pollution to be constructed, or existing sources to be modified in areas classified as attainment, while preserving the existing ambient air quality levels, protecting public health and welfare, and protecting Class I Areas (e.g., national parks and wilderness areas).	EPA Region IX	The PSD requirements apply on a pollutant-specific basis to any project that is a new major stationary source. Sources that have the potential to emit 100 tons per year (tpy) of any pollutant regulated by the CAA and are included in the list of 28 specified source categories would be classified as a major stationary source. In addition, the project would be subject to PSD if the cumulative emissions increase for the pollutants exceed the following Federal major modification thresholds for an existing major stationary source: 40 tpy for NO_x, 100 tpy for CO, 15 tpy for PM_{10}, and 40 tpy for SO_2. Also, a modification at a non-major source is subject to PSD if the modification itself would be considered a major source. Criteria pollutant potential to emit (PTE) for GWF Henrietta is expected to be less than 100 tons per year for each of the PSD criteria pollutants. As a result, facility is not a major source subject to PSD review.
Title 40 CFR Parts 51 and 52, NSR (SJVAPCD Rule 2201)	Requires pre-construction review and permitting of new or modified stationary sources of air pollution to allow industrial growth without interfering with the attainment and maintenance of ambient air quality standards.	SJVAPCD with EPA Region IX oversight	Requires NSR facility permitting for construction or modification of specified stationary sources. NSR applies to pollutants for which ambient concentration levels are higher than NAAQS. The NSR requirements are implemented at the local level with EPA oversight (SJVAPCD Rule 2201). The Applicant will comply with all SJVAPCD permit conditions limiting emissions and operations.

TABLE 3.1-17
Applicable Federal, State, and Local Laws, Ordinances, Regulations, and Standards for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Strategy
Title 40 CFR, Part 60	Establishes national standards of performance for new or modified facilities in specific source categories.	SJVAPCD with EPA Region IX oversight	**Turbine:** Proposed 40 CFR Part 60 Subpart KKKK – NO_x Emission Limits for New Stationary Combustion Turbines, would apply to all new combustion turbines that commence construction, modification, or reconstruction after February 18, 2005. The rule requires natural-gas-fired turbines greater than or equal to 30 MW to meet a NO_x emission limit of 50 nanograms per Joule (ng/J) (0.39 pounds per megawatt-hour [lb/MW-hr]), and an SO_2 limit of 73 ng/J (0.58 lb/MW-hr). Alternatively, a fuel sulfur limit of 500 parts per million by weight (ppmw) could be met. Stationary combustion turbines regulated under this subpart would be exempt from the requirements of Subpart GG. The NO_x emissions from the turbines operating in the simple- and combined-cycle normal operating modes will be 0.093 lb/MW-hr and 0.074 lb/MW-hr, respectively. The SO_2 emissions from the turbines in simple- cycle and combined-cycle mode will both be at 0.0068 lb/MW-hr. Therefore, the proposed turbines will comply with both the NO_x and SO_2 limits.
Title 40 CFR, Part 60	Establishes national standards of performance for new or modified facilities in specific source categories.	SJVAPCD with EPA Region IX oversight	**Auxiliary Boiler:** 40 CFR Part 60 Subpart Dc (Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units) applies to boilers with a heat input capacity equal to or less than 100 MMBtu/hr and greater than or equal to 10 MMBtu/hr. The proposed auxiliary boiler would be natural gas fired. Therefore, GWF will comply with the 40 CFR Part 60 Subpart Dc by keeping records of the potential sulfur emissions rate of the fuel in ng/J heat input; and by recording the method used to determine the potential sulfur emissions rate of the fuel.

TABLE 3.1-17
Applicable Federal, State, and Local Laws, Ordinances, Regulations, and Standards for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Strategy
Title 40 CFR, Part 60	Establishes national standards of performance for new or modified facilities in specific source categories.	SJVAPCD with EPA Region IX oversight	**Emergency ICE:** 40 CFR Part 60 Subpart IIII (Standards of Performance for Stationary Compression Ignition Internal Combustion Engines) would apply to the emergency standby generator used to drive the fire pump. The NMHC+NO_x emission limit for a model year 2009 fire pump between 300 and 600 hp would be 3.0 g/bhp, the CO emission limit would be 2.6 g/bhp, and the PM_{10} emission limit would be 0.15 g/bhp. The proposed CI ICE used to operate the emergency fire pump would be a Tier III, 460 bhp ICE. Therefore, the engine would meet the NMHC+NO_x, CO, and PM_{10} emission standards.
Title 40 CFR, Part 63	Establishes national emission standards to limit emissions of hazardous air pollutants (HAPs, or air pollutants identified by EPA as causing or contributing to the adverse health effects of air pollution but for which NAAQS have not been established) from facilities in specific categories.	SJVAPCD with EPA Region IX oversight	Title 40, Code of Federal Regulations, Part 63—National Emission Standards for Hazardous Air Pollutants for Source Categories, establishes emission standards to limit emissions of hazardous air pollutants from specific source categories for Major HAP sources. Sources subject to Part 63 requirements must either use the maximum achievable control technology (MACT), be exempted under Part 63, or comply with published emission limitations. The potential NESHAPS applicable to the project are Subpart YYYY, which sets a formaldehyde emission limit or an operational limit of 91 parts per billion by volume (ppbv) for the turbines and the NESHAPS for Stationary Reciprocating Internal Combustion Engines (RICE). GWF Henrietta would not exceed the HAPs major source thresholds (10 tpy for any one pollutant or 25 tpy for all HAPs combined). Therefore, GWF Henrietta is not subject to the National Emissions Standards for Hazardous Air Pollutants (NESHAP) regulations.

TABLE 3.1-17
Applicable Federal, State, and Local Laws, Ordinances, Regulations, and Standards for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Strategy
Title 40 CFR Part 64 (CAM Rule)	Establishes onsite monitoring requirements for emission control systems.	SJVAPCD with EPA Region IX oversight	Title 40, Code of Federal Regulations, Part 64—Compliance Assurance Monitoring (CAM), requires facilities to monitor the operation and maintenance of emissions control systems and report any control system malfunctions to the appropriate regulatory agency. If an emission control system is not working properly, the CAM rule also requires a facility to take action to correct the control system malfunction. The CAM rule applies to emissions units with uncontrolled potential to emit levels greater than applicable major source thresholds. Emission control systems governed by Title V operating permits requiring continuous compliance determination methods are generally compliant with the CAM rule. GWF Henrietta would have an emission control systems for NO_x and CO (SCR and oxidation catalyst). However, emissions of NO_x and CO would be directly measured by a continuous monitoring system. Therefore, GWF Henrietta is not subject to the CAM provisions.
Title 40 CRF part 70 (SJVAPCD Rule 2520)	CAA Title V Operating Permit Program	SJVAPCD with EPA Region IX oversight	Title 40, Code of Federal Regulations, Part 70—Operating Permits Program, requires the issuance of operating permits that identify all applicable federal performance, operating, monitoring, recordkeeping, and reporting requirements. The requirements of 40 CFR, Part 70 apply to facilities that are subject to NSPS requirements and are implemented at the local level through SJVAPCD Rule 2520. GWF currently holds a Title V permit for the existing HPP, and would continue to be subject to the 40 CFR, Part 70 requirements. Therefore, a parallel application to modify the existing Title V permit will be submitted to the SJVAPCD.

TABLE 3.1-17
Applicable Federal, State, and Local Laws, Ordinances, Regulations, and Standards for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Strategy
Title 40 CRF part 72 (SJVAPCD Rule 2540)	CAA Acid Rain Program	SJVAPCD with EPA Region IX oversight	Title 40, Code of Federal Regulations, Part 72—Acid Rain Program, establishes emission standards for SO_2 and NO_x emissions from electric generating units through the use of market incentives, requires sources to monitor and report acid gas emissions, and requires the acquisition of SO_2 allowances sufficient to offset SO_2 emissions on an annual basis. This program is implemented through SJVAPCD's Rule 2540. An acid rain facility, such as GWF Henrietta, must also obtain an acid rain permit as mandated by Title IV of the Clean Air Act. A permit application must be submitted to the SJVAPCD at least 24 months before operation of the new units commence. The application must present all relevant sources at the facility, a compliance plan for each unit, applicable standards, and estimated commencement date of operation. The necessary Title IV applications will be included during the CEC amendment proceeding.
California Code of Regulations, Section 41700	Prohibits emissions in quantities that adversely affect public health, other businesses, or property.	SJVAPCD with ARB oversight	The CEC conditions of exemption and the air quality management district (AQMD) ATC processes are developed to ensure no adverse public health affects or public nuisances result from operation of GWF Henrietta.
California Code of Regulations Sections 93115 (Diesel ATCM)	The purpose of the airborne toxics control measure (ATCM) is to reduce diesel particulate emissions from stationary diesel fired compression engines.	SJVAPCD with ARB oversight	The ARB diesel ATCM applies to stationary compression engines with a rating of greater than 50 brake horsepower and requires the use of ARB-certified diesel fuel or equivalent, and limits emissions from the operation of compression engines. The proposed CI ICE used to operate the emergency fire pump would be a Tier III, 460 bhp ICE and the non-emergency hours of operation would be limited to 50 hours or less per year. Therefore, the proposed CI ICE proposed for GWF Henrietta would comply with the ARB diesel ATCM.
California Assembly Bill 32 - Global Warming Solutions Act of 2006 (AB32)	The purpose is to reduce carbon emissions within the state by approximately 25% by the year 2020.	SJVAPCD with ARB oversight	There are currently no applicable facility-specific greenhouse gas emission limits or caps. Therefore, greenhouse gas emissions have been estimated for GWF Henrietta for information purposes at this time.

TABLE 3.1-17
Applicable Federal, State, and Local Laws, Ordinances, Regulations, and Standards for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Strategy
SJVAPCD Rule 1080 (Stack Monitoring)	Purpose of this rule is to grant the APCO the authority to request the installation, use maintenance, and inspection of continuous monitoring equipment.	SJVAPCD	This rule shall apply to any owner or operator of a source operation which emits or may emit air contaminants. Upon request, the owner or operator shall provide, properly install, and maintain in good working order, continuous monitoring systems for oxides of nitrogen and carbon dioxide or oxygen, if the fossil-fuel fired steam generator has a heat input of 250 MMBtu or more per hour with a use factor of at least 30 percent per year. GWF Henrietta expects to install and certify a continuous emissions monitoring system for NO_X, CO, and oxygen.
SJVAPCD Rule 1081 (Source Sampling)	Purpose of this rule is to ensure that any source operation which emits or may emit air contaminants provides adequate and safe facilities for use in sampling to determine compliance. The rule also specifies the methods and procedures for source testing, sample collection, and compliance determination.	SJVAPCD	The provisions of this rule shall apply to any source operation which emits or may emit air contaminants. GWF Henrietta will comply with the requirements stated in Rule 1081 by designing the project to include adequate sampling platforms and ports.
SJVAPCD Rule 2010 (Permits Required)	The purpose of this rule is to require any person constructing, altering, replacing or operating any source operation which emits, may emit, or may reduce emissions to first obtain an Authority to Construct or a Permit to Operate.	SJVAPCD	The provisions of this rule shall apply to any person who plans to or does operate, construct, alter, or replace any source operation which may emit air contaminants or may reduce the emission of air contaminants. In conjunction with the submittal of the AFC Amendment documents to the CEC, the Applicant will work with the SJVAPCD to provide the information needed for the issuance of an ATC. As stated in this rule, the review will be conducted as outlined in Rule 2201.

TABLE 3.1-17
Applicable Federal, State, and Local Laws, Ordinances, Regulations, and Standards for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Strategy
SJVAPCD Rule 2201 (New and Modified Stationary Source Review Rule)	The purpose of this rule is to provide for a review of 1.) new and modified Stationary Sources of air pollution and to provide mechanisms including emission trade-offs by which Authorities to Construct such sources may be granted, without interfering with the attainment or maintenance of Ambient Air Quality Standards; and a 2.) net increase in emissions above specified thresholds from new and modified Stationary Sources of all nonattainment pollutants and their precursors.	SJVAPCD	This rule shall apply to all new stationary sources and all modifications to existing stationary sources which are subject to the District permit requirements and after construction emit or may emit one or more affected pollutant. The SJVAPCD defines a source as “Major” if the annual emissions from the permitted facility exceed the following Major Source Thresholds: 25 ton/year of VOC or NO_x,100 ton/year of CO, and 70 ton/year of PM_{10} or SO_2. The annual NOx emissions would exceed 25 ton per year, therefore, GWF Henrietta would be considered a SJVAPCD major source. Per Rule 2201, BACT shall be applied to all new and modified sources with a potential to emit 2 pounds per day or more of any of the following: VOC, NO_x, SO_2, and PM_{10} or 100 ton per year of CO. Per Rule 2201, emission offsets would be required for a new or modified facility if emissions exceed the following SJVAPCD offset thresholds: 20,000 lb/year for NO_x and VOC; 54, 750 lb/year for SO_2; 29,200 lb/year for PM; and 200,000 lb/year for CO. Emergency equipment used exclusively as emergency standby equipment that would not operate for more than 200 hours per year would be exempt from emission offset requirements. As part of the NSR permit approval process, an air quality dispersion analysis must be conducted, using a mass emissions-based analysis or an approved dispersion model, to evaluate impacts of increased criteria pollutant emissions from any new or modified facility on ambient air quality. Rule 2020 exempts water cooling towers from the permitting process that have a circulation rate of less than 10,000 gallons per minute (GPM). The wet surface air cooler (WSAC) proposed for GWF Henrietta is rated at 305 GPM. Therefore, GWF Henrietta’s WSAC unit would be exempt from the SJVAPCD permitting process.
SJVAPCD Rule 2520 (40 CFR Part 70)	The purpose of the rule is to provide a mechanism for issuing federally mandated operating permits for new and modified sources of air contaminants in accordance with requirements of 40 CFR Part 70.	SJVAPCD with EPA Oversight	See Federal, Title 40 CFR, Part 70 to review applicability and the compliance assessment. GWF currently holds a Title V permit for the existing HPP, and would continue to be subject to the 40 CFR, Part 70 requirements. Therefore, a parallel application to modify the existing Title V permit has been made to the SJVAPCD in addition to this Amendment petition.

TABLE 3.1-17
Applicable Federal, State, and Local Laws, Ordinances, Regulations, and Standards for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Strategy
SJVAPCD Rule 2540 (40 CFR Part 72)	The purpose of this rule is to incorporate by reference the provisions of 40 CFR Part 72 for purposes of implementing an acid rain program that meets the requirements of Title IV of the CAA.	SJVAPCD with EPA Oversight	If a facility is subject to 40CFR Part 72, an application must be presented to SJVAPCD with all relevant sources at the facility, a compliance plan for each unit, applicable standards, and estimated commencement date of operation. See the “Federal, Title 40 CFR, Part 72” discussion above for a summary of the applicability and compliance assessment for SJVAPCD Rule 2540.
SJVAPCD Rule 4001 (40 CFR Part 60)	This rule incorporates the New Source Performance Standards from 40 CFR Part 60.	SJVAPCD with EPA Oversight	All new sources of air pollution and modification of existing sources of air pollution shall comply with the standards, criteria, and requirements set forth in Rule 4001. See the “Federal, Title 40 CFR, Part 60” discussion above for a summary of the applicability and compliance assessment for SJVAPCD Rule 4001.
SJVAPCD Rule 4002 (40 CFR Part 63)	This rule incorporates the National Emission Standards for Hazardous Air Pollutants from 40 CFR, Part 63.	SJVAPCD with EPA Oversight	All new sources of air pollution and modification of existing sources of air pollution shall comply with the standards, criteria, and requirements set forth in Rule 4002. See the “Federal, Title 40 CFR, Part 63” discussion above for a summary of the applicability and compliance assessment for SJVAPCD Rule 4002.
SJVAPCD Rule 4101 (Visible Emissions)	The purpose of this rule is to prohibit the emissions of visible air contaminants to the atmosphere.	SJVAPCD	The provisions of this rule shall apply to any source operation which emits or may emit air contaminants. Rule 4101 prohibits visible emissions as dark or darker than No. 1 on the Ringelman chart. GWF Henrietta will emit PM at 0.0009 grains per dry standard cubic feet (DSCF) of exhaust gas volume, less than the 0.15 grains per DSCF limit.

TABLE 3.1-17
Applicable Federal, State, and Local Laws, Ordinances, Regulations, and Standards for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Strategy
SJVAPCD Rule 4102 (Nuisance)	The purpose of this rule is to protect the health and safety of the public.	SJVAPCD	This rule shall apply to any source operation which emits or may emit air contaminants or other materials. Per Rule 4102, a person shall not discharge from any source whatsoever such quantities of air contaminants or other materials which cause injury, detriment, nuisance or annoyance to any considerable number of persons or to the public or which endanger the comfort, repose, health or safety of any such person or the public or which cause or have a natural tendency to cause injury or damage to business or property. Air dispersion modeling performed for GWF Henrietta shows that overall air quality impacts from the project will not cause or contribute to the violation an ambient air quality standard, established to be protective of human health and the environment. In cases where the ambient air quality standards have not been met, mitigation will be provided to reduce the impacts to below significant levels. To ensure the project will comply with applicable regulations, the CEC COCs and the SJVAPCD Determination of Compliance/ATC process is designed to ensure that the operation of GWF Henrietta will not cause a public nuisance.
SJVAPCD Rule 4201 (Particulate Matter Concentration)	The purpose of this rule is to protect the ambient air quality by establishing a particulate matter emission standard.	SJVAPCD	This rule shall apply to any source operation which emits or may emit dust, fumes, or total suspended particulate matter. Per Rule 4201, the total suspended particulate emission limit would be 0.1 gr/DSCF. The simple- and combined-cycle operating modes will emit PM at 0.0009 grains per dry standard cubic feet (DSCF) of exhaust gas volume, less than the 0.1 grains per DSCF limit.

TABLE 3.1-17
Applicable Federal, State, and Local Laws, Ordinances, Regulations, and Standards for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Strategy
SJVAPCD Rule 4301 (Fuel Burning Equipment)	The purpose of this rule is to limit the emission of air contaminants from fuel burning equipment. This rule limits the concentration of combustion contaminants and specifies maximum emission rates for sulfur dioxide, nitrogen oxide and combustion contaminant emissions.	SJVAPCD	The provisions of this rule shall apply to any fuel burning equipment with the exception of fuel burning equipment serving primarily as air pollution control equipment using a combustion process to destroy air contaminants. A person shall not discharge into the atmosphere combustion contaminants exceeding in concentration at the point of discharge, 0.1 grain per cubic foot of gas calculated to 12% of carbon dioxide at dry standard conditions and: 200 pounds per hour of sulfur compounds, calculated as sulfur dioxide (SO_2); 140 pounds per hour of nitrogen oxides, calculated as nitrogen dioxide (NO_2); 10 pounds per hour of particulate matter discharged into the atmosphere from the burning of any kind of material containing carbon in a free or combined state. During normal simple- and combined-cycle operations, GWF Henrietta will emit NO_x at a maximum of 4.2 and 3.4 pounds per hour, respectively; sulfur compounds at 0.3 pounds per hour for both operating modes, and particulate matter at 2.2 pounds per hour for both operating modes. Therefore, GWF Henrietta will comply with Rule 4301.
SJVAPCD Rule 4306 (Boilers, Steam Generators, and Process Heaters – Phase 3)	The purpose of this rule is to limit emissions of NO_x and CO from boilers, steam generators, and process heaters.	SJVAPCD	This rule applies to any gaseous fuel or liquid fuel fired boiler, steam generator, or process heater with a total rated heat input greater than 5 million Btu per hour. The auxiliary boiler will be equipped with ultra-low NO_x burners and will achieve a 6 ppm NO_x concentration (corrected to 3 percent oxygen). The natural gas-fired auxiliary boiler will be equipped with ultra-low emission burners and will achieve a 50 ppm CO concentration (corrected to 3 percent oxygen). Therefore, GWF Henrietta will meet the requirements of SJVAPCD Rule 4306.
SJVAPCD Rule 4702 (Internal Combustion Engines – Phase 2)	The purpose of this rule is to limit the emissions of NO_x, CO, and VOC from internal combustion engines.	SJVAPCD	This rule applies to any internal combustion engine with a rated brake horsepower greater than 50 horsepower. Per Rule 4702, an ICE greater than 50 bhp but less than 500 bhp would be required to meet the EPA Tier 3 Standard. The proposed internal combustion engine used to operate the emergency fire pump would be a 460 bhp, Tier III, ICE. Therefore, the engine would meet the requirements of Rule 4702.

TABLE 3.1-17
Applicable Federal, State, and Local Laws, Ordinances, Regulations, and Standards for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Strategy
SJVAPCD Rule 4703 (Stationary Gas Turbines)	The purpose of this rule is to limit NO_x emissions from stationary gas turbine systems.	SJVAPCD	The provisions of this rule apply to all stationary gas turbine systems, which are subject to District permitting requirements, and with ratings equal to or greater than 0.3 MW or a maximum heat input rating of more than 3,000,000 Btu per hour. Per Rule 4703, the Tier II NO_x emission limit for the standard compliance option for both simple- and combined-cycle turbines greater than 10 MW would be 5 ppm and the CO emission limit would be 200 ppm at 15% O_2. GWF Henrietta combined-cycle NO_x and CO emissions are expected to be 2 and 3 ppm corrected to 15 percent oxygen, respectively. GWF Henrietta simple- cycle NO_x and CO emissions are expected to be 2.5 and 3 ppm corrected to 15 percent oxygen, respectively. Therefore, GWF Henrietta will comply with Rule 4703 in the simple- or combined-cycle mode.
SJVAPCD Rule 4801	The purpose of this rule is to limit the emissions of sulfur compounds.	SJVAPCD	The provisions of this rule shall apply to any discharge to the atmosphere of sulfur compounds, which would exist as a liquid or a gas at standard conditions. Per Rule 4801, the SO_2 emission limit would be 0.2% by volume, dry (2,000 ppmvd) for GWF Henrietta. The SO_2 emissions from GWF Henrietta's turbines operating in simple- and combined-cycle mode are expected to emit less than 1 part per million of SO_2. Therefore, GWF Henrietta would comply with Rule 4801.

TABLE 3.1-17
Applicable Federal, State, and Local Laws, Ordinances, Regulations, and Standards for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Strategy
SJVAPCD Reg VIII (Fugitive PM_{10} Prohibitions)	The purpose of Regulation VIII (Fugitive PM_{10} Prohibitions) is to reduce ambient concentrations of fine particulate matter (PM_{10}) by requiring actions to prevent, reduce or mitigate anthropogenic fugitive dust emissions. The Rules contained in this Regulation have been developed pursuant to United States Environmental Protection Agency guidance for Serious PM_{10} Nonattainment Areas. The rules are applicable to specified anthropogenic fugitive dust sources. Fugitive dust contains PM_{10} and particles larger than PM_{10}. Controlling fugitive dust emissions when visible emissions are detected will not prevent all PM_{10} emissions, but will substantially reduce PM_{10} emissions.	SJVAPCD	The provisions of this rule are applicable to specified outdoor fugitive dust sources. The definitions, exemptions, requirements, administrative requirements, recordkeeping requirements, and test methods set forth in this rule are applicable to all Rules under Regulation VIII (Fugitive PM_{10} Prohibitions) of the Rules and Regulations of the San Joaquin Valley Unified Air Pollution Control District. The provisions of this rule adopted on November 15, 2001 shall remain in effect until October 1, 2004 at which time the amendments adopted on August 19, 2004 shall take effect. Construction of the project will employ fugitive dust control measures. These measures will include reduced vehicle speeds, application of water or other dust pallatives, minimizing excavation/grading during high wind events, and stabilizing disturbed soils when work is not being performed. The CEC will enforce these measures by incorporating construction fugitive dust COCs to mitigate construction impacts of the project.

3.2 Biological Resources

GWF Henrietta, as described in Sections 1.0 and 2.0 of this Amendment would not involve substantial changes to the biological resource findings and conclusions from the HPP Final Decision, (CEC, 2002) and supporting application, and Staff Assessment materials. This analysis also provides an update of the environmental baseline in regards to sensitive species database records for the project area.

Pursuant to the CEC's siting regulations contained in Title 20, California Code of Regulations, section 1769 *et seq*., this supplemental analysis for the HPP addresses all the requirements necessary to make a determination of the potential environmental impact of GWF Henrietta on biological resources and whether such impacts would require new or revised COCs to reduce any impacts to a level of insignificance. The analysis is based on information previously incorporated into the record for the approved HPP and is hereby incorporated by reference for this Amendment and included on the Reference CD included as Attachment G.

3.2.1 Environmental Baseline Information

GWF Henrietta will permanently disturb 2.86 acres immediately east of the existing HPP fence line, expanding the total fenced area from 7.0 to 9.86 acres. This area is already highly disturbed as it is immediately adjacent to the current HPP site, and was used for construction and laydown during HPP construction. Construction parking and laydown will result in 4.52 acres of temporary disturbance, split into two discreet areas. The first area, located along the south side of GWF Henrietta will accommodate construction parking. This area was previously disturbed as it was used for construction parking and laydown during the construction of the HPP. The second area, located to the northeast of the project site, will be used for construction laydown. This area was also previously disturbed; in part by HPP related construction activities and part by intensive agricultural use.

Prior analyses related to the HPP are hereby incorporated by reference for this Amendment. For GWF Henrietta, all of the potential biological resources impacts will occur within the 2.86 additional acres of permanent disturbance or the temporary construction laydown and parking area noted above. Since the interconnection to electrical transmission, natural gas and water supply will occur via the existing connections within the HPP site, there will not be any offsite impacts due to linear connections.

Section 8.2 of the HPP AFC (GWF, 2001a), hereby incorporated by reference, includes a list of special-status plant and wildlife species compiled for the project area based upon the following references: (1) the CDFG California Natural Diversity Data Base (CNDDB), (2) unpublished biological reports produced for other projects in the area, and (3) staff experience and knowledge of sensitive flora and fauna in the central San Joaquin Valley. The CNDDB list of potentially occurring special-status species was updated for this Amendment. These updated lists are included in Attachment D.

3.2.1.1 Biological Field Surveys

As discussed in Section 8.2.3 of the HPP AFC (GWF, 2001a), field surveys of the original HPP site were completed in spring 2001. In support of this Amendment, on April 26, 2007, reconnaissance-level wildlife and floristic surveys of the proposed GWF Henrietta site were conducted by CH2M HILL biologists, Gary Santolo and Virginia Dains, to characterize the biological resources for the additional project features. The technical memorandum supporting the April 2007 site visit is included in Attachment D.

During the 2007 field effort, the entire site was surveyed on foot and a list of observed plant and wildlife species was compiled. Habitat areas within a one-mile radius of the site were assessed for their potential to support special-status wildlife. A list of plant and wildlife species observed during the April 2007 survey is included in Attachment D.

3.2.1.2 Habitat and Vegetation Communities

GWF Henrietta is devoid of natural vegetation or natural communities. The portion of the project site that falls within the existing HPP fence line is graded and covered with concrete foundations, crushed rock and a paved plant access road. The portion of GWF Henrietta that extends beyond the existing fence line to the east encompasses a graded access road and some areas currently in agricultural production.

There are two areas designated for construction parking and laydown use. The smaller of these two areas is located adjacent to the existing HPP, on the south side of the site. This area is generally flat, has been previously graded, has been altered by past and current industrial use, and supports only weedy annuals. This area was also used for construction laydown and parking during the construction of the HPP. The larger of the two construction parking and laydown areas is also located adjacent to the existing HPP, but on the northeast side of the site. Like the area to the south, this area is generally flat and has been previously graded. However, the majority of the northeast construction laydown and parking area is dominated by intensively managed agricultural activities.

3.2.1.3 Special-status Plants

The analysis conducted for the HPP AFC (GWF, 2001a) indicated that, at the time, three special-status plant species had the potential to occur in the project area. Two new CNDDB searches were conducted to support this Amendment. The first search was done to support the 2007 Biological Resource survey and technical memorandum, and the second search was done in 2008 to obtain current data (complete results from 2007 and 2008 searches can be found in Attachment D). A California Native Plant Society (CNPS) search was also run in support of the 2007 field survey and technical memo. The 2008 CNDDB search, when considered with the 2007 CNPS search, resulted in five additions to the original AFC list as seen in Table 3.2-1. In addition, two of the species on the 2001 list are not present on the 2008 lists, most likely due to the smaller area of impact for GWF Henrietta.

TABLE 3.2-1
Special-Status Plants Potentially Occurring within the GWF Henrietta Project Area

Scientific Name	Common Name	Federal/State/ CNPS* Status	Potential Occurrence in Project Area
Lepidium jaredii ssp. Album	panoche pepper-grass	--/--/1B.2	Not present; no appropriate habitat
Atriplex depressa	Brittlescale	--/--/1B.2	Not present; no appropriate habitat
Atriplex erecticaulis	erectstem saltbush or earlimart orache	--/--/1B.2	Not present; no appropriate habitat
Atriplex subtilis	subtle orache	--/--/1B.2	Not present; no appropriate habitat
Monolopia congdonii	San Joaquin woollythreads	E/--/1B.2	Not present; no appropriate habitat

Source: CNPS 2007, CDFG 2008

Note: This table only includes plant species not identified in Table 8.2-1 of the HPP AFC.

*1B.2 = plants on CNPS List 1B are rare throughout their range and have declined significantly over the last century.

Based on the reconnaissance survey performed in April 2007, it was determined that suitable habitat for these plants is not available on the project site (or within a one-mile radius), and no additional consideration for project impacts is needed. A list of plant species observed during the 2007 survey is included in Biological Resources Technical Memo, Attachment D. No special-status plant species were observed in the project area during surveys conducted in support of the HPP AFC (GWF, 2001a) and no evidence of these plant species was discovered during field reconnaissance for this Amendment, either within the power plant location or in the construction parking and laydown area.

3.2.1.4 Special-status Wildlife

At the time of the HPP AFC (GWF, 2001a), 13 special-status wildlife species (including three invertebrate species) had the potential to occur in the project area. As with the special-status plants, two new searches (2007 and 2008) of the CNDDB database were conducted for this Amendment (complete results from 2007 and 2008 searches can be found in Attachment D). The 2008 CNDDB search resulted in ten additions (including one invertebrate species) to the original HPP AFC list as seen in Table 3.2-2. However, only three special-status species (two newly identified species and one from the HPP AFC) were recorded within six miles of the project site, and none were recorded within one-mile. Additionally, four of the species on the 2001 list are not present on the 2008 list, most likely due to the smaller area of impact related to GWF Henrietta.

TABLE 3.2-2
Additional Special-Status Wildlife Potentially Occurring Within the GWF Henrietta Project Area
(not identified in the HPP AFC)

Scientific Name	Common Name	Federal/State Status	Potential Occurrence in Project Area
Actinemys marmorata	western pond turtle	--/SC	Not present; no appropriate habitat
Agelaius tricolor	tricolored blackbird	--/SC	Not present; no appropriate habitat

TABLE 3.2-2
Additional Special-Status Wildlife Potentially Occurring Within the GWF Henrietta Project Area
(not identified in the HPP AFC)

Scientific Name	Common Name	Federal/State Status	Potential Occurrence in Project Area
Ammospermophilus nelsoni	Nelson's antelope squirrel	--/T	Not present; no appropriate habitat
Charadrius alexandrinus nivosus	western snowy plover	T/--	Not present; no appropriate habitat
Coelus gracilis	San Joaquin dune beetle	--/--	Not present; no appropriate habitat
Dipodomys nitratoides exilis	Fresno kangaroo rat	E/E	Not present; no appropriate habitat
Falco columbarius	Merlin	--/--	Not present; no appropriate habitat
Masticophis flagellum ruddocki	San Joaquin whipsnake	--/--	Not present; no appropriate habitat
Nycticorax nycticorax	black-crowned night heron	--/--	Not present; no appropriate habitat
Spea hammondii	Western spadefoot	--/SC	Not present; no appropriate habitat

Source: CDFG 2008

Note: This table only includes wildlife species **not** identified in Table 8.2-1 of the HPP AFC.

E = endangered
T = threatened
SC = species of special concern

-- = no special-status (species for which dashes are shown for both federal and state status are included by CNDDB because of declining trends)

The April 2007 survey found no evidence of the wildlife species listed in Table 3.2-2 above or in Table 8.2-1 of the HPP AFC. No special-status wildlife species were observed during the 2007 reconnaissance survey and none are expected to occur due to lack of appropriate habitat and/or sign (i.e., burrows, scat, prey remains, etc.). No playa areas that would support species such as the snowy plover or standing water that would support amphibians or turtles were observed and no burrows typical of burrowing owls, kangaroo rats, or kit fox were observed during the site visit.

3.2.2 Environmental Consequences

In the HPP AFC (GWF, 2001a), potential direct and indirect impacts to biological resources were evaluated to determine the permanent and temporary effects of project construction, operation, maintenance, and decommissioning of the HPP project and supporting facilities. No impacts to sensitive species or sensitive species habitat were identified at that time. In the HPP Final Decision (01-AFC-18), the CEC determined that with the implementation of identified mitigation measures, no significant impacts to biological resources would occur.

GWF Henrietta is located within the range of several listed species (e.g. the San Joaquin kit fox, Tipton kangaroo rat, Fresno Kangaroo Rat, Giant kangaroo rat, and Swainson’s hawk) that may use fallow fields such as the area proposed for the temporary construction and laydown area because little natural habitat remains in this region. The San Joaquin kit fox, burrowing owl, and the Swainson's hawk may move into such marginal areas, most likely for foraging. Therefore, GWF Henrietta has the potential to result in temporary loss of habitat from use of the construction laydown and parking area. Additionally, the 2.86 acre expansion of the fenced plant site will result in a corresponding amount of permanent potential habitat loss.

As the temporary and permanent areas of disturbance related to GWF Henrietta are both smaller in acreage and more highly degraded than the areas developed as part of the HPP site, it is expected that the impacts from this project would be less than those of the HPP. Therefore, similar applicable COCs and mitigation measures that were applied to the HPP will be applied to GWF Henrietta. These COCs include a number of avoidance measures including pre-construction biological surveys, construction monitoring by a Designated Biologist, and a worker environmental awareness program, all contained within the existing HPP Biological Resources Mitigation and Implementation and Monitoring Plan (BRMIMP). Thus, permanent or temporary impacts to biological resources related from implementation of GWF Henrietta are expected to be less than significant with the implementation of the applicable HPP COCs, revised to reflect GWF Henrietta.

GWF Henrietta will provide habitat compensation for the additional permanent disturbance that would occur at the same ratio applied to the HPP. GWF Henrietta will not cause any adverse impacts to biological resources with the incorporation of mitigation measures discussed in Section 3.2.3.

According to the Kings County Planning Department, there are no proposed or foreseeable developments planned within one mile of the project site. Implementation of GWF Henrietta will not result in any individually significant impacts and the project will comply with applicable COCs and LORS. Therefore, GWF Henrietta will not contribute to any cumulative biological resource impacts.

3.2.3 Mitigation Measures

The only additional mitigation measure (beyond those in the HPP Final Decision) required for this Amendment is compensation for the additional 2.86 acres of permanent disturbance associated with GWF Henrietta. Pursuant to the HPP COCs , mitigation for 7.0 acres of permanent habitat disturbance (at a 1:1 compensation ratio) and 11.7 acres of temporary disturbance (at a 0.2:1 compensation ratio) was achieved by providing 10 acres of habitat compensation to mitigate the loss of potential San Joaquin kit fox habitat (see Attachment D). The compensatory habitat was purchased through the Kern Water Bank Habitat Conservation Plan (KWBHCP) to satisfy the requirements for Federal and State Incidental Take Permits. Areas of temporary disturbance were mitigated through the preparation and implementation of BRMIMP and an employee awareness training program (Worker Environmental Awareness Plan [WEAP]).

In order to compensate for the additional 3 acres (2.86 acres rounded up to 3 acres) of permanent disturbance associated with GWF Henrietta, GWF proposes to purchase an additional 3 acres of compensation habitat to mitigate the new permanent disturbance at a 1:1 ratio through KWBHCP. Participation in the KWBHCP would provide continuing coverage under the existing Federal and State Incidental Take Permits for GWF Henrietta. GWF is currently working with the US Fish and Wildlife Service (USFWS) and California Department of Fish and Game (CDFG) to determine final mitigation requirements and will purchase mitigation credits through KWBHCP once written confirmation from these agencies is obtained. Consistent with the BRMIMP, GWF Henrietta will conduct pre-construction biological surveys and implement all other applicable mitigation measures specified in the BRMIMP.

3.2.4 Consistency with LORS

The LORS associated with biological resources are the same as were analyzed in Section 3.2 of the HPP AFC (GWF, 2001a) and Section 3.2 of the CEC Staff Assessment (CEC, 2001). No material LORS changes have occurred since that time. The construction and operation of GWF Henrietta, will conform with all applicable LORS related to biological resources.

3.2.5 Conditions of Certification

GWF Henrietta will result in 2.86 acres of new permanent disturbance that will be fully mitigated to ensure there are no significant adverse impacts to biological resources and full compliance with existing Federal and State Incidental Take Permits. No other additional COCs are needed beyond those applicable COCs stipulated as part of the HPP Final Decision (01-AFC-18). Proposed changes to reflect the inclusion of additional 3 acres of compensation habitat mitigation for GWF Henrietta will be required.

3.3 Cultural Resources

3.3.1 Environmental Baseline Information

GWF Henrietta, as described in Sections 1.0 and 2.0 of this Amendment, would not involve substantial changes to the cultural resources analysis and conclusions from the HPP Final Decision (CEC, 2002), supporting application, and Staff Assessment materials.

Pursuant to the Energy Commission's siting regulations contained in Title 20, California Code of Regulations, section 1769 *et seq*., this supplemental analysis for the HPP addresses all the requirements necessary to make a determination of the potential environmental impacts of GWF Henrietta on cultural resources and whether such impacts would require new or revised COCs in order to reduce any impacts to a level of insignificance. The analysis is based on information from the administrative record for the HPP and hereby incorporated by reference for this Amendment and included on the Reference CD included as Attachment G. The Cultural Resources Technical Report prepared as part of the HPP process will be submitted separately under a confidentiality agreement to the CEC.

3.3.1.1 Archaeological Inventory Results

In August 2008, staff of the California Historical Resources Information System (CHRIS) Archaeological Information Center, conducted a file search for GWF Henrietta using a one-mile radius around the project site defined as the "Project Area." Additionally, CH2M HILL staff reviewed historic maps of the Project Area.

According to information available in the CHRIS files, there have been only two previous cultural resource studies prepared for the Project Area. A third study, not available in the CHRIS files, was prepared by URS in 2002 (URS, 2002). However, CH2M HILL staff had access to this study during preparation of this section. All three studies are related to the HPP AFC and the HPP's subsequent construction. The August 2008 archaeological literature search identified recorded cultural resources at the HPP site as well as within the Project Area. The one previously recorded isolated find at the HPP site is P-16-000199.

P-16-000199

This isolated find was originally documented by URS in 2002 and consists of one basalt mortar fragment and one basalt pestle fragment. The isolate was recorded as being located within the HPP project site, near the Henrietta Substation (URS, 2002). This isolate was found in a heavily plowed agricultural field and was considered to have been moved over time from its originally deposited location (Bass and Egherman 2001). This isolate is by definition considered a non-unique archaeological resource, due to the fact that is was removed from its original location, and is therefore not eligible for listing on the CRHR or NRHP (CEQA PRC Chapter 2.6, Section 21083.2 (h)).

An additional five recorded cultural resources, including the Henrietta Substation and four transmission line segments, are recorded within the Project Area. None of these resources are considered eligible for listing on the National Register of Historic Places (NRHP) or on the California Register of Historic Resources (CRHR).

CH2M HILL staff review of historic maps showed features not included in the list of recorded cultural resources presented above. Other than the previously mentioned Henrietta Substation and transmission lines, three additional buildings and one reservoir are visible on the 1929 *Westhaven* topographic map within the Project Area, however, none of these features will be impacted through implementation of GWF Henrietta.

Furthermore, there are no cultural resources listed on the NRHP, the CRHR, or the California Inventory of Historic Resources and no cultural resources considered California Points of Historic Interest, California State Historic Landmarks, historic districts or cultural landscapes within the Project Area, according to the results of the 2008 literature search. The one non-unique isolated find (P-16-000199, noted above) that could be affected by GWF Henrietta, is not eligible for listing on the NRHP and therefore given no further consideration beyond simple recordation, which has already been completed.

3.3.1.2 Archeological and Architectural Reconnaissance Results

A pedestrian survey was conducted as part of the HPP AFC in May 2001 by URS archaeologists (GWF, 2001a). The survey covered the 20-acre proposed HPP project site as well as all proposed linear corridors. A 200 foot buffer was also surveyed around the HPP project site and on either side of the center line of all the proposed linears. With the exception of paved areas, the pedestrian survey had sufficient ground visibility and no prehistoric or historic archaeological resources were identified.

Recordation of historic buildings and structures within the 20-acre proposed HPP project site and proposed linear feature corridors occurred as a part of the HPP AFC in October 2001. Four historic structures are located within the 20-acre site and linear feature corridors. These include the Henrietta Substation, built in 1911, and three transmission lines, constructed in 1941. None of these structures are considered eligible for listing on the NRHP or the CRHR. All of these structures are located outside of the HPP project site and will not be affected by the implementation of GWF Henrietta. Since no additional areas beyond those covered in the 2001 survey will be disturbed as part of GWF Henrietta, CEC staff confirmed, during pre-filing consultation on February 8, 2008, that new cultural resources field surveys would not be required for this Amendment.

3.3.2 Environmental Consequences

Consistent with the previous findings from the cultural resources studies conducted for the HPP in 2001 and 2002 (GWF 2001a; GWF 2002), the results of the 2008 CHRIS literature search for GWF Henrietta also confirmed that the prehistoric and historic archaeological sensitivity within the Project Area is low. No significant prehistoric archaeological sites are known to exist within the GWF Henrietta Project Area. As described above, there is one documented isolate, P-16-000199, discovered in an active agricultural field within the HPP site in 2001, but it is not significant and not eligible for the CRHR or NRHP listing (URS, 2002). Also, as described above, a total of five historic resources are known to exist within one mile of GWF Henrietta, however, none of these resources are considered eligible for listing on the CRHR or NRHP. Since GWF Henrietta will occur within the area previously subject to surveys and searches conducted in support of the HPP AFC, none of which identified any eligible cultural or historic resources, no significant impacts to cultural resources are anticipated from implementation of GWF Henrietta.

According to the Kings County Planning Department, there are no proposed or foreseeable developments planned within one mile of the project site. Implementation of GWF Henrietta will not result in any individually significant impacts and the project will comply with applicable COCs and LORS. Therefore, GWF Henrietta will not contribute to any cumulative cultural resource impacts.

3.3.3 Mitigation Measures

No significant impacts to cultural resources will result from the approval of this Amendment. Therefore, mitigation beyond those measures stipulated as COCs in the HPP Final Decision (CEC, 2002) are not necessary. These measures require GWF to designate a cultural resource specialist who will monitor excavation and, in the event of an unanticipated discovery, provide for the handling and curation of any recovered cultural resources.

3.3.4 Consistency with LORS

The LORS associated with cultural resources are the same as were analyzed in Section 8.3.1 of the HPP AFC (GWF, 2001a). No material LORS changes have occurred since that time. The construction and operation of GWF Henrietta will conform with all applicable LORS related to cultural resources. Applicable State and Federal LORS are listed in Attachment A.

3.3.5 Conditions of Certification

Because GWF Henrietta will not result in any new impacts to cultural resources, no additional COCs are needed. Proposed revisions to the existing HPP COCs, to reflect GWF Henrietta, are discussed in Section 4.0. These expected minor revisions include allowing GWF to revise the existing cultural resource compliance program, coordinate with the CEC CPM to determine when, and if, resource monitoring is required (due to the low sensitivity), and allow GWF to forgo filing reports if no resources are encountered during implementation of GWF Henrietta.

3.4 Geology and Paleontology

GWF Henrietta, as described in Sections 1.0 and 2.0 of this Amendment, would not involve substantial changes to geologic and paleontological resources analysis and conclusions from the HPP Final Decision (CEC, 2002), supporting application, and Staff Assessment materials.

Pursuant to the Energy Commission's siting regulations contained in Title 20, California Code of Regulations, section 1769 *et seq*., this supplemental analysis for the HPP addresses all the requirements necessary to make a determination of the potential environmental impacts of GWF Henrietta on geologic and paleontological resources and whether such impacts would require new or revised COCs in order to reduce any impacts to a level of insignificance. The analysis is based on information from the administrative record for the HPP and hereby incorporated by reference for this Amendment and included on the Reference CD included as Attachment G. The Paleontological Resources Technical Report prepared as part of the HPP process will be submitted separately under a confidentiality agreement to the CEC.

3.4.1 Environmental Baseline Information

3.4.1.1 Geology Environmental Baseline Information

The geologic baseline of GWF Henrietta remains unchanged from that described in section 8.15.1 of the HPP AFC (GWF, 2001) and is hereby incorporated by reference.

3.4.1.2 Paleontology Environmental Baseline Information

To support construction laydown and parking requirements, GWF Henrietta will temporarily disturb 4.52 acres immediately adjacent to the existing HPP fence line that were previously disturbed for the same purpose during construction of the HPP. GWF Henrietta will also permanently disturb 2.86 acres outside of the existing HPP fence line to accommodate new project components. Areas of both temporary and permanent disturbance will occur within those surveyed for the HPP AFC (GWF, 2001).

Figure 8.16-3 from the HPP AFC indicates that the entire 20 acres was surveyed for paleontological resources. During the pre-filing consultation on February 8, 2008, CEC staff confirmed that no supplemental field surveys or literature searches would need to be conducted for this Amendment. Areas of permanent disturbance will occur just outside the existing fence line of the HPP. This area has been highly disturbed by current and past industrial and agricultural use. Areas of temporary disturbance, for construction laydown and parking, will occur just south and immediately east of the existing HPP fence line. As outlined in Section 8.16.1.6 of the HPP AFC (GWF, 2001), the paleontological sensitivity analysis found the geologic units in the project area to be primarily Quaternary alluvium, a high sensitivity rock formation (fossiliferous or potentially fossiliferous). The May 2001 HPP paleontological survey conducted in support of the HPP AFC, however, did not identify any paleontological resources. Additionally, no paleontological finds were reported during monitoring for construction of the HPP. Paleontological sensitivity ratings are based on both the general fossil baring potential of a specific geologic unit and the historical yield of that unit in a specific region. As neither previous agricultural disturbance nor HPP construction excavations (which reached below the plow depth of previous disturbance) yielded any significant fossil finds, the paleontological sensitivity of the Quaternary alluvium in the project vicinity is now considered low.

3.4.2 Environmental Consequences

3.4.2.1 Geology

As detailed in section 8.15.2 of the HPP AFC (GWF, 2001), no geologic hazards were identified. However, it was found that potential ground shaking; and subsidence would need to be addressed as part of the final design and construction. Since GWF Henrietta's construction and design activities will not differ from those analyzed in the AFC (GWF, 2001) or as described in the HPP Final Decision (CEC, 2002), no new impacts to geologic resources or related geologic hazards will occur.

3.4.2.2 Paleontology

As no fossils were identified during the 2001 survey or during subsequent excavations for HPP construction, it is expected that onsite paleontological monitoring will only be required for those project features that require excavation in virgin soils. With the implementation of appropriate mitigation measures discussed in Section 3.4.3, it is expected that the construction of GWF Henrietta will have less than significant impacts on paleontological resources.

Nevertheless there remains a remote chance that paleontological resources could be encountered in the east portion of GWF Henrietta where foundation installation for the STG and ACC (Figure 2-1) or construction of the relocated storm water retention basin may require disturbance of virgin soils at depth. As a result, incidental find mitigation described in Section 3.4.3 will be applied to reduce impacts to paleontological resources to less than significant levels.

According to the Kings County Planning Department, there are no conflicting proposed or foreseeable developments planned within one mile of the project site. Implementation of GWF Henrietta will not result in any individually significant impacts and the project will comply with applicable COCs and LORS. Therefore, GWF Henrietta will not contribute to any cumulative geologic or paleontological impacts.

3.4.3 Mitigation Measures

3.4.3.1 Geology

No changes to previously identified impacts to geologic resources would result from the approval of this Amendment. Therefore, mitigation measures beyond those stipulated in the HPP Final Decision are not necessary. The mitigation measures previously stipulated that remain applicable, are adequate to mitigate impacts to geological resources that may occur as a result of build-out of GWF Henrietta.

3.4.3.2 Paleontology

No significant impacts to paleontological resources will result from the approval of this Amendment. Therefore, mitigation beyond those measures stipulated as COCs in the HPP Final Decision (CEC, 2002), that remain applicable, are not necessary. These measures require GWF to designate a paleontological resource specialist who will monitor excavation and, in the event of an unanticipated discovery, provide for the handling and curation of any recovered paleontological resources.

With the implementation of these mitigation measures, impacts to paleontological resources will be less than significant.

3.4.4 Consistency with LORS

3.4.4.1 Geology

Construction and operation of GWF Henrietta will conform to all applicable LORS related to geologic resources that were analyzed as part of the AFC (GWF, 2001). No material LORS changes have occurred since that time. Refer to Attachment A for LORS related to engineering requirements for geologic hazards.

3.4.4.2 Paleontology

GWF Henrietta will conform to all applicable LORS related to paleontological resources that were analyzed as part of the AFC including the guidelines promulgated by the Society for Vertebrate Paleontology for the evaluation and mitigation of impacts to paleontological resources. No material LORS changes have occurred since that time. Thus, the construction and operation of GWF Henrietta will conform with all applicable LORS related to paleontological resources. Applicable state and Federal LORS are presented in Attachment A.

3.4.5 Conditions of Certification

3.4.5.1 Geology

Because GWF Henrietta will not result in any impacts to geologic resources, no additional COCs are needed. A discussion of proposed revisions to existing COCs, that remain applicable, to reflect GWF Henrietta, is included in Section 4.0.

3.4.5.2 Paleontology

Because GWF Henrietta will not result in any new impacts to paleontological resources, no additional COCs are needed. A discussion of proposed revisions to the existing HPP COCs, that remain applicable, to reflect GWF Henrietta, is included in Section 4.0. These expected minor revisions include allowing GWF to revise the existing paleontological resource compliance program, coordinate with the CEC CPM to determine when, and if, resource monitoring is required (due to the low sensitivity), and allow GWF to forgo filing reports if no resources are encountered during implementation of GWF Henrietta.

3.5 Hazardous Materials Management

GWF Henrietta, as described in Sections 1.0 and 2.0 of this Amendment, would not involve substantial changes to the hazardous material management analysis and conclusions from the HPP Final Decision (CEC, 2002), supporting application, and Staff Assessment materials. Pursuant to the Energy Commission's siting regulations contained in Title 20, California Code of Regulations, section 1769 *et seq*., this supplemental analysis for the HPP addresses all the requirements necessary to make a determination of the potential environmental impacts of GWF Henrietta's hazardous materials management and whether such impacts would require new or revised COCs in order to reduce any impacts to a level of insignificance. The analysis is based on information from the administrative record for the HPP and hereby incorporated by reference for this Amendment and included on the Reference CD included as Attachment G.

As discussed below, hazardous materials amounts will only differ slightly from that described in the HPP AFC.

3.5.1 Environmental Information

3.5.1.1 Hazardous Materials Used During Construction

The hazardous material used in the construction phase of GWF Henrietta will not differ significantly from those outlined in Section 8.12.2.1 of the HPP AFC. Hazardous materials used may include gasoline, diesel fuel, motor oil, hydraulic fluid, lubricants (including transformer oils), greases, solvents, cleaners, sealers, paints, and paint thinner.

The quantities of hazardous materials that will be onsite during construction are small, relative to the quantities used during operation. Construction personnel will be trained to handle the materials properly. The most likely incident involving hazardous materials during construction is a small spill or release of fuels, solvents, paints, or lubricants. The potential for adverse health effects will be avoided by quickly cleaning up any spill that occurs and ensuring that workers are adequately trained to recognize the hazards associated with such spills. These hazardous materials quantities are similar to the quantities determined to be insignificant when the HPP AFC was granted (see Section 8.12.2.1 and Table 8.12-1 of the HPP AFC). Therefore, the expected environmental impact is minimal.

3.5.1.2 Hazardous Materials Used During Operations

Numerous hazardous materials and one extremely hazardous substance (aqueous ammonia) will continue to be used and/or stored onsite during operation of GWF Henrietta after implementation of this project. These hazardous materials are similar to those presently used at the HPP and would be used in the same manner for GWF Henrietta.

These materials are listed in Table 3.5-1 along with information on the state and use of each hazardous material. The hazardous materials that will be used during the operations and maintenance phase are typical of those used at other industrial facilities and include oils, solvents, water treatment chemicals, and other products. The types of safety precautions that will be taken to prevent the accidental release of any hazardous materials during the operation of GWF Henrietta will be the same as those described in Sections 8.12.2.2 and

8.12.2.3 of the HPP AFC. These precautions are codified in the COCs for 01-AFC-18 and as stipulated to as part of this Amendment consistent with Section 4.0.

The selective catalytic reduction (SCR) systems will be located within each once-through steam generator (OTSG) to control oxides of nitrogen (NO_x) emissions. The 29.5 percent aqueous ammonia solution used in the SCR systems will be stored in the existing HPP aqueous ammonia storage system. Section 8.12.2.3 of the HPP AFC details the physical and health hazards of ammonia, as well as the safety features of the ammonia storage and handling facilities. Secondary containment structures are part of the existing ammonia storage system.

Aqueous ammonia will be the only extremely hazardous substance present onsite in sufficient quantity to be a state and federally regulated substance subject to the requirements of the California Accidental Release Prevention (CalARP) Program and/or Risk Management Plan (RMP) program. The RMP prepared for the existing HPP plant will not need revisions to accommodate GWF Henrietta. As a result, impacts related to hazardous materials used during operation of GWF Henrietta will be less than significant.

3.5.1.3 Offsite Consequence Analysis (OCA)

The results of the worst case scenario (WCS) from the OCA prepared for the HPP Risk Management Plan (RMP) show concentrations of ammonia from the HPP site are estimated to fall below 75 ppm approximately 36.3 meters (119 feet) from the truck unloading area, which would not go off site. It was also determined that the impact circle would be further reduced if mitigation measures are taken into account. To minimize the occurrence of an accidental release during facility operations, prevention programs (such as personnel training, inspections, and preventative maintenance) addressing operations and maintenance issues associated with the aqueous ammonia system have been applied to the HPP. All of these measures were incorporated as part of the HPP. The HPP RMP analysis concluded that no significant offsite public health impacts due to an ammonia release would occur based on the results of the OCA prepared for the RMP. Additionally, the HPP Final Decision (01-AFC-18) concluded that the use of aqueous ammonia significantly reduces the risk that would otherwise be associated with use of the more economical anhydrous form of ammonia and that all potential adverse impacts related to hazardous materials management will be mitigated to insignificance.

Therefore, since no changes will be required to the aqueous ammonia storage and handling systems or the solution concentration and there are no new residences within the vicinity of the project site (within 1-mile), a new OCA is not required. As a result, impacts related specifically to the use of aqueous ammonia during operation of GWF Henrietta will be less than significant.

TABLE 3.5-1
GWF Henrietta Operations - Use and Storage Location of Hazardous Materials

Chemical	Use	Quantity (gallons/lbs)	Storage Location	State	Type of Storage
Aqueous Ammonia (29.4% Ammonia by weight)	Control oxides of nitrogen (NO_x) emissions through selective catalytic reduction	7,650 gallons	Onsite storage tank. (9,000 gallon capacity – tank is filled to a maximum of 85% of volume or 7,650 gallons)	Liquid	Continuously Onsite
Laboratory reagents	Water/wastewater laboratory analysis	8 gal liquids 70 lbs solids	Laboratory chemical storage cabinets	Liquid and Granular Solid	Continuously Onsite
Cleaning chemicals/detergents	Periodic cleaning of combustion turbine	330 gallons	Site chemical storage area	Liquid	Continuously Onsite
Hydraulic Oil	High-pressure combustion turbine starting system, turbine control valve actuators	325 gal	Contained within equipment and storage containers at site chemical storage area	Liquid	Continuously Onsite
Compressor Oil	Compressor lubrication	160 gal	Contained within equipment and storage containers at site chemical storage area	Liquid	Continuously Onsite
Lubrication Oil	Lubricate rotating equipment (e.g., gas turbine and steam turbine bearings)	3,000 gal	Contained within equipment and storage containers at site chemical storage area	Liquid	Continuously Onsite
Mineral Insulating Oil	Transformers	25,000 gal	Contained within switchyard equipment and storage containers at site chemical storage area	Liquid	Continuously Onsite
Sodium Bisulfite solution	Reverse Osmosis oxygen scavenger	55 gallons	Water treatment system and site chemical storage area	Liquid	Continuously Onsite
RO Water Treatment Chemicals	Reverse Osmosis scale inhibitor	300 gal	Water treatment system and site chemical storage area	Liquid	Continuously Onsite
Citric Acid	Reverse Osmosis cleaning (Iron chelate)	Varies as need (approx 80 lbs)	Water treatment system and site chemical storage area	Solid	Initial Start-up and Periodically Onsite
Boiler treatment Chemicals	Cleaning of OTSG	Varies as needed	Site chemical storage area	Solid	Initial start-up and periodically onsite
Propylene Glycol	Antifreeze	400 gallons	Turbine lube oil coolant system	Liquid	Continuously Onsite

TABLE 3.5-1
GWF Henrietta Operations - Use and Storage Location of Hazardous Materials

Chemical	Use	Quantity (gallons/lbs)	Storage Location	State	Type of Storage
Trisodium Phosphate	Boiler water alkalinity control	265 gal	Contained within equipment and stored in containers at site chemical storage area	Liquid	Continuously Onsite
Gas Calibration Standards (various mixtures of oxygen, nitrogen, carbon monoxide, nitrous oxide, and carbon dioxide)	CEMS gas calibration standards	200 pounds	Gas storage cylinder rack near stack	Gas	Continuously Onsite
Sulfur hexafluoride	Switchyard/ switchgear devices	135 lbs	Gas storage cylinder and contained within equipment	Gas	Continuously Onsite
Oxygen	Welding Gas	565 cubic feet	Site chemical storage area	Gas	Continuously Onsite
Acetylene	Welding Gas	650 cubic feet	Site chemical storage area	Gas	Continuously Onsite
Liquid Carbon Dioxide	Fire Suppression	3,000 lbs	CO_2 cylinders at Fire Protection Systems	Liquid	Continuously Onsite

Note: All containers of hazardous material liquids will be stored in either portable or permanent secondary containment structures.

3.5.2 Environmental Consequences

Based upon the information presented above, no significant impacts from hazardous materials storage or use would result from the changes proposed as part of this Amendment. Hazardous materials used in the construction and operation of GWF Henrietta will not differ significantly from those analyzed in the HPP AFC. Consistent with the current operating procedures at the HPP, hazardous materials will be handled and stored in a safe manner, reducing any potential public health or safety hazards. Impacts associated with the transport of hazardous materials are discussed in Section 3.11 of this Amendment (Traffic and Transportation).

According to the Kings County Planning Department, there are no conflicting proposed or foreseeable developments planned within one mile of the project site. Implementation of GWF Henrietta will not result in any individually significant impacts and the project will comply with applicable COCs and LORS. Therefore, GWF Henrietta will not contribute to any cumulative hazardous materials impacts.

3.5.3 Mitigation Measures

No significant hazardous materials handling impacts will result from the approval of this Amendment. Therefore, mitigation measures beyond those stipulated in the HPP Final Decision (CEC, 2002) are not necessary.

3.5.4 Consistency with LORS

The construction and operation of GWF Henrietta, as amended, will conform with all applicable LORS related to hazardous materials storage, use, or transport.

3.5.5 Conditions of Certification

GWF Henrietta will not result in any new hazardous materials impacts, therefore no additional COCs beyond those stipulated as part of the HEPP (01-AFC-18) (CEC, 2002), and that remain applicable, are needed. A discussion of proposed minor revisions to existing HPP COCs, to reflect GWF Henrietta, is included in Section 4.0.

3.6 Land Use

GWF Henrietta, as described in Sections 1.0 and 2.0 of this Amendment, would not involve substantial changes to land use resources analysis and conclusions from the HPP Final Decision (CEC, 2002), supporting application, and Staff Assessment materials. Pursuant to the Energy Commission's siting regulations contained in Title 20, California Code of Regulations, section 1769 *et seq*., this supplemental analysis for the HPP addresses all the requirements necessary to make a determination of the potential environmental impacts of GWF Henrietta on land use resources and whether such impacts would require new or revised COCs in order to reduce any impacts to a level of insignificance. The analysis is based on information from the administrative record for the HPP and hereby incorporated by reference for this Amendment and included on the Reference CD included as Attachment G.

3.6.1 Environmental Baseline Information

GWF Henrietta will occupy an approximate 9.86-acre, fenced site within the existing GWF-owned 20-acre parcel, which includes the existing HPP. The project will tie into existing electric, gas, and water supply lines currently servicing the existing HPP and, therefore, does not involve any linear facilities outside the existing 20-acre property. The GWF parcel is adjacent to the PG&E Henrietta Substation in Kings County, California near the Lemoore Naval Air Station, (NAS Lemoore). The baseline setting information from the AFC (GWF, 2001a) is hereby incorporated by reference.

GWF Henrietta (including the HPP) is located within unincorporated Kings County. GWF Henrietta will be located on APN 024-190-070 (Kings County, 2008). The parcel on which the project is located is zoned Exclusive Agriculture (AX) by Kings County.

The installation of cogeneration equipment, with a capacity of 50 MW or less at existing facilities, which comply with all local, state, and Federal LORS are a permitted use in this zone district. The minimum lot size for districts zoned AX is 40 acres; however, a parcel of no less than one acre is allowed in the AX district for specified conditional uses, including electric generation. The Kings County Board of Supervisors granted a parcel map waiver to GWF on July 9, 2001, which remains in effect for perpetuity (GWF, 2001a). Lands within one-mile of the project are also zoned AX. There have been no changes to the allowable uses within the County's AX zone since the 2001 AFC (personal communication, Chuck Kinney, 2008a).

The Warren-Alquist Act consistently refers to compliance with "applicable" laws, and as determined in the CEC's approval of 01-AFC-18, as a result, conformance with the Kings County LORS is not required because they are not applicable. Additionally, under the California Environmental Quality Act (CEQA) the initial inquiry for potential significance is whether a project conflicts with the land use plan, policy or regulation of an agency with "jurisdiction over the project." (Cal. Code of Regs., tit. 14, § 15387, App. G, IX(b).) This CEQA procedure is analogous to the Commission's process which seeks comments on LORS compliance from agencies that, but for the Commission's exclusive jurisdiction, would have jurisdiction over the project. Therefore, consistent with the HPP Final Decision, GWF Henrietta can be found to be consistent with Kings County plans and policies.

The Land Use Element of the Kings County General Plan was last updated January 27, 2004. Since the Henrietta Peaker Project AFC was prepared in January 2001, only minor changes have occurred, as described in Table 3.6-1. No new policies applicable to the project have been identified.

TABLE 3.6-1
Kings County Minor Changes to the General Plan Applicable to GWF Henrietta

Authority Category	Policy (as identified in HPP AFC – August 2001)	Revised Policy (as revised January 27, 2004)
Kings County General Plan: Land Use, Resource Conservation, Open Space, and Safety Elements	Industrial uses must locate near adequate transportation resources and away from residential concentrations (Policy 3b).	Renumbered Policy to LU 3.2a
	New development must not result in encroachment of incompatible uses (Policy 3c).	Renumbered Policy to LU 3.3a
	Industrial development must use Best Available Control Technology to minimize air emissions (Policy 13b).	No change
	Development must be located adjacent to existing development (Policy 16a).	No change
	Agricultural lands must be maintained as open space when not necessary for other uses that promote the economy, public welfare, or quality of life for Kings County residents (Policy 22b).	No change
	New construction astride known faults or fault lines is prohibited (Policy 36e).	No change
	Proposed developments must be reviewed by the Fire Department to ensure compliance with building standards (Policy 36f).	No change

Source: Kings County Planning Department, 1993 [2001].

According to the Kings County Planning Department, there are no conflicting proposed or foreseeable developments planned within one-mile of the project site (personal communication, Chuck Kinney 2008b). The local setting discussion in the AFC (GWF, 2001a), is hereby incorporated by reference, including the location of sensitive receptors, such as residential uses and schools proximate to the project site. The closest sensitive receptors (residences) have not changed since the AFC or CEC Final Decision. The residences are located on NAS Lemoore, north of SR 198, approximately 1.2 miles north of the site. Additional information on the location of sensitive receptors is included in Sections 3.8.1, Public Health and 3.7.1 Noise.

3.6.2 Environmental Consequences

The proposed GWF Henrietta project is an industrial land use in an agricultural area. The proposed use of the site is compatible with adjacent uses, as evidenced by its inclusion as a conditionally permitted use in the Kings County Zoning Ordinance. Construction and operation activities associated with GWF Henrietta will be very similar to those analyzed in the HPP, which concluded that the project will not result in a significant land use impact.

No new significant land use impacts to will result from implementation of GWF Henrietta. Based on the related analysis provided in the HPP AFC, implementation of GWF Henrietta will not: physically divide an established community; conflict with applicable land use plans, policies or regulations; or conflict with an applicable habitat conservation plan. As a result, no significant land use impacts will result.

As discussed in Section 3.6.1, there are no conflicting proposed or foreseeable developments planned within one mile of the project site. Additionally, there are no sensitive receptors, such as residential uses and schools, within one mile of the project site. Implementation of GWF Henrietta will not result in any individually significant impacts and the project will comply with applicable COCs and LORS. Therefore, GWF Henrietta will not contribute to any cumulative land use impacts.

3.6.3 Mitigation Measure

No significant impacts to land use will result from implementation of GWF Henrietta. Therefore, GWF Henrietta will not require land use related mitigation. This finding is consistent with the HPP Final Decision, in which no mitigation measures were identified or required.

3.6.4 Consistency with LORS

The General Plan policies, standards, and applicable LORS of Kings County detailed in the HPP AFC remain in effect for GWF Henrietta, with the exception that permits for work performed within King's County right-of-way and transportation encroachment for installation of pipelines beneath a transportation corridor will not be required. The construction and operation of GWF Henrietta, as proposed, will conform to all applicable LORS related to land use.

3.6.5 Conditions of Certification

Because GWF Henrietta will not result in any land use impacts, no additional COCs beyond those stipulated as part of the HPP (01-AFC-18), that remain applicable, are needed. A discussion of proposed minor revisions to existing COCs, to reflect GWF Henrietta, is included in Section 4.0.

3.7 Noise

GWF Henrietta, as described in Sections 1.0 and 2.0 of this Amendment, would not involve substantial changes to the noise and vibration analysis and conclusions from the HPP Final Decision (CEC, 2002), and supporting application, and Staff Assessment materials. Pursuant to the Energy Commission's siting regulations contained in Title 20, California Code of Regulations, section 1769 *et seq*., this supplemental analysis for the HPP addresses all the requirements necessary to make a determination of the potential environmental impacts of GWF Henrietta-related noise and vibration and whether such impacts would require new or revised COCs in order to reduce any impacts to a level of insignificance. The analysis is based on information from the administrative record for the HPP and hereby incorporated by reference for this Amendment and included on the Reference CD included as Attachment G.

As discussed below, noise impacts will only increase slightly from the levels described in the AFC with the addition of the new project components.

3.7.1 Environmental Baseline Information

3.7.1.1 Fundamentals of Acoustics

Acoustics is the study of sound, and noise is defined as unwanted sound. Airborne sound is a rapid fluctuation or oscillation of air pressure above and below atmospheric pressure creating a sound wave. Acoustical terms used in this section are summarized in Table 3.7-1.

TABLE 3.7-1
Definitions of Acoustical Terms

Term	Definition
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise or sound at a given location. The ambient level is typically defined by the L_{eq} level.
Background Noise Level	The underlying ever-present lower level noise that remains in the absence of intrusive or intermittent sounds. Distant sources, such as traffic, typically makeup the background. The background level is generally defined by the L_{90} percentile noise level.
Intrusive	Noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, time of occurrence, tonal content, the prevailing ambient noise level as well as the sensitivity of the receiver. The intrusive level is generally defined by the L_{10} percentile noise level.
Decibel (dB)	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
A-Weighted Sound Level (dBA)	The sound level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighted filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this report are A-weighted.

TABLE 3.7-1
Definitions of Acoustical Terms

Term	Definition
Equivalent Noise Level (L_{eq})	The average A-weighted noise level, on an equal energy basis, during the measurement period.
Percentile Noise Level (L_n)	The noise level exceeded during n percent of the measurement period, where n is a number between 0 and 100 (e.g., L_{90})

The most common metric is the overall A-weighted sound level measurement that has been adopted by regulatory bodies worldwide. The A-weighting network measures sound similarly to how a person perceives or hears sound, thus achieving good correlation with how humans interpret acceptable and unacceptable sounds.

A-weighted sound levels are typically measured or presented as equivalent sound pressure level (L_{eq}), which is defined as the average noise level, on an equal energy basis for a stated period of time and is commonly used to measure steady state sound or noise that is usually dominant. Statistical methods are used to capture the dynamics of a changing acoustical environment. Statistical measurements are typically denoted by L_n, where *n* represents the percentile of time the sound level is exceeded. The L_{90} is a measurement that represents the noise level that is exceeded during 90 percent of the measurement period. Similarly, the L_{10} represents the noise level exceeded for 10 percent of the measurement period.

The effects of noise on people can be listed in three general categories:

- Subjective effects of annoyance, nuisance, dissatisfaction
- Interference with activities such as speech, sleep, learning
- Physiological effects such as startling and hearing loss

In most cases, environmental noise may produce effects in the first two categories only. However, workers in industrial plants may experience noise effects in the last category. No completely satisfactory way exists to measure the subjective effects of noise, or to measure the corresponding reactions of annoyance and dissatisfaction. This lack of a common standard is primarily due to the wide variation in individual thresholds of annoyance and habituation to noise. Thus, an important way of determining a person's subjective reaction to a new noise is by comparing it to the existing or "ambient" environment to which that person has adapted. In general, the more the level or the tonal (frequency) variations of a noise exceed the previously existing ambient noise level or tonal quality, the less acceptable the new noise will be, as judged by the exposed individual.

Table 3.7-2 shows the relative A-weighted noise levels of common sounds measured in the environment and in industry for various sound levels.

TABLE 3.7-2
Typical Sound Levels Measured in the Environment and Industry

Noise Source At a Given Distance	A-Weighted Sound Level in Decibels	Qualitative Description
Carrier Deck Jet Operation	140	
	130	Pain threshold
Jet takeoff (200 feet)	120	
Auto Horn (3 feet)	110	Maximum Vocal Effort
Jet takeoff (2,000 feet) Shout (0.5 feet)	100	
N.Y. Subway Station Heavy Truck (50 feet)	90	Very Annoying Hearing Damage (8-hr, continuous exposure)
Pneumatic drill (50 feet)	80	Annoying
Freight Train (50 feet) Freeway Traffic (50 feet)		
	70	Intrusive Telephone Use Difficult
Air Conditioning Unit (20 feet)	60	
Light auto traffic (50 feet)	50	Quiet
Living Room Bedroom	40	
Library Soft whisper (5 feet)	30	Very Quiet
Broadcasting Studio	20	Recording studio
	10	Just Audible

Adapted from Table E, “Assessing and Mitigating Noise Impacts”, NY DEC, February 2001.

3.7.1.2 Affected Environment

No new residences or other sensitive receptors within the project vicinity have been identified since HPP AFC. As stated in the HPP AFC, the nearest residential area, housing for the Lemoore NAS, is over one mile northeast of the site. Sources of ambient noise in the project area include traffic along State Route 198 and the Avenal Cutoff as well as military aircraft.

3.7.1.3 Ambient Noise Survey

Ambient noise measurements were conducted by Consultants in Engineering Acoustics (CIEA) to comply with HPP COC NOISE-3 and are summarized in Tables 3.7-3 and 3.7-4 (CIEA, 2002). Figure 3.7-1 depicts the monitoring locations. CIEA’s analysis states that the project was not audible at the closest receptor (M1). It was also determined the project’s contribution to the ambient noise levels at this location was 30 to 33 dBA while the overall measured noise level was 41 dBA. Based upon these measurements, the project was found to comply with the HPP COC’s.

TABLE 3.7-3
Noise Levels Near Residential Housing at Lemoore NAS Beginning on Wednesday, July 31, 2002

Date	Hour Beginning At	Leq	L01	L10	L50	L90	Prominent Noise Sources
Wed. 6/31	1112	64	75.1	68.2	57	52.8	Jets, traffic near and far (N&F)
	1200	67	75.5	72.5	59.3	54.4	(N.B.) 2 jets; one very near, traffic N&F
Units 1 & 2 on	1300	66.9	75.5	70.6	60.9	55.3	4 jets, 1 near, 3 relatively far, traffic N&F
	1400	65.1	72.7	69.1	62.5	57.2	Traffic N&F, 1 prop plane far away
	1500	64.5	73.6	68.4	59.9	54.6	1 jet, traffic N&F
	1600	66.4	73.5	68.9	65.4	61.1	Traffic N&F, 1 jet far away
Unit 2 off	1700	65.3	71.7	68.7	63.8	57.6	Traffic N&F, 2 jets—1 near
	1800	67.4	75.5	74	62.4	55.3	1 jet very near, traffic N&F
	1900	62.4	69.2	65.3	61.1	54.2	2 jets far, traffic N&F, talking 1 sample
	2000	69.2	75.5	73.1	66.8	61	7 jets, 2 very near, talking 3 samples, traffic
	2100	67.4	73.6	71.4	65.1	58.6	6 jets, 1 near
	2200	68.7	75.5	73.7	62.6	57.9	2 jets, traffic N&F
Thurs. 7/01	2300	63.7	74.4	66.7	60.3	54.2	1 jet, traffic N&F
	2400	60	68.9	62.4	57.3	52.4	Traffic N&F
Units 1 & 2 on	100	51.4	60.8	57.9	50.9	39.7	Mostly distant (Hwy 198) traffic
	200	50.5	60	54.6	46	40.9	2 nearby autos, mostly distant traffic
	300	46.2	56.3	49.8	43.3	40.7	2 nearby autos, far traffic
	400	51.1	59	54.7	48.7	43.4	Increasing traffic N&F
	500	53.6	58.4	55.7	53.3	50.7	Traffic N&F
	600	58.3	63	61	57.6	53.6	Traffic N&F
	700	53.9	69.5	56.8	53.3	47	Traffic N&F
	800	55	71.2	69.5	60.9	55.5	2 jets relatively far away, traffic N&F
	900	52.8	58.5	56	51.7	42.4	Traffic N&F, prop plane
	1000	58.5	66.8	63.8	52	45.2	2 jets relatively far, traffic N&F
	1100	52.7	61.5	57	49.6	44.6	Traffic N&F
	1200	56.8	68.2	59.9	50.3	42.9	Traffic N&F
	1300	54.2	65.9	58.1	47.7	43.3	2 jets relatively far, traffic N&F
	1400	53.1	62.3	56.9	49.8	46.3	Traffic N&F, 1 far jet
	1500	55.8	64.1	59.1	53.7	48.6	Traffic N&F 2 jets far
	1600	58.9	68.9	62.7	54.9	46.7	3 jets relatively near, traffic N&F
	1700	54.4	61.9	58.5	51.5	45.6	Traffic N&F
	1800	52.4	60.1	57.1	48.6	44.6	Traffic N&F
	1900	58	71.4	58.2	52.9	58.2	1 jet, traffic N&F
	2000	53.7	59.1	56.7	52.4	49	3 jets far, traffic N&F

TABLE 3.7-4
Noise Levels at the South Property Line of GWF's Henrietta Power Plant Beginning on Wednesday, July 31, 2002

Date	Hour Beginning At	Leq	L01	L10	L50	L90	Prominent Noise Sources
Wed. 6/31	1130	60.2	63.1	61.9	59.9	58	Plant
	1200	63.8	71.3	68.3	61.4	53.9	Jet, backup beepers (bub), some vehicles near, plant
Units 1 & 2 on	1300	64.5	71.7	69.5	61.7	58.4	2 jets, bub nearby, plant
	1400	61.6	64.1	62.5	61.5	60.4	Bub, plant
	1500	62.2	66.3	63	62	61.1	Bub near and far, plant
	1600	62.5	64.5	63.7	62.4	61.2	Steam vent-like noise 2 samples, plant
Unit 2 off	1700	63.1	71.2	66.1	60.8	59.7	Jet, plant
	1800	63.6	71.6	66.9	61.2	60	Jet, plant
	1900	61.7	65.5	62.5	61.5	60.6	1 far jet, plant
	2000	67.7	73.1	71.3	65	61.5	7 jets, plant
	2100	63.9	70.1	67.2	62.4	61.3	2 jets, plant
	2200	66.7	72.5	70.9	64.7	62.8	3 jets, plant
Thurs. 7/01 Units 1 & 2 on	2300	64.4	66.1	65.3	64.4	63.5	Plant
	2400	64.6	66.2	65.5	64.6	63.8	Plant
	100	64.8	66.4	65.6	64.8	64	Plant
	200	65.3	66.8	66	65.2	64.4	Plant
	300	64.8	66.3	65.6	64.7	63.7	Plant
	400	64.4	66.1	65.2	64.3	63.4	Plant
	500	64.3	66.1	68.3	64.2	63.3	Plant
	600	64.4	66.2	67.3	64.3	63.4	Plant, some workers arriving just before 0700
	700	64.6	67.4	65.7	64.5	63.4	Plant, distant bub, auto door slam, autos at distance
	800	64.1	66.2	65.2	64	62.8	Plant, far jet?
	900	64.1	66.8	65.5	63.9	62.7	Plant
	1000	64.2	70.4	68.2	62.7	61.5	1 jet, plant
	1100	63.5	70	64.8	62.5	61.6	Jet, plant, far bub
	1200	61.5	63.9	62.3	61.4	60.7	Plant, 1 jet far, bub far
	1300	61.6	62.8	62.2	61.6	60.9	Plant, bub far
	1400	62.4	65.1	63.5	62.2	61	Plant, far jet?
	1500	62.2	63.7	63	62.1	61.2	Plant
	1600	62.6	65.1	63.5	62.5	61.7	Plant
	1700	62.5	64.3	63.5	62.5	61.3	Plant
	1800	62.6	64	63.4	62.5	61.7	Plant
	1900	62.6	64.2	63.4	62.6	61.7	Plant
	2000	63.2	64.7	63.9	63.2	62.4	Plant, end at 2048

3.7.2 Environmental Consequences

The construction and operation of GWF Henrietta will generate noise, but this noise is expected to comply with the existing HPP COCs. Potential noise impacts from construction and operation activities are assessed in this section.

3.7.2.1 Construction Impacts

Construction, testing, and commissioning noise impacts from GWF Henrietta are expected to be similar to these same activities discussed in the HPP AFC (GWF, 2001a). Given the combined-cycle features of GWF Henrietta, steam blows will be required. High pressure steam blows represent the loudest potential short term construction-related activities. The applicant has proposed mitigation measures to silence high pressure blows or use a low pressure blow process.

GWF implemented a construction noise notification program and no noise complaints were registered during the HPP facility construction. A similar notification program will be implemented during construction of GWF Henrietta. Given the temporary nature of the construction impacts, and with the implementation of mitigation measures discussed below, noise impacts during construction, testing and commissioning are expected to be less than significant.

3.7.2.2 Operational Impacts

3.7.2.2.1 Worker Exposure to Operational Noise

The major components of the facility will be specified not to exceed near-field maximum noise levels of 90 dBA at 3 feet (or 85 dBA at 3 feet where available as a vendor standard) to comply with worker health and safety standards. Onsite noise levels will generally be in the 70- to 85-dBA range. Since there are no permanent or semi-permanent workstations located near any piece of noisy plant equipment, no worker's time-weighted average exposure to noise should approach the level allowable under OSHA guidelines. Nevertheless, signs requiring the use of hearing protection devices will be posted in all areas where noise levels may commonly exceed 85 dBA, such as inside acoustical enclosures. Outdoor noise levels throughout the plant will typically range from above 90 dBA near (closer than 3 feet) certain equipment to roughly 65 dBA in areas more distant from any major noise source. Based on the above, worker exposure to operational noise is expected to conform to applicable OSHA requirements and impacts are expected to be less than significant.

3.7.2.2.2 Plant Operation Noise Levels

A noise model of GWF Henrietta has been developed using source input levels derived from manufacturers' data and field surveys of similar equipment. The noise emissions from GWF Henrietta have been calculated at the residential receptors of potential concern as shown on Figure 3.7-1. The expected noise levels at the closest residences represent the anticipated steady-state level from the plant with essentially all equipment operating with noise mitigation incorporated.

Standard acoustical engineering methods were used in this noise analysis. The computer software noise model, CADNA/A by DataKustik GmbH of Munich, Germany is very sophisticated and is capable of fully modeling very complex industrial plants. The sound propagation factors used in the model have been adopted from ISO 9613-2 *Acoustics – Sound Attenuation During Propagation Outdoors* and VDI 2714 *Outdoor Sound Propagation*. The model divides the proposed facility into a list of individual point and area noise sources representing each piece of equipment that produces a significant amount of noise. The sound power levels, which represent the standard performance of each of these components, are assigned based either on field measurements of similar equipment made at other existing plants, data supplied by manufacturers, or information found in the technical literature. Using these standard power levels as a basis, the model calculates the sound pressure level that would occur at each receptor from each source after losses from distance, air absorption, blockages, etc. are considered. The sum of all these individual levels is the total plant level at the modeling point.

The A-weighted sound power levels for the major noise sources associated with GWF Henrietta are summarized in Table 3.7-5.

TABLE 3.7-5
Summary of Sound Power Levels Used to Model GWF Henrietta Plant Operations

Plant Component	Sound Power Level, dBA
Stacks (unmitigated)	117
Combustion Turbine Generators	100
Steam Turbine Generators	110
Air Cooled Condenser	112
GSU Transformers	95
OTSG Duct Walls	106

Operational noise from GWF Henrietta, with noise control incorporated in the design, is anticipated to not exceed 46 dBA at the closest residential receptors, represented by M1. Design elements included to control noise emissions include stack silencers and equipment enclosures. The specifications for the requisite noise controls will be refined during the detailed project design phase to ensure COC's are satisfied. Based on the above, the expected operational noise impacts will be comply with the existing HPP COCs and are considered a less than significant impact.

3.7.2.2.3 Tonal Noise

At the monitoring locations modeled for GWF Henrietta, no significant tones are anticipated. That is not to say that audible tones are impossible—certain sources within the plant such as the combustion turbine inlets, transformers, pump motors etc. have been known to sometimes produce significant tones. The Applicant will design and specify the plant's equipment and take necessary steps to prevent sources from emitting tones that exceed noise and vibration standards at the nearest receptors. Based on the above, tonal noise impacts are considered to be less than significant.

3.7.2.2.4 Ground and Airborne Vibration

Similar combined-cycle facilities have not resulted in ground or airborne vibration impacts. GWF Henrietta gas turbines will exhaust into a large OTSG duct and a stack silencer. These very large ducts will reduce low frequency noise, which is the main source of airborne-induced vibration of structures.

The equipment that will be used for GWF Henrietta is well balanced and is designed to produce very low vibration levels throughout the life of the project. An imbalance could contribute to ground vibration levels in the vicinity of the equipment. However, vibration-monitoring systems installed in the equipment are designed to ensure that the equipment remains balanced. Should an imbalance occur, the event would be detected and the equipment would automatically shut down and the vibrations would cease. Based on the above, ground and air vibration impacts from GWF Henrietta are considered to be less than significant.

3.7.2.2.5 Transmission Line and Switchyard Noise Levels

As stated in section 2.2.3.6, GWF Henrietta will generate electricity at 13.8-kV and connect at 70-kV. Therefore, it is expected that no corona-related design issues will be encountered, and that the construction and operation of GWF Henrietta will not result in any significant increase in audible noise. The minor addition to the switchyard to facilitate the additional interconnection is expected to result in a less than significant change to current transmission line and switchyard noise levels.

3.7.3 Cumulative Effects

According to the Kings County Planning Department, there are no conflicting proposed or foreseeable developments planned within one mile of the project site. Additionally, there are no sensitive receptors, such as residential uses and schools, within one mile of the project site. Implementation of GWF Henrietta will not result in any individually significant impacts and the project will comply with applicable COCs and LORS. Therefore, GWF Henrietta will not contribute to any cumulative noise impacts.

3.7.4 Mitigation Measures

No significant noise impacts will result from implementation of GWF Henrietta with implementation of a new mitigation measure to address high-pressure steam blows during short-term commissioning activities. In order to mitigate high pressure blows, a new mitigation measure requiring use of low pressure steam blow process or installation of a temporary silencer and limiting hours of steam blows is expected to be incorporated into new NOISE COC for GWF Henrietta .

GWF implemented a construction noise notification program, pursuant to HPP COC NOISE-2, and no noise complaints were registered during the HPP facility construction. A similar notification program will be implemented during construction of GWF Henrietta. Based on the above, including the implementation of a new NOISE COC to address noise impacts during construction, testing and commissioning are expected to be less than significant.

3.7.5 Consistency with LORS

The LORS applicable to GWF Henrietta are the same as those evaluated in the 2001 HPP AFC. As described below, GWF Henrietta will comply with the applicable HPP NOISE COCs ; therefore the project's consistency with LORS is unchanged. It should be noted that the County has clarified that the conditionally acceptable level of 75 L_{dn} is the applicable criteria at the adjacent agricultural and industrial properties.

3.7.6 Conditions of Certification

GWF Henrietta will not result in any new noise impacts, with the exception of high pressure steam blows, therefore only minor revisions to the HPP NOISE COCs and the addition of a new COC NOISECOC will be required to mitigate noise impacts beyond those stipulated as part of the HPP Final Decision (CEC, 2002. A discussion of proposed minor changes to existing COCs, including the expectation of the addition of a new NOISE COC, to reflect GWF Henrietta, is included in Section 4.0.

LEGEND

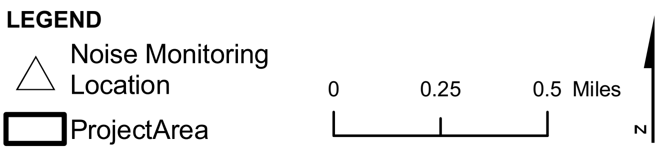


Figure 3.7-1
COMPLIANCE NOISE MONITORING LOCATIONS

GWF HENRIETTA COMBINED-CYCLE POWER PLANT
KINGS COUNTY, CA

CH2MHILL

SCO \\GALT\PROJ\GWFPOWERSYSTEMS\378088HENRIETTA\MAPFILES\GWF_NOISE_AERIAL_8_5X11.MXD
GWF_NOISE_AERIAL_8_5X11.PDF RANHORN 8/28/2008 13:02:26

3.8 Public Health

GWF Henrietta, as described in Sections 1.0 and 2.0 of this Amendment, would not involve substantial changes to the public health analysis and conclusions from the HPP Final Decision (CEC, 2002), supporting application, and Staff Assessment materials.

Pursuant to the Energy Commission's siting regulations contained in Title 20, California Code of Regulations, section 1769 *et seq.*, this supplemental analysis for the HPP addresses all the requirements necessary to make a determination of the potential environmental impacts of GWF Henrietta on public health and whether such impacts would require new or revised COCs in order to reduce any impacts to a level of insignificance. The analysis is based on information from the administrative record for the HPP and hereby incorporated by reference for this Amendment and included on the Reference CD included as Attachment G.

3.8.1 Environmental Baseline Information

Based on the Environmental Data Resources (EDR) "Offsite Receptor Report" (EDR, 2008), there are approximately 6,000 residents currently living within a 6-mile radius of GWF Henrietta. The sensitive receptors located within a 6-mile radius are presented in Attachment C4. The sensitive receptors listed in the EDR report were supplemented using the school, hospital, and care facility information presented on the Google Earth overlay (Google Earth, 2008). The closest sensitive receptor, which is an elementary school, is approximately 2 miles northeast of GWF Henrietta.

3.8.2 Environmental Analysis

3.8.2.1 Construction

The extent of the construction activity for GWF Henrietta would be similar to the activity assessed by the CEC for the HPP AFC process, which found there to be no significant impacts related to public health. Potential impacts would result primarily from exposure to combustion byproducts from onsite construction equipment and vehicles traveling on site, as well as worker and delivery truck vehicle miles traveled to and from the construction site. However, improvements in particulate control from diesel engines and emission reductions in newer model vehicles, compared to the technology evaluated by the CEC, would also lead to further reductions in the potential public health impacts from exhaust emissions. Therefore, no incremental increase in the public health impact is expected as a result of the construction of GWF Henrietta compared to the HPP.

3.8.2.2 Operation

The HPP Final Decision assumed 8,000 hours of steady state operation. GWF Henrietta assumes the same number of steady-state operating hours but includes an additional 541 hours of start-up and shutdown operations, as well as additional toxic air contaminants (TAC) emissions from the proposed auxiliary boiler and diesel driven fire pump and emergency diesel generator. The acute, chronic, or excess cancer risk impacts were evaluated to assess the potential increase in the acute, chronic, or excess cancer risk impacts associated with the additional hours of operation and the additional TAC emissions associated with the auxiliary boiler, fire pump and emergency diesel generator operation. The acute, chronic, and cancer risks were evaluated using the ARB *Hotspots Analysis Reporting Program* (HARP, Version 1.4), along with the ARB HARP On-ramp program (version 1.0). The HARP On-ramp tool was used to import the American Meteorological Society/EPA Regulatory Model (AERMOD) air dispersion modeling results into the HARP Risk Module (see Section 3.1 Air Quality for a discussion of the AERMOD dispersion modeling methodology). The HARP modeling files have also been compiled and submitted on a CD and included as part of the formal GWF Henrietta CEC License Amendment filing.

3.8.2.2.1 Acute Non-Cancer Impact

The maximum predicted acute hazard index for GWF Henrietta is 0.51, which is below the significance level of 1.0. Since GWF Henrietta will not result in a significant increase in the acute health hazard index, no significant acute impacts to public health are expected.

3.8.2.2.2 Chronic Non-Cancer Impact

The maximum predicted chronic hazard index for GWF Henrietta is 0.05, which is well below the significance level of 1.0. Since the proposed changes to the project will not result in a significant increase in the chronic health hazard index, no significant acute impacts to public health are expected.

3.8.2.2.3 Potential Cancer Risk at the Point of Maximum Impact

The potential increase in the number of hours of operation for the LM6000 turbines and the proposed addition of the auxiliary boiler and diesel driven fire pump and emergency diesel generator is expected to result in a slightly higher public health impact for the proposed design changes. Based on a health risk assessment (HRA) of the previously permitted 8,000 hours of operation, the proposed auxiliary boiler, diesel driven fire pump and emergency diesel generator and the additional 541 start-up and shutdown hours of turbine operation, the predicted derived adjusted cancer risk from GWF Henrietta at the point of maximum impact (PMI) is estimated to be 2.2 in one million (the derived OEHHA PMI value is predicted to be 2.8 in one million), which would remain below the significance level of 10 in 1 million. Therefore, no significant increase in cancer risk is expected at the residential, worker, and sensitive receptors as a result of GWF Henrietta.

3.8.3 Cumulative Impacts

According to the Kings County Planning Department, there are no conflicting proposed or foreseeable developments planned within one mile of the project site. Additionally, there are no sensitive receptors, such as residential uses and schools, within one mile of the project site. Implementation of GWF Henrietta will not result in any individually significant impacts and the project will comply with applicable COCs and LORS. Furthermore, the cumulative impacts of GWF Henrietta are not expected to exceed those analyzed during the HPP AFC process (GWF, 2001a). Therefore, GWF Henrietta will not contribute to any significant cumulative public health impacts.

3.8.4 Mitigation Measures

No significant impacts in terms of public health would result from implementation of GWF Henrietta. Therefore, mitigation measures would not be required.

3.8.5 Compliance with LORS

The LORS associated with the HPP were analyzed in Section 8.6.4 of the HPP AFC. No material LORS changes have occurred since that time. The proposed project changes would not result in any inconsistencies with applicable LORS as previously analyzed. As a result, the implementation of GWF Henrietta, will conform with all applicable LORS related to public health.

3.8.6 Conditions of Certification

GWF Henrietta will not require changes to the Public Health COCs presented in the HPP Final Decision (CEC, 2002).

3.9 Socioeconomics

GWF Henrietta, as described in Sections 1.0 and 2.0 of this Amendment, would not involve substantial changes to the socioeconomic analysis and conclusions from the HPP Final Decision (CEC, 2002), and supporting application, and Staff Assessment materials.

Pursuant to the Energy Commission's siting regulations contained in Title 20, California Code of Regulations, section 1769 *et seq*., this supplemental analysis for the HPP addresses all the requirements necessary to make a determination of the potential environmental impacts of GWF Henrietta on socioeconomics and whether such impacts would require new or revised COCs in order to reduce any impacts to a level of insignificance. The analysis is based on information from the administrative record for the HPP and hereby incorporated by reference for this Amendment and included on the Reference CD included as Attachment G.

The construction and operation of GWF Henrietta will not cause any significant socioeconomic impacts. The number of employees required for operations and maintenance of GWF Henrietta is projected to be 14. Currently, HPP operations and maintenance staff are dispatched from the Hanford Energy Park Peaker when necessary. Additionally, because tax rates and capital costs and expenses have increased since the construction of the HPP, the project will contribute economic benefits to the local economy.

3.9.1 Environmental Information

3.9.1.1 Construction Phase Impacts

3.9.1.1.1 Construction Workforce

Construction will take place over a 15 month construction period from February 2011 through April 2012. Table 2-2 identifies the construction workforce for GWF Henrietta. Construction personnel requirements will peak at approximately 157 workers (an increase from the peak workforce of 93 workers presented in the HPP AFC) in month 9 of the construction period.

As discussed in Section 8.8.2.2 of the HPP AFC (GWF, 2001), Kings County has a limited number of construction workers. Because of this, all construction workers are expected to come from Fresno and Kern Counties. This assumption is based on the experience of GWF in constructing other energy projects within Kings County. The construction workers from Fresno and Kern Counties are expected to commute daily. Given that workers will not permanently relocate, the temporary influx of construction workers from Fresno and Kern Counties for project construction will not result in a significant adverse socioeconomic impact related to the displacement of housing or people or the inducement of unplanned population growth**.**

Only the construction phase of GWF Henrietta will generate secondary employment, which includes jobs supported through local purchasing of equipment and supplies. The temporary secondary employment created by the project will not result in immigration of nonlocal workers because:

- The unemployment rate is high in the area;
- Construction workers coming from Fresno and Kern Counties will have an acceptable daily commuting distance to the site;
- The secondary employment from construction is temporary; and
- The salaries generated from the indirect jobs do not attract new workers to the area.

3.9.1.1.2 Fiscal Resources

The total construction cost of the project is estimated to be approximately $79.3 million, of which $23.5 million will be paid out as wages and salaries, including benefits. Local products subject to county taxes will be purchased during the construction process. Local governments will not realize property tax revenue, which reflects the value of the completed facility, until construction is complete. Sales tax revenue, however, will be realized when the construction period begins. It is expected that approximately $1.2 million of total local product purchases (occurring within Kings County) would be taxed during project construction.

The sales tax rate in Kings County is 7.25 percent (as of April 1, 2008), distributed as shown in Table 3.9-1. The total tax revenue from the purchase of local products would be approximately $87,000.

TABLE 3.9-1
Kings County Sales Tax Rate and Distribution

Sales Tax Rate	Distribution	Distribution
7.25% (county-wide)	State of California – 6.25%	$75,000
	Local (City/County) – 0.75%	$9,000
	Transportation Fund – 0.25%	$3,000
Totals	**7.25%**	**$87,000**

Source: California Board of Equalization. 2008a; BOE, 2008b

3.9.1.2 Operation Phase Impacts

3.9.1.2.1 Plant Operation Workforce

GWF Henrietta will begin commercial operation in the summer of 2012. The number of new employees required for operations and maintenance of GWF Henrietta is projected to be 14. Consequently, no significant increase in population is expected to result from project operations. However, there will be a small positive impact on local employment opportunities.

3.9.1.2.2 Operation Impacts on Fiscal Resources

As GWF Henrietta will generate the need for approximately 14 operations staff beyond those already employed at the HPP, a positive impact to the local economy related to employment opportunities will occur. GWF Henrietta is, however, expected to bring increased property tax revenue to Kings County. The California State Board of Equalization has jurisdiction over the valuation of a power-generating facility for property tax purposes, if the power plant produces 50 (MW or more. For a power-generating facility producing less than 50 MW, the county has jurisdiction over the valuation. Because GWF Henrietta is a nominal 120-MW power-generating facility, the Board of Equalization will assess property value. The property tax rate is set by the Kings County Assessors Office. The current property tax rate in Kings County is the same as the California state rate of 1.0 percent. Assuming the assessed value of the project site will increase by the value of the construction costs ($79 million), the increase in property tax value is estimated to be approximately $800,000 per year. Because the property taxes are collected at the city level, their disbursement also occurs at the city level.

3.9.2 Environmental Justice

Since the HPP AFC was written in 2001, the population demographics in Kings County have shifted. Approximately 48 percent of the population is now of Hispanic or Latino origin (increased from 34 percent) and roughly 39 percent of the population is non-Hispanic white (Kings EDC, 2008). Previously, persons of non-Hispanic origin were the majority in Kings County. Approximately 18% of residents in Kings County live below the poverty level (U.S. Census Bureau, 2008b). Regardless of the shift in Kings County demographics, the population density near the project site is very low.

At the census tract level, the demographics differ somewhat from the county-wide estimates. The tract in which GWF Henrietta falls (#060310016012) does have total minority population over 50 percent (approximately 73 percent) which could trigger its classification as an environmental justice population under the U.S. EPA’s 50 percent rule U.S. Census Bureau, 2008a). However, because all project impacts will be mitigated to less than significant levels, there will not be any significant impacts from GWF Henrietta that disproportionately effect a minority or low income group.

3.9.3 Environmental Consequences

The project will not cause a significant influx of construction or operation workers to the local area; will not have an adverse effect on employment, housing, schools, medical, tax revenues, fire and police protection, or disproportionately impact an environmental justice population. However, the project will result in increased revenue from sales taxes due to construction activities and will recruit the construction labor force and purchase project materials within the San Joaquin Valley to the greatest extent possible. Therefore, no significant adverse impacts to socioeconomics will result from the approval of this Amendment.

According to the Kings County Planning Department, there are no conflicting proposed or foreseeable developments planned within one mile of the project site. Implementation of GWF Henrietta will not result in any individually significant impacts and the project will comply with applicable COCs and LORS. Therefore, GWF Henrietta will not contribute to any cumulative socioeconomic impacts.

3.9.4 Mitigation Measures

Given that the project will not result in any new significant impacts related to socioeconomics, no changes to the mitigation measures included in the HPP Final Decision (CEC, 2002) are necessary.

3.9.5 Consistency with LORS

Construction and operation of GWF Henrietta will conform to all applicable LORS related to socioeconomics that were analyzed as part of the HPP AFC (GWF, 2001). No material LORS changes have occurred since that time. Refer to Attachment A for LORS related to engineering requirements for socioeconomics.

3.9.6 Conditions of Certification

GWF Henrietta will not result in any new significant, adverse socioeconomic impacts; therefore, no additional COCs beyond those stipulated, that remain applicable, as part of the HPP Final Decision (01-AFC-18) are needed. A discussion of proposed minor changes to existing COCs, to reflect GWF Henrietta, is included in Section 4.0.

3.10 Soil and Water Resources

GWF Henrietta, as described in Sections 1.0 and 2.0 of this Amendment, would not involve substantial changes to the soil and water analysis and conclusions from the HPP Final Decision (CEC, 2002), and supporting application, and Staff Assessment materials.

Pursuant to the Energy Commission's siting regulations contained in Title 20, California Code of Regulations, section 1769 *et seq*., this supplemental analysis for the HPP addresses all the requirements necessary to make a determination of the potential environmental impacts of GWF Henrietta soil and water resources and whether such impacts would require new or revised COCs in order to reduce any impacts to a level of insignificance. The analysis is based on information from the administrative record for the HPP and hereby incorporated by reference for this Amendment and included on the Reference CD included as Attachment G.

3.10.1 Environmental Information

Regional ground and surface water resources in the vicinity of GWF Henrietta are addressed in Section 8.14.1.1 of the HPP AFC (GWF, 2001a).

3.10.1.1 Water Use

Maximum daily water use for GWF Henrietta construction activities will occur during site grading and excavation, expected to take place over a 5-month period. Most of this water will be used for fugitive dust control. The maximum daily use is expected to be approximately 6,000 gallons and the daily average is estimated at approximately 1,000 gallons. Additional water will be required for flushing and commissioning of the water treatment systems and the OTSGs. Steam blows of the OTSGs will also be performed during start-up. It is estimated that these activities will take place over a one-month period, with peak daily water use estimated at 6,000 gallons and average daily water use estimated at 1,000 gallons. As with plant wastewater and contact storm water runoff, wastewater from these activities will be discharged to an existing onsite holding tank for eventual transport and disposal offsite.

GWF Henrietta will require approximately 158 AFY for planned operations. This is an increase of 8 AFY from the 150 AFY required by the existing HPP. Consistent with the discussion in Section 8.14.1.2 of the HPP AFC, GWF Henrietta will continue to rely principally on two existing sources: (1) 200 ac-ft of State Water Project (SWP) surface water delivered from the California Aqueduct from Kings County by Westlands Water District (WWD) and (2) 51.8 ac-ft of Central Valley Project (CVP) surface water delivered from the California Aqueduct by the WWD from the existing service pipeline. Additionally, GWF has legal control of approximately 2,000 ac-ft of SWP entitlements associated with the Land Purchase Option Agreement held for 750 acres (an expansion of the acreage and associated entitlements included this agreement is currently being negotiated) adjacent to GWF Henrietta.

Consistent with the discussion in the HPP Final Decision, GWF Henrietta will rely on an existing 2001 contract between GWF and Kings County for 200 acre-feet of SWP water per year. This Agreement is included in Attachment E. The 200 acre-feet Kings County supply is subject to annual allocation and so may yield less than 200 acre-feet when allocation is less than 100 percent.

Additionally, the 20 acre parcel on which the project is located has an existing entitlement of 51.8 acre-feet of Central Valley Project (CVP) water, administered by the WWD. This entitlement was adjusted to 33.7 acre-feet upon conversion of seven acres to non-agricultural use related to the construction of the HPP. The 33.7 acre-feet are currently used on the 13 acres of the parcel which have been returned to agricultural use (CEC, 2002). Five ac-ft (not subject to allocation) of the 18.1 acre-feet lost through the conversion of the seven acres from agricultural to non-agricultural use was made available to the HPP as Manufacturing and Industrial (M & I) Use water. In regards to GWF Henrietta, WWD has verbally agreed to allow GWF to use the entire 51.8 acre-feet agricultural entitlement tied to the 20 acre parcel, subject to annual allocation, as M&I water.

Finally, GWF Henrietta can, if necessary, rely upon the approximately 2,000 acre-feet entitlement associated with the 750 acres to which GWF holds a Land Purchase Option Agreement. This Land Purchase Option Agreement is currently being revised to cover 950 acres of land and 2,600 acre-feet of SWP entitlements (this revised agreement will be submitted to the CEC under separate cover upon completion). While the previously discussed water sources would be used first, the availability of the option agreement entitlements insures an adequate long-term water supply for GWF Henrietta.

The use of an additional 8 AFY by GWF Henrietta will not exceed the arranged entitlements discussed above. Further, because the water to be supplied for the operation of the HPP is held under pre-existing SWP and CVP contracts, the project will not exert an additional or new demand upon SWP or CVP water and therefore will not result in new significant environmental impact to water resources.

Figures 2-7 and 2-8 provide GWF Henrietta's water balance of the water treatment and distribution system. GWF Henrietta water use can be divided into the following two categories based on the quality required: (1) demineralized water (via the project's reverse osmosis system) for makeup to the steam cycle; and (2) service water for the plant, which includes all other miscellaneous uses.

Process water supplied from WWD and Kings County (SWP and CVP water) will be treated using a microfiltration system, a multistage reverse osmosis (RO) system, and a portable de-mineralized bottles. This higher quality water will be used in the CTG evaporative coolers, NOx water injection system, and OTSG makeup. Demineralized water will be stored in a 300,000 gallon onsite tank. In addition, demineralized water will be used for CTG compressor washing. This water processing system will minimize the use of makeup water in the plant. Untreated supply water will be used for other purposes, such as in the service and fire water systems and the STG lube oil cooler. Water quality supply parameters for GWF Henrietta are presented in Table 3.10-1.

TABLE 3.10-1
GWF Henrietta Water Quality Supply Parameters (mg/L unless otherwise indicated)*

Constituents	Concentration
Calcium	20
Hardness	95 (as $CaCO_3$)
Antimony	<0.005
Alkalinity	71 (as $CaCO_3$)
Total Dissolved Solids	253
Specific Conductance	410 (microSiemens/cm)
Sulfate	33
Chloride	56
Arsenic	0.002
Beryllium	<0.001
Boron	0.2
Fluoride	<0.01
Chromium	0.006
Copper	0.002
Iron	0.047
Lead	<0.001
Selenium	not reported
Magnesium	11
Manganese	<0.005
Turbidity	10.2 (NTU)
Phosphorus-Total	0.12
Phosphorus-Ortho	0.08
Sodium	43
Zinc	<0.005
Bromide	0.16
Nitrite+Nitrate	0.66 (as N)
Carbon-Total Organic	not reported
Carbon-Dissolved Organic	not reported
Diuron	0.6 (micrograms/L)
Simazine	0.08 (micrograms/L)
Diazinon	0.01 (micrograms/L)
2,4-Dichlorophenylacetic acid	0.365 (micrograms/L)

* Sampled at Check 21 (California Aqueduct near Kettleman City) in March and June, 2001.
mg/L = milligrams per liter (equivalent to parts per million)
gpd = gallons per day
gpm = gallons per minute
NTU = turbidity units
Source: Excerpted from Table 8.14-2 Surface Water Requirements and Source Water Quality for the HPP (GWF, 2001a)

Consistent with Section 8.14.1 of the HPP AFC, drinking water needs for GWF Henrietta employees will continue to be met through the delivery of bottled water.

3.10.1.2 Wastewater Disposal

Wastewater produced by GWF Henrietta will be managed of in one of two ways: it will be reclaimed and returned to the common raw water tank by a waste recovery system; or it will be hauled offsite for recycle or disposal. As illustrated in Figures 2-7 and 2-8 (water balances), the primary wastewater discharge from the plant will be from the RO treatment and demineralization systems. As mentioned above, wastewater that is generated as a result of the demineralized water reverse osmosis system will be reclaimed and returned to the common raw water tank by a waste recovery system. Water retained in the oil holding tank associated with the oil/water separator as well as collected turbine wash water will be hauled offsite for final disposal. GWF Henrietta will not discharge water from plant operations; hence no water discharges will be released to surface waters or to the surrounding ground surface. Consequently, there will be no significant impacts associated with wastewater discharge from GWF Henrietta.

3.10.1.3 Flooding Potential

Consistent with the discussion in Section 8.14.2 of the HPP AFC, drainage at GWF Henrietta has been designed to prevent flooding of permanent facilities and roads. No project features will be located within the 100-year floodplain and no surface water bodies are present within the immediate vicinity of the site. In addition, the drainage systems for GWF Henrietta have been designed to accommodate the storm water flow resulting from a 10-day, 100 year storm. As a result, impacts related to flooding will be less than significant.

3.10.1.4 Storm water Drainage

Best engineering management practices and drainage control measures will be implemented to minimize erosion and water quality impacts during construction of GWF Henrietta. A construction storm water monitoring program will be implemented and construction related storm water discharge will be addressed in a construction storm water Pollution Prevention Plan (SWPPP) in order to minimize soil erosion. In addition, best management practices (BMPs), including erosion and sediment controls, will be implemented to achieve compliance with the California National Pollutant Discharge Elimination System (NPDES) Storm Water General Permit for Storm Water Discharge Associated with Construction Activity and all other applicable LORS. These BMPs will apply to both construction and operational phases of GWF Henrietta to ensure impacts related to storm water drainage are reduced to less-than-significant levels. GWF Henrietta will be incorporated into the existing HPP operational SWPPP.

Grading for GWF Henrietta will be designed to ensure that storm water runoff during operations and maintenance is confined within GWF Henrietta and drained to the new storm water retention basin located on the east side of the project site. Contact storm water runoff from equipment areas onsite will be routed to the oil/water separator for processing. Figures 2-9 and 2-10 illustrate the grading and storm water drainage changes associated with the development of GWF Henrietta.

The existing storm water retention basin will be replaced with a new and slightly larger storm water retention basin located east of its current position to accommodate the minimal increase in storm water flow from GWF Henrietta. The drainage systems for GWF Henrietta have been designed to accommodate the storm water flow resulting from a 10-day, 100 year storm and can accommodate the small increase in storm water flow from GWF Henrietta. The relocated basin will expand the size of the existing HPP basing by approximately 2,200 cubic yards. Cut and fill from the basin relocation will be retained onsite and incorporated into filling the existing basin and final facility grading.

Consistent with Section 8.14.2 of the HPP AFC analysis, runoff from GWF Henrietta will be handled through the implementation of the construction and operation SWPPPs and identified BMPs to prevent any offsite discharge to surface water resources. GWF Henrietta will be incorporated into the existing HPP SWPPP. Consequently, impacts associated with storm water drainage will be less than significant.

3.10.1.5 Groundwater

GWF Henrietta will not use groundwater from the surrounding Tulare Lake Groundwater Basin and thus will not have any impact on local or regional groundwater supplies. The onsite storm water detention basin will only contain "noncontact" storm water and therefore will not cause an impact on local and regional groundwater.

3.10.1.6 Soils

Project soil types in the area of the new project features are as listed in Table 3.10-2. Potential impacts to soils will be restricted to the 2.86 acres of new permanent disturbance. Soil impacts related to temporary disturbance areas will be minimal and will occur in previously disturbed areas. Implementation of the applicable mitigations measures included the HPP COCs will ensure that construction-related erosion impacts will be less than significant. The characteristics of these soil types are discussed in detail in Table 8.9-2 of the HPP AFC.

TABLE 3.10-2
Soil Mapping Unit Identified by Project Component

Project Component	Approximate Area Disturbed	Soil Mapping Unit
GWF Henrietta Project Site	2.86 acres	139 - Lethent clay loam
Construction Parking and Laydown	4.52 acres	139 - Lethent clay loam

Source: Excerpted from Table 8.9-2 Characteristics of Soil Types in the Immediate Vicinity of the HPP (GWF, 2001a).

3.10.1.7 Soil Erosion

After the project site has been re-graded, compacted, drainage systems installed, and covered with concrete or gravel, there will be little remaining potential for natural erosion. Routine vehicular access to the individual project components during operation of the project will be limited to existing roads. Standard operational activities will not involve disruption of soil. As such, there will be no significant soil erosion impacts during operations.

3.10.2 Environmental Consequences

Some soil compaction and grading will occur within the 2.86 acres of new permanent disturbance associated with GWF Henrietta. However, these potential impacts will be mitigated to a less than significant level by the mitigation measures already stipulated in the HPP Final Decision.

With the implementation of the applicable mitigation measures outlined in the HPP Final Decision, no new significant impacts to soil and water will result from the proposed changes as part of this amendment. Specifically, GWF Henrietta will not: increase erosion, increase the water supply demand beyond the project associated entitlements already held by GWF, significantly increase wastewater disposal volumes, or cause storm water drainage into the nearby wetlands or surface waters.

According to the Kings County Planning Department, there are no conflicting proposed or foreseeable developments planned within one mile of the project site. Implementation of GWF Henrietta will not result in any individually significant impacts and the project will comply with applicable COCs and LORS. Therefore, GWF Henrietta will not contribute to any cumulative soil or water resource impacts.

3.10.3 Mitigation Measures

Because the types of minor impacts to soil resources are of the same type and lesser magnitude than those analyzed in the HPP AFC and no new water related impacts would be associated with the approval of this Amendment, applicable mitigation measures beyond those already stipulated in the HPP Final Decision (CEC, 2002) are not necessary.

3.10.4 Consistency with LORS

The construction and operation of GWF Henrietta will conform with all applicable LORS related to soils and water resources (Attachment A).

The following discussion addresses consistency with water supply policies. Under the State Water Resources Control Board (SWRCB) Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Powerplant Cooling (adopted on June 19, 1975, as Resolution 75-58), the use of fresh inland waters should only be used for power plant cooling if other sources or other methods of cooling would be environmentally undesirable or economically unsound. In the 2003 Integrated Energy Policy Report, the CEC adopted a similar policy stating they will approve the use of fresh water for cooling purposes by power plants only where alternative water supply sources and alternative cooling technologies are shown to be “environmentally undesirable” or “economically unsound.”

GWF Henrietta is consistent with SWRCB Resolution 75-58 and the CEC’s freshwater policy. Only a very small increase in water consumption will be associated with the project because it will utilize dry cooling technology. GWF Henrietta’s use of an additional 8 AFY represents a minor project modification of the HPP because the total water use required by GWF Henrietta would still be less than the entitlements GWF previously secured, as discussed in Section 3.10.1 of this Amendment, thereby eliminating the need to procure additional water supplies or construct new water supply infrastructure, such as pipelines. If new infrastructure were required, construction costs would reduce the economic feasibility of the project while construction activities could significantly increase environmental impacts related to water quality, air quality, soils, traffic, and biological resources. Therefore, GWF Henrietta’s use of the HPP’s existing water supplies, as discussed in Section 3.10.1, eliminates the need to construct new alternative water supply infrastructure that would be both “environmentally undesirable” and “economically unsound.”

Furthermore, it should be noted that operation of the project in the combined-cycle configuration, as opposed to the simple-cycle configuration represents a more efficient use of water resources.

3.10.5 Conditions of Certification

Because GWF Henrietta will not result in any significant impacts to soil and water resources, no additional COCs beyond those stipulated as part of the HPP (01-AFC-18), that remain applicable, are needed. A discussion of proposed revisions to existing COCs, to reflect GWF Henrietta, is included in Section 4.0.

3.11 Traffic and Transportation

GWF Henrietta, as described in Sections 1.0 and 2.0 of this Amendment, would not involve substantial changes to the traffic and transportation analysis and conclusions from the HPP Final Decision (CEC, 2002), and supporting application, and Staff Assessment materials.

Pursuant to the Energy Commission's siting regulations contained in Title 20, California Code of Regulations, section 1769 *et seq*., this supplemental analysis for the HPP addresses all the requirements necessary to make a determination of the potential environmental impacts from GWF Henrietta-related traffic and whether such impacts would require new or revised COCs in order to reduce any impacts to a level of insignificance. The analysis is based on information from the administrative record for the HPP and hereby incorporated by reference for this Amendment and included on the Reference CD included as Attachment G.

3.11.1 Environmental Baseline Information

Figure 3.11-1 is an updated graphic that shows the project location and the regional traffic and transportation setting.

3.11.1.1 Plans

The transportation-related plans applicable for this supplemental assessment are the same as those listed in the HPP AFC, however, the following more current versions of the plans now apply:

- Kings County Regional Transportation Plan (RTP) adopted in May 2007.
- Kings County Transportation Improvement Program (TIP) adopted in January 2008.
- Kings County Regional Bicycle Plan adopted in June 2005.
- Kings County Transit Development Plan (TDP) adopted in November 2004, which determines future transit needs in the county through 2007.

The 2007 Kings County RTP identifies the following long-range and short-range improvements to the regional transportation system:

- SR 198 between SR 43 and Tulare County – Widening of the highway from two lanes to a four-lane expressway. An Environmental Impact Statement for this project was completed in 2000. The estimated date for completion of the widening is 2010.
- SR 198 at 19th Avenue – Construction of an interchange, estimated to be completed after 2020.
- SR 198 at 9th Avenue – Construction of an interchange, estimated to be completed after 2030.
- SR 198 at 12th Avenue – Construction of an interchange, estimated to be completed by 2013.
- SR 198 from 19th Avenue to 11th Avenue – Pavement overlay (rehabilitation) to be completed by 2009-2010.

- SR 41 from SR 198 to I-5 – Widening from 2 to 4 lanes, estimated to be completed after 2030.
- SR 41 at Grangeville Boulevard – Construction of an interchange, estimated to be completed after 2030.
- I-5 – Widening from 4 to 6 lanes, estimated to be completed after 2030.

The proposed construction schedules for these projects are not expected to overlap with the construction of the proposed project, GWF Henrietta.

3.11.1.2 Local Setting

Updated local traffic and transportation information is provided to reflect currently available information on traffic roadway volumes. In general, the current traffic volumes on highways and local roadways located in the vicinity of the project area are higher than those reported in the original HPP AFC. The updated traffic volumes are presented in Tables 3.11-1 and 3.11-2 for highways and local roadways, respectively.

As shown in Table 3.11-1, the highest peak hour traffic volume along SR 198 in the immediate vicinity of GWF Henrietta (between Fresno County line and SR 41) is 2,000 vehicles, and the level of service (LOS) for this section of SR 198 is mostly LOS B, with one segment at LOS C. Daily truck traffic on SR 198 is between 8 and 14 percent of total traffic volume in the immediate vicinity of the project site, and peaks at 15 percent along the segment of SR 198 between SR 43 and the Tulare County Line. Along SR 41, the highest peak hour traffic volume is 1,750 vehicles between SR 198 and Fresno County. Along this section, SR 41 operates at LOS B, and trucks constitute up to 16 percent of total traffic. The highest peak hour traffic volume along I-5 is 3,650 vehicles between SR 41 and Avenal Cutoff Road. This segment of I-5 operates at LOS B, and trucks are 30 percent of the total traffic.

TABLE 3.11-1
Current Traffic Characteristics of the Interstate Highways and State Routes in the GWF Henrietta Project Area

Milepost	Location	AADT	AADTT	Truck Traffic Percentage[a]	Peak Hour Capacity	Peak Hour Volume	LOS
I-5							
0.0 – 16.6	Kern Co. – SR 41	34,000	10,200	30%	3,720	3,550	B
16.6 – 25.4	SR 41 – Avenal Cutoff Rd.	34,000	10,200	30%	3,720	3,650	B
25.4 – 26.7	Avenal Cutoff Rd. – Fresno Co.	34,000	10,200	30%	3,720	3,500	B
SR 41							
8.1 – 16.3	SR 33 – I-5	6,300	880	14%	1,620	850	A
16.3 – 28.4	I-5 – Nevada Ave.	8,900	1,430	16%	3,720	1,150	C
28.4 – 37.8	Nevada Ave.– Jackson Ave.	8,100	1,300	16%	1,900	1,050	A
37.8 – 40.1	Jackson Ave. – SR 198	9,100	1,460	16%	1,900	1,150	A
40.1 – 42.1	SR 198 – Hanford-Armona Rd.	15,600	2,030	13%	1,920	1,750	B
42.1 – 48.3	Hanford-Armona Rd. – Fresno Co.	13,500	2,160	16%	3,840	1,1,750	B

TABLE 3.11-1
Current Traffic Characteristics of the Interstate Highways and State Routes in the GWF Henrietta Project Area

Milepost	Location	AADT	AADTT	Truck Traffic Percentage[a]	Peak Hour Capacity	Peak Hour Volume	LOS
SR 43							
16.4 – 18.2	Houston Ave. – SR 198	7,900	1,820	23%	1,860	730	B
18.2 – 22.3	SR 198 – 10th Ave.	10,500	1,680	16%	1,840	1,000	B
SR 198							
0.0 – 3.0	Fresno Co. – NAS Lemoore	7,100	1,000	14%	1,900	1,700	C
3.0 – 5.0	NAS Lemoore – Avenal Cutoff Rd.	14,200	1,140	8%	3,800	1,700	B
5.0 – 8.9	Avenal Cutoff Rd. – SR 41	17,500	1,400	8%	3,880	2,000	B
8.9 – 15.8	SR 41 – 16th Ave.	28,500	2,570	9%	3,840	2,850	B
15.8 – 17.1	16th Ave. – 12th Ave	28,000	3,920	14%	3,880	2,650	B
17.1 – 21.0	12th Ave. – SR 43	27,000	3,780	14%	3,880	2,550	B
21.0 – 28.3	SR 43 – Tulare Co.	18,500	2,780	15%	3,720	1,650	B

Source: 2007 Kings County Regional Transportation Plan
NOTES:
[a]Truck traffic percentage in 2002 ADT
AADT – Annual Average Daily Traffic
AADTT – Annual Average Daily Truck Traffic
LOS – Level of Service

TABLE 3.11-2
Existing Traffic Characteristics of Local Roadways in the Immediate Vicinity of GWF Henrietta

Roadway	Location	Roadway Classification	AADT	Peak Hour Volume	Peak Hour Capacity	LOS
Avenal Cutoff Rd.	SR 269 – Nevada Ave.	Arterial, 2 Lane	2,100	290	1,796	B
	Nevada Ave. – SR 198	Arterial, 2 lane	3,400	510	1,718	B
Jackson Ave.	SR 198 – SR 41	Arterial, 2 lane	500	90	1,484	A
	SR 41 – 18th Ave.	Arterial, 2 lane	700	90	1,404	A
25th Ave.	Avenal Cutoff Rd. – SR 198	Arterial, 2 lane	3,000	N/A	N/A	A

Source: 2007 Kings County Regional Transportation Plan (Avenal Cutoff Road and Jackson Avenue)
Original HPP AFC (25th Avenue)
NOTES:
AADT – Annual Average Daily Traffic
N/A – Not Available
LOS – Level of Service
Based on year 1999 traffic volumes for Avenal Cutoff Road and Jackson Avenue.

3.11.2 Environmental Consequences

3.11.2.1 Construction Impacts

The construction of GWF Henrietta will occur over an estimated 15-month period between 2011 and 2012. The project will require a total construction average workforce of 87 workers, assuming a Monday through Saturday (six-day) workweek. All workers are assumed to be non-local (living in Kern, Fresno, and Tulare counties). A peak construction workforce of approximately period 157 construction workers (all non-local) will be required (estimated to occur during month nine of the 15-month construction period). The revised workforce vehicle trips associated with GWF Henrietta construction were calculated based on these assumptions.

Table 3.11-3 summarizes the vehicle origins and distribution (by county) of the daily average and peak construction workforce. Table 3.11-4 presents the projected number of daily average and peak construction period vehicle trips to be generated by the construction of GWF Henrietta.

TABLE 3.11-3
Construction Workforce Distribution

Worker (vehicle) Origin	Daily Distribution of Workforce	Daily Average Workforce[a]	Peak Distribution of Workforce	Peak Workforce[b]
Bakersfield / Kern County	50%	44	50%	79
Fresno / Fresno County	35%	30	35%	55
Kings / Tulare County	15%	13	15%	23
Total	**100%**	**87**	**100%**	**157**

[a] The daily average workforce is based on an average of 15 months during the construction period.

[b] The peak workforce is based on month 9 of the 15-month construction period.

TABLE 3.11-4
Total Daily Construction Workforce Vehicle Trip Generation

Worker (vehicle) Origin	Trip Distribution[a]	Average Daily Workforce Round Trips[b]	Average Daily Workforce Total (One-way) Trips[b]	Peak Workforce Round Trips[b]	Peak Workforce Total (One-way) Trips[b]
Bakersfield / Kern County	50%	40	79	71	142
Fresno / Fresno County	35%	28	55	50	100
Kings / Tulare County	15%	12	24	21	42
Total	**100%**	**79**	**158**	**142**	**284**

[a] Combination of construction and contractor labor force.

[b] This analysis assumes that 20% of the workforce will carpool. Columns may not add because of rounding.

Assuming 20 percent of the workers will carpool (consistent with Section 8.10.2.2 the HPP AFC), the average daily construction workforce of 87 workers will generate 79 round trips, or 158 total daily one-way vehicle trips. These trips are the sum of 70 round trips (140 total one-way vehicle trips) made by 70 workers (80 percent) driving alone plus 9 round trips (18 total one-way vehicle trips) made by 17 workers (20 percent) carpooling. Similarly, the peak construction workforce of 157 workers will generate 142 round trips (284 total one-way daily vehicle trips). These peak construction workforce trips are the sum of 126 round trips (252 total one-way vehicle trips) made by 126 workers (80 percent) driving alone, plus 16 round trips (32 total one-way vehicle trips) made by 31 workers (20 percent) carpooling. In summary, construction of GWF Henrietta will result in an estimated total of 158 one-way vehicle trips per day, on average, and one-way 284 vehicle trips per day during the peak construction period.

3.11.2.2 Impacts of Construction Workforce Traffic on State Routes

Table 3.11-5 presents the updated, estimated effect (as percent increase in Annual Average Daily Traffic) of GWF Henrietta related construction traffic on state routes in the vicinity of the project site as a result of the construction workforce commuting to and from the project site.

During the peak construction period (estimated to occur during month nine of the fifteen-month construction period), construction-related vehicle traffic will increase traffic on state routes by less than 1 percent, except for two sections of SR 198 and one section on SR 43. Therefore, GWF Henrietta construction workforce traffic is not expected to change the existing LOS of the roadways (all roadways will remain at LOS B). On the section of SR 43 between Houston and SR 198, construction traffic will result in a two percent increase in traffic. On the sections of SR 198 between Lemoore and SR 41, construction traffic will result in a one to two percent increase in traffic. This moderate change in traffic volumes would still result in LOS C or better conditions.

Additionally, the construction-related increases will be short term, occurring mostly during the peak construction period. Therefore, traffic impacts on state routes in the HPP vicinity are not considered significant.

TABLE 3.11-5
Distribution of Construction Worker Generated Traffic on State Routes and Local Roadways

	Existing Conditions		Daily Average Construction Period		Peak Construction Period		
Highway/ Roadway	**AADT**	**LOS**	**Projected Total Vehicle Trips/Day**	**AADT Increase**	**Projected Total Vehicle Trips/Day**	**Increase in Vehicle Trips/Day**	**Projected LOS**
I-5							
Kern Co. – SR 41	34,000	B	79	<1%	142	<1%	B
SR 41 to Avenal Cutoff Rd.	34,000	B	79	<1%	142	<1%	B
SR 41							
SR 198 to Grangeville	15,600	B	55	<1%	100	<1%	B
Grangeville to Fresno Co.	13,500	B	55	<1%	100	<1%	B
SR 43							
Houston Ave. to SR 198	7,900	B	179	<1%	142	2%	B
SR 198 to 10th Ave.	10,500	B	55	<1%	100	<1%	B

TABLE 3.11-5
Distribution of Construction Worker Generated Traffic on State Routes and Local Roadways

Highway/ Roadway	Existing Conditions		Daily Average Construction Period		Peak Construction Period		
	AADT	LOS	Projected Total Vehicle Trips/Day	AADT Increase	Projected Total Vehicle Trips/Day	Increase in Vehicle Trips/Day	Projected LOS
SR 198							
Lemoore to Avenal Cutoff	14,200	B	118	<1%	213	2%	B
Avenal Cutoff to SR 41	17,500	B	118	<1%	213	1%	B/C
SR 41 to 16th Ave.	28,500	B	90	<1%	163	<1%	B
16th Ave. to 12th Ave.	28,000	B	90	<1%	163	<1%	B
12th Ave. to SR 43	27,000	B	90	<1%	163	<1%	B
SR 43 to Tulare Co.	18,500	B	24	<1%	42	<1%	B
Avenal Cutoff Road							
SR 269 to Nevada Ave.	2,100	B	41	2%	71	3%	B/C
Nevada Ave. to SR 198	3,400	B	100	3%	178	5%	B/C
Jackson Avenue							
SR 198 to SR 41	500	A	0	0%	0	0%	A
SR 41 to 18th Ave.	700	A	0	0%	0	0%	A
25^{th} Avenue							
North of site	3,000	A	59	2%	106	4%	A/B
South of site	3,000	A	100	3%	178	6%	A/B

NOTES:
AADT – Annual Average Daily Traffic
LOS – Level of Service
X/Y – Expected LOS is X or Y

3.11.2.3 Impacts of Construction Workforce Traffic on Local Roads

During the peak construction period, total daily traffic is estimated to increase by up to 6 percent on 25th Avenue but less along other local roadways serving GWF Henrietta. With these traffic increases the projected peak LOS would be LOS C or better on all local roadways serving the project site. These minor increases will be short term, occurring mostly during the peak construction period. Therefore, traffic impacts on local roadways serving GWF Henrietta are not considered significant.

3.11.2.4 Construction Truck Traffic Impacts

An estimated 3019 total truck deliveries will be made to GWF Henrietta over the 15-month construction period. The greatest number of material deliveries (approximately 392 deliveries) is expected in month three of construction, while the remaining fourteen months of the construction period will require approximately 188 deliveries per month on average. Assuming an average of 24 workdays per month and two trips (1 round-trip) for each truck delivery, the HPP construction would generate approximately 16 truck trips per day under average conditions and approximately 33 truck trips per day during the peak delivery month.

Increases of 16 truck trips on state routes during average conditions and 33 truck trips on state routes during peak delivery month are minor compared with existing truck traffic on these routes (see Table 3.11-1) and represent a minimal increase in truck traffic along the proposed routes of travel in the project area. Consequently, the impact of delivery truck traffic on state routes is considered less than significant.

3.11.2.5 Operation Impacts

Operation of the project will generate 14 additional employees beyond those described in the HPP AFC (GWF, 2001a). Monthly deliveries will remain the same as for the HPP, which represents less than one percent of the daily demand on surrounding streets. Therefore, no significant traffic and transportation impacts will result from project operation.

3.11.2.5.1 Transport of Hazardous Materials and Hazardous Waste

During project construction and operation, regulated substances, as defined in California Health and Safety Code Section 25531, may be used.

Hazardous materials to be used during construction are listed in Section 3.5 Hazardous Materials Management. Because of the small quantities of hazardous materials used during project construction, shipments will likely be consolidated. Multiple truck deliveries of hazardous materials during construction are unlikely. During construction, a the primary hazardous waste generated will be SCR and CO catalyst related heavy metals from the demolition of the existing emission control structures. Up to 100 tons may be generated during the construction period. Because the transport of hazardous wastes will be conducted in accordance with the relevant transportation regulations, (consistent with the discussion of proposed revisions to the applicable HPP COCs included in Section 4.0) no significant impact is expected. Refer to Section 3.13 Waste Management for additional information on project-related waste generation.

During the Project's operations phase, several hazardous materials, including one regulated substance (29.4 percent aqueous ammonia, which poses inhalation hazards) will be shipped and stored at the generating site. Transportation impacts related to hazardous materials associated with operations will not be significant since deliveries of hazardous materials will be limited. The HPP Final Decision concluded that with the implementation of mitigation measures potential impacts from ammonia transport and delivery to support 8000 hours of operation per year would be less than significant. The number of ammonia deliveries for GWF Henrietta is not expected to exceed what was analyzed for the HPP. Refer to Section 3.5 Hazardous Materials Management for additional information on project-related hazardous materials use and waste generation. Delivery of these materials will continue to comply with all LORS governing the safe transportation of hazardous materials and potential traffic impacts will be less than significant.

3.11.2.6 Public Safety

Construction-related traffic is not expected to cause safety impacts to the general public because it will not be routed through residential areas. Deliveries of hazardous materials and removal of wastes related to project construction or operation will continue to occur in a safe manner, as the transporter will be licensed in accordance with CVC Section 32105 and will be required to follow appropriate safety procedures. As a result, impacts will be less than significant.

3.11.2.7 Aviation Safety

GWF Henrietta is located approximately 4.5 miles from the southern edge of the runway at Lemoore NAS. Lemoore NAS is a restricted naval air training facility that is not open to commercial or general aviation. The nearest general aviation airport to GWF Henrietta is the Hanford Municipal Airport, located approximately 16 miles to the east. These airports are shown on Figure 3.11-1.

Both the Lemoore NAS and Hanford Municipal Airport locations are outside of the boundaries that would require submittal of a Notice of Construction under Title 14 Code of Federal Regulations, Part 77. GWF Henrietta would include conversion to combined-cycle operation that would reduce vertical plume velocities during combined-cycle operation. In addition GWF Henrietta is located beyond the 3 mile radius within which potential thermal plume impacts are of a presumptive concern. Lemoore NAS was consulted during review of the HPP and expressed no significant concern regarding aviation safety at that time. Stack lighting was installed on the HPP at the request of the Navy and similar lighting would be installed on the new GWF Henrietta stacks. GWF Henrietta has operated in its current configuration for over five years with no incident or concern regarding aviation safety from Lemoore NAS.

GWF will coordinate with Lemoore NAS regarding proposed stack lighting for GWF Henrietta. Based on the foregoing, GWF Henrietta will not cause significant impacts to aviation safety.

3.11.3 Cumulative Impacts

According to the Kings County Planning Department, there are no conflicting proposed or foreseeable developments planned within one mile of the project site. Additionally, there are no sensitive receptors, such as residential uses and schools, within one mile of the project site. Implementation of GWF Henrietta will not result in any individually significant impacts and the project will comply with applicable COCs and LORS. Therefore, GWF Henrietta will not contribute to any cumulative traffic and transportation impacts.

3.11.4 Mitigation Measures

3.11.4.1 Construction Impacts

Construction-related traffic associated with the project is considered to be minimal because the trips generated during this phase will not adversely affect the LOS of surrounding roadway segments. Since no LOS will fall below C, the degradation in LOS that occurs with the addition of temporary construction related project traffic is less than significant. No changes to previously identified construction-related traffic and transportation impacts would result from the approval of this Amendment. Therefore, mitigation measures beyond those stipulated in the HPP Final Decision, that remain applicable, are not necessary.

3.11.4.2 Operations Impacts

Operations and maintenance-related traffic changed from that described in the HPP AFC (GWF, 2001a) as GWF Henrietta will add 14 operations staff. However, no significant changes to previously identified operations-related traffic and transportation impacts would result from the approval of this Amendment. Therefore, mitigation measures beyond those stipulated in the HPP Final Decision, that remain applicable, are not necessary.

3.11.5 Consistency with Local, Ordinances, Regulations, and Standards (LORS)

A detailed list of applicable state and federal LORS is included in Attachment A. As previously discussed in Section 3.11.1 above, applicable regional transportation plans analyzed in the HPP AFC (Section 8.10.4) are unchanged but for minor revisions not applicable to GWF Henrietta. No material changes have occurred to state or Federal LORS since the HPP AFC. GWF Henrietta, as proposed, will cause no traffic or transportation impacts that would be inconsistent with federal, state, and local LORS.

3.11.6 Involved Agencies and Contacts

Updated contacts of involved agencies for GWF Henrietta are presented in Table 3.11-6.

TABLE 3.11-6
Updated Contacts of Involved Agencies

Agency	Contact	Telephone
Kings County Association of Governments	Seth Eberhard, Regional Planner	(559) 582-3211; ext. 2657

3.11.7 Conditions of Certification

It is not expected that GWF Henrietta will result in any new significant traffic and transportation impacts that would require additional COCs beyond those stipulated as part of the HPP Final Decision (CEC, 2002), that remain applicable. A discussion of proposed revisions to existing COCs, to reflect GWF Henrietta, is included in Section 4.0.

3.12 Visual Resources

GWF Henrietta, as described in Sections 1.0 and 2.0 of this Amendment, would not involve substantial changes to the visual resources analysis and conclusions from the HPP Final Decision (CEC, 2002), and supporting application, and Staff Assessment materials.

Pursuant to the Energy Commission's siting regulations contained in Title 20, California Code of Regulations, section 1769 *et seq*., this supplemental analysis for the HPP addresses all the requirements necessary to make a determination of the potential environmental impacts from GWF Henrietta on visual resources and whether such impacts would require new or revised COCs in order to reduce any impacts to a level of insignificance. The analysis is based on information from the administrative record for the HPP and hereby incorporated by reference for this Amendment.

This section discusses the potential visual impacts resulting from GWF Henrietta. The HPP Final Decision determined that, with implementation of the mitigation measures specified by the Visual Resources COCs, the HPP would not have significant impacts on visual resources. GWF Henrietta would expand the generating capacity of the existing HPP and alter the exterior appearance of the site, however, the modifications would be located within the existing HPP boundary, and impacts on visual resources would continue to be less than significant, as described below.

In addition, this analysis is conducted in accordance with CEC guidelines for preparing visual impact assessments using the methodology developed by the Federal Highway Administration (FHWA). The analysis also conforms to the documentation requirements of the California Environmental Quality Act (CEQA).

Section 3.12.1 updates the environmental baseline information so that current conditions at the HPP are accurately described. Section 3.12.2 discusses the environmental consequences associated with GWF Henrietta and the significance criteria used in this analysis. Section 3.12.3 describes mitigation measures necessary to offset any identified impacts. Section 3.12.4 reviews the consistency of GWF Henrietta with all applicable laws, ordinances and regulations (LORS), specifically any LORS that are new since the time of the HPP AFC. Section 3.12.5 describes any necessary revisions to the COCs from the HPP Final Decision (CEC, 2002).

3.12.1 Environmental Baseline Information

3.12.1.1 Project Site

The project site is located in the south-central portion of the greater San Joaquin Valley in California, along the western edge of Kings County, approximately eight miles southwest of the City of Lemoore. As described in the HPP AFC (GWF, 2001a), the Lemoore region of the valley is an expansive flatland with a strong rural and agricultural character. The population density in the vicinity of the project site is extremely low, with no residences within one mile of the site. Residences in the surrounding area consist mainly of scattered ranch-style homes on parcels ranging up to several hundred acres and the residential subdivisions associated with Lemoore NAS, to the north of the project site.

The existing HPP is located on 25th Avenue, approximately one mile south of the entrance to NAS Lemoore and State Route (SR) 198. The HPP occupies a seven-acre portion of a 20-acre parcel owned by GWF Energy LLC. The PG&E Henrietta Substation borders the HPP to the north, and a closed commercial warehouse is located approximately 0.7 miles south of the site, on the east side of 25th Avenue. A sewage treatment plant percolation-evaporation pond area, occupying approximately 275 acres and operated by the NAS, is approximately 0.5 miles east of the site. The remainder of the surrounding area is in agricultural use, consistent with the description in the HPP AFC (GWF, 2001a).

The existing HPP site does not contain any features that would be considered to be scenic resources. It is industrial in character due to the presence of the existing HPP, which consists of a number of buildings and other structures, including two 85-foot tall exhaust stacks which are the facility's most visible feature. The site is surrounded by a perimeter fence, which is lined with trees and shrubs, as required by COC VIS-5 from the HPP Final Decision (CEC, 2002). The area surrounding the project site is characterized visually by the agricultural use. Land dedicated to the production of field and row crops surrounds the project site. With the exception of the substation and warehouse mentioned above, the land within one mile of the project site appears flat and devoid of any substantial structures. Berms associated with the percolation-evaporation pond area appear as the only elevated portions of the landscape within the vicinity of the project site. Existing 70-kV, 115-kV and 230-kV transmission lines in the vicinity of the site, including those tying in to the PG&E substation, make up the linear elements of the area surrounding the project site. There are no state or locally designated scenic routes in the project vicinity.

GWF Henrietta would expand the HPP site by 2.86 acres, increasing to approximately 10 acres the amount of permanently disturbed area within the GWF owned 20-acre parcel. There will also be temporary disturbance of approximately 4.5 acres for construction laydown and parking on a previously disturbed portion of the larger GWF parcel, outside of the existing HPP fence line. This area was previously used for construction laydown and parking during the construction of HPP and would be surrounded with temporary construction fencing for security purposes.

Current conditions at the HPP are shown in Figures 3.12-2A, 3.12-3A, 3.12-4A, and 3.12-5A. The views depicted in these figures are discussed in greater detail in the following section.

3.12.1.2 Views toward the Project

The analysis of GWF Henrietta's effects on visual resources relies on the approach developed by the FHWA (FHWA, 1988). In order to characterize the scenic quality of a viewscape and the viewer response to visual resources, the view areas that would be the most sensitive to GWF Henrietta's potential visual impacts and the sensitive receptors in those areas were identified.[1] Representative viewpoints from these sensitive receptor locations are referred to as Key Observation Points (KOPs). The four KOPs chosen for this analysis were selected in coordination with CEC staff and were based, in part, on KOPs used in the HPP AFC (see HPP AFC figures 8.11-1 through 8.11-11).

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[1] Typically, residents and recreationists are considered to be the most sensitive receptors to changes in the landscape. This is because of the potential for effects to their long-term views or their enjoyment of a particular landscape or activity.

The selected KOPs represent the best viewing conditions from major areas of viewer sensitivity: from 25th Avenue, south of the existing HPP (KOP-1); from SR 198, north of the existing HPP and west of the intersection with 25th Avenue (KOP-2); from SR 198, northeast of the existing HPP and east of the entrance to NAS Lemoore (KOP-3); and from Avenal Cutoff Road, east of the existing HPP (KOP-4). The visual analysis in the HPP AFC included five KOPs: four along SR 198 and one on 25th Avenue, south of the project site. In this analysis, KOP-1 is from a location on 25th Avenue, south of the project site. Only two KOPs from locations along SR 198 are included (KOP-2 and KOP-3) because GWF Henrietta would entail modifications to the existing HPP, and it was agreed in coordination with CEC that two KOPs from the highway would adequately demonstrate the changes proposed by the project. Finally, KOP-4 in this analysis represents views of the site from the primary transportation route located to the east.

The locations of the KOPs are indicated on Figure 3.12-1. Views of existing conditions from these KOPs, along with photo simulated views including GWF Henrietta, are presented in Figures 3.12-2 through 3.12-5. Based on field work conducted in March 2008, CH2M HILL staff documented and evaluated the existing visual conditions of the views from each of the KOPs.

3.12.1.3 Visual Quality Ratings

Assessments of existing levels of scenic quality were made based on professional judgment and consultation with CEC Staff. A broad spectrum of factors was taken into consideration, including:

- Natural features, including topography and natural vegetation
- The positive and negative effects of cultural alterations and built structures on visual quality
- Visual composition, including an assessment of the vividness, intactness, and unity of patterns in the landscape[2]

The visibility and visual dominance of landscape elements are described with respect to their placement within the field of view. Foreground elements are features nearest to the viewer, and background elements are features at a great distance from the viewer. The middle-ground portion of a view is intermediate between the foreground and the background. A view shed is defined as all the surface area visible from a particular location or a sequence of locations (e.g., roadway or trail) (US DOT FHWA, 1983).

Scenic quality ratings were assigned to each view based on the rating scale summarized in Table 3.12-1. This scale builds on a scale developed for use with an artificial intelligence system for evaluation of landscape visual quality (Buhyoff et al., 1994), and incorporates landscape assessment concepts applied by the U.S. Forest Service (1995) and the U.S. Department of Transportation (1988).

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[2] These three variables provide the basis for landscape assessments prepared using the FHWA visual impact assessment method. Vividness is the memorability of the visual impression received from contrasting landscape elements as they combine to form a striking and distinctive visual pattern. Intactness is the integrity of visual order in the natural and man-built landscape, and the extent to which the landscape is free from visual encroachment. Unity is the degree to which the visual resources of the landscape join together to form a coherent, harmonious visual pattern. Unity refers to the compositional harmony of intercompatibility between landscape elements (US DOT FHWA, 1988).

TABLE 3.12-1
Landscape Scenic Quality Scale

Rating	Explanation
Outstanding Visual Quality	A rating reserved for landscapes with exceptionally high visual quality. These landscapes are significant nationally or regionally. They usually contain exceptional natural or cultural features that contribute to this rating. They are what we think of as "picture post card" landscapes. People are attracted to these landscapes to view them.
High Visual Quality	Landscapes that have high quality scenic value. This may be due to cultural or natural features contained in the landscape or to the arrangement of spaces contained in the landscape that causes the landscape to be visually interesting or a particularly comfortable place for people. These landscapes have high levels of vividness, unity, and intactness.
Moderately High Visual Quality	Landscapes that have above average scenic value but are not of high scenic value. The scenic value of these landscapes may be due to man-made or natural features contained within the landscape, to the arrangement of spaces in the landscape or to the two-dimensional attributes of the landscape. Levels of vividness, unity, and intactness are moderate to high.
Moderate Visual Quality	Landscapes, that are common or typical landscapes that have, average scenic value. They usually lack significant cultural or natural features. Their scenic value is primarily a result of the arrangement of spaces contained in the landscape and the two-dimensional visual attributes of the landscape. Levels of vividness, unity, and intactness are average.
Moderately Low Visual Quality	Landscapes that have below average scenic value but not low scenic value. They may contain visually discordant man-made alterations, but these features do not dominate the landscape. They often lack spaces that people will perceive as inviting and provide little interest in terms of two-dimensional visual attributes of the landscape.
Low Visual Quality	Landscapes that have below average scenic value. They may contain visually discordant man-made alterations, and often provide little interest in terms of two-dimensional visual attributes of the landscape. Levels of vividness, unity, and intactness are below average.

Aesthetic sensitivity is described in terms of viewer activity, awareness, and visual expectations in relation to the number of viewers and viewing duration. Drivers (including commuters and non-recreational travelers) generally have fleeting views and are assumed to focus their attention away from surrounding scenery and onto traffic. As a viewer group, drivers therefore are generally considered to have low aesthetic sensitivity. Residential viewers typically have extended viewing periods and are generally assumed to be concerned about changes in views from their homes. As a viewer group, residential viewers are considered aesthetically sensitive.

3.12.1.3.1 View from KOP-1

Figure 3.12-2A shows the current view from KOP-1, located approximately two-thirds of a mile south of the existing HPP on 25th Avenue. This viewpoint was selected to represent views from the south of the project site, and in order to approximate one of the viewpoints analyzed in the HPP AFC.

The existing view from this location is representative of the character in the project area. Agricultural uses occupy the majority of the land visible from this viewpoint, but the dominant features are related to energy production and transmission; the most prominent features are the 115-kV transmission poles running along the western side of 25th Avenue (on the left side of the road in this view), the 70-kV transmission poles on the eastern side of 25th Avenue, the existing HPP stacks and, across the horizon, the 230-kV lattice-steel transmission towers.

Applying the scale in Table 3.12-1, the view from KOP-1 is rated as having a low visual quality. In the view, agricultural, industrial and energy facilities occupy the entire landscape, and while the agricultural crops in the foreground add a degree of vividness to the view, the scale of the transmission poles makes them the dominant feature. The roadway and adjacent transmission rights-of-way provide a strong linear element to the view, but because they appear to divide the otherwise flat, agricultural landscape in the foreground – in addition to contrasting with the HPP and other transmission structures in the middle-ground – intactness and unity in the view are low.

This view is seen mainly by motorists traveling northbound on 25th Avenue toward NAS Lemoore. Therefore, the aesthetic sensitivities of viewers in the area of KOP-1 will be low.

3.12.1.3.2 View from KOP-2

Figure 3.12-3A shows the current view from KOP-2, located approximately one mile north of the project site. This viewpoint was selected to demonstrate GWF Henrietta's visibility from SR 198, and to approximate views from the vicinity analyzed in the HPP AFC. KOP-2 is located along the shoulder of the eastbound lane of SR 198, just west of the intersection with 25th Avenue.

The existing view from this location is characterized by the expansive agricultural lands in the fore- and middle-ground, and the industrial/transmission-related uses present in the background. The existing HPP is visible in the center of the view, and the PG&E Henrietta substation is visible to the northeast of the HPP (to the left in this view). The 70-kV and 115-kV transmission lines appear to recede into the horizon, alongside 25th Avenue (to the south), while the larger, 230-kV transmission line continues along the horizon (to the west).

Applying the scale in Table 3.12-1, the view from KOP-2 is rated as having a moderately low visual quality. The agricultural land that occupies the entire fore- and middle-ground provides a degree of vividness that would likely be enhanced during times of the year when crops have been planted and are mature or reaching maturity. However, the presence of large swaths of crops is typical for this region. The industrial and transmission-oriented structures contrast visually with the cropland but because they are removed from the fore- and middle-ground in this view, the result is a moderately low to moderate level of both unity and intactness.

This view is seen mainly by motorists who are traveling through the area (Lemoore and Hanford are approximately 8 and 19 miles to the northeast, respectively) or are traveling to/from NAS Lemoore or the nearby residential subdivision. Therefore, the aesthetic sensitivities of viewers in the area will be low.

3.12.1.3.3 View from KOP-3

Figure 3.12-4A shows the current view from KOP-3, located approximately 1.5 miles northeast of GWF Henrietta. This viewpoint was selected to represent the proposed project's visibility from the residential area along SR 198, and to approximate views from the vicinity analyzed in the HPP AFC. KOP-3 is located along the shoulder of the westbound lane of SR 198, approximately 0.6 miles east of the entrance to NAS Lemoore.

The existing view from this location is characterized by the visible distinction between land forms and uses across the landscape. In the foreground, in the area beyond SR 198, field crops are the dominant feature. The middle-ground is characterized by industrial structures, including the existing HPP and PG&E Henrietta substation. In the background, mountains that are part of the coast range are visible, marking the western edge of the San Joaquin Valley. Transmission lines, and their associated towers and poles, extend across the horizon in the middle-ground, and also extend into the foreground in the eastern portion (left side) of the view. Due their proximity to the viewpoint, some of the taller transmission towers extend above the mountain skyline in the background.

Applying the scale in Table 3.12-1, the view from KOP-3 is rated as having a moderately low visual quality. The agricultural land and distant mountains provide a moderate level of vividness; however, the industrial and transmission structures bisect the view horizontally and encroach on the foreground and background. This results in a moderately low level of both intactness and unity.

As with KOP-2, the majority of the viewers from this KOP are motorists who are traveling through the area from nearby cities or are traveling toward NAS Lemoore or the nearby residential subdivision. However, because the view is also intended to represent views from the nearby residences, the aesthetic sensitivities of viewers from this location are considered to be high.

3.12.1.3.4 View from KOP-4

Figure 3.12-5A shows the current view from KOP-4, which is located approximately one mile east of GWF Henrietta. This viewpoint was selected to represent the proposed project's visibility from locations to the east. KOP-4 is located along the shoulder of the southwest-bound lane of Avenal Cutoff Road, approximately 3.5 miles northeast of the intersection of Avenal Cutoff Road and 25th Avenue.

The existing view from this location is characterized by a distinction between land form and uses, similar to the view from KOP-3. Land under agricultural production dominates the foreground, industrial-type structures dedicated to energy production and transmission occupy the entire horizon in the middle-ground, and mountains are visible in the background. However, in this view, the transmission lines and poles do not encroach on the cropland in the foreground, and encroach only somewhat on the view of the mountains in the background. As such, applying the scale presented in Table 3.12-1, this view is rated as having a moderate visual quality. The moderate vividness present in the foreground remains uncompromised by the industrial structures in the middle-ground of the view. This results from the moderate level of intactness within each segment of the view. However, the disparate uses clearly visible from this location result in a moderately low level of unity.

Viewers of GWF Henrietta from this viewpoint will be motorists traveling the roadway that provides a more direct connection between Lemoore and a point on Interstate 5 (I-5) further south than the point where SR 198 intersects with I-5 (to the west of the project area). Therefore, the aesthetic sensitivities of viewers in the area will be low.

3.12.2 Environmental Consequences

3.12.2.1 Analysis Procedure

This assessment of GWF Henrietta's potential effects on visual resources was conducted by applying the systematic method for evaluating the potential aesthetic effects of proposed power plant projects that has been adopted by CEC staff. Attachment E provides a more complete description of the visual resources evaluation process.

As an initial step in the evaluation process, planning documents applicable to the project area (including documents related to previous applications for the project site) were reviewed to gain insight as to the type of land uses intended for the area, and the guidelines given for the protection or preservation of visual resources. Consideration was given to the existing visual setting within the project view shed, which is defined as the geographical area in which the project can be seen. An assessment was then made of the visual changes that the project would cause to determine impact significance, in terms of the four CEQA Guidelines checklist questions listed below.

Potential project impacts were evaluated using an approach that focused on views from representative KOPs. Site reconnaissance was conducted by CH2M HILL staff to view the site and surrounding area, to identify potential KOPs, and to take representative photographs of existing visual conditions. A single-lens reflex 35 mm camera with a 50 mm lens (view angle 40 degrees) was used to shoot site photographs. CEC staff participated in the selection of final KOPs.

Photographs are presented to depict the "before" conditions from each KOP. Visual simulations were produced to illustrate the "after" visual conditions from the KOPs to provide the viewer with a clear image of the location, scale, and visual appearance of the proposed project. These simulation images represent the project's appearance in the period immediately after completion of construction. The computer generated simulations are the result of an objective analytical and computer modeling process described briefly below. The images are accurate within the constraints of the available site and project data.

Computer modeling and rendering techniques were used to produce the simulated images of the views of the site as they would appear after development of the project. Existing topographic and site data provided the basis for developing an initial digital model. The project engineers provided site plans and digital data for the proposed project, GWF Henrietta. These were used to create three-dimensional (3-D) digital models of the new facilities. These models were combined with the digital site model to produce a complete computer model of the proposed facility additions.

For each viewpoint, viewer location was digitized from topographic maps and scaled aerial photos, using 5 feet as the assumed eye level. Computer "wire frame" perspective plots were then overlaid on the photographs of the views from the KOPs to verify scale and viewpoint location. Digital visual simulation images were produced as a next step, based on computer renderings of the 3-D model combined with high-resolution digital versions of base photographs. The final "hardcopy" visual simulation images that appear in this document were produced from the digital image files using a color printer.

Once all potential impacts were examined, a determination was made as to whether any impacts would reach a level that would be considered significant under CEQA's standards, and thus require mitigation beyond that proposed as a part of the initial project design. Under CEQA, any required mitigation must be specific to an identified impact, and must be feasible.

3.12.2.2 Impact Evaluation Criteria

The following criteria from the CEQA Guidelines were considered in determining whether a visual impact would be significant.

The CEQA Guidelines define a "significant effect" on the environment to mean a "substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including… objects of historic or aesthetic significance" (CCR tit. 14, § 15382).

Appendix G of the CEQA Guidelines, under Aesthetics, lists the following four questions to be addressed regarding whether the potential impacts of a project are significant:

1. Would the project have a substantial adverse effect on a scenic vista?
2. Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State Scenic Highway?
3. Would the project substantially degrade the existing visual character or quality of the site and its surroundings?
4. Would the project create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?

3.12.2.3 Project Appearance

GWF Henrietta is described in detail in Chapter 2.0, Project Description. Figure 2-1 shows the general arrangement and layout and project features and Figure 2-2 provides typical elevation views. Table 3.12-2 summarizes the dimensions, finishes, and materials of the facility's major features. The most prominent features will be the two, 67-foot tall Once Thru Steam Generators (OTSGs), the two 92-foot tall OTSG stacks, and the Air Cooled Condenser (ACC), which will be 74 feet in height and will occupy an area measuring 120 feet in length and 84 feet in width. By comparison, the largest structures currently part of the HPP are the two 85-foot tall stacks, the 55-foot tall air pollution control system structure, and the 45-foot tall combustion turbine inlet air structure.

The exteriors of all major project equipment will be treated with a neutral gray or beige finish intended to optimize its visual integration with the surrounding environment. The project will continue to be surrounded by the existing chain-link security fence with slats, and access will be provided via the existing site entrance. GWF Henrietta will occupy approximately 10 acres of the fenced site within the existing GWF owned 20-acre parcel.

TABLE 3.12-2
Approximate Dimensions and Colors, Materials, and Finishes of the Major Project Features

Feature	Height (feet)	Length (feet)	Width (feet)	Diameter (feet)	Color	Materials	Finish
Once Thru Steam Generators (OTSGs)	67	55	13	—	Gray	Metal	Flat/Untextured
OTSG Stacks	92	9	13	—	Gray	Metal	Flat/Untextured
Steam Turbine Generator: Area Structure	13	75	50	—	Gray	Concrete	Flat/Untextured
Steam Turbine Generator: T/G Enclosure	26	40	15	—	Beige	Metal	Flat/Untextured
Air Cooled Condenser	74	120	84	—	Beige	Metal	Flat/Untextured
Pipe Rack	25	360	8	—	Gray	Metal	Flat/Untextured
Water Treatment Structure	20	75	50	—	Beige	Metal	Flat/Untextured
S.T. Lube Oil Skid	18	26	14	—	Gray	Metal	Flat/Untextured
S.T. Lube Oil Cooler	10	18	8	—	Gray	Metal	Flat/Untextured
Fire Water Tank	32	-	-	35	Beige	Metal	Flat/Untextured
Aux. Boiler	10	20	10	—	Beige	Metal	Flat/Untextured
Aux. Boiler Stack	30			4	Beige	Metal	Flat/Untextured

3.12.2.3.1 Light and Glare

The project's effects on visual conditions during hours of darkness will be limited. Night lighting is already visible in the view shed as a result of the existing HPP. COC VIS-3 in HPP Final Decision required that lighting for the project was to be installed so that light bulbs and reflectors would not be visible from public viewing areas and illumination of the vicinity and nighttime sky would be minimized. Due to its small increase in total area, some additional night lighting will be required by GWF Henrietta for operational safety and security. There will be additional visible lighting associated with the project stacks, and open site areas. High illumination areas not occupied on a regular basis will be provided with switches or motion detectors to light these areas only when occupied. In order to maintain consistency with existing HPP COC VIS-3, at times when lights are turned on, the lighting would not be highly visible offsite and would not produce offsite glare effects. The offsite visibility and potential glare of the lighting would be restricted by specification of non-glare fixtures and placement of lights to direct illumination into only those areas where it is needed. With construction of GWF Henrietta, the overall change from existing lighting conditions at the project site, as viewed from nearby locations and vantage points, would not be substantial.

Lighting that may be required to facilitate nighttime construction activities would, to the extent feasible and consistent with worker safety codes, be directed toward the center of the construction site and shielded to prevent light from straying offsite. Task-specific construction lighting would be used to the extent practical while complying with worker safety regulations. Given that construction impacts will be temporary, impacts from construction light and glare will be less than significant.

3.12.2.3.2 Plumes

Experience at natural gas-fired, combined-cycle power plants similar to the combined-cycle units for GWF Henrietta has demonstrated that the high velocity and temperature of the OTSG stack exhaust results in a quick dispersion of stack plumes. This same combination of high velocity and temperature minimize the probability that a visible water vapor plume will be created above the stacks. Based on previous experience with combined-cycle power plants, it is further likely that any formation of visible plumes from the two GWF Henrietta OTSG exhaust stacks will be rare occurrences, and that, if present, they will be relatively small. The visual presence of water vapor plumes is related to a combination of cold and damp conditions that cause the water vapor to temporarily condense. Therefore, if they occur at all, plumes will tend to occur during conditions when visibility is already reduced (i.e., during conditions of rain, fog, or high humidity and cold temperatures). If fog is present, plumes may or may not be discernible in the fog.

As the auxiliary boilers will be operated infrequently, the frequency and magnitude of visible exhaust stack plumes are not expected to be significant. In addition, because GWF Henrietta's cooling system would be a dry cooling system and would not emit water into the atmosphere, the ACC is not expected to produce any water vapor plumes.[3]

Given the rarity of plume formation related to the exhaust stacks and the plant's expected operational regime, it is very unlikely that visible water vapor plumes of any size would be present. Therefore, any plume-related visual impacts would be less than significant.

3.12.2.4 Assessment of Visual Effects

3.12.2.4.1 KOP-1 – View from 25th Avenue, south of project site

Figure 3.12-2A presents a photograph of the existing view toward the project site from 25th Avenue, south of the project site, and Figure 3.12-2B presents a simulation of the view as it would appear upon completion of GWF Henrietta. Comparison of the two images indicates that the OTSG stacks associated with GWF Henrietta would appear in the view as similar in size, scale and location to the current HPP stacks. The new ACC would appear to approximately double in size the horizontal space occupied by the HPP from this viewpoint, and it would add to the visible mass of the facility. A number of other structures, notably the new fire water storage tank, would be visible beyond the facility's perimeter fence. However, all of the new project features would appear as being located within the existing industrial-appearing area, which includes the HPP and the PG&E Henrietta substation. GWF Henrietta would appear to fit well within this industrial-appearing envelope in the view from KOP-1.

The overall presence of industrial-appearing uses in the landscape – already prominent in the existing view – would be marginally increased with GWF Henrietta. The vividness in the view would remain unchanged, as GWF Henrietta would not extend into any agricultural land. The prominence of the ACC would strengthen the visible intactness of the industrial

[3] CEC Siting Regulations (CEC, 2007; Appendix B(g)(6)(E)) require the provision of cooling tower and HRSG exhaust design parameters that affect visible plume formation, including a range of ambient conditions (temperature and relative humidity), and proposed operating scenarios. This information is included in Section 3.1 and Attachment C (Air Quality).

portion of the view, but would not detract from the presence of strong linear elements (the road and the transmission lines). These divergent patterns would result in the view's overall visual unity remaining low. The site's existing character, as seen from this viewpoint, would not be substantially altered by GWF Henrietta, and, applying the scale presented in Table 3.12-1, and the visual quality of the view would remain low.

3.12.2.4.2 KOP-2 – View from SR 198, north of project site

Figure 3.12-3A presents a photo of the existing view toward the project site from SR 198, north of the site, and Figure 3.12-3B presents a simulation of the view as it would appear upon completion of GWF Henrietta. Comparison of the two images indicates that GWF Henrietta would be noticeable in the view, but would not be substantially prominent relative to other existing structures. The ACC would horizontally extend the space occupied by GWF facilities. The additional structures in the center of the view from KOP-2 would not be out of scale with other existing industrial structures visible nearby, including the transmission towers associated with the PG&E Henrietta substation.

Because GWF Henrietta would not encroach on the open land in the fore- and middle-ground, the vividness in the view would remain moderate. The intactness and unity of the existing view would remain unchanged, since the new structures associated with GWF Henrietta would appear entirely within the existing industrial and transmission-oriented envelope, which would remain in contrast with the surrounding agricultural land. The site's existing character, as seen from this viewpoint, would not be substantially altered by GWF Henrietta. Applying the scale presented in Table 3.12-1, the view from KOP-2 would retain the moderately low visual quality of the existing view.

3.12.2.4.3 KOP-3 – View from SR 198, northeast of project site

Figure 3.12-4A presents a photo of the existing view toward the project site from SR 198, northeast of the project site, and Figure 3.12-4B presents a simulation of the view as it would appear upon completion of GWF Henrietta. Comparison of the two images indicates that GWF Henrietta would be noticeable in the view. It would increase the existing prominence of the HPP by extending the horizontal space occupied by large, industrial-appearing structures. Specifically, the ACC would appear to the left of the power plant/transmission cluster formed by the existing HPP and the PG&E Henrietta substation, resulting in a structure appearing where no other structures, aside from transmission towers, exist. The ACC would obstruct a small portion of the distant mountains that is currently blocked only by the transmission towers; however, the ACC would not appear above the mountains, preserving an unobstructed view of the mountain skyline.

The moderate level of vividness in the existing view would thus remain moderate in the view with GWF Henrietta. Similarly, the low level of both intactness and unity in the existing view would remain with GWF Henrietta, as the collection of industrial-appearing and transmission-oriented structures visible in the center of the view would remain in place, would appear somewhat more prominent with the presence of the ACC, and would continue to encroach on both the foreground and background. GWF Henrietta would not substantially alter the site's existing character as seen from this viewpoint. Applying the scale presented in Table 3.12-1, the existing moderately low visual quality would remain unchanged.

3.12.2.4.4 KOP-4 – View from Avenal Cutoff Road

Figure 3.12-5A presents a photo of the existing view toward the project site from Avenal Cutoff Road, east of the project site, and Figure 3.12-5B presents a simulation of the view as it would appear upon completion of GWF Henrietta.

Comparison of the two images indicates that GWF Henrietta would be noticeable in the view. It would increase the existing prominence of the HPP by extending the horizontal space occupied by large industrial-appearing structures. The ACC would appear to the left of the OTSG stacks, but well within the power plant/transmission envelope formed by the HPP and the PG&E Henrietta substation. Existing HPP structures would be either partially or fully blocked from view by the ACC from this KOP.

The moderate level of vividness in the existing view, resulting mostly from the cropland in the foreground, would remain moderate with GWF Henrietta. The moderate level of intactness within each segment of the view would be reinforced by the appearance of additional structures within the horizontal view in the middle-ground, and this would result in the view maintaining its overall low level of unity. As such, applying the scale presented in Table 3.12-1, the existing moderate level of visual quality would remain unchanged, and GWF Henrietta would not substantially alter the site’s existing character as seen from this viewpoint.

3.12.2.5 Impact Significance

The assessment of whether the visual effects of the project would be significant pursuant to CEQA applies the criteria set forth in Appendix G of the CEQA Guidelines. The CEQA Guidelines define a “significant effect” on the environment to mean a “substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project, including objects of historic or aesthetic significance” (14 CCR 15382). The four questions related to aesthetics that are posed for lead agencies and the answers to them are:

Would the project have a substantial adverse effect on a scenic vista?

No. There are no vista points or other important scenic viewpoints in the project vicinity. Further, as described in the analysis of views from the KOPs, the existing low to moderate level of visual quality in each view would not be substantially altered by the proposed project; there would be no net change in visual quality rating related to the addition of GWF Henrietta to the views. As a result, the project would not have a substantial adverse effect on a scenic vista or important scenic viewpoint.

Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

No. There are no state scenic highways within the vicinity of GWF Henrietta. Thus, there will be no project-related changes that will occur within a state scenic highway viewing area. No impacts to scenic resources within a scenic highway area would result from the project.

Would the project substantially degrade the existing visual character or quality of the site and its surroundings?

No. The site itself is a flat parcel in an area devoted to agricultural uses and energy production and transmission; it includes the existing HPP and does not contain any resources of scenic significance that would be affected by the proposed project. As stated above, the HPP Final Decision (CEC, 2002) determined that, with implementation of the mitigation measures specified in the COCs, the HPP would not have significant impacts on visual resources.

The project would be noticeably visible in views from KOPs -1, -2, -3, and -4. In each view, however, GWF Henrietta would be visually absorbed into the existing industrial-appearing setting within which it is located. The presence of the project would not alter the visual character of the views from the closest viewpoint along 25th Avenue (KOP-1), from the viewpoint approximating a residential view (KOP-3), or from unobstructed viewpoints along local roadways (KOPs -2 and -4). The visible envelope occupied by the facility would increase, but it would remain similar in scale to the existing HPP structures and nearby transmission facilities. As discussed previously, any plume-related visual impacts would be less than significant. The entire existing landscape in fore- and middle-ground views is disturbed. While there are relatively few structures of any substantial size in the area, the entire landscape has been engineered, managed, or developed to fulfill agricultural or energy-related purposes. With the addition of GWF Henrietta, the degree of change in the visual character of views from the surrounding area would be relatively low. Overall, GWF Henrietta would have a limited effect on the visual quality of the views from these areas. There would be no net change in visual quality rating from any of the KOPs. Changes in the appearance of the facility would be noticeable, but not substantial, and thus would not be significant.

Would the project create a new source of substantial light and glare that would adversely affect day or nighttime views in the area?

No. As described in the section on light and glare above, and as required by COC VIS-3 from the HPP Final Decision (CEC, 2002), all new project light fixtures will be restricted to areas required for safety, security, and operations. Lighting will be directed onsite; it will be shielded from public view, and non-glare fixtures and use of switches, sensors, and timers to minimize the time that lights not needed for safety and security are on will be specified. These measures will substantially reduce the offsite visibility of project lighting.

Because the existing HPP has nighttime illumination, the lighting associated with GWF Henrietta is not likely to create a substantial change in nighttime lighting at the site compared to the existing baseline. Given the limited level of lighting proposed for the project, the measures that will be taken to minimize offsite effects, and the minimal level of change from existing conditions, GWF Henrietta's night lighting impacts will be less than significant.

All GWF Henrietta structures will be treated with non-reflective finishes. Because none of the major project features will have surfaces that are highly reflective, the project will not be a source of daytime glare. As a result, daytime glare impacts will be less than significant.

Any lighting that will be installed to facilitate nighttime construction activities will, to the extent feasible and consistent with worker safety codes, be directed toward the center of the construction site and shielded to prevent direct lighting from extending outside the boundaries of the facility, as required by COC VIS-3 from the HPP Final Decision (CEC, 2002). Task specific construction lighting will be used to the extent practical while complying with worker safety regulations. Because of these impact attenuation measures, and because the duration of these effects will be limited, the construction lighting will not create a significant impact.

According to the Kings County Planning Department, there are no conflicting proposed or foreseeable developments planned within one mile of the project site. Implementation of GWF Henrietta will not result in any individually significant impacts and the project will comply with applicable COCs and LORS. Therefore, GWF Henrietta will not contribute to any cumulative visual impacts.

3.12.3 Mitigation Measures

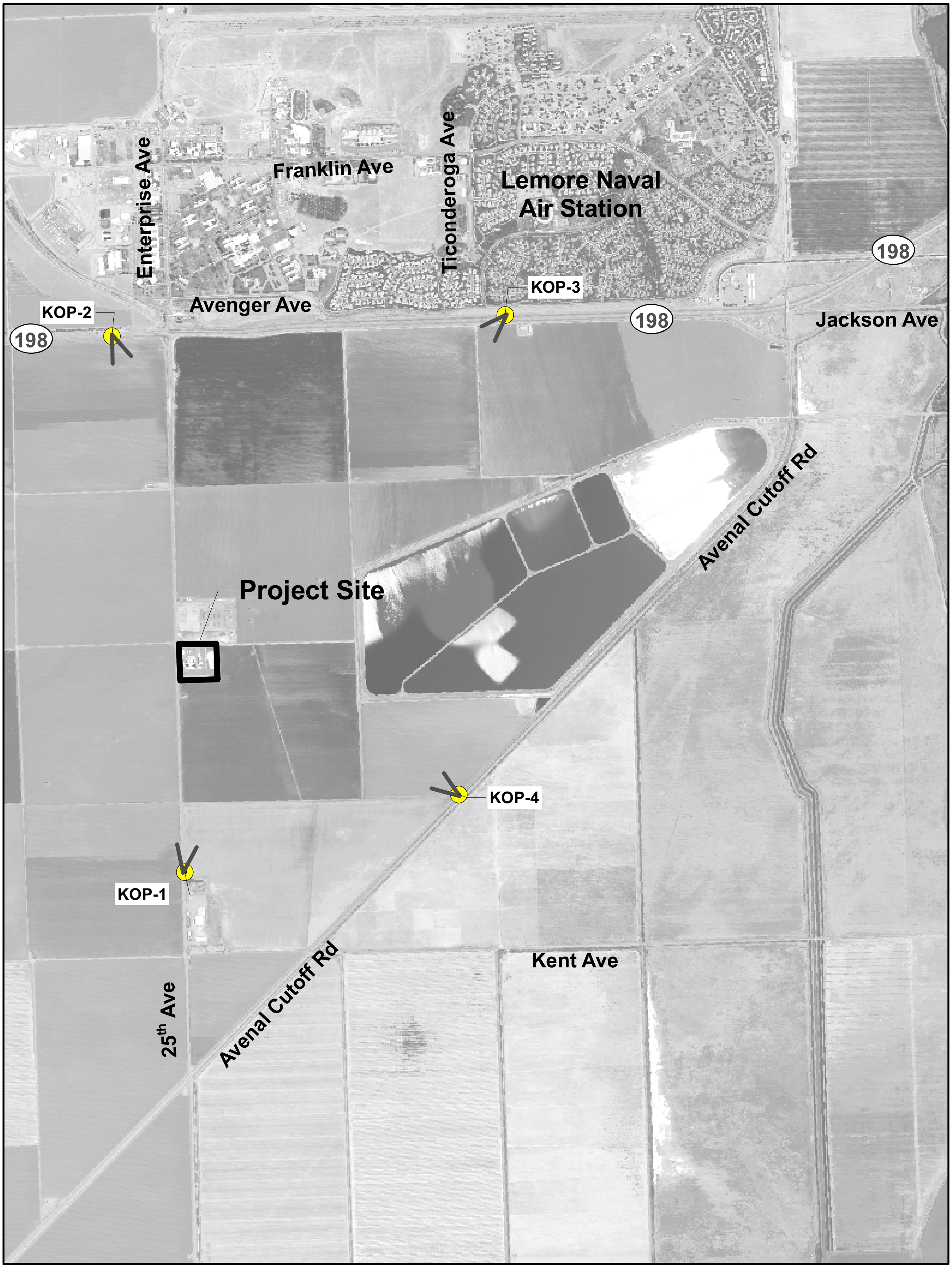
No significant impacts to visual resources will result from the approval of this Amendment. Therefore, mitigation measures beyond those stipulated in the original HPP Final Decision (CEC, 2002), that remain applicable, are not required.

3.12.4 Consistency with LORS

The HPP AFC reported that there were no applicable federal or state LORS concerning visual or aesthetic resources beyond the CEQA Guidelines. Also, the HPP AFC reported that Kings County does not have specific policies on visual or aesthetic resources. However, the HPP AFC also noted that scenic resources are addressed in the open space element of the Kings County General Plan, which is implemented by the Kings County Planning Department (County of Kings, 1996). This document analyzes GWF Henrietta’s potential to cause significant impacts to visual resources under CEQA. As stated in Section 3.6 Land Use, the General Plan policies, standards, and applicable LORS of Kings County detailed in the HPP AFC remain in effect for GWF Henrietta. Because no changes have been made to applicable LORS since the HPP AFC was completed and approved, and because there are no scenic highways in the vicinity of the project site, there continue to be no county LORS related to visual impacts that would be pertinent to this project. As a result, GWF Henrietta is consistent with all applicable LORS.

3.12.5 Conditions of Certification

GWF Henrietta will not result in any new visual resource impacts, therefore no additional COCs beyond those stipulated as part of the HPP Final Decision (CEC, 2002), that remain applicable, are needed. A discussion of proposed revisions to existing COCs, to reflect GWF Henrietta, is included in Section 4.0.



LEGEND

View Points

Project Area

0 0.25 0.5 Miles

N

FIGURE 3.12-1
KEY OBSERVATION POINTS

GWF HENRIETTA COMBINED-CYCLE POWER PLANT
KINGS COUNTY, CA

CH2MHILL

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A. View of project site from KOP-1, along 25th Avenue, south of the project site. The existing HPP is visible in the center of this view, alongside 25th Avenue. The PG&E Henrietta substation, which borders the HPP to the north, is visible to the right of the HPP in this view.

B. Simulated view from KOP-1 with GWF-Henrietta.

FIGURE 3.12-2
KEY OBSERVATION POINT 1
GWF HENRIETTA COMBINED-CYCLE POWER PLANT
KINGS COUNTY, CALIFORNIA

CH2MHILL

A. View of the project site from KOP-2, along the eastbound shoulder of SR 198, north of the project site. The existing HPP is visible in the center of this view. The PG&E Henrietta substation, which borders the HPP to the north, is visible to the left of the HPP in this view.

B. Simulated view from KOP-2 with GWF-Henrietta.

FIGURE 3.12-3
KEY OBSERVATION POINT 2
GWF HENRIETTA COMBINED-CYCLE POWER PLANT
KINGS COUNTY, CALIFORNIA

A.View of the project site from KOP-3, along the westbound shoulder of SR 198, northeast of the project site. The existing HPP is visible in the center of this view. The PG&E Henrietta substation, which borders the HPP to the north, is visible to the right of the HPP in this view.

B. Simulated view from KOP-3 with GWF-Henrietta.

FIGURE 3.12-4
KEY OBSERVATION POINT 3
GWF HENRIETTA COMBINED-CYCLE POWER PLANT
KINGS COUNTY, CALIFORNIA

A.View of the project site from KOP-4, along the southwest-bound shoulder of Avenal Cutoff Road, east of the project site. The PG&E Henrietta substation, which borders the HPP to the north, is visible to the right of the HPP in this view.

B. Simulated view from KOP-4 with GWF-Henrietta.

FIGURE 3.12-5
KEY OBSERVATION POINT 4
GWF HENRIETTA COMBINED-CYCLE POWER PLANT
KINGS COUNTY, CALIFORNIA

CH2MHILL

3.13 Waste Management

GWF Henrietta, as described in Sections 1.0 and 2.0 of this Amendment, would not involve substantial changes to the waste management analysis and conclusions from the HPP Final Decision (CEC, 2002), and supporting application, and Staff Assessment materials.

Pursuant to the Energy Commission's siting regulations contained in Title 20, California Code of Regulations, section 1769 *et seq.*, this supplemental analysis for the HPP addresses all the requirements necessary to make a determination of the potential environmental impacts from GWF Henrietta waste management and whether such impacts would require new or revised COCs in order to reduce any impacts to a level of insignificance. The analysis is based on information from the administrative record for the HPP and hereby incorporated by reference for this Amendment.

3.13.1 Environmental Information

3.13.1.1 Project Waste Generation

Waste will be generated at GWF Henrietta during both facility construction and operation. Types of waste will include wastewater, solid nonhazardous waste, and liquid and solid hazardous waste. Only small volumes of hazardous wastes will be generated and, when handled properly, neither nonhazardous nor hazardous wastes will significantly impact the environment or human health.

3.13.1.1.1 Construction Phase

During construction, the primary waste generated at GWF Henrietta will be solid nonhazardous waste. As detailed in Section 8.13.2.1 of the HPP AFC (01-AFC-18), solid non-hazardous waste generated will primarily include paper, wood, glass, plastics, excess concrete, scrap metal, calcium silicate insulation, mineral wool insulation, empty nonhazardous material containers, steel cuttings, packing metal, and electrical wiring waste. Recycling of wastes will be maximized to include materials such as scrap metal, copper wire, empty containers, paper and cardboard, and absorbent materials. Estimates for the amount of non-hazardous waste likely to be produced during the construction of this project are presented in Table 3.13-1.

TABLE 3.13-1
GWF Henrietta- Non-hazardous Wastes Generated during the Construction Phase

Non-hazardous Waste	Origin	Composition	Estimated Quantity	Disposal
Scrap wood, glass, plastic, paper, calcium silicate insulation, and mineral wool insulation	Construction	Normal refuse	5,600 lbs/mo (dumpster)	Recycle and/or dispose of in a Class II or III landfill
Scrap Metals	Demolition	Demolition of SCR/CO catalysts and stacks	500 tons during construction	Recycle and/or dispose of in a Class III landfill
Concrete	Construction	Concrete	40 tons during construction	Recycle and/or dispose of in a Class III landfill
Empty containers NOT previously containing a hazardous material or waste	Construction	Drums, containers, totes	35 containers	Containers will be drained before disposing as normal refuse or returned to vendors for recycling, reused on site, or recycled offsite
Empty containers previously containing a hazardous material or waste	Construction	Drums, containers, totes	35 containers	Containers that are 5 gallons or less will be drained before disposing as normal refuse. Containers >5 gallons will be returned to the vendor for recycling, kept on site for reuse, or recycled offsite
Drained, Used Oil Filters	Construction equipment and vehicles	Solids	70 lbs/mo	Recycle at an approved metal reclamation facility
Sanitary waste	Portable toilet holding tanks	Sewage	375 gal/day	Remove by contracted sanitary service

Hazardous waste produced during construction will not differ greatly that described in the HPP AFC. Additional types of hazardous waste generated during construction of GWF Henrietta includes: spent welding materials, STG cleaning waste, other chemical cleaning waste, and potentially contaminated hydrotest water. In the event contaminated soil is encountered during construction, a soil management work plan will be prepared prior to removing and disposing of the contaminated soil. Estimates for the type and amount of hazardous wastes generated during construction are listed in Table 3.13-2. The majority of these wastes will be recycled. Non-recyclable waste will be disposed of in accordance with applicable regulations.

TABLE 3.13-2
GWF Henrietta - Hazardous Wastes Generated during the Construction Phase

Hazardous Waste	Origin	Composition	Estimated Quantity	Disposal
Spent welding materials, i.e. welding rods	Construction	Solid	70 lbs/mo	Recycle for metal reclamation, dispose with normal refuse, or dispose at a permitted TSDF
SCR and CO catalysts	Demolition	Heavy Metals	100 tons during construction	Recycle via catalyst vendor or dispose at permitted TSDF
Used and waste lube oil	CT and ST lube oil flushes	Hydrocarbons	135 drums (life of project construction)	Recycle at a permitted TSDF
Oily rags, oil sorbent excluding lube oil flushes	Cleanup of small spills	Hydrocarbons	70 lb/mo	Recycle or dispose at a permitted TSDF
Solvents, paint, adhesives	Maintenance	Varies	120 lbs/mo	Recycle or dispose at a permitted TSDF
Spent lead acid batteries	Construction equipment, trucks.	Heavy metals	4 batteries per year	Recycle at an approved lead-acid battery recycling facility
Spent alkaline batteries	Equipment	Metals	8 batteries per month	Recycle at a Universal Waste Processing Facility
Steam turbine cleaning waste	Pre-boiler piping	Corrosive cleaning chemicals	135 gallons before plant start-up	Sample for waste characterization. Dispose of accordingly
Waste oil	Equipment, vehicles	Hydrocarbons	15 gal/mo	Recycle at certified oil recycler
Fluorescent, mercury vapor lamps	Lighting	Metals	65 lbs/yr	Recycle at a Universal Waste Processing Facility
Passivating and chemical cleaning fluid waste	Pipe cleaning and flushing	Varies	385,000 gal (life of project construction)	Perform waste characterization – if nonhazardous, dispose of in sanitary sewer; otherwise, manage for offsite waste disposal
Hydrotest water	Testing equipment and piping integrity	Water	195,000 gallons (life of project construction)	Perform waste characterization – if nonhazardous, dispose of in sanitary sewer; otherwise, manage for offsite waste disposal

3.13.1.1.2 Operation Phase

During operation of GWF Henrietta, the primary waste generated will be nonhazardous wastewater. Other types of nonhazardous wastes that will be generated during the operations and maintenance phase of GWF Henrietta, which are substantially similar to those listed in Section 8.13.2.2 of the HPP AFC (01-AFC-18) include sanitary wastewater, combustion turbine wash water, surface water runoff, evaporative cooler blowdown, solid maintenance wastes, and standard office wastes. Nonhazardous waste quantities are not expected to vary significantly between those described in the HPP AFC and this Amendment.

The types of hazardous waste that will be generated during the operations and maintenance phase of GWF Henrietta include selective catalytic reduction (SCR) catalyst, waste oils, and other maintenance wastes. In addition to those hazardous wastes listed in Section 8.13.2.2 of the HPP AFC, it is expected that GWF Henrietta will generate laboratory analysis waste, lubrication oil sorbents, oily rags, contaminated liquid waste from the chemical feed area drainage, propylene glycol solution, and combustion turbine cleaning fluid. The types and estimated amounts of hazardous waste generated are listed in Table 3.13-3. These waste amounts and types are comparable to waste amounts and types already determined to be insignificant by the CEC.

TABLE 3.13-3
GWF Henrietta - Hazardous Wastes Generated During Operation

Hazardous Waste	Origin	Composition	Estimated Quantity	Disposal
Lubricating oil sorbents	Small leaks and spills from the gas turbine lubricating oil system	Hydrocarbons	450 lb/yr	Dispose of oily debris at a permitted TSDF
Lubricating oil	Maintenance of turbine, equipment	Hydrocarbons	320 lb/yr	Recycled by certified oil recycler
Solvents, paint, adhesives	Maintenance	Varies	135 lbs/mo	Recycle or dispose at a permitted TSDF
Laboratory analysis waste	Water treatment	Waste reagents/ laboratory chemicals	35 gals/yr	Dispose at a permitted TSDF
SCR catalyst units	OTSG (Warranty is 3 years-use tends to be 3 to 5 years)	Metal and heavy metals, including vanadium	40 to 50 tons every 3 to 5 yrs	Recycled by SCR manufacturer or disposed at permitted TSDF
CO catalyst units	OTSG (Use tends to be 3 to 5 years)	Metal and heavy metals, including vanadium	4 to 5 tons every 3 to 5 yrs	Recycled by manufacturer or disposed at permitted TSDF
Spent lead acid batteries	Electrical room, equipment	Metals	4 batteries per year	Recycle at an approved lead-acid battery recycling facility
Spent alkaline batteries	Equipment	Metals	40 lbs/year	Recycle at a Universal Waste Processing Facility
Fluorescent tubes	Lighting of maintenance areas	Metals	40 lbs/year	Recycle at a Universal Waste Processing Facility
Oily rags	Maintenance, wipe down of equipment, etc.	Hydrocarbons, cloth	195 lb/yr (~600 rags/yr)	Recycle or dispose at a permitted TSDF
Chemical feed area drainage	Spillage, tank overflow, area washdown water	Water with water treatment chemicals	Minimal	Perform waste characterization – if nonhazardous, dispose of in sanitary sewer; otherwise, manage for offsite waste disposal

TABLE 3.13-3
GWF Henrietta - Hazardous Wastes Generated During Operation

Hazardous Waste	Origin	Composition	Estimated Quantity	Disposal
Propylene glycol solution	Antifreeze for turbine lube oil coolant system	Propylene glycol & water mixture	300 gallons every 5-10 years	Recycled by approved antifreeze recycler
Turbine Wash solution	Combustion turbine cleaning	Detergent, water (may add Isopropanol during cold seasons)	8,000 gal/yr	Perform waste characterization – if nonhazardous, dispose of in sanitary sewer; otherwise, manage for offsite waste disposal

3.13.1.2 Waste Disposal Sites

3.13.1.2.1 Nonhazardous Waste Disposal Facilities

All nonhazardous project waste will be transported by a local hauler to the Kings Waste & Recycling Authority materials recovery facility (MRF) where it will be sorted and recyclables removed. The remaining waste will then be transferred to the Chemical Waste Management Kettleman Hills B-19 landfill facility in Kettleman City. The B-19 landfill has a permitted capacity of 4.2 million cubic yards, and a remaining capacity of 272,000 cubic yards. Based on the current annual usage, the estimated closure date is June 2009 (Turek, 2008a). Waste Management, Inc. (Kettleman Hills operator) has already begun construction of a new non-hazardous disposal facility, landfill B-17. The new landfill will be operational by November 2008 and will have a capacity of 18.4 million cubic yards. As soon as B-17 is complete, all waste currently sent to B-19 will be routed to B-17, retaining some capacity in B-19. Landfill B-19 is a bioreactor and will break down previously land-filled waste. As the current volume decreases over time, B-19 will be re-opened to accommodate more non-hazardous class II and III waste (Turek, 2008a). As both landfill B-17 and landfill B-19 will be available to receive nonhazardous waste generated by the construction and operation of GWF Henrietta, there will be adequate waste disposal space available and no project related impacts to non-hazardous waste management.

3.13.1.2.2 Hazardous Waste Disposal Facilities

There are 61 Treatment Storage Disposal and Transfer Facilities (TSDTF) in California that can accept hazardous waste for treatment and recycling (DTSC, 2008). For ultimate disposal, California has three hazardous waste (Class I) landfills, which are described below. The closest commercial hazardous waste disposal facility to GWF Henrietta is Waste Management, Inc.'s Kettleman Hills Landfill in Kettleman City, Kings County. Based on the currently remaining capacity and proposed expansion of Kettleman Hills B-18 hazardous materials landfill, this facility can accommodate the relatively small amounts of hazardous waste generated by the project. Therefore, GWF Henrietta will result in no impacts related to hazardous waste management.

Clean Harbors' Buttonwillow Landfill, Kern County

This landfill has a permitted capacity of 14.3 million cubic yards and has approximately 9.2 million cubic yards of remaining capacity as of August 2008 (CIWMB, 2008a). At the current deposit rate, the landfill is permitted to accept waste until 2040 (CIWMB, 2008a). Buttonwillow has been permitted to accept all hazardous wastes except flammables, polychlorinated biphenyls (PCBs) with a concentration greater than 50 parts per million, medical waste, explosives, and radioactive waste with radioactivity greater than 1,800 picocuries (CIWMB, 2008a).

Clean Harbors' Westmorland Landfill in Imperial County

This facility is not currently open and accepting waste because the Buttonwillow facility can accommodate the current rate of hazardous waste generation. The facility is, however, available in reserve and could be re-opened if necessary. The landfill's conditional use permit prohibits the acceptance of some types of waste, including radioactive waste (except geothermal), flammables, biological hazard waste (medical), PCBs, dioxins, air- and water-reactive wastes, and strong oxidizers.

Waste Management, Inc.'s Kettleman Hills Landfill in Kings County

This facility accepts Class I and II waste (CIWMB, 2008b). This landfill has permitted capacity of 10.7 million cubic yards with a remaining capacity of approximately 1 million cubic yards as of August 2008. The life expectancy remaining for Landfill B-18 is about 2 years; however, expansion of the facility is anticipated (Turek, 2008b). Expansion of the facility would change the closure date to 2020 (Turek, 2008b).

Additional Commercial Hazardous Waste Treatment and Recycling Facilities

In addition to hazardous waste landfills, there are numerous offsite commercial liquid hazardous waste treatment and recycling facilities in California. Some of the closest facilities include Evergreen Environmental Services, Oil Conservation Service, and Safety Kleen Corp all in Fresno (DTSC, 2008).

3.13.2 Environmental Consequences

No new significant impacts from waste management would result from the changes proposed as part of this amendment. The quantities and types of wastes to be generated are comparable to the amounts and types already determined to have an insignificant impact when the HPP Final Decision. Although the project will generate some additional hazardous and nonhazardous waste, the landfill capacity for disposal of waste is more than adequate for disposal of these additional quantities.

According to the Kings County Planning Department, there are no conflicting proposed or foreseeable developments planned within one mile of the project site. Implementation of GWF Henrietta will not result in any individually significant impacts and the project will comply with applicable COCs and LORS. Therefore, GWF Henrietta will not contribute to any cumulative waste management impacts.

3.13.3 Mitigation Measures

Given that the project will not result in any new significant impacts related to waste management, no significant impacts in terms of waste management would result from the approval of this Amendment. Therefore, mitigation measures beyond those stipulated in the HPP Final Decision (01-AFC-18), that remain applicable, are not necessary.

3.13.4 Consistency with LORS

The construction and operation of GWF Henrietta, as amended, will conform with all applicable LORS related to waste management. No material LORS related to waste management have changed since the HPP was approved.

3.13.5 Conditions of Certification

GWF Henrietta will not result in any waste management impacts, therefore, no additional COCs beyond those stipulated as part of the HPP AFC (01-AFC-18), that remain applicable, are needed. A discussion of proposed revisions to existing COCs, to reflect GWF Henrietta, is included in Section 4.0.

3.14 Worker Safety

3.14.1 Environmental Baseline Information

GWF Henrietta, as described in Sections 1.0 and 2.0 of this Amendment, would not involve substantial changes to the worker safety analysis and conclusions from the HPP Final Decision (CEC, 2002), and supporting application, and Staff Assessment materials.

Pursuant to the Energy Commission's siting regulations contained in Title 20, California Code of Regulations, section 1769 *et seq*., this supplemental analysis for the HPP addresses all the requirements necessary to make a determination of the potential environmental impacts from GWF Henrietta on worker safety and whether such impacts would require new or revised COCs in order to reduce any impacts to a level of insignificance. The analysis is based on information from the administrative record for the HPP and hereby incorporated by reference for this Amendment.

In order to protect worker safety, GWF will implement the construction health and safety programs outlined in the HPP Final Decision updated to include GWF Henrietta. These programs include:

- Construction Injury and Illness Prevention Program
- Construction Personal Protective Equipment Program
- Construction Exposure Monitoring Program
- Construction Onsite Fire Suppression and Prevention
- Other Construction Written Safety Programs

Additionally, GWF will implement updated versions of the operations and maintenance health and safety programs outlined in the HPP Final Decision. These programs include:

- Injury and Illness Prevention Program
- Fire Protection and Prevention Program
- Emergency Action and Evacuation Plan
- Hazardous Materials Management Program
- Personal Protective Equipment Program
- Other Written Safety Programs

The health and safety programs outlined above will enforce safe and healthful practices and implement an accident/injury prevention program intended to ensure worker safety and health during the construction and operation of GWF Henrietta.

Further, a Construction Safety Training Program will be developed prior to the start of construction and the existing Operations and Maintenance Safety Training Program for the HPP will continue to be maintained by GWF and its contractors. Tables 8.7-5 and 8.7-6 in Section 8.7 of the HPP AFC give a detailed overview of the existing safety training programs available to HPP and GWF Henrietta employees.

GWF Henrietta fire prevention and suppression will continue to rely on both onsite fire protection systems and local fire protection services from Kings County Fire Department, Station 7, as more fully described in Sections 8.7.3.1 and 8.7.3.2 of the HPP AFC. Station 7 is now staffed by 2 Captains and 2 Engineers for a total of 4 fire fighting personnel. Additionally, Station 7 continues to be equipped with one 1,000 gallon capacity fire engine but now has one additional squad vehicle. As stated in the HPP AFC, the worst-case emergency response time from Station 7 to GWF Henrietta remains 8-9 minutes (Jones, 2008).

The overall fire prevention and protection program for the facility will be designed and implemented to protect both personnel and property. This program will be based on the existing HPP fire prevention and protection program, described in Section 8.7.3 of the HPP AFC, which will be modified and updated to incorporate GWF Henrietta. Fire protection during the construction and operation of GWF Henrietta will include measures to safeguard human life, prevent personnel injury, preserve property, and minimize downtime due to fire or explosion. The program will principally involve physical arrangements, such as sprinkler systems, water supplies, and fire extinguishers. GWF Henrietta will be subject to the same comprehensive health, safety, and fire prevention programs detailed in the HPP AFC and applied under the current license

3.14.2 Environmental Consequences

The potential worker safety and fire hazards related to GWF Henrietta are similar to those associated with the HPP construction and current HPP operation. Since all workers will undergo proper training under the terms of the current license, GWF Henrietta will not result in impacts different than those analyzed by the CEC during certification of the HPP. Incorporation of GWF Henrietta into the existing HPP safety and fire protection plans and systems will make potential worker safety impacts associated with GWF Henrietta less than significant.

3.14.3 Mitigation Measures

No significant impacts in terms of worker safety and fire protection will result from the approval of this Amendment. Therefore, mitigation measures beyond those stipulated in the HPP Final Decision (01-AFC-18), that remain applicable, are not necessary.

3.14.4 Consistency with LORS

The LORS associated with worker safety are the same as those analyzed in the HPP Final Decision (01-AFC-18). No material LORS changes have occurred since that time. The construction and operation of GWF Henrietta will conform with all applicable LORS related to worker safety and fire protection as identified in the HPP Final Decision (01-AFC-18).

3.14.5 Conditions of Certification

This Amendment does not require changes to the Worker Safety COCs for the HPP. A discussion of proposed revisions to existing COCs, to reflect GWF Henrietta, is included in Section 4.0.

3.14.6 Agency Contacts

Table 3.14-1 below, presents a list of the agency contacts related to worker safety.

TABLE 3.14-1
GWF Henrietta Worker Safety and Fire Agency Contacts

Agency	Person Contacted	Contact information
Kings County Fire Department, Station 7	Captain Brandon Jones	1285 S Lemoore Avenue - Lemoore CA 93245-9457 (559) 924-2626

4.0 Proposed Modifications to the Conditions of Certification

Consistent with the requirements of the CEC Siting Regulations Section 1769 (a)(1)(A), this section addresses proposed modifications to the existing HPP COCs.

A set of revised HPP COCs has not been provided at this time. The omission of Appendix B was discussed and agreed upon with CEC CPM staff on Wednesday October 8, 2008. GWF is committed to working with CEC staff regarding the development of an appropriate set of COCs for GWF Henrietta. Following the collaborative effort to establish the fundamental requirements of the appropriate COCs, GWF is prepared to take the lead in developing the GWF Henrietta COCs. The COCs will be submitted to the CEC during the final review process of the GWF Henrietta Amendment. GWF's rationale for modifying or removing HPP COCs is listed below:

1) GWF has stipulated to all applicable HPP COCs.
2) Several HPP COCs are outdated. The COCs reference policies that have been superseded. Replacing existing HPP COCs with the current standard CEC COCs may be warranted.
3) The HPP BRMIMP, CRMIMP, PRMIMP, Safety Plans, and other standard plans were accepted by the CEC CPM. The need for COCs detailing the required contents of these plans may not be necessary. Thus, it may be more appropriate to develop COCs that specifically direct GWF to incorporate GWF Henrietta into these existing plans that already meet CEC requirements.
4) The areas that will be disturbed through implementation of GWF Henrietta are within the existing HPP and are presently covered with concrete, gravel, or are highly disturbed. Resource surveys that were conducted for the HPP found that the site has low biological, cultural, paleontological, contaminated soil, or other geologic concerns. Therefore, it is expected that construction monitoring by specialists should be limited. GWF expects that consultation with the CEC CPM can occur to determine the appropriate and necessary level of monitoring.
5) Several HPP COCs were related to one-time activities that occurred through implementation of the HPP and therefore, are no longer applicable for GWF Henrietta. Also, COCs that refer to HPP facility components, that are not being changed by implementation of GWF Henrietta, are not appropriate requirements for GWF Henrietta.

5.0 Potential Effects on the Public

This section discusses the potential effects on the public that may result from the modifications proposed in this Amendment application, per CEC Siting Regulations (Title 20, CCR, Section 1769[a][1][G]).

The modifications proposed in this Amendment will benefit the public and local economy by increasing the project's contribution to the local tax base, compared with the project as proposed in the AFC and analyzed in the HPP Final Decision (see Sections 2.0 and 3.9). No significant adverse effects on the public will occur because of the changes to the project as proposed in this Amendment.

6.0 List of Property Owners

This section lists the property owners in accordance with the CEC Siting Regulations (Title 20, CCR, Section 1769[a][1][H]). The list presented below includes all property owners whose property is located within 1,000 feet of the project site and onsite linear connections.

TABLE 6-1
Property Owners within 1,000 ft of GWF Henrietta (APN 024-190-070)

Assessor's Parcel No. (APN)	Property Owner	Address
024-190-002	Pacific Gas & Electric	One Market, Spear Tower, Suite 2400 San Francisco, CA 94105
024-190-066	John D. & Sally L. Oliveira	286 Hotchkiss Drive Lemoore, CA 93245
024-190-070	GWF Energy, LLC	10596 Idaho Avenue Hanford, CA 93230
024-190-071	John D. & Sally L. Oliveira	286 Hotchkiss Drive Lemoore, CA 93245
024-260-004	Nancy L. Oliveira Revocable Trust Leonard Oliveira Trust	9235 24th Avenue Lemoore, CA 93245
024-270-009	Jack R. Clinton, et al.	1718 Marion Drive Glendale, CA 91205
024-270-010	Nancy L. Oliveira Revocable Trust Leonard Oliveira Trust	9235 24th Avenue Lemoore, CA 93245
024-270-011	Robert & Eleanor M. Sawyer Doris Goodin Jack Sawyer	5220 Blue Fountain Lane Bakersfield, CA 93313
024-270-012	Dr. Seymour, et al	716 N. Palm Drive Beverly Hills, CA 90212
024-270-013	Isabella Trust c/o Robert E. and Helen J. Carey	2 Isabella Avenue Atherton, CA 94027
024-270-014	Arthur B. Moss	1220 6th Avenue Edmonds, WA 98020

Sources:

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7.0 Potential Effects on Property Owners

This section addresses potential effects of the project changes proposed in this Amendment on nearby property owners, the public, and parties in the application proceeding, per CEC Siting Regulations (Title 20, CCR, Section 1769 [a][1][I]).

The proposed use is compatible with the industrial and agricultural uses on neighboring properties. Therefore, there will be no significant adverse effect on adjacent property owners.

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ATTACHMENT A

Applicable LORS/Engineering Design Criteria

ATTACHMENT A.1

Federal and State LORS

GWF Henrietta Federal and State LORS		
LORS	**Requirements/Applicability**	**Administering Agency**
Air Quality – Federal LORS		
Title 40 CFR Part 50	Establishes AAQS for criteria pollutants.	EPA Region IX, ARB, and SJVAPCD
Title 40 CFR Parts 52, PSD	The PSD program allows new sources of air pollution to be constructed, or existing sources to be modified in areas classified as attainment, while preserving the existing ambient air quality levels, protecting public health and welfare, and protecting Class I Areas (e.g., national parks and wilderness areas).	EPA Region IX
Title 40 CFR Parts 51 and 52, NSR (SJVAPCD Rule 2201)	Requires pre-construction review and permitting of new or modified stationary sources of air pollution to allow industrial growth without interfering with the attainment and maintenance of ambient air quality standards.	SJVAPCD with EPA Region IX oversight
Title 40 CFR, Part 60	Establishes national standards of performance for new or modified facilities in specific source categories.	SJVAPCD with EPA Region IX oversight
Title 40 CFR, Part 60	Establishes national standards of performance for new or modified facilities in specific source categories.	SJVAPCD with EPA Region IX oversight
Title 40 CFR, Part 60	Establishes national standards of performance for new or modified facilities in specific source categories.	SJVAPCD with EPA Region IX oversight
Title 40 CFR, Part 63	Establishes national emission standards to limit emissions of hazardous air pollutants (HAPs, or air pollutants identified by EPA as causing or contributing to the adverse health effects of air pollution but for which NAAQS have not been established) from facilities in specific categories.	SJVAPCD with EPA Region IX oversight

GWF Henrietta Federal and State LORS		
LORS	**Requirements/Applicability**	**Administering Agency**
Title 40 CFR Part 64 (CAM Rule)	Establishes onsite monitoring requirements for emission control systems.	SJVAPCD with EPA Region IX oversight
Title 40 CRF part 70 (SJVAPCD Rule 2520)	CAA Title V Operating Permit Program	SJVAPCD with EPA Region IX oversight
Title 40 CRF part 72 (SJVAPCD Rule 2540)	CAA Acid Rain Program	SJVAPCD with EPA Region IX oversight
Air Quality – State LORS		
California Code of Regulations, Section 41700	Prohibits emissions in quantities that adversely affect public health, other businesses, or property.	SJVAPCD with ARB oversight
California Code of Regulations Sections 93115 (Diesel ATCM)	The purpose of the airborne toxics control measure (ATCM) is to reduce diesel particulate emissions from stationary diesel fired compression engines.	SJVAPCD with ARB oversight
California Assembly Bill 32 - Global Warming Solutions Act of 2006 (AB32)	The purpose is to reduce carbon emissions within the state by approximately 25 percent by the year 2020.	SJVAPCD with ARB oversight
Biological Resources – Federal LORS		
Federal Endangered Species Act (Federal ESA, 16 USC 1531 et seq.)	Applicants for projects that could result in adverse impacts to or take of any federally listed species are required to obtain take authorization and mitigate potential impacts in consultation with USFWS.	
Migratory Bird Treaty Act (16 USC 703 to 711)	Protects all migratory birds, including nests and eggs.	
Bald and Golden Eagle Protection Act (16 USC 668)	Specifically protects bald and golden eagles from harm or trade in parts of these species.	
Biological Resources – State LORS		
California Endangered Species Act (Fish and Game Code, Section 2050 et seq.).	Species listed under this act cannot be “taken” or harmed unless authorized by an incidental take permit.	
Fish and Game Code, Section 3511	Describes bird species, primarily raptors, that are “fully protected.” Fully protected birds may not be taken or possessed, except under specific permit requirements.	

GWF Henrietta Federal and State LORS		
LORS	**Requirements/Applicability**	**Administering Agency**
Fish and Game Code, Section 3503	States that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this **code** or any regulation made pursuant thereto.	
Fish and Game Code, Section 3503.5	Protects all birds of prey and their eggs and nests.	
Fish and Game Code, Section 3513	Makes it unlawful to take, possess, or destroy any birds of prey or to take, possess, or destroy the nest or eggs of any such bird.	
Fish and Game Code, Sections 4700, 5050, and 5515	Lists mammal, amphibian, and reptile species that are fully protected in California.	
Fish and Game Code, Sections 1900 et seq.,	The Native Plant Protection Act lists threatened, endangered, and rare plants listed by the state.	
Title 14, California Code of Regulations, Sections 670.2 and 670.5	Lists animals designated as threatened or endangered in California.	
Fish and Game Code Sections 1601 through 1607	Prohibits alteration of any stream, including intermittent and seasonal channels and many artificial channels, without a permit from CDFG.	
CEQA (Public Resources Code, Section 15380)	CEQA requires that the effects of a project on environmental resources must be analyzed and assessed using criteria determined by the lead agency.	
Warren-Alquist Act (Public Resources Code, Section 25000, et seq.)	Warren-Alquist Act is a CEQA-equivalent process implemented by the CECP.	
Cultural Resources – State LORS		
California Environment Quality Act Guidelines	Project construction may encounter archaeological and/or historical resources.	CEC
Health and Safety Code Section 7050.5	Construction may encounter Native American graves; coroner calls the Native American Heritage Commission (NAHC).	State of California
Public Resources Code Section 5097.98	Construction may encounter Native American graves; NAHC assigns Most Likely Descendant.	State of California

GWF Henrietta Federal and State LORS		
LORS	**Requirements/Applicability**	**Administering Agency**
Public Resources Code Section 5097.5/5097.9	Would apply only if some project land were acquired by the state (no state land is associated or expected to be associated with this project so this LORS does not apply).	State of California
Geological Resources – State LORS		
California Building Code (CBC) 2007, as amended by the County of San Joaquin	Acceptable design criteria for structures with respect to seismic design and load-bearing capacity.	California Building Standards Commission, State of California, and County of San Joaquin
Alquist-Priolo Earthquake Fault Zoning Act (Title 14, Division 2, Chapter 8, Subchapter 1, Article 3, California Code of Regulations)	Identifies areas subject to surface rupture from active faults.	California Building Standards Commission, State of California, and County of San Joaquin
The Seismic Hazards Mapping Act (Title 14, Division 2, Chapter 8, Subchapter 1, Article 10, California Code of Regulations.)	Identifies non-surface fault rupture earthquake hazards, including liquefaction and seismically induced landslides.	California Building Standards Commission, State of California, and County of San Joaquin
Hazardous Materials – Federal LORS		
29 CFR 1910 et seq. and 1926 et seq.	Requirements for equipment used to store and handle hazardous materials.	EPA and Cal-OSHA
49 CFR Parts 172, 173, and 179	Provides standards for labeling and packaging of hazardous materials during transportation.	CHP and DOT
Section 302, EPCRA (Pub. L. 99–499, 42 USC 11022) Hazardous Chemical Reporting: Community Right-To-Know (40 CFR 370)	Requires one time notification if extremely hazardous substances are stored in excess of TPQs.	County of San Joaquin Environmental Health Department
Section 304, EPCRA (Pub. L. 99–499, 42 USC 11002) Emergency Planning And Notification (40 CFR 355)	Requires notification when there is a release of hazardous material in excess of its RQ.	County of San Joaquin Environmental Health Department
Section 311, EPCRA (Pub. L. 99–499, 42 USC 11021) Hazardous Chemical Reporting: Community Right-To-Know (40 CFR 370)	Requires that either MSDSs for all hazardous materials or a list of all hazardous materials be submitted to the SERC, LEPC, and County of San Joaquin Environmental Health Department.	County of San Joaquin Environmental Health Department
Section 313, EPCRA (Pub. L. 99–499, 42 USC 11023) Toxic Chemical Release Reporting: Community Right-To-Know (40 CFR 372)	Requires annual reporting of releases of hazardous materials.	County of San Joaquin Environmental Health Department

GWF Henrietta Federal and State LORS		
LORS	**Requirements/Applicability**	**Administering Agency**
Section 311, CWA (Pub. L. 92–500, 33 USC 1251 et seq.) Oil Pollution Prevention (40 CFR 112)	Requires preparation of an SPCC plan if oil is stored in a single AST with a capacity greater than 660 gallons or if the total petroleum storage (including ASTs, oil-filled equipment, and drums) is greater than 1,320 gallons. The facility will have petroleum in excess of the aggregate volume of 1,320 gallons.	RWQCB
Section 112, CAA Amendments (Pub. L. 101–549, 42 USC 7412) Chemical Accident Prevention Provisions (40 CFR 68)	Requires an RMP if listed hazardous materials (designated as "regulated substances") are stored at or above a TQ. An RMP will not be required under the CAA because GWF Henrietta will not store regulated substances above federal TQs. However the state's CalARP program requirements will require an RMP for aqueous ammonia because the state's TQ is lower than the federal one.	County of San Joaquin Environmental Health Department (CalARP)
Pipeline Safety Laws (49 USC 60101 et seq.) Hazardous Materials Transportation Laws (49 USC 5101 et seq.) Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards (49 CFR 192)	Specifies natural gas pipeline construction, safety, and transportation requirements.	DOT
Hazardous Materials – State LORS		
8 CCR Section 339; Section 3200 et seq., Section 5139 et seq. and Section 5160 et seq.	8 CCR Section 339 lists hazardous chemicals relating to Hazardous Substance Information and Training Act; 8 CCR Section 3200 et seq. and 5139 et seq. address control of hazardous substances in places of employment; 8 CCR Section 5160 et seq. Establishes minimum standards for the use, handling, and storage of hazardous substances in all places of employment, and addresses hot, flammable, poisonous, corrosive, and irritant substances.	County of San Joaquin Environmental Health Department
Health and Safety Code, Section 25500, et seq. (HMBP)	Requires preparation of an HMBP if hazardous materials are handled or stored in excess of threshold quantities.	Cal-OSHA

GWF Henrietta Federal and State LORS		
LORS	**Requirements/Applicability**	**Administering Agency**
CalARP Program. Health and Safety Code, Sections 25531 through 25543.4	Requires registration with local CUPA or lead agency and preparation of an RMP if regulated substances are handled or stored in excess of TQs.	County of San Joaquin Environmental Health Department
Health and Safety Code, Section 25270 through 25270.13 (Aboveground Petroleum Storage Act)	Requires preparation of an SPCC plan if oil is stored in a single AST with a capacity greater than 660 gallons or if the total petroleum storage (including ASTs, oil-filled equipment, and drums) is greater than 1,320 gallons. The facility will have petroleum in excess of the aggregate volume of 1,320 gallons.	County of San Joaquin Environmental Health Department
Health and Safety Code, Section 25249.5 through 25249.13 (Safe Drinking Water and Toxics Enforcement Act) (Proposition 65)	Requires warning to persons exposed to a list of carcinogenic and reproductive toxins and protection of drinking water from same toxins.	CA OEHHA
California Fire Code, Article 80	Includes provisions for storage and handling of hazardous materials.	County of San Joaquin Environmental Health Department
CPUC General Order Nos. 112-E and 58-A	Specifies standards for gas service and construction of gas gathering, transmission, and distribution piping systems.	CPUC
Land Use – Federal LORS		
Federal Aviation Regulations, Part 77, Section 77.13 ff	The Federal Aviation Regulations require notice of any construction or alteration that is (a) more than 200 feet in height above ground level or (b) greater than certain planes extending outward and upward at specified radius and slopes from the nearest runway of certain airports.	Federal Aviation Administration
Land Use – State LORS		
Warren-Alquist Act and California Environmental Quality Act; California Public Resources Code, Sections 21000 through 21178.1, including Guidelines for implementation of CEQA are codified in the California Code of Regulations (CCR) Sections 15000 through 15387.	Establishes policies and procedures for review of proposed power plants greater than 50 MW in California.	California Energy Commission 1516 Ninth Street Sacramento, CA 95814
California Lands Conservation Act (Williamson Act)	Preserves agricultural land and encourages open space preservation and efficient urban growth.	Department of Conservation (NRCS)

GWF Henrietta Federal and State LORS		
LORS	**Requirements/Applicability**	**Administering Agency**
Noise – Federal LORS		
EPA	Guidelines for state and local governments.	EPA
OSHA	Exposure of workers over 8-hour shift limited to 90 dBA.	OSHA
Noise – State LORS		
Cal-OSHA 8 CCR Article 105 Sections 095 et seq.	Exposure of workers over 8-hour shift limited to 90 dBA.	Cal-OSHA
California Vehicle Code Sections 23130 and 23130.5	Regulates vehicle noise limits on California highways.	Caltrans, California Highway Patrol and the County Sheriff's Office
Paleontological Resources – Federal LORS		
Antiquities Act of 1906	Protects paleontological resources on federal lands; requires inventory, assessment of effects, and mitigation if appropriate. Not applicable – No federal land involved, or federal entitlement required.	Federal lead agency
National Environmental Policy Act of 1969	Not applicable – No federal land involved, or federal entitlement required.	Federal lead agency
Paleontological Resources – State LORS		
CEQA, Appendix G	Requires that impacts to paleontological resources be assessed and mitigated on all discretionary projects, public and private. Applicable – Fossil remains may be encountered by earth-moving activities	California Energy Commission
Public Resources Code, Sections 5097.5/5097.9	Designates unauthorized removal or disturbance of fossil remains or fossil site on publicly owned lands in the State of California as a misdemeanor. Not applicable – Applies to state-owned land.	California Energy Commission

GWF Henrietta Federal and State LORS		
LORS	**Requirements/Applicability**	**Administering Agency**
Public Health – Federal LORS		
Title 40 CFR, Part 63	Establishes national emission standards to limit emissions of hazardous air pollutants (HAPs, or air pollutants identified by EPA as causing or contributing to the adverse health effects of air pollution but for which National Ambient Air Quality Standards (NAAQS) have not been established) from facilities in specific categories.	SJVAPCD, with EPA Region IX oversight
Public Health – State LORS		
Health and Safety Code Sections 44360 to 44366 (Air Toxics "Hot Spots" Information and Assessment Act—AB 2588)	Requires preparation and biennial updating of facility emission inventory of hazardous substances; risk assessments.	SJVAPCD with oversight from ARB/OEHHA
Health and Safety Code 25249.5 et seq. (Safe Drinking Water and Toxic Enforcement Act of 1986—Proposition 65)	Provides notification of Proposition 65 chemicals.	OEHHA
Socioeconomics – Federal LORS		
Civil Rights Act of 1964	Prohibits discrimination on the basis of race, color, or national origin.	
Executive Order 12898	Avoid disproportionately high and adverse impacts to minority and low-income members of the community.	
Socioeconomics – State LORS		
Government Code Sections 65996-65997	Establishes that the levy of a fee for construction of an industrial facility be considered mitigating impacts on school facilities.	
Education Code Section 17620	Allows a school district to levy a fee against any construction within the boundaries of the district for the purpose of funding construction of school facilities.	
Soils – Federal LORS		
Federal Water Pollution Control Act of 1972: Clean Water Act (CWA) of 1977 (including 1987 amendments)	Regulates stormwater discharge from construction and industrial activities	Regional Water Quality Control Board (RWQCB) Central Valley Region 5 under State Water Resources Control Board (SWRCB). U.S. Environmental Protection Agency (EPA) may retain jurisdiction at its discretion.

GWF Henrietta Federal and State LORS		
LORS	**Requirements/Applicability**	**Administering Agency**
Natural Resources Conservation Service (NRCS) (1983), National Engineering Handbook, Sections 2 and 3	Standards for soil conservation	Natural Resources Conservation Service
Soils – State LORS		
Porter-Cologne Water Quality Control Act of 1972; Cal. Water Code 13260-13269: 23 CCR Chapter 9	Regulates stormwater discharge	CEC and Central Valley Region (5S) under SWRCB
Traffic and Transportation – Federal LORS		
49 Code of Federal Regulations (CFR) 171-177	Govern the transportation of hazardous materials, including the marking of the transportation vehicles.	U.S. Department of Transportation (DOT) and California Department of Transportation (Caltrans)
49 CFR 350-399 and Appendices A-G	Address safety considerations for the transport of goods, materials, and substances over public highways.	DOT and Caltrans
49 CFR 397.9	Establishes criteria and regulations for the safe transportation of hazardous materials.	DOT
14 CFR 77.13(2)(i)	Requires applicants to notify Federal Aviation Administration (FAA) of construction, within 20,000 feet of an airport, of greater height than an imaginary surface as defined by the FAA.	DOT and FAA
14 CFR 77.17	Requires applicant for construction within 20,000 feet of an airport to submit Form 7460-1 to the FAA.	DOT and FAA
14 CFR 77.21, 77.23, and 77.25	Outline the obstruction standards that the FAA uses to determine whether an air navigation conflict exists for structures within 3 nautical miles of an airport.	DOT and FAA
Traffic and Transportation – State LORS		
California Vehicle Code (CVC), Sections 13369, 15275, and 15278	Address the licensing of drivers and classifications of licenses required to operate particular types of vehicles, including certificates permitting the operation of vehicles transporting hazardous materials.	Caltrans
CVC, Sections 25160 et seq.	Address the safe transport of hazardous materials.	Caltrans

GWF Henrietta Federal and State LORS		
LORS	**Requirements/Applicability**	**Administering Agency**
CVC, Sections 2500-2505	Authorize the issuance of licenses by the Commissioner of the California Highway Patrol (CHP) to transport hazardous materials, including explosives.	Caltrans
CVC, Section 31303	Requires transporters of hazardous materials to use the shortest route possible.	Caltrans
CVC, Sections 31600-31620	Regulate the transportation of explosive materials.	Caltrans
CVC, Sections 32100-32109	Requires transporters of inhalation hazardous materials or explosive materials to obtain a Hazardous Materials Transportation License.	Caltrans
CVC, Sections 34000-34121	Establish special requirements for transporting flammable and combustible liquids over public roads and highways.	Caltrans
CVC, Sections 34500, 34501, 34505, 34506, 34507, and 34510	Regulate the safe operation of vehicles, including those used to transport hazardous materials.	Caltrans
CVC, Section 35100 et seq.	Specifies limits for vehicle width.	Caltrans
CVC, Section 35250 et seq.	Specifies limits for vehicle height.	Caltrans
CVC, Section 35400 et seq.	Specifies limits for vehicle length.	Caltrans
CVC, Section 35780	Requires a Single-Trip Transportation Permit to transport oversized or excessive loads over state highways.	Caltrans
California State Planning Law, Government Code Section 65302	Requires each city and county to adopt a General Plan consisting of seven mandatory elements to guide its physical development, including a circulation element.	Caltrans
California Street and Highway Code §§117, 660-711	Requires permits from Caltrans for any roadway encroachment during truck transportation and delivery.	Caltrans
California Street and Highway Code §§660-711	Requires permits for any load that exceeds Caltrans weight, length, or width standards for public roadways.	Caltrans

GWF Henrietta Federal and State LORS		
LORS	**Requirements/Applicability**	**Administering Agency**
Waste Management – Federal LORS		
Resource Conservation and Recovery Act (RCRA) Subtitle D	Regulates design and operation of solid waste landfills. GWF Henrietta Project solid waste will be collected and disposed of by a collection company that will be required to conform to Subtitle D.	California Integrated Waste Management Board (CIWMB)
RCRA Subtitle C	Controls storage, treatment, and disposal of hazardous waste. GWF Henrietta solid waste will be collected and disposed of by a collection company that will be required to conform to Subtitle C.	Department of Toxic Substance Control (DTSC)
Clean Water Act (CWA)	Controls discharge of wastewater to the surface waters of the U.S. GWF Henrietta will discharge plant wastewater to an onsite tank for disposal offsite. Sanitary wastewater will be stored onsite and hauled off periodically.	Regional Water Quality Control Board (RWQCB)
Waste Management – State LORS		
California Integrated Waste Management Act (CIWMA)	Controls solid waste collectors, recyclers, and depositors. GWF Henrietta solid waste will be collected and disposed of by a collection company in conformance with the CIWMA.	CIWMB
CA Hazardous Waste Control Law (HWCL)	Controls storage, treatment, and disposal of hazardous waste. Hazardous waste will be handled by contractors that will be required to conform to HWCL.	DTSC
Porter-Cologne Water Quality Control Act	Controls discharge of wastewater to the surface and ground waters of California. GWF Henrietta will discharge industrial wastewater to an onsite tank for disposal offsite. Sanitary wastewater will be stored onsite and hauled off periodically.	RWQCB
Water Resources – Federal LORS		
Federal Clean Water Act of 1977 (as amended)	Prohibits discharge of pollutants to receiving waters unless the discharge is in compliance with a National Pollution Discharge Elimination System (NPDES) permit.	Central Valley RWQCB
Water Resources – State LORS		
Constitution, Article X, Section 2	Prohibits waste or unreasonable use of water.	Central Valley RWQCB

GWF Henrietta Federal and State LORS		
LORS	**Requirements/Applicability**	**Administering Agency**
Water Code, Section 13550	States that use of potable water for non-potable purposes is an unreasonable use of water.	Central Valley RWQCB
SWRCB Resolution 75-58	Encourages use of wastewater for power plant cooling.	Central Valley RWQCB
Porter-Cologne Water Quality Control Act	Governs the regulation of water quality within California and authorizes preparation of Basin Plans.	Central Valley RWQCB
Worker Health and Safety – Federal LORS		
Title 29 Code of Federal Regulations (CFR) Part 1910	Contains the minimum occupational safety and health standards for general industry in the United States.	OSHA
Title 29 CFR Part 1926	Contains the minimum occupational safety and health standards for the construction industry in the United States.	OSHA
Worker Health and Safety – State LORS		
California Occupational Safety and Health Act, 1970	Establishes minimum safety and health standards for construction and general industry operations in California.	Cal-OSHA
8 California Code of Regulations (CCR) 339	Requires list of hazardous chemicals relating to the Hazardous Substance Information and Training Act.	Cal-OSHA
8 CCR 450	Addresses hazards associated with pressurized vessels.	Cal-OSHA
8 CCR 750	Addresses hazards associated with high-pressure steam.	Cal-OSHA
8 CCR 1509	Addresses requirements for construction Injury and Illness prevention plans.	Cal-OSHA
8 CCR 1509, et seq. and 1684, et seq.	Addresses construction hazards, including head, hand, and foot injuries, and noise and electrical shock.	Cal-OSHA
8 CCR 1528, et seq., and 3380, et seq.	Requirements for personal protective equipment (PPE).	Cal-OSHA
8 CCR 1597, et seq., and 1590, et seq.	Requirements addressing the hazards associated with traffic accidents and earth-moving.	Cal-OSHA
8 CCR 1604, et seq.	Requirements for construction hoist equipment.	Cal-OSHA

GWF Henrietta Federal and State LORS		
LORS	**Requirements/Applicability**	**Administering Agency**
8 CCR 1620, et seq. and 1723, et seq.	Addresses miscellaneous hazards.	Cal-OSHA
8 CCR 1709, et seq.	Requirements for steel reinforcing, concrete pouring, and structural steel erection operations.	Cal-OSHA
8 CCR 1920, et seq.	Requirements for fire protection systems.	Cal-OSHA
8 CCR 2300, et seq. and 2320, et seq.	Requirements for addressing low-voltage electrical hazards.	Cal-OSHA
8 CCR 2395, et seq.	Addresses electrical installation requirements.	Cal-OSHA
8 CCR 2700, et seq.	Addresses high-voltage electrical hazards.	Cal-OSHA
8 CCR 3200, et seq. and 5139, et seq.	Requirements for control of hazardous substances.	Cal-OSHA
8 CCR 3203, et seq.	Requirements for operational accident prevention programs	Cal-OSHA
8 CCR 3270, et seq. and 3209, et seq.	Requirements for evacuation plans and procedures	Cal-OSHA
8 CCR 3301, et seq.	Requirements for addressing miscellaneous hazards, including hot pipes, hot surfaces, compressed air systems, relief valves, enclosed areas containing flammable or hazardous materials, rotation equipment, pipelines, and vehicle-loading dock operations.	Cal-OSHA
8 CCR 3360, et seq.	Addresses requirements for sanitary conditions.	Cal-OSHA
8 CCR 3511, et seq. and 3555, et seq.	Requirements for addressing hazards associated with stationary engines, compressors, and portable, pneumatic, and electrically powered tools.	Cal-OSHA
8 CCR 3649, et seq. and 3700, et seq.	Requirements for addressing hazards associated with field vehicles.	Cal-OSHA
8 CCR 3940, et seq.	Requirements for addressing hazards associated with power transmission, compressed air, and gas equipment.	Cal-OSHA
8 CCR 5109, et seq.	Requirements for addressing construction accident and prevention programs.	Cal-OSHA

GWF Henrietta Federal and State LORS		
LORS	**Requirements/Applicability**	**Administering Agency**
8 CCR 5110, et. seq.	Requirements for the implementation of an ergonomics program.	Cal-OSHA
8 CCR 5139, et seq.	Requirements for addressing hazards associated with welding, sandblasting, grinding, and spray-coating.	Cal-OSHA
8 CCR 5150, et seq.	Requirements for confined space entry.	Cal-OSHA
8 CCR 5160, et seq.	Requirements for addressing hot, flammable, poisonous, corrosive, and irritant substances.	Cal-OSHA
8 CCR 5192, et seq.	Requirements for conducting emergency response operations.	Cal-OSHA
8 CCR 5194, et seq.	Requirements for employee exposure to dusts, fumes, mists, vapors, and gases.	Cal-OSHA
8 CCR 5405, et seq.; 5426, et seq.; 5465, et seq.; 5500, et seq.; 5521, et seq.; 5545, et seq.; 5554, et seq.; 5565, et seq.; 5583, et seq.; and 5606, et seq.	Requirements for flammable liquids, gases, and vapors.	Cal-OSHA
8 CCR 5583, et seq.	Requirements for design, construction, and installation of venting, diking, valving, and supports.	Cal-OSHA
8 CCR 6150, et seq.; 6151, et seq.; 6165, et seq.; 6170, et seq.; and 6175, et seq.	Provides fire protection requirements.	Cal-OSHA
24 CCR 3 et seq.	Incorporates current addition of Uniform Building Code.	Cal-OSHA
8 CCR, Part 6	Provides health and safety requirements for working with tanks and boilers.	Cal-OSHA
Health and Safety Code Section 25500, et seq.	Requires that every new or modified facility that handles, treats, stores, or disposes of more than the threshold quantity of any of the listed acutely hazardous materials prepare and maintain a Risk Management Plan.	Cal-OSHA
Health and Safety Code Sections 25500 through 25541	Requires the preparation of a Hazardous Material Business Plan that details emergency response plans for a hazardous materials emergency at the facility.	Cal-OSHA

GWF Henrietta Federal and State LORS		
LORS	**Requirements/Applicability**	**Administering Agency**
Worker Health and Safety – Applicable National Consensus Standards		
Uniform Fire Code, Article 80	Addresses the prevention, control, and mitigation of dangerous conditions related to storage, dispensing, use, and handling of hazardous materials and information needed by emergency response personnel.	Local Fire Department
National Fire Protection Association (NFPA) 10, Standard for Portable Fire Extinguishers	Requirements for selection, placement, inspection, maintenance, and employee training for portable fire extinguishers.	Local Fire Department
NFPA 11, Standard for Low-Expansion Foam and Combined Agent Systems	Requirements for installation and use of low-expansion foam and combined-agent systems.	Local Fire Department
NFPA 11A, Standard for Medium- and High-Expansion Foam Systems	Requirements for installation and use of medium- and high-expansion foam systems.	Local Fire Department
NFPA 12, Standard on Carbon Dioxide Extinguishing Systems	Requirements for installation and use of carbon dioxide extinguishing systems.	Local Fire Department
NFPA 13, Standard for Installation of Sprinkler Systems	Guidelines for selection and installation of fire sprinkler systems.	Local Fire Department
NFPA 13A, Recommended Practice for the Inspection, Testing, and Maintenance of Sprinkler Systems	Guidance for inspection, testing, and maintenance of sprinkler systems.	Local Fire Department
NFPA 14, Standard for the Installation of Standpipe and Hose Systems	Guidelines for selection and installation of standpipe and hose systems.	Local Fire Department
NFPA 15, Standard for Water Spray Fixed Systems	Guidelines for selection and installation of water spray fixed systems.	Local Fire Department
NFPA 17, Standard for Dry Chemical Extinguishing Systems	Guidance for selection and use of dry chemical extinguishing systems.	Local Fire Department
NFPA 20, Standard for the Installation of Centrifugal Fire Pumps	Guidance for selection and installation of centrifugal fire pumps	Local Fire Department
NFPA 22, Standard for Water Tanks for Private Fire Protection	Requirements for water tanks for private fire protection	Local Fire Department
NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances	Requirements for private fire service mains and their appurtenances.	Local Fire Department

GWF Henrietta Federal and State LORS		
LORS	**Requirements/Applicability**	**Administering Agency**
NFPA 26, Recommended Practice for the Supervision of Valves Controlling Water Supplies	Supervision guidance for valves controlling water supplies.	Local Fire Department
NFPA 30, Flammable and Combustible Liquid Code	Requirements for storage and use of flammable and combustible liquids.	Local Fire Department
NFPA 37, Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines	Fire protection requirements for installation and use of combustion engines and gas turbines.	Local Fire Department
NFPA 50A, Standard for Gaseous Hydrogen Systems at Consumer Sites	Fire protection requirements for hydrogen systems.	Local Fire Department
NFPA 54, National Fuel Gas Code	Fire protection requirements for use of fuel gases.	Local Fire Department
NFPA 59A, Standard for the Storage and Handling of Liquefied Petroleum Gases	Requirements for storage and handling of liquefied petroleum gases.	Local Fire Department
NFPA 68, Guide for Explosion Venting	Guidance in design of facilities for explosion venting.	Local Fire Department
NFPA 70, National Electric Code	Guidance on safe selection and design, installation, maintenance, and construction of electrical systems.	Local Fire Department
NFPA 70B, Recommended Practice for Electrical Equipment Maintenance	Guidance on electrical equipment maintenance.	Local Fire Department
NFPA 70E, Standard for Electrical Safety Requirements for Employee Workplaces	Employee safety requirements for working with electrical equipment.	Local Fire Department
NFPA 71, Standard for the Installation, Maintenance, and Use of Central Station Signaling Systems	Requirements for installation, maintenance, and use of central station signaling systems.	Local Fire Department
NFPA 72A, Standard for the Installation, Maintenance and Use of Local Protective Signaling Systems for Guard's Tour, Fire Alarm, and Supervisory Service	Requirements for installation, maintenance, and use of local protective signaling systems.	Local Fire Department
NFPA 72E, Standard on Automatic Fire Detection	Requirements for automatic fire detection.	Local Fire Department
NFPA 72F, Standard for the Installation, Maintenance and Use of Emergency Voice/Alarm of Communication Systems	Requirements for installation, maintenance, and use of emergency and alarm communications systems.	Local Fire Department

GWF Henrietta Federal and State LORS		
LORS	**Requirements/Applicability**	**Administering Agency**
NFPA 72H, Guide for Testing Procedures for Local, Auxiliary, Remote Station, and Proprietary Protective Signaling Systems	Testing procedures for types of signaling systems anticipated for facility.	Local Fire Department
NFPA 75, Standard for the Protection of Electronic Computer/Data Processing Equipment	Requirements for fire protection systems used to protect computer systems	Local Fire Department
NFPA 78, Lightning Protection Code	Lightning protection requirements.	Local Fire Department
NFPA 80, Standard for Fire Doors and Windows	Requirements for fire doors and windows.	Local Fire Department
NFPA 90A, Standard for the Installation of Air Conditioning and Ventilating Systems	Requirements for installation of air conditioning and ventilating systems.	Local Fire Department
NFPA 101, Code for Safety to Life from Fire in Buildings and Structures	Requirements for design of means of exiting the facility.	Local Fire Department
NFPA 291, Recommended Practice for Fire Flow Testing and Marking of Hydrants	Guidelines for testing and marking of fire hydrants.	Local Fire Department
NFPA 850, Recommended Practice for Fire Protection for Fossil Fuel Steam Electric Generating Plants	Requirements for fire protection in fossil-fuel steam electric generating plants and alternative fuel electric generating plants.	Local Fire Department
NFPA 1961, Standard for Fire Hose	Specifications for fire hoses.	Local Fire Department
NFPA 1962, Standard for the Care, Maintenance, and Use of Fire Hose Including Connections and Nozzles	Requirements for care, maintenance, and use of fire hose.	Local Fire Department
NFPA 1963, Standard for Screw Threads and Gaskets for Fire Hose Connections	Specifications for fire hose connections.	Local Fire Department
American National Standards Institute/American Society for Mechanical Engineers (ANSI/ASME), Boiler and Pressure Vessel Code	Specifications and requirements for pressure vessels.	Local Fire Department
ANSI, B31.2, Fuel Gas Piping	Specifications and requirements for fuel gas piping.	Local Fire Department

ATTACHMENT A.2

Engineering

The GWF Henrietta project will be designed for high reliability and efficiency. A detailed project description is provided in Section 2.0. The engineering standards and requirements are provided in Attachment A.2.1-5.

Design and engineering information for the project is located throughout this License Amendment, as follows:

Power generation	Section 2.2.2 (Process Description), Section 2.2.3 (Major Electrical Equipment and Systems).
Water supply system	Section 2.2.5 (Water Supply and Use).
Atmospheric emission control system	Section 2.2.8 (Emissions Control and Monitoring), and Section 3.1 (Air Quality).
Waste disposal system	Section 2.2.7 (Waste Management) and Section 3.13 (Waste Management).
Noise abatement	Section 3.7 (Noise).
Switchyard/transformer systems	Section 2.2.3 (Major Electrical Equipment and Systems).
Transmission system design	Section 2.2.3 (Major Electrical Equipment and Systems).
Reliability	Section 2.3.2 (Facility Reliability).
Efficiency	Section 2.2.2 (Process Description) and Figures.

Information regarding design measures to ensure safe facility operation is contained in Section 2.3.1.1 (Facility Safety Design). Applicable engineering laws, ordinances, regulations, and standards (LORS) are summarized in Section 2.5 (Laws, Ordinances, Regulations, and Standards) and Attachment A.2.1-5. Throughout this Amendment and Attachment A.2, references to the Uniform Building Code should be understood to be inclusive of the corresponding provisions of the California Building Code.

A geotechnical investigation of the project site was conducted, including foundation core borings, and can be found in the HPP AFC Appendix H1-3.

Additional engineering information, including information on mechanical engineering, electrical engineering, civil engineering, structural engineering, system controls, and an equipment summary, is contained in Attachment A.2.1-5.

GWF Henrietta will comply with all applicable LORS. A summary of the LORS is provided in Section 2.5 (Laws, Ordinances, Regulations, and Standards) and Attachment A.1 and A.2.1-5.

Contact information for the pertinent agencies is provided below.

TABLE A.2-1
Local Agency Contacts

Agency	Contact	Title	Telephone
Kings County Public Works/Building Department	Bill Zumwalt	Director of Planning and Building Inspection	(559) 582-3211 ext. 2686
Kings County Fire Department	Brandon Jones	#2 Station Captain	(559) 924-2626

ATTACHMENT A.2.1

Foundation and Civil Engineering Design Criteria

1.0 Introduction

The design, engineering, procurement, and construction activities on the project will be in accordance with various predetermined standards and project-specific practices. This attachment summarizes the civil engineering codes and standards, design criteria, and practices that will be used during design and construction. These criteria form the basis of the design for the foundations and civil systems of the project. More specific design information will be developed during the detailed design phase to support equipment procurement and construction specifications. It is not the intent of this attachment to present the detailed design information for each component and system, but rather to summarize the codes, standards, and general criteria that will be used.

Section 2.0 summarizes the applicable codes and standards, and Section 3.0 includes the general criteria for foundations, design loads, and sitework.

2.0 Design Codes and Standards

2.1 General Requirements

The design and specification of work will be in accordance with all applicable laws and regulations of the Federal Government, the State of California, and the applicable local codes and ordinances. Except where noted otherwise, the latest issue of all codes and standards, including addenda, in effect at the start of the project will be used. The codes and standards, including all addenda, in effect at the time of purchase will be used for material and equipment procurement.

A summary of the codes and the standards to be used in the design and construction follows:

- Seismic standards and criteria will follow the California Building Code (CBC).
- Specifications for materials will follow the standard specifications of the American Society for Testing and Materials (ASTM) and the American National Standards Institute (ANSI), unless noted otherwise.
- Field and laboratory testing procedures for materials will follow ASTM standards.
- Design and placement of structural concrete and reinforcing steel will be in accordance with the codes, guides, and standards of the American Concrete Institute (ACI) and the Concrete Reinforcing Steel Institute (CRSI).

- Specifications for materials for roads will follow the State of California Department of Transportation (Caltrans) Standard Specifications.
- Design and construction of roads will follow the American Association of State Highway and Transportation Officials (AASHTO) and Caltrans standards.
- Design and construction of the sanitary sewer system will conform to the Uniform Plumbing Code (UPC).
- Design and construction will conform to federal and California Occupational Safety and Health Administration (OSHA and CAL-OSHA) requirements.

Other recognized standards will be used where required to serve as guidelines for the design, fabrication, and construction. Where no other code or standard governs, the CBC, 2007 Edition, will govern.

2.2 Government Rules and Regulations

The following laws, ordinances, regulations, and standards (LORS) are applicable to the civil engineering design and construction. In cases where conflicts between cited codes (or standards) exist, the requirements of the more stringent code will govern.

2.2.1 Federal

- Title 29, Code of Federal Regulations (CFR), Part 1910, Occupational Safety and Health Standards.
- Title 29, CFR, Part 1926, National Safety and Health Regulations for Construction.
- Walsh-Healy Public Contracts Act (Public Law [PL] 50-204.10).
- National Pollutant Discharge Elimination System (NPDES) (U.S. Environmental Protection Agency [EPA]).

2.2.2 State

- California Building Code.
- Business and Professions Code Section 6704, et seq.; Sections 6730 and 6736. Requires state registration to practice as a Civil Engineer or Structural Engineer in California.
- Labor Code Section 6500, et seq. Requires a permit for construction of trenches or excavations 5 feet or deeper into which personnel have to descend. This also applies to construction or demolition of any building, structure, false work, or scaffolding that is more than three stories high or equivalent.
- Title 24, California Code of Regulations (CCR). Adopts current edition of CBC as minimum legal building standards.
- Caltrans, Standard Plans & Specifications.
- Title 8, CCR Section 1500, et seq.; Section 2300, et seq.; and Section 3200, et seq. Describes general construction safety orders, industrial safety orders, and work safety requirements and procedures.

- Regulations of the following state agencies as applicable:
  - Department of Labor and Industry Regulations.
  - Bureau of Fire Protection.
  - Department of Public Health.
  - Water and Power Resources.
- Vehicle Code, Section 35780, et seq. Requires a permit from Caltrans to transport heavy loads on state roads.

2.2.3 Local

- California Building Code, 2007 edition.

2.2.4 Engineering Geology Codes and Standards

The design and specification of work will be in accordance with all applicable laws and regulations of the Federal Government, the State of California, and the applicable local codes and ordinances.

The site development activities will require certification during and following construction. The Geotechnical Engineer and Engineering Geologist will certify the placement of fills and adequacy of the site for structural improvements in accordance with the CBC. Additionally, the Engineering Geologist will present findings and conclusions pursuant to PRC Section 25523 (a) and (c) 20 CCR Section 1752 (b) and (c).

The following laws, ordinances, codes, and standards have been identified as applying to engineering geology design and construction. In cases where conflicts between cited codes (or standards) exist, the requirements of the more conservative code will be met.

2.2.4.1 Federal

- None are applicable.

2.2.4.2 State —California Building Code

The Warren-Alquist Act (PRC Section 25000, et seq.) and the CEC Siting Regulations (20 CCR, Chapter 2) require that Applications for Certification address geologic and seismic issues. Detailed geologic and seismic information must be provided with respect to safety and reliability concerns and environmental impacts.

The California Environmental Quality Act (CEQA) (PRC Section 21000, et seq.) and the CEQA Guidelines also require that potential significant effects, including geologic hazards, be identified and a determination made as to whether they can be substantially reduced.

2.2.4.3 County

California State Planning Law, Government Code Section 65302, requires each city and county to adopt a general plan, consisting of nine mandatory elements, to guide its physical development. Section 65302 (f) requires that a seismic safety element be included in the general plan. Seismic and geologic hazard plans and regulations are often addressed under the seismic safety elements of general plans or in local building and grading ordinances.

2.2.4.4 Industry Codes and Standards

In addition to the California Codes discussed above, other laws, standards, and ordinances, which typically pertain to engineering geology, include the following:

- California Business and Professions Code Section 7835. Requires registration for geologists (including engineering geologists) who practice for others.

The codes and industry standards used for design, fabrication, and construction will be the codes and industry standards, including all addenda, in effect as stated in equipment and construction purchase or contract documents. Where no other standard or code governs, the CBC will be used.

2.3 Industry Codes and Standards

2.3.1 American Association of State Highway and Transportation Officials (AASHTO)

- A Policy on Geometric Design of Highways and Streets.

2.3.2 American Concrete Institute (ACI)

- ACI 117—Standard Specification for Tolerances for Concrete Construction and Materials.
- ACI 211.1—Standard Practice for Selecting Proportions of Normal, Heavyweight, and Mass Concrete.
- ACI 301—Specifications for Structural Concrete for Buildings.
- ACI 302.1R—Guide for Concrete Floor and Slab Construction.
- ACI 304R—Guide for Measuring, Mixing, Transporting, and Placing Concrete.
- ACI 305R—Hot Weather Concreting.
- ACI 306R—Cold Weather Concreting.
- ACI 308—Standard Practice for Curing Concrete.
- ACI 309R—Guide for Consolidation of Concrete.
- ACI 311AR—Guide for Concrete Inspection.
- ACI 318—Building Code Requirements for Reinforced Concrete.
- ACI 318.1—Building Code Requirements for Structural Plain Concrete.
- ACI 347R—Guide to Formwork for Concrete.

2.3.3 American Society for Testing and Materials (ASTM)

- ASTM A82—Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
- ASTM A116—Standard Specification for Zinc-Coated (Galvanized) Steel Woven Wire Fence Fabric.
- ASTM A121—Standard Specification for Zinc-Coated (Galvanized) Steel Barbed Wire.

- ASTM A185—Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
- ASTM A392—Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric.
- ASTM A615—Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- ASTM C31—Standard Practice for Making and Curing Concrete Test Specimens in the Field.
- ASTM C33—Standard Specification for Concrete Aggregates.
- ASTM C39—Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- ASTM C76—Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
- ASTM C94—Standard Specification for Ready-Mixed Concrete.
- ASTM C109—Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 in. or 50 mm Cube Specimens).
- ASTM C136—Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- ASTM C138—Standard Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete.
- ASTM C143—Standard Test Method for Slump of Hydraulic Cement Concrete.
- ASTM C150—Standard Specification for Portland Cement.
- ASTM C172—Standard Practice for Sampling Freshly Mixed Concrete.
- ASTM C231—Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
- ASTM C260—Standard Specification for Air-Entraining Admixtures for Concrete.
- ASTM C289—Standard Test Method for Potential Reactivity of Aggregates (Chemical Method).
- ASTM C443—Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
- ASTM C478—Standard Specification for Precast Reinforced Concrete Manhole Sections.
- ASTM C494—Standard Specification for Chemical Admixtures for Concrete.
- ASTM C586—Standard Test Method for Potential Alkali Reactivity of Carbonate Rocks for Concrete Aggregates (Rock Cylinder Method).
- ASTM C618—Standard Specification for Coal Fly Ash and Raw or Calcinated Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.

- ASTM C1064—Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete.
- ASTM C1107—Standard Specification for Packaged Dry, Hydraulic Cement Grout (Nonshrink).
- ASTM D422—Standard Test Method for Particle-Size Analysis of Soils.
- ASTM D698—Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft (600 kN-m/m)).
- ASTM D1556—Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
- ASTM D1752—Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
- ASTM D2216—Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock.
- ASTM D2922—Standard Test Methods for Density of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow Depth).
- ASTM D3017—Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
- ASTM D3034—Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- ASTM D3740—Standard Practice for Evaluation of Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- ASTM D4318—Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- ASTM E329—Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.

2.3.4 Concrete Reinforcing Steel Institute (CRSI)

- Manual of Standard Practice.

2.3.5 International Association of Plumbing and Mechanical Officials

- UPC—Uniform Plumbing Code.

2.3.6 International Conference of Building Officials

- CBC—California Building Code.

3.0 Civil Design Criteria

3.1 Foundations

3.1.1 General

Geotechnical exploration, testing, and analysis determine the most suitable bearing methods for foundations. Criteria will be established to permit design of the most economical foundation compatible with the life expectancy and service of the structure.

A summary of subsurface investigations, laboratory testing programs and a geotechnical assessment of the proposed site are presented in the Geotechnical Investigation prepared by Kleinfelder – July 2001. This report is provided in Appendix H1-3 of the HPP AFC, included in Attachment G.

3.1.2 Foundation Design Criteria

Allowable settlements for all foundations (based on predicted elastic or short-term, and consolidation or long-term settlements) will be limited as follows:

Major and minor foundations except as otherwise indicated:

- Total settlement: 1.5 inches.
- Differential settlement: 0.1 percent between adjacent foundations.

Large field erected tanks:

- Total settlement: 6.0 inches.
- Differential settlement: 3.0 inches.

Foundations for all critical structure and equipment will be supported on reinforced concrete mat foundations. Noncritical or lightly loaded structures and equipment will be founded on individual spread footings. The design of reinforced concrete foundations will satisfy the requirements of ACI 318.

Spread footings will have a minimum width of 3 feet, and a minimum width of 2 feet will be provided for wall footings. The bottom of footings will be located a minimum of 12 inches below finished grade.

Detailed foundation design criteria, including allowable bearing pressures, will be developed based on the results of additional subsurface investigations performed during the detailed design phase of the project. Allowable bearing pressures will include a safety factor of at least 3 against bearing failures.

3.1.3 Equipment Foundations

Each piece of equipment will be supplied with a reinforced concrete foundation suitable to its operation. Where the equipment could induce excessive vibration, the foundation will be provided with adequate mass to dampen vibratory motions. Special consideration will be given to vibration and stiffness criteria where specified by an equipment manufacturer. Equipment located within an enclosed building with a grade slab will generally be placed on a concrete pad that is raised above the grade slab to keep the equipment off the floor surface.

Minimum temperature and shrinkage reinforcing steel will be provided for equipment foundations unless additional reinforcement is required for the equipment loads. Anchor bolts designed to develop their yield strength will be provided for critical equipment. For noncritical or lightly loaded equipment, concrete expansion anchors may be used to secure equipment to foundations.

3.1.4 Rotating Equipment Foundations

Dynamic behavior will be considered in the design of foundations subjected to significant rotating equipment loads, such as foundations for the steam turbine and the boiler feedwater pumps. A dynamic analysis will be performed to determine the natural frequencies and dynamic responses of the foundation. To account for soil and structure interaction, geotechnical data will be used to determine the soil stiffnesses and damping coefficients used in the dynamic analysis.

Dynamic responses will satisfy the equipment manufacturer's criteria and/or industry standards in terms of maximum velocity/displacement amplitudes that are considered acceptable for machine and human tolerances. To avoid resonance during machine operation, the resonant frequency of the foundation will typically be less than 80 percent or greater than 120 percent of the machine operating speed.

3.2 Design Loads

3.2.1 General

Design loads for structures and equipment foundations are discussed in Attachment A of the Amendment. Design loads for pavements and buried items will be determined according to the criteria described below, unless the applicable building code requires more severe design conditions.

3.2.2 Wheel Loads

Loads exerted on roadway pavements, buried piping, electrical duct banks, and culverts will be reviewed and selected prior to design of the underlying items. As a minimum, these items will be designed for HS20 loadings in accordance with AASHTO Standard Specifications. Loadings exceeding the HS20 loadings will be considered where found applicable during the detailed design phase.

A surcharge load of 250 psf will be applied to plant structures accessible to truck traffic.

3.3 Site

3.3.1 Site Arrangement

The site arrangement will conform to all applicable laws, regulations, and environmental standards. The principal elements to be considered establishing the site arrangement include the physical space requirements and relationships dictated by each of the major plant systems and the constraints imposed by the physical size and existing topography of the site. Distances from the main plant to various systems will be minimized for economy.

However, adequate clearance between various plant systems will be provided as needed for construction, operations, maintenance, fire protection, and adequate space for storm water drainage systems The plant will be configured to minimize construction costs and visual impacts while remaining operationally effective. Routing for utility interconnections will be optimized as much as practical.

3.3.2 Site Preparation

Site preparation will consist of minimal clearing and grubbing for the area to the east of the existing simple cycle units, excavating soils to design grade, and preparing fill slopes and embankments designed so as to be stable and capable of carrying the anticipated loads from either equipment or structures.

Root mats or stumps, if any, will be removed to a depth of not less than 2 feet below existing grade, and holes will be refilled with compacted material suitable for embankment construction. Materials from clearing and grubbing operations will either be removed from the site or, if suitable, reused onsite.

3.3.3 Earthwork

Earthwork will consist of the removal, storage, and/or disposal of earth, sand, gravel, vegetation, organic matter, loose rock, boulders, and debris to the lines and grades necessary for construction. Material suitable for backfill will be stored in stockpiles at designated locations using proper erosion protection and control methods. Excess and unsuitable material will be removed from the site and disposed of at an acceptable location. If contaminated material is encountered during excavation, it will be disposed of in compliance with applicable federal, state, and local regulations.

Graded areas will be finished to be smooth, compacted, free from irregular surface changes, and sloped to drain. Cut and fill slopes for permanent embankments will be designed to withstand horizontal ground accelerations as defined by the CBC. For slopes requiring soil reinforcement to resist seismic loading, geogrid reinforcement will be used in fill areas and soil nails will be used in cut areas. Slopes for embankments will be no steeper than 2:1 (horizontal:vertical). Construction will be at the existing plant grade, which is fairly level; therefore, major cuts and fills are not anticipated.

Areas to be backfilled will be prepared by removing unsuitable material and rocks. The bottom of an excavation will be examined for loose or soft areas. Such areas will be excavated fully and backfilled with compacted fill.

Backfilling will be in layers of uniform, specified thickness. Soil in each layer will be properly moistened to facilitate compaction and achieve the specified density. To verify compaction, representative field density and moisture-content tests will be taken during compaction. Structural fill supporting foundations, roads, parking areas, etc., will be compacted to at least 95 percent of the maximum dry density as determined by ASTM D698. Embankments, dikes, bedding for buried piping, and backfill surrounding structures will be compacted to a minimum of 90 percent of the maximum dry density. General backfill placed in remote and/or unsurfaced areas will be compacted to at least 85 percent of the maximum dry density.

Where fills are to be placed on subgrades sloped at 6:1 (horizontal:vertical) or greater, keys into the existing subgrade may be provided to help withstand horizontal seismic ground accelerations.

The subgrade (original ground), subbases, and base courses of roads will be prepared and compacted in accordance with Caltrans standards. Testing will be in accordance with ASTM and Caltrans standards.

3.3.4 Site Drainage

The site drainage system will be designed to comply with all applicable federal, state, and local regulations.

Runoff from possible oil contamination areas, such as the lube oil storage area and transformer areas, will be contained and routed to an existing oil/water separator. After passing through the oil/water separator the effluent is routed to an onsite wastewater storage tank.

3.3.4.1 Storm Sewer System

The storm sewer system within the limits of the power block will consist of the existing system of drop inlets and storm drain pipes. The new storm sewer system will include a combination of catch basins, manholes, and storm piping directing drainage to the expanded retention basin on the east side of the project site. All catch basin inlets will be constructed of cast-in-place or precast concrete with top grates. The minimum cover requirement, loading, and material selection for pipes will be adequate for HS20 truck loading.

3.3.4.2 Pre- and Post-Development Runoff Conditions

The existing simple cycle plant site currently consists of asphalt paved loop roads, aggregate surfacing around the power block and supporting facilities, and grass on the remaining perimeter. For the combined cycle conversion, the surfacing around the power block area will remain the same. Asphalt paved looped roads will be added for access to the air cooled condenser (ACC) and supporting facilities. Aggregate surfacing will be used within the loop roads and grass along the remaining perimeter.

Currently storm water is collected through a combination of gradually sloped ditches, catch basins, storm drains, trench drains and culverts. Additional runoff will be directed into the existing ditches, catch basins, storm drains, and culverts to the expanded and relocated retention basin located on the east side of the project site.

Erosion and Sedimentation Control

Erosion and sedimentation control will be provided to retain sediment onsite and prevent violations of water quality standards.

Permanent erosion and sedimentation control measures within the plant site will include the runoff collection system (inlets and drainage piping) and surfaced traffic areas. Final grading within the limits of the new facilities will include aggregate surfacing. These measures will minimize the possibility of any appreciable erosion, and the resulting sedimentation, occurring on the site.

Temporary erosion and sediment control measures which comply with the state and local requirements will be used during the construction phase.

3.3.5 Roads

Access to the plant site is provided by an existing public street to the east of the power block facility.

Access within the overall plant site will be provided by continuation of the loop road consisting of a 20 foot wide asphalt-paved road.

All new roads will be aggregate surfaced during the construction. Periodic watering or applications of a dust palliative material will be used for dust control.

The minimum radius to the inside edge of pavement (EOP) or aggregate surface at intersections of the roads will be 40 feet.

Because of the flat terrain of the plant site, grades for all roads will be minimal.

3.3.6 Fencing and Security

Modifications to the existing chain-link security fencing, topped with barbed wire, will be provided around the added combined cycle power plant facility site and other areas requiring controlled access.

Fencing heights will be in accordance with applicable codes and regulatory requirements.

A controlled access gate will be located at the main entrance to the secured area.

3.3.7 Sanitary Waste System

Sanitary waste is currently conveyed to a county-approved onsite sanitary waste disposal system consisting of a septic tank and a leaching field. The existing system will be adequate for final plant operations.

3.3.8 Spill Protection

Spill containment measures will be provided for chemical storage tanks and chemical additive/lube oil skid areas. All new chemical storage tanks will be provided with a containment structure with a volume equal to at least 110 percent of the tank capacity. In addition, all new outdoor containment structures will have a volume equal to the capacity of the tank, a fire protection flow of 250 gpm for ten minutes, and the volume of rainfall from the 25 year storm event. Concrete curbs will be provided for chemical additive/lube oil skid areas. Where required for protection of the containment structure, appropriate surface coatings will be provided.

3.4 Geotechnical Investigation

A Geotechnical Investigation for the HPP was performed by Kleinfelder. This report is provided in Appendix H1-3 of the HPP AFC, included in Attachment G.

ATTACHMENT A.2.2

Structural and Seismic Engineering Design Criteria

1.0 Introduction

The project design, engineering, procurement, and construction activities will be in accordance with various predetermined standards and project-specific practices. This attachment summarizes the structural and seismic engineering codes and standards, design criteria, and practices that will be used during design and construction. These criteria form the basis for the project structural design work. More specific design information will be developed during detailed design to support equipment procurement and construction specifications. It is not the intent of this attachment to present the detailed design information for each component and system, but rather to summarize the codes, standards, and general criteria that will be used.

Section 2.0 summarizes the applicable codes and standards. Section 3.0 includes the general criteria for natural phenomena, design loads, materials, seismic design, and architecture. Section 4.0 describes the structural design methodology for structures and equipment. Section 5.0 addresses project hazard mitigation.

2.0 Design Codes and Standards

2.1 General Requirements

Work will be designed and specified in accordance with applicable laws and regulations of the Federal Government and the State of California and applicable local codes and ordinances. Except where noted otherwise, the latest issue of codes and standards, including addenda, in effect at the start of the project will be used. The codes and standards, including addenda, in effect at the time of purchase will be used for material and equipment procurement.

A summary of the codes and the standards to be used in design and construction follows:

- Seismic standards and criteria will follow the California Building Code (CBC).
- Specifications for materials will follow the standard specifications of the American Society for Testing and Materials (ASTM) and the American National Standards Institute (ANSI), unless noted otherwise.
- Field and laboratory testing procedures for materials will follow ASTM standards.
- Structural concrete and reinforcing steel will be designed and placed in accordance with the codes, guides, and standards of the American Concrete Institute (ACI) and the Concrete Reinforcing Steel Institute (CRSI).

- Structural steel will be designed, fabricated, and erected in accordance with the American Institute of Steel Construction (AISC) Steel Construction Manual, AISC 325.
- Steel components for metal wall panels and roof decking will conform to the American Iron and Steel Institute (AISI) Specification for the Design of Cold-Formed Steel Structural Members.
- Welding procedures and qualifications for welders will follow the recommended practices and codes of the American Welding Society (AWS).
- Metal surfaces for coating systems will be prepared following the specifications and standard practices of the Steel Structures Painting Council (SSPC) and the specific instructions of the coatings manufacturer.
- Masonry materials will be designed and erected in accordance with the ACI Building Code Requirements for Masonry Structures.
- Roof covering design will comply with the requirements of the National Fire Protection Association (NFPA) and Factory Mutual (FM).
- Design and construction will conform to federal and California Occupational Safety and Health Administration (OSHA and CAL/OSHA) requirements.

Other recognized standards will be used where required to serve as guidelines for design, fabrication, and construction. When no other code or standard governs, the CBC, 2007 Edition will govern.

2.2 Government Rules and Regulations

The following laws, ordinances, codes, and standards are applicable to structural design and construction. In cases where conflicts between cited codes (or standards) exist, the requirements of the more stringent code will govern.

The State of California has advised that they will incorporate the International Building Code (IBC) 2006 Edition into the California Building Code (CBC) on January 1, 2008. Where sections in the CBC have been quoted throughout this document as reference, these sections are based on the 1998 edition of the CBC. However, the latest edition of CBC in force at the start of the project will apply to the engineering design.

2.2.1 Federal

- Title 29, Code of Federal Regulations (CFR), Part 1910, Occupational Safety and Health Standards.
- Title 29, CFR, Part 1926, National Safety and Health Regulations for Construction.
- Walsh-Healy Public Contracts Act (Public Law [PL] 50-204.10).

2.2.2 State

- Business and Professions Code Section 6704, et seq.; Sections 6730 and 6736. Requires state registration to practice as a Civil Engineer or Structural Engineer in California.

- Labor Code Section 6500, et seq. Requires a permit for construction of trenches or excavations 5 feet or deeper into which personnel will descend. This also applies to construction or demolition of any building, structure, false work, or scaffolding which is more than three stories high or equivalent.
- Title 24, California Code of Regulations (CCR) Section 2-111, et seq.; Section 3-100, et seq.; Section 4-106, et seq.; Section 5-1021, et seq.; Section 6-T8-769, et seq.; Section 6-T8-3233, et seq.; Section 6-T8-3270, et seq., Section 6-T8-5138, et seq.; Section 6-T8-5465, et seq.; Section 6-T8-5531, et seq.; and Section 6-T8-5545, et seq. Adopts current edition of CBC as minimum legal building standards.
- Title 8 CCR Section 450, et seq. and Section 750, et seq. Adapts American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASMEB and PVC) and other requirements for unfired and fired boilers.
- Title 8, CCR Section 1500, et seq.; Section 2300, et seq.; and Section 3200, et seq. Describes general construction safety orders, industrial safety orders, and work safety requirements and procedures.
- Regulations of the following state agencies as applicable:
  - Department of Labor and Industry Regulations.
  - Bureau of Fire Protection.
  - Department of Public Health.
  - Water and Power Resources.

2.2.3 Local

- California Building Code.

2.3 Industry Codes and Standards

2.3.1 American Concrete Institute (ACI)

- ACI 117—Standard Specification for Tolerances for Concrete Construction and Materials.
- ACI 211.1—Standard Practice for Selecting Proportions of Normal, Heavyweight, and Mass Concrete.
- ACI 301—Specifications for Structural Concrete for Buildings.
- ACI 302.1R—Guide for Concrete Floor and Slab Construction.
- ACI 304R—Guide for Measuring, Mixing, Transporting, and Placing Concrete.
- ACI 305R—Hot Weather Concreting.
- ACI 306R—Cold Weather Concreting.
- ACI 308—Standard Practice for Curing Concrete.
- ACI 309R—Guide for Consolidation of Concrete.

- ACI 311AR—Guide for Concrete Inspection.
- ACI 318—Building Code Requirements for Reinforced Concrete.
- ACI 318.1—Building Code Requirements for Structural Plain Concrete.
- ACI 347R—Guide to Formwork for Concrete.
- ACI 530—Building Code Requirements for Masonry Structures.
- ACI 530.1—Specifications for Masonry Structures.

2.3.2 American Institute of Steel Construction (AISC)

- AISC 303—Code of Standard Practice for Steel Buildings and Bridges.
- AISC 325—Steel Construction Manual.
- AISC 360—Specification for Structural Steel Buildings.
- AISC 341—Seismic Provisions for Structural Steel Buildings

2.3.3 American Iron and Steel Institute (AISI)

- NAS—North American Specification for the Design of Cold-Formed Steel Structural Members.

2.3.4 American Society for Testing and Materials (ASTM)

- ASTM A36—Standard Specification for Carbon Structural Steel.
- ASTM A53—Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- ASTM A82—Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
- ASTM A106—Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service.
- ASTM A108—Standard Specification for Steel Bars, Carbon, Cold Finished, Standard Quality.
- ASTM A123—Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- ASTM A153—Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- ASTM A185—Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
- ASTM A240—Standard Specification for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels.
- ASTM A276—Standard Specification for Stainless and Heat-Resisting Steel Bars and Shapes.

- ASTM A307—Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
- ASTM A325—Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
- ASTM A446—Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
- ASTM A500—Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- ASTM A501—Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
- ASTM A569—Standard Specification for Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip Commercial Quality.
- ASTM A615—Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- ASTM A706—Standard Specification for Low-alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
- ASTM A992 Standard Specification for Structural Shapes.
- ASTM B695—Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
- ASTM C31—Standard Practice for Making and Curing Concrete Test Specimens in the Field.
- ASTM C33—Standard Specification for Concrete Aggregates.
- ASTM C39—Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- ASTM C90—Standard Specification for Load-Bearing Concrete Masonry Units.
- ASTM C94—Standard Specification for Ready-Mixed Concrete.
- ASTM C109—Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 in. or 50 mm Cube Specimens).
- ASTM C129—Standard Specification for Non-Load-Bearing Concrete Masonry Units.
- ASTM C136—Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- ASTM C138—Standard Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete.
- ASTM C143—Standard Test Method for Slump of Hydraulic Cement Concrete.
- ASTM C150—Standard Specification for Portland Cement.

- ASTM C172—Standard Practice for Sampling Freshly Mixed Concrete.
- ASTM C231—Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
- ASTM C260—Standard Specification for Air-Entraining Admixtures for Concrete.
- ASTM C270—Standard Specification for Mortar for Unit Masonry.
- ASTM C289—Standard Test Method for Potential Reactivity of Aggregates (Chemical Method).
- ASTM C494—Standard Specification for Chemical Admixtures for Concrete.
- ASTM C586—Standard Test Method for Potential Alkali Reactivity of Carbonate Rocks for Concrete Aggregates (Rock Cylinder Method).
- ASTM C618—Standard Specification for Coal Fly Ash and Raw or Calcinated Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.
- ASTM C1064—Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete.
- ASTM C1107—Standard Specification for Packaged Dry, Hydraulic Cement Grout (Nonshrink).
- ASTM D1752—Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
- ASTM E329—Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.
- ASTM F1554—Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.

2.3.5 American Society of Mechanical Engineers (ASME)

- Boiler and Pressure Vessel Code, Section VIII, Rules for Construction of Pressure Vessels, Division 2 - Alternative Rules.
- ASME/STS-1, Steel Stacks.

2.3.6 American Society of Civil Engineers (ASCE)

- ASCE 7—Minimum Design Loads for Buildings and Other Structures.

2.3.7 American Water Works Association (AWWA)

- AWWA D100—Welded Steel Tanks for Water Storage.

2.3.8 American Welding Society (AWS)

- AWS D1.1—Structural Welding Code - Steel.
- AWS D1.4—Structural Welding Code - Reinforcing Steel.

2.3.9 California Energy Commission

- Recommended Seismic Design Criteria for Non-Nuclear Generating Facilities in California.

2.3.10 Concrete Reinforcing Steel Institute (CRST)

- Manual of Standard Practice.

2.3.11 International Code Council

- CBC—California Building Code.
- IBC—International Building Code.

2.3.12 Metal Building Manufacturers Association (MBMA)

- Low Rise Building Systems Manual.

2.3.13 National Fire Protection Association (NFPA)

- NFPA 22—Standard for Water Tanks for Private Fire Protection.
- NFPA 24—Standard for the Installation of Private Fire Service Mains and Their Appurtenances.
- NFPA 80—Standard for Fire Doors and Fire Windows.
- NFPA 101—Life Safety Code
- NFPA 850—Recommended Practice for Fire Protection for Electric Generating Plants.

2.3.14 Steel Structures Painting Council (SSPC)

- Steel Structures Painting Manual, Volume 2, Systems and Specifications.

2.3.15 Research Council on Structural Connections (RCSC)

- Specification for Structural Joints Using ASTM A325 or A490 Bolts.

3.0 Structural Design Criteria

3.1 Natural Phenomena

The design criteria based on natural phenomena are discussed in this section. The climatological data listed were retrieved from the Local Climatological Data, Annual Summaries for 1998, Stockton, CA. The data cover a period of record from 1937 to 1998. The detail design will be based on the latest available data at the start of the project.

3.1.1 Rainfall

- Maximum 24 Hour: 3.01 inches.
- Maximum Monthly: 8.22 inches.
- Normal Annual: 13.95 inches.

The rainfall design basis may vary for the different systems and system components. Precipitation amounts and intensities to be used with each design basis for various durations and return periods will be obtained from TR-25.

3.1.2 Wind Speed

The maximum recorded 5-second wind speed for 1998 is 54 mph. The maximum recorded 2-minute wind speed is 41 mph. The Annual Summary for Local Climatological Data recently introduced 5-second and 2-minute measurements for wind speed. As a result, the Period of Record (POR) for these measurements is only 9 years.

The design basic wind speed will be 85 miles per hour (3-second gust), as determined from Figure 1609 of the IBC. This design wind speed will be used to determine wind loads for all structures as discussed in Section 3.2.3, Wind Loads.

3.1.3 Temperature

- Maximum: 114° F (1972).
- Minimum: 17° F (1990).
- Normal Dry Bulb: 61.6° F.

3.1.4 Relative Humidity

The relative humidity ranges from 26 to 90 percent.

3.1.5 Seismicity

The seismic hazard for the plant site is defined using S_{DS} = 1.23g, S_{D1} = 0.61g, Site Class D, Occupancy Category III and Importance Factor of 1.25 as determined from IBC 2006.

3.1.6 Snow

The plant site is located in a region with zero ground snow load.

3.2 Design Loads

3.2.1 Dead Loads

Dead loads include the weight of all components forming the permanent parts of structures and all permanent equipment. The dead load of permanent plant equipment will be based on actual equipment weights. For major equipment, structural members and foundations will be specifically located and designed to carry the equipment load into the structural system. For equipment weighing less than the uniform live load, the structural system will be designed for the uniform live load.

The contents of tanks and bins at full operating capacity will be considered as dead loads. The contents of tanks and bins will not be considered effective in resisting uplift due to wind forces, but will be considered effective for seismic forces.

A uniform load of 50 psf will be used to account for piping and cable trays, except in administration building areas, and will be carried to the columns and foundations as dead loads. Uniform piping and cable tray loads will not be considered effective in resisting uplift due to wind forces, but will be considered effective for seismic forces. Additional piping loads will be considered in the design of areas with heavy piping concentrations. After critical and/or heavy piping hanger loads and locations are established, the supporting members will be reviewed for structural adequacy.

For piperacks, the weight of piping and cable trays will be treated as live load.

3.2.2 Live Loads

- Live loads are the loads superimposed by the use and occupancy of the building or structure. They do not include wind loads, snow loads, or seismic loads.

Uniformly distributed live loads are specified to provide for movable and transitory loads, such as the weight of people, office furniture and partitions, portable equipment and tools, and other nonpermanent materials. These uniform live loads will not be applied to floor areas permanently occupied by equipment, with no access beneath. Uniform live loads for equipment lay-down areas will be based on the actual weight and size of the equipment and parts that may be temporarily placed on floors during dismantling, maintenance, installation, or removal.

The design live loads will be as follows:

- **Ground Floor (Grade Slab)**—A uniform load of 250 psf, nonpermanent equipment weights, storage weights, or lay-down weights, whichever is greater, will be used.
- **Grating Floors, Platforms, Walkways, and Stairs**—A uniform live load of 100 psf will be used. In addition, a concentrated load of 2 kips will be applied concurrently to the supporting beams to maximize stresses in the members, but the reactions from the concentrated load will not be carried to columns. Maximum deflection of the grating will be limited to 1/200 of the span.
- **Elevated Concrete Slabs**—A uniform load of 100 psf, nonpermanent equipment weights, storage weights, or lay-down weights, whichever is greater, will be used.

Elevated concrete slabs will be designed to support either the prescribed live load or a single concentrated load of 2 kips, whichever produces the greater stresses. The concentrated load will be treated as a uniformly distributed load acting over an area of 2.5 square feet and will be located to produce the maximum stress conditions in the slab.

Metal decking for concrete slabs will be designed for a load during construction equal to the weight of concrete plus 50 psf (no increase in allowable stress).

- **Roof**—Roof areas will be designed for a minimum live load of 20 psf. Ponding loading effect due to roof deck and framing deflections will be investigated in accordance with Appendix 2 of AISC 360, Specification for Structural Steel Buildings.
- **Piperacks**—A minimum uniform load of 100 psf will be used for each level of the piperacks, except that, where piping and cable tray loads exceed 100 psf, the actual loads will be used. In addition, a concentrated load of 5 kips will be applied concurrently to the supporting beams to maximum stresses in the members, but the reactions from the concentrated loads will not be carried to columns.

- **Truck Loads**—A surcharge load of 250 psf will be applied to plant structures accessible to truck traffic.

Roads pavements, underground piping, conduits, sumps, and foundations subject to truck traffic will be designed for wheel loadings in accordance with the HPP AFC Appendix H1, Section 3.2.2, included in Attachment G.

- **Thermal Forces**—Thermal forces caused by thermal expansion of equipment and piping under all operating conditions will be considered.

- **Dynamic Loads**—Dynamic loads will be considered and applied in accordance with the manufacturer's criteria/recommendations and industry standards.

3.2.3 Wind Loads

Wind loads for structures and their components will be determined in accordance with the IBC, using a basic wind speed of 85 mph (3-second gust) at 33 feet above grade. Category III and an Importance Factor of 1.15 will be used.

3.2.4 Seismic Loads

Seismic loads will be determined in accordance with the requirements specified in Section 3.4.

3.2.5 Other Loads

Other expected loads required to predict the structural response of structures will be considered where appropriate (i.e., water hammer, test loads, etc.).

3.2.6 Load Combinations

Applicable code-prescribed load combinations will be considered in the design of structures. As a minimum, the following load combinations will be considered:

- Dead load.
- Dead load + live load + operating loads.
- Dead load + live load + operating loads + wind load.
- Dead load + live load + operating loads + seismic load.
- Dead load + construction loads.
- Dead load + live load + emergency loads.
- Dead load + wind load.
- Dead load + seismic load.

Operating loads include all loads associated with normal operation of the equipment (e.g., temperature and pressure loads, piping loads, normal torque loads, impact loads, etc.).

3.2.7 Strength Requirements

Each load combination will not exceed the stress or strength levels permitted by the appropriate code for that combination.

3.2.7.1 Concrete Structures

The required strength (U) of concrete structures will be at least equal to the following:

- U = 1.4 Dead.
- U = 1.2 Dead + 1.6 Live + 1.6 Earth Pressure.
- U = 1.2 Dead + 0.5 Live + 1.6 Wind.
- U = 0.9 Dead + 1.6 Wind + 1.6 Earth Pressure.
- U = 1.2 Dead + 0.5 Live + 1.0 Seismic.
- U = 0.9 Dead + 1.0 Seismic + 1.6 Earth Pressure.

3.2.7.2 Steel Structures

The required strength will be based on elastic design methods, and will use either the Load and Resistance Factor Design (LRFD) or the Allowable Strength Design (ASD) method as defined in AISC 360, Specification for Structural Steel Buildings. The required strength (U) for the LRFD method will be as given above for Concrete Structures. The required strength (S) for the ASD method will be at least equal to the following:

- S = Dead.
- S = Dead + Live.
- S = Dead + Wind.
- S = Dead + 0.7 Seismic.
- S = Dead + 0.75 Live + 0.75 Wind.
- S = Dead + 0.75 Live + 0.525 Seismic.

For load combinations including seismic loading, frame members and connections will conform to the additional requirements of Section 2205 of the IBC.

3.2.8 Factors of Safety

Minimum factors of safety for foundations supporting structures, tanks, and equipment supports will be as follows:

- Overturning—1.50.
- Sliding:
  - 1.10 for seismic load.
  - 1.50 for wind load.
- Buoyancy—1.25.
- Uplift due to wind—1.50.

3.3 Materials

3.3.1 Structural Steel

3.3.1.1 General

Structural steel will conform to ASTM A36, A992, or other materials as required and accepted for use by AISC 360, Specification for Structural Steel Buildings.

High strength bolts for connections will conform to ASTM A325. Bolts other than high strength bolts will conform to ASTM A307, Grade A. Nonheaded anchor bolts will conform to ASTM F1554. Drilled-in expansion anchors for concrete will be Hilti Kwik Bolts TZ, HSL, HDA, or equivalent.

Structural steel will be detailed and fabricated in accordance with AISC 303, Code of Standard Practice and AISC 360, Specification for Structural Steel Buildings. Structural material will be fabricated and assembled in the shop to the greatest extent possible. Structural members will be welded in accordance with AWS D1.1. Columns will be milled to bear on the baseplate or cap plate. Connections will have a minimum of two bolts.

Exterior structural steel will be either hot-dip galvanized or shop primed and finish painted after installation. Interior structural steel will be shop primed after fabrication. Surface preparation and painting will be in accordance with SSPC standards. Galvanizing will be in accordance with the requirements of ASTM standards.

3.3.1.2 Design and Testing

Steel structures will be designed by either the LRFD or the ASD methods in accordance with the CBC and AISC 360, Specification for Structural Steel Buildings. Connections will be in accordance with AISC 325, Manual of Steel Construction and the RCSC Specification for Structural Joints Using ASTM A325 or A490 Bolts.

Steel structures will be designed as "rigid frames" using fully-restrained (FR) moment connections or as "braced frames", using single-span beam systems with simple connections, vertical diagonal bracing at main column lines, and horizontal bracing at the roof and major floor levels.

Rigid frames will be generally limited to prefabricated metal buildings. All other framed structures will use braced frame design and construction.

Metal roof and floor decking attached with appropriate welding or fasteners may be considered effective as horizontal diaphragms, provided they are previously qualified by the manufacturer. Grating floors will not be considered as providing horizontal rigidity.

Mill test reports or certificates of conformance certifying that material is in conformance with the applicable ASTM specification will be required. In addition, the fabricator will be required to provide an affidavit stating that steel has been furnished in accordance with the requirements of the drawings and the specifications, including specified minimum yield strength.

3.3.1.3 Handrails, Guardrails, and Toe Plates

Handrails and/or guardrails, except for pre-engineered equipment, will be fabricated from standard weight steel pipe and fittings, either galvanized or painted. Handrails will have toe plates where there is no curb.

3.3.1.4 Steel Grating and Grating Stair Treads

The steel to be used for grating and grating treads will conform to either ASTM A36 or ASTM A569. Grating will be rectangular and consist of welded steel construction. Grating will be hot-dip galvanized after fabrication.

Stair treads will have nonslip abrasive nosing and will have end plates for attaching to stringers. Outdoor grating will have a serrated surface.

The Hilti Grating Disk system, or equivalent, will be used for fastening. Grating will have at least a 1-inch bearing support.

Floor and platform openings necessitated by expansion and movement requirements around piping and equipment will be protected as follows:

- Openings more than 1-1/2 inches wide around penetrating objects will be protected by toe plates.
- Openings more than 8 inches wide around penetrating objects will be protected by toe plates and handrails.

3.3.1.5 Stairs and Ladders

Stairs will be the means of travel from one elevation to another. Vertical ladders, ship ladders, etc., will be installed only where personnel access is infrequent.

Fixed ladders will have safety cages and/or other fall prevention devices as required by the applicable codes and regulations. Stairs will have handrails on both sides.

3.3.2 Concrete and Reinforcing Steel

3.3.2.1 General

Materials for concrete will comply with ACI 301. Cement will be portland cement meeting the requirements of ASTM C150. Fine aggregates will be clean natural sand. Coarse aggregates will be crushed stone or gravel. Aggregates will conform to the chemical and physical requirements of ASTM C33. Only clean water of potable quality and satisfying the requirements of ASTM C94 will be used.

Admixtures such as plasticizers and retarders may be used to improve workability and control setting time. Concrete will have an entrained air content between 3 and 6 percent by volume. Air-entraining admixtures will meet ASTM C260 requirements. Water reducing admixtures will conform to ASTM C494, Type A. Calcium chloride or admixtures containing calcium chloride will not be used.

Concrete reinforcing will be deformed bars of intermediate grade billet steel conforming to ASTM A615, Grade 60, or welded wire fabric conforming to ASTM A185.

3.3.2.2 Mix Design

Concrete mix designs will be proportioned and furnished in accordance with ACI 211.1, ASTM C94, and CBC Section 1905. Proportions for the concrete mixture will be selected to meet the strength requirements specified in design documents. Generally, a minimum concrete compressive strength of 4,000 psi at 28 days will be required for structural concrete. Final concrete mix designs will be established based on historical strength performance data or trial mixtures meeting the requirements of Section 1905 of the CBC.

3.3.2.3 Testing and Material Certification

Certified mill test reports on chemical and physical properties confirming compliance with ASTM C150 will be required for each shipment of cement used.

Certificates of Conformance will be obtained from the supplier, certifying that aggregates used comply with the chemical and physical requirements of ASTM C33. Gradation analyses of fine and coarse aggregates, performed in accordance with ASTM C136, will also be provided.

The manufacturer will certify that the admixture provided conforms to the specified ASTM standard and that it contains no chlorides except those that may be contained in the water used in manufacturing the admixture.

The slump, air content, and temperature of the concrete at the point of discharge from the conveying vehicle will be tested in accordance with specified minimum testing frequencies. Concrete strength will be evaluated in accordance with ASTM C94 and CBC Section 1905.

Mill test reports certifying that reinforcing steel is in accordance with ASTM and project specifications will be required.

3.3.2.4 Design

Reinforced concrete structures will be designed by the Strength Design Method, in accordance with the CBC and ACI 318, Building Code Requirements for Reinforced Concrete.

3.4 Seismic Design Criteria

This section provides the general criteria and procedures to be used for the seismic design of buildings, structures, and structural components.

3.4.1 Seismic Performance Objectives

The seismic performance objectives for this facility are as follows:

- Resist minor levels of earthquake ground motion without damage.
- Resist moderate levels of earthquake ground motion without structural damage, but with some nonstructural damage.
- Resist major levels of earthquake ground motion without collapse, but with some structural as well as nonstructural damage.

To achieve these objectives and to meet the requirements of the California Energy Commission (CEC) and local codes, the facility will be designed in accordance with the CBC.

3.4.2 General Criteria

The seismic hazard for the plant site is defined by S_{DS} = 1.23g, S_{D1} = 0.61g and Site Class D according to IBC 2006. For seismic load calculations, the Importance Factor for Category III structures (power plants) is 1.25 based on the 2006 IBC.

Buildings and structures will be designed using either the equivalent lateral force procedure or the modal response spectrum analysis procedure, as defined in the applicable CBC Section.

Buildings and structures requiring ground motion representation will be designed utilizing the elastic design response spectrum in accordance with the applicable CBC Section.

Lateral forces on elements of structures and nonstructural components supported by structures will be determined in accordance with applicable CBC Section.

Water storage tanks will meet the seismic design requirements of AWWA D100, Attachment A.2.2.

3.5 Architecture

3.5.1 General

Architectural work will be in accordance with the applicable laws, ordinances, codes and industry standards, design criteria, guidelines, general requirements, and material selection specified in this section.

The plant will be laid out to accommodate the spaces required for plant equipment and operations. Aisles and clearances will provide access for operation, minor maintenance, and equipment removal. Personnel walkways to equipment (for routine maintenance only), doors, stairs, and other access points will be provided. Plant security and life safety features will also be considered in the plant layout.

3.5.2 Criteria

These criteria are intended to govern the architectural design of structures and facilities.

Safety, construction, fire protection and fire walls, and requirements for the physically handicapped will be in accordance with the requirements of the applicable local, state, and national codes and standards. Requirements of the Americans with Disabilities Act will also be included in the design where applicable.

Plant buildings will be single story pre-engineered buildings with insulated siding. For sloping roofs, roofing will be standing seam metal with insulation and a vapor barrier; for flat roofs, roofing will be single-ply membrane over metal decking with insulation. The Water Treatment Building will house the water treatment equipment, electrical equipment and a chemical laboratory. The equipment areas, electrical rooms, and HVAC equipment spaces will have exposed structure. The laboratory area will have a suspended acoustical ceiling.

Reinforced concrete grade slabs will be treated with a sealer and/or floor hardener, as applicable, to accommodate maintenance or laydown. Interior wall partitions will be concrete block masonry, concrete, or gypsum wallboard on metal studs. Stairs will be concrete, galvanized grating, or checkered plate. Floor drains will be provided as necessary.

3.5.3 Materials

Asbestos- and lead-containing materials will not be used in the facility.

3.5.3.1 Concrete Masonry

Concrete masonry unit (CMU) partitions will generally be used in traffic and spillage areas, in toilets and locker rooms, in the battery and electrical rooms, and as fire boundaries where required by code.

CMU will be both hollow, normal weight, nonload-bearing Type I conforming to ASTM C129, and load-bearing Grade N, Type I conforming to ASTM C90. Mortar will conform to ASTM C270, Type M. CMU will be reinforced as required.

Masonry structures will be designed and constructed in accordance with ACI 530, Building Code Requirements for Masonry Structures; ACI 530.1, Specifications for Masonry Structures; and Chapter 21 of the CBC.

3.5.3.2 Preformed Metal Siding

Exterior siding will be either an insulated or an uninsulated field assembled system. Exterior face panels will be 24 gauge minimum; interior face panels will be 22 gauge minimum. Panels will be fabricated from galvanized sheet steel.

The wall system will be designed to withstand the specified wind loading with practical and economical support girt spacing.

Wall insulation will be noncombustible glass fiber to produce a maximum U-factor of 0.08 Btu/h/ft/F.

3.5.3.3 Metal Studwall Partitions

Except when CMU partitions are required, ceiling height interior partitions will generally be of metal stud and painted gypsum board construction.

3.5.3.4 Roofing

Roofing will be either single-ply membrane over rigid insulation board, mechanically fastened to the metal roof deck, or standing seam metal with insulation and vapor barrier. The completed roofing system will conform to UL requirements for Class A roofs and to Factory Mutual wind uplift Class 90. The completed roof will have an overall maximum U-factor of 0.05 Btu/h/ft/F.

3.5.3.5 Metal Roll-Up Doors

Roll-up doors will have insulated door curtains constructed of interlocking roll-formed galvanized steel slats to withstand the specified wind pressure. Doors will be manually operated.

3.5.3.6 Hollow Metal Doors, Frames, and Hardware

Personnel doors will be flush hollow metal on pressed steel door frames, with hinges, locksets, closers, weatherstripping, and accessory hardware. Fire doors and frames will conform to NFPA 80 for the class of door furnished.

3.5.3.7 Louvers

Louvers will be operable, extruded aluminum section alloy, with stainless steel fastenings and removable aluminum bird screen. Blades will be stormproof. Louver free area will be a minimum of 50 percent of louver face area. Louvers will be designed for manual or gravity operation.

3.5.3.8 Floor Finish

Floor finishes will generally be concrete with curing and sealing protection.

All chemical areas will generally receive special coatings.

3.5.4 Painting

Generally, exposed wall surface, structures, and structural components will be primer painted or otherwise treated to protect them from corrosion in accordance with the applicable codes, industry standards, and manufacturer's recommendations.

3.5.4.1 Structural and Miscellaneous Steel

Structural and miscellaneous steel will receive shop applied inorganic zinc primer. Field touchup will be performed after erection. Structural steel requiring fireproofing will either receive no painting or a primer compatible with the selected fireproofing material.

3.5.4.2 Masonry Walls and Concrete Walls and Floors

Concrete floors in areas not exposed to chemical contaminants will not be coated. Indoor masonry walls in areas requiring paint but not exposed to chemical contaminants will be painted with one coat of acrylic filler and a compatible finish coat.

3.5.4.3 Gypsum Wallboard

Exposed surfaces will receive one coat each of sealer and compatible acrylic finish.

4.0 Structural Design Methodology

This section describes the structural aspects of the design of the proposed equipment to convert the existing Simple Cycle facility to a Combined Cycle facility. Each major structural component of the plant equipment to be added is addressed by defining the design criteria and analytical techniques that will be employed.

4.1 Structures

4.1.1 Steam Turbine/Generator Foundation

The steam turbine/generator turbine foundation will be designed to support the turbine and generator components.

Each foundation will be designed to resist the loadings furnished by the manufacturer plus loadings from natural phenomena and structural framing, if applicable, and will be constructed of reinforced concrete.

4.1.1.1 Foundation Loads

Equipment foundation loads will be furnished by the steam turbine/generator manufacturer and will be combined with the other loads imposed on the foundation. Typical loading data supplied by the manufacturer include the following. The steam turbine/generator foundation will be designed for these loads:

- Dead loads.
- Live loads.
- Wind loads.
- Seismic loads.
- Normal torque loads.

- Normal machine unbalance loads.
- Emergency loads, such as turbine accident or generator short circuit.
- Thermal loads due to thermal expansion or contraction of the machines, connected piping, and turbine pedestal components.
- Shrinkage and creep loads.

4.1.1.2 Induced Forces

The steam turbine/generator and associated equipment will be securely anchored to the foundation using cast-in-place steel anchor bolts designed to resist the equipment forces and seismic or wind loads.

4.1.1.3 Structural System

The steam turbine/generator foundation system will consist of a reinforced concrete mat bearing directly on undisturbed soil or compacted fill.

4.1.1.4 Structural Criteria

Each foundation will be designed and constructed as a monolithic reinforced concrete structure using the criteria from Section 3.0 and Attachment A.2.2, Section 3.1. The foundation design will address the following considerations:

- Allowable soil pressures.
- Allowable settlements.
- Equipment, structure, and environmental loads.
- Factors of safety against overturning and sliding.
- Equipment performance criteria.
- Natural frequencies and dynamic effects of rotating equipment.
- Access and maintenance.

Soil pressures will satisfy the allowable bearing pressure criteria that will be developed during project detailed design to provide a minimum safety factor of 3 against bearing failure. Total and differential settlements will be limited to the values specified in the HPP AFC, Appendix H1, Section 3.1.2, included in Attachment G.

Environmental loadings will be determined in accordance with Sections 3.1 and 3.2. Foundation seismic loading will be calculated as specified in Section 3.4. Seismic forces will be applied at the center of gravity of the equipment.

Load combinations and their respective strength requirements for the foundation design will be as indicated in Sections 3.2.6 and 3.2.7. Factors of safety against overturning and sliding will satisfy the requirements of Section 3.2.8.

4.1.1.5 Analytical Techniques

Steam Turbine/Generator Foundation

The mat foundation for the steam turbine/generator will be designed using static analysis techniques. If adequate rigidity is provided, the mat will be analyzed as a rigid mat foundation to determine the resulting soil pressures and internal forces and moments. The foundation will be analyzed assuming a linear soil pressure distribution.

If its rigidity is in question, the foundation mat will be considered as a flexible system and modeled as a plate structure using 3-D plate bending elements. The interaction between the mat and supporting soil will be modeled using a system of vertical and horizontal springs attached to a fixed boundary. A computer analysis will be performed using finite element techniques.

The foundation will be checked for dynamic response to the operating turbine. A dynamic analysis will typically be performed by considering the mat foundation as rigid and using a lumped mass model. The lumped mass model will include soil springs and dashpots to account for soil and structure interaction. An analysis will be performed to determine the natural frequencies of the foundation using the lumped mass model. When the rigidity of the mat foundation is in question, the mat will be considered flexible and will be modeled by plate elements, and a dynamic analysis will be performed using finite element computer analysis.

To avoid resonance during machine operation, the resonant frequency of the foundation will typically be less than 80 percent or greater than 120 percent of the machine operating speed.

4.1.2 Once Through Steam Generator (OTSG) Foundations

The OTSG foundations will be designed to support the OTSG components.

Each foundation will be designed to resist the loadings furnished by the manufacturer plus loadings from natural phenomena and structural framing, if applicable, and will be constructed of reinforced concrete.

4.1.2.1 Foundation Loads

Equipment foundation loads will be furnished by the OSTG manufacturer and will be combined with the other loads imposed on the foundation. Typical loading data supplied by the manufacturer include the following. The OSTG foundations will be designed for these loads:

- Dead loads.
- Live loads.
- Wind loads.
- Seismic loads.
- Normal torque loads.
- Thermal loads due to thermal expansion or contraction of the equipment and connected piping.
- Shrinkage and creep loads.

4.1.2.2 Induced Forces

The OSTG and associated equipment will be securely anchored to the foundation using cast-in-place steel anchor bolts designed to resist the equipment forces and seismic or wind loads.

4.1.2.3 Structural System

The OSTG foundation system will consist of a reinforced concrete mat bearing directly on undisturbed soil or compacted fill.

4.1.2.4 Structural Criteria

Each foundation will be designed and constructed as a monolithic reinforced concrete structure using the criteria from the HPP AFC Appendix H1, included in Attachment G. The foundation design will address the following considerations:

- Allowable soil pressures.
- Allowable settlements.
- Equipment, structure, and environmental loads.
- Factors of safety against overturning and sliding.
- Equipment performance criteria.
- Natural frequencies and dynamic effects of rotating equipment.
- Access and maintenance.

Soil pressures will satisfy the allowable bearing pressure criteria that will be developed during project detailed design to provide a minimum safety factor of 3 against bearing failure. Total and differential settlements will be limited to the values specified in the HPP AFC Appendix H1.

Environmental loadings will be determined in accordance with Sections 3.1 and 3.2. Foundation seismic loading will be calculated as specified in Section 3.4. Seismic forces will be applied at the center of gravity of the equipment.

Load combinations and their respective strength requirements for the foundation design will be as indicated in Sections 3.2.6 and 3.2.7. Factors of safety against overturning and sliding will satisfy the requirements of Section 3.2.8.

4.1.2.5 Analytical Techniques

OSTG Foundations

The mat foundations for the OSTG's will be designed using static analysis techniques. If adequate rigidity is provided, the mat will be analyzed as a rigid mat foundation to determine the resulting soil pressures and internal forces and moments. The foundation will be analyzed assuming a linear soil pressure distribution.

If its rigidity is in question, the foundation mat will be considered as a flexible system and modeled as a plate structure using 3-D plate bending elements. The interaction between the mat and supporting soil will be modeled using a system of vertical and horizontal springs attached to a fixed boundary. A computer analysis will be performed using finite element techniques.

4.1.3 Stacks and Foundations

Each stack will be carbon steel with a separate reinforced concrete mat foundation bearing directly on undisturbed soil or compacted fill or monolithic with the OSTG foundation.

4.1.3.1 Foundation Loads

Foundation loads will be determined using project-specific design criteria. The design will include the following loads:

- Dead load.
- Live loads.
- Wind loads.
- Seismic loads.
- Temperature and pressure loads.

4.1.3.2 Induced Forces

The stack will be securely anchored to its foundation using cast-in-place steel anchor bolts designed to resist the stack-induced forces.

4.1.3.3 Structural System

The steel stack will consist of a cylindrical steel shell that resists lateral loading as a fixed-base, cantilevered structure. The stack foundation system will consist of a reinforced concrete mat bearing directly on undisturbed soil or compacted fill.

4.1.3.4 Structural Criteria

The predominant forces acting on the stack will result from wind or seismic loading. The stack will be designed as indicated in this section.

The steel stack and supports will be capable of enduring specified normal and abnormal design operating conditions in combination with wind or seismic loads for the design life of the facility. The design will be in accordance with the design methods of ASME STS-1, Steel Stacks, and AISC 325, Steel Construction Manual.

Design values for yield strength and modulus of elasticity of the stack material will depend on the composition of the material and the maximum temperature of the metal at design operating conditions and will be as prescribed by the ASME Pressure Vessel Code, Section VIII, Division 2, Part AM.

Wind loads will be determined from the CBC, using Exposure Category C. Consideration will be given to along-wind and across-wind responses, ovalling, and interference effects. Seismic loads will be determined in accordance with CBC for Nonbuilding Structures.

The allowable longitudinal, circumferential, and shear stresses for the design of the stack shell will be determined in accordance with ASME STS-1.

The minimum shell thickness will be 1/4 inch plus 1/16 inch corrosion allowance. The corrosion allowance will be considered in the generation of seismic loads but not in the resistance to seismic or wind loads. Allowable stresses for stiffeners, platform members, and other miscellaneous steel components will be in accordance with AISC 360, Specification for Structural Steel Buildings. Allowable stresses for the shell will not be increased for wind or seismic loadings.

Each foundation will be designed and constructed as a monolithic reinforced concrete structure using the criteria from the HPP AFC Appendix H1, included in Attachment G. The foundation design will address the following considerations:

- Allowable soil pressures.
- Allowable settlements.
- Structure and environmental loads.
- Factors of safety against overturning and sliding.

Soil pressures will satisfy the allowable bearing pressure criteria that will be developed during project detailed design to provide a minimum safety factor of 3 against bearing failure. Total and differential settlements will be limited to the values specified in the HPP Appendix H1, included in Attachment G.

Load combinations and their respective strength requirements for the foundation design will be as indicated in Sections 3.2.6 and 3.2.7. Factors of safety against overturning and sliding will satisfy the requirements of Section 3.2.8.

4.1.3.5 Analytical Techniques

Stack moments, shears, and axial forces will be calculated using static analysis procedures on a cantilevered member. Longitudinal stresses resulting from axial loads and flexure will be combined and compared to a single allowable stress.

Circumferential stresses will also be compared to a single allowable value. Interaction between longitudinal and circumferential stresses will be considered.

The stack foundation will typically be designed using static analysis techniques assuming a rigid mat.

4.1.4 Air Cooled Condenser (ACC) Foundations

The ACC foundations will be designed to support the ACC components.

Each foundation will be designed to resist the loadings furnished by the manufacturer plus loadings from natural phenomena and structural framing and will be constructed of reinforced concrete.

4.1.4.1 Foundation Loads

Equipment foundation loads will be furnished by the ACC manufacturer and will be combined with the other loads imposed on the foundation. Typical loading data supplied by the manufacturer include the following. The ACC foundations will be designed for these loads:

- Dead loads.
- Live loads.
- Wind loads.
- Seismic loads.
- Normal torque loads.

- Thermal loads due to thermal expansion or contraction of the equipment and connected piping.
- Shrinkage and creep loads.

4.1.4.2 Induced Forces

The ACC and associated equipment will be securely anchored to the foundation using cast-in-place steel anchor bolts designed to resist the equipment forces and seismic or wind loads.

4.1.4.3 Structural System

The ACC foundation system will consist of reinforced concrete mats and grade beams bearing directly on undisturbed soil or compacted fill.

4.1.4.4 Structural Criteria

The foundation mats and grade beams will be designed and constructed as a monolithic reinforced concrete structure using the criteria from the HPP Appendix H1, included in Attachment G.

The HPP Appendix H1, included in Attachment G addresses the following foundation design considerations:

- Allowable soil pressures.
- Allowable settlements.
- Equipment, structure, and environmental loads.
- Factors of safety against overturning and sliding.
- Equipment performance criteria.
- Natural frequencies and dynamic effects of rotating equipment.
- Access and maintenance.

Soil pressures will satisfy the allowable bearing pressure criteria that will be developed during project detailed design to provide a minimum safety factor of 3 against bearing failure. Total and differential settlements will be limited to the values specified in Attachment A.2.2, Section 3.1.2.

Environmental loadings will be determined in accordance with Sections 3.1 and 3.2. Foundation seismic loading will be calculated as specified in Section 3.4. Seismic forces will be applied at the center of gravity of the equipment.

Load combinations and their respective strength requirements for the foundation design will be as indicated in Sections 3.2.6 and 3.2.7. Factors of safety against overturning and sliding will satisfy the requirements of Section 3.2.8.

4.1.4.5 Analytical Techniques

ACC Foundation

The mat and grade beam foundation for the ACC will be designed using static analysis techniques. If adequate rigidity is provided, the foundation will be analyzed as a rigid mat foundation to determine the resulting soil pressures and internal forces and moments. The foundation will be analyzed assuming a linear soil pressure distribution.

If its rigidity is in question, the foundation will be considered as a flexible system and modeled as a plate structure using 3-D plate bending elements. The interaction between the foundation and supporting soil will be modeled using a system of vertical and horizontal springs attached to a fixed boundary. A computer analysis will be performed using finite element techniques.

4.1.5 Pipe Rack and Steam Turbine Maintenance Area Structures

The Pipe Rack will be designed to support the pipe and electrical interfaces between the OTSG's and the Steam Turbine/Generator. The Steam Turbine/Generator Maintenance area will be designed to provide area for lay down of parts and personnel access to the equipment during overhaul and maintenance operations.

The Pipe Rack and Steam Turbine/Generator Maintenance Structure foundations will be designed to support the loads from the structures.

Each foundation will be designed to resist the loadings from the equipment and components being supported plus loadings from natural phenomena and structural framing and will be constructed of reinforced concrete.

4.1.5.1 Foundation Loads

The structure foundation loads will be determined during the plant design phase and will be combined with the other loads imposed on the foundation. Typical loading data include the following. The structure foundations will be designed for these loads:

- Dead loads.
- Live loads.
- Wind loads.
- Seismic loads.
- Normal torque loads.
- Thermal loads due to thermal expansion or contraction of the equipment and connected piping.
- Shrinkage and creep loads.

4.1.5.2 Induced Forces

The pipe rack and steam turbine/generator maintenance structures and associated equipment will be securely anchored to the foundation using cast-in-place steel anchor bolts designed to resist the equipment forces and seismic or wind loads.

4.1.5.3 Structural System

The Pipe Rack and Steam Turbine/Generator Maintenance Structures will be designed as AISC Type 1 rigid frames or as Type 2 simple braced frames. For the purpose of resisting seismic lateral loads, the structures will be classified as regular structures with a concentric braced frame, an ordinary moment-resisting frame, or a special moment-resisting frame, in accordance with the definitions of the CBC Chapters 16 to 22.

The structure foundation systems will consist of reinforced concrete mats and grade beams bearing directly on undisturbed soil or compacted fill.

4.1.5.4 Structural Criteria

Pipe Rack and Steam Turbine/Generator Maintenance Structure steel frames will be designed and constructed using the materials and criteria set forth in Section 3.0. Environmental loading will be determined in accordance with Sections 3.1 and 3.2. Seismic loading for the structures will be calculated using equivalent static lateral forces or dynamic lateral forces applied to the structure in accordance with the procedures of CBC.

Structure foundations will be designed and constructed using reinforced concrete according to the criteria set forth in the HPP Appendix H1, included in Attachment G. The foundation design will address the following considerations:

- Allowable soil pressures.
- Allowable settlements.
- Equipment, structure, and environmental loads.
- Factors of safety against overturning and sliding.
- Equipment performance criteria.
- Access and maintenance.

Soil pressures will satisfy the allowable bearing pressure criteria that will be developed during project detailed design to provide a minimum safety factor of 3 against bearing failure. Total and differential settlements will be limited to the values specified in Appendix H1, Section 3.1.2.

Load combinations and their respective strength requirements for the foundation design will be as indicated in Sections 3.2.6 and 3.2.7. Factors of safety against overturning and sliding will satisfy the requirements of Section 3.2.8.

4.1.5.5 Analytical Techniques

Pipe Rack and Steam Turbine/Generator Maintenance Structure Foundations

The mat and grade beam foundations for the structures will be designed using static analysis techniques. If adequate rigidity is provided, the foundations will be analyzed as rigid mat foundations to determine the resulting soil pressures and internal forces and moments. The foundations will be analyzed assuming a linear soil pressure distribution.

If the rigidity is in question, the foundations will be considered as flexible systems and modeled as a plate structures using 3-D plate bending elements. The interaction between the foundation and supporting soil will be modeled using a system of vertical and horizontal springs attached to a fixed boundary. A computer analysis will be performed using finite element techniques.

4.1.6 Buildings and Enclosures

The various plant buildings and enclosures will provide support, protection, and access to the systems contained within their boundaries. Generally, each building and enclosure will be one story and pre-engineered.

4.1.6.1 Foundation Loads

Foundation loads will be determined from the analysis and design of the superstructure and from the support of the equipment contained within the structure. The following loads will be considered:

- Dead loads.
- Live loads.
- Equipment and piping loads.
- Wind loads.
- Seismic loads.

4.1.6.2 Induced Forces

Each building and enclosure will be securely anchored to its foundation using cast-in-place steel anchor bolts designed to resist any induced forces.

4.1.6.3 Structural System

Buildings and enclosures will be designed as rigid frames or as braced frames. For the purpose of resisting seismic lateral loads, the structures will be classified as regular structures with a concentric braced frame, an ordinary moment-resisting frame, or a special moment-resisting frame, in accordance with the definitions of the CBC Chapters 16 to 22.

The foundation systems for buildings and enclosures will consist of individual spread footings to resist the column loads with an isolated slab-on-grade floor system.

4.1.6.4 Structural Criteria

Building and enclosure steel frames will be designed and constructed using the materials and criteria set forth in Section 3.0.

Environmental loading will be determined in accordance with the HPP Appendix H1, included in Attachment G. Seismic loading for the buildings and enclosures will be calculated using equivalent lateral forces applied to the structure in accordance with the procedures of the CBC.

Building and enclosure foundations will be designed and constructed using reinforced concrete according to the criteria set forth in the HPP Appendix H1, included in Attachment G. The foundation design will address the following considerations:

- Allowable soil pressures.
- Allowable settlements.
- Equipment, structure, and environmental loads.
- Factors of safety against overturning and sliding.
- Equipment performance criteria.
- Access and maintenance.

Soil pressures will satisfy the allowable bearing pressure criteria that will be developed during project detailed design to provide a minimum safety factor of 3 against bearing failure. Total and differential settlements will be limited to the values specified in the HPP Appendix H1, included in Attachment G.

Load combinations and their respective strength requirements for the foundation design will be as indicated in Sections 3.2.6 and 3.2.7. Factors of safety against overturning and sliding will satisfy the requirements of Section 3.2.8.

4.1.6.5 Analytical Techniques

Building and enclosure foundations will be designed as simple spread footings or mat foundations, using static analysis techniques. The foundations will be analyzed assuming a linear soil pressure distribution.

4.2 Tanks

4.2.1 Field-Erected Storage Tanks

Field-erected storage tanks will typically be vertical, cylindrical shells of stainless steel or carbon steel construction with a protective interior coating. Tank roofs will be either self-supported domes or cones. Tank bottoms will be ground-supported, flat-bottomed, with a slope of 1 percent. Tanks will have ladders, landing platforms, and handrails to provide access to working areas. Vents, manholes, overflow piping, and grounding lugs will be provided as necessary.

4.2.1.1 Foundation Loads

Foundation loads will be determined using project-specific design criteria. Tank and foundation design will include the following loads:

- Dead loads (including contained fluid load).
- Live loads.
- Wind loads.
- Seismic loads (including hydrodynamic loads).

4.2.1.2 Induced Forces

Storage tanks will be securely anchored to their foundations using cast-in-place steel anchor bolts designed to resist tank-induced forces.

4.2.1.3 Structural System

Each tank will be a cylindrical steel shell that resists lateral loading through shear in the tank wall. Anchor bolts connecting the tank wall to the foundation will resist overturning.

The tank foundation system will typically consist of a reinforced concrete ringwall or mat foundation. The interior of the ring will consist of compacted backfill with a layer of compacted sand to serve as a bearing surface for the tank bottom. If soil conditions could result in excessive settlements or soil overstress, a complete concrete mat may be required.

4.2.1.4 Structural Criteria

Tank structures will be designed and constructed using the criteria established in AWWA D100 or NFPA 22, as applicable.

Foundations will be designed and constructed as reinforced concrete structures using the criteria from the HPP Appendix H1, included in Attachment G. Foundation design will address the following considerations:

- Allowable soil pressures.

- Allowable settlements.
- Fluid, structure, and environmental loads.
- Factors of safety against overturning and sliding.

Soil pressures will satisfy the allowable bearing pressure criteria that will be developed during project detailed design to provide a minimum safety factor of 3 against bearing failure. Total and differential settlements will be limited to the values specified in he HPP Appendix H1, included in Attachment G.

Environmental loadings will be determined in accordance with Sections 3.1 and 3.2. Seismic loads will be determined in accordance with Section 3.4 and AWWA D100, Section 13.

Load combinations and their respective strength requirements for the foundation design will be as indicated in Sections 3.2.6 and 3.2.7 of this Attachment and in Section 3 of AWWA D100. Factors of safety against overturning and sliding will satisfy the requirements of Section 3.2.8.

Tank foundation design will include the moment resulting from lateral displacement (hydrodynamics) of the tank contents in accordance with AWWA D100, Section 13.3.3.2.

4.2.1.5 Analytical Techniques

Tank foundations will typically be designed as circular ringwalls using static analysis techniques. Each ringwall will be proportioned to resist the design load of the tank and the maximum overturning moment due to wind or seismic loading. The ringwall will also be proportioned to resist maximum anchor bolt uplift force. Circumferential reinforcing steel will be provided in the ringwall to develop the hoop stress produced by the lateral soil pressure within the ringwall.

Tank structures will be designed and proportioned so that during the application of any load, or combination of loads, the allowable stresses stipulated in AWWA D100 are not exceeded.

4.2.2 Shop Fabricated Storage Tanks

Shop fabricated storage tanks will be either vertical or horizontal, cylindrical, carbon steel shells. The tanks will have ladders, landing platforms, and handrails, to provide access to working areas. Each tank will have nozzles for fill connection, fill drain, overflow, vent connections, manholes, and grounding lugs as necessary.

4.2.2.1 Foundation Loads

Foundation loads will be furnished by the tank manufacturer and will be superimposed with loads for the foundation itself.

Typical loadings supplied by the manufacturer include the following:

- Dead loads.
- Live loads.
- Wind loads.
- Seismic loads (including hydrodynamic loads).
- Temperature and pressure loads.

4.2.2.2 Induced Forces

Each tank will be securely anchored to its foundation using cast-in-place steel anchor bolts or concrete expansion anchors designed to resist tank-induced forces.

4.2.2.3 Structural System

Each tank will consist of a cylindrical steel shell, either supported by integral legs or saddle supports, or with a flat bottom bearing directly on the foundation.

Foundations will typically consist of individual pads bearing directly on undisturbed soil or compacted fill. For tanks located in buildings, the pads may be constructed integrally with the grade slab.

4.2.2.4 Structural Criteria

Tanks will be designed by a tank manufacturer in accordance with the relevant ASME code, ANSI code, and ASTM standards.

Foundations will be designed and constructed as monolithic reinforced concrete structures using the criteria from Section 3.0 of this Attachment and in the HPP Appendix H1, included in Attachment G. Foundation design will address the following considerations:

- Allowable soil pressures.
- Allowable settlements.
- Fluid, structure, and environmental loads.
- Factors of safety against overturning and sliding.

Soil pressures will satisfy the allowable bearing pressure criteria that will be developed during project detailed design to provide a minimum safety factor of 3 against bearing failure. Total and differential settlements will be limited to the values specified in the HPP Appendix H1, included in Attachment G.

Environmental loadings will be determined in accordance with Sections 3.1 and 3.2. Seismic loading will be calculated using equivalent static lateral forces applied at the center of gravity of the tank or tank component in accordance with the criteria specified in Section 3.4.

Load combinations and their respective strength requirements for the foundation design will be as indicated in Sections 3.2.6 and 3.2.7. Factors of safety against overturning and sliding will satisfy the requirements of Section 3.2.8.

4.2.2.5 Analytical Techniques

The tank foundations will typically be designed using static analysis techniques assuming a rigid mat. The foundations will be analyzed assuming a linear soil pressure distribution. The mats will be proportioned so that the resultant of the soil pressure coincides as nearly as possible with the resultant of the vertical loading.

The tanks will be designed and analyzed by a tank manufacturer to satisfy the requirements of the relevant ASME code, ANSI code, and ASTM standards.

4.3 Equipment and Equipment Foundations

Plant equipment will be designed in accordance with manufacturers' standards and applicable codes and industry standards. Equipment will be designed to resist project-specific environmental loadings, as applicable.

Foundations will be designed to resist the loadings furnished by the manufacturers and will be constructed of reinforced concrete.

Specific criteria for the combustion turbine foundations are addressed in Section 4.1.1.

4.3.1 Equipment/Foundation Loads

Equipment and foundation loads will be determined by the manufacturers using project-specific design criteria. Typical loadings used for design will include the following:

- Dead loads.
- Live loads.
- Operating loads.
- Wind loads.
- Seismic loads.
- Emergency loads.

Foundation loads furnished by the equipment manufacturers will be superimposed with loads for the foundation itself.

4.3.2 Induced Forces

The equipment will use steel anchor bolts, concrete expansion anchors, welds, and other equipment anchorage devices to resist equipment-induced forces.

4.3.3 Structural System

Foundations will typically consist of individual pads bearing directly on undisturbed soil or compacted fill. For equipment located in buildings, the pads may be constructed integrally with the grade slab.

4.3.4 Structural Criteria

Plant equipment will be designed to resist project-specific criteria in accordance with the manufacturers' standards and applicable codes and industry standards.

Environmental loading will be determined in accordance with Sections 3.1 and 3.2. Seismic loading will be calculated using equivalent static lateral forces applied at the center of gravity of the equipment or component in accordance with the criteria specified in Section 3.4.

Seismic lateral forces on equipment supported by structures will be determined in accordance with applicable CBC Sections. Equipment bases, foundations, support frames, and structural members used to transfer equipment seismic forces to the main lateral load-resisting system will be designed for the same seismic load as the equipment.

Integral support structures provided by manufacturers with their equipment, such as the combustion turbine air inlet support structure, will be designed to resist, at a minimum, the lateral forces specified in CBC Section for Nonbuilding Structures, and the applicable criteria of Section 3.4.

Load combinations will be as indicated in Section 3.2.6. These load combinations are in addition to those normally used in design and those specified in applicable codes and standards.

Equipment foundations will be designed and constructed as monolithic reinforced concrete structures using the criteria from in the HPP Appendix H1, included in Attachment G.

The foundation design will address the following considerations:

- Allowable soil pressures.
- Allowable settlements.
- Equipment and environmental loads.
- Factors of safety against overturning and sliding.
- Equipment performance criteria.
- Access and maintenance.

Soil pressures will satisfy the allowable bearing pressure criteria that will be developed during project detailed design to provide a minimum safety factor of 3 against bearing failure. Total and differential settlements will be limited to the values specified in the HPP Appendix H1, included in Attachment G.

Load combinations and their respective strength requirements for the foundation design will be as indicated in Sections 3.2.6 and 3.2.7. Factors of safety against overturning and sliding will satisfy the requirements of Section 3.2.8.

4.3.5 Analytical Techniques

Equipment foundations will typically be designed using static analysis techniques assuming a rigid mat. Foundations will be analyzed assuming a linear soil pressure distribution. Mats will be proportioned so that the resultant of the soil pressure coincides as nearly as possible with the resultant of the vertical loading.

Equipment will be designed and analyzed by the manufacturer to satisfy the requirements of the relevant codes and industry standards.

5.0 Hazard Mitigation

The project will be designed to mitigate natural and environmental hazards caused by seismic and meteorological events. This section addresses the structural design criteria used to mitigate these hazards.

5.1 Seismic Hazard Mitigation Criteria

The HPP Appendix H1, included in Attachment G and this attachment describe the civil and structural design criteria that will be applied to the project.

Project seismic design criteria were selected based on the following considerations:

- Compliance with applicable laws, ordinances, regulations, codes, and life safety.
- Structural behavior and performance.
- Reliability of the plant.

- Financial impacts from seismically induced outages.
- Seismic probability and magnitude.

The project seismic design criteria were developed to incorporate these considerations using a systematic approach to correlate performance criteria with assumed risk level. The following procedure was used to establish the design criteria:

- Seismic hazard for the site defined by S_{DS} = 1.23g, S_{D1} = 0.61g and Site Class D in the IBC 2006 Edition was determined to be appropriate for structural design.

- Appropriate design criteria and analysis methods consistent with the seismic performance criteria were established for each major plant structure, equipment, and component.

- Acceleration levels for various structural frequencies will be based on the applicable CBC Design Response Spectra Shapes Figures.

Specific design features that will be incorporated into the plant to mitigate the identified seismic hazards include the following:

- Appropriate analysis techniques will be employed to calculate structure-specific seismic loads.

- Plant structures, equipment, piping, and other components will be designed to resist the project-specific seismic loads.

- Critical equipment will be positively anchored to its supporting structure.

- Anchorages will be designed to resist project-specific seismic loadings.

- Adequate factors of safety against overturning and sliding due to seismic loads will be provided.

- The design of piping connections to structures, tanks, and equipment will consider differential seismic displacements between components.

- Adjacent structures will be seismically isolated from one another.

- Structural elements will be designed to comply with special detailing requirements intended to provide ductility.

- Connections for steel structures will have a minimum load carrying capability without regard to the calculated load.

- Lateral and vertical displacements of structures and elements of structures will be limited to specified values.

- Appropriate measures will be taken to prevent saturation of foundation soils and eliminate the potential for soil liquefaction.

The foregoing design features are intended to provide the degrees of safety for structures and equipment as follows:

- Resist minor earthquakes without damage. Plant remains operational.

- Resist moderate earthquakes without structural damage but with some nonstructural damage. Plant remains operational or is returned to service following visual inspection and/or minor repairs.

Resist design basis major earthquake without collapse but with structural and nonstructural damage.

5.2 Meteorological and Climatic Hazard Mitigation

Meteorological and climatic data were used to establish the project design basis. Portions of the data and the design bases that pertain to structural engineering are provided in this attachment.

Specific design features which will be incorporated into the plant to mitigate meteorological and climatic hazards include the following:

- Structures and cladding will be designed to resist the wind forces.
- Sensitive structures will be designed for wind-induced vibration excitation.
- Roofs will be sloped and equipped with drains to prevent accumulation of rainfall.
- Site drainage systems will be designed to convey the runoff from a 100 year, 10 day storm event.
- Ground floor levels of structures will be placed above probable flood levels.
- Building drainlines will be installed with backflow prevention devices where necessary.
- The bases of plant equipment will be placed above probable flood levels.
- The plant site will be graded to convey runoff away from structures and equipment.

The foregoing design features will be incorporated in accordance with the applicable codes and standards identified in this attachment.

The degree of safety offered by these features is consistent with the requirements of the applicable codes and standards and the economic benefits these features provide.

ATTACHMENT A.2.3

Mechanical Engineering Design Criteria

1.0 Introduction

This section covers the design criteria which will be used for all mechanical work related to this project.

2.0 Design Codes and Standards

The design and specification of all work shall be in accordance with the laws and regulations of the federal government and the state of California, and local codes and ordinances. The following laws, ordinances, codes, and standards have been identified as applying to mechanical engineering design and construction. In cases where conflicts between cited codes (or standards) exist, the requirements of the more conservative code will be met.

Federal

- Title 29 Code of Federal Regulations (CFR) Part 1910, Occupational Safety and Health Administration (OSHA).
- Title 40 CFR Part 60, Standards of Performance for New Stationary Sources.
- Title 40 CFR Part 75, Continuous Emission Monitoring.
- Title 40 CFR Subchapter C, Air Programs, Part 50 et seq.
- Title 40 CFR Subchapter D, Water Programs, Part 100 et seq.
- Title 40 CFR Subchapter I, Solid Waste and Hazardous Waste, Part 260 et seq.
- Title 40 CFR Subchapter J, Superfund Emergency Planning and Community Right-to-Know Act, Part 300 et seq.
- Title 40 CFR Subchapter N, Effluent Guidelines and Standards, Part 400 et seq.
- Title 49 CFR Part 192, Transportation of Natural and Other Gas by Pipeline.

State

- California Occupational Safety and Health Administration (CAL-OSHA).
- Title 8 California Code of Regulations (CCR) Chapters 4 through 7, Groups 20 Flammable Liquids, Gases, and Vapors, Chapter 27 Fire Protection.
- Title 14 CCR Natural Resources.
- Title 17 CCR Public Health.

- Title 19 CCR Public Safety.
- Title 20 CCR Public Utilities and Energy.
- Title 22 CCR Social Security Division 4.5 Minimum Standards for Management of Hazardous and Extremely Hazardous Waste.
- Title 23 CCR Waters.
- Title 24 CCR California Building Code, California Mechanical Code, and California Plumbing Code.
- Title 26 CCR Toxics.
- California Business and Professional Code Section 6704 (requires state registration to practice engineering) and Section 6735 (requires engineering documents to be prepared by a registered engineer).
- Regulations of the following state agencies, as applicable:
  - Department of Labor and Industry Regulations
  - Bureau of Fire Protection
  - Department of Public Health
  - Water and Power Resources

Industry Codes and Standards

- ABMA—American Bearing Manufacturers Association:
  - ABMA 9—Load Ratings and Fatigue Life for Ball Bearings.
  - ABMA 11—Load Ratings and Fatigue Life for Roller Bearings.
- ACPI—American Concrete Pipe Association Standards.
- AGMA—American Gear Manufacturers Association Standards.
- AISC—American Institute of Steel Construction Standards.
- AMCA – Air Moving and Conditioning Association.
- API— American Petroleum Institute:
  - API 5L—Specification for Line Pipe.
  - API 599—Steel and Ductile Iron Plug Valves.
  - API 608—Metal Ball Valves – Flanged and Butt-Welding Ends.
  - API 609—Lug and Wafer-type Butterfly Valves.
  - API 610—Centrifugal Pumps for Petroleum, Heavy-Duty Chemical and Gas Industry Services.
- ASA—Acoustical Society of America:
  - ASA 47—Sound Level Meters.
  - ASA 53—Preferred Frequencies, Frequency Levels, and Band Numbers for Acoustical Measurements.
- ASHRAE—American Society of Heating, Refrigerating and Air Conditioning Standards.

- ASTM—American Society for Testing and Materials:
  - ASTM A36/A36M—Specification for Structural Steel.
  - ASTM A53—Standard Specification for Pipe, Steel, Black, and Hot-Dipped, Zinc-Coated Welded and Seamless.
  - ASTM A105/A105M—Standard Specification for Forgings, Carbon Steel, for Piping Components.
  - ASTM A106—Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service.
  - ASTM A126—Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
  - ASTM A134—Specification for Pipe, Steel, Electric-Fusion (Arc)-Welded (Sizes NPS 16 and Over).
  - ASTM A182/A182M—Standard Specification for Forged or Rolled Alloy Steel Pipe Flanges/Forged Fitting and Valves and Parts for High-Temperature Service.
  - ASTM A193/A193M—Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
  - ASTM A194/A194M—Standard Specifications for Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service.
  - ASTM A213/A213M—Standard Specification for Seamless Ferritic and Austenitic Alloy-Steel Boiler, Superheater, and Heat-Exchanger Tubes.
  - ASTM A216/A216M—Standard Specifications for Steel Castings, Carbon, Suitable for Fusion Welding, for High-Temperature Service.
  - ASTM A217/A217M—Standard Specification for Steel Castings, Martenistic Stainless and Alloy for Pressure Containing Parts, Suitable for High-Temperature Service.
  - ASTM A234/A234M—Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.
  - ASTM A283/A283M—Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.
  - ASTM A307—Standard Specifications for Carbon Steel Bolts and Studs, 60,000 psi, Tensile Strength.
  - ASTM A312/A312M—Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipes.
  - ASTM A335/A335M—Standard Specification for Seamless Ferritic Alloy-Steel Pipe for High-Temperature Service.
  - ASTM A351/A351M—Standard Specification for Steel Castings, Austenitic, for High-Temperature Service.
  - ASTM A387/A387M—Standard Specification for Pressure Vessel Plates, Alloy Steel, Chromium-Molybdenum.
  - ASTM A403/A403M—Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings.
  - ASTM A490—Specification for Heat-Treated, Steel Structural Bolts, 150 ksi Tensile Strength.
  - ASTM A672—Specification for Electric-Fusion-Welded Steel Pipe for Atmospheric and Lower Temperatures.
  - ASTM B43—Specification for Seamless Red Brass Pipe Standard Sizes.

- ASTM B61—Standard Specification for Steam or Valve Bronze Castings.
- ASTM B62—Composition Bronze or Ounce Metal Castings.
- ASTM B75/B75M—Specification for Seamless Copper Tube.
- ASTM B88—Standard Specification for Seamless Copper Water Tube.
- ASTM B111—Specification for Copper and Copper-Alloy Seamless Condenser Tubes and Ferrule Stock.
- ASTM B209—Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- ASTM B462—Specification for Forged or Rolled UNS N08020, UNS N08024, UNS N08026, UNS N08367, and UNS R20033 Alloy Pipe Flanges, Forged Fittings, and Valves and Parts for Corrosive High-Temperature Service.
- ASTM C195—Specification for Mineral Fiber Thermal Insulating Cement.
- ASTM C411—Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
- ASTM C533—Specification for Calcium Silicate Block and Pipe Thermal Insulation.
- ASTM C547—Specification for Mineral Fiber Pipe Insulation.
- ASTM C612—Specification for Mineral Fiber Block and Board Thermal Insulation.
- ASTM D1248—Specification for Polyethylene Plastics Molding and Extrusion Materials.
- ASTM D1785—Specification for Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
- ASTM D2241—Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
- ASTM D2513—Thermoplastic Gas Pressure Pipe, Tubing and Fittings.
- ASTM D2517—Reinforced Epoxy Resin Gas Pressure Pipe and Fittings.
- ASTM D3350—Specification for Polyethylene Plastics Pipe and Fittings Materials.
- ASTM F441/F441M—Specification for Chlorinated Poly Vinyl Chloride (CPVC) Plastic Pipe, Schedules 40 and 80.

- ANSI—American National Standards Institute:
  - ANSI/ASME B1.1—Unified Inch Screw Threads (UN and UNR thread form).
  - ANSI/ASME B16.1—Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800 lb.
  - ANSI/ASME B16.5—Pipe Flanges and Flanged Fittings, Steel Nickel Alloy and Other Special Alloys.
  - ANSI/ASME B16.9—Factory-Made Wrought Steel Buttwelding Fittings.
  - ANSI/ASME B16.10—Face-to-Face and End-to-End Ferrous Valves.
  - ANSI/ASME B16.11—Forged Steel Fittings Socket-Welding and Threaded.
  - ANSI/ASME B16.15—Cast Bronze Threaded Fittings Classes 125 and 250.
  - ANSI/ASME B16.21—Nonmetallic Flat Gaskets for Pipe Flanges.
  - ANSI/ASME B16.22—Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings.
  - ANSI/ASME B16.24—Bronze Pipe Flanges and Flanged Fittings, Class 150 and 300 lb.
  - ANSI/ASME B16.25—Buttwelding Ends.
  - ANSI/ASME B16.28—Wrought Steel Buttwelding Short Radius Elbows and Returns.

- ANSI/ASME B16.34—Valves-Flanged, Threaded and Welding End.
- ANSI/ASME B18.2.1—Square and Hex Bolts and Screws, Inch Series.
- ANSI/ASME B31.1—Power Piping.
- ANSI/ASME B31.8—Gas Transmission and Distribution Piping.
- ANSI/ASME B36.1 OM—Welded and Seamless Wrought Steel Pipe.
- ANSI/ASME B36.19M—Stainless Steel Pipe.
- ANSI/ASME B73.IM—Specifications for Horizontal End Suction Centrifugal Pumps for Chemical Process.
- ANSI/ASME B133.1M—Procurement Standards for Gas Turbines.
- ANSI/AWWA C110/A21.10—Ductile-Iron and Grey-Iron Fittings, 3 inch through 48 inch (75 mm through 1200 mm) for Water and Other Liquids.
- ANSI/AWWA C111/A21.11—Rubber Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

- ASME—American Society of Mechanical Engineers:
  - ASME Section I—Rules for Construction of Power Boilers.
  - ASME Section VIII—Rules for Construction of Pressure Vessels.
  - ASME Section IX—Qualification Standard for Welding and Brazing Procedures, Welders, Brazer, and Welding and Brazing Operators.
  - ASME PTC-4.4—Gas Turbine Heat Recovery Steam Generators (R. 1192).
  - ASME PTC-22—Power Test Code for Gas Turbine Power Plants.

- AWS—American Welding Society:

  Welding procedures and qualifications for welders would follow the recommended practices and codes of the AWS.

  - AWS-D1.1—Structural Welding Code-Steel.

- AWWA—American Water Works Association:
  - AWWA-C110—Ductile Iron and Gray Iron Fittings, 3 inches through 48 inches for Water and Other Liquids.
  - AWWA-C111—Rubber-Gasket Joints for Ductile-Iron and Grey Iron Pressure Pipe and Fittings.
  - AWWA-C301—Prestressed Concrete Pressure Pipe, Steel-Cylinder Type For Water and Other Liquids.
  - AWWA-C304—Design of Prestressed Concrete Cylinder Pipe.
  - AWWA-C502—Dry-Barrel Fire Hydrant.
  - AWWA-C504—Rubber Seated Butterfly Valves.
  - AWWA-C906—Polyethylene Pressure Pipe and Fittings, 4 inches through 63 inches for Water Distribution.
  - AWWA-D100—Welded Steel Tanks for water Storage.
  - AWWA-M1 1—Water Supply Practices, Pipe – Design and Installation.

- CGA—Compressed Gas Association Standards.

- CTI—Cooling Tower Institute Standards.

- EEI—Edison Electric Institute Standards.

- EJMA—Expansion Joint Manufacturers Association Standards.
- FCI—Fluid Controls Institute.
- FCI 70-2—Quality Control Standard for Control Valve Seat Leakage.
- HEI—Heat Exchange Institute:
  - Performance Standards for Liquid Ring Vacuum Pumps.
  - Standards and Typical Specifications for Deaerators.
  - Standards for Closed Feedwater Heaters.
  - Standards for Power Plant Heat Exchangers.
  - Standards for Steam Jet Vacuum Systems.
  - Standards for Steam Surface Condensers.
- HI—Hydraulic Institute:
  - ANSI/HI 1.1-1.5—Centrifugal Pumps Nomenclature, Definitions, Applications and Operation
  - ANSI/HI 1.6—Centrifugal Pump Tests
  - ANSI/HI 2.1-2.5—Vertical Pumps Nomenclature, Definitions, Application and Operation
  - ANSI/HI 2.6—Vertical Pump Tests
  - ANSI/HI 9.1-9.5—Pumps-General Guidelines Types, Definitions, Application and Sound Measurements.
- IGCI—Industrial Gas Cleaning Institute Standards.
- MIL—U.S. Department of Defense - Military Specification:
  - MIL-1-24244C Amendment 3—Insulation Material, with Special Corrosion, Chloride, and Fluoride Requirements.
- MSS—Manufacturers Standardization Society of the Valve and Fittings Industry:
  - MSS-SP-25—Standard Marking System for Valves, Fittings, Flanges and Unions.
  - MSS-SP-42—Class 150 Corrosion-Resistant Gate, Globe, Angle, and Check Valves with Flanged and Butt-Weld Ends.
  - MSS-SP 55—Quality Standard for Steel Castings-Visual Method.
  - MSS-SP 67—Butterfly Valves.
  - MSS-SP 80—Bronze Gate, Globe, Angle and Check Valves.
  - MSS-SP-91—Guidelines for Manual Operation Valves.
- NACE—National Association of Corrosion Engineers Recommended Practices.
- NFPA—National Fire Protection Association Codes:
  - ANSI/NFPA 10, Portable Fire Extinguishers.
  - ANSI/NFPA 12, Carbon Dioxide Extinguishing Systems.
  - ANSI/NFPA 13, Installation of Sprinkler Systems.
  - ANSI/NFPA 14, Installation of Standpipe and Hose Systems.
  - ANSI/NFPA 15, Water Spray Fixed Systems.
  - ANSI/NFPA 20, Installation of Centrifugal Fire Pumps.
  - ANSI/NFPA 22, Water Tanks for Private Fire Protection.

  - ANSI/NFPA 24, Private Fire Service Mains and Their Appurtenances.
  - ANSI/NFPA 26, Supervision of Valves Controlling Water Supplies for Fire Protection.
  - ANSI/NFPA 30, Flammable and Combustible Liquids Code.
  - ANSI/NFPA 37, Stationary Combustion Engines and Gas Turbines.
  - ANSI/NFPA 54, National Fuel Gas Code.
  - ANSI/NFPA 70, National Electrical Code.
  - ANSI/NFPA 72, National Fire Alarm Code.
  - ANSI/NFPA 78, Lightning Protection Code.
  - ANSI/NFPA 255, Method of Test of Surface Burning Characteristics of Building Materials.
  - ANSI/NFPA 85, Fire Protection for Electric Generating Plants.
  - ANSI/NFPA 850, Steam Electric Generating Plants.
  - ANSI/NFPA 1961, Fire Hose.
  - ANSI/NFPA 1962, Care, Use, and Service Testing of Fire Hose Including Couplings and Nozzles.
  - ANSI/NFPA 1963, Screw Threads and Gaskets for Fire Hose Connections.

- PFI—Pipe Fabrication Institute Standards.

- PPI—Plastic Pipe Institute Standards.

- SSPC—Steel Structures Painting Council:
  - SSPC-PA1—Shop, Field, and Maintenance Painting.
  - SSPC-PA2—Measurement of Dry Paint Thickness with Magnetic Gages.
  - SSPC-SP1—Solvent Cleaning.
  - SSPC-SP2—Hand Tool Cleaning.
  - SSPC-SP3—Power Tool Cleaning.
  - SSPC-SP6—Commercial Blast Cleaning.
  - SSPC-SP8—Pickling.
  - SSPC-SP10—Near-White Blast Cleaning.

- TEMA—Tubular Exchanger Manufacturers Association Standards.

- UBC—Uniform Building Code:
  - Chapter 3, Classification of All Buildings by Use or Occupancy and General Requirements for All Occupancies.
  - Chapter 6, Type 11 One-Hour and 11-N Buildings.
  - Chapter 10, Exits.
  - Chapter 15, Roof Construction and Covering.
  - UL—Underwriters' Laboratories Standards.

- UPC – Uniform Plumbing Code

3.0 Reliability Codes and Standards

The design and specification of work will be in accordance with the laws and regulations of the federal government, the state of California, and with local codes and ordinances. The following laws, ordinances, codes, and standards have been identified as applying to power plant reliability, design, and construction. In cases where conflicts between cited codes (or standards) exist, the requirements of the more conservative code will be met.

Federal

- None are applicable.

State

- Both the Warren-Alquist Energy Resource Conservation and Development Act, Public
- Resources Code (PRC) Section 25000 et seq., and the California Energy Commission (CEC)
- Siting Regulations require the applicant to submit detailed information describing measures proposed to ensure the safe and reliable operation of the facility and the design and feasibility of all systems and components related to the generation of power (PRC Sections 25511 and 25520).

County

- None are applicable.

Industry Codes and Standards

There are no industry codes or standards that govern power plant reliability; however, there are trade organizations or associations that are generally recognized as authorities and leaders in the field of power plant availability and reliability. Definitions used by these organizations have become generally accepted as a common means of communicating and the data published have been found useful. The organizations are as follows:

The Electric Power Research Institute (EPRI)
P.O. Box 50490
Palo Alto, CA 94303
Telephone (415) 965-4081

North American Electric Reliability Council (NERC)
Research Park
Terhune Road
Princeton, NJ 08540-3573
Telephone (609) 924-6050

Other recognized standards will be used as required to serve as design, fabrication, and construction guidelines when not in conflict with the above listed standards.

The codes and industry standards used for design, fabrication, and construction will be the codes and industry standards, including all addenda, in effect as stated in equipment and construction purchase or contract documents.

4.0 Mechanical Engineering General Design Criteria

The systems, equipment, materials, and their installation will be designed in accordance with the applicable codes; industry standards; and local, state, and federal regulations; as well as the design criteria; manufacturing processes and procedures; and material selection, testing, welding, and finishing procedures specified in this section.

Detailed equipment design will be performed by the equipment vendors in accordance with the performance and general design requirements.

4.1 OTSGs

OTSGs will be sized in accordance with the heat balances. The OSTG design will meet the requirements of the ASME Boiler and Pressure Vessel Code, Section I, ASME Boiler and Pressure Vessel Code, ASME B31.1, and other applicable codes and standards. Access design and egress requirements for the OSTGs will meet the requirements of NFPA and OSHA.

4.2 STG

The STG will be sized in accordance with the heat balances. STG design will meet the requirements of the ASME Boiler and Pressure Vessel Code, ASME TDP-1, and other applicable codes and standards.

4.3 Pumps

Pumps will be sized in accordance with industry standards. Where feasible, pumps will be sized for maximum efficiency at the normal operating point. Pumps will be designed to be free from excessive vibration throughout the operating range.

4.4 Tanks

Water storage tanks will be designed in accordance with API or AWWA. Large outdoor storage tanks will be non-insulated except where required to maintain appropriate process temperatures or for personnel protection. Overflow connections and lines will be provided. Maintenance drain connections will be provided for complete tank drainage. Manways will be at least 18 inches in diameter and hinged to facilitate removal. Storage tanks will have ladders and cleanout doors as required to facilitate access/maintenance. Provisions will be included for proper tank ventilation during internal maintenance.

4.5 Heat Exchangers

The air cooled condenser and cooling water heat exchanger will be sized based on the heat balances and equipment manufacturer heat loads. The condenser and cooling water heat exchanger will be designed in accordance with HEI, ASME Boiler and Pressure Vessel Code, and TEMA.

4.6 Pressure Vessels

Pressure vessels will be designed in accordance with the ASME Boiler and Pressure Vessel Code, Section VIII, Division I. Pressure vessels will include all necessary vent, drains, process connections, manways, and relief valves.

4.7 Piping

Piping will be designed, selected, and fabricated in accordance with the following criteria.

4.7.1 Design Temperature and Pressure

The design pressure and temperature for piping will be consistent with conditions established for the design of the associated system.

The design pressure of a piping system generally will be based on the maximum sustained pressure that may act on the system plus 25 psi. All design pressure values will be rounded up to the next 10 psi increment.

The design temperature of a piping system generally will be based on the maximum sustained temperature which may act on the system plus 10° F. The piping design temperature will be rounded up to the next 5° F increment.

Fire water piping will be designed and tested in accordance with NFPA requirements.

4.7.2 General Design and Selection Criteria

Piping will be designed in accordance with the requirements of the Code for Pressure Piping, ASME B31.1—Power Piping, or other codes and standards referenced in Section 2.2 of this Attachment, as applicable.

Minimum wall thicknesses of straight steel pipe under internal pressure will be designed in accordance with Paragraph 104.1.2 of ASME B31.1.

Allowance for variations from normal operation, consideration for local conditions, and transients will be in accordance with Paragraphs 102.2.4 and 102.2.5 of ASME B31.1.

The value of A (thickness allowance) must be selected to compensate for material removed in threading, corrosion, and erosion, and to provide mechanical strength. The following minimum allowances should be applied:

- Special wall piping 2-1/2 inches and larger—The value of A will be 0.0625 inch.
- Schedule wall piping 2-1/2 inches and larger—The value of A will generally be zero except when additional thickness is considered necessary for a specific service.
- Schedule wall piping 2 inches and smaller—The value of A should be selected to provide adequate mechanical strength. An A value of 0.0625 inch is suggested, but is not mandatory.
- Threaded piping—The value of A will equal the depth of thread.

The pressure temperature ratings for plain end seamless schedule wall pipe will be based on minimum wall values which are 87-1/2 percent of the nominal pipe wall thicknesses with the value of A equal to zero. This will make allowance for the minus 12-1/2 percent manufacturing tolerance on wall thickness.

The pressure temperature ratings for fusion welded, or forged and bored, schedule wall pipe will be based on the appropriate manufacturing tolerances and the required A value.

Material selection will generally be based on the design temperature and service conditions in accordance with the following:

- Carbon steel piping materials will be used for design temperatures less than or equal to 750° F.
- ASTM A335 Grade P22 or P91 steel piping materials will be used for design temperatures greater than 750° F.
- Five percent chromium alloy steel piping materials will be used where flashing may occur.
- Stainless steel piping materials will be used as follows:
  - Piping applications requiring a high degree of cleanliness generally including miscellaneous lubricating oil system piping and sampling piping after process isolation valves.
  - Piping generally subjected to highly corrosive service applications.
- Fiberglass reinforced plastic piping materials will be used only in applications requiring corrosion-resistant materials.
- Plastic piping having a high coefficient of thermal expansion will be used only after a thorough analysis of the piping system thermal expansion parameters.

The above listed materials, or other suitable piping materials listed in Section 2.3, will be used where required for special service to meet specific requirements. Materials selected for use with main cycle systems will be free of copper materials to allow the cycle to be treated at the optimum pH for corrosion protection of carbon steel components.

4.7.3 Miscellaneous Piping Design and Selection Criteria

The minimum pipe size and wall thickness for miscellaneous piping, other than instrument primary piping, will generally be in accordance with the following criteria:

- The pipe size for piping, except as described above, with a design pressure of 600 psi or less, and with a design temperature of 750° F or less, will be 1/2 inch minimum.

The wall thickness for piping 2 inch nominal size and smaller will be Schedule 80 for carbon steel and alloy pipe, and Schedule 40S for stainless steel pipe minimum.

4.7.4 Instrument Primary Piping Design and Selection Criteria

Instrument primary piping will generally be designed in accordance with the following criteria:

- Piping and instrument diagrams will indicate the size and selection information for piping through the root valves. The line sizes and selection information of tubing piping after the root valves will not be called out on the piping and instrument diagram. The size requirements for instrument primary piping are stated in Attachment A.2.4.
- Pressure connections and piping through the root valves for all pressure indicators, pressure switches, pressure transmitters, etc., will be 3/4 inch.
- Temperature indicators, temperature controllers, temperature switches, temperature detectors, and test well connections will be 3/4 inch NPT.
- Flow transmitter connections and piping through the root valves will be 1 inch for all piping except orifice flanges, where 1/2 inch piping and valves will be used.
- Level switch connections and piping through root valves will be 1 inch.
- Level controllers and level transmitters of the displacement type will have connections and piping through root valves of 2 inches.
- Level controllers and level transmitters of the differential pressure type will have connections and piping through root valves conforming to the requirements for miscellaneous piping.
- Level transmitters on tanks and vessels will be installed with isolation valves.
- Instrument columns at tanks and pressure vessels will generally be 2 inch minimum.

4.7.5 Vent and Drain Piping Design Criteria

Vent and drain piping will generally be in accordance with the following criteria:

- Vent connections will be provided at all high points in water and oil piping, and all high points in other piping which will be hydrostatically tested.
- Drain connections will be provided at all non-drainable points in water and oil piping, and all other piping which will be hydrostatically tested.
- All vent and drain connections will be provided with isolation valves. Vent and drains will use full ported valves where practical to resist pluggage. Low-pressure water systems with design pressures of 150 psi or less will use ball valves. Other systems will use gate valves. Alternatively, if the use of full-ported valves is not possible, gate valves will be used.
- Vent and drain connections that require frequent operation or which may discharge significant quantities of fluid will be piped to a suitable drain. Vent or drain connections that will normally require operation at a time when hot fluids will be discharged will be piped to a safe termination point (drain funnel or floor area discharge). All other vent and drain connections will be capped.

4.7.6 Piping Materials

Piping materials will be in accordance with applicable ASTM and ANSI standards. Materials to be incorporated in permanent systems will be new, unused, and undamaged. Piping materials will generally be in accordance with the following criteria:

- Carbon steel piping 2-inch nominal size and smaller will be ungalvanized ASTM A106, Grade B minimum.
- Carbon steel piping 2.5 inch through 26-inch nominal size will be ungalvanized ASTM A53 Grade B seamless or A106 Grade B, with the indicated grades as a minimum. Carbon steel piping larger than 26 inch nominal size will be ASTM A672 Grade B70, Class 21, for steam service, and ASTM A134 (with ASTM A283 Grade C plate material) for cold water service, with the industrial grades as a minimum.
- Alloy steel pipe, including large diameter special wall pipe, will be ungalvanized seamless type. Alloy steel pipe with a 1.25 percent chromium content will conform to ASTM A335, Grade P11. Alloy steel pipe with 2.25 percent chromium content will conform to ASTM A335, Grade P22. Alloy steel pipe with 5 percent chromium content will conform to ASTM A335, Grade P5. Alloy steel pipe with 9 percent chromium content will conform to ASTM A335, Grade P91.
- Stainless steel pipe will be ASTM A3l2 Grades TP 304, TP 304L, TP 316, or TP 316L piping. All stainless steel piping materials will be seamless and fully solution annealed prior to fabrication. The Type 316 materials will be utilized for high resistance to corrosion. The Type 316L materials will be utilized for applications requiring hot working (welding, etc.), when the piping will handle solutions that are high in chlorides.
- Schedule numbers, sizes, and dimensions of all carbon steel pipe will conform to ASME B36.10. Sizes and dimensions of stainless steel pipe designated as Schedule 10S, 40S, or 80S will conform to ANSI B36.19. Schedule numbers, sizes, and dimensions of stainless steel pipe not designated as 10S, 40S, or 80S will conform to ASME B36.10.
- Galvanized carbon steel piping will be ASTM A53 Grade B. The piping will be hot-dip galvanized. The use of galvanized steel pipe will be limited to systems where a high degree of cleanliness is required or where codes require the use of galvanized steel pipe rather than black steel pipe.
- Lining materials for rubber lined carbon steel pipe, method of application, and lining manufacturer will be chosen in accordance with service requirements
- Steel plate piping will be of the welded straight seam type.
- Mechanical joint or push-on joint ductile iron pipe will conform to ANSI/AWWA C151/A21.51. Flanged ductile iron pipe will conform to ANSI/AWWA C115/A21.15.
- Copper alloy pipe will conform to ASTM B43, Seamless Red Brass Pipe.
- Polypropylene lined pipe will be ASTM A53 steel pipe with an applied liner of polypropylene.

- Fiberglass Reinforced Plastic (FRP) pipe will be chosen in accordance with the specific service requirements.
- Polyvinyl Chloride (PVC) pipe will conform to ASTM D1785 or ASTM D2241.
- Chlorinated Polyvinyl Chloride (CPVC) pipe will conform to ASTM F441 or ASTM F442.
- High density polyethylene (HDPE) pipe will conform to ASTM D3350 with a Plastic Pipe Institute rating of PE 3406 or 3408.

4.7.7 Tubing Materials

Tubing materials will generally be in accordance with the following criteria:

- Copper Tubing—Copper tubing 3/8 inch and smaller will be light drawn temper tubing conforming to ASTM B75. Copper tubing, 1/2 inch and larger, will be ASTM B88 Type K drawn temper. Copper tubing will be oxygen-free or phosphorus deoxidized copper. Oxygen bearing tough pitch copper tubing will be used.
- Stainless Steel Tubing—Stainless steel tubing will conform to ASTM A213, Type 316 seamless. All stainless steel tubing will be of the fully annealed type, with a carbon content greater than 0.04 percent. Stainless steel tubing for use with tubing fittings will not exceed Rockwell B80 hardness.
- Tubing Wall Thickness—Wall thickness for tubing 3/4 inch and smaller, not protected by enclosures, will not be less than the following. Heavier wall tubing will be used where required for specific design pressure and temperature conditions:

Wall Thickness

Outside Diameter of Tubing (inch)	Stainless Steel (inch)
1/4	0.035
3/8	0.035
1/2	0.049

4.7.8 Fitting Materials

Fittings will be constructed of materials equivalent to the pipe with which they are used:

- Steel Fittings—Steel fittings 2-1/2 inches and larger will be of the butt welding type, and steel fittings 2 inches and smaller will be of the socket welding type, except galvanized steel fittings will be threaded.
- Butt Welding Fittings—The wall thicknesses of butt welding fittings will be equal to the pipe wall thickness with which they are used. The fittings will be manufactured in accordance with ASME B16.9, ASME B16.28, and ASTM A234 or ASTM A403.
- Forged Steel Fittings—Forged steel fittings will be used for socket-weld and steel threaded connections and will conform to ASME B16.11. The metal thicknesses in the

fittings will be adequate to provide actual bursting strengths equal to or greater than those of the pipe with which they are used.

The minimum class rating of socket-weld and threaded fittings used with various pipe schedules will be as follows:

	Minimum Fitting Class Ratings	
Pipe Schedule No.	**Threaded**	**Socket Welding**
80 or less	2,000	3,000
120 or 160	3,000	6,000
Double extra strong	6,000	9,000

- Cast Steel Flanged Fittings—Cast carbon steel flanged fittings will conform to ASME B16.5 and will be of materials conforming to ASTM A216 WCB.
- Adapters—Specially designed adapters may be used in lieu of reducing outlet tees for the run and branch sizes specified. Specially designed adapters must be postweld heat treated as specified in ASME B31.1. Specially designed adapters will be Weldolets or Sweepolets as manufactured by Bonney Forge and Tool Works, WFI, or equal.
- Branch connections 2 inches and smaller will be made with special reinforced welding adapters, Bonney Forge and Tool Works Thredolets or Sockolets or equal, or will be special welded and drilled pads.
- Ductile Iron Fittings—Mechanical joint or push-on joint ductile iron fittings will conform to ANSI/AWWA C110/A21.10 and ANSI/AWWA C111/A21.11. Flanged ductile iron fittings will conform to ANSI/AWWA C110/A21.10.
- Cast Iron Fittings—Cast iron fittings will conform to ASTM A126, Class B.
- Brass and Bronze Fittings—Screwed brass and bronze pipe fittings will conform to ASME B16.15. Flanged brass and bronze pipe fittings will conform to ASME B16.24.
- Fiberglass Reinforced Plastic (FRP) Fittings—Fittings for use with FRP pipe will be manufactured from material of the same type as the pipe. Joints will be as required by the application. Filament wound or molded fittings will be used as required by the application.
- Polyvinyl Chloride (PVC) Fittings—PVC pipe fittings will be manufactured from PVC material of the same type as the pipe with which they are used. The fittings will have socket ends with internal shoulders designed for solvent cementing.
- Chlorinated Polyvinyl Chloride (CPVC) Fittings—CPVC pipe fittings will be manufactured from CPVC material of the same type as the pipe with which they are used. The fittings will have socket ends with internal shoulders designed for solvent cementing.
- Tubing Fittings—Stainless steel fittings will be used with stainless steel tubing. Fittings for use with stainless steel tubing in sizes smaller than 3/4 inch will be of the flareless

"bite" type. Fittings for use with tubing in sizes 3/4 inch and larger will be socket-weld type conforming in general design to ASME B16.11. Fitting material and bursting strength will be equivalent to the tubing with which they are used.

4.7.9 Flanges, Gaskets, and Unions

Flanged joints will be in accordance with the following requirements:

- Flanges mating with flanges on piping, valves, and equipment will be of sizes, drillings, and facings, which match the connecting flanges of the piping, valves, and equipment. Flange class ratings will be adequate to meet the design pressure and temperature values specified for the piping with which they are used. Flanges will be constructed of materials equivalent to the pipe with which they are used.
- Steel flanges will conform to ANSI B16.5. Carbon steel flanges will be of ASTM A105 material. Carbon steel flanges will not be used for temperatures exceeding 750° F.
- Chromium alloy steel and stainless steel flanges will conform to ASTM A182.
- Brass and bronze screwed companion flanges will be plain faced and will conform to Class 150 or Class 300 classifications of ANSI B16.24. Drilling will be in accordance with ANSI Class 125 or Class 250 standards.
- Compressed fiber gaskets will be used with flat face flanges and raised face slip-on flanges.
- Spiral wound gaskets will be used with raised face flanges, except for raised face slip-on flanges. Gaskets containing asbestos are not acceptable.

Gaskets will be suitable for the design pressures and temperatures:

- Compressed fiber gaskets will be in accordance with ANSI B16.21, and materials will be suitable for a maximum working pressure of 600 psi and a maximum working temperature of 75° F.
- Spiral wound gaskets will be constructed of a continuous stainless steel ribbon wound into a spiral with non-asbestos filler between adjacent coils.
- Rubber gasket materials will be cloth inserted sheet rubber and will conform to ANSI B16.21.

4.7.10 Cathodic Protection

Underground carbon steel, stainless steel, copper, or brass piping will be electrically isolated from aboveground piping and other metallic components, and will be provided with a bonded, dielectric coating system to allow the underground piping to be cathodically protected. Isolation from aboveground piping will be achieved by installation of isolation flanges with insulating gaskets, sleeves, and washers. For piping 2 inches and smaller, insulating unions may be used for isolation from aboveground piping. Cathodically protected piping routed into concrete foundations will be isolated from reinforcing steel with a wrapping of polyethylene mesh over the coating system.

4.7.11 Piping Fabrication

Piping fabrication will generally be in accordance with the requirements of the Piping Fabrication Institute (PFI) and ASME B31.1.

Welding procedures, welders, and welding operators will be qualified in accordance with code requirements. Backing rings will not be used for shop or field welds except where specifically permitted.

4.7.11.1 Inspection and Testing

Inspection and testing of piping will be performed in accordance with the requirements of the applicable code and in accordance with the following criteria.

Pressure testing of piping assemblies, including hydrostatic, pneumatic, and in-service leak testing, will be performed on the system assemblies upon the completion of erection. Shop leak testing of piping will not be required. All underground piping to be tested will be given the test prior to covering the line. Testing will be performed in accordance with the following methods:

- Hydrostatic testing of all piping, except as otherwise discussed herein or for which a pneumatic leak test will be provided, will be performed with cold water at 1-1/2 times the design pressure of the piping.

Piping for which isolation by valving or blanking is impractical (open ended vents and drains after the last valve, safety valve vent stacks, etc.) will not be hydrostatically tested. Piping between isolation valves and connected equipment that is not leak tested will not be hydrostatically tested. Piping connected to equipment that is leak tested will be hydrostatically tested at the lowest test pressure of items involved in that test (pumps and discharge piping to the first isolation valve will be tested at the pump suction piping test conditions, if the suction test conditions are lower). Temporary piping for use only during construction will not be hydrostatically tested.

- Pneumatic testing will be provided for all pressure piping that should not be subject to water filling. This will generally include the following piping:
  - Lube oil piping.
  - Low-pressure (design pressure less than or equal to l50 psi) compressed gas piping conveying natural gas and ammonia.
  - Compressed air piping.
  - Instruments will be carefully protected against overpressure during testing of piping.
- In-service leak testing will be performed for all pressure piping that is not hydrostatically or pneumatically tested by tests that are in full accordance with the applicable code.

Nondestructive testing will generally include visual, radiographic, magnetic particle and liquid penetrant, and ultrasonic examinations:

- Visual examination of welds will be performed by personnel qualified and certified in accordance with AWS QC1, Standard for Qualification and Certification of Welding Inspectors.

- Radiographic examination will be performed on welds requiring examination under the applicable code.
- Magnetic particle and liquid penitrant examination will be performed as required by the applicable code.
- Ultrasonic tests will be performed as required by the applicable code.

4.7.12 Pipe Supports and Hangers

The term "pipe supports" includes all assemblies such as hangers, floorstands, anchors, guides, brackets, sway braces, vibration dampeners, positioners, and any supplementary steel required to attach pipe supports.

4.7.12.1 Design and Selection Criteria

All support materials, design, and construction will be in accordance with the latest applicable provisions of the Power Piping Code, ASME B31.1. Seismic design of piping systems will be in accordance with criteria as stipulated by the Uniform Building Code.

Structure attachment components will be fastened by welding or bolting. Pipe supports will be attached to concrete by cast-in-place anchor bolts, studs, expansion bolts, or plates. Expansion bolts with a minimum pullout safety factor of five will be used. Expansion bolts will be cone-expansion type, conforming to Federal Specification FF-S-325, Group II, Type 4, Class l or 2. Minimum thickness of cast-in-place steel plate bearing against concrete will be as follows:

Supported Pipe Size (nominal inches)	Plate Thickness (inch)
4 and smaller	1/4
6	3/8
8	1/2
10 through 18	3/4
20 and larger	1

Pipe attachments will be rigid relative to the piping and insulation and will extend sufficiently outside insulation, if any, to permit free installation and operation of other support components. Insulation protection saddles or components will be used where required to prevent damage to insulation. On piping other than steel or iron, the piping manufacturer's recommendations will be followed.

Material for clamps, lugs, bolts, studs, and nuts will be carbon steel for piping 750° F or less, and will be alloy steel for piping more than 750° F. Piping attachments for nonmetallic pipe will meet the following minimum requirements:

- The minimum recommendations of the piping manufacturer will be met.
- Piping attachments will not bear load by a point. Their width will equal or exceed the square root of the outside diameter of the piping (thus, 4 inch OD piping minimum

clamp width equals 2 inches), and they will bear around 120 degrees or more of the circumference.

- In general, clamps will not be clamped tight and hard on the piping. Where piping attachment must grip the piping by clamping, a soft, Shore 50-60 rubber pad will be provided between the clamp and the piping, and the clamp will be formed to fit the padding.

The top surface of riser clamps will be flat and normal to the pipe.

Riser lugs will be sized in accordance with Welding Research Council Bulletin No. 198 and the requirements of ASME B31.1.

Trapezes will be constructed from structural tubing or from double channels positioned back-to-back with space between for the hanger rods and with washer plates welded to channel tops and bottoms. Washer plates shall be used at all hanger rod attachment points.

Hanger rods will be constructed of solid round steel bars. Maximum allowable stress in a rod will be 9,000 psi average at the thread root cross-sectional area, or 12,000 psi in nonthreaded rods. Pipe, strap, chain, or other similar materials will not be permitted in place of rods.

Screw threads will be in conformance with ASME B1.1. Stress areas for threaded rods will be equal to or larger than the following American National Standard Unified Inch Screw Thread Series:

Nominal Rod Diameter (inches)	Thread Series
3/8 through 4	UNC
4-1/4 and larger	4 UN

Bolting will consist of either studs and nuts or bolts and nuts. Minimum thread engagement will be 100 percent of the nut thread. Nuts for each stud will be installed equidistant from the ends of the stud. Middle portions of studs and shank portions of bolts will not be threaded. Bolt heads and nuts will be hexagonal type, conforming to ASME B18.2. Where no axial load is to be carried, pins with washers and cotter pin retainers will be permitted in place of bolts.

Restraints, struts, and anchors will have the following features:

- Restraints fabricated of structural steel will have a clearance of 1/8 inch, with respect to the restrained component, in the directions of the restrained movement unless otherwise noted.
- All restraints will be designed to withstand the static and kinematic friction due to relative movement of the pipe with respect to the restraints.
- All restraints and anchors will withstand the design loading indicated without buckling.

- All struts will be provided with means for locking the length adjustment. The length adjustment lock will be on the right-hand thread end, if both right- and left-hand threads are used.

Exposed components of shop fabricated pipe supports will be shop painted before shipment to the jobsite. Before painting, surfaces will be suitably cleaned and prepared in accordance with the paint manufacturer's instructions. Bearing surfaces and nameplates will not be painted. These surfaces will be coated with an easily removable rust-preventive compound.

4.7.12.2 Pipe Support and Hanger Materials

Support component materials will be suitable for service at the operating temperature of the pipe to which they are attached. Where support component temperature is below 750° F, component material will be carbon steel or of an ASTM type having a minimum yield strength of 35,000 psi, and a minimum ultimate strength of 58,000 psi.

4.8 Valves

Valve pressure classes, sizes, types, body materials, and end preparations will generally be as described herein. Special features and special application valves will be utilized where required.

Valves specified to have flanged, socket-welded, or screwed connections will have ends prepared in accordance with the applicable ANSI standards. Steel flanges will be raised face type unless otherwise required. Cast iron and bronze flanges will be flat faced type. Butt welding ends will be prepared in accordance with ASME B16.25 and ASME B31.1.

Steel body gate, globe, angle, plug, and check valves will be designed and constructed in accordance with ASME B16.34 as applicable. Valve bodies and bonnets will be designed to support the valve operators (handwheel, gear, or motor) with the valve in any position, without external support.

4.8.1 Steel Body Valves 2 Inches and Smaller

Steel body valves 2 inches and smaller will have forged steel bodies. Forged steel valves complying with the standards and specifications listed in Table 126.1 of ASME B31.1 will be used within the manufacturer's specified pressure temperature ratings and will be limited in accordance with the pressure temperature ratings specified in ANSI B16.34.

- Valve ends will be socket-weld type unless otherwise required.
- Except as otherwise required, check valves will be of the guided piston or swing disk type. All check valves will be designed for installation in either horizontal piping or vertical piping with upward flow.

4.8.2 Steel Body Valves 2-1/2 Inches and Larger

Steel body valves 2-1/2 inches and larger will have cast or forged steel bodies. The face-to-face and end-to-end dimensions will conform to ASME B16.10. Selection of these valves will be in accordance with the pressure temperature ratings specified in ASME B16.34 as applicable:

- Body ends will be butt weld or flanged type.

Check valves will be of the guided piston, swing disk, or double disk spring check type. The use of double disk spring check valves will be limited to cold water services. All check valves will be designed for installation in either horizontal or vertical piping with upward flow.

4.8.3 Iron Body Valves

Iron body gate, globe, and check valves will have iron bodies and will be bronze mounted.

The face-to-face dimensions will be in accordance with ASME B16.10. These valves will have flanged bonnet joints. Gate and globe valves will be of the outside screw and yoke (OS&Y) construction. Body seats will be of the renewable type. Gate valves will be of the wedge disk type.

4.8.4 Butterfly Valves

Rubber-seated butterfly valves will be generally constructed in accordance with AWWA C504 Standard for Rubber-Seated Butterfly Valves. The valves will also generally conform to the requirements of MSS Standard Practice SP-67, Butterfly Valves. Valves of the wafer or lugwafer type will be designed for installation between two ANSI flanges. Valves with flanged ends will be faced and drilled in accordance with ASME B16.1. The selected use of butterfly valves will be in accordance with the pressure temperature ratings specified in AWWA C504, the pressure temperature ratings specified by the manufacturer, and as specified in the following criteria:

- Butterfly valves will generally be used for 4 inch and larger cold water services only.
- Butterfly valves for buried service will be of cast iron body material and will be equipped with flanged ends.
- Cast iron butterfly valves will have pressure classes selected based on the piping design pressure as follows:

Piping Design Pressure	Valve Class
25 psi and below	Class 25
Above 25 psi to 75 psi	Class 75
Above 75 psi to 150 psi	Class 150

Cast iron butterfly valves will be limited to use with piping systems having a design temperature of 125°F or less.

- Butterfly valves for other than buried service will be of carbon steel or cast iron body material depending on the service application. Valves will be of the wafer type, or lugwafer type, if used with steel or alloy steel piping.
- Carbon steel butterfly valves will be limited to use with piping systems having a design temperature of 150°F or less. Carbon steel butterfly valves will have pressure classes selected in accordance with the pressure temperature ratings specified in ASME B16.34 for 24 inch and smaller valves.

Metal seated or teflon seal ring seated butterfly valves for special service applications will be of the wafer or lugwafer type and will be designed for installation between ANSI flanges. The use of these valves will be in accordance with the pressure temperature ratings specified by the manufacturer.

4.8.5 Bronze Body Valves

Bronze gate and globe valves 2 inches and smaller will have union bonnet joints and screwed ends. Gate valves will be inside screw, rising stem type with solid wedge disks. Globe valves will have renewable seats and disks.

Bronze check valves 2 inches and smaller will be Y-pattern swing disk type or guided piston type designed for satisfactory operation in both horizontal piping and vertical piping with upward flow.

Bronze valves 2-1/2 inches and larger will have bolted flange bonnet joints and flanged ends. Gate and globe valves will be of the outside screw rising stem construction. Gate valves will have either integral or renewable seats. Globe valves will have renewable seats.

The use of these valves will be in accordance with the pressure temperature ratings specified by the manufacturer. Bronze valves will be limited to service with piping systems having design pressures of 200 psi or less, and design temperatures of 150° F or less.

Bronze valves will generally be limited to a size of 3 inches or less.

4.8.6 Ball Valves

All ball valves will be in accordance with the pressure temperature ratings specified by the manufacturer. Ball valve bodies 2 inches and smaller will have threaded end or socket-weld connections. Ball valves 2-1/2 inches and larger will have flanged ends. The valves will not require lubrication. Ball valves for use with copper piping shall have brazed or screwed ends. Ball valves for natural gas service shall have renewable seats and be firesafe per API 601 as a minimum.

4.8.7 Diaphragm Valves

Diaphragm valves will be straightaway or weir bodies with flanged ends faced and drilled for installation between ANSI flanges. The use of these valves will be in accordance with the pressure temperature ratings specified by the manufacturer.

4.8.8 Plug Valves

Plug valves will be in accordance with the pressure temperature ratings specified by the manufacturer. All valves will be suitable for the intended service. Plug valve bodies 2 inches and smaller will be socket weld, screwed, or flanged. Plug valves 2-1/2 inches and larger will be butt weld or flanged.

4.8.9 Polyvinyl Chloride (PVC) and Chlorinated Polyvinyl Chloride (CPVC) Valves

PVC and CPVC valves will be constructed entirely from polyvinyl chloride, chlorinated polyvinyl chloride, and teflon. The use of these valves will be in accordance with the pressure temperature ratings specified by the manufacturer.

4.8.10 Valve Materials

Valve bodies will generally be constructed of materials equivalent to the pipe with which they are used. Valve body and trim materials of construction will be in accordance with applicable ASTM and AISI standards. Valve body materials will generally be as follows:

Material Name	Description	
Cast Iron	ASTM A126 Class B	
Bronze	ASTM B61 or ASTM B62	
	Forged	**Cast**
Carbon Steel	ASTM A105	ASTM A216 Grade WCB
Stainless Steel	ASTM A182 Grade F316L or Grade F316	ASTM A351 Grade CF3M or Grade CF8M

4.8.11 Valve Operators

Valves will be provided with manual or automatic operators as required for the service application and system control philosophy. Automatic operators will be motor, piston, or diaphragm type.

Manual operators will be lever, handwheel, or gear type, with the use of lever operators to be limited to valves requiring a maximum of 90 degree stem rotation from full open to full closed position on valve sizes 6 inches and smaller. All operators will be sized to operate the valve with the valve exposed to maximum differential pressure.

4.8.12 Branch Line Isolation Valves

An isolation valve will be provided in 2 inch and smaller branch lines from major headers.

4.8.13 Valve Special Features

Valves will be provided with locking devices, handwheel extensions, vacuum service packing, limit switches, and other special features as required. Locking devices, when furnished, will allow the valve to be locked either open or closed with a standard padlock. Limit switches, when furnished, will be provided for the open and closed position of the valve.

Valves (control) will not be equipped with bypasses unless specifically required.

4.9 Insulation and Lagging

The insulation and lagging to be applied to piping, equipment, and ductwork for the purposes of reducing heat loss, reducing sweating, and personnel protection will be in accordance with the following criteria.

4.9.1 Insulation Materials and Installation

Insulation materials will be inhibited and of a low halogen content so that the insulation meets the requirements of MIL-I-24244 Amendment 3 regarding stress-corrosion cracking of austenitic stainless steel. Insulation materials will contain no asbestos.

All piping operating above 140°F will be insulated with calcium silicate molded insulation in accordance with ASTM C533, fiberglass, or mineral fiber, dependent on the application.

Equipment and ductwork operating at elevated temperatures will be insulated with calcium silicate block fiberglass, or mineral fiber block insulation dependent on the application.

Mineral fiber block insulation for use on equipment surfaces will be in accordance with ASTM C612, Class 3, and have a density of 8 to 12 pcf.

Insulating cements will be mineral fiber thermal insulating cements and will confirm to ASTM C195.

4.9.2 Lagging Materials and Installation

All insulated surfaces of equipment, ductwork, piping, and valves will be lagged. All aluminum lagging will be ASTM B209 Alclad 3004 or acceptable equal. All aluminum lagging will be stucco pattern embossed.

4.9.3 Insulation Supports for Piping

Vertical runs of piping, which will be insulated, will utilize support lugs and collars to prevent slippage of the insulation.

4.9.4 Insulation Classes for Piping and Equipment

Piping and equipment insulation classes and corresponding thicknesses are designated by letters, which will be indicated in the design documents.

The insulation for piping accessories will be of the same class as is indicated for the piping. Insulation materials for miscellaneous piping and equipment will be suitable for the actual operating temperatures.

For piping systems operating above 140° F where the retention of heat is not necessary for proper operation, such as vents and various drains, the insulation thickness shall be reduced to that necessary to maintain the surface temperature of the insulation at approximately 140 F.

4.9.5 Freeze Protection

All aboveground water and steam piping will be arranged to allow drainage to protect the piping from freezing. The piping systems will be arranged to minimize the amount of piping requiring drainage for freeze protection. Certain small bore piping and tubing applications exposed to freezing conditions will be heat traced and insulated.

4.9.6 Anti Sweat Insulation

All aboveground cold water and air piping will be provided with anti sweat insulation.

ATTACHMENT A.2.4

Control Engineering Design Criteria

1.0 Introduction

Control of the design, engineering, procurement, and construction activities on the project will be completed in accordance with various predetermined standard practices and project-specific programs and practices. An orderly sequence of events for the implementation of the project is planned consisting of the following major activities:

- Conceptual design.
- Licensing and permitting.
- Detailed design.
- Procurement.
- Construction and construction management.
- Startup, testing, and checkout.
- Project completion.

The purpose of this attachment is to summarize the codes and standards and standard design criteria and practices that will be used during the project. These criteria form the basis of the design for the control systems of the project. More specific design information will be developed during detailed design to support equipment and erection specifications. It is not the intent of this attachment to present the detailed design information for each component and system, but rather to summarize the codes, standards, and general criteria that will be used. Codes, standards, and general criteria selected during the detail design phase of the project may vary from the information indicated in this Attachment in accordance with specific project or design requirements. The lead control engineer will authorize all variations in design criteria.

Section 2.0 summarizes the applicable codes and standards and Section 3.0 includes the general design criteria for general conditions, instruments, modulating type control systems, motor controls, and control equipment locations.

2.0 Codes and Standards

The design specification of all work will in accordance with the laws and regulations of the federal government and the state of California, and applicable local codes and ordinances. A summary of general codes and industry standards applicable to design and construction follows:

- American National Standards Institute (ANSI).

- American Society of Mechanical Engineers (ASME).

- American Society for Testing and Materials (ASTM).

- The Institute of Electrical and Electronics Engineers (IEEE).
- Instrument Society of America (ISA).
- National Electric Code (NEC).
- National Electric Manufacturers Association (NEMA).
- National Electric Safety Code (NESC).
- National Fire Protection Association (NFPA).
- Scientific Apparatus Makers Association (SAMA).
- California Referenced Standards Code, 2001.
- California Energy Code, Title 24 of the California Code of Regulations.
- California Electrical Code, 2004 edition and Uniform Administrative Code Provisions for the National Fire Code, 1996.
- Other recognized standards will be utilized as required to serve as design, fabrication, and construction guidelines when not in conflict with the above listed standards.
- The codes and industry standards used for design, fabrication, and construction will be the codes and industry standards, including all addenda, in effect as stated in equipment and construction purchase or contract documents.

3.0 Control Systems Design Criteria

3.1 General Requirements

3.1.1 Ambient Conditions

All instrument and control devices will be designed to withstand ambient conditions appropriate to their mounting location or be suitably protected. The evaluated operating conditions for instruments and control devices installed in heated/air-conditioned areas will include air conditioning failures.

3.1.2 Power Supplies

All instruments and control devices will be designed to operate on power supplies as follows:

- Electric:
  - 120 volt AC, 60 hertz, single-phase for control logic (digital input interrogation voltage), motor control center (MCC), solenoid valve, and low torque drives with guaranteed satisfactory operation when equipment is continuously energized at any voltage from 100 to 132 volts AC.
  - 125 volt DC for logic, control (switchgear) and low torque drives.
  - 480 volt AC, 60 hertz, 3-phase for high torque drives.

  – Any voltage required other than the above will be furnished by the equipment supplier.

- Pneumatic: Clean, dry, and oil free instrument air at 70 to 125 psig. All necessary pressure reducing controls (pressure regulators), where required, will be furnished by the equipment supplier.

3.1.3 Standard Ranges of Analog Signals

The ranges of analog signals will normally be as follows:

- Electric—4 to 20 mA DC
- Pneumatic—3 to 15 psig
- Thermocouple—Type K
- RTD—100 ohm platinum

The use of any signal range other than the above will be avoided.

3.1.4 Contact Ratings

The rating of all instrument contacts used for alarm and interlocking will be coordinated to meet the requirements of the interfacing/interlocking system. The ratings of all solid-state control system output contacts will be coordinated to meet the requirements of the driven device/equipment. Consideration will be given to the voltage and current rating, continuous rating, maximum rating (break), and switch rating (break).

In general, the ratings of all instrument contacts used for alarms and interlocks will have a minimum rating as follows:

Voltage Rating, Volts	Continuous Rating, Amperes	Maximum Rating (Break), Amperes	Switching Rating (Break)
120 AC	5.0	3.0	360 volt-amperes
125 DC	2.5	0.50	63 watts

The ratings of all microprocessor output contacts will be the manufacturer's standard rating.

3.2 Instruments

Instrument housings will be in accordance with the NEMA, or other project designated authority rating for the area in which the instrument is located.

3.2.1 Instrument Primary Piping/Tubing (Impulse Lines)

Instrument primary piping/tubing is defined as the piping directly connected to the process, beginning at the outlet of the root valve and terminating at the blowdown valve, and at the point of connection to the instrument.

The preferred material for installation of instrument primary tubing is stainless steel tubing using grip type fittings.

Piping will be used exclusively for all measuring devices to be supported on connecting piping. Stainless steel tubing will be used for all other instrument primary lines. Socket weld fittings will be used on tubing having 0.083 inch or greater wall thickness. Grip type fittings will be used on tubing with wall thickness 0.065 inch or less. Changes in instrument primary tubing direction for tubing having 0.083 inch or greater wall thickness will use tube fittings. All other tubing will be bent.

Pressure test points will have isolation valves and caps. Temperature test points will have thermowells, caps, and plugs.

3.2.1.1 Sizes of Instrument Primary Piping/Tubing

Instrument primary piping will not be smaller than the connection at the process pipe root valve and/or the following:

- Pressure measurement will use primary tubing conforming to the requirements below.
- Flow and level measurement by differential pressure will use primary tubing conforming to the requirements below; however, flange tap connections may be of 0.5 inch size.
- Float actuated level switch devices will be supported on connecting piping not smaller than 1 inch.
- Level controllers and transmitters of the displacement float or guided wave radar type will be supported on connecting piping not smaller than 2 inches.
- Instrument columns for float actuated level switches, displacement float devices, or guided wave radar devices will be piping of not less than 2 inches.
- Primary piping/tubing internal diameter shall not be less than 0.330 inch between the process connection and instrument blowdown valve.
- Instrument tubing will be 0.5 inch OD with wall thickness of 0.083 inch, 0.065 inch, or 0.049 inch as required by the primary piping design pressure and temperature.
- When instrument manifolds are furnished, 0.25 inch outside diameter stainless steel flexible metal hoses, rated for the process design temperature and pressure, may be used as a flex line (less than 18 inch length) between the instrument manifold and the instrument. Direct manifold mounting of the instrument to the manifold is preferred.

3.2.1.2 Materials for Instrument Primary Piping

Material for connecting from the process header to the root valve will preferably be the same as that used in the process system to which it is connected. Material for instrument primary tubing will be stainless steel, ASTM A213 GR TP316. Higher strength materials may be substituted in the interest of standardization; however, welding procedures at the point of joining the instrument primary piping/tubing to the process piping must be appropriate to the combination of materials involved. Copper or brass may be used only for compressed air or for water services that use copper or brass process piping.

3.2.1.3 Insulation of Instrument Primary Piping/Tubing

Instrument primary piping or tubing connecting to high temperature systems, which might become hot enough to injure personnel during blowdown of the instrument line, will be insulated where such hazard exists. Insulation materials, exterior finish, and metal lagging will conform to the standards adopted for the process piping.

3.2.1.4 Criteria for Routing of Instrument Primary Piping/Tubing

Routing of instrument primary piping or tubing, including piping from the process connection through the root valve and the instrument primary piping or tubing, will be in accordance with the following criteria.

Special fittings such as reservoirs and other devices will be installed at differential pressure element connections as required by the process parameter to be measured and by the design of the instrument, in accordance with instructions of the instrument supplier.

Instrument primary piping or tubing for steam flow, liquid flow, and manometer level measurement systems should slope downward from the primary element connections to the instrument. Instrument primary piping or tubing for fuel gas, compressed air, flue gas and airflow measurement systems should slope upward from the primary element connections to the instrument. If these requirements cannot be met, special venting, drain, or seal provisions will be required. Horizontal runs must have a slope of not less than 0.5 inch per foot and must be adequately supported to maintain a constant slope.

Pressure taps will be located on the top or sides of gas, or air piping, and on the bottom (15 degrees from dead center bottom) or side of liquid filled or steam piping. Pressure taps on boiler gas and air ducts will be located on the top or side to permit draining condensation.

3.2.1.5 Support of Instrument Piping/Tubing

Instrument primary piping will be supported in accordance with support requirements for process piping. Instrument primary tubing will be continually supported using unistrut, angle iron, or tubing tray. Pneumatic signal and air supply tubing will be continuously supported and will normally be provided by tubing tray.

3.2.2 Thermowells and Protecting Tubes

Fluid system temperature sensors will be equipped with threaded thermowells and will be made of one-piece, solid bored Type 316 stainless steel of stepless tapered design. Threaded temperature wells in lines operating above 600 psi will be seal welded after installation.

Thermowells in main steam and feedwater piping will be designed to prevent damage caused by vortex-induced vibration over the range of velocities encountered in normal service in accordance with ASME PTC 19.3.

All thermowells in steam piping will be installed and seal welded after steam blow to avoid exposure to vibration damage. For steam blow, the connections will be plugged by screwed plugs after assuring thermowells can be properly inserted. All other thermowells will be installed prior to hydrostatic testing.

Test wells will be provided on main steam, feedwater, and other piping as required to meet ASME or other project designated test requirements.

Temperature detectors in exhaust gas ducts will be mounted in protecting tubes to provide mechanical support and to permit replacement while in operation. Protecting tubes will be made of Type 316 stainless steel not smaller than 0.5 inch with 1.5-inch screwed pipe bushings tack welded to the tubes for attachment to the duct and insertion adjustments. Duct connections will consist of screwed couplings or adapter flanges welded to the ducts, into which the bushings on the protecting tubes can be threaded. Duct connections will be located to minimize the effect of temperature stratification within the ducts. Protecting tubes exceeding 3 feet in length shall be provided with additional supports within the boiler casing or ducts.

3.2.3 Thermocouples and Resistance Temperature Detectors

Temperature measurements for remote use will be by temperature detectors. Temperature detectors will preferably be thermocouples. Thermocouples should be chromel-alumel, Type K, with Type KX extension cable. Thermocouples and extension cable will comply with the standard limits of error in accordance with ANSI MC 96.1 (latest revision). The elements as a rule will be separate from ground (ungrounded).

Resistance temperature detectors (RTDs) will be of the three-wire, 100-ohm platinum type. The nominal resistance of the platinum detectors will be 100 ohms at 0 degrees C. All RTDs for measurement of fluid system temperature will be ungrounded, metal sheathed, ceramic packed, and suitable for the design temperature, pressure, and velocity of the fluid system.

Thermocouples and RTDs will have sheathed elements spring-loaded to provide good thermal contact with the well or protecting tube. The sheath will be made of stainless steel and have swaged type magnesium oxide insulation. All connection heads will be weatherproof, with screwed covers, and supported from the well by a stainless steel extension nipple, extending at least six inches outside the insulation.

3.2.4 Transmitters

Transmitters will be used to provide the required 4 to 20 mA DC signals for all control systems. Transmitters will be of the electronic two wire type, capable of driving a load up to 750 ohm, designed with provisions for zero and span adjustments, and will have ±0.25 percent accuracy or better. Pressure and differential pressure type transmitters will have ±0.1 percent accuracy or better.

3.2.4.1 Static Pressure and Differential Pressure Transmitters

Sensing elements for static pressure and differential pressure transmitters will be of either the capacitance, strain gauge, or resonant frequency type.

For steam and water services, static pressure transmitters will be equipped with a two-valve manifold, and differential pressure transmitters will be equipped with a three-valve manifold. Manifolds will be constructed in accordance with ASME B31.1. Direct manifold mounting of the instrument to the manifold is preferred.

3.2.4.2 Level Transmitters

Sensing elements for level transmitters will be of the following types:

- Static head devices for vessels exposed to atmospheric pressure; air bubbler type devices may be used if absorption of air by the liquid is not objectionable. (Level transmitters of this type are the same as static pressure transmitters.)

- Differential pressure type with constant head chamber for high-pressure and temperature applications where installation of guided wave radar or float cage becomes impractical. (Level transmitters of this type are the same as differential pressure transmitters.) Tank level installations will include flanged isolation valves.
- Displacement float type, guided wave radar type, or differential pressure type for feedwater heaters and enclosed vessels (where practical).
- RF admittance, guided wave radar, or ultrasonic type, for specialized applications.

3.2.4.3 Flow Transmitters

Flow transmitters for general applications will be of the differential pressure type:

Primary Elements

Flow nozzles will be used for feedwater flow, steam flow and other critical measurements where weld-in construction is required. Flow nozzles will be made of stainless steel with dual sets of pressure taps installed in the pipe wall where required. Installation of flow nozzles and pressure taps will be made in the flow element manufacturer's shop as required. Feedwater flow and steam flow nozzles will be calibrated by a nationally recognized feedwater and steam flow calibrating facility.

Paddle type orifice plates will be used for other flow measurements where flanged construction and higher pressure loss are acceptable. Orifice plates will be made of stainless steel. Orifice flanges will be of the raised face weld neck type with dual sets of taps.

Construction and installation of flow nozzles and orifices will conform to the requirements of ASME Performance Test Code PTC 19.5, and discharge coefficients will be predicted in accordance with data published in ASME Research Report on Fluid Meters by ASME.

Airfoil or venturi flow sections, or averaging type pitot tubes, may be used for measuring boiler combustion airflow.

Thermal dispersion meters, piezometers, and averaging pitot tubes will be used for measuring flows in large pipes or ducts where installation of flow nozzles, orifice plates, or airfoils is impractical.

Secondary Elements

Secondary elements for differential type primary flow elements will be differential pressure transmitters as described above. Square root extraction required for the DP transmitters will be performed electronically in the control system, which receives the transmitter output signal.

Positive displacement type flowmeters will be used for measuring fuel oil flows.

Turbine or vortex flowmeters or orifice type flow sections will be used for measuring gas flows.

3.2.5 Temperature, Pressure, Level, and Flow Switches

Temperature, pressure, level, and flow switches will generally have two single-pole, double-throw (two Form C contacts) for each actuation point. Each switch will have screw type or compression type terminals to accept field wiring no smaller than 16 AWG.

Where standard switch ranges allow, switches will be applied so that the actuation point is within the center one-third of the instrument range. Switch set point will be adjustable. Contacts will be of the snap-acting type.

3.2.5.1 Temperature Switches

Temperature switches will be actuated by filled-bulb type elements equipped with standard length armored capillary tubing.

3.2.5.2 Pressure Switches

Pressure switches will be actuated by diaphragm type elements. Pressure switches will be classified into the following types:

- General static pressure switches and general differential pressure switches for normal static pressure ranges.
- Low differential pressure switches for low static pressure ranges.
- Low differential pressure switches for high static pressure and/or applications requiring both indication and pressure switch contacts.

3.2.5.3 Level Switches

Level switches will be actuated by elements of the following types:

- Static head devices for vessels exposed to atmospheric pressure; air bubbler type devices may be used if absorption of air by liquid is not objectionable. Level switches of this type are the same as static pressure switches.
- Differential type for high pressure and high temperature applications. Level switches of this type are the same as differential pressure switches.
- Displacement float type or differential type for enclosed vessels and sumps.
- Moving float or ultrasonic type for open tanks and sumps.
- Capacitance, RF admittance, or ultrasonic type, for specialized applications.

Switching elements of moving float and displacement float type level switches will have float and body construction appropriate to the service conditions of the systems to which they are connected. Switch elements shall be of the vibration resistant, snap-acting type magnetically coupled to the float. Two switch elements or one DPDT switch element will be available at each level point monitored.

Each switch element will be reversible for NC or NO operation, or will be double-throw construction. Switch element leads will be of high temperature construction as required, and terminated on terminal blocks within the switch housing. Switch housing will be NEMA 4 construction, unless otherwise specified.

3.2.5.4 Flow Switches

Variable area or differential pressure type actuating elements will be used for low-flow and low-pressure applications.

3.2.6 Local Indicators

3.2.6.1 Local Temperature Indicators (Thermometers)

Thermometers for local mounting will be 4.5 inch dial with white faces and black scale markings, bimetal actuated thermometers, or acceptable equal. Thermometers for panel mounting will be gas-actuated with stainless steel armored capillary tubing of the length required for installation with 4.5 inch minimum dial size. Dial scales will be such that the normal operating range is in the middle third of the dial range. The dials will be engraved with service legends, or separate nameplates will be furnished to identify the service. Separate nameplates shall be engraved phenolic attached to the dial face or stamped stainless steel attached to the thermometer by stainless steel wire. Thermowells will be furnished for all thermometers.

3.2.6.2 Local Pressure Indicators (Pressure Gauges)

Gauges for control air supply and signal pressures integral to an instrument will be in accordance with the instrument manufacturer's standards. All other gauges will be 4.5 inch minimum dial size or acceptable equal. All gauges will have stainless steel movements. Gauges for panel mounting shall be of the flush mounting type. Gauges for separate mountings shall have 0.5 inch NPT bottom connections.

Dial scales will be such that the normal operating range is in the middle third of the dial range. In general, pressure indicators will have linear scales with units in psig. The dials will be engraved with service legends, or separate nameplates will be furnished to identify the service. Separate nameplates shall be engraved phenolic attached to the dial face or stamped stainless steel attached to the thermometer by stainless steel wire.

Gauges for fluids which may be corrosive to the gauge internals will be furnished with glycerin filled cases and diaphragm seals. Gauges on pulsating services will have pulsation dampeners. Gauges used in compressed gas applications or those equipped with diaphragm seals will not be furnished with pulsation dampeners. Gauges required by a specific code, such as NFPA 20, will be supplied in accordance with the code.

3.2.6.3 Local Level Indicators (Gauge Glasses)

Tubular gauge glasses will be used for low-pressure applications. Transparent or reflex gauges will be used for high-pressure applications. All gauge glasses will be equipped with gauge valves, including a safety ball check.

3.2.6.4 Flow Indicators

Sight flow and variable flow indicators will be only be used for low pressure and low temperature applications where quantitative measure of flow is not required.

Flow indicators for high-pressure and high temperature applications are not anticipated.

3.2.7 Solenoid Valves

Solenoid coils will generally be high temperature construction and will be designed for continuous duty. Three-way solenoid valves will be designed for universal operation so that the supply air may be connected to any port. Solenoid enclosures will be NEMA 4.

3.3 Plant Control Systems

3.3.1 Pneumatic Controllers

The use of pneumatic controllers will be minimized but may be used for the following applications:

- Control loops which require only proportional or proportional plus reset action, but require no remote manual positioning by the control room operator.
- Control loops that do not require any interface with any receiver installed in the control room.

3.3.2 Electronic Control Systems

The objective of the control and information systems is to facilitate plant operations by ensuring personnel safety, equipment protection, adequate operation, and plant availability. The control and information systems will ensure these criteria are met by incorporating the following design features:

- Centralized control location(s).
- Reasonably consistent operator interface.
- Redundancy of key critical components.
- Fail-safe design of protective systems.
- Cost-effective design.

The majority of plant equipment control and information functions will be implemented in the Distributed Control System (DCS). The major exceptions are controls for the combustion and steam turbines.

3.3.2.1 Combustion and Steam Turbine Controls

All combustion and steam turbine controls will be performed in the proprietary control systems furnished by the turbine suppliers. The combustion turbine control systems and steam turbine control systems will interface with the DCS through redundant datalinks and a limited complement of hard-wired I/O for operator actions and information display; however, the equipment control and protection logic will be implemented in the proprietary control systems provided by the respective equipment suppliers. In addition to the local controls provided for the combustion and steam turbines, and the information furnished to the DCS via datalinks and hard wiring, workstations should be provided for the proprietary turbine control systems in the control room.

3.3.2.2 DCS Equipment Function

The DCS will be a microprocessor-based system and will provide modulating control, digital control, monitoring, alarming, logging, data archiving, and indicating functions for the plant systems. The following functions will be provided:

- Overall control of the combustion turbine generator, steam turbine generator, and other systems in a coordinated response to unit load demands.
- Sequential combined cycle plant startups and shutdowns initiated by the plant operators.

- Control of the balance-of-plant process equipment, including the steam-feedwater-condensate cycle, auxiliary cooling water, water quality control systems, cycle chemical feed system, and other process systems.
- Operator interface for the turbine generator controls for normal or automatic operation.
- Operator interface for the auxiliary electric system.
- Visual and discernible audible alarms for abnormal events based on field signals or software generated signals from the systems, processes, or equipment.
- Consolidated sequence-of-events recording for each combustion turbine, steam turbine, and balance-of-plant systems to assist with diagnostic evaluation of plant upsets and trips.
- Provide operator interface through control consoles consisting of CRTs and printers.
- On-line hardware and software diagnostics.
- On-line programming and logic changes with tuning capability.
- Monitor plant equipment and process parameters and provide this information to the plant operators in a meaningful format.

3.3.2.3 Major DCS Components

The DCS will include the following equipment:

- Distributed I/O cabinets containing the system input/output equipment and wiring terminations for process sensing and control equipment interface. These I/O cabinets will be located in areas of high concentration of field equipment that interfaces with the DCS.
- Distributed processing unit cabinets containing the redundant processing units, data highway communications equipment, and power supplies.
- Communication interfaces between the DCS and proprietary control systems furnished with major equipment packages.
- Redundant data highway to provide communication between the various components of the DCS. The redundant data highway cables will be routed through separate raceway systems to provide proper isolation.
- Operator workstations, each composed of color CRTs and a cursor control (trackball or mouse), to provide the normal interface between the operator and the plant processes and equipment being controlled or monitored. Alarm functions will also be displayed on these work stations.
- Printers to provide the operator with a hard copy record of logs, reports, system events, and CRT displays.
- Operator/Engineer's workstation containing the CRT-based, operator/engineer station to provide the interface between the plant engineer and the plant processes and equipment for control system tuning, system program development and modification,

and CRT graphic display development and modification. A printer will also be located on the console to provide the engineer logs and special reports, and documentation of system programming changes.

- Facilities for historical storage and retrieval will also be provided. Both analog values and digital status information will be stored. Each data point will have an individually selectable collection frequency.

Control systems supplied with individual vendor's equipment will, to the extent practical, be designed to be integrated into the plant DCS.

Operator workstation displays will provide manual/automatic control station interface to the modulating control system. The displays will provide for operator adjustments of set point, bias, output, and manual/automatic control switching and indication of the associated station status and process values.

Operator workstation displays will also provide start and stop or open and close commands to motor-operated equipment. Running, stopped, open, closed, and automatic trip status feedback and automatic/standby mode status will be displayed for the operator.

3.3.2.4 DCS Functional Distribution

The DCS will be composed of functionally distributed redundant (modular) processors, input/output modules, and operator interface devices, all connected via a redundant communications network. Each system component connected to the communications network will be assigned a specific control or information task. All components will have the capability to communicate with one another through the communications network.

3.3.2.5 DCS Inputs and Outputs

Input/output modules will be used for interfacing with transmitters and other sensors, final control elements, motor starters, breakers, and other plant equipment located throughout the plant. The I/O modules containing inputs and outputs used for control functions will be connected directly to the individual control processors so that a failure of the communications network will not affect the availability of the inputs and outputs necessary for execution of the control functions of the system.

Where control information is transmitted between processors via the data highway, the overall security and response times of the control loops and digital control operations will be evaluated for acceptability. To the extent practical, the system will be organized so that the program within a processing unit will stand alone without dependence upon another processing unit or loop communications.

3.3.2.6 Workstations

CRT based operator workstations will be provided in sufficient quantities to allow for ease of operation of the plant control systems.

Each operator workstation will be designed for point-and-click initiation of operator control commands. "Hard-wired" devices such as push buttons and indicators will be limited to those required by codes and regulations, and those necessary for hard-wired emergency shutdown push buttons in the unlikely event of control system failure.

3.3.2.7 DCS Failure Mitigation and Reliability

The DCS will be designed so that no single failure of any equipment or power source will interrupt or disrupt any control function, nor will any single failure cause any controlled equipment to change status unless specifically required in accordance with the design. System outputs controlling redundant or parallel process equipment will be assigned to minimize the impact of an output card failure. In general, the use of redundant DCS outputs will be avoided. In cases of a failure of a single system input transducer or of an input module serving only that transducer, a predicted DCS system control response to the failure will be allowable. All such failures, however, will be alarmed.

The DCS design will incorporate functional and component redundancy to ensure maximum reliability during system operation. Each of the processing units performing control and alarm functions will contain a pair of completely duplicate processors. One processor of the pair will be active; the other processor will be operating in a hot standby mode and will be continuously updated to be aware of the status of the active processor. In the event of a failure in the active processor, all functions will instantly be assumed by the standby processor. The transfer to the standby processor will be alarmed.

The system configuration will be such that no single component failure of the communication network will degrade other components within the system.

Redundant and secure power supplies will be provided for all control components in the system. Peripheral devices such as printers and copiers will be powered from a vital power source in the plant.

3.3.2.8 DCS Diagnostics

The DCS will be equipped with a diagnostic package that includes both hardware and software to detect system malfunctions and equipment failure. The occurrence of any malfunction or equipment failure will be alarmed instantly. The diagnostic package will be capable of pinpointing the defective component down to the card level.

3.3.2.9 DCS Responses to Failures

The DCS will be designed to react in a predictable manner to certain failures, such as those listed below.

- Upon system logic failure, as detected by system diagnostics, a controller transfers to its backup. If the backup is unavailable, the controller outputs will fail to a predictable state and will enable any manual shutdown facilities which are appropriate to provide orderly shutdown of equipment.
- Upon system logic power supply failure, the controller will transfer to its backup. If the backup is unavailable, the system outputs will fail to a de-energized state.
- Upon power failure to an active or running controlled device or equipment, the system will react in a predetermined manner, either to command a restart of the equipment upon power resumption, or to cycle the logic to a status requiring equipment shutdown.

3.3.2.10 Response Time

The response time of the system will be sufficient to maintain control over the plant processes under all system operating conditions including extreme plant upset conditions with all points in alarm. The response time is the total elapsed time for transmission of data through the system communication path. This time will include all communication time from processor to processor, I/O scans, nodes, gateways, operator work stations, and associated equipment internal to the system. The system response time will be as follows:

Function	Nominal Response (msec)
Monitoring/Information	2,000
Modulating Control	
Slow Loops	1,000
Fast Loops	250
Manual Control	1,000
Motor Control	1,000
Sequence-of-Events and Alarm Monitoring	1

3.3.2.11 DCS Expansion

The DCS will include spare capacity and equipment, and provisions for future expansions.

3.3.2.12 DCS Information Presentation

The control systems will provide real-time information to the operators in several formats as follows:

- Process graphic displays—The process graphic displays present information to the operator in formats similar to simplified Piping and Instrument Diagrams or equipment pictorials. Process information and equipment status are presented as dynamic text values and symbol colors. Operator control actions may be affected through the process graphic displays.
- Faceplate displays—Faceplate displays consist of an intelligent grouping of manual/auto stations or control "faceplates" associated with a given piece of equipment or process. Operator control actions will be affected through the faceplate displays.
- Bar chart displays—Bar chart displays consist of a grouping of vertical or horizontal dynamic bar graphs associated with a particular process. Bar charts provide an analog representation of process parameters for quick operator recognition and comparison.
- Trend displays—Trend displays provide a dynamic graphical representation of analog (or discrete) values versus time. Trend displays replace the function of ink type "strip chart" recorders. Trend displays provide the capability to scroll backwards in time to review performance or process trends, thereby assisting in troubleshooting and post-trip analysis.

3.3.2.13 DCS Annunciation

The control systems will annunciate the occurrence of abnormal events in the form of CRT alarm summaries, printed alarm logs, and audible tones.

The operators will be alerted to the occurrence of abnormal events and the return of abnormal events to normal operating conditions. The conditions to be annunciated include those that are potentially dangerous to personnel or damaging to equipment, those that may affect the plant's load carrying capability, and those indicative of processes or equipment that are operating in an abnormal or inefficient condition. Return-to-normal operating conditions will not be annunciated.

The alarm printer will provide a hard copy printout of the alarm conditions that appear on the operator work stations.

3.3.3 Discrete Controls

Motor and other discrete interlocks will be designed in accordance with the following criteria. The logic will be designed to minimize the requirement for operator interface.

3.3.3.1 Protective Interlocks

The protective interlocks for each motor and its associated equipment will be designed as follows:

- To prevent the motor from being started if the starting permissives required for safe operation are not satisfied.
- To automatically stop the motor under unsafe operating conditions when any action by the operator may be too slow to prevent the motor and its associated equipment from being damaged.
- To automatically start any standby equipment as a result of a motor trip and/or as required by the process.
- To provide outputs to inform the operator of the equipment status at all times.
- To provide outputs to alert the operator when any critical operating parameter is approaching its limit or when an abnormal operating condition occurs.
- To prevent operation of generators and transformers when permissives are not met. These will combine hard-wired protective and lockout relays with software protective interlocks.

3.3.3.2 Standby Starts

Components in a system, such as turbine AC and DC lube oil pumps, which are paired to back up each other, will have a standby mode imposed upon the protective interlock scheme. If the redundant pump is in the standby mode when the operating pump is tripped, or a process parameter indicates that the operating pump has failed, the standby pump will standby-start. After a pump has started in the standby mode, the pump will not stop automatically, except on a trip condition. An alarm will be generated to alert the operator that the pump has standby started.

3.3.3.3 Automatic Starts and Stop

Equipment in some systems will operate in an automatic mode in which the starting and stopping of a motor are initiated automatically. An example of the automatic mode is a tank fill pump that automatically starts at a low level and stops at a high level. Automatic motor actuations will not be alarmed unless the automatic action is initiated by a protective interlock. Normal automatic motor actuations will, however, be recorded in the events log and summary display.

3.3.3.4 Manual Control

All equipment will be provided with the manual control mode. Automatic and standby control modes will be provided for equipment as appropriate. Equipment that is not frequently operated, such as auxiliary electric system feeder breakers, or equipment which is normally not started without supervision will only be provided with the manual control mode.

3.3.3.5 Sequential Controls

Sequential controls apply control logic to a system or group of equipment. Its functions are to coordinate the operation of all components in a functional group and to automatically start and stop or open and close all components in a predetermined sequence. The sequence should not require the operator to initiate any step-by-step control during the process. Sequential controls are typically found in vendor-furnished packaged systems, such as demineralizers and water treatment systems, and are generally implemented in programmable logic controllers. Sequential controls should be designed to provide required information via network connection to the DCS, if implemented in vendor-furnished packaged systems.

3.3.4 Hardware Selection

3.3.4.1 Logic System

The main plant controls will utilize DCS type hardware. Controls purchased as part of an equipment package may utilize electromechanical or solid-state hardware, or may be hybrid.

3.3.4.2 Local Control Hardware

Small fans and pumps may be controlled by local control switches, if advantageous, and no intervention is required by the control room operator.

3.3.5 Location of Control Equipment

Control equipment refers to the control devices used to implement the modulating and discrete control strategies, and the equipment provided for operator interface.

All pneumatic controllers will be field-mounted. All other control devices will be either mounted on a control console or panel, in a control cabinet, or on local stands.

Control areas will include the Control Room, local equipment buildings supplied by the combustion turbine and steam turbine supplier, and local areas in which local control stations and local control panels are located.

3.3.5.1 Control Room

The Control Room will contain the DCS, combustion turbine, and steam turbine operator workstations mounted on the control console from which the operator will conduct all normal and emergency operations of the unit. The alarm and log printers will also be located in the Control Room.

3.3.5.2 Electronic Equipment Room

The electronic equipment room for the installation of control equipment, computer cabinets, and other solid-state electronic equipment will be provided in an area adjacent to the Control Room. The electronic equipment room will be environmentally controlled.

3.3.5.3 DCS I/O Locations

All DCS I/O modules and devices will be located in environments compatible with the hardware. Where remote I/O cabinets are used, they will be located in protected, ventilated (or air-conditioned) environments as appropriate for solid-state electronics, in accordance with the manufacturer's recommendations. I/O hardware will be physically distributed where practical to reduce cable costs.

3.3.5.4 Local Control Areas

Local control areas will be established for systems where it is advantageous to have operator control in the vicinity of the equipment being controlled. The combustion turbine controls fall under this category.

Each of these systems will be provided with sufficient local control devices for a local operator to initiate a startup or shutdown sequence with provisions for manual control of major power-operated components within the system independent of the sequential operation.

3.3.6 Final Control Devices

Final control devices will be supplied with the necessary signal conditioning and sensing devices to adequately interface with the control system.

3.3.6.1 Control Valves

Air-operated modulating valves controlled from an electronic control system will be provided with a valve positioner capable of receiving a 4 to 20 mA signal and converting the signal to an air pressure signal corresponding to the force required to move the valve diaphragm to the adjusted position. In certain instances when an electronic-to-pneumatic positioner is not commercially available, a combination of an signal converter (electropneumatic) and pneumatic valve positioner will be supplied.

3.3.6.2 Control Drives

Control drives modulating boiler process dampers and other process related equipment will be capable of receiving a 4 to 20 mA signal. The drive will include integral position switches and/or a position transmitter. The drives and associated linkages will be sized to accommodate the maximum operating force required by the damper or driven equipment. Drive operating speeds will accommodate the process dynamics of the system.

3.3.6.3 Open/Close Air-Operated Valves and Operators

Air-operated open/close valves and operators controlled from the electronic control system will include solenoid valves and open/close position switches. Failure mode will be determined during detailed design.

3.3.6.4 Open/Close Electrically Operated Valves and Operators

Electrically operated open/close/jog valves and operators controlled from the electronic control system will include integral position switches. Valves and operators required to jog (stop in an undetermined, intermediated position) will include position transmitters.

3.3.7 Operator Interface Devices

Operator interface devices, whether workstations or local interface devices will be designed in accordance with ISA Recommended Practice 60.3 and, in particular, the human factors design criteria listed below.

- Safety—Consideration will be given to safety, including minimizing potential human error in the operation or maintenance of plant equipment using the DCS control equipment.
- Standardization—Controls, displays, nomenclature, color selection, and arrangement schemes will be consistent for common functions of all equipment.
- Allocation of Functions—The allocation of control functions between man and machine will be optimized based on study or prior successful experience.
- Ergonomics—The physical design and construction of equipment will give consideration to human engineering ergonomics.
- Interaction—The operator will have all control devices and displays necessary to fulfill his assignment at his disposal and within his reach and visual range.

In consideration of these criteria, provisions will be made for remote (control room) operator interaction with plant systems and equipment, which are routinely started and stopped, adjusted, or require hourly monitoring.

ATTACHMENT A.2.5

Electrical Engineering Design Criteria

1.0 Introduction

This attachment describes the design criteria which will be used for all electrical work related to this project.

Project design, engineering, procurement, and construction activities will be controlled in accordance with various predetermined standard practices and project-specific programs/practices. An orderly sequence of events for project implementation is planned, consisting of the following major activities:

- Conceptual design.
- Licensing and permitting.
- Detailed design.
- Procurement.
- Construction and construction management.
- Checkout, testing, and startup.
- Project completion.

This attachment also summarizes the codes and standards, standard design criteria, and recommended industrial practices that will be used during the project. The general electrical design criteria defined herein form the basis of the design for project electrical components and systems. More specific design information will be developed during detailed design to support equipment and erection specifications. It is not the intent of this attachment to present the detailed design information for each component and system, but rather to summarize the codes, standards, and general criteria that will be used. Codes, standards, and general criteria selected during the detail design phase of the project may vary from the information indicated in this attachment per specific project or design requirements.

Section 2.0 summarizes the applicable codes and standards, and Section 3.0 includes the general design criteria for motors, power and control wiring, protective relaying, classification of hazardous areas, grounding, lighting, heat tracing, lightning protection, raceway and conduit, and cathodic protection.

2.0 Codes and Standards

The design and specification of all work shall be in accordance with the laws and regulations of the Federal Government and the state of California, including applicable local codes and ordinances. A listing of the applicable local codes and industry recognized general codes and standards to be used in design, construction and testing follows:

- The American Bearing Manufacturers Association (ABMA).
- American National Standards Institute (ANSI).

- American Society for Testing and Materials (ASTM).
- Insulated Cable Engineers Association (ICEA).
- Institute of Electrical and Electronics Engineers (IEEE).
- Illuminating Engineering Society (IES).
- National Electrical Code (NEC).
- National Electrical Manufacturers Association (NEMA).
- National Electrical Safety Code (NESC).
- National Fire Protection Association (NFPA).
- Occupational Safety and Health Administration (OSHA).
- Underwriters' Laboratories (UL).
- Uniform Building Code (UBC).
- American Gas Association (AGA).

Other recognized standards will be used where required to serve as guidelines for design, fabrication, and construction when not in conflict with the above listed standards.

The codes and industry standards used for design, fabrication, and construction will be the codes and industry standards, including all addenda, in effect as stated in equipment and construction purchase or contract documents.

- Seismic design criteria from either the Uniform Building Code or IEEE will be used.

The following laws, ordinances, regulations, and standards (LORS) have been identified as applying to electrical engineering design and construction. In cases where conflicts between cited codes (or standards) exist, the requirements of the more conservative code will be met.

2.1 Federal

None are applicable.

2.2 State

- Title 24 California Code of Regulations (CCR) Sections 2-5301 et seq., Energy Conservation.
- Title 24 CCR Section 2-6101 et seq., Special Electrical Systems.
- Title 24 CCR Section 3-089 et seq., State Electrical Systems.
- Warren-Alquist Act (WAA) and the California Energy Commission (CEC) siting regulations require submittal of detailed information describing measures proposed to ensure safe and reliable operation of the facility and the design and feasibility of all systems and components related to the generation of power.
- California State Building Code.
- California Referenced Standards Code, 2001 Edition.
- California Energy Code, Title 24 of the California Code of Regulations.
- California Electrical Code, 2004 Edition and Uniform Administrative Code provisions for the National Electrical Code, 1996 Edition.

2.3 County

None are applicable.

3.0 Electric Motors

3.1 General Motor Design Criteria

These paragraphs outline basic motor design guide parameters for selecting and purchasing electric motors. The following design parameters will be considered:

- Motor manufacturer.
- Environment, including special enclosure requirements.
- Voltage, frequency, and phases.
- Horsepower, starting, running and duty cycle requirements and limitations.
- Motor type (synchronous, induction, DC, etc.) and construction.
- Power factor (Starting and Running).
- Service factor.
- Speed and direction of rotation.
- Insulation.
- Temperature limitations of winding insulation and enclosures.
- Accessory devices.
- Enclosure.
- Bearing construction, rating life of rolling elements, and external lube oil system for sleeve or plate bearings.
- Cooling requirements
- Ambient noise level and noise level for motor and driven equipment.
- Frame size.
- Termination provisions for power and grounding conductors and accessories.
- Installation, testing, and maintenance requirements.
- Special features (shaft grounding, temperature and vibration monitoring, surge protection, etc.).
- Motor space heater requirements.

3.1.1 Safety Considerations for Motors

The Occupational Safety and Health Administration rules will be followed for personnel protection. Belt guards will be specified for personnel safety and, when required, to prevent foreign objects from contacting belt surfaces. Guard screens will be provided over motor enclosure openings to prevent direct access to rotating parts. Electrical motors will be adequately grounded.

Motors in hazardous areas will conform to applicable regulatory requirements and will be UL labeled for the application. For medium voltage motors, electrical connections will be terminated within oversized conduit boxes mounted to the motor frame.

3.1.2 Codes and Standards

Motors will be designed, manufactured, and tested in accordance with the latest applicable standards, codes, and technical definitions of ANSI, IEEE, NEMA, and ABMA. The requirements of each applicable code or standard will be supplemented by requirements of the individual equipment specifications.

3.1.3 Testing Requirements

Each type of AC and DC machine will be tested in accordance with the manufacturer's routine tests at the factory to determine that it is free from electrical or mechanical defects and to provide assurance that it meets specified requirements. The following criteria and tests will be used in testing each type of machine:

- Integral horsepower, three-phase, 460-volt induction motors:
  - Routine tests listed in NEMA MG-1, Routine Tests for Polyphase Medium-Induction Motors
  - Test procedures will be in accordance with IEEE, Test Procedure for Polyphase Induction Motors and Generators
- Induction motors rated above 600 volts:
  - Routine tests listed in NEMA MG-1, Large Machines-Induction Machines-Tests, will be performed on each motor.
  - The following additional tests and inspections will be performed on each motor larger than 500 horsepower:
    - Locked-rotor current at fractional voltage. Current balance.
    - Length of time of bearing test and final temperature rise of bearing.
    - A statement that bearings have been inspected and approved for shipment.
    - Insulation resistance time curve and polarization index for motors with formed-coil stators.
    - Final value of motor noise levels including statement that there is no objectionable single frequency noise.
    - Final air gap measurements (single air gap).

- Motors that are specified to have complete tests performed on either the furnished motor or an electrically duplicate motor will require the following tests:

  – Temperature
  – Percent slip
  – No-load saturation curve
  – Locked-rotor saturation curve, including locked-rotor torque, current, and power
  – Speed-torque and speed-current curves at rated voltage and at minimum starting voltage
  – Efficiency at full, three-fourths, and one-half loads

  Power factor at full, three-fourths, and one-half loads.

- Direct current motors—The standard routine tests and inspections will be performed on each motor. These shall include the following:

  – High potential dielectric test
  – Measurement of resistance of all windings

  Inspection of bearings and bearing lubrication system.

(1) No-load running armature current, shunt field current, and speed in revolutions per minute, at rated voltage.

(2) Full load armature current, shunts field current, and speed in revolutions per minute, at rated voltage.

Test procedures will be in accordance with NEMA MG-1 Tests and Performance DC Small and Medium Motors.

3.2 Electrical Design Criteria

Special requirements for individual motors and specifications for special application motors will be included in individual specification technical sections.

3.2.1 Rating

The motor nameplate horsepower multiplied by the motor nameplate service factor will be at least 15 percent greater than the driven equipment operating range maximum brake horsepower requirement. For motors with 1.15 service factor, the maximum load break horsepower will not exceed the motor nameplate.

Motor operating voltages (excluding motor-operated valves) are tabulated as follows:

Voltage Horsepower	Nominal System Voltage	Motor Nameplate Voltage	Frequency, Hz	Phases
Up to 1/3	120	115	60	1
1/2 and less than or equal to 249 (except for special applications)	480	460	60	3
250 and larger	4,160	4,000	60	3
DC motors	125	120	DC	—

This table is intended as a general guide; however, individual conditions such as distance from power source, voltage drop, etc., may dictate deviations from the stated horsepower/voltage criteria.

Emergency motors will operate continuously at the nominal system voltage with any supply voltage variation between 80 and 112 percent of the nominal system voltage.

Motors will be designed for full voltage across the line starting and frequent starting where required and will be suitable for continuous duty in the specified ambient conditions. Intermittent duty motors will be selected where recognized and defined as standard by the equipment standards and codes.

The torque characteristics of all induction motors will be as required to accelerate the inertia loads of the motor and driven equipment to full speed without damage to the motor or the equipment at any voltage from 90 to 110 percent of motor nameplate voltage except those to be individually considered. A voltage drop greater than 10 percent from the specified motor nameplate rating will be individually considered for proper motor starting and operating.

3.2.2 Temperature Considerations

Integral horsepower motors will be designed for an ambient temperature of 40°C. Motors located in areas where the ambient temperature exceeds 40°C will be designed for that ambient condition.

3.2.3 Windings and Insulation

All insulated windings will have a Class F nonhygroscopic insulation system with Class B temperature rise and ambient temperature in accordance with NEMA MG-1 standards. When ambient temperatures greater than 40°C are specified, the allowable temperature rise will be reduced in accordance with NEMA MG-1 standards.

All insulated stator winding conductors and wound rotor motor secondary windings will be copper.

The insulation resistance corrected to 40°C will be not less than motor rated kV+1 megohms for all windings.

Where required, the windings will be treated with a resilient, abrasion resistant material.

3.2.4 Overspeeds

Squirrel-cage and wound-rotor induction motors, except crane motors, will be so constructed that, in an emergency of short duration, they will withstand, without mechanical injury, overspeeds above synchronous speed in accordance with the table as listed in NEMA MG-1, Overspeeds for Motors.

3.2.5 Space Heaters

Space heaters will be sized as required to maintain the motor internal temperature above the dew point when the motor is idle. Motor space heaters will not cause winding temperatures to exceed rated limiting values nor cause thermal protective device over temperature indication when the motor is not energized.

In general, all NEMA series 180 frame size motors or larger will have 120-volt, single-phase, 60-hertz space heaters. The voltage rating of the heaters shall be at least twice their operating voltage of 120 volts. All 4,000-volt motors will have space heaters. Space heaters rated 10 amps and less will be suitable for operation on 120 volts, single-phase, 60 hertz. Heaters rated above 10 amps will be suitable for operation on 208 volts, three-phase, 60 hertz. Heaters will be located and insulated so they do not damage motor components or finish.

Space heater leads will be stranded copper cable with 600-volt insulation and shall include terminal connectors. Space heater leads will be wired to a separate terminal housing on 4,000-volt motors.

3.2.6 Nameplates

All motor nameplate data will conform to NEMA MG-1 requirements. The following additional nameplate data will be included for 4,000-volt-rated motors:

- Manufacturer's identification number.
- Frame size number.
- Insulation system class designation.
- Maximum ambient temperature for which the motor is designed or the temperature rise by resistance.
- Service factor.
- Starting limitations.
- Direction of rotation and voltage sequence.
- ABMA bearing identification number for motors furnished with rolling element bearings.
- For motors with connections to an external lubricant recirculating system, or with an integral forced lubrication system, oil pressure and oil flow required.
- For motors designed for service in hazardous areas:
  - Location class and group designation.
  - Maximum operating temperature value or operating temperature code number.

3.2.7 Environment

Location of individual motors within the plant will determine ambient temperature, corrosive environment, hazardous environment, and humidity to be experienced by the motors. These conditions will be considered in the purchase specification.

3.2.8 Allowable Noise

The motor sound level will conform with the motor driven equipment assembly overall sound level requirements. In no case will the average no-load sound pressure level, reference level 20 micropascals, produced by the motor, exceed 90 dBA free field at 1 meter for motors rated 200 horsepower and less and at 2 meters for motors rated above 200 horsepower.

3.3 4,000-Volt Squirrel-Cage Induction Motors

3.3.1 Design and Construction

Design and construction of 4,000-volt motors will be coordinated with the driven equipment requirements.

Motor power lead terminal housings will be adequately sized to terminate the power conductors. The power lead terminal housing will also be large enough to provide working space for field fabrication of stress cones within the housing and to contain the stress cones after installation.

The terminal housings of motors required being equipped with current transformers and neutral connections will have sufficient space for the added equipment.

Separate terminal housings will be provided for:

- Motor power leads.
- Motor accessory leads.
- Motor temperature detector leads.

All leads will be wired into their respective terminal housings. All motor leads and their terminals will be permanently marked in accordance with the requirements of NEMA MG-1, Part 2. Each lead marking will be visible after taping of the terminals.

Motors designed to rotate in only one direction will have the direction of rotation marked by an arrow mounted visibly on the stator frame near the terminal housings or on the nameplate, and the leads marked for phase sequence T1, T2, and T3 to correspond to the direction of rotation and supply voltage sequence.

All outdoor motors will be TEFC with NEMA waterproof features or WP Type II with filter. Indoor motors in wet areas will be fully guarded, with dripproof enclosures.

Motors for outdoor service will have all exposed metal surfaces protected with a corrosion-resistant polyester paint or coating.

In addition to the preceding requirements for outdoor service motors, totally enclosed motors will have enclosure interior surfaces and the stator and rotor air gap surfaces protected with a corrosion-resistant alkyd enamel or with polyester or epoxy paint or coating. Bolts, nuts, screws, and other hardware items will be corrosion-resistant or heavy cadmium plated metal. A rotating labyrinth shaft seal will be furnished on the shaft extension end of the motor.

Weather protected Type II enclosures will have standard space heaters, and removable, recleanable, impingement type air filters.

Squirrel-cage induction motors will have rotors of fabricated copper alloy, cast aluminum, or fabricated aluminum alloy. Fabricated aluminum alloy will only be used where the manufacturer has demonstrated the reliability of his design and low inertia loads.

3.3.2 Insulation

All motors shall be furnished with Class F or Class H insulation systems, provided the temperature rise is based on Class B maximum. An insulation resistance time curve corrected to 40°C for determining the polarization index for motor stator windings will be taken immediately before making the final high potential ground test. Each stator phase will be tested separately to ground, with other phases grounded. Motors will be tested at not less than 5,000 VDC. The ambient temperature, winding temperature, and relative humidity values will be included with the recorded data. The polarization index will not be less than 3.0. An insulation-to-ground dielectric test will be made on the motor windings at a value of two times rated voltage + 1,000.

3.3.3 Bearings

Horizontal motors, except motors for belted drives, will have split sleeve bearings of oil ring type, unless required otherwise.

Sleeve bearings on horizontal motors will be designed and located centrally with respect to running magnetic center to prevent the rotor axial thrust from being continuously applied against either end of the bearing. The motors will be able to withstand without damage the axial thrusts developed when the motor is energized.

When sleeve bearings are not specified, horizontal motors will have antifriction bearings.

Thrust bearings for vertical motors will be able to operate for extended periods of time at any of the thrust loadings imposed by the specific piece of driven equipment during starting and normal operation, without damage to the bearings, the motor frame, or other motor parts.

Motors furnished with spherical roller thrust bearings will also be furnished with ball or deep groove radial guide bearings. The guide bearings will be locked to the shaft so that the guide bearing will take upward thrust and to assure that the thrust bearing is always loaded. If spring loading is furnished, the guide bearing will not be preloaded during normal operation.

Bearing lubricants will contain a corrosion inhibitor. The type and grade of lubricant will be indicated on a nameplate attachment to the motor frame or end shield adjacent to the lubricant filling device.

Insulation will be provided on bearing temperature detectors and on oil piping connections when required to prevent circulation of shaft current through bearings.

Bearings and bearing housings will be designed to permit disassembly in the field for inspection of the bearings or removal of the rotor.

3.3.4 Bearing Temperature Detectors

One Type E thermocouple per motor bearing, complete with detector head and holder assemblies as required, will be furnished. Thermocouple lead wire insulation will be color-coded with standard colors to represent the thermocouple metals.

3.3.5 Winding Temperature Detectors

Two resistance platinum temperature detectors (RTDs) per winding will be furnished, installed, and wired complete. Temperature detectors will normally be three-wire type RTDs.

3.3.6 Temperature Detector and Terminal Block Requirements

Temperature detectors will be ungrounded, with detector leads wired to terminal blocks furnished in the accessory terminal housings. A grounding terminal for each temperature detector will be included with the detector lead terminals. The grounding terminals will be wired internally to a common ground connection in each terminal box. The internal wiring will be removable.

3.4 460-Volt Integral Horsepower Motors

3.4.1 Design and Construction

Design and construction of each 460-volt integral horsepower motor will be coordinated with the driven equipment requirements and the requirements of NEMA MG1 Standards.

Motors will have TEFC enclosures unless located in hazardous areas.

Motors for service in hazardous areas will be individually considered for type of enclosure depending upon the classification, group, and division of the hazardous area in question.

Motors for outdoor service will have all exposed metal surfaces protected with a corrosion-resistant polyester paint or coating.

Motor power lead terminal housing will be sized to allow for ease in terminating the incoming power cable. Space heater leads will also be in this terminal housing.

3.4.2 Bearings

The motor manufacturer will determine the type of bearings to be furnished based upon the load, speed, and thrust conditions of the driven equipment.

Antifriction bearings will be grease lubricated, designed to minimize the likelihood of over lubricating, shall be sealed to protect against dust entry and loss of lubricant, and shall be self-lubricating and regreaseable.

All bearing mountings will be designed to prevent the entrance of lubricant into the motor enclosure of dirt into the bearings.

Grease fittings for lubrication will be arranged for safe, easy addition of lubricant from the outside of the motor while the motor is in service.

Bearings and bearing housings will be designed to permit disassembly in the field for inspection of the bearings or removal of the rotor.

Horizontal motor bearings will have an L-10 rating life when operating under the load, speed, and thrust requirements of the driven equipment of not less than 40,000 hours for direct coupled or gear driven service and not less than 20,000 hours for belt or chain connected service.

Vertical motor bearings will have an L-10 rating life of not less than 40,000 hours.

3.5 Direct Current Machines

3.5.1 Design and Construction

All direct current machines will be designed and constructed for continuous operation and in accordance with the requirements of NEMA MG-1.

Motors for operation on an AC rectified power source will be rated, designed, and factory tested in accordance with NEMA MG-1 requirements for the form factor of the rectified power source. The rated form factor will be obtained from the rectifier manufacturer.

3.5.2 Service Factor

For motors furnished with a service factor greater than 1.0, the motor nameplate will indicate the horsepower rating at 1.0 service factor, and the service factor. The motor will be designed to provide a continuous horsepower capacity equal to the rated horsepower at 1.0 service factor multiplied by the specified motor service factor without exceeding the total limiting temperature rise stated in these specifications for the insulation system and enclosure specified.

3.5.3 Insulation and Windings

All insulated windings will have a minimum of Class B nonhygroscopic, or acceptable equivalent, sealed insulation system. All insulated winding conductors will be copper.

3.5.4 Armatures and Brushes

Commutator bars will be fabricated of silver bearing copper, free of cracks, pits, slivers, and similar imperfections. Bars will be insulated with mica segments, assembled and seasoned as a unit, properly undercut, and securely mounted on the shaft. The area in back of the armature commutator risers will be packed with an epoxy compound and cured. Coil end connections to the risers will be soldered with high temperature pure tin solder, brazed, or tungsten inert gas welded.

Brush holders will be fabricated of nonferrous materials, located accurately, and mounted securely to position the brushes on the armature. Brush holder pockets will be sized to permit proper movement of the brushes. Means for adjusting brush pressures and brush assembly ring will be provided. A stop device will be furnished to prevent the brush terminal from scoring the commutator.

Brushes will be carbon type and will be furnished with insulated shunts sized for the rated brush current.

Successful commutation in accordance with NEMA standards will be maintained over the load range encountered in service.

Extra large openings will be provided for ease of inspection, pressure adjustment and replacement of brushes, and for brush assembly ring adjustment.

3.5.5 Bearings

All bearings will be self-lubricating, will have provisions for relubrication, and will be designed to operate in any position or at any angle.

3.6 Fractional Horsepower Motors

Type, design, and construction of each general, special, and definite purpose fractional horsepower motor will be coordinated with the driven equipment requirements and will be in accordance with the requirements of NEMA MG-1. Motors will be provided with Class B or Class F insulation classification. Motors for service in hazardous areas will be individually considered for type of enclosure depending upon the classification, group, and division of the hazardous area in question.

Motors will be totally enclosed (TEFC or TENV) unless specified otherwise.

Motors for outdoor service will have all exposed metal surfaces protected, where practical, with a corrosion-resistant polyester paint or coating. Enclosure exterior and interior surfaces, air gap surfaces, and windings will be protected with a corrosion-resistant epoxy paint or coating.

All bearings will be self-lubricating, will have provisions for relubrication, and will be designed to operate in any position or at any angle.

3.7 Motor Operators for Nonmodulating Valve, Gate, or Damper Service

The following requirements are applicable to all electric operators required for nonmodulating motor operators.

3.7.1 Rating, Design, and Construction

Motors will be designed for high torque, reversing service in a 50°C ambient temperature. Motors will have Class F insulation classification. Requirements of NEMA MG-1 and MG-2 will apply.

Motors will be rated 460 volts, three-phase, 60 hertz unless otherwise indicated. The DC motors will be rated 120 volts DC to operate from a nominal 125-volt battery.

The motor time rating for normal opening and closing service will be not less than whichever of the following is greatest:

- As required for three successive open-close operations.
- As required for the service.
- Fifteen minutes at maximum driven equipment torque in a 50°C (122°F) ambient temperature.

Sufficient torque will be provided to operate against system torque at 90 percent nominal voltage for AC motors and at 85 percent nominal voltage for DC motors.

Motors will be provided with NEMA 4 enclosures unless specified otherwise.

Motors for service in hazardous areas will be individually considered for type of enclosure depending upon the classification, group, and division of the hazardous area in question.

3.7.2 Bearings

Double-shielded, grease prelubricated, regreaseable antifriction bearings will be furnished. Motor leads will be terminated in the limit switch compartment.

3.7.3 Space Heaters

All motor operators 7-1/2 horsepower and larger will be supplied with 120-volt AC, single-phase, space heaters. Space heater leads will be terminated in the limit switch compartment.

3.8 Hoist, HVAC, and Miscellaneous Motors

Motors not related to power production will conform to applicable requirements of NEMA MG 1 and will otherwise be manufacturer's standard.

4.0 Power and Control Wiring

4.1 Design Conditions

In general, conductors will be insulated on the basis of a normal maximum conductor temperature of 90°C in 40°C ambient air, with a maximum emergency overload temperature of 130°C and a short-circuit temperature of 250°C. In areas with higher ambient temperatures, larger conductors will be used or higher temperature rated insulation will be selected. Conductor size and ampacity will be coordinated with circuit protective devices. Cable feeders from 4.16 kV switchgear to power equipment will be sized so that a short-circuit fault at the terminals of the load will not result in damage to the cable before normal operation of fault interrupting device (breaker is tripped or fuse is melted).

Instrument cable will be shielded and twisted to minimize electrical noise interference as follows:

- Aluminum-polyester tape with 100 percent coverage and copper drain wire will be used for shielding.
- Low-level analog and digital signal cables will be made up of twisted and shielded pairs.
- Except where specific reasons dictate otherwise, cable shields will be electrically continuous. When two lengths of shielded cable are connected together at a terminal block, a point on the terminal block will be used for connecting the shields.
- For multi-pair cables using individual pair shields, the shields will be electrically isolated from each other.

To be effective, instrument cable shields will be grounded on one end as follows:

- The shield on instrument circuits will typically be grounded at the power supply end, unless directed otherwise by the control equipment supplier.

- The shields on grounded, as well as ungrounded, thermocouple circuits will be grounded at the thermocouple well.
- Multi-pair cables used with thermocouples will have individually isolated shields so that each shield will be maintained at the particular couple ground potential.
- Each resistance temperature detector (RTD) system will be a three-wire system consisting of one power supply and one or more RTDs and will be grounded at only one point.
- RTDs embedded in windings of transformers and rotating machines will be grounded at the frame of the respective equipment.
- The low or negative potential side of an instrument signal pair will be grounded at the same point where the shield is grounded. Where a common power supply is used, the low side of each signal pair and its shield will typically be grounded at the power supply.

4.2 Conductors

4.2.1 Design Basis

Electrical conductors will be selected with an insulation level applicable to the system voltage for which they are used and ampacities suitable for the load being served. The type of cable used will be determined by individual circuit requirements and individual equipment manufacturer’s recommendations.

All current carrying conductors, except for thermocouple wiring, will be copper.

4.2.2 Cable Ampacities

The maximum ampacity for any cable will depend upon the worst case in which the cable will be routed (tray, conduit, duct, or direct buried) and the associated NEC ampacity requirements. In addition to ampacity, special requirements such as voltage drop, fault current availability, and environment will be taken into consideration when sizing cable.

4.2.3 Insulation

Cable insulation and construction will be as follows.

4.2.4 Flame Retardance

To minimize the damage that can be caused by a cable fire, cables will have insulations and jackets with non-propagating and self-extinguishing characteristics. As a minimum, these cables will meet the flame test requirements of IEEE, using a gas-burner flame source. These characteristics are essential for cables installed in electrical cable tray in the plant.

4.2.5 Medium Voltage Power Cable

Single conductor shielded power cable, with stranded copper conductor, cross-linked polyethylene (XLPE) or ethylene propylene rubber (EPR) insulation, and flame retardant polyvinyl chloride (FRPVC), flame retardant chlorinated polyethylene (CPE), or flame retardant chlorosulfonated polyethylene (CSP) jacket will be used on service above 2,400 volts.

Shielded power cable with minimum 5 kV class, 133 percent or 8 kV, 100% insulation level will supply all 4.16 kV service and will be routed in trays, conduits, or underground duct banks.

If required, shielded power cable with minimum 15 kV class, 133 percent insulation level will supply all 13.8 kV service and will be routed in trays, conduits, or underground duct banks.

4.2.6 Low Voltage Power Cable, 600 Volts

Nonshielded power cable with 600-V thermosetting insulation will supply power to loads at voltage levels of 600 VAC and below and 125 VDC and below. Cables will be routed in trays, conduits, or ducts. Loads requiring 3-phase, 12 to 2 AWG conductors will be fed with NEC type TC power cable which utilizes three insulated copper conductors, XLPE or EPR insulation, a bare ground wire, and an FRPVC, CPE, or CSP overall jacket.

Loads requiring 1 AWG and larger conductors will be fed with single conductor power cable which uses stranded copper conductor, XLPE or EPR insulation without an overall jacket.

4.2.7 Control Cable 600 Volts

Nonshielded control cable with 600-V-class insulation will be used for 120-volt AC and all DC control, metering, and relaying applications. Cables will be routed in trays, conduits, or ducts.

Direct current circuits, which are routed underground, shall utilize multiple conductor control cable having 10, 12, or 14 AWG stranded copper conductors, XLPE or EPR insulation, and with an FRPVC, CPE, or CSP overall jacket.

Direct current circuits which are routed aboveground, and all 120-volt AC circuits, will utilize the same construction as below grade DC circuits, as stated above, or may utilize multiple conductor control cable having 10, 12, or 14 AWG stranded copper conductors, NEC Type TC with THHN or THWN (PVC/nylon) insulated conductors, and with an FRPVC overall jacket.

The conductor size for current transformer circuits will be 10 AWG or larger.

4.2.8 Instrument Cable 600 Volt

Instrument cable will be used for control and instrument circuits that require shielding to avoid induced currents and voltages.

Cables may be routed in trays, conduits, or ducts and will be routed separate from 600-volt power circuits. The following cable constructions will be utilized:

- 600-volt, single pair and single triad shielded instrument cable, 16 AWG stranded copper conductors, XLPE or EPR insulation, FRPVC, CPE, or CSP jacket overall.

- 600-volt multiple pair, shielded instrument cable with individually shielded pairs and overall shield, 16 AWG stranded copper conductors, XLPE or EPR insulation, FRPVC, CPE, or CSP jacket overall.

4.2.9 Thermocouple Extension Cable

Thermocouple extension cable will be used for extension leads from thermocouples to junction boxes and to instruments for measurements of temperature. Cables may be routed in trays, conduits, or ducts. The following cable construction will be utilized:

- 600-volt, single pair, solid alloy conductor with the same material as the thermocouples, with shield over each pair (except for one pair construction) and with an overall shield, l6 AWG XLPE or EPR insulation; FRPVC, CPE, or CSP jacket overall.

4.2.10 High Temperature Cable

High temperature cable will be used for wiring to devices located in areas with ambient temperatures above 75°C. Cables may be routed in conduit. Cable lengths will be minimized by terminating the cable at terminal boxes or conduit outlet fittings located outside the high temperature area and continuing the circuit with control or thermocouple extension cable. The following cable construction will be used:

- Single-conductor control cable; NEC Type SF-2 12 AWG; stranded copper conductor; silicone rubber insulation; braided glass jacket.
- Single pair shielded thermocouple extension cable; solid alloy conductor with the same material as the thermocouples; 16 AWG; FEP Teflon insulation; FEP Teflon jacket overall.

4.2.11 Lighting and Fixture Cable

Lighting and fixture cable designations and conductor sizes will be identified on the drawings. Minimum conductor size will be 12 AWG. Lighting and fixture cable with 600-volt insulation will be used as follows:

- NEC Type 600 V, 90 degrees, XHHW-2 with copper conductor for 120-volt circuits in outdoor or unheated areas or 208-volt circuits in all areas. All circuit runs totally in conduit.
- Circuit runs for roadway or outdoor area lighting enclosed in PVC duct, stranded copper conductors, NEC Type 600 V, 90 degrees, XHHW-2 conductor insulation.
- Circuit runs for interior lighting and receptacles circuits (120 volts or less) will be copper, 600 V, 75 degrees NEC Type THHN insulation or equal.
- Fixture wire, NEC Type SF-2, with copper conductor, silicone rubber insulation, braided glass jacket.

4.2.12 Grounding Cable

Grounding cable will be insulated NEC Type THW or THHN or uninsulated bare copper conductor sized as required.

4.2.13 Switchboard and Panel Cable

Switchboard and panel cable will be insulated to 600 V. Cable will be NEC Type SIS or XHHW-2, meeting the UL VW-1 flame test.

4.2.14 Special Cable

Special cable will include cable supplied with equipment, prefabricated cable, coaxial cable, communication cable, etc. This cable will normally be supplied by a particular manufacturer. Special cable will be routed in accordance with the manufacturer's recommendations.

4.2.15 Miscellaneous Cable

If other types and constructions of cable are required as design and construction of the unit progress, they will be designated and routed as required.

4.3 Testing Requirements

Preoperational testing of installed cables will be performed by the Construction Contractor on insulated conductors after installation, as follows:

Insulated conductors with insulation rated 5,000 volts and above will be given a field DC insulation test.

Low voltage cables will be either insulation-resistance tested before connecting to equipment or functionally tested (at equipment operation voltage) as part of the checkout of the equipment system.

Insulated conductors will be continuity-tested for correct conductor identification.

4.4 Installation

Cable installation will be performed by the Construction Contractor in accordance with the following general rules:

- Cables will be routed as indicated in the circuit list. Each circuit will be assigned an unique number.
- The pulling tension of cable will not exceed the maximum tension recommended by the cable manufacturer, and the sidewall pressure at a bend will not exceed the cable manufacturer's recommendations. Maximum bend radii shall not exceed the manufacturer's recommendations.
- Care will be exercised during the placement of all cable to prevent tension and bending conditions in violation of the manufacturer's recommendations.
- All cable supports and securing devices will have bearing surfaces located parallel to the surfaces of the cable sheath and will be installed to provide adequate support without deformation of the cable jackets or insulation.
- Nylon ties will be used to neatly lace together conductors entering panelboards, control panels, and similar locations after the conductors have emerged from their supporting raceway and before they are attached to terminals.

- The Electrical Construction Contractor will identify both ends of all circuits. He will also identify all circuits at manholes and handholes.
- All spare conductors of a multi-conductor cable will be left at their maximum length for possible replacement of any other conductor in the cable. Each spare conductor will be neatly coiled and taped to the conductors being used.
- In addition to the above requirements, cables will be installed in accordance with manufacturer's requirements and recommendations.

4.5 Connectors

This subsection defines methods of connecting cable between electrical systems and equipment. In this subsection, the term "connector" is applied to devices that join two or more conductors or are used to terminate conductors at equipment terminals for the purpose of providing a continuous electrical path.

Connector material will be compatible with the conductor material to avoid the occurrence of electrolytic action between metals.

All medium voltage and low voltage connectors will be pressure type and secured by using a crimping tool. The tool will be a ratchet type and a product of the connector manufacturer made for the particular connector to be installed. The tool will produce a crimp without damage to the conductor, but will assure a firm metal to metal contact.

Medium voltage cables require stress cones at the termination of the cables. Stress cones will be of the preformed type suitable for the cable to which they are to be applied.

Cables will not be spliced in cable trays or conduits. Control and low-level instrument cable will be spliced only at pigtails and at the transition to high temperature wire. Connections will be made in conduit outlet fittings or junction boxes utilizing terminal blocks or an appropriate connector.

5.0 Protective Relaying

The selection and application of protective relays is discussed in the following paragraphs. These relays protect equipment in the Auxiliary Power Supply System, Generator Terminal System, Primary Power Supply System, Turbine-Generator System, and the electrical loads powered from these systems.

The following general requirements apply to all protective relay applications:

- The protective relaying scheme will be designed to remove or alarm any of the following abnormal occurrences on equipment designed for electrical power generation, voltage transformation, energy conversion, and transmission/distribution of electrical power:
  - Overcurrent
  - Undervoltage or overvoltage
  - Frequency variations
  - Overtemperature
  - Abnormal pressure

   - Open circuits and unbalanced current
   - Abnormal direction of power flow

- The protective relaying scheme will also achieve the following:

   - Limit damage to faulted equipment
   - Minimize possibility of fire or explosion
   - Minimize hazards to personnel

- The protective relaying system will be a coordinated application of either individual relays, multifunction relays, or a combination of individual and multifunction relays. Solid-state multifunction relays will be used wherever possible. For each monitored abnormal condition, there will exist a designated primary device for detection of that condition. A failure of any primary relay will result in the action of a secondary, overlapping scheme if possible to detect the effect of the same abnormal occurrence. The secondary relay may be the primary relay for a different abnormal condition. Alternate relays may exist which detect the initial abnormal condition but which have an inherent time delay so that the alternate relays will operate after the primary and secondary relays. Similar to secondary relays, the alternate relays may be primary relays for other abnormal conditions. All protective relays will be selected to coordinate with protective devices supplied by manufacturers of major items and the thermal limits of electrical equipment, such as transformers and motors. Where selective coordination cannot be achieved, protection will be maintained.

- Secondary current produced by current transformers will be in the 5-ampere range, and voltage signals produced by potential transformers will be in the 120-volt range.

5.1 Generator Protective Relays

Generator protective relay packages will be furnished in accordance with the particular manufacturer's requirements. Protective relaying and monitoring will be selected to provide, as a minimum, detection and correction/isolation action as required for faults and malfunctions. In general, protective relay packages, including generator differential protection, will be provided to minimize the effects from the following faults and malfunctions and will be interfaced with the utility's protection scheme:

- Generator phase faults
- Generator stator ground faults
- Stator open circuits and unbalanced currents
- Loss of excitation
- Backup protection for external system faults
- Reverse power
- Generator potential transformer circuit monitoring
- Underfrequency/overfrequency
- Breaker failure
- Inadvertent energization of the generator from the system

In general, equipment furnished with the generator's excitation equipment will provide the following additional protection:

- Underexcitation
- Overexcitation
- Generator field ground faults
- Excessive volts per hertz
- Exciter field ground faults

Additional generator protective monitoring equipment will be provided to protect against the following:

- High bearing temperatures
- Overspeed conditions
- Excessive vibrations
- Generator overheating

A typical complement of protective relays for the turbine generator may be as follows. The actual protective relaying to be used will be developed during design stages:

- **Generator Differential Relay.** A generator differential relay will provide primary generator protection against three-phase and phase-to-phase faults within the generator. This relay will not detect ground faults within its zone of protection.

- **Generator Ground Relays.** This low voltage pickup, overvoltage relay will sense voltage across the generator neutral grounding transformer secondary resistor when a ground fault occurs in the generator, isolated phase bus duct, generator transformer low voltage windings, auxiliary transformer high voltage windings, or the surge protection and potential transformer equipment.

- **Negative Sequence Relay.** The negative sequence relay provides protection against unbalanced phase currents, which result from unbalanced loading, unbalanced faults, a turn-to-turn winding fault, and an open circuit. Negative sequence currents exceeding the generator allowable limits result in overheating of the generator rotor.

- **Loss-of-Field Relays.** The loss-of-field relay complete with timer will provide protection against thermal damage caused by underexcitation and loss-of-field. These relays provide backup protection for excitation system protective devices furnished with the generator.

- **Reverse Power Relays.** Reverse power relays will provide protection of the turbine generator by detection of reverse power flow and motoring of the generator. Reverse power proven will initiate a normal sequential shutdown.

- **Voltage Balance Relays.** Voltage balance relays will monitor potential transformer circuits to the generator voltage regulator and protective relays. Upon loss of relaying potential, the voltage balance relay will disable the loss-of-field relay to avoid false tripping of the unit. Upon loss of potential to the voltage regulator, the voltage balance relay will transfer the voltage regulator from the automatic to manual mode of operation. An alarm will be actuated upon loss of either potential.

- **Underfrequency and Overfrequency Relays.** Underfrequency and over frequency conditions will be detected by the underfrequency and overfrequency relays.
- **Overvoltage and Undervoltage Protection.** The voltage regulator and excitation system include interlocks and protective circuits to prevent operating the generator beyond its design limits. An under voltage relay and an overvoltage relay will alarm if the voltage regulator fails to maintain voltage within design limits.
- **Field Ground Fault Protection.** Grounds on the generator field will be alarmed by this device.
- **Generator Backup Distance Relay.** This relay will provide backup protection against external system faults. This relay will operate only if an external system fault persists after all other primary system relays, including breaker failure, have failed to operate. This relay will trip the generator lockout relay.
- **Inadvertent Back Energization Protection.** This relay will provide protection of the generator against inadvertent energization when it is at standstill, on turning gear, or coasting to a stop.
- **Breaker Failure Relay.** This relay will provide protection against the generator breaker failing to open. This relay will operate when an external system fault persists after all other primary systems have failed to open the generator breaker.
- **Excessive Volts per Hertz Relay**.

5.2 Power Transformer Relays

5.2.1 Generator Step-Up Transformer

The generator transformer is protected against the effects of the following conditions:

- Phase faults
- Ground faults
- Sudden pressure
- Excessive tank pressure
- Combustible gas
- Oil level
- High temperature
- Excessive volts per hertz (protection from the volts per hertz relay used with the generator)

This protection will be provided by the relays, which are discussed in the following paragraphs.

The first relay is a differential relay that provides transformer primary protection by detection of three-phase and phase-to-phase faults in the generator transformer low voltage delta-connected windings, and three-phase, phase-to-phase, and phase-to-ground faults in the generator transformer high voltage wye-connected windings.

A second relay will provide sensitive backup protection for ground faults in the external system.

A rapid increase in pressure within the transformer tank associated with an internal fault will be detected by a sudden-pressure relay. This relay will be furnished with the transformer.

Loss of cooling and resulting high temperature will be alarmed.

5.2.2 Auxiliary Transformer

The auxiliary transformer is protected against the effects of the following conditions:

- Phase faults
- Ground faults
- Sudden pressure

This protection will be provided by the following relays, which are discussed in the following paragraphs.

The first auxiliary transformer relay provides primary protection for the high voltage and low voltage windings of the auxiliary transformers and for the cable connecting each low voltage winding to each incoming main breaker in the plant metal-clad switchgear lineups. These relays offer protection against phase-to-phase and three-phase faults. This relay is relatively insensitive to ground faults on the secondary side of the transformer should the fault current magnitudes be less than the maximum available ground fault current.

The one time over current relay is connected to the bushing current transformer on the neutral of the low voltage winding of the auxiliary transformer. This relay provides primary overload protection to its neutral winding’s resistor for ground faults on the switchgear buses or on feeders emanating from the switchgear lineups. This relay also provides backup protection for ground faults in the transformer low voltage winding, in the cable, on the switchgear buses, or on feeders emanating from the switchgear lineups.

A rapid increase in pressure within the transformer tank associated with an internal fault will be detected by a sudden-pressure relay. This relay will be furnished with the transformer. Loss of cooling and resulting high temperature will be alarmed.

5.3 Metal-Clad Switchgear

The protective relays used in the 4,160-volt metal-clad switchgear lineups are discussed in the following paragraphs. The relays for the auxiliary electrical protective relay system will be selected and set to provide coordinated tripping to mitigate the faulted connection.

5.3.1 Bus and Incoming (Source) Breakers and/or Medium Voltage Contactors

Each incoming (source) breaker and contactor will be provided wit protective relay type devices. These devices may be single element type or multifunction relays. The incoming breakers and/or contactors and bus will be provided with devices to detect and take appropriate action against the effects of the following conditions:

- Phase faults
- Ground faults
- Overloads
- Undervoltage

In general, each breaker will have time over current relays and a time over current ground detection relay. The time over current relays will detect and trip the respective switchgear incoming breaker for sustained overloads and short-circuit currents on the switchgear bus. These relays will provide backup protection for faults on feeders emanating from the switchgear lineups. The time over current ground detection relay will be residually connected to switchgear current transformers and provide primary protection for ground faults on the switchgear bus and backup protection for ground faults in feeders emanating from the switchgear lineup.

Each medium voltage switchgear bus will be provided with two under voltage relays or transducers which will, when bus voltage drops to a preset level, trip load feeder circuits.

5.3.2 Secondary Unit Substation Feeders

Each secondary unit substation transformer will be protected by 4.16 kV NEMA type fused motor starter contactor assembly and a Multilin solid-state multifunction protective relay. The Multilin will provide primary equipment and cable time over current, instantaneous over current, open phase, ground, and zero sequence protection. Both the longtime and instantaneous elements for phase protection will be adjustable.

5.3.3 Motor Feeders

Each single speed induction motor feeder will be protected by 4.16 kV NEMA type fused motor starter contactor assembly and a Multilin solid-state multifunction protective relay. The Multilin protective relay will provide primary equipment and cable time phase/ground time overcurrent (51/51N), phase/ground overcurrent (50/50N), and negative sequence (46) protection.

5.3.4 480 Volt Secondary Unit Substation Switchgear

Overload and fault protection for loads connected to the 480-volt secondary unit substations (SUS) will be provided by solid-state trip devices (SSTDs), which are an integral part of drawout air circuit breakers.

Breakers supplying motors or other devices that do not require coordination with downstream trip devices will have adjustable long-time and instantaneous elements for phase protection and will include ground fault protection.

Main breakers, tie breakers and breakers supplying motor control centers (MCCs) or other loads that contain trip devices will have adjustable long-time and short-time SSTD elements for phase protection and will include ground fault protection. The pickup point and time settings will be adjustable to allow for proper coordination with all downstream trip devices.

Sustained under voltage in the 480-volt secondary unit substation switchgear bus will be detected by under voltage relays or transducers.

5.3.5 480 Volt Motor Control Centers

MCCs will be protected by the 480-V switchgear feeder breakers, which have adjustable long-time and short-time SSTD elements for phase protection and ground fault protection in a manner similar to that described in Subsection 2-4.3.3.4, 480-Volt Secondary Unit

Substation Switchgear. The SSTD will protect the MCC feeder circuit and the bus against sustained short-circuit currents and serve as backup protection for MCC feeder circuits.

Each magnetic starter within an MCC that supplies power to a motor will have a magnetic-only molded case circuit breaker with adjustable motor circuit protector and a thermal overload element in the starter.

Certain nonmotor loads will be fed from MCC feeder circuit breakers. The feeder breakers will be thermal-magnetic molded-case breakers sized to protect supply cable and individual loads.

5.3.6 480-Volt Power Panels

Power panels will have thermal-magnetic circuit breakers sized to protect supply cable and individual loads.

6.0 Classification of Hazardous Area

Areas where flammable and combustible liquids, gases, and dusts are handled and stored will be classified for the purpose of determining the minimum criteria for design and installation of electrical equipment to minimize the possibility of ignition. The criteria for determining the appropriate classification are specified in National Electrical Code (NEC) Article 500 (NFPA 70/ANSI C1). The application of these criteria to specific areas at generating stations is provided in Article 127 of the National Electrical Safety Code (NESC/ANSI C2).

In addition to defining hazardous areas by class and division, each hazardous element is also assigned a group classification (A, B, C, etc.). The group classifications of hazardous elements are specified in NEC Article 500 and NFPA Standard 497M.

Electrical equipment in areas classified as hazardous will be constructed and installed in accordance with NEC Articles 501 and 502.

References for use in classification of areas, as well as specification of requirements for electrical installation in such areas, include:

- NESC, ANSI C2
- NEC, ANSI C1, NFPA 70/ANSI C1
- NFC, NFPA
- American Petroleum Institute Recommended Practices
- American Gas Association, Publication XFO277

6.1 Flammable and Combustible Liquid Storage and Handling

Areas where flammable and combustible liquids are stored and handled will be classified as indicated in the following subsections.

6.1.1 Flammable Liquids

Flammable liquids (flash point below 100°F/38°C), which include gasoline (Group D hazard), will be considered hazardous wherever they are handled or stored. The areas where gasoline is handled or stored will be classified as specified in Section 127.E of the National Electrical Safety Code.

6.1.2 Combustible Liquids

Combustible liquids (flash point of 100°F/38°C or higher) include fuel oil, diesel fuel, and lubrication oil (Group D hazards). Areas where these liquids are handled or stored will not be classified because they will not be handled or stored at temperatures which will produce sufficient vapors to form an ignitable mixture with air beyond the surface of the liquid within the piping or vessel in which they are normally contained.

6.2 Gaseous Hydrogen Systems

(Not Applicable).

6.3 Natural Gas Systems

Natural gas systems used as a fuel source for combustion turbine generators will be classified as follows. Classification of areas within the combustion turbine equipment is as follows:

- Outdoor areas within 5 feet (1.5 m) of vents from relief valves will be Class I, Division 1, Group D. The area from 5 feet (1.5 m) to 15 feet (4.5 m) from the vent will be classified as Class I, Division 2, Group D.
- Enclosed areas which are adequately ventilated and contain equipment such as gas compressors, valves, regulators, etc., where natural gas will be present outside of the contained equipment only upon equipment failure will be classified Class I, Division 2, Group D. An area extending 5 feet (1.5 m) from the ridge vents for such enclosures shall also be classified Class I, Division 2, Group D.
- Outdoor areas within 15 feet (4.5 m) of gas compressors, regulators, valves, etc., will be classified Class I, Division 2, Group D.
- Enclosed areas which are not adequately ventilated and where bleed gas or gas leakage is anticipated will be classified Class I, Division 1, Group D. Adequately ventilated areas within 10 feet (3 m) of these enclosures, unless separated by a vapor tight barrier, will be classified as Class I, Division 2, Group D. Areas separated by a vapor tight barrier will be classified as nonhazardous.
- Enclosed areas which are adequately ventilated and contain equipment such as valves, pipe flanges, instruments, screwed pipe connections, etc., where natural gas will be present outside of the contained equipment only upon equipment failure, and which contain natural gas detectors which shut off the supply of natural gas outside the enclosed area, will be classified as nonhazardous except for within 15 feet (4.5 m) of the valve, flange, instrument, or screwed connection (potential source of gas), which shall be classified as Class I, Division 2, Group D.
- Indoor areas such as burner fronts where flames, heat, or other such sources of ignition are present will not be classified as hazardous.

- The use of low-pressure natural gas for building heating systems will not in itself be considered a cause for classifying an adequately ventilated area as hazardous.

6.4 Liquid Hydrogen Systems

(Not Applicable).

6.5 Sewage Lift Stations

Sewage lift station wet wells and any enclosed nonventilated area above the wet well will be classified Class I, Division 1, Group D.

7.0 Grounding

The station grounding system will be in an interconnected network of bare copper conductor and copper-clad ground rods. The system will protect plant personnel and equipment from the hazards that can occur during power system faults and lightning strikes.

7.1 Design Basis

The station grounding grid will be designed for adequate capacity to dissipate heat from ground current under the most severe conditions in areas of high ground fault current concentrations, with grid spacing such that safe voltage gradients are maintained.

Bare conductors to be installed below grade will be spaced in a grid pattern to be indicated on the construction drawings prepared during detailed design. Each junction of the grid will be bonded together by an exothermal welding process.

In plant areas, grounding stingers will be brought through the ground floor and connected to the building steel and selected equipment. Concrete floor penetrations will be through PVC conduit embedded in the concrete. The grounding system will be extended, by way of stingers and conductor installed in cable tray, to the remaining plant equipment. Equipment grounds will conform to the following general guidelines:

- Grounds will conform to the NEC and NESC.
- Major items of equipment, such as switchgear, secondary unit substations, motor control centers, relay panels, and control panels, will have integral ground buses which will be connected to the station ground grid.
- Electronic panels and equipment, where required, will be grounded utilizing an insulated ground wire connected in accordance with the manufacturer's recommendations. Where practical, electronics ground loops will be avoided. Where this is not practical, isolation transformers will be furnished.
- Distributed control system (DCS) cabinets and equipment will be grounded according to manufacturer's requirements or recommendations.
- Motor supply circuits to 460 volt motors, which utilize three-conductor cable with a ground in the interstices, will utilize this ground for the motor ground. For 460 volt motor supply circuits, which utilize three single-conductor cables, a separate ground

conductor will be utilized. The separate ground conductor will be sized in accordance with applicable codes.

- All 4,160 volt motors will have a minimum of one 1/0 AWG bare copper ground conductor connected between the motor frame and the station ground grid.
- All large mechanical equipment such as tanks, pressure vessels, skids, etc. will have a minimum of two 1/0 AWG bare copper ground conductors, located at diagonally opposite corners, connected from the equipment ground pad or frame, to the station ground grid.
- All ground wires installed in conduit will be insulated.

Remote buildings and outlying areas with electrical equipment will be grounded by establishing local subgrade ground grids and equipment grounding systems in a manner similar to the plant area. Remote grids, where practical, will be interconnected with the station ground grid to reduce the hazard of transferring large fault potentials to the remote area through interconnecting instrumentation and communication cable shields.

7.2 Materials

Grounding materials furnished are described in the following:

- Rods will be copper-clad. Ground rod length and diameter will be determined by soil resistivity and subsurface mechanical properties. Where required ground rod length exceeds 10 feet, standard sections will be exothermally welded together using a guide clamp.
- Cable will be soft-drawn copper with Class B stranding or copper-clad steel.
- Exothermal welds will use molds, cartridges, and materials as manufactured by Cadweld or equivalent.
- Clamps, connectors, and other hardware used with the grounding system will be made of copper and purchased from an approved supplier.
- Ground wires installed in conduit will be soft-drawn copper with Class B stranding, and green colored 600 volt PVC insulation.

8.0 Lighting

The lighting system will provide personnel with illumination to perform indoor operation and maintenance activities, general yard task, safety, and plant security operations.

Voltage used to supply indoor and outdoor lighting fixtures will be 120, 208 volts or 277 volts single phase. The power supply for the lighting system will be from 208/120 volt and 480/277 volt, 3-phase, four-wire panelboards located within the balance of plant areas.

8.1 Light Sources

The lighting system will be designed to provide illumination levels recommended by the following standards and organizations:

- IES RP - Standard Practice for Industrial Lighting.
- IES RP - Standard Practice for Roadway Lighting.
- IES RP - Standard Practice for Lighting Offices Containing Computer Display Terminals.

Light source size and fixture selections will be based on the applicability of the luminaries for the area under consideration during detail design. Generally, high pressure sodium luminaries will be used outdoors and fluorescent luminaries will be used indoors within conditioned spaces. High pressure sodium or similar luminary may be used in high bay applications. Other special luminaries will be selected as based upon the hazardous area classification, unique applications or other specific areas to be illuminated.

For design purposes, lighting is categorized by the following areas:

- Outdoor areas.
- Roadway, area parking and security fencing.
- Indoor areas.

Table 8-1 summarizes the illumination levels.

TABLE A.2.5-1
Illumination Levels

Location	Maintained Foot-Candles	Illumination LUX
Outdoor Catwalks and Platforms	2	20
Roadway		
Between or along buildings	1	10
Not bordered by buildings	0.5	5

8.2 Roadway and Area

Roadway and area lighting will be designed using high-pressure sodium light sources. The light fixtures will be the cutoff type designed to control and direct light within the property line of the facilities. Roadway light fixtures will be installed on hot-dip galvanized steel poles. Local task lighting will be installed on buildings or equipment.

8.3 Outdoor Areas

This category includes lighting of equipment located outdoors and outdoor platforms. High pressure sodium light sources will be used.

8.4 Indoor Areas

Indoor lighting will consist of fluorescent luminaries within office, equipment rooms and other conditioned spaces. High bay high pressure sodium luminaries will be used in larger open areas.

8.5 Lighting Control

Electric power to outdoor light fixtures will be switched on and off with photoelectric controllers. Local task lighting will be controlled with photoelectric controllers and manual switches at the task.

8.6 Wiring Devices

Convenience outlets located outdoors will be provided with weatherproof snap-action covers. In hazardous locations, convenience outlets will be suitable for the NEC class and group requirements.

9.0 Freeze Protection

Piping subject to freezing will be protected with electric heating cable.

9.1 Above Grade Freeze Protected Piping

The electric heating cable will be applied directly to the pipeline, and insulation shall be applied over the pipe and cable. The insulation shall be mineral fiber or fiberglass insulation. Class F insulation shall be used on all piping to be freeze protected for which an insulation class is not specified. Mineral fiber preformed pipe insulation for this application shall have a nominal density of 8 to 10 pounds per cubic foot (128 to 160 kg per cubic meter). Fiberglass blanket shall have a minimum nominal density of 3.5 pounds per cubic foot (56 kg per cubic meter). When the contract includes insulation materials for freeze protected pipe, aluminum foil wrap shall be provided for a single wrap of foil over the heat tracing cable.

Heat tracing on exterior aboveground freeze protected pipelines will extend down to the frost line regardless of the piping classification for the below grade portion of the pipeline.

The electric heating cable will be tested prior to being covered with insulation. After all insulation and jacketing have been installed, the heating cable will again be tested. If the cable is found to be damaged, the Supplier shall remove the jacketing and insulation to allow for inspection of the cable. If the electric heating cable was installed by others and if, in the opinion of the Purchaser, the damage to the cable was done during the insulation and jacketing work, the Supplier shall be responsible for all costs involved in replacing the cable including cost of the cable, its installation and testing, and the additional insulation and jacketing work. The Supplier will be reimbursed for the extra work if the damage did not result from his operation.

9.2 Below Grade Freeze Protected Piping

Outdoor above grade piping that is freeze protected and continues below grade will have the heat tracing extended to the frost line. Water resistant type insulation shall be installed below grade for this application. The insulation shall be held in place using aluminum lagging and end cap. All seams shall be sealed.

9.3 Vessels, Tanks, and Pump Casings

Tanks or vessels subject to freezing will be protected by auxiliary steam, electric immersion type heaters, electric panels or pads, or heat trace cables. Heat trace cable, if selected, will be applied in a serpentine or spiral manner, covering the bottom half of tanks 20 feet tall and shorter, and covering the bottom third of tanks taller than 20 feet.

10.0 Lightning Protection

Lightning protection will be provided as required for stacks and top of tall buildings.

Lightning protection for stacks will consist of air terminals provided at radial intervals around the top of the stack. The air terminals will be connected together by copper cable and connected to the plant ground grid with not less than two copper down conductors. Protection against side strokes will be considered for obstruction lighting, antennas, and external elevators.

Lightning protection for tall buildings will consist of air terminals installed on the roof. The air terminals will be connected together with copper cable and connected to the plant ground grid with copper down conductors. Air terminals will be arranged to provide protection for roof penetrating devices, such as piping, air moving equipment, etc.

11.0 Raceway and Conduit

The design and specifications for the raceway and conduit systems used in supporting and protecting electrical cable will be in accordance with the provisions of the NEC.

11.1 Cable Tray

All cable trays except electronic trays will be of trough or ladder type construction with a maximum rung spacing of 6 inches, nominal depths of 4 to 6 inches, and various widths as required. There will be a maximum spacing of 8 feet between cable tray supports, except fittings (elbows, tees, etc.) which shall be supported in accordance with standards.

Cable tray fittings will have a radius equal to or greater than the minimum bending radius of the cables they contain.

Solid bottom trays will be provided for all electric systems such as special noise-sensitive circuits and analog instrumentation circuits.

Individual tray systems will be established for the following services:

- Medium voltage power cables.
- 600-volt power cables equal to or greater than 2/0 AWG.
- 120-volt AC and 125-volt DC power, control, and multi-conductor 600-volt power
- Special noise-sensitive circuits or instrumentation cables.

Further division will be provided where required by the equipment manufacturer.

The summation of the cross-sectional areas of cable in tray will be limited to 30 percent of the usable cross section of the tray for medium voltage power cables and to 40 percent for 600-volt power and control cables and electronic cables.

The minimum design vertical spacing for trays will be 12 inches measured from the bottom of the upper tray to the top of the lower tray. At least a 9-inch clearance will be maintained between the top of a tray and beams, piping, or other obstacles to facilitate installation of cables in the tray. A working space of not less than 24 inches will be maintained on at least one side of each tray.

Ventilated covers will be provided for vertical trays. Solid covers will be provided for all solid bottom tray and for all outdoor tray. Solid covers will also be provided for the top tray of horizontal tray runs located under grating floor or insulated piping.

11.2 Conduit

Conduit will be used to protect conductors routed to individual devices, in hazardous areas, and where the quantity of cable does not economically justify the use of cable tray.

Electrical Metallic Tubing (EMT) will be used indoors in nonhazardous areas for lighting branch circuits and communication circuits.

Polyvinyl chloride conduit will be used for underground duct banks and some below grade concrete encased conduit.

Liquid tight flexible metallic conduit will be used for connections to accessory devices such as: solenoid valves, limit switches, pressure switches, etc.; for connections to motors or other vibrating equipment; and across areas where expansion or movement of the conduit is required.

All other conduit, unless specific environmental requirements dictate the use of plastic or aluminum conduit, will be rigid galvanized steel.

Exposed conduit will be routed parallel or perpendicular to dominant surfaces with right angle turns made of symmetrical conduit bends or fittings.

Conduit will be routed at least 6 inches from the insulated surfaces of hot water, steam pipes, and other hot surfaces.

Conduit will be sized in accordance with the conduit fill requirements of the National Electrical Code.

Conduit will be securely supported within 3 feet of connections to boxes and cabinets.

Conduit larger than one-half inch and up to 1.25 inches will be supported by supports with a maximum separation of 8 feet. Conduit 1.5 inch and larger will be supported by supports located at least every 10 feet.

11.3 Duct Bank and Manholes

Underground duct banks will be used for cable routed between outlying areas and other remote areas as necessary.

All underground duct banks will consist of Type EB PVC tubing encased in reinforced concrete. The nominal diameter of the plastic ducts will be 4 inches. A 3 inch or larger galvanized steel conduit will also be installed where required for analog low-level circuits requiring noise immunity from adjacent power circuits.

All underground duct banks will be installed in accordance with the following methods:

- Ducts will be sloped not less than 3 inches per 100 feet to manholes to provide adequate drainage. Low spots in duct runs will be avoided.
- Reinforcing steel will not form closed magnetic paths between ducts. Nonmetallic spacers will be used to maintain duct spacing.

Reinforced concrete manholes and electrical vaults will be provided, where required, so that cable may be installed without exceeding allowable pulling tensions and cable sidewall pressures. Each manhole will have the following provisions:

- Provisions for attachment of cable pulling devices
- Provisions for racking of cables
- Manhole covers of sufficient size to loop feed the largest diameter cable through the manhole without splicing
- Sealed bottoms and sumps
- Water stops at duct bank entrances

Duct bank risers and conduit from manholes to the equipment at remote locations will be changed to rigid steel prior to emerging from below grade. All below grade steel conduit will be wrapped and encased in concrete.

Duct banks and manholes shall be designed in accordance with the seismic criteria defined in the Structural and Seismic Engineering Design Criteria.

Duct banks will be designed to include spare capacity after completion of installation to allow for future growth and expansion.

12.0 Battery System

The batteries used for the DC power supply system for the balance-of-plant loads will consist of 125-volt pressure regulated type batteries.

THIS ATTACHMENT IS NOT INCLUDED

ATTACHMENT B

Proposed Modifications to the Conditions of Certification

ATTACHMENT C

Air Quality

Attachment C1
Construction Emission Estimates

ATTACHMENT C1

Construction Emission Estimates

Tables C1.1a through C1.1l summarize the onsite construction emissions from power plant construction.

Table C1.1a	Onsite Power Plant Construction Equipment CO Emissions
Table C1.1b	Onsite Power Plant Construction Equipment VOC Emissions
Table C1.1c	Onsite Power Plant Construction Equipment NO_x Emissions
Table C1.1d	Onsite Power Plant Construction Equipment SO_x Emissions
Table C1.1e	Onsite Power Plant Construction Equipment PM_{10} Emissions
Table C1.1f	Onsite Power Plant Construction Equipment $PM_{2.5}$ Emissions
Table C1.1g	Onsite Power Plant Construction Motor Vehicle CO Emissions
Table C1.1h	Onsite Power Plant Construction Motor Vehicle VOC Emissions
Table C1.1i	Onsite Power Plant Construction Motor Vehicle SO_x Emissions
Table C1.1j	Onsite Power Plant Construction Motor Vehicle NO_x Emissions
Table C1.1k	Onsite Power Plant Construction Motor Vehicle PM_{10} Emissions
Table C1.1l	Onsite Power Plant Construction Motor Vehicle $PM_{2.5}$ Emissions

Tables C1.2a through C1.2i summarize the fugitive dust emissions from power plant construction.

Table C1.2a	Onsite Power Plant Construction Fugitive Dust Monthly Activity Levels
Table C1.2b	Onsite Power Plant Construction Fugitive PM_{10} Emissions
Table C1.2c	Onsite Power Plant Construction Fugitive $PM_{2.5}$ Emissions
Table C1.2d	Onsite Power Plant Construction Motor Vehicle Fugitive PM_{10} Emissions
Table C1.2e	Onsite Power Plant Construction Motor Vehicle Fugitive $PM_{2.5}$ Emissions
Table C1.2f	Onsite Power Plant Construction Motor Vehicle Activity
Table C1.2g	Fugitive PM_{10} Emission Factors for Grading
Table C1.2h	Fugitive PM_{10} Emission Factors for Unpaved Roads
Table C1.2i	Fugitive $PM_{2.5}$ Emission Factors for Unpaved Roads

Table C1.3a	Equations Used to Calculate Emissions

Table C1.4a	Number of Onsite Power Plant Construction Equipment
Table C1.4b	Number of Onsite Power Plant Construction Motor Vehicles
Table C1.4c	Power Plant Construction Equipment Emission Factors
Table C1.4d	Derivation of Construction Equipment Emission Factors
Table C1.4e	Motor Vehicle Emission Factors

Table C1.5a	Offsite Motor Vehicle Usage during Construction
Table C1.5b	Offsite Motor Vehicle CO Emissions
Table C1.5c	Offsite Motor Vehicle VOC Emissions
Table C1.5d	Offsite Motor Vehicle SO_x Emissions
Table C1.5e	Offsite Motor Vehicle NO_x Emissions
Table C1.5f	Offsite Motor Vehicle PM_{10} Emissions
Table C1.5g	Offsite Motor Vehicle $PM_{2.5}$ Emissions

Table C1.1a: Onsite Power Plant Construction Equipment CO Emissions

Onsite Equipment	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Manlift	39	79	118	118	118	118	158	158	158	158	158	118	79	39	39
Air Compressor	0	0	0	0	0	404	404	404	539	539	606	674	808	0	0
Excavator	212	212	212	212	318	318	318	212	212	106	106	106	106	106	0
Grader	151	151	151	151	151	151	151	0	0	0	0	0	0	0	0
Cranes	53	53	0	0	0	53	106	106	106	106	106	106	106	53	0
Asphalt Paver	0	0	0	0	0	0	0	0	0	0	0	0	114	114	114
Compactor	200	0	0	200	200	200	200	0	0	0	0	0	0	0	0
Welding Machine	0	10	31	41	82	102	143	143	153	153	153	102	51	10	0
Total (lbs/month, E_m)	**655**	**505**	**512**	**722**	**869**	**1,346**	**1,479**	**1,022**	**1,167**	**1,061**	**1,128**	**1,105**	**1,264**	**323**	**154**
Total (lbs/day, E_d)	**25.2**	**19.4**	**19.7**	**27.8**	**33.4**	**51.8**	**56.9**	**39.3**	**44.9**	**40.8**	**43.4**	**42.5**	**48.6**	**12.4**	**5.9**

Table C1.1b: Onsite Power Plant Construction Equipment VOC Emissions

Onsite Equipment	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Manlift	14.6	29.3	43.9	43.9	43.9	43.9	58.5	58.5	58.5	58.5	58.5	44	29	15	15
Air Compressor	0	0	0	0	0	115.1	115.1	115.1	153.4	153.4	172.6	191.8	230.1	0	0
Excavator	43.6	43.6	43.6	43.6	65.4	65.4	65.4	43.6	43.6	22	22	22	22	22	0
Grader	33.7	33.7	33.7	33.7	33.7	33.7	33.7	0	0	0	0	0	0	0	0
Cranes	19	18.9	0	0	0	18.9	37.7	37.7	37.7	37.7	37.7	37.7	37.7	18.9	0
Asphalt Paver	0	0	0	0	0	0	0	0	0	0	0	0	34.4	34.4	34.4
Compactor	46.1	0.0	0.0	46.1	46.1	46.1	46.1	0	0	0	0	0	0	0	0
Welding Machine	0	3.8	11.5	15.3	30.6	38.2	53.5	53.5	57.3	57.3	57.3	38.2	19.1	3.8	0
Total (lbs/month, E_m)	**157**	**129**	**133**	**183**	**220**	**361**	**410**	**308**	**351**	**329**	**348**	**333**	**372**	**94**	**49**
Total (lbs/day, E_d)	**6.0**	**5.0**	**5.1**	**7.0**	**8.4**	**13.9**	**15.8**	**11.9**	**13.5**	**12.6**	**13.4**	**12.8**	**14.3**	**3.6**	**1.9**

Table C1.1c: Onsite Power Plant Construction Equipment NOx Emissions

Onsite Equipment	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Manlift	41	82	123	123	123	123	164	164	164	164	164	123	82	41	41
Air Compressor	0	0	0	0	0	687	687	687	916	916	1,030	1,144	1,373	0	0
Excavator	329	329	329	329	493	493	493	329	329	164	164	164	164	164	0
Grader	260	260	260	260	260	260	260	0	0	0	0	0	0	0	0
Cranes	186	186	0	0	0	186	372	372	372	372	372	372	372	186	0
Asphalt Paver	0	0	0	0	0	0	0	0	0	0	0	0	205	205	205
Compactor	362	0	0	362	362	362	362	0	0	0	0	0	0	0	0
Welding Machine	0	17	52	69	138	172	241	241	258	258	258	172	86	17	0
Total (lbs/month, E_m)	**1,177**	**874**	**763**	**1,142**	**1,375**	**2,282**	**2,578**	**1,792**	**2,038**	**1,874**	**1,988**	**1,975**	**2,282**	**613**	**246**
Total (lbs/day, E_d)	**45.3**	**33.6**	**29.4**	**43.9**	**52.9**	**87.8**	**99.1**	**68.9**	**78.4**	**72.1**	**76.5**	**76.0**	**87.8**	**23.6**	**9.5**

Table C1.1d: Onsite Power Plant Construction Equipment SOx Emissions

Onsite Equipment	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Manlift	0.05	0.09	0.14	0.14	0.14	0.14	0.19	0.19	0.19	0.19	0.19	0.14	0	0	0
Air Compressor	0	0	0	0	0	0.63	0.63	0.63	0.84	0.84	0.94	1.05	1.26	0	0
Excavator	0.44	0.44	0.44	0.44	0.66	0.66	0.66	0.44	0.44	0	0	0	0	0	0
Grader	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0	0	0	0	0	0	0	0
Cranes	0	0.22	0	0	0	0.22	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.22	0
Asphalt Paver	0	0	0	0	0	0	0	0	0	0	0	0	0.17	0.17	0.17
Compactor	0.39	0.00	0.00	0.39	0.39	0.39	0.39	0	0	0	0	0	0	0	0
Welding Machine	0	0.02	0.06	0.09	0.17	0.21	0.30	0.30	0.32	0.32	0.32	0.21	0.11	0.02	0
Total (lbs/month, E_m)	**1.4**	**1.1**	**0.9**	**1.3**	**1.7**	**2.5**	**2.9**	**2.0**	**2.2**	**2.0**	**2.1**	**2.1**	**2.3**	**0.7**	**0.2**
Total (lbs/day, E_d)	**0.053**	**0.041**	**0.036**	**0.052**	**0.064**	**0.098**	**0.112**	**0.077**	**0.086**	**0.077**	**0.081**	**0.080**	**0.088**	**0.026**	**0.009**

Table C1.1e: Onsite Power Plant Construction Equipment PM_{10} Emissions

Onsite Equipment	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Manlift	3.73	7.47	11.20	11.20	11.20	11.20	14.93	14.93	14.93	14.93	14.93	11	7	4	4
Air Compressor	0	0	0	0	0	63.20	63.20	63.20	84.27	84.27	94.81	105.34	126.41	0	0
Excavator	19.87	19.87	19.87	19.87	29.80	29.80	29.80	19.87	19.87	10	10	10	10	10	0
Grader	15.26	15.26	15.26	15.26	15.26	15.26	15.26	0	0	0	0	0	0	0	0
Cranes	7	6.88	0	0	0	6.88	13.75	13.75	13.75	13.75	13.75	13.75	13.75	6.88	0
Asphalt Paver	0	0	0	0	0	0	0	0	0	0	0	0	18.14	18.14	18.14
Compactor	21.08	0.00	0.00	21.08	21.08	21.08	21.08	0	0	0	0	0	0	0	0
Welding Machine	0	1.16	3.48	4.64	9.28	11.60	16.25	16.25	17.41	17.41	17.41	11.60	5.80	1.16	0
Total (lbs/month, E_m)	**67**	**51**	**50**	**72**	**87**	**159**	**174**	**128**	**150**	**140**	**151**	**152**	**182**	**40**	**22**
Total (lbs/day, E_d)	**2.57**	**1.95**	**1.92**	**2.77**	**3.33**	**6.12**	**6.70**	**4.92**	**5.78**	**5.40**	**5.80**	**5.84**	**6.98**	**1.53**	**0.84**

Table C1.1f: Onsite Power Plant Construction Equipment $PM_{2.5}$ Emissions

Onsite Equipment	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Manlift	3.32	6.65	9.97	9.97	9.97	9.97	13.29	13.29	13.29	13.29	13.29	10	7	3	3
Air Compressor	0	0	0	0	0	56.25	56.25	56.25	75.00	75.00	84.38	93.75	112.50	0	0
Excavator	17.68	17.68	17.68	17.68	26.53	26.53	26.53	17.68	17.68	9	9	9	9	9	0
Grader	13.58	13.58	13.58	13.58	13.58	13.58	13.58	0	0	0	0	0	0	0	0
Cranes	6	6.12	0.00	0.00	0.00	6.12	12.24	12.24	12.24	12.24	12.24	12.24	12.24	6.12	0
Asphalt Paver	0	0	0	0	0	0	0	0	0	0	0	0	16.14	16.14	16.14
Compactor	18.76	0.00	0.00	18.76	18.76	18.76	18.76	0	0	0	0	0	0	0	0
Welding Machine	0	1.03	3.10	4.13	8.26	10.33	14.46	14.46	15.49	15.49	15.49	10.33	5.16	1.03	0
Total (lbs/month, E_m)	**59**	**45**	**44**	**64**	**77**	**142**	**155**	**114**	**134**	**125**	**134**	**135**	**162**	**35**	**19**
Total (lbs/day, E_d)	**2.29**	**1.73**	**1.71**	**2.47**	**2.97**	**5.44**	**5.97**	**4.38**	**5.14**	**4.80**	**5.16**	**5.20**	**6.21**	**1.36**	**0.75**

Table C1.1g: Onsite Power Plant Construction Motor Vehicle CO Emissions

Vehicle Type	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Onsite Flatbed Truck	0.016	0.016	0.033	0.033	0.033	0.033	0.049	0.049	0.049	0.049	0.049	0.049	0.033	0.016	0.016
Onsite Fuel/Lube Truck	0.033	0.033	0.033	0.033	0.033	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.033	0
Onsite Water Truck	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0
Onsite Concrete Pump Truck	0	0.033	0.049	0.049	0.033	0.016	0.016	0	0	0	0	0	0	0	0
Total (lbs/day)	**0.21**	**0.25**	**0.28**	**0.28**	**0.26**	**0.26**	**0.28**	**0.26**	**0.26**	**0.26**	**0.26**	**0.26**	**0.25**	**0.21**	**0.115**
Onsite Flatbed Truck	0.43	0.43	0.85	0.85	0.85	0.85	1.28	1.28	1.28	1.28	1.28	1.28	0.85	0.43	0.43
Onsite Fuel/Lube Truck	0.85	0.85	0.85	0.85	0.85	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	0.85	0
Onsite Water Truck	4.26	4.26	4.26	4.26	4.26	4.26	4.26	4.26	4.26	4.26	4.26	4.26	4.26	4.26	2
Onsite Concrete Pump Truck	0	0.85	1.28	1.28	0.85	0.43	0.43	0	0	0	0	0	0	0	0
Total (lbs/month)	**5.53**	**6.39**	**7.24**	**7.24**	**6.81**	**6.81**	**7.24**	**6.81**	**6.81**	**6.81**	**6.81**	**6.81**	**6.39**	**5.53**	**2.98**

Table C1.1h: Onsite Power Plant Construction Motor Vehicle VOC Emissions

Vehicle Type	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Onsite Flatbed Truck	0.0015	0.0015	0.0031	0.0031	0.0031	0.0031	0.0046	0.0046	0.0046	0.0046	0.0046	0.0046	0.0031	0.0015	0.0015
Onsite Fuel/Lube Truck	0.0031	0.0031	0.0031	0.0031	0.0031	0.0046	0.0046	0.0046	0.0046	0.0046	0.0046	0.0046	0.0046	0.0031	0
Onsite Water Truck	0.0153	0.0153	0.0153	0.0153	0.0153	0.0153	0.0153	0.0153	0.0153	0.0153	0.0153	0.0153	0.0153	0.0153	0
Onsite Concrete Pump Truck	0	0.0031	0.0046	0.0046	0.0031	0.0015	0.0015	0	0	0	0	0	0	0	0
Total (lbs/day)	**0**	**0.023**	**0.026**	**0.026**	**0.025**	**0.025**	**0.026**	**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.023**	**0.020**	**0.0107**
Onsite Flatbed Truck	0.040	0.040	0.080	0.080	0.080	0.080	0.120	0.120	0.120	0.120	0.120	0.120	0.080	0.040	0.040
Onsite Fuel/Lube Truck	0.080	0.080	0.080	0.080	0.080	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.080	0
Onsite Water Truck	0.399	0.399	0.399	0.399	0.399	0.399	0.399	0.399	0.399	0.399	0.399	0.399	0.399	0.399	0
Onsite Concrete Pump Truck	0	0.080	0.120	0.120	0.080	0.040	0.040	0	0	0	0	0	0	0	0
Total (lbs/month)	**0.52**	**0.60**	**0.68**	**0.68**	**0.64**	**0.64**	**0.68**	**0.64**	**0.64**	**0.64**	**0.64**	**0.64**	**0.60**	**0.52**	**0.279**

Table C1.1i: Onsite Power Plant Construction Motor Vehicle SOx Emissions

Vehicle Type	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Onsite Flatbed Truck	0.000035	0.000035	0.000071	0.000071	0.000071	0.000071	0.000106	0.000106	0.000106	0.000106	0.000106	0.000106	0.000071	0.000035	0.000035
Onsite Fuel/Lube Truck	0.000071	0.000071	0.000071	0.000071	0.000071	0.000106	0.000106	0.000106	0.000106	0.000106	0.000106	0.000106	0.000106	0.000071	0
Onsite Water Truck	0.000353	0.000353	0.000353	0.000353	0.000353	0.000353	0.000353	0.000353	0.000353	0.000353	0.000353	0.000353	0.000353	0.000353	0
Onsite Concrete Pump Truck	0	0.000071	0.000106	0.000106	0.000071	0.000035	0.000035	0	0	0	0	0	0	0	0
Total (lbs/day)	**0.00046**	**0.00053**	**0.00060**	**0.00060**	**0.00056**	**0.00056**	**0.00060**	**0.00056**	**0.00056**	**0.00056**	**0.00056**	**0.00056**	**0.00053**	**0.00046**	**0.000247**
Onsite Flatbed Truck	0.00092	0.00092	0.00183	0.00183	0.00183	0.00183	0.00275	0.00275	0.00275	0.00275	0.00275	0.00275	0.00183	0.00092	0.00092
Onsite Fuel/Lube Truck	0.00183	0.00183	0.00183	0.00183	0.00183	0.00275	0.00275	0.00275	0.00275	0.00275	0.00275	0.00275	0.00275	0.00183	0
Onsite Water Truck	0.00917	0.00917	0.00917	0.00917	0.00917	0.00917	0.00917	0.00917	0.00917	0.00917	0.00917	0.00917	0.00917	0.00917	0
Onsite Concrete Pump Truck	0	0.00183	0.00275	0.00275	0.00183	0.00092	0.00092	0	0	0	0	0	0	0	0
Total (lbs/month)	**0.0119**	**0.0138**	**0.0156**	**0.0156**	**0.0147**	**0.0147**	**0.0156**	**0.0147**	**0.0147**	**0.0147**	**0.0147**	**0.0147**	**0.0138**	**0.0119**	**0.00642**

Table C1.1j: Onsite Power Plant Construction Motor Vehicle NOx Emissions

Vehicle Type	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Onsite Flatbed Truck	0.0029	0.0029	0.0057	0.0057	0.0057	0.0057	0.0086	0.0086	0.0086	0.0086	0.0086	0.0086	0.0057	0.0029	0.0029
Onsite Fuel/Lube Truck	0.0057	0.0057	0.0057	0.0057	0.0057	0.0086	0.0086	0.0086	0.0086	0.0086	0.0086	0.0086	0.0086	0.0057	0
Onsite Water Truck	0.0287	0.0287	0.0287	0.0287	0.0287	0.0287	0.0287	0.0287	0.0287	0.0287	0.0287	0.0287	0.0287	0.0287	0
Onsite Concrete Pump Truck	0	0.0057	0.0086	0.0086	0.0057	0.0029	0.0029	0	0	0	0	0	0	0	0
Total (lbs/day)	**0.037**	**0.043**	**0.049**	**0.049**	**0.046**	**0.046**	**0.049**	**0.046**	**0.046**	**0.046**	**0.046**	**0.046**	**0.043**	**0.037**	**0.0201**
Onsite Flatbed Truck	0.075	0.075	0.149	0.149	0.149	0.149	0.224	0.224	0.224	0.224	0.224	0.224	0.149	0.075	0.075
Onsite Fuel/Lube Truck	0.149	0.149	0.149	0.149	0.149	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.224	0.149	0
Onsite Water Truck	0.746	0.746	0.746	0.746	0.746	0.746	0.746	0.746	0.746	0.746	0.746	0.746	0.746	0.746	0
Onsite Concrete Pump Truck	0	0.149	0.224	0.224	0.149	0.075	0.075	0	0	0	0	0	0	0	0
Total (lbs/month)	**0.97**	**1.12**	**1.27**	**1.27**	**1.19**	**1.19**	**1.27**	**1.19**	**1.19**	**1.19**	**1.19**	**1.19**	**1.12**	**0.97**	**0.522**

Table C1.1k: Onsite Power Plant Construction Motor Vehicle PM_{10} Emissions

Vehicle Type	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Onsite Flatbed Truck	0.00025	0.00025	0.00050	0.00050	0.00050	0.00050	0.00075	0.00075	0.00075	0.00075	0.00075	0.00075	0.00050	0.00025	0.00025
Onsite Fuel/Lube Truck	0.00050	0.00050	0.00050	0.00050	0.00050	0.00075	0.00075	0.00075	0.00075	0.00075	0.00075	0.00075	0.00075	0.00050	0
Onsite Water Truck	0.00249	0.00249	0.00249	0.00249	0.00249	0.00249	0.00249	0.00249	0.00249	0.00249	0.00249	0.00249	0.00249	0.00249	0
Onsite Concrete Pump Truck	0	0.00050	0.00075	0.00075	0.00050	0.00025	0.00025	0	0	0	0	0	0	0	0
Total (lbs/day)	**0.0032**	**0.0037**	**0.0042**	**0.0042**	**0.0040**	**0.0040**	**0.0042**	**0.0040**	**0.0040**	**0.0040**	**0.0040**	**0.0040**	**0.0037**	**0.0032**	**0.00174**
Onsite Flatbed Truck	0.0065	0.0065	0.0130	0.0130	0.0130	0.0130	0.0194	0.0194	0.0194	0.0194	0.0194	0.0194	0.0130	0.0065	0.0065
Onsite Fuel/Lube Truck	0.0130	0.0130	0.0130	0.0130	0.0130	0.0194	0.0194	0.0194	0.0194	0.0194	0.0194	0.0194	0.0194	0.0130	0
Onsite Water Truck	0.0648	0.0648	0.0648	0.0648	0.0648	0.0648	0.0648	0.0648	0.0648	0.0648	0.0648	0.0648	0.0648	0.0648	0
Onsite Concrete Pump Truck	0	0.0130	0.0194	0.0194	0.0130	0.0065	0.0065	0	0	0	0	0	0	0	0
Total (lbs/month)	**0.084**	**0.097**	**0.110**	**0.110**	**0.104**	**0.104**	**0.110**	**0.104**	**0.104**	**0.104**	**0.104**	**0.104**	**0.097**	**0.084**	**0.0453**

Table C1.1l: Onsite Power Plant Construction Motor Vehicle $PM_{2.5}$ Emissions

Vehicle Type	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Onsite Flatbed Truck	0.00023	0.00023	0.00046	0.00046	0.00046	0.00046	0.00069	0.00069	0.00069	0.00069	0.00069	0.00069	0.00046	0.00023	0.00023
Onsite Fuel/Lube Truck	0.00046	0.00046	0.00046	0.00046	0.00046	0.00069	0.00069	0.00069	0.00069	0.00069	0.00069	0.00069	0.00069	0.00046	0
Onsite Water Truck	0.00231	0.00231	0.00231	0.00231	0.00231	0.00231	0.00231	0.00231	0.00231	0.00231	0.00231	0.00231	0.00231	0.00231	0
Onsite Concrete Pump Truck	0	0.00046	0.00069	0.00069	0.00046	0.00023	0.00023	0.00000	0	0	0	0	0	0	0
Total (lbs/day)	**0.0030**	**0.0035**	**0.0039**	**0.0039**	**0.0037**	**0.0037**	**0.0039**	**0.0037**	**0.0037**	**0.0037**	**0.0037**	**0.0037**	**0.0035**	**0.0030**	**0.00162**
Onsite Flatbed Truck	0.0060	0.0060	0.0120	0.0120	0.0120	0.0120	0.0181	0.0181	0.0181	0.0181	0.0181	0.0181	0.0120	0.0060	0.0060
Onsite Fuel/Lube Truck	0.0120	0.0120	0.0120	0.0120	0.0120	0.0181	0.0181	0.0181	0.0181	0.0181	0.0181	0.0181	0.0181	0.0120	0.0060
Onsite Water Truck	0.0602	0.0602	0.0602	0.0602	0.0602	0.0602	0.0602	0.0602	0.0602	0.0602	0.0602	0.0602	0.0602	0.0602	0.0301
Onsite Concrete Pump Truck	0.0000	0.0120	0.0181	0.0181	0.0120	0.0060	0.0060	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total (lbs/month)	**0.078**	**0.090**	**0.102**	**0.102**	**0.096**	**0.096**	**0.102**	**0.096**	**0.096**	**0.096**	**0.096**	**0.096**	**0.090**	**0.078**	**0.0421**

Table C1.2a: Onsite Power Plant Construction Fugitive Dust Monthly Activity Levels

Source	Monthly Activity Levels														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Grading (acres)[a]	7.4	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	0

[a]Assumes the entire temporary (4.52 acres) and permanent (2.86 acres) disturbed areas are graded simultaneously in the 1st month of construction. Conservatively assumes 2.86 acres graded for each of the remaining months with at least one grader or excavator.

Table C1.2b: Onsite Power Plant Construction Fugitive PM_{10} Emissions

Source	Fugitive PM_{10} Emissions (lb/month)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Grading (acres)	73.8	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	29.0	28.6	28.6	0
Total (lbs/month)	**73.8**	**28.6**	**28.6**	**28.6**	**28.6**	**28.6**	**28.6**	**28.6**	**28.6**	**28.6**	**28.6**	**29.0**	**28.6**	**28.6**	**0**
Total (lbs/day)	**2.8**	**1.1**	**1.1**	**1.1**	**1.1**	**1.1**	**1.1**	**1.1**	**1.1**	**1.1**	**1.1**	**1.1**	**1.1**	**1.1**	**0**

[a] Calculation based on highest (controlled) grading emission factor of 10 lb/acre.
[b] Based on 26 days/month

Table C1.2c: Onsite Power Plant Construction Fugitive $PM_{2.5}$ Emissions

Source	Fugitive $PM_{2.5}$ Emissions (lb/month)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Grading (acres)	15.4	6	6	6	6	6	6	6	6	6	6	6	6	6	0
Total (lbs/month)	**15.4**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**0**
Total (lbs/day)	**0.6**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**	**0**

[a] Calculation based on assumption that 20.8% of PM_{10} is $PM_{2.5}$ for construction fugitive dust emissions. Reference: SCAQMD CEQA Handbook, Appendix A, Table A.
[b] Based on 26 days/month

Table C1.2d: Onsite Power Plant Construction Motor Vehicle Fugitive PM_{10} Emissions

Vehicle Type	Daily Fugitive PM_{10} Emissions (lb/day) for Each Month														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Onsite Flatbed Truck	0.76	0.76	1.52	1.52	1.52	1.52	2.27	2.27	2.27	2.27	2.27	2.27	1.52	0.76	0.76
Onsite Fuel/Lube Truck	1.52	1.52	1.52	1.52	1.52	2.27	2.27	2.27	2.27	2.27	2.27	2.27	2.27	1.52	0.76
Onsite Water Truck	7.58	7.58	7.58	7.58	7.58	7.58	7.58	7.58	7.58	7.58	7.58	7.58	7.58	7.58	3.79
Onsite Concrete Pump Truck	0	1.52	2.27	2.27	1.52	0.76	0.76	0	0	0	0	0	0	0	0
Total (lbs/day)	9.9	**11.4**	**12.9**	**12.9**	**12.1**	**12.1**	**12.9**	**12.1**	**12.1**	**12.1**	**12.1**	**12.1**	**11.4**	**9.9**	**5.3**
Vehicle Type	**Monthly Fugitive PM_{10} Emissions (lb/month)**														
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Onsite Flatbed Truck	19.7	19.7	39.4	39.4	39.4	39.4	59.1	59.1	59.1	59.1	59.1	59.1	39.4	19.7	19.7
Onsite Fuel/Lube Truck	39.4	39.4	39.4	39.4	39.4	59.1	59.1	59.1	59.1	59.1	59.1	59.1	59.1	39.4	19.7
Onsite Water Truck	197.1	197.1	197.1	197.1	197.1	197.1	197.1	197.1	197.1	197.1	197.1	197.1	197.1	197.1	98.5
Onsite Concrete Pump Truck	0	39.4	59.1	59.1	39.4	19.7	19.7	0	0	0	0	0	0	0	0
Total (lb/month)	256	**296**	**335**	**335**	**315**	**315**	**335**	**315**	**315**	**315**	**315**	**315**	**296**	**256**	**138**

[a] Calculation based on highest (controlled) unpaved road emission factor of 0.76 lb/mi for PM_{10}.
[b] Based on 26 days/month

Table C1.2e: Onsite Power Plant Construction Vehicle Fugitive $PM_{2.5}$ Emissions

Vehicle Type	Daily Fugitive $PM_{2.5}$ Emissions (lb/day) for Each Month														
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Onsite Flatbed Truck	0.076	0.076	0.15	0.15	0.15	0.15	0.23	0.23	0.23	0.23	0.23	0.23	0.15	0.076	0.076
Onsite Fuel/Lube Truck	0.152	0.152	0.152	0.152	0.152	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.152	0
Onsite Water Truck	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0
Onsite Concrete Pump Truck	0	0.15	0.23	0.23	0.15	0.08	0.076	0	0	0	0	0	0	0	0
Total (lbs/day)	**0.99**	**1.14**	**1.29**	**1.29**	**1.21**	**1.21**	**1.29**	**1.21**	**1.21**	**1.21**	**1.21**	**1.21**	**1.14**	**0.99**	**0.53**

Vehicle Type	Monthly Fugitive $PM_{2.5}$ Emissions (lb/month)														
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Onsite Flatbed Truck	1.97	1.97	3.94	3.94	3.94	3.94	5.91	5.91	5.91	5.91	5.91	5.91	3.94	1.97	1.97
Onsite Fuel/Lube Truck	3.94	3.94	3.94	3.94	3.94	5.91	5.91	5.91	5.91	5.91	5.91	5.91	5.91	3.94	2
Onsite Water Truck	19.71	19.71	19.71	19.71	19.71	19.71	19.71	19.71	19.71	19.71	19.71	19.71	19.71	19.71	10
Onsite Concrete Pump Truck	0	3.94	5.91	5.91	3.94	1.97	1.97	0	0	0	0	0	0	0	0
Total (lb/month)	**25.6**	**29.6**	**33.5**	**33.5**	**31.5**	**31.5**	**33.5**	**31.5**	**31.5**	**31.5**	**31.5**	**31.5**	**29.6**	**25.6**	**13.8**

[a] Calculation based on highest (controlled) unpaved road emission factor of 0.08 lb/mi for $PM_{2.5}$.
[b] Based on 26 days/month

Table C1.2f: Onsite Power Plant Construction Motor Vehicle Activity

Vehicle Type	Miles/Day	Working Days per Month
Onsite Flatbed Truck	1	26
Onsite Fuel/Lube Truck	1	26
Onsite Water Truck	5	26
Onsite Concrete Pump Truck	1	26

Table C1.2g: Fugitive PM_{10} Emission Factors for Grading

Grading

Emission Factor (Uncontrolled)	20	lb/acre
Controlled Emission Factor	10	lb/acre

Reference: URBEMIS2007, Appendix A, Table A-4

Table C1.2h: Fugitive PM_{10} Emission Factors for Unpaved Roads

Motor Vehicles and Equipment on Unpaved Surfaces

Emission Factor [lb/mi] = 1.5 x (silt content [%] / 12)$^{0.9}$ x (average vehicle weight [tons] / 3)$^{0.45}$
Reference: AP-42, Section 13.2.2, November 2006

Parameter	PM_{10}
Average Vehicle Weight (tons) by month	16.50
Silt Content (%)	8.5
Emission Factor (Uncontrolled, lb/mile)	2.37
Reduction from Watering Twice/Day	68%
Controlled Emission Factor (lb/mile)	0.76

Average vehicle weight assumes that medium/heavy duty trucks weigh 16.5 tons.

Reference for Silt Content: AP-42, Section 13.2.2, Table 13.2.2-1, Average for a Construction Site, Scraper Route
Reference for Control Efficiency: SCAQMD CEQA Handbook, Table 11-4

Table C1.2i: Fugitive $PM_{2.5}$ Emission Factors for Unpaved Roads

Motor Vehicles and Equipment on Unpaved Surfaces

Emission Factor [lb/mi] = 0.15 x (silt content [%] / 12)$^{0.9}$ x (average vehicle weight [tons] / 3)$^{0.45}$
Reference: AP-42, Section 13.2.2, November 2006

Parameter	$PM_{2.5}$
Average Vehicle Weight (tons) by month	16.50
Silt Content (%)	8.5
Emission Factor (Uncontrolled, lb/mile)	0.24
Reduction from Watering Twice/Day	68%
Controlled Emission Factor (lb/mile)	0.08

Reference for Silt Content: AP-42, Section 13.2.2, Table 13.2.2-1, Average for a Construction Site, Scraper Route
Reference for Control Efficiency: SCAQMD CEQA Handbook, Table 11-4

Table C1.3a: Equations Used to Calculate Emissions

Emission Source	Pollutant(s)	Equation	Variables
Construction Equipment Exhaust	CO, VOC, NOx, SOx, PM_{10} and $PM_{2.5}$	E_m = N * EF * H * 26	E_m = Emissions (lb/month) N = number of pieces of equipment EF = emission factor (lb/hr) H = daily hours of operation, assumed to be 12 hr/day 26 = 26 construction days per month
		$E_d = E_m$ / 26	E_d = Emissions (lb/day) E_m = Emissions (lb/month) 26 = 26 construction days per month
		Et = ΣE_m / 2000	E_t = Emissions (ton/yr) E_m = Emissions (lb/month) 2000 = conversion from lbs to tons
Onsite and Offsite Motor Vehicle Exhaust and Unpaved Road Fugitive PM_{10} and $PM_{2.5}$	CO, VOC, NOx, SOx, PM_{10}, $PM_{2.5}$	E_d = N * VMT * EF	E_d = Emissions (lb/day) N = number of vehicles VMT = vehicle miles traveled per day (miles/day) EF =EMFAC2007 emission factor (lb/mile). For fugitive PM_{10} and $PM_{2.5}$, Unpaved road dust emission factor based on equation in AP-42, ch. 13.2.2, December 2003 (lb/mile). See Tables 5.1A.2h and 5.1A.2i.
		$E_m = E_d$ * D	E_m = Emissions (lb/month) E_d = Emissions (lb/day) D = number of construction days (days/month)

Reference: SCAQMD CEQA Handbook online, http://www.aqmd.gov/ceqa/handbook/offroad/offroad.html for construction equipment exhaust emissions and http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html for vehicle exhaust.

Table C1.4a: Number of Onsite Power Plant Construction Equipment

Onsite Equipment	Month														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Manlift	1	2	3	3	3	3	4	4	4	4	4	3	2	1	1
Air Compressor	0	0	0	0	0	6	6	6	8	8	9	10	12	0	0
Excavator	2	2	2	2	3	3	3	2	2	1	1	1	1	1	0
Grader	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Cranes	1	1	0	0	0	1	2	2	2	2	2	2	2	1	0
Asphalt Paver	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Compactor	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0
Welding Machine	0	1	3	4	8	10	14	14	15	15	15	10	5	1	0

Table C1.4b: Number of Onsite Power Plant Construction Motor Vehicles

Vehicle Type	Month														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Onsite Flatbed Truck	1	1	2	2	2	2	3	3	3	3	3	3	2	1	1
Onsite Fuel/Lube Truck	2	2	2	2	2	3	3	3	3	3	3	3	3	2	1
Onsite Water Truck	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
Onsite Concrete Pump Truck	0	2	3	3	2	1	1	0	0	0	0	0	0	0	0

Table C1.4c: Power Plant Construction Equipment Emission Factors

Equipment	Fuel Type	Hours per Month[a]	Emission Factors, EF (lb/hr)[b]					
			CO	VOC	NO_X	SO_X	PM_{10}	$PM_{2.5}$
Manlfit	diesel	312	0.13	0.05	0.13	0.0002	0.01	0.01
Air Compressor	diesel	312	0.22	0.06	0.37	0.0003	0.03	0.03
Excavator	diesel	312	0.34	0.07	0.53	0.0007	0.03	0.03
Grader	diesel	312	0.48	0.11	0.83	0.0009	0.05	0.04
Cranes	diesel	312	0.17	0.06	0.60	0.0007	0.02	0.02
Asphalt Paver	diesel	312	0.37	0.11	0.66	0.0006	0.06	0.05
Compactor	diesel	312	0.64	0.15	1.16	0.0012	0.07	0.06
Welding Machine	diesel	312	0.03	0.01	0.06	0.0001	0.00	0.00

[a] Hours per month assumes 12 work hours per day and 26 days per month.

[b] Table C1.4d below summarizes the horsepower, load factors, and emission factors (g/ bhp hr) used to derive the lb/hr emission factors.

Table C1.4d. Derivation of Construction Equipment Emission Factors

Equipment	Horsepower[a]	Load Factor[b]	Emission Factors, EF (g/bhp hr)[b]					
			CO	VOC	NO_X	SO_X	PM_{10}	$PM_{2.5}$[c]
Manlift	50	0.46	2.49	0.925	2.594	0.003	0.236	0.2100
Air Compressor	106	0.48	1.925	0.548	3.270	0.003	0.301	0.2679
Excavator	140	0.57	1.932	0.397	2.994	0.004	0.181	0.1611
Grader	174	0.61	2.067	0.461	3.562	0.004	0.209	0.1860
Cranes	250	0.43	0.714	0.255	2.513	0.003	0.093	0.0828
Asphalt Paver	102	0.62	2.631	0.791	4.710	0.004	0.417	0.3711
Compactor	145	0.78	2.572	0.593	4.648	0.005	0.271	0.2412
Welding Machine	23	0.45	1.432	0.537	2.415	0.003	0.163	0.1451

[a] Construction equipment horsepower provided by GWF.

[b] Offroad mobile source load and emission factors from URBEMIS2007 version 9.2 Handbook Appendices G and I. The emission factors for the year 2011 were used for the construction equipment exhaust emission calculations. The aerial lift emission factors were used for the manlift.

[c] $PM_{2.5}$ emission factors were calculated following the SCAQMD Particulate Matter (PM) 2.5 Significance Thresholds and Calculation Methodology, October 2006. For offroad combustion sources, 89% of the PM_{10} would be $PM_{2.5}$.

Table C1.4e: Motor Vehicle Emission Factors [a]

Vehicle Type	Vehicle Class	CO Exhaust lb/mi	VOC Exhaust lb/mi	SO_X Exhaust lb/mi	NO_X Exhaust lb/mi	PM_{10} Exhaust lb/mi	$PM_{2.5}$ Exhaust lb/mi
Onsite Flatbed Truck	MDT	0.0164	0.0015	0.0000	0.0029	0.0002	0.00023
Onsite Fuel/Lube Truck	MDT	0.0164	0.0015	0.0000	0.0029	0.0002	0.00023
Onsite Water Truck	MDT	0.0164	0.0015	0.0000	0.0029	0.0002	0.00023
Onsite Concrete Pump Truck	MDT	0.0164	0.0015	0.0000	0.0029	0.0002	0.00023
Offsite Delivery Trucks	MDT	0.0063	0.0002	0.0000	0.0018	0.0001	0.00005
Construction Worker Commute	LDA	0.0053	0.0002	0.0000	0.0006	0.0001	0.00004

[a] All emission factors were derived from the emission factors [g/mi] from EMFAC2007 for calendar year 2011 in Kings County. For this model, a speed of 5 mph was assumed for onsite vehicles. A speed of 45 mph was assumed for offsite vehicles and worker commutes. The emission factors account for emissions from running.

Table C1.5a: Offsite Motor Vehicle Usage during Construction

Vehicle Type	Number per Month														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Offsite Delivery Trucks[a]	189	232	392	290	286	265	232	194	238	206	204	87	82	72	50
Construction Worker Commute[b]	17	30	45	54	58	83	116	134	154	144	147	131	81	63	32

[a] Included Standard Deliveries and Heavy Haul Deliveries as Offsite Delivery Trucks, characterized as Medium-Duty Trucks (MDT).

[b] Assumed 1 commute per 1 worker.

Table C1.5b: Offsite Motor Vehicle CO Emissions

Vehicle Type	Number per Month														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Offsite Delivery Trucks	119.58	146.79	248.02	183.49	180.96	167.67	146.79	122.75	150.59	130.34	129.07	55.05	51.88	45.56	31.64
Construction Worker Commute	5.38	9.49	14.23	17.08	18.34	26.25	36.69	42.38	48.71	45.54	46.49	41.43	25.62	19.93	10.12
Total (lbs/month)	**125.0**	**156.3**	**262.3**	**200.6**	**199.3**	**193.9**	**183.5**	**165.1**	**199.3**	**175.9**	**175.6**	**96.5**	**77.5**	**65.5**	**41.76**
Total (ton/yr)	**0.42**														

Table C1.5c: Offsite Motor Vehicle VOC Emissions

Vehicle Type	Number per Month														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Offsite Delivery Trucks	4.38	5.37	9.07	6.71	6.62	6.13	5.37	4.49	5.51	4.77	4.72	2.01	1.90	1.67	1.16
Construction Worker Commute	0.16	0.29	0.43	0.51	0.55	0.79	1.10	1.28	1.47	1.37	1.40	1.25	0.77	0.60	0.30
Total (lbs/month)	**4.54**	**5.66**	**9.50**	**7.23**	**7.17**	**6.92**	**6.48**	**5.77**	**6.98**	**6.14**	**6.12**	**3.26**	**2.67**	**2.27**	**1.46**
Total (ton/yr)	**0.014**														

Table C1.5d: Offsite Motor Vehicle SOx Emissions

Vehicle Type	Number per Month														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Offsite Delivery Trucks	0.21	0.26	0.43	0.32	0.32	0.29	0.26	0.21	0.26	0.23	0.22	0.10	0.09	0.08	0.06
Construction Worker Commute	0.0067	0.0119	0.0179	0.0214	0.0230	0.0329	0.0460	0.0532	0.0611	0.0571	0.0583	0.0520	0.0321	0.0250	0.0127
Total (lbs/month)	**0.22**	**0.27**	**0.45**	**0.34**	**0.34**	**0.33**	**0.30**	**0.27**	**0.32**	**0.28**	**0.28**	**0.15**	**0.12**	**0.10**	**0.07**
Total (ton/yr)	**0.0007**														

Table C1.5e: Offsite Motor Vehicle NOx Emissions

Vehicle Type	Number per Month														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Offsite Delivery Trucks	33.17	40.71	68.79	50.89	50.19	46.50	40.71	34.04	41.77	36.15	35.80	15.27	14.39	12.63	8.77
Construction Worker Commute	0.58	1.02	1.52	1.83	1.96	2.81	3.93	4.54	5.21	4.88	4.98	4.44	2.74	2.13	1.08
Total (lbs/month)	**33.74**	**41.73**	**70.31**	**52.72**	**52.15**	**49.31**	**44.64**	**38.58**	**46.98**	**41.03**	**40.78**	**19.70**	**17.13**	**14.77**	**9.86**
Total (ton/yr)	**0.10**														

Table C1.5f: Offsite Motor Vehicle PM_{10} Emissions

Vehicle Type	Number per Month														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Offsite Delivery Trucks	1.63	1.99	3.37	2.49	2.46	2.28	1.99	1.67	2.05	1.77	1.75	0.75	0.71	0.62	0.43
Construction Worker Commute	0.07	0.12	0.18	0.21	0.23	0.33	0.46	0.53	0.61	0.57	0.58	0.52	0.32	0.25	0.13
Total (lbs/month)	**1.69**	**2.11**	**3.55**	**2.71**	**2.69**	**2.61**	**2.46**	**2.20**	**2.66**	**2.34**	**2.34**	**1.27**	**1.03**	**0.87**	**0.56**
Total (ton/yr)	**0.006**														

Table C1.5g: Offsite Motor Vehicle PM2.5 Emissions

Vehicle Type	Number per Month														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Offsite Delivery Trucks	0.09	0.15	0.23	0.27	0.29	0.42	0.59	0.68	0.78	0.73	0.75	0.66	0.41	0.32	0.16
Construction Worker Commute	0.04	0.06	0.10	0.11	0.12	0.18	0.25	0.28	0.33	0.30	0.31	0.28	0.17	0.13	0.07
Total (lbs/month)	**0.12**	**0.22**	**0.32**	**0.39**	**0.42**	**0.60**	**0.83**	**0.96**	**1.11**	**1.03**	**1.06**	**0.94**	**0.58**	**0.45**	**0.23**
Total (ton/yr)	**0.003**														

Vehicle Type	Roundtrip Miles per Day
Offsite Delivery Trucks	100
Construction Worker Commute	60

Attachment C2
Calculation of Maximum Hourly, Daily, and Annual Emissions

ATTACHMENT C2

Calculation of Maximum Hourly, Daily, and Annual Emissions

Tables presented in this Attachment are as follows:

GWF Henrietta Combined Cycle Power Plant
Table C2.1
Commissioning Emission Scenarios
October 2008

Number	Scenario	Turbine	Turbine Load Rate (%)	Scenario Modeled	Emission Rate per turbine (lb/hr) 1 Hr NOx	1-Hr CO	8-Hr CO
2	Steam Blows	1 or 2	45	X	52.0	20.9	20.9
3	Steam Blows	Both	45	X	39.0	18.2	18.2
8	Bypass Operation until Steam Quality Achieved/STG Initial Roll and Trip Test	1 or 2	50		8.1	5.3	5.3
9	STG Load Testing	1 or 2	50		6.7	4.4	4.4
1	CTG Testing (OSTG HP Startup)	1 or 2	100		44.1	36.1	36.1
4	Verify STG on Turning Gear; Establish Vacuum in ACC Ext Bypass Blowdown to ACC (combined blows) commence tuning on ACC Controls; Finalize Bypass Valve Tuning	1 or 2	100	X	44.8	40.5	40.5
6	CTG Base Load / Commissioning of Ammonia system	1 or 2	100		23.4	36.1	36.1
10	STG Load Test	1 or 2	100		6.1	3.1	3.1
5	Verify STG on Turning Gear; Establish Vacuum in ACC Ext Bypass Blowdown to ACC (combined blows) commence tuning on ACC Controls; Finalize Bypass Valve Tuning	Both	100	X	44.8	40.5	40.5
7	CTG Base Load / Commissioning of Ammonia system	Both	100		19.1	34.2	34.2
11	Load Test STG / Combine Cycle (2X1)	Both	100		6.7	4.4	4.4
12	Combine Cycle testing	Both	100		5.7	3.7	3.7
13	RATA / Pre-performance Testing/Source Testing	Both	100		8.1	4.5	4.5
14	Source Testing	Both	100		8.1	4.5	4.5
15	Performance Testing	Both	100		7.1	3.8	3.8
16	CALISO Certification	Both	100		8.1	4.5	4.5
			Max		52.0	40.5	40.5

For 45-50% Load, use the 60% normal operating turbine parameters.

GWF Henrietta Combined Cycle Power Plant
Table C2.2
Summary of Simple Cycle Turbine Emissions - Criteria Pollutants
October 2008

GWF
Henrietta Combined Cycle Conversion

LM6000PC-SPRINT Simple Cycle Emissions

Case Number	1	2	3	4	5	6
CTG Model	LM6000	LM6000	LM6000	LM6000	LM6000	LM6000
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Load	100%	60%	100%	60%	100%	60%
CTG Inlet Air Cooling	Off	Off	Evap. Cooler	Evap. Cooler	Evap. Cooler	Evap. Cooler
CTG Steam/Water Injection	Water	Water	Water	Water	Water	Water
Ambient Temperature, F	15	15	63	63	115	115
HRSG Duct Firing	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired
Fuel Sulfur Content (grains/100 standard cubic feet)	0.25	0.25	0.25	0.25	0.25	0.25
Ambient Conditions						
Ambient Temperature, F	15.0	15.0	63.0	63.0	115.0	115.0
Ambient Relative Humidity, %	92.0	92.0	60.0	60.0	21.0	21.0
Atmospheric Pressure, psia	14.569	14.569	14.569	14.569	14.569	14.569
Combustion Turbine Performance						
CTG Performance Reference	GE	GE	GE	GE	GE	GE
CTG Inlet Air Conditioning Effectiveness, %	0	0	85	85	85	85
CTG Compressor Inlet Dry Bulb Temperature, F	15.0	15.0	56.1	56.1	84.6	84.6
CTG Compr. Inlet Relative Humidity, %	92.1	92.1	92.9	92.9	79.4	79.4
Inlet Loss, in. H2O	4.5	4.5	4.5	4.5	4.5	4.5
Exhaust Loss, in. H2O	12.0	12.0	12.0	12.0	12.0	12.0
CTG Load Level (percent of Base Load)	100%	60%	100%	60%	100%	60%
Gross CTG Output, kW	49,967	29,970	48,893	29,340	42,756	25,655
Gross CTG Heat Rate, Btu/kWh (LHV)	8,412	9,152	8,574	9,356	8,761	9,596
Gross CTG Heat Rate, Btu/kWh (HHV)	9,309	10,128	9,489	10,354	9,696	10,620
CTG Heat Input, MBtu/h (LHV)	420.3	274.3	419.2	274.5	374.6	246.2
CTG Heat Input, MBtu/h (HHV)	465.2	303.6	463.9	303.8	414.6	272.5
CTG Water/Steam Injection Flow, lb/h	22,457	10,639	18,510	11,235	13,804	8,370
Injection Fluid/Fuel Ratio	1.0	0.7	0.8	0.8	0.7	0.7
CTG Exhaust Flow, lb/h	1,119,571	860,648	1,048,369	833,496	954,633	735,795
CTG Exhaust Temperature, F	785	732	847	789	873	842
Combustion Turbine Fuel						
Total CTG Fuel Flow, lb/h	22,140	14,450	22,090	14,460	19,730	12,970
CTG Fuel Temperature, F	76	76	76	76	76	76
CTG Fuel LHV, Btu/lb	18,981	18,981	18,981	18,981	18,981	18,981
CTG Fuel HHV, Btu/lb	21,006	21,006	21,006	21,006	21,006	21,006
HHV/LHV Ratio	1.1067	1.1067	1.1067	1.1067	1.1067	1.1067
CTG Fuel Composition (Ultimate Analysis by Weight)						
Ar	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
C	68.44%	68.44%	68.44%	68.44%	68.44%	68.44%
H2	21.38%	21.38%	21.38%	21.38%	21.38%	21.38%
N2	8.80%	8.80%	8.80%	8.80%	8.80%	8.80%
O2	1.37%	1.37%	1.37%	1.37%	1.37%	1.37%
S	0.00074%	0.00074%	0.00074%	0.00074%	0.00074%	0.00074%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Fuel Sulfur Content (grains/100 standard cubic feet)	0.25	0.25	0.25	0.25	0.25	0.25
Stack Emissions						
Stack Exhaust Analysis - Volume Basis - Wet						
Ar	0.92%	0.93%	0.91%	0.92%	0.90%	0.90%
CO2	3.18%	2.72%	3.38%	2.80%	3.30%	2.82%
H2O	9.33%	7.27%	10.39%	8.68%	11.45%	10.12%
N2	73.08%	74.34%	72.39%	73.30%	71.51%	72.20%
O2	13.49%	14.73%	12.93%	14.30%	12.84%	13.95%
SO2 (after SO2 oxidation)	0.000010%	0.000010%	0.000010%	0.000010%	0.000010%	0.000010%
SO3 (after SO2 oxidation)	0.000005%	0.000004%	0.000005%	0.000004%	0.000005%	0.000004%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Stack Exit Temperature, F	785	732	847	789	873	842
Stack Diameter, ft (estimated)	9.6	9.6	9.6	9.6	9.6	9.6
Stack Flow, lb/h	1,119,571	860,648	1,048,369	833,496	954,633	735,795
Stack Flow, scfm	250,784	191,494	235,534	186,425	215,429	165,431
Stack Flow, acfm	605,501	442,660	597,570	451,755	557,187	418,177
Stack Exit Velocity, ft/s	139	101	137	103	127	96
Stack NOx Emissions with the Effects of Selective Catalytic Reduction (SCR)						
NOx, ppmvd (dry, 15% O2)	2.5	2.5	2.5	2.5	2.5	2.5
NOx, lb/h as NO2	4.2	2.8	4.2	2.8	3.8	2.5
NOx, lb/MBtu (HHV) as NO2	0.0101	0.0101	0.0101	0.0101	0.0100	0.0102
SCR NH3 slip, ppmvd (dry, 15% O2)	10.0	10.0	10.0	10.0	10.0	10.0
SCR NH3 slip, lb/h	6.2	4.1	6.2	4.1	5.6	3.7
Stack CO Emissions with the Effects of Catalytic Reduction (CO Catalyst)						
CO, ppmvd (dry, 15% O2)	3.0	3.0	1.8	2.9	2.2	2.7
CO, lb/h	3.1	2.0	1.8	2.1	2.2	1.8
CO, lb/MBtu (HHV)	0.0067	0.0067	0.0039	0.0069	0.0053	0.0066

GWF

Henrietta Combined Cycle Conversion

LM6000PC-SPRINT Simple Cycle Emissions

Case Number	1	2	3	4	5	6
CTG Model	LM6000	LM6000	LM6000	LM6000	LM6000	LM6000
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Load	100%	60%	100%	60%	100%	60%
CTG Inlet Air Cooling	Off	Off	Evap. Cooler	Evap. Cooler	Evap. Cooler	Evap. Cooler
CTG Steam/Water Injection	Water	Water	Water	Water	Water	Water
Ambient Temperature, F	15	15	63	63	115	115
HRSG Duct Firing	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired
Fuel Sulfur Content (grains/100 standard cubic feet)	0.25	0.25	0.25	0.25	0.25	0.25
Stack SO_2 Emissions without the Effects of SO_2 Scrubber						
SO_2, ppmvd (dry, 15% O_2)	0.14	0.14	0.14	0.14	0.14	0.14
SO_2, lb/h	0.33	0.21	0.33	0.21	0.29	0.19
SO_2, lb/MBtu (HHV)	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007
Stack VOC Emissions with the Effects of Catalytic Reduction (CO Catalyst)						
VOC, ppmvd (dry, 15% O_2)	2.0	2.0	0.8	0.8	0.8	0.8
VOC, lb/h as CH_4	1.2	0.8	0.5	0.3	0.4	0.3
VOC, lb/MBtu (HHV)	0.0025	0.0025	0.0011	0.0010	0.0010	0.0010
PM10 with the Effects of SO_2 Oxidation						
PM10 Emissions - Front and Back Half Catch						
PM10, lb/h	2.2	2.1	2.2	2.1	2.1	2.1
PM10, lb/MBtu (HHV)	0.0046	0.0068	0.0046	0.0068	0.0051	0.0075
PM2.5 with the Effects of SO_2 Oxidation						
PM2.5 Emissions - Front and Back Half Catch						
PM2.5, lb/h	2.2	2.1	2.2	2.1	2.1	2.1
PM2.5, lb/MBtu (HHV)	0.0046	0.0068	0.0046	0.0068	0.0051	0.0075
Additional Emissions						
CTG Exhaust						
O_2, lb/h	171,178	142,728	154,101	134,909	140,023	116,793
CO_2, lb/h	55,528	36,241	55,403	36,267	49,484	32,530
H_2O, lb/h	66,610	39,687	69,768	46,119	70,295	47,729

Notes:

1. The emissions estimates shown in the table above are per stack. Emission estimates are expected and do not include any margin. Permitting margins should be applied by permitting engineer.
2. The dry air composition used is 0.98% Ar, 78.03% N_2 and 20.99%O_2.
3. Standard conditions are defined as 59° F, 14.696 psia, Norm conditions are defined as 32° F, 14.696 psia.
4. All ppm values are based on CH_4 calibration gas.
5. The CTG performance and emissions is based on GE APPS data.
6. The VOC/UHC ratio is assumed to be 20% for natural gas firing (typical for GE turbines).
7. UHC values shown do not include the effects of oxidation in the CO catalyst.
8. The O_2 reduction in the CO catalyst is negligible and not included in the analysis.
9. The H_2O increase in the SCR catalyst is negligible and not included in the analysis.
10. The front half catch of particulate emissions is assumed to be half the amount of the front and back half catch.
11. Ammonium sulfates created downstream of the SCR are included in front & back half particulates. The assumption that 100% SO_3 is converted to ammonium sulfates results in "worst case" particulate emissions.
12. B&V estimates of lb/h of pollutant emissions were adjusted, where applicable, to meet the values specified by GWF (VOC and PM10). VOC estimates for all cases except emissions on 15°F were adjusted based on 100% load emissions at 63F provided by GWF. All the PM10 emissions were adjusted based on value provided by GWF at 100% load on 63°F case.
13. SCR and CO Catalyst are included for emission reduction and are designed to control NOx and CO emissions to meet permit limits provided by GWF. The revised simple cycle permit limits for NOx, CO and VOC are 2.5 ppmvd @15% O_2, 3.0 ppmvd @15%O_2 and 2.0 ppmvd @15% O_2 respectively. VOC conversion across the CO catalyst is assumed to be 30% for 63°F and 115°F ambient cases. VOC catalyst efficiency for 15°F cases is adjusted so that VOC at stack equals target level of 2 ppmvd @ 15%O_2.
14. Sulfur content in fuel gas was assumed to be 0.25 grains/100 SCF.
15. The estimated PM2.5 emissions are assumed to be 100% of PM10 emissions as per GE.
16. SO_2 oxidation rate of 20% in CO catalyst was used for emission estimates. Permitting engineer should apply necessary margins if the assumed SO_2 oxidation rate in CO catalyst varies from 20%.
17. The estimates for SO_2 do not account for any reduction in SO_2 emissions because of the oxidation of SO_2 to SO_3 in CTG, SCR and CO catalyst respectively.
18. SO_3 and subsequent PM10 and PM2.5 values are calculated based on the SO_2 to SO_3 conversion rates noted for the CTG, SCR and CO catalyst.
19. The estimated ammonia slip (lb/hr) in SCR is based on the ammonia slip concentration (10 ppmvd @15%O_2) as per GWF specified simple cycle permit limits.

GWF Henrietta Combined Cycle Power Plant
Table C2.3
Summary of Combined Cycle Turbine Emissions - Criteria Pollutants
October 2008

GWF **Henrietta Combined Cycle Conversion** **LM6000PC-SPRINT Combined Cycle Emissions**						
Case Number	1	2	3	4	5	6
CTG Model	LM6000	LM6000	LM6000	LM6000	LM6000	LM6000
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Load	100%	60%	100%	60%	100%	60%
CTG Inlet Air Cooling	Off	Off	Evap. Cooler	Evap. Cooler	Evap. Cooler	Evap. Cooler
CTG Steam/Water Injection	Water	Water	Water	Water	Water	Water
Ambient Temperature, F	15	15	63	63	115	115
HRSG Duct Firing	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired
Fuel Sulfur Content (grains/100 standard cubic feet)	0.25	0.25	0.25	0.25	0.25	0.25
Ambient Conditions						
Ambient Temperature, F	15.0	15.0	63.0	63.0	115.0	115.0
Ambient Relative Humidity, %	92.0	92.0	60.0	60.0	21.0	21.0
Atmospheric Pressure, psia	14.569	14.569	14.569	14.569	14.569	14.569
Combustion Turbine Performance						
CTG Performance Reference	GE	GE	GE	GE	GE	GE
CTG Inlet Air Conditioning Effectiveness, %	0	0	85	85	85	85
CTG Compressor Inlet Dry Bulb Temperature, F	15.0	15.0	56.1	56.1	84.6	84.6
CTG Compr. Inlet Relative Humidity, %	92.1	92.1	92.9	92.9	79.4	79.4
Inlet Loss, in. H2O	4.5	4.5	4.5	4.5	4.5	4.5
Exhaust Loss, in. H2O	12.0	12.0	12.0	12.0	12.0	12.0
CTG Load Level (percent of Base Load)	100%	60%	100%	60%	100%	60%
Gross CTG Output, kW	49,967	29,970	48,893	29,340	42,756	25,655
Gross CTG Heat Rate, Btu/kWh (LHV)	8,412	9,152	8,574	9,356	8,761	9,596
Gross CTG Heat Rate, Btu/kWh (HHV)	9,309	10,128	9,489	10,354	9,696	10,620
CTG Heat Input, MBtu/h (LHV)	420.3	274.3	419.2	274.5	374.6	246.2
CTG Heat Input, MBtu/h (HHV)	465.2	303.6	463.9	303.8	414.6	272.5
CTG Water/Steam Injection Flow, lb/h	22,457	10,639	18,510	11,235	13,804	8,370
Injection Fluid/Fuel Ratio	1.0	0.7	0.8	0.8	0.7	0.7
CTG Exhaust Flow, lb/h	1,119,571	860,648	1,048,369	833,496	954,633	735,795
CTG Exhaust Temperature, F	785	732	847	789	873	842
Combustion Turbine Fuel						
Total CTG Fuel Flow, lb/h	22,140	14,450	22,090	14,460	19,730	12,970
CTG Fuel Temperature, F	76	76	76	76	76	76
CTG Fuel LHV, Btu/lb	18,981	18,981	18,981	18,981	18,981	18,981
CTG Fuel HHV, Btu/lb	21,006	21,006	21,006	21,006	21,006	21,006
HHV/LHV Ratio	1.1067	1.1067	1.1067	1.1067	1.1067	1.1067
CTG Fuel Composition (Ultimate Analysis by Weight)						
Ar	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
C	68.44%	68.44%	68.44%	68.44%	68.44%	68.44%
H2	21.38%	21.38%	21.38%	21.38%	21.38%	21.38%
N2	8.80%	8.80%	8.80%	8.80%	8.80%	8.80%
O2	1.37%	1.37%	1.37%	1.37%	1.37%	1.37%
S	0.00074%	0.00074%	0.00074%	0.00074%	0.00074%	0.00074%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Fuel Sulfur Content (grains/100 standard cubic feet)	0.25	0.25	0.25	0.25	0.25	0.25
Stack Exhaust Analysis - Volume Basis - Wet						
Ar	0.92%	0.93%	0.91%	0.92%	0.90%	0.90%
CO2	3.18%	2.72%	3.38%	2.80%	3.30%	2.82%
H2O	9.33%	7.27%	10.39%	8.68%	11.45%	10.12%
N2	73.08%	74.34%	72.39%	73.30%	71.51%	72.20%
O2	13.49%	14.73%	12.93%	14.30%	12.84%	13.95%
SO2 (after SO2 oxidation)	0.000010%	0.000010%	0.000010%	0.000010%	0.000010%	0.000010%
SO3 (after SO2 oxidation)	0.000005%	0.000004%	0.000005%	0.000004%	0.000005%	0.000004%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Stack Exit Temperature, F	288	284	272	269	283	269
Stack Diameter, ft (estimated)	9.6	9.6	9.6	9.6	9.6	9.6
Stack Flow, lb/h	1,119,571	860,648	1,048,369	833,496	954,633	735,795
Stack Flow, scfm	250,784	191,494	235,534	186,425	215,429	165,431
Stack Flow, acfm	363,861	276,411	334,430	263,663	310,415	234,105
Stack Exit Velocity, ft/s	83.2	63.2	76.5	60.3	71.0	53.6
Stack NOx Emissions with the Effects of Selective Catalytic Reduction (SCR)						
NOx, ppmvd (dry, 15% O2)	2.0	2.0	2.0	2.0	2.0	2.0
NOx, lb/h as NO2	3.4	2.2	3.4	2.2	3.0	2.0
NOx, lb/MBtu (HHV) as NO2	0.0073	0.0073	0.0073	0.0073	0.0073	0.0073
SCR NH3 slip, ppmvd (dry, 15% O2)	5.0	5.0	5.0	5.0	5.0	5.0
SCR NH3 slip, lb/h	3.1	2.0	3.1	2.0	2.8	1.8

GWF

Henrietta Combined Cycle Conversion

LM6000PC-SPRINT Combined Cycle Emissions

Case Number	1	2	3	4	5	6
CTG Model	LM6000	LM6000	LM6000	LM6000	LM6000	LM6000
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Load	100%	60%	100%	60%	100%	60%
CTG Inlet Air Cooling	Off	Off	Evap. Cooler	Evap. Cooler	Evap. Cooler	Evap. Cooler
CTG Steam/Water Injection	Water	Water	Water	Water	Water	Water
Ambient Temperature, F	15	15	63	63	115	115
HRSG Duct Firing	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired
Fuel Sulfur Content (grains/100 standard cubic feet)	0.25	0.25	0.25	0.25	0.25	0.25
Stack CO Emissions with the Effects of Catalytic Reduction (CO Catalyst)						
CO, ppmvd (dry, 15% O2)	3.00	3.00	1.80	1.58	1.75	1.75
CO, lb/h	3.10	2.04	1.80	2.25	1.75	2.63
CO, lb/MBtu (HHV)	0.01	0.01	0.00	0.01	0.00	0.01
Stack SO2 Emissions without the Effects of SO2 Scrubber, after SO2 Oxidation						
SO2, ppmvd (dry, 15% O2)	0.14	0.14	0.14	0.14	0.14	0.14
SO2, lb/h	0.33	0.21	0.33	0.21	0.29	0.19
SO2, lb/MBtu (HHV)	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007
Stack VOC Emissions with the Effects of Catalytic Reduction (CO Catalyst)						
VOC, ppmvd (dry, 15% O2)	2.0	2.0	0.8	0.8	0.8	0.8
VOC, lb/h as CH4	1.2	0.8	0.5	0.3	0.4	0.3
VOC, lb/MBtu (HHV)	0.0025	0.0025	0.0011	0.0010	0.0010	0.0010
PM10 with the Effects of SO2 Oxidation [includes (NH4)2-(SO4)]						
PM10 Emissions - Front and Back Half Catch						
PM10, lb/h	2.2	2.1	2.2	2.1	2.1	2.1
PM10, lb/MBtu (HHV)	0.0046	0.0068	0.0046	0.0068	0.0051	0.0075
PM2.5 with the Effects of SO2 Oxidation [includes (NH4)2-(SO4)]						
PM2.5 Emissions - Front and Back Half Catch						
PM2.5, lb/h	2.2	2.1	2.2	2.1	2.1	2.1
PM2.5, lb/MBtu (HHV)	0.0046	0.0068	0.0046	0.0068	0.0051	0.0075
Additional Emissions						
CTG Exhaust						
O2, lb/h	171,178	142,728	154,101	134,909	140,023	116,793
CO2, lb/h	55,528	36,241	55,403	36,267	49,484	32,530
H2O, lb/h	66,610	39,687	69,768	46,119	70,295	47,729

Notes:

1. The emissions estimates shown in the table above are per stack. Emission estimates are expected and do not include any margin. Permitting margins should be applied by permitting engineer.
2. The dry air composition used is 0.98% Ar, 78.03% N2 and 20.99%O2.
3. Standard conditions are defined as 59° F, 14.696 psia, Norm conditions are defined as 32° F, 14.696 psia.
4. All ppm values are based on CH4 calibration gas.
5. The CTG performance and emissions is based on GE APPS data.
6. The VOC/UHC ratio is assumed to be 20% for natural gas firing (typical for GE turbines).
7. UHC values shown do not include the effects of oxidation in the CO catalyst.
8. The O2 reduction in the CO catalyst is negligible and not included in the analysis.
9. The H2O increase in the SCR catalyst is negligible and not included in the analysis.
10. The front half catch of particulate emissions is assumed to be half the amount of the front and back half catch.
11. Ammonium sulfates created downstream of the SCR are included in front half particulates and front&back half particulates. The assumption that 100% SO3 is converted to ammonium sulfates results in "worst case" particulate emissions.
12. B&V estimates of lb/h of pollutant emissions were adjusted, where applicable, to meet the values specified by GWF (VOC and PM10). VOC estimates for all cases except emissions on 15°F were adjusted based on 100% load emissions at 63F provided by GWF. All the PM10 emissions were adjusted based on value provided by GWF at 100% load on 63°F case.
13. SCR and CO Catalyst are included for emission reduction and are designed to control NOx and CO emissions to meet emission limits provided by GWF. The combined cycle limits for NOx, CO and VOC are set to 2.0 ppmvd @15% O2, 3.0 ppmvd @15%O2 and 2.0 ppmvd @15% O2 respectively as per GWF guidelines. VOC conversion across the CO catalyst is assumed to be 30% for 63°F and 115°F ambient cases. VOC catalyst efficiency for 15°F cases is adjusted so that VOC at stack equals target level of 2 ppmvd @ 15%O2.
14. Sulfur content in fuel gas was assumed to be 0.25 grains/100 SCF.
15. The estimated PM2.5 emissions are assumed to be 100% of PM10 emissions as per GE.
16. SO2 oxidation rate of 20% in CO catalyst was used for emission estimates. Permitting engineer should apply necessary margins if the assumed SO2 oxidation rate in CO catalyst varies from 20%.
17. The estimates for SO2 do not account for any reduction in SO2 emissions because of the oxidation of SO2 to SO3 in CTG, SCR and CO catalyst respectively.
18. SO3 and subsequent PM10 and PM2.5 values are calculated based on the SO2 to SO3 conversion rates noted for the CTG, SCR and CO catalyst.
19. The estimated ammonia slip (lb/hr) in SCR is based on the ammonia slip concentration (5 ppmvd @15%O2) as per GWF specified limits.
20. A equivalent stack diameter of 12 ft is used for stack velocity estimation.
21. Estimated stack temperatures are obtained from Thermoflow estimated combined cycle performance data.

GWF Henrietta Combined Cycle Power Plant
Table C2.4
Summary of Turbine Emissions - Ammonia and HAPs
October 2008

Assume:

Unfired Operations Hours/Year	8541	Hours/Year
Gas Heat Content =	1020	MMBtu/MMSCF
Hourly CTG Heat Input (per unit)	465.2	MMBtu/Hr high heating value (HHV)
Hourly CTG Heat Input (per unit)	0.456	MMCF/Hr
Annual CTG Heat Input (per unit)	3895	MMCF/Yr

Compound	Emission Factor (Lb/MMCF)[a]	Maximum CTG and DB Heat Input (mmBtu/hr)	Gas Input (MMCF/hr)	Turbine Emissions					
				lb/hr/CT	lb/hr/2-CT	lb/yr/CT	TPY/CT	lb/yr/2-CT	TPY/2-CT
Ammonia[b]	10 ppm	465	0.456	6.3	12.7	54089	27.0	108178	54.1
Acetaldehyde	0.137	465	0.456	0.06	0.125	534	0.3	1067	0.5
Acrolein	0.0189	465	0.456	0.009	0.017	73.6	0.04	147	0.07
Benzene	0.0133	465	0.456	0.006	0.012	52	0.03	104	0.05
1,3-Butadiene	0.000127	465	0.456	0.00006	0.0001	0.5	0.0002	1	0.0005
Ethylbenzene	0.0179	465	0.456	0.008	0.016	70	0.03	139	0.07
Formaldehyde	0.917	465	0.456	0.4	0.8	3572	1.8	7144	3.6
Hexane	0.259	465	0.456	0.12	0.24	1009	0.5	2018	1.0
Naphthalene	0.00166	465	0.456	0.0008	0.002	6.5	0.003	13	0.006
PAHs[c]	0.000014	465	0.456	0.00001	0.000	0.05	0.00003	0.1	0.00005
Propylene	0.771	465	0.456	0.35	0.70	3003.3	1.5	6007	3.0
Propylene Oxide	0.0478	465	0.456	0.022	0.04	186	0.09	372	0.19
Toluene	0.071	465	0.456	0.032	0.06	277	0.1	553	0.3
Xylene	0.0261	465	0.456	0.012	0.024	102	0.05	203	0.1
TOTAL HAPs						8885	4.4	17769	8.9

Notes:

[a] Obtained from the California Air Toxics Emission Factors (CATEF) database.

[b] Based on an exhaust NH_3 limit of 10 ppmv @ 15% O_2 and a F-factor of 8710.

[c] Carcinogenic PAHs only; naphthalene considered separately. Emission Factor based on two separate source tests (2002 and 2004) from the Delta Energy Center located in Pittsburg, CA.

GWF Henrietta Combined Cycle Power Plant
Table C2.5
Summary of Turbine Emissions - Greenhouse Gas Pollutants
October 2008

Turbine Natural Gas Use: 7,946,174 MMBtu/yr

	Emission Factor (kg/MMBtu)	Emissions (metric tons/year)
CO_2	53.06	421,624
CH_4	0.0059	47
N_2O	0.0001	1

CO_2 emission factor from CCAR General Reporting Protocol (version 3.0, April 2008) Table C.6.

CH_4 and N_2O emission factors from CCAR General Reporting Protocol (version 3.0, April 2008) Table C.7.

GWF Henrietta Combined Cycle Power Plant
Table C2.6
Summary of Emergency Fire Pump Emissions - Criteria, HAPS, and Greenhouse Gas Pollutants
October 2008

Given: Cummins Model CFP15E-F10 (or equivalent) fire pump to be driven by 460 bHp diesel engine

Assume: Tier 3 engine
Engine operates a maximum of 24 hours per day/50 hours per year for maintenance and reliability testing.

Rated Horsepower	460	
Max Hours/Day	24	
Hours/Year	50	
Fuel usage is	22.5	Gal/hr
	540	Gal/day
	1125	Gal/yr

Engine Data Source - Cummins California ATCM Tier 3 Emissions Data Spec Sheet (15 ppm sulfur diesel fuel) - January 26, 2006

Pollutant	Emission Factor[1]	Emissions		
	Grams/Brake-Horsepower-Hour	lb/hr	lb/day	lb/yr
Hydrocarbons	0.086	0.09	2.1	4.4
Oxides of Nitrogen	2.66	2.698	65	135
Carbon Monoxide	0.671	0.68	16	34
Particulates	0.078	0.079	1.9	3.96
Sulfur Dioxide[2]	-	0.0048	0.1142	0.24
	kg/gal	**lb/hr**	**lb/day**	**metric tons/yr**
Carbon Dioxide[3]	10.15	503	12084	11.4
Methane[4]	0.0003	0.0149	0.36	0.00034
Nitrous Oxide[4]	0.0001	0.0050	0.119	0.00011

1. Emission factors from the Cummins California ATCM Tier 3 Emissions Data Spec Sheet (15 ppm sulfur diesel fuel) - January 26, 2006.
2. Calculated from fuel use of 22.5 gal/hr, fuel density of 7.05 lb/gal and 15 ppmw of sulfur.
3. Based on CCAR General Reporting Protocol (version 3.0, April 2008) Table C.6 emission factor for distallate oil of 10.15 kg/gal.
4. Based on CCAR General Reporting Protocol (version 3.0, April 2008) Table C.7 emission factor for distallate oil of 0.0003 kg CH4 /gal and 0.0001 kg N2O/gal.

Fuel usage is	22.5	Gal/hr	0.0225	1000 Gal/hr
	540	Gal/day	0.54	1000 Gal/day
	1125	Gal/yr	1.125	1000 Gal/yr

Pollutant	Emission Factor lb/1000 gallons	Emissions lb/hr	lb/day	lb/yr
Benzene	0.1863	0.0042	0.101	0.21
Formaldehyde	1.7261	0.039	0.93	1.9
PAHs - Naphthalene	0.0559	0.00126	0.030	0.063
Naphthalene	0.0197	0.00044	0.0106	0.022
Acetaldehyde	0.7833	0.018	0.42	0.88
Acrolein	0.0339	0.00076	0.018	0.038
1,3 Butadiene	0.2174	0.0049	0.117	0.24
Chlorobenzene	0.0002	0.0000045	0.000108	0.00023
Dioxins	ND	ND	ND	ND
Furans	ND	ND	ND	ND
Propylene	0.467	0.0105	0.25	0.53
Hexane	0.0269	0.00061	0.0145	0.030
Toluene	0.1054	0.0024	0.057	0.119
Xylenes	0.0424	0.00095	0.023	0.048
Ethyl Benzene	0.0109	0.00025	0.0059	0.0123
Hydrogen Chloride	0.1863	0.0042	0.101	0.21
Arsenic	0.0016	0.000036	0.00086	0.0018
Beryllium	ND	ND	ND	ND
Cadmium	0.0015	0.000034	0.00081	0.0017
Total Chromium	0.0006	0.0000135	0.00032	0.00068
Hexavalent Chromium	0.0001	0.0000023	0.000054	0.000113
Copper	0.0041	0.000092	0.0022	0.0046
Lead	0.0083	0.00019	0.0045	0.0093
Manganese	0.0031	0.000070	0.00167	0.0035
Mercury	0.002	0.000045	0.00108	0.0023
Nickel	0.0039	0.000088	0.0021	0.0044
Selenium	0.0022	0.000050	0.00119	0.0025
Zinc	0.0224	0.00050	0.0121	0.025
			Total (lb/yr)	4.4

Emission Factor Source - Ventura County APCD AB-2588 Combustion Emission Factors, dated May 17, 2001

GWF Henrietta Combined Cycle Power Plant
Table C2.7
Summary of Auxiliary Boiler Emissions - Criteria, HAPS, and Greenhouse Gas Pollutants
October 2008

Operating Data

Annual Operating Hours	4000	
Daily Operating Hours	24	
Fuel Heat content (HHV)	1,005	Btu/scf
Fuel Heat content (LHV)	906	Btu/scf
Fuel S Content	0.25	gr/100dscf
Heat Input	42.0	MMBTU/hr
Fuel Input	0.0463	MMscf/hr

Emissions Data

	Emission	Hourly Emissions		Daily	Annual	Annual
	Factor (lb/MMBtu)	(lb/hr)	g/s	g/s	g/s	(ton/yr)
NOx (lb/MMBTU)	0.0073	0.306	0.039	0.039	0.018	0.61
CO (lb/MMBTU)	0.03697	1.553	0.196	0.196	0.089	3.11
VOC (lb/MMBTU)	0.005	0.210	0.026	0.026	0.012	0.42
SOx (as SO2) (lb/MMBTU)	0.0006	0.025	0.0032	0.0032	0.0015	0.050
PM10 (lb/MMBTU)	0.01	0.294	0.037	0.037	0.017	0.59

Note: Emission factors based on vendor (Rentech) data.

			Annual
			(metric ton/yr)
CO2 (kg/MMBtu)	53.06	29.24	8914.08
CH4 (kg/MMBtu)	0.0059	0.55	0.9912
N2O (kg/MMBtu)	0.0001	0.01	0.0168

CO2 emission factor from CCAR General Reporting Protocol (version 3.0, April 2008) Table C.6

CH4 and N2O emission factors from CCAR General Reporting Protocol (version 3.0, April 2008) Table C.7.

Auxiliary Boiler HAP Emission Calculations

Daily Operating Hours	24	
Annual Operating Hours	4,000	
Fuel Usage	0.0463	MMscf/hr

HAP

	Emission Factor Lb/MMSCF	Lb/Hr	Lb/Day	TPY
benzene (1)	0.00431	0.0002	0.005	0.0004
formaldehyde (1)	0.0221	0.0010	0.025	0.002
acetaldehyde (1)	0.00887	0.0004	0.010	0.001
toluene (2)	0.0034	0.0002	0.004	0.0003
Copper (2)	0.00085	0.0000	0.001	0.00008
Nickel (2)	0.0021	0.0001	0.002	0.0002
			Total (ton/yr)	0.0039

(1) Source - CATEF, Emission Factors for Natural Gas Fired Boiler, Website Accessed May 19, 2008
(2) Source - AP-42, Tables 1.4-3 and 1.4-4, revised 7/98. Use of only C or better emission factors.

GWF Henrietta Combined Cycle Power Plant
Table C2.8
Summary of Emergency Backup Generator Emissions - Criteria, HAPS, and Greenhouse Gas Pollutants
October 2008

Given: Existing 300 kW electric generator powered by a 471 HP Caterpiller Model 3456 DI TA AA diesel-fired emergency generator (Assume Tier 2)

Assume: Engine operates a maximum of 24 hours per day/50 hours per year for maintenance and reliability testing.

Fraction of Hour Operated:	1	(hourly emission rate assumes a maximum of 60 minutes of operation per hour)
Max Hours/Day	24	
Total Hours/Year	50	
Rated Horsepower	471	
Max Hourly Fuel usage:	22.3 Gal/hr	(engine manufacturer data)
Hourly Fuel Use:	22.3 Gal/hr	(assumes engine is operated for one hour)
	535.2 Gal/day	(assumes engine is operated 24 hours per day)
	1115 Gal/yr	(assumes 50 hours per year)

Engine Data Source - existing SJVAPCD operating permit for similar engine at another GWF facility (expiration date: 6/30/2009)
Maximum fuel usage based on the engine cut sheet on file with GWF
(phone conversation with Peter Lai on 05/28/2008 - 100% Load = 22.3 gph; 75% Load = 17.3 gph; 50% Load = 12.7 gph)

Pollutant	Emission Factor[1]	Emissions		
	Grams/Brake-Horsepower-Hour	lb/hr	lb/day	lb/yr
Hydrocarbons	0.04	0.042	1.0	2.1
Oxides of Nitrogen	4.69	4.87	117	243
Carbon Monoxide	0.12	0.12	3.0	6.2
Particulates	0.029	0.030	0.72	1.5
Sulfur Dioxide[2]	-	0.0047	0.11	0.236
	kg/gal	**lb/hr**	**lb/day**	**metric tons/yr**
Carbon Dioxide[3]	10.15	499	11976	11
Methane[4]	0.0003	0.015	0.35	0.0003
Nitrous Oxide[4]	0.0001	0.005	0.12	0.00011

1. Emission factors from the SJVAPCD operating permit. (Expiration Date: 6/30/2009).
2. Calculated from fuel use of 22.3 gal/hr, fuel density of 7.05 lb/gal, fraction of hour operated, and 15 ppmw of sulfur.
3. Based on CCAR General Reporting Protocol (version 3.0, April 2008) Table C.6 emission factor for distallate oil of 10.15 kg/gal.
4. Based on CCAR General Reporting Protocol (version 3.0, April 2008) Table C.7 emission factor for distallate oil of 0.0003 kg CH4 /gal and 0.0001 kg N2O/gal.

Hourly Fuel Use:	22.3 Gal/hr	0.0223 1000 Gal/hr
	22.3 Gal/day	0.0223 1000 Gal/day
	1115 Gal/yr	1.115 1000 Gal/yr

Pollutant	Emission Factor lb/1000 gallons	Emissions lb/hr	lb/day	lb/yr
Benzene	0.1863	0.0042	0.0042	0.21
Formaldehyde	1.7261	0.038	0.038	1.9
PAHs - Naphthalene	0.0559	0.0012	0.0012	0.062
Naphthalene	0.0197	0.00044	0.00044	0.022
Acetaldehyde	0.7833	0.017	0.017	0.87
Acrolein	0.0339	0.0008	0.0008	0.038
1,3 Butadiene	0.2174	0.0048	0.0048	0.24
Chlorobenzene	0.0002	0.0000045	0.0000045	0.00022
Dioxins	ND	ND	ND	ND
Furans	ND	ND	ND	ND
Propylene	0.467	0.010	0.010	0.52
Hexane	0.0269	0.00060	0.00060	0.030
Toluene	0.1054	0.0024	0.0024	0.12
Xylenes	0.0424	0.0009	0.0009	0.047
Ethyl Benzene	0.0109	0.0002	0.0002	0.012
Hydrogen Chloride	0.1863	0.0042	0.0042	0.21
Arsenic	0.0016	0.000036	0.000036	0.0018
Beryllium	ND	ND	ND	ND
Cadmium	0.0015	0.000033	0.000033	0.0017
Total Chromium	0.0006	0.000013	0.000013	0.00067
Hexavalent Chromium	0.0001	0.0000022	0.0000022	0.00011
Copper	0.0041	0.000091	0.000091	0.0046
Lead	0.0083	0.00019	0.00019	0.0093
Manganese	0.0031	0.000069	0.000069	0.0035
Mercury	0.002	0.000045	0.000045	0.0022
Nickel	0.0039	0.000087	0.000087	0.0043
Selenium	0.0022	0.000049	0.000049	0.0025
Zinc	0.0224	0.00050	0.00050	0.0250
			Total (lb/yr)	4.4

Emission Factor Source - Ventura County APCD AB-2588 Combustion Emission Factors, dated May 17, 2001

GWF Henrietta Combined Cycle Power Plant
Table C2.9
WSAC Cooling Tower Emissions
October 2008

Calculation of Wet SAC Emissions

		Source
Water Flow Rate, lbm/hr	152,622	Calculated
Water Flow Rate, gal/min	305	Niagara Proposal Estimate - WS08-110
Drift Rate, % of Recirculation Rate	0.005	Niagara Proposal Estimate - WS08-110
Drift, lbm water/hr	7.6	Calculated
TDS level, ppm (based on 5 COC)	1100	Email confirmation from GWF-08/20/2008
Annual Hours of Operation (hrs/yr)	850	Email confirmation from GWF-08/20/2008
PM10, lb/hr	0.0084	Calculated
PM10, lb/day	0.201	Calculated
PM10, tpy	0.0036	Calculated
Exhaust Gas Temperature (F)	85	Niagara Proposal Estimate - WS08-110
Exhaust Gas Mass Flow Rate (lb/hr)	107,000	Niagara Proposal Estimate - WS08-110
Design Heat Load (Btu/hr)	1,605,000	Niagara Proposal Estimate - WS08-110
Liquid to Gas Mass Flow Ratio	0.0160	Calculated

GWF Henrietta Combined Cycle Power Plant
Table C2.10
Facility Wide Greenhouse Gas Emission Summary
October 2008

Source	Emissions (Metric tons per year)			
	CO_2	CH_4	N_2O	CO_2e
Turbines	421,624	47	1	422,855
Auxiliary Boiler	8,914	0.99	0.0168	8,940
Fire Pump	11	0.00034	0.00011	11
Emergency Generator	11	0.00033	0.00011	11
Total	430,561	48	1	431,818

CO_2 Equivalent Emissions (metric tons/year) =[CO_2 Emissions] + [CH_4 Emissions x CH_4 GWP] + [NO_2 Emissions x NO_2 GWP]

Global Warming Potential

CH_4	21
N_2O	310

Reference: Intergovernmental Panel on Climate Change, Second Assessment Report (SAR) (IPCC, 1996).

GWF Henrietta Combined Cycle Power Plant
Table C2.11
Facility Wide Maximum Natural Gas Fuel Use
October 2008

Total annual heat input per unit			
	Auxiliary Boiler	42	MMBtu/Hr
	Turbine	465	MMBtu/Hr
Hours/Year			
	Turbine	8541	(includes startup and shutdowns)
	Auxiliary Boiler	4000	

Max Fuel Use	**Turbine (per unit)**	**Auxiliary Boiler**	**Total All Units**
Per Hour (MMBtu)	465	42	972
Per Day (MMBtu)	11,165	1,008	23,338
Per Year (MMBtu)	3,973,087	168,000	8,114,174

Maximum daily fuel use is based on the maximum rated heat capacity multiplied by 24 hours/day

Attachment C3
Dispersion Modeling Summary

ATTACHMENT C3

Dispersion Modeling Summary

Tables presented in this Attachment are as follows:

GWF Henrietta Combined Cycle Power Plant
Table C3-1
Commissioning Source Parameters for AERMOD Input
October 2008

Point Sources

Case	Source Name	Easting (X)	Northing (Y)	Base Elevation	Stack Height	Temperature	Exit Velocity	Stack Diameter	NO_2		CO	
		(m)	(m)	(m)	(m)	(K)	(m/s)	(m)	(g/s)	(lb/hr)	(g/s)	(lb/hr)
2	OTSG1	239058	4014261.6	68.5	27.89	723.15	29.26	2.93	6.55	52.0	2.63	20.9
	OTSG2	239093.1	4014260.5	68.5	27.89	723.15	29.26	2.93	6.55	52.0	2.63	20.9
3	OTSG1	239058	4014261.6	68.5	27.89	723.15	29.26	2.93	4.91	39.0	2.29	18.2
	OTSG2	239093.1	4014260.5	68.5	27.89	723.15	29.26	2.93	4.91	39.0	2.29	18.2
4	OTSG1	239058	4014261.6	68.5	27.89	412.59	21.64	2.93	5.64	44.8	5.10	40.5
	OTSG2	239093.1	4014260.5	68.5	27.89	412.59	21.64	2.93	5.64	44.8	5.10	40.5
5	OTSG1	239058	4014261.6	68.5	27.89	412.59	21.64	2.93	5.64	44.8	5.10	40.5
	OTSG2	239093.1	4014260.5	68.5	27.89	412.59	21.64	2.93	5.64	44.8	5.10	40.5

GWF Henrietta Combined Cycle Power Plant
Table C3-2
Commissioning Modeling Results Summary
October 2008

Case	Source	NO_2 (µg/m^3)	CO (µg/m^3)	
		1-hr	1-hr	8-hr
2	ALL	-	-	-
2	OTSG1	20.375	8.189	3.730
2	OTSG2	20.448	8.218	3.738
3	ALL	29.953	13.978	6.461
3	OTSG1	-	-	-
3	OTSG2	-	-	-
4	ALL	-	-	-
4	OTSG1	29.239	26.432	16.375
4	OTSG2	29.183	26.382	16.467
5	ALL	57.048	51.573	32.308
5	OTSG1	-	-	-
5	OTSG2	-	-	-

GWF Henrietta Combined Cycle Power Plant
Table C3-3
Stack Parameters for AERMOD Input
October 2008

Point Sources

Case	Source ID	Source Description	Easting (X) (m)	Northing (Y) (m)	Base Elevation (m)	Stack Height (m)	Temperature (K)	Exit Velocity (m/s)	Stack Diameter (m)
SC-1	OTSG1	OTSG Stack	239058	4014261.6	68.5	27.89	691.48	42.37	2.93
SC-1	OTSG2	OTSG Stack	239093.1	4014260.5	68.5	27.89	691.48	42.37	2.93
SC-1	WSAC1	WSAC Fan	239139.25	4014289.75	68.5	2.48	302.59	7.89	1.05
SC-1	WSAC2	WSAC Fan	239141.42	4014289.75	68.5	2.48	302.59	7.89	1.05
SC-1	WSAC3	WSAC Fan	239143.61	4014289.75	68.5	2.48	302.59	7.89	1.05
SC-1	AUXBOIL	Auxiliary Boiler	239141.06	4014283.25	68.5	9.14	422.04	16.68	0.51
SC-1	EGEN	Emergency Generator	239087.89	4014309.25	68.5	3.56	696.48	69.52	0.15
SC-1	FIREPUMP	Diesel Fire Pump Engine	239131.55	4014277.75	68.5	4.27	745.93	74.54	0.15
SC-2	OTSG1	OTSG Stack	239058	4014261.6	68.5	27.89	662.04	30.78	2.93
SC-2	OTSG2	OTSG Stack	239093.1	4014260.5	68.5	27.89	662.04	30.78	2.93
SC-2	WSAC1	WSAC Fan	239139.25	4014289.75	68.5	2.48	302.59	7.89	1.05
SC-2	WSAC2	WSAC Fan	239141.42	4014289.75	68.5	2.48	302.59	7.89	1.05
SC-2	WSAC3	WSAC Fan	239143.61	4014289.75	68.5	2.48	302.59	7.89	1.05
SC-2	AUXBOIL	Auxiliary Boiler	239141.06	4014283.25	68.5	9.14	422.04	16.68	0.51
SC-2	EGEN	Emergency Generator	239087.89	4014309.25	68.5	3.56	696.48	69.52	0.15
SC-2	FIREPUMP	Diesel Fire Pump Engine	239131.55	4014277.75	68.5	4.27	745.93	74.54	0.15
SC-3	OTSG1	OTSG Stack	239058	4014261.6	68.5	27.89	725.93	41.76	2.93
SC-3	OTSG2	OTSG Stack	239093.1	4014260.5	68.5	27.89	725.93	41.76	2.93
SC-3	WSAC1	WSAC Fan	239139.25	4014289.75	68.5	2.48	302.59	7.89	1.05
SC-3	WSAC2	WSAC Fan	239141.42	4014289.75	68.5	2.48	302.59	7.89	1.05
SC-3	WSAC3	WSAC Fan	239143.61	4014289.75	68.5	2.48	302.59	7.89	1.05
SC-3	AUXBOIL	Auxiliary Boiler	239141.06	4014283.25	68.5	9.14	422.04	16.68	0.51
SC-3	EGEN	Emergency Generator	239087.89	4014309.25	68.5	3.56	696.48	69.52	0.15
SC-3	FIREPUMP	Diesel Fire Pump Engine	239131.55	4014277.75	68.5	4.27	745.93	74.54	0.15
SC-4	OTSG1	OTSG Stack	239058	4014261.6	68.5	27.89	693.71	31.39	2.93
SC-4	OTSG2	OTSG Stack	239093.1	4014260.5	68.5	27.89	693.71	31.39	2.93
SC-4	WSAC1	WSAC Fan	239139.25	4014289.75	68.5	2.48	302.59	7.89	1.05
SC-4	WSAC2	WSAC Fan	239141.42	4014289.75	68.5	2.48	302.59	7.89	1.05
SC-4	WSAC3	WSAC Fan	239143.61	4014289.75	68.5	2.48	302.59	7.89	1.05
SC-4	AUXBOIL	Auxiliary Boiler	239141.06	4014283.25	68.5	9.14	422.04	16.68	0.51
SC-4	EGEN	Emergency Generator	239087.89	4014309.25	68.5	3.56	696.48	69.52	0.15
SC-4	FIREPUMP	Diesel Fire Pump Engine	239131.55	4014277.75	68.5	4.27	745.93	74.54	0.15
SC-5	OTSG1	OTSG Stack	239058	4014261.6	68.5	27.89	740.37	38.71	2.93
SC-5	OTSG2	OTSG Stack	239093.1	4014260.5	68.5	27.89	740.37	38.71	2.93
SC-5	WSAC1	WSAC Fan	239139.25	4014289.75	68.5	2.48	302.59	7.89	1.05
SC-5	WSAC2	WSAC Fan	239141.42	4014289.75	68.5	2.48	302.59	7.89	1.05
SC-5	WSAC3	WSAC Fan	239143.61	4014289.75	68.5	2.48	302.59	7.89	1.05
SC-5	AUXBOIL	Auxiliary Boiler	239141.06	4014283.25	68.5	9.14	422.04	16.68	0.51
SC-5	EGEN	Emergency Generator	239087.89	4014309.25	68.5	3.56	696.48	69.52	0.15
SC-5	FIREPUMP	Diesel Fire Pump Engine	239131.55	4014277.75	68.5	4.27	745.93	74.54	0.15
SC-6	OTSG1	OTSG Stack	239058	4014261.6	68.5	27.89	723.15	29.26	2.93
SC-6	OTSG2	OTSG Stack	239093.1	4014260.5	68.5	27.89	723.15	29.26	2.93
SC-6	WSAC1	WSAC Fan	239139.25	4014289.75	68.5	2.48	302.59	7.89	1.05
SC-6	WSAC2	WSAC Fan	239141.42	4014289.75	68.5	2.48	302.59	7.89	1.05
SC-6	WSAC3	WSAC Fan	239143.61	4014289.75	68.5	2.48	302.59	7.89	1.05
SC-6	AUXBOIL	Auxiliary Boiler	239141.06	4014283.25	68.5	9.14	422.04	16.68	0.51
SC-6	EGEN	Emergency Generator	239087.89	4014309.25	68.5	3.56	696.48	69.52	0.15
SC-6	FIREPUMP	Diesel Fire Pump Engine	239131.55	4014277.75	68.5	4.27	745.93	74.54	0.15

GWF Henrietta Combined Cycle Power Plant
Table C3-3
Stack Parameters for AERMOD Input
October 2008

Point Sources

Case	Source ID	Source Description	Easting (X) (m)	Northing (Y) (m)	Base Elevation (m)	Stack Height (m)	Temperature (K)	Exit Velocity (m/s)	Stack Diameter (m)
CC-1	OTSG1	OTSG Stack	239058	4014261.6	68.5	27.89	415.37	25.36	2.93
CC-1	OTSG2	OTSG Stack	239093.1	4014260.5	68.5	27.89	415.37	25.36	2.93
CC-1	WSAC1	WSAC Fan	239139.25	4014289.75	68.5	2.48	302.59	7.89	1.05
CC-1	WSAC2	WSAC Fan	239141.42	4014289.75	68.5	2.48	302.59	7.89	1.05
CC-1	WSAC3	WSAC Fan	239143.61	4014289.75	68.5	2.48	302.59	7.89	1.05
CC-1	AUXBOIL	Auxiliary Boiler	239141.06	4014283.25	68.5	9.14	422.04	16.68	0.51
CC-1	EGEN	Emergency Generator	239087.89	4014309.25	68.5	3.56	696.48	69.52	0.15
CC-1	FIREPUMP	Diesel Fire Pump Engine	239131.55	4014277.75	68.5	4.27	745.93	74.54	0.15
CC-2	OTSG1	OTSG Stack	239058	4014261.6	68.5	27.89	413.15	19.26	2.93
CC-2	OTSG2	OTSG Stack	239093.1	4014260.5	68.5	27.89	413.15	19.26	2.93
CC-2	WSAC1	WSAC Fan	239139.25	4014289.75	68.5	2.48	302.59	7.89	1.05
CC-2	WSAC2	WSAC Fan	239141.42	4014289.75	68.5	2.48	302.59	7.89	1.05
CC-2	WSAC3	WSAC Fan	239143.61	4014289.75	68.5	2.48	302.59	7.89	1.05
CC-2	AUXBOIL	Auxiliary Boiler	239141.06	4014283.25	68.5	9.14	422.04	16.68	0.51
CC-2	EGEN	Emergency Generator	239087.89	4014309.25	68.5	3.56	696.48	69.52	0.15
CC-2	FIREPUMP	Diesel Fire Pump Engine	239131.55	4014277.75	68.5	4.27	745.93	74.54	0.15
CC-3	OTSG1	OTSG Stack	239058	4014261.6	68.5	27.89	406.48	23.32	2.93
CC-3	OTSG2	OTSG Stack	239093.1	4014260.5	68.5	27.89	406.48	23.32	2.93
CC-3	WSAC1	WSAC Fan	239139.25	4014289.75	68.5	2.48	302.59	7.89	1.05
CC-3	WSAC2	WSAC Fan	239141.42	4014289.75	68.5	2.48	302.59	7.89	1.05
CC-3	WSAC3	WSAC Fan	239143.61	4014289.75	68.5	2.48	302.59	7.89	1.05
CC-3	AUXBOIL	Auxiliary Boiler	239141.06	4014283.25	68.5	9.14	422.04	16.68	0.51
CC-3	EGEN	Emergency Generator	239087.89	4014309.25	68.5	3.56	696.48	69.52	0.15
CC-3	FIREPUMP	Diesel Fire Pump Engine	239131.55	4014277.75	68.5	4.27	745.93	74.54	0.15
CC-4	OTSG1	OTSG Stack	239058	4014261.6	68.5	27.89	404.82	18.38	2.93
CC-4	OTSG2	OTSG Stack	239093.1	4014260.5	68.5	27.89	404.82	18.38	2.93
CC-4	WSAC1	WSAC Fan	239139.25	4014289.75	68.5	2.48	302.59	7.89	1.05
CC-4	WSAC2	WSAC Fan	239141.42	4014289.75	68.5	2.48	302.59	7.89	1.05
CC-4	WSAC3	WSAC Fan	239143.61	4014289.75	68.5	2.48	302.59	7.89	1.05
CC-4	AUXBOIL	Auxiliary Boiler	239141.06	4014283.25	68.5	9.14	422.04	16.68	0.51
CC-4	EGEN	Emergency Generator	239087.89	4014309.25	68.5	3.56	696.48	69.52	0.15
CC-4	FIREPUMP	Diesel Fire Pump Engine	239131.55	4014277.75	68.5	4.27	745.93	74.54	0.15
CC-5	OTSG1	OTSG Stack	239058	4014261.6	68.5	27.89	412.59	21.64	2.93
CC-5	OTSG2	OTSG Stack	239093.1	4014260.5	68.5	27.89	412.59	21.64	2.93
CC-5	WSAC1	WSAC Fan	239139.25	4014289.75	68.5	2.48	302.59	7.89	1.05
CC-5	WSAC2	WSAC Fan	239141.42	4014289.75	68.5	2.48	302.59	7.89	1.05
CC-5	WSAC3	WSAC Fan	239143.61	4014289.75	68.5	2.48	302.59	7.89	1.05
CC-5	AUXBOIL	Auxiliary Boiler	239141.06	4014283.25	68.5	9.14	422.04	16.68	0.51
CC-5	EGEN	Emergency Generator	239087.89	4014309.25	68.5	3.56	696.48	69.52	0.15
CC-5	FIREPUMP	Diesel Fire Pump Engine	239131.55	4014277.75	68.5	4.27	745.93	74.54	0.15
CC-6	OTSG1	OTSG Stack	239058	4014261.6	68.5	27.89	404.82	16.34	2.93
CC-6	OTSG2	OTSG Stack	239093.1	4014260.5	68.5	27.89	404.82	16.34	2.93
CC-6	WSAC1	WSAC Fan	239139.25	4014289.75	68.5	2.48	302.59	7.89	1.05
CC-6	WSAC2	WSAC Fan	239141.42	4014289.75	68.5	2.48	302.59	7.89	1.05
CC-6	WSAC3	WSAC Fan	239143.61	4014289.75	68.5	2.48	302.59	7.89	1.05
CC-6	AUXBOIL	Auxiliary Boiler	239141.06	4014283.25	68.5	9.14	422.04	16.68	0.51
CC-6	EGEN	Emergency Generator	239087.89	4014309.25	68.5	3.56	696.48	69.52	0.15
CC-6	FIREPUMP	Diesel Fire Pump Engine	239131.55	4014277.75	68.5	4.27	745.93	74.54	0.15

GWF Henrietta Combined Cycle Power Plant
Table C3-4
Building and Tank Parameters for AERMOD Input
October 2008

Building Name	Number of Tiers	Tier Number	Base Elevation (m)	Tier Height (m)	Number of Corners	Corner 1 East (X) (m)	Corner 1 North (Y) (m)	Corner 2 East (X) (m)	Corner 2 North (Y) (m)	Corner 3 East (X) (m)	Corner 3 North (Y) (m)	Corner 4 East (X) (m)	Corner 4 North (Y) (m)
OTSGB1	1	1	68.5	20.42	4	239055.7	4014269.5	239059.66	4014269.5	239059.66	4014252.82	239055.7	4014252.82
OTSGB2	1	1	68.5	20.42	4	239090.8	4014268.4	239094.76	4014268.4	239094.76	4014251.72	239090.8	4014251.72
ACC	1	1	79.3	11.78	4	239155.97	4014278.5	239192.546	4014278.5	239192.546	4014252.9	239155.97	4014252.9
AUXBOI	1	1	68.5	3.05	4	239139.44	4014284.25	239142.49	4014284.25	239142.49	4014278.15	239139.44	4014278.15
STG	1	1	72.5	3.96	4	239149.05	4014299.25	239153.622	4014299.25	239153.622	4014282.49	239149.05	4014282.49
WTREAT	1	1	68.5	6.10	4	239129.52	4014245.75	239152.38	4014245.75	239152.38	4014230.51	239129.52	4014230.51
LOS	1	1	68.5	2.74	4	239140.72	4014302.25	239144.99	4014302.25	239144.99	4014294.63	239140.72	4014294.63
WSAC	1	1	68.5	2.06	4	239137.84	4014290.75	239144.85	4014290.75	239144.85	4014288.31	239137.84	4014288.31
LOC	1	1	68.5	3.05	4	239139.45	4014294.5	239144.94	4014294.5	239144.94	4014292.06	239139.45	4014292.06

Tank Name	Base Elevation (m)	Center East (X) (m)	Center North (Y) (m)	Tank Height (m)	Tank Diameter (m)
FWTANK	68.5	239121.09	4014238.5	9.75	10.7
T-157	68.5	239121.45	4014297.5	9.83	12.2
T-118	68.5	239121.45	4014277.75	9.83	12.2

GWF Henrietta Combined Cycle Power Plant
Table C3-5
Operational Modeling Parameters - Emission Rates
October 2008

Emission Rates for 1-hr, 3-hr, 8-hr, and 24-hr Modeling (Simple Cycle)
All Cases

Source ID	NO_2		CO		SO_2		PM_{10}		$PM_{2.5}$	
	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)
OTSG1	1.611	12.8	1.296	10.3	0.042	0.330	0.277	2.200	0.277	2.200
OTSG2	1.611	12.8	1.296	10.3	0.042	0.330	0.277	2.200	0.277	2.200
WSAC1	--	--	--	--	--	--	3.53E-04	2.80E-03	3.53E-04	2.80E-03
WSAC2	--	--	--	--	--	--	3.53E-04	2.80E-03	3.53E-04	2.80E-03
WSAC3	--	--	--	--	--	--	3.53E-04	2.80E-03	3.53E-04	2.80E-03
AUXBOIL	0.039	0.306	0.196	1.553	0.003	0.025	3.70E-02	2.94E-01	3.70E-02	2.94E-01
EGEN	0.614	4.870	0.016	0.125	0.001	0.005	3.79E-03	3.01E-02	3.79E-03	3.01E-02
FIREPUMP	0.340	2.70	0.086	0.680	0.0006	0.0048	9.97E-03	7.91E-02	9.97E-03	7.91E-02

Emission Rates for 1-hr, 3-hr, 8-hr, and 24-hr Modeling (Combined Cycle)
All Cases

Source ID	NO_2		CO		SO_2		PM_{10}		$PM_{2.5}$	
	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)
OTSG1	1.611	12.8	1.159	9.2	0.042	0.330	0.277	2.200	0.277	2.200
OTSG2	1.611	12.8	1.159	9.2	0.042	0.330	0.277	2.200	0.277	2.200
WSAC1	--	--	--	--	--	--	3.53E-04	2.80E-03	3.53E-04	2.80E-03
WSAC2	--	--	--	--	--	--	3.53E-04	2.80E-03	3.53E-04	2.80E-03
WSAC3	--	--	--	--	--	--	3.53E-04	2.80E-03	3.53E-04	2.80E-03
AUXBOIL	0.039	0.306	0.196	1.553	0.0032	0.0252	3.70E-02	2.94E-01	3.70E-02	2.94E-01
EGEN	0.614	4.870	0.016	0.125	0.0006	0.0047	3.79E-03	3.01E-02	3.79E-03	3.01E-02
FIREPUMP	0.340	2.70	0.086	0.680	0.0006	0.0048	9.97E-03	7.91E-02	9.97E-03	7.91E-02

Emission Rates for Annual Modeling (Simple and Combined Cycle)
All Cases

Source ID	NO_2		SO_2		PM_{10}		$PM_{2.5}$	
	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)
OTSG1	0.554	4.40	0.040	0.316	0.269	2.136	0.269	2.136
OTSG2	0.554	4.40	0.040	0.316	0.269	2.136	0.269	2.136
WSAC1	--	--	--	--	3.42E-05	2.72E-04	3.42E-05	2.72E-04
WSAC2	--	--	--	--	3.42E-05	2.72E-04	3.42E-05	2.72E-04
WSAC3	--	--	--	--	3.42E-05	2.72E-04	3.42E-05	2.72E-04
AUXBOIL	0.018	0.14	0.0014	0.012	1.69E-02	1.34E-01	1.69E-02	1.34E-01
EGEN	0.0035	0.028	3.39E-06	2.69E-05	2.17E-05	1.72E-04	2.17E-05	1.72E-04
FIREPUMP	0.0019	0.015	3.42E-06	2.72E-05	5.69E-05	4.51E-04	5.69E-05	4.51E-04

GWF Henrietta Combined Cycle Power Plant

Table C3-6

Operational Modeling Results Summary

October 2008

Case	Source	NO_2 (µg/m^3)		CO (µg/m3)		SO_2 (µg/m3)				PM_{10} (µg/m3)		$PM_{2.5}$ (µg/m3)	
		1-hr	Annual	1-hr	8-hr	1-hr	3-hr	24-hr	Annual	24-hr	Annual	24-hr	Annual
SC-1	ALL	200.469	2.250	124.595	86.242	1.844	1.305	0.901	0.165	11.522	1.947	11.522	1.947
SC-1	OTSG	8.013	0.157	6.446	2.632	0.207	0.136	0.050	0.011	0.335	0.076	0.335	0.076
SC-1	OTSG1	4.054	0.079	3.261	1.327	0.105	0.069	0.025	0.006	0.168	0.038	0.168	0.038
SC-1	OTSG2	4.077	0.079	3.279	1.325	0.105	0.068	0.025	0.006	0.168	0.038	0.168	0.038
SC-1	WSAC	--	--	--	--	--	--	--	--	0.421	0.021	0.421	0.021
SC-1	WSAC1	--	--	--	--	--	--	--	--	0.137	0.007	0.137	0.007
SC-1	WSAC2	--	--	--	--	--	--	--	--	0.141	0.007	0.141	0.007
SC-1	WSAC3	--	--	--	--	--	--	--	--	0.145	0.007	0.145	0.007
SC-1	AUXBOIL	21.508	1.991	109.112	59.293	1.771	1.073	0.738	0.164	8.608	1.913	8.608	1.913
SC-1	EGEN	107.927	0.113	8.213	3.819	0.311	0.191	0.065	0.000	0.414	0.001	0.414	0.001
SC-1	FIREPUMP	160.342	0.189	54.573	30.286	0.382	0.247	0.143	0.000	2.369	0.006	2.369	0.006
SC-2	ALL	200.469	2.256	124.842	86.310	1.855	1.307	0.902	0.166	11.528	1.950	11.528	1.950
SC-2	OTSG	9.902	0.231	7.965	3.704	0.256	0.183	0.075	0.017	0.498	0.112	0.498	0.112
SC-2	OTSG1	5.051	0.116	4.063	1.864	0.130	0.092	0.038	0.008	0.251	0.056	0.251	0.056
SC-2	OTSG2	5.064	0.116	4.074	1.864	0.131	0.093	0.037	0.008	0.250	0.056	0.250	0.056
SC-2	WSAC	--	--	--	--	--	--	--	--	0.421	0.021	0.421	0.021
SC-2	WSAC1	--	--	--	--	--	--	--	--	0.137	0.007	0.137	0.007
SC-2	WSAC2	--	--	--	--	--	--	--	--	0.141	0.007	0.141	0.007
SC-2	WSAC3	--	--	--	--	--	--	--	--	0.145	0.007	0.145	0.007
SC-2	AUXBOIL	21.508	1.991	109.112	59.293	1.771	1.073	0.738	0.164	8.608	1.913	8.608	1.913
SC-2	EGEN	107.927	0.113	8.213	3.819	0.311	0.191	0.065	0.000	0.414	0.001	0.414	0.001
SC-2	FIREPUMP	160.342	0.189	54.573	30.286	0.382	0.247	0.143	0.000	2.369	0.006	2.369	0.006
SC-3	ALL	200.469	2.250	124.590	86.242	1.844	1.305	0.901	0.165	11.522	1.947	11.522	1.947
SC-3	OTSG	7.905	0.154	6.359	2.585	0.204	0.133	0.049	0.011	0.328	0.075	0.328	0.075
SC-3	OTSG1	4.003	0.078	3.220	1.303	0.103	0.067	0.025	0.006	0.165	0.038	0.165	0.038
SC-3	OTSG2	4.023	0.077	3.236	1.302	0.104	0.067	0.025	0.006	0.165	0.038	0.165	0.038
SC-3	WSAC	--	--	--	--	--	--	--	--	0.421	0.021	0.421	0.021
SC-3	WSAC1	--	--	--	--	--	--	--	--	0.137	0.007	0.137	0.007
SC-3	WSAC2	--	--	--	--	--	--	--	--	0.141	0.007	0.141	0.007
SC-3	WSAC3	--	--	--	--	--	--	--	--	0.145	0.007	0.145	0.007
SC-3	AUXBOIL	21.508	1.991	109.112	59.293	1.771	1.073	0.738	0.164	8.608	1.913	8.608	1.913
SC-3	EGEN	107.927	0.113	8.213	3.819	0.311	0.191	0.065	0.000	0.414	0.001	0.414	0.001
SC-3	FIREPUMP	160.342	0.189	54.573	30.286	0.382	0.247	0.143	0.000	2.369	0.006	2.369	0.006
SC-4	ALL	200.469	2.255	124.801	86.300	1.854	1.306	0.902	0.166	11.527	1.950	11.527	1.950
SC-4	OTSG	9.589	0.218	7.714	3.509	0.248	0.175	0.070	0.016	0.470	0.106	0.470	0.106
SC-4	OTSG1	4.901	0.110	3.943	1.761	0.127	0.088	0.035	0.008	0.236	0.053	0.236	0.053
SC-4	OTSG2	4.914	0.109	3.953	1.767	0.127	0.089	0.035	0.008	0.236	0.053	0.236	0.053
SC-4	WSAC	--	--	--	--	--	--	--	--	0.421	0.021	0.421	0.021
SC-4	WSAC1	--	--	--	--	--	--	--	--	0.137	0.007	0.137	0.007
SC-4	WSAC2	--	--	--	--	--	--	--	--	0.141	0.007	0.141	0.007
SC-4	WSAC3	--	--	--	--	--	--	--	--	0.145	0.007	0.145	0.007
SC-4	AUXBOIL	21.508	1.991	109.112	59.293	1.771	1.073	0.738	0.164	8.608	1.913	8.608	1.913
SC-4	EGEN	107.927	0.113	8.213	3.819	0.311	0.191	0.065	0.000	0.414	0.001	0.414	0.001
SC-4	FIREPUMP	160.342	0.189	54.573	30.286	0.382	0.247	0.143	0.000	2.369	0.006	2.369	0.006
SC-5	ALL	200.469	2.251	124.628	86.253	1.846	1.305	0.901	0.165	11.523	1.948	11.523	1.948
SC-5	OTSG	8.246	0.166	6.634	2.739	0.213	0.141	0.053	0.012	0.353	0.081	0.353	0.081
SC-5	OTSG1	4.171	0.083	3.355	1.382	0.108	0.071	0.027	0.006	0.177	0.041	0.177	0.041
SC-5	OTSG2	4.192	0.083	3.372	1.379	0.108	0.071	0.027	0.006	0.178	0.040	0.178	0.040
SC-5	WSAC	--	--	--	--	--	--	--	--	0.421	0.021	0.421	0.021
SC-5	WSAC1	--	--	--	--	--	--	--	--	0.137	0.007	0.137	0.007
SC-5	WSAC2	--	--	--	--	--	--	--	--	0.141	0.007	0.141	0.007
SC-5	WSAC3	--	--	--	--	--	--	--	--	0.145	0.007	0.145	0.007
SC-5	AUXBOIL	21.508	1.991	109.112	59.293	1.771	1.073	0.738	0.164	8.608	1.913	8.608	1.913
SC-5	EGEN	107.927	0.113	8.213	3.819	0.311	0.191	0.065	0.000	0.414	0.001	0.414	0.001
SC-5	FIREPUMP	160.342	0.189	54.573	30.286	0.382	0.247	0.143	0.000	2.369	0.006	2.369	0.006
SC-6	ALL	200.469	2.257	124.843	86.312	1.855	1.307	0.902	0.166	11.528	1.950	11.528	1.950
SC-6	OTSG	9.818	0.229	7.898	3.651	0.253	0.181	0.074	0.016	0.492	0.111	0.492	0.111
SC-6	OTSG1	5.009	0.115	4.029	1.835	0.129	0.091	0.037	0.008	0.248	0.056	0.248	0.056
SC-6	OTSG2	5.027	0.115	4.044	1.839	0.130	0.092	0.037	0.008	0.247	0.056	0.247	0.056
SC-6	WSAC	--	--	--	--	--	--	--	--	0.421	0.021	0.421	0.021
SC-6	WSAC1	--	--	--	--	--	--	--	--	0.137	0.007	0.137	0.007
SC-6	WSAC2	--	--	--	--	--	--	--	--	0.141	0.007	0.141	0.007
SC-6	WSAC3	--	--	--	--	--	--	--	--	0.145	0.007	0.145	0.007
SC-6	AUXBOIL	21.508	1.991	109.112	59.293	1.771	1.073	0.738	0.164	8.608	1.913	8.608	1.913
SC-6	EGEN	107.927	0.113	8.213	3.819	0.311	0.191	0.065	0.000	0.414	0.001	0.414	0.001
SC-6	FIREPUMP	160.342	0.189	54.573	30.286	0.382	0.247	0.143	0.000	2.369	0.006	2.369	0.006

GWF Henrietta Combined Cycle Power Plant
Table C3-6
Operational Modeling Results Summary
October 2008

Case	Source	NO_2 (µg/m^3)		CO (µg/m3)		SO_2 (µg/m3)				PM_{10} (µg/m3)		$PM_{2.5}$ (µg/m3)	
		1-hr	Annual	1-hr	8-hr	1-hr	3-hr	24-hr	Annual	24-hr	Annual	24-hr	Annual
CC-1	ALL	200.469	2.274	125.611	86.484	1.878	1.311	0.904	0.167	11.542	1.959	11.542	1.959
CC-1	OTSG	14.478	0.504	10.420	6.605	0.374	0.330	0.158	0.036	1.050	0.245	1.050	0.245
CC-1	OTSG1	7.415	0.253	5.336	3.338	0.191	0.169	0.079	0.018	0.529	0.123	0.529	0.123
CC-1	OTSG2	7.381	0.254	5.312	3.336	0.191	0.168	0.080	0.018	0.530	0.123	0.530	0.123
CC-1	WSAC	--	--	--	--	--	--	--	--	0.421	0.021	0.421	0.021
CC-1	WSAC1	--	--	--	--	--	--	--	--	0.137	0.007	0.137	0.007
CC-1	WSAC2	--	--	--	--	--	--	--	--	0.141	0.007	0.141	0.007
CC-1	WSAC3	--	--	--	--	--	--	--	--	0.145	0.007	0.145	0.007
CC-1	AUXBOIL	21.508	1.991	109.112	59.293	1.771	1.073	0.738	0.164	8.608	1.913	8.608	1.913
CC-1	EGEN	107.927	0.113	8.213	3.819	0.311	0.191	0.065	0.000	0.414	0.001	0.414	0.001
CC-1	FIREPUMP	160.342	0.189	54.573	30.286	0.382	0.247	0.143	0.000	2.369	0.006	2.369	0.006
CC-2	ALL	200.469	2.288	126.257	86.657	1.893	1.315	0.906	0.168	11.554	1.966	11.554	1.966
CC-2	OTSG	17.933	0.659	12.906	7.858	0.463	0.389	0.197	0.047	1.310	0.320	1.310	0.320
CC-2	OTSG1	9.215	0.332	6.632	3.997	0.238	0.198	0.099	0.024	0.663	0.161	0.663	0.161
CC-2	OTSG2	9.137	0.332	6.576	3.994	0.236	0.197	0.100	0.024	0.665	0.161	0.665	0.161
CC-2	WSAC	--	--	--	--	--	--	--	--	0.421	0.021	0.421	0.021
CC-2	WSAC1	--	--	--	--	--	--	--	--	0.137	0.007	0.137	0.007
CC-2	WSAC2	--	--	--	--	--	--	--	--	0.141	0.007	0.141	0.007
CC-2	WSAC3	--	--	--	--	--	--	--	--	0.145	0.007	0.145	0.007
CC-2	AUXBOIL	21.508	1.991	109.112	59.293	1.771	1.073	0.738	0.164	8.608	1.913	8.608	1.913
CC-2	EGEN	107.927	0.113	8.213	3.819	0.311	0.191	0.065	0.000	0.414	0.001	0.414	0.001
CC-2	FIREPUMP	160.342	0.189	54.573	30.286	0.382	0.247	0.143	0.000	2.369	0.006	2.369	0.006
CC-3	ALL	200.469	2.279	125.860	86.545	1.884	1.313	0.905	0.168	11.547	1.962	11.547	1.962
CC-3	OTSG	15.347	0.571	11.045	7.172	0.396	0.356	0.175	0.041	1.165	0.278	1.165	0.278
CC-3	OTSG1	7.853	0.287	5.652	3.644	0.203	0.181	0.088	0.021	0.589	0.139	0.589	0.139
CC-3	OTSG2	7.873	0.287	5.666	3.662	0.203	0.181	0.088	0.021	0.588	0.140	0.588	0.140
CC-3	WSAC	--	--	--	--	--	--	--	--	0.421	0.021	0.421	0.021
CC-3	WSAC1	--	--	--	--	--	--	--	--	0.137	0.007	0.137	0.007
CC-3	WSAC2	--	--	--	--	--	--	--	--	0.141	0.007	0.141	0.007
CC-3	WSAC3	--	--	--	--	--	--	--	--	0.145	0.007	0.145	0.007
CC-3	AUXBOIL	21.508	1.991	109.112	59.293	1.771	1.073	0.738	0.164	8.608	1.913	8.608	1.913
CC-3	EGEN	107.927	0.113	8.213	3.819	0.311	0.191	0.065	0.000	0.414	0.001	0.414	0.001
CC-3	FIREPUMP	160.342	0.189	54.573	30.286	0.382	0.247	0.143	0.000	2.369	0.006	2.369	0.006
CC-4	ALL	200.721	2.293	126.507	86.713	1.898	1.316	0.906	0.168	11.558	1.968	11.558	1.968
CC-4	OTSG	18.821	0.716	13.545	8.305	0.486	0.410	0.210	0.051	1.402	0.348	1.402	0.348
CC-4	OTSG1	9.705	0.361	6.984	4.246	0.251	0.209	0.107	0.026	0.711	0.176	0.711	0.176
CC-4	OTSG2	9.749	0.361	7.016	4.239	0.252	0.208	0.107	0.026	0.710	0.176	0.710	0.176
CC-4	WSAC	--	--	--	--	--	--	--	--	0.421	0.021	0.421	0.021
CC-4	WSAC1	--	--	--	--	--	--	--	--	0.137	0.007	0.137	0.007
CC-4	WSAC2	--	--	--	--	--	--	--	--	0.141	0.007	0.141	0.007
CC-4	WSAC3	--	--	--	--	--	--	--	--	0.145	0.007	0.145	0.007
CC-4	AUXBOIL	21.508	1.991	109.112	59.293	1.771	1.073	0.738	0.164	8.608	1.913	8.608	1.913
CC-4	EGEN	107.927	0.113	8.213	3.819	0.311	0.191	0.065	0.000	0.414	0.001	0.414	0.001
CC-4	FIREPUMP	160.342	0.189	54.573	30.286	0.382	0.247	0.143	0.000	2.369	0.006	2.369	0.006
CC-5	ALL	200.469	2.282	125.976	86.580	1.887	1.313	0.905	0.168	11.549	1.963	11.549	1.963
CC-5	OTSG	16.278	0.594	11.715	7.339	0.420	0.363	0.180	0.043	1.200	0.289	1.200	0.289
CC-5	OTSG1	8.343	0.299	6.004	3.720	0.215	0.185	0.091	0.021	0.610	0.145	0.610	0.145
CC-5	OTSG2	8.327	0.299	5.993	3.741	0.215	0.185	0.091	0.021	0.610	0.145	0.610	0.145
CC-5	WSAC	--	--	--	--	--	--	--	--	0.421	0.021	0.421	0.021
CC-5	WSAC1	--	--	--	--	--	--	--	--	0.137	0.007	0.137	0.007
CC-5	WSAC2	--	--	--	--	--	--	--	--	0.141	0.007	0.141	0.007
CC-5	WSAC3	--	--	--	--	--	--	--	--	0.145	0.007	0.145	0.007
CC-5	AUXBOIL	21.508	1.991	109.112	59.293	1.771	1.073	0.738	0.164	8.608	1.913	8.608	1.913
CC-5	EGEN	107.927	0.113	8.213	3.819	0.311	0.191	0.065	0.000	0.414	0.001	0.414	0.001
CC-5	FIREPUMP	160.342	0.189	54.573	30.286	0.382	0.247	0.143	0.000	2.369	0.006	2.369	0.006
CC-6	ALL	201.355	2.301	126.960	86.810	1.906	1.317	0.907	0.169	11.564	1.972	11.564	1.972
CC-6	OTSG	20.611	0.794	14.833	8.953	0.532	0.444	0.230	0.057	1.534	0.386	1.534	0.386
CC-6	OTSG1	10.635	0.400	7.654	4.584	0.275	0.227	0.117	0.029	0.778	0.194	0.778	0.194
CC-6	OTSG2	10.759	0.401	7.743	4.594	0.278	0.229	0.116	0.029	0.774	0.195	0.774	0.195
CC-6	WSAC	--	--	--	--	--	--	--	--	0.421	0.021	0.421	0.021
CC-6	WSAC1	--	--	--	--	--	--	--	--	0.137	0.007	0.137	0.007
CC-6	WSAC2	--	--	--	--	--	--	--	--	0.141	0.007	0.141	0.007
CC-6	WSAC3	--	--	--	--	--	--	--	--	0.145	0.007	0.145	0.007
CC-6	AUXBOIL	21.508	1.991	109.112	59.293	1.771	1.073	0.738	0.164	8.608	1.913	8.608	1.913
CC-6	EGEN	107.927	0.113	8.213	3.819	0.311	0.191	0.065	0.000	0.414	0.001	0.414	0.001
CC-6	FIREPUMP	160.342	0.189	54.573	30.286	0.382	0.247	0.143	0.000	2.369	0.006	2.369	0.006

GWF Henrietta Combined Cycle Power Plant
Table C3-7
Construction Source Parameters for AERMOD Input
October 2008

Point Sources

Source Name	Easting (X) (m)	Northing (Y) (m)	Base Elevation (m)	Stack Height (m)	Temperature (K)	Exit Velocity (m/s)	Stack Diameter (m)
EXHAUST1	239082	4014268.33	68.5	3	533	18	0.127
EXHAUST2	239144	4014268.33	68.5	3	533	18	0.127
EXHAUST3	239082	4014318.67	68.5	3	533	18	0.127
EXHAUST4	239144	4014318.67	68.5	3	533	18	0.127

Area Sources

Source ID	Easting (X) (m)	Northing (Y) (m)	Base Elevation (m)	Release Height (m)	Length (m)	Width (m)	Angle from North
FUGITIVE	239030	4014228	68.5	2	166	131	-

GWF Henrietta Combined Cycle Power Plant

Table C3-8

Construction Modeling Parameters - Emission Rates

October 2008

Emission Rates for 1-hr, 3-hr, 8-hr, and 24-hr Modeling

Source ID	NO_2		CO		SO_2		PM_{10}		$PM_{2.5}$	
	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)
EXHAUST1	0.260	2.067	0.150	1.191	2.95E-04	2.34E-03	0.018	0.146	0.016	0.130
EXHAUST2	0.260	2.067	0.150	1.191	2.95E-04	2.34E-03	0.018	0.146	0.016	0.130
EXHAUST3	0.260	2.067	0.150	1.191	2.95E-04	2.34E-03	0.018	0.146	0.016	0.130
EXHAUST4	0.260	2.067	0.150	1.191	2.95E-04	2.34E-03	0.018	0.146	0.016	0.130
FUGITIVE	--	--	--	--	--	--	0.147	1.165	0.018	0.140

Emission Rates for Annual Modeling

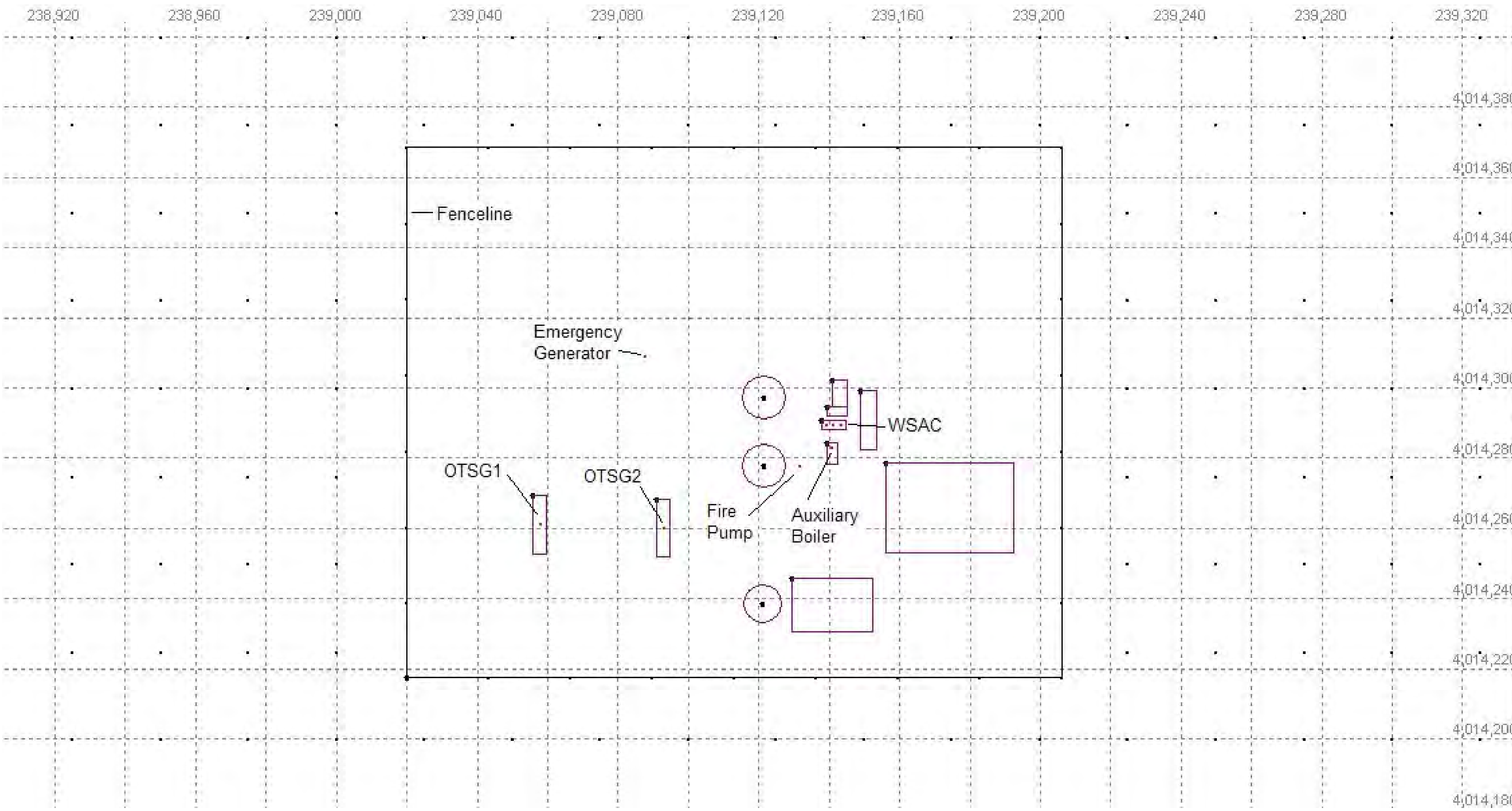
Source ID	NO_2		CO		SO_2		PM_{10}		$PM_{2.5}$	
	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)
EXHAUST1	0.075	0.599	0.044	0.350	8.40E-05	6.67E-04	0.005	0.043	0.005	0.038
EXHAUST2	0.075	0.599	0.044	0.350	8.40E-05	6.67E-04	0.005	0.043	0.005	0.038
EXHAUST3	0.075	0.599	0.044	0.350	8.40E-05	6.67E-04	0.005	0.043	0.005	0.038
EXHAUST4	0.075	0.599	0.044	0.350	8.40E-05	6.67E-04	0.005	0.043	0.005	0.038
FUGITIVE	--	--	--	--	--	--	0.060	0.474	0.007	0.052

GWF Henrietta Combined Cycle Power Plant
Table C3-9
Construction Modeling Results
October 2008

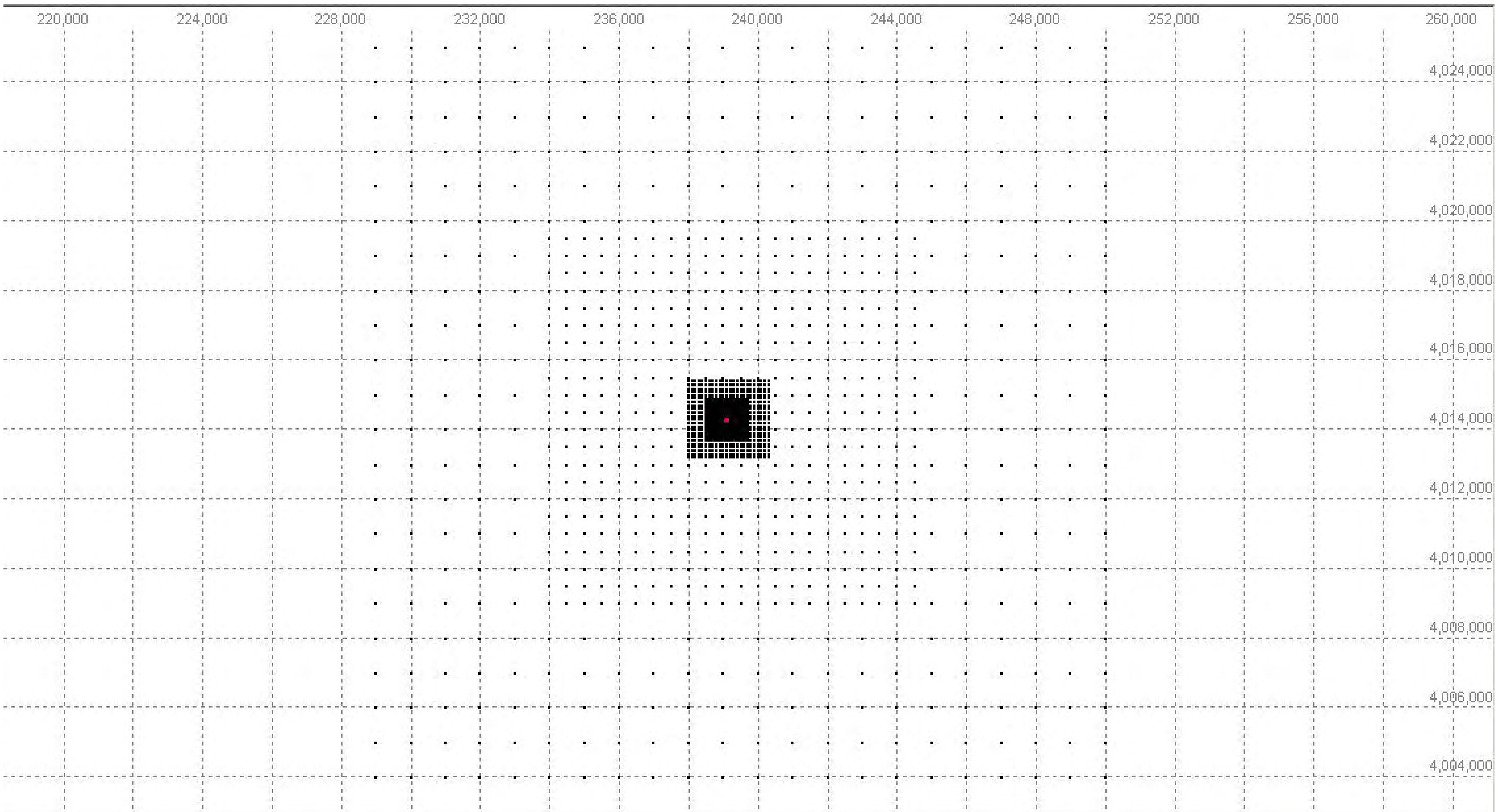
Source	NO_2 (µg/m^3)		CO (µg/m3)		SO_2 (µg/m3)				PM_{10} (µg/m3)		$PM_{2.5}$ (µg/m3)	
	1-hr[a]	Annual	1-hr	8-hr	1-hr	3-hr	24-hr	Annual	24-hr[b]	Annual	24-hr[b]	Annual
ALL	269	18.4	233	81.4	0.457	0.296	0.092	0.020	57.6	11.92	7.72	2.31
EXHAUST	269	18.4	233	81.4	0.457	0.296	0.092	0.020	5.73	1.31	5.10	1.17
FUGITIVE	--	--	--	--	--	--	--	--	56.74	10.72	6.818	1.176

a. Result from AERMOD OLM modeling
b. Maximum fugitive and exhaust impacts are at different locations

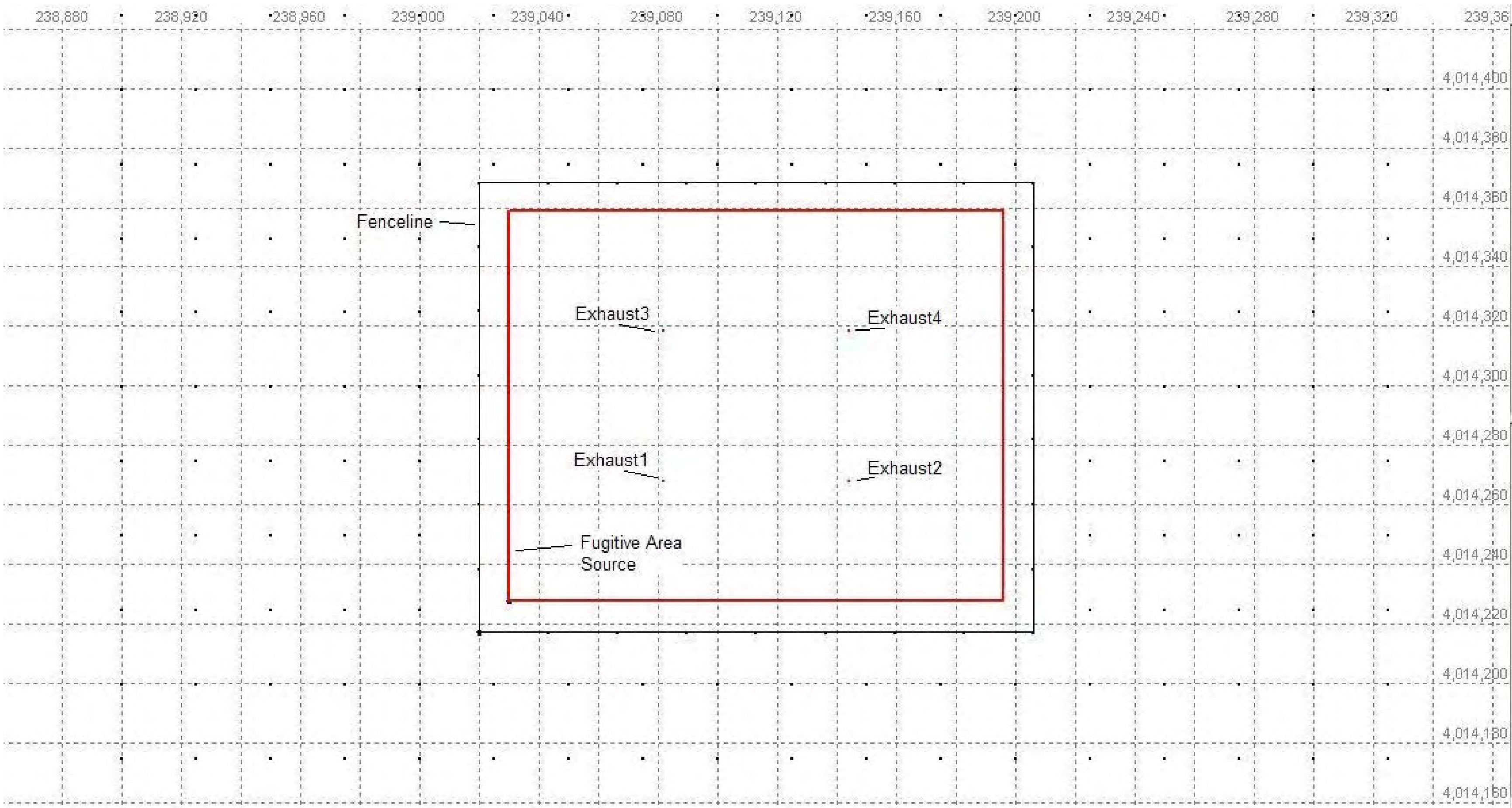
GWF Henrietta Combined Cycle Power Plant
Figure C3-1
AERMOD Operational Model Setup
October 2008



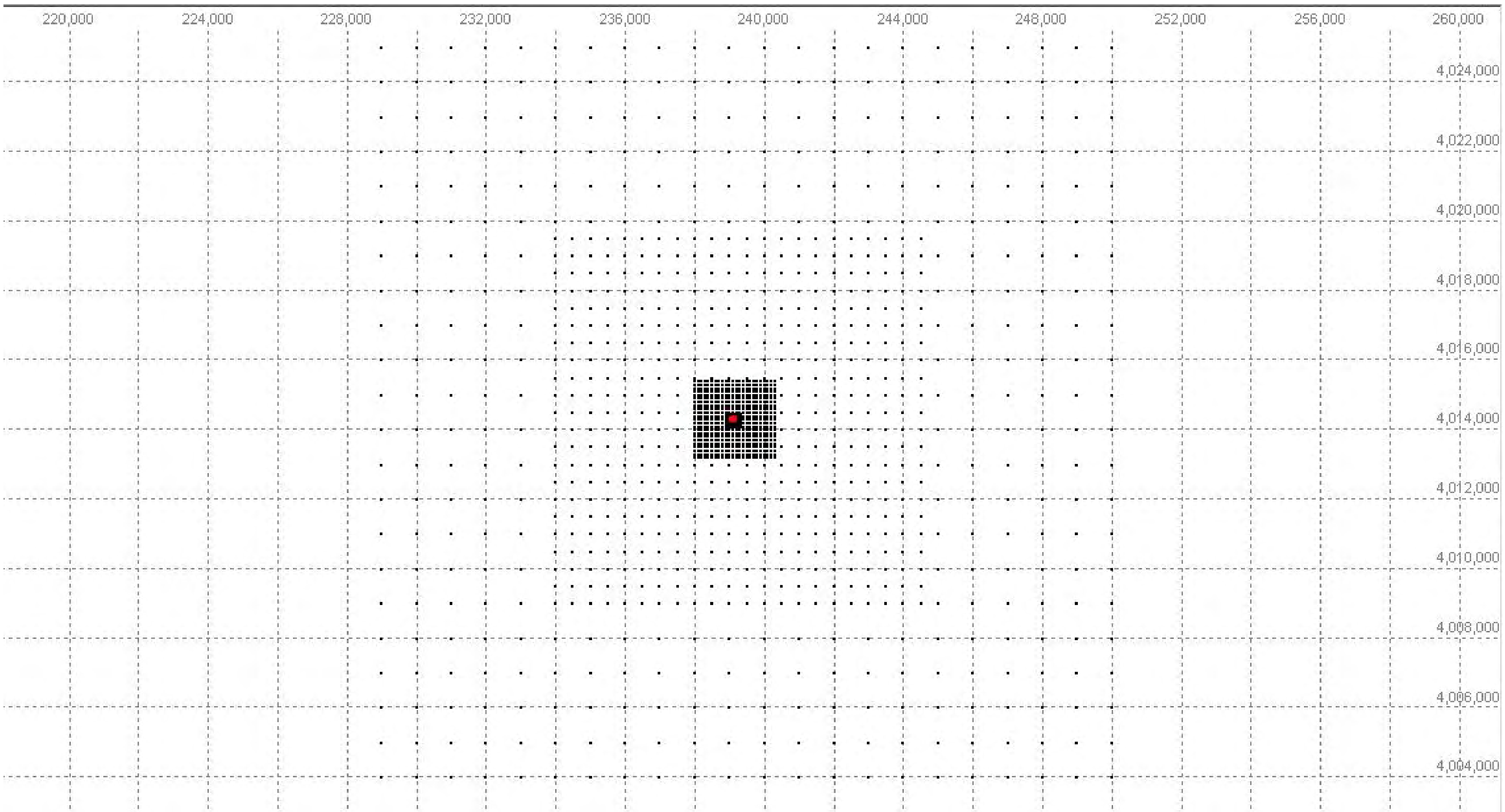
GWF Henrietta Combined Cycle Power Plant
Figure C3-2
Operational Receptor Grid
October 2008



GWF Henrietta Combined Cycle Power Plant
Figure C3-3
AERMOD Construction Model Setup
October 2008



GWF Henrietta Combined Cycle Power Plant
Figure C3-4
Construction Receptor Grid
October 2008



Attachment C4
EDR Offsite Receptor Report Summary

GWF Henrietta Combined Cycle Power Plant
25th Ave.Aveneal Cutoff
Leemore Station, CA 93245

Inquiry Number: 2289964.1s
August 12, 2008

EDR Offsite Receptor Report

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
Toll Free: 800.352.0050
www.edrnet.com

TABLE OF CONTENTS

Thank you for your business
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

A search of available records was conducted by Environmental Data Resources, Inc. (EDR). The EDR Offsite Receptor Report provides information which may be used to comply with the Clean Air Act Risk Management Program 112-R. *"The rule requires that you estimate in the RMP residential populations within the circle defined by the endpoint for your worst-case and alternative release scenarios (i.e., the center of the circle is the point of release and the radius is the distance to the endpoint). In addition, you must report in the RMP whether certain types of public receptors and environmental receptors are within the circles."*

The address of the subject property, for which the search was intended, is:

GWF HENRIETTA COMBINED CYCLE POWER PLANT
25TH AVE.\AVENEAL CUTOFF
LEEMORE STATION, CA 93245

Distance Searched: 6.000 miles from subject property

RECEPTOR SUMMARY
An X indicates the presence of the receptor within the search radius.

Residential Population
Estimated population within search radius: 5892 persons.

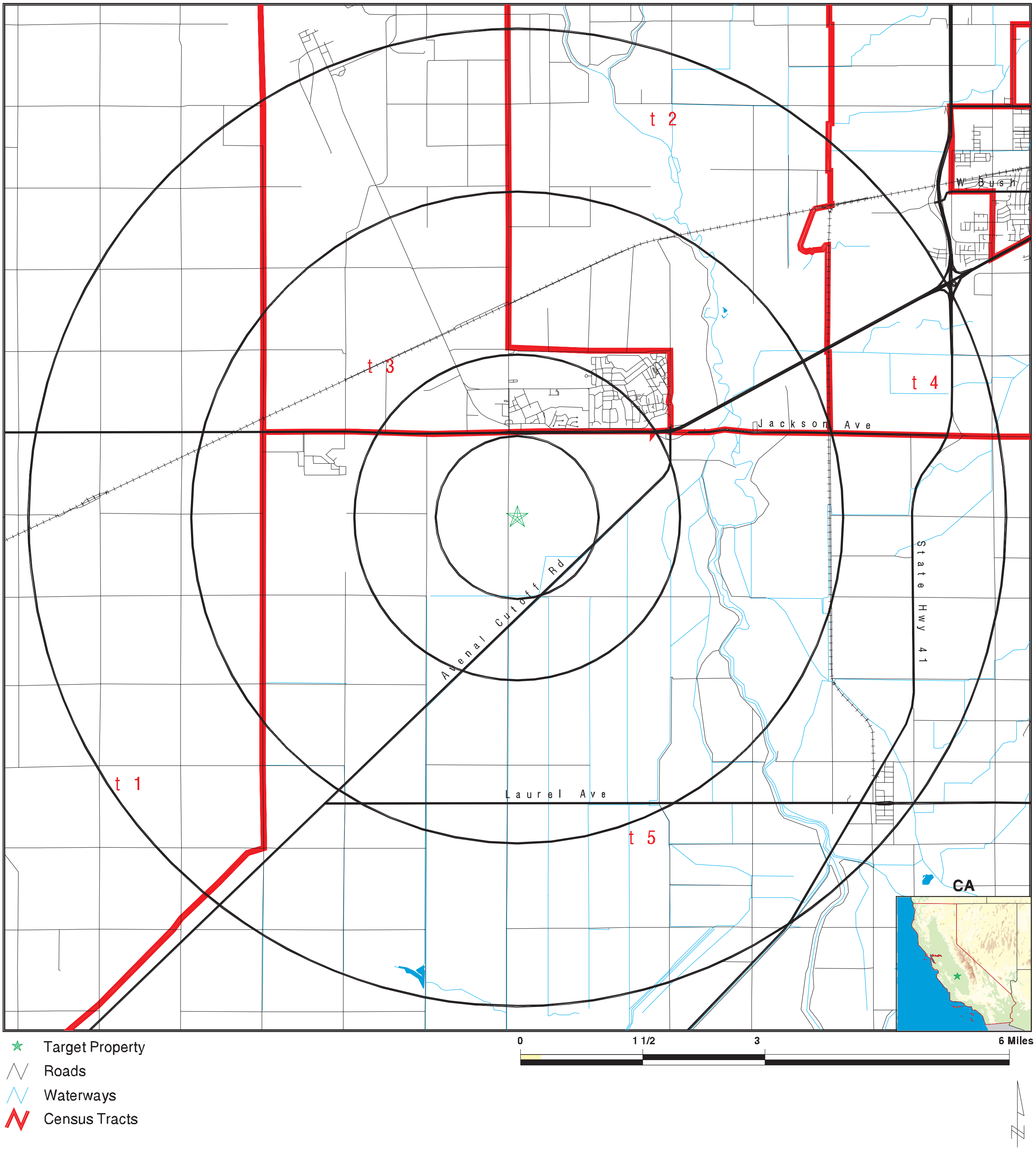
Other Public Receptors

Type	Within Search Radius	Sites Total
Day Care Centers:	☒	3
Medical Centers:	☐	
Nursing Homes:	☐	
Schools:	☒	1
Hospitals:	☐	
Colleges:	☐	
Arena:	☐	
Prison:	☐	

Environmental Receptors

Type	Within Search Radius	Sites Total
Federal Land:	☒	1

CENSUS MAP - 2289964.1s

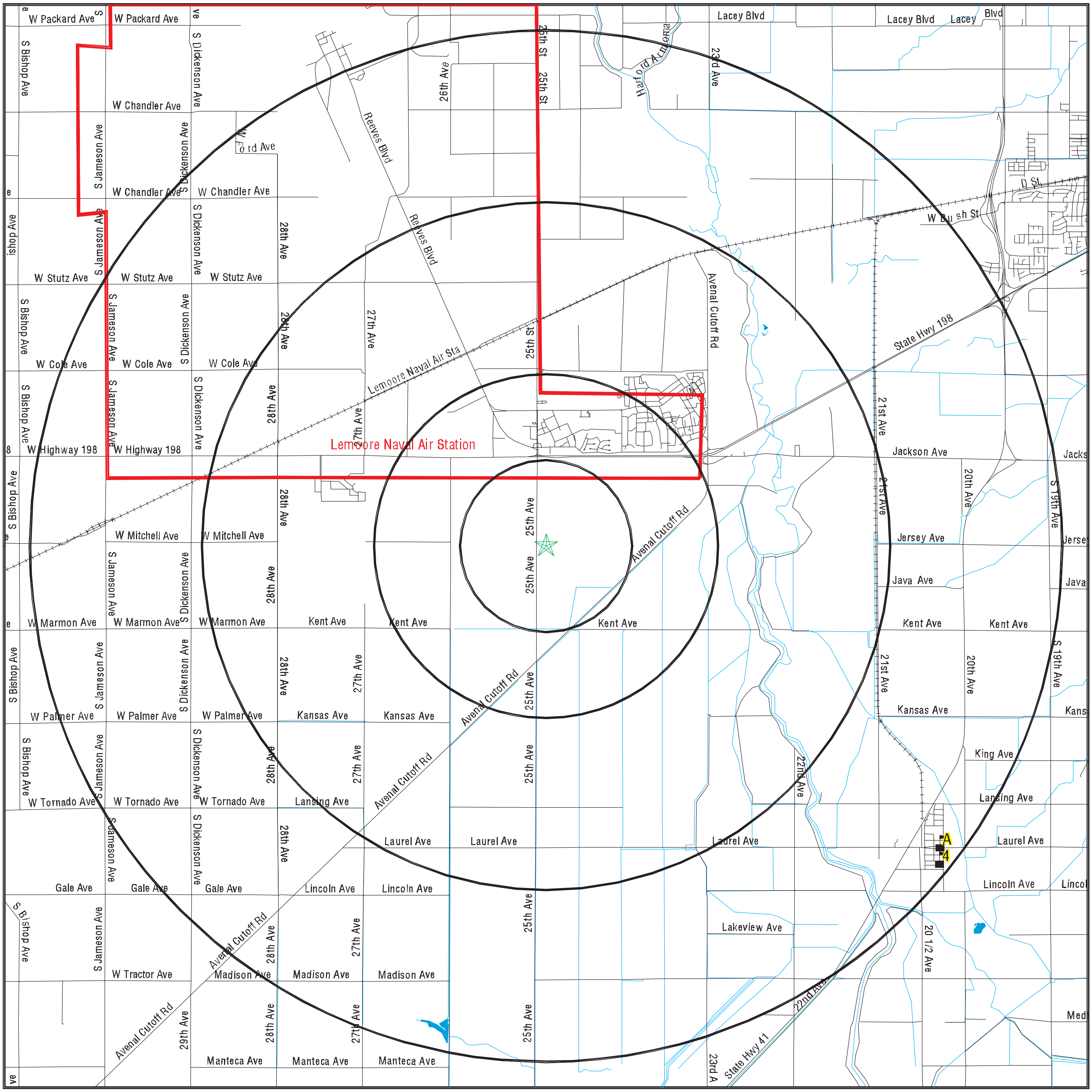


TARGET PROPERTY:	GWF Henrietta Combined Cycle Power Plant	CUSTOMER:	CH2M Hill, Inc.
ADDRESS:	25th Ave.	CONTACT:	Dana Larson
CITY/STATE/ZIP:	Aveneal Cutoff	INQUIRY #:	2289964.1s
LAT/LONG:	Leemore Station CA 93245	DATE:	August 12, 2008 1:22 pm
	36.2403 / 119.9032		

CENSUS FINDINGS

Map ID	Tract Number	Total Population	Population in Radius	Total Area(sq.mi.)	Area in Radius(sq.mi.)
T1	0078.00	13105	841.7	315.86	20.29
T2	0002.00	2297	563.8	63.49	15.59
T3	0003.00	5753	3381.5	27.20	15.99
T4	0004.02	3680	716.2	25.20	4.90
T5	0016.01	4554	388.8	653.14	55.76

RECEPTOR MAP - 2289964.1s



0 1 1/2 3 6 Miles

Target Property
Roads
Waterways
Environmental or Public Receptor
Federal Lands Linear Features
Federal Lands Area

TARGET PROPERTY:	GWF Henrietta Combined Cycle Power Plant	CUSTOMER:	CH2M Hill, Inc.
ADDRESS:	25th Ave.	CONTACT:	Dana Larson
CITY/STATE/ZIP:	Aveneal Cutoff	INQUIRY #:	2289964.1s
LAT/LONG:	Leemore Station CA 93245 36.2403 / 119.9032	DATE:	August 12, 2008 1:22 pm

MAP FINDINGS

Map ID Direction Distance Distance (ft.) Elevation	Site		EDR ID Database
NA			CUSA137733
North	Name:	Lemoore Naval Air Station	FED_LAND
1/2-1 mi	Feature:	Navy DOD	
4181	URL:	Not Reported	
NA	Bureau:	DOD	
	State:	CA	
	Is DOD?:	Yes	

A1			SRDCCA200752215
SE	EDR ID:	SRDCCA200752215	Daycare
4-6 mi	Facility number:	163801248	
29788	Facility name:	STRATFORD HEAD START CENTER	
Lower	Facility eval. code:	0312	
	Facility office number:	04	
	Facility county number:	16	
	Facility type code:	850	
	Facility status code:	03	
	Address:	19275 CROSS STREET	
	City:	STRATFORD	
	State:	CA	
	Zip:	93266	
	Alt. address:	1222 W. LACEY BLVD.	
	City:	HANFORD	
	State:	CA	
	Zip:	93230	
	Facility investor:	"KINGS COMMUNITY ACTION ORGANIZATION, INC. "	
	Licensee type:	C	
	License effective date:	961119	
	License expiration date:	Not Reported	
	License issue date:	960819	
	Program type:	"WELL CHILDREN, AGES 2 TO 6 YEARS OLD, 5 NON-AMBULATORY. SEE WAIVER. "	
	Original app. received date:	960618	
	Facility closed date:	Not Reported	
	Mailing address:	1222 W. LACEY BLVD.	
	Mailing city:	HANFORD	
	Mailing state:	CA	
	Mailing zip:	93230	
	Contact person:	"JIMENEZ, LUPE "	
	Facility capacity:	20	
	Type of clients served:	950	
	Facility phone:	5599479290	

A2			SRDCCA200755486
SE	EDR ID:	SRDCCA200755486	Daycare
4-6 mi	Facility number:	543808205	
30634	Facility name:	KCOE-STRATFORD PRESCHOOL	
Lower	Facility eval. code:	0312	
	Facility office number:	04	
	Facility county number:	54	
	Facility type code:	850	
	Facility status code:	03	
	Address:	19348 EMPIRE STREET	

Map ID
Direction
Distance
Distance (ft.)
Elevation **Site** **EDR ID** **Database**

	City:	STRATFORD
	State:	CA
	Zip:	93266
	Alt. address:	1144 W. LACEY BLVD
	City:	HANFORD
	State:	CA
	Zip:	93230
	Facility investor:	KINGS COUNTY OFFICE OF EDUCATION
	Licensee type:	F
	License effective date:	50815
	License expiration date:	Not Reported
	License issue date:	050815
	Program type:	PRESCHOOL AGE CHILDREN AGES 2 - 6 YEARS OLD. AMBULATORY ONLY. SEE PLAYGROUND WAIVER.
	Original app. received date:	050429
	Facility closed date:	Not Reported
	Mailing address:	1144 W. LACEY BLVD.
	Mailing city:	HANFORD
	Mailing state:	CA
	Mailing zip:	93230
	Contact person:	"STANKOVICH, JOHN "
	Facility capacity:	24
	Type of clients served:	950
	Facility phone:	5599473391

A3			SRPU20071007181
SE	Ncessch:	060798000768	Public Schools
4-6 mi	Schname05:	STRATFORD ELEMENTARY	
30634	Mstreet05:	19348 EMPIRE AVE.	
Lower	Mcity05:	STRATFORD	
	Mstate05:	CA	
	Mzip05:	93266	
	Mzip405:	0148	
	Member05:	301	
	Phone05:	(559) 947-3391	
	Locale05:	8	
	Type05:	1	
	Level05:	1	
	Gslo05:	KG	
	Gshi05:	08	
	Edr id:	SRPU20071007181	

4			SRDCCA200718471
SE	EDR ID:	SRDCCA200718471	Daycare
4-6 mi	Facility number:	163806909	
30951	Facility name:	"GONZALEZ, ROSA FAMILY CHILD CARE "	
Lower	Facility eval. code:	0324	
	Facility office number:	04	
	Facility county number:	16	
	Facility type code:	810	
	Facility status code:	03	
	Address:	20241 5TH STREET	
	City:	STRATFORD	
	State:	CA	

Zip:	93266
Alt. address:	P.O. BOX 214
City:	STRATFORD
State:	CA
Zip:	93266
Facility investor:	"GONZALEZ, ROSA "
Licensee type:	A
License effective date:	30205
License expiration date:	Not Reported
License issue date:	030205
Program type:	"MAXIMUM CAPACITY: 6 CHILDREN WITH NO MORE THAN 3 INFANTS, OR 4 INFANTSONLY, OR CAPACITY 8 CHILDREN WHEN 2 ARE AT LEAST 6 YEARS OF AGE WITH AMAXIMUM OF 2 INFANTS; PROPERTY OWNER/LANDLORD CONSENT IS REQUIRED "
Original app. received date:	020508
Facility closed date:	Not Reported
Mailing address:	P.O. BOX 214
Mailing city:	STRATFORD
Mailing state:	CA
Mailing zip:	93266
Contact person:	"GONZALEZ, ROSA "
Facility capacity:	8
Type of clients served:	960
Facility phone:	5599473019

RECORDS SEARCHED/DATA CURRENCY TRACKING

Census
Source: U.S. Census Bureau
Telephone: 301-457-4100
2000 U.S. Census data was used to estimate residential population following these EPA guidelines:
"Census data are presented by Census tract. If your circle covers only a portion of the tract, you should develop an estimate for that portion...Determine the population density per square mile (total population of the Census tract divided by the number of square miles in the tract) and apply that density figure to the number of square miles within your circle."

FED_LAND: Federal Lands
Source: USGS
Telephone: 888-275-8747
Federal lands data. Includes data from several Federal land management agencies, including Fish and Wildlife Service, Bureau of Land Management, National Park Service, and Forest Service. Includes National Parks, Forests, Monuments; . Wildlife Sanctuaries, Preserves, Refuges; Federal Wilderness Areas.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Colleges - Integrated Postsecondary Education Data
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on integrated postsecondary education in the United States.

Arenas
Source: Dunhill International
EDR indicates the location of buildings and facilities - arenas - where individuals who are public receptors are likely to be located.

Prisons: Bureau of Prisons Facilities
Source: Federal Bureau of Prisons
Telephone: 202-307-3198
List of facilities operated by the Federal Bureau of Prisons.

Daycare Centers: Licensed Facilities
Source: Department of Social Services
Telephone: 916-657-4041

STREET AND ADDRESS INFORMATION

Appendix C5
SJVAPCD ATC Permit Applications Materials

GWF ENERGY LLC

August 1, 2008

James Swaney, PE
Permit Services Manager
San Joaquin Valley Air Pollution Control District
1990 E. Gettysburg Avenue
Fresno, CA 93726

Subject: Authority to Construction Application for the Conversion of the Henrietta Peaker Plant (HPP) (C-3929) to a Combined Cycle Plant

Dear Mr. Swaney:

Please find the attached GWF Energy LLC's Authority to Construction (ATC) Application for the GWF Henrietta Combined Cycle Power Plant. The project will include the modification of GWF's HPP, a nominal 95-megawatt (MW) simple-cycle power plant, by converting the facility into a combined cycle power plant with a nominal increase of 25 megawatts (net) of additional generating capacity. GWF will also retain the ability to operate the plant in simple cycle mode following completion of the modifications. The modifications to the facility will be referred to hereinafter as the GWF Henrietta Combined Cycle Power Plant project (GWF Henrietta) with a new nominal generating capacity of 120 megawatts (net). GWF Henrietta will occupy the same fenced site within the existing GWF-owned parcel in Lemoore, CA. Figure 1-1 presents a vicinity map for the project.

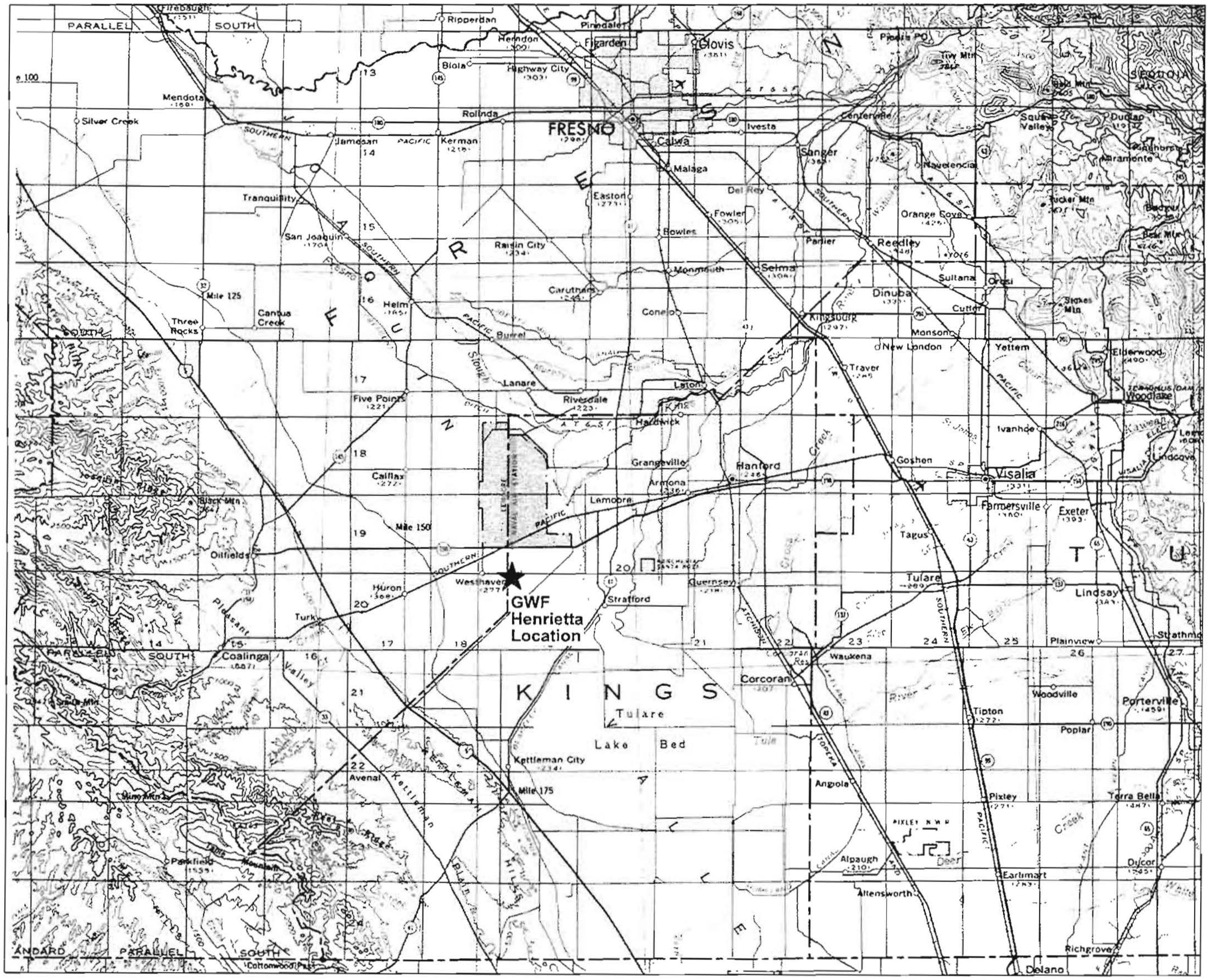
GWF Energy LLC expected to submit a petition to amend the California Energy Commission license on or about September 30, 2008. This amendment petition will include comprehensive air quality and public health analyses, with complete emission estimates for both construction and operation. In addition, the amendment petition will also include an air dispersion modeling and public health impact assessments. Finally, the petition amendment will demonstrate GWF Henrietta's consistency with San Joaquin Valley Air Pollution Control District rules and regulations.

The remainder of this letter presents a description of the project, emission control systems, expected air emissions, and emission offset requirements.

Project Description

The GWF Henrietta site arrangement is shown on Figure 2-1 (attached), respectively. The typical elevation views shown on Figure 2-2 (attached) illustrate the location and size of the modified GWF Henrietta.

4300 RAILROAD AVE., PITTSBURG, CALIFORNIA 94565-6006 • TEL. (925) 431-1444 • FAX (925) 431-0515



N

0 4 8

Scale in Miles

Source: USGS 1:500,000 Scale Topographic Map of California-South Half

Figure source: URS

FIGURE 1-1
VICINITY MAP
GWF HENRIETTA COMBINED CYCLE POWER PLANT PROJECT
KINGS COUNTY, CA

EY072008001BAO GWF_Henrietta_figures.indd 07-31-08 dash

CH2MHILL

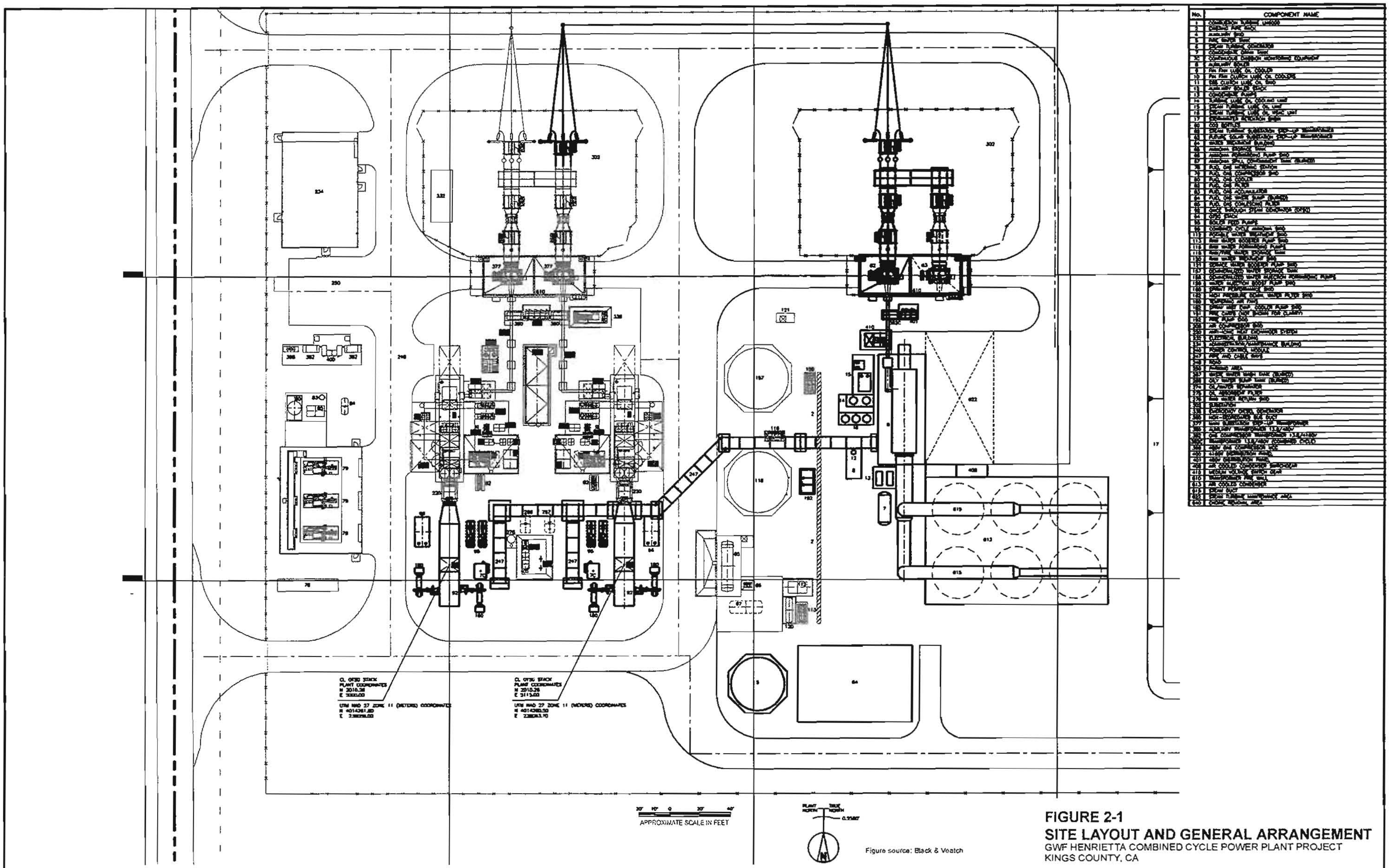


FIGURE 2-1
SITE LAYOUT AND GENERAL ARRANGEMENT
GWF HENRIETTA COMBINED CYCLE POWER PLANT PROJECT
KINGS COUNTY, CA

CH2MHILL

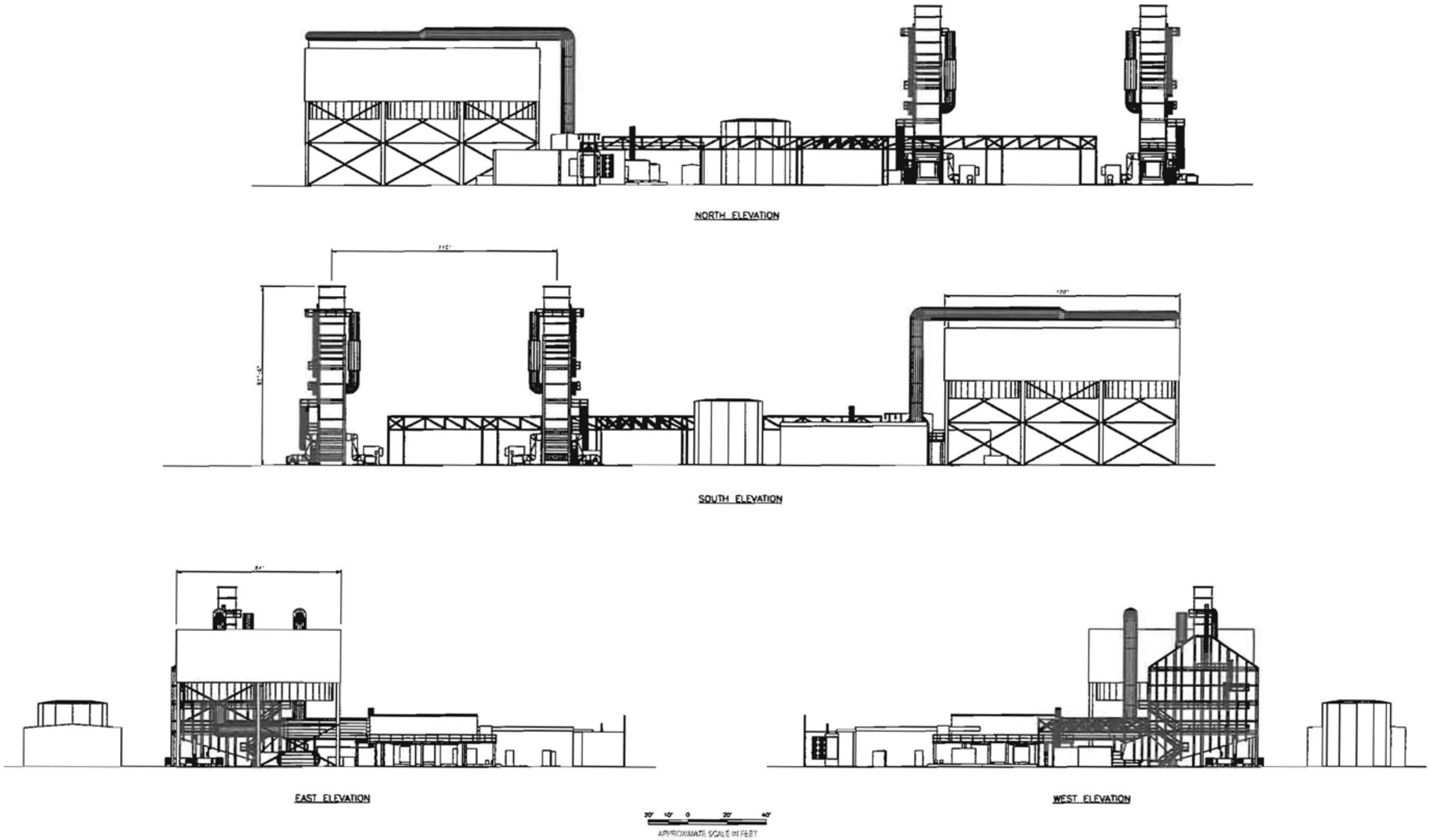


FIGURE 2-2
PROJECT ELEVATIONS
GWF HENRIETTA COMBINED CYCLE POWER PLANT PROJECT
KINGS COUNTY, CA

Figure source: Black & Veatch

EY072008001BAO GWF_Henrietta_figures.indd 07-31-08 dash

CH2MHILL

The modified GWF Henrietta would consist of two existing General Electric (GE) LM6000 PC Sprint combustion turbine generators (CTGs) equipped with water injection for control of nitrogen oxides and evaporative cooling of the CTG air inlet. The CTGs will exhaust to two unfired once through steam generators (OTSGs) to generate steam. Exhaust gases will be released to the atmosphere through 91.5 foot exhaust stacks (1 for each CTG). The OTSG's will be equipped with selective catalytic reduction (SCR) systems to control oxides of nitrogen (NOx) and an oxidation catalyst system to control carbon monoxide (CO) and volatile organic compounds (VOCs) Steam from the two OTSGs would flow through a 25 MW (net) condensing steam generator (STG). Steam cycle cooling will be accomplished by a new air cooled condenser (ACC). The fuel system for the CTGs will remain unchanged.

The modified GWF Henrietta will retain the capability to operate in simple cycle mode. Under simple cycle operation, the OTSG would be operated in a "dry" condition (no steam generation) and combustion turbine exhaust gas emissions would still be controlled by the SCR and oxidation catalyst systems.

GWF Henrietta will also include a new auxiliary boiler to facilitate start up of the facility. The boiler will be equipped with an ultra-low oxides of nitrogen burner. In order to retain maximum operating flexibility, GWF requests that the auxiliary boiler be permitted to operate up to 4.000 hours per year.

Heat balance diagrams for combined cycle operations of GWF Henrietta are presented on Figures 2-3, 2-4, and 2-5, for three ambient conditions (15, 63, and 115 degrees Fahrenheit [°F]) each at 60 percent and at 100 percent base load operation. The supporting emissions tables for each ambient and load condition are also provided.

The simple cycle heat balance diagrams were provided in the original application.

Emissions Controls

While operating under the simple cycle mode, all emission limits will remain the same as identified in the existing HPP Permit to Operate, except for the CO emission limits which will be reduced from 6.0 ppmvd to 3.0 ppmvd at 15% O_2. GWF Energy LLC proposes to replace the existing SCR and oxidation catalyst systems with new emission controls specifically designed for the OTSG application. The following section discusses the proposed emission controls.

NO_x Emission Control

A SCR will be used to control NO_x concentrations in the exhaust gas emitted to the atmosphere to 2.0 or less ppmvd at 15 percent oxygen while operating in combined cycle mode and 3.6 ppmvd at 15 percent oxygen when operating in the simple cycle mode. The SCR process will use aqueous ammonia. Ammonia slip, or the concentration of un-reacted ammonia in the exiting exhaust gas, will be limited to 5 or less ppmvd at 15 percent oxygen while operating in combined cycle mode and 10 ppmvd at 15 percent oxygen when operating in the simple cycle mode. GWF Henrietta will continue to use the existing aqueous ammonia storage system, ammonia vaporization and injection system, and monitoring equipment and sensors.

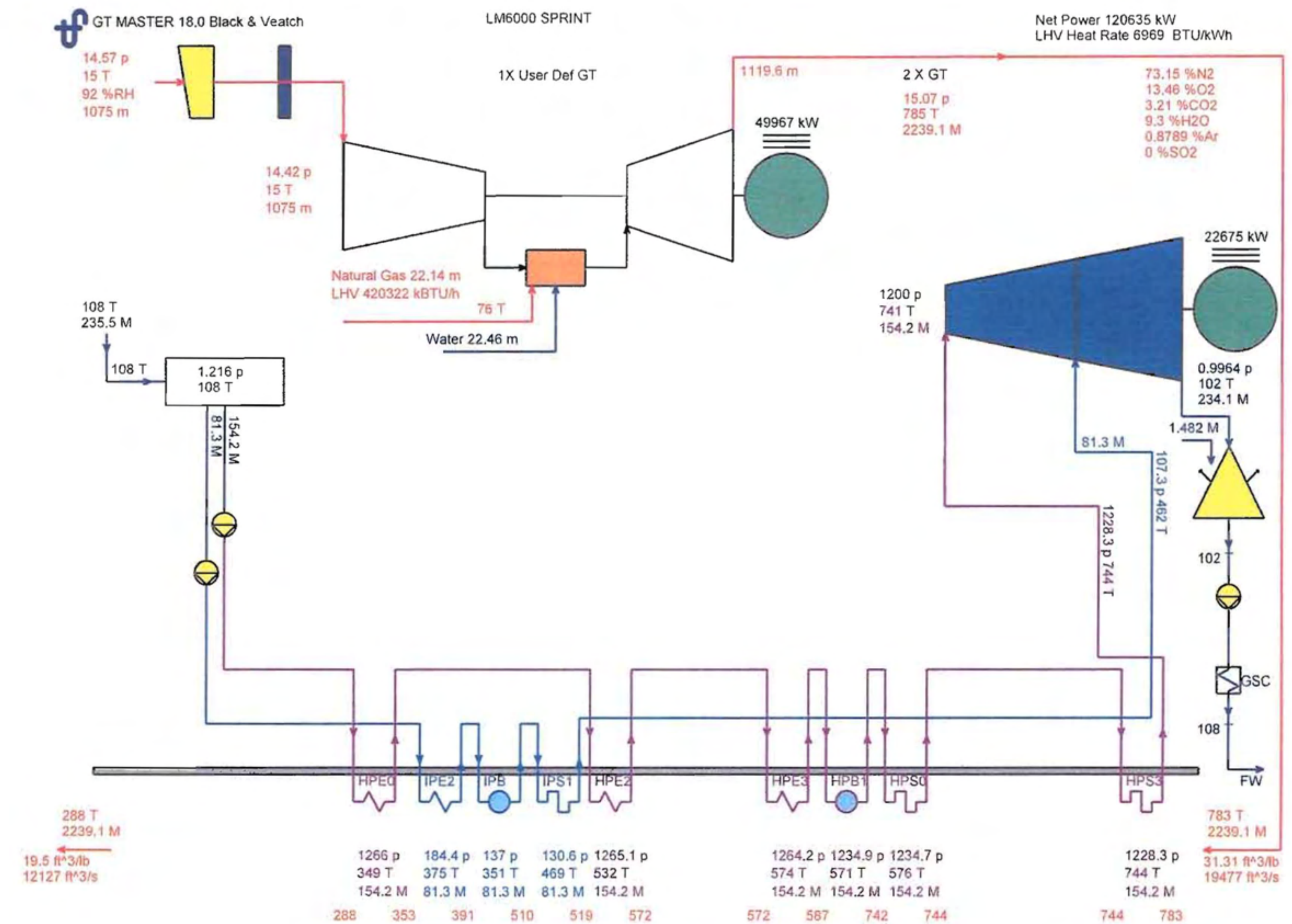


FIGURE 2-3A
BASE LOAD 15ºF HEAT AND MASS BALANCE DIAGRAM
GWF HENRIETTA COMBINED CYCLE POWER PLANT PROJECT
KINGS COUNTY, CALIFORNIA

CH2MHILL

EY072008002SAC Figure_2-3A.ai 07.31.08 tdaus

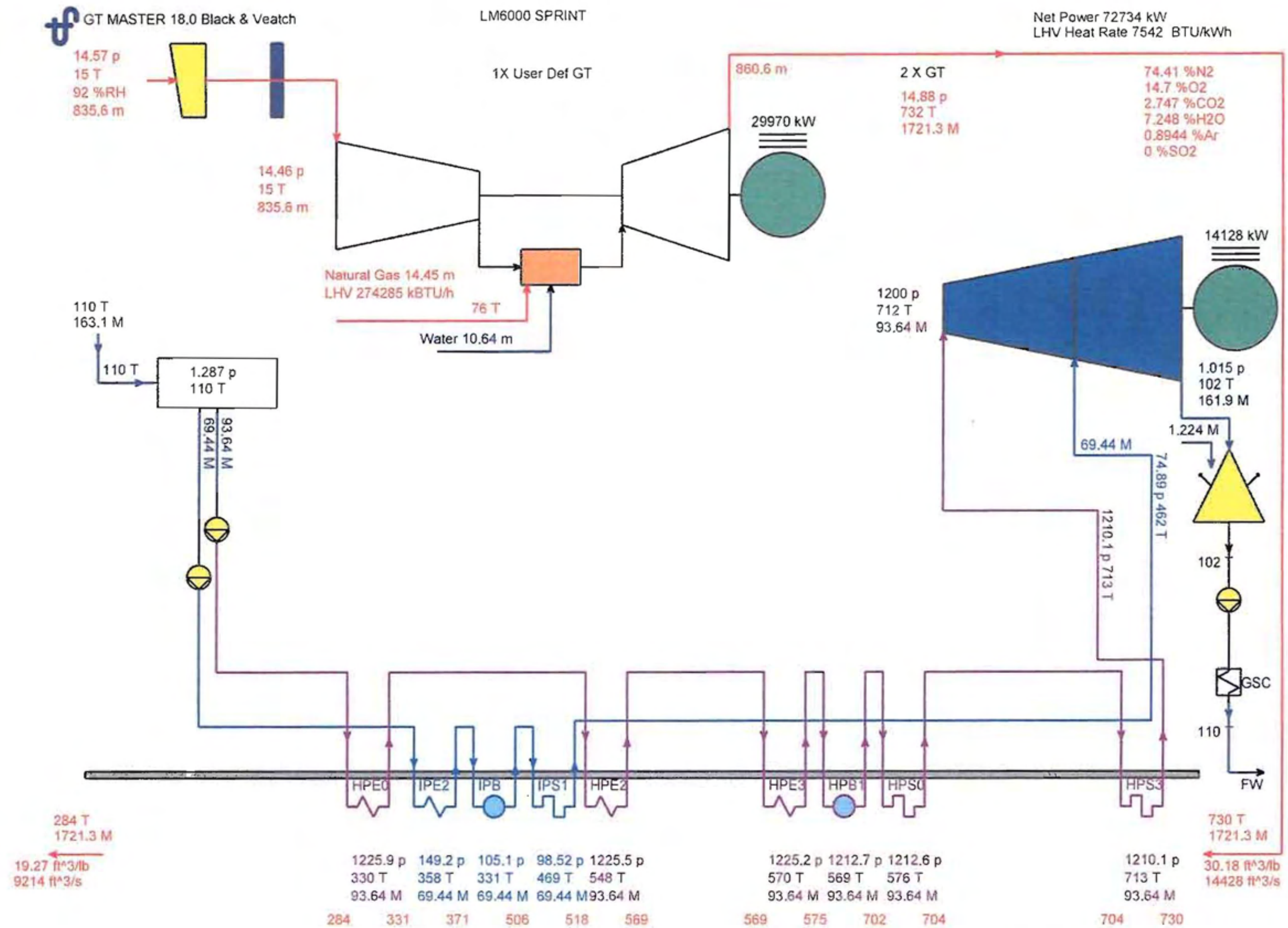


FIGURE 2-3B
60 PERCENT LOAD 15ºF HEAT AND MASS BALANCE DIAGRAM

GWF HENRIETTA COMBINED CYCLE POWER PLANT PROJECT
KINGS COUNTY, CALIFORNIA

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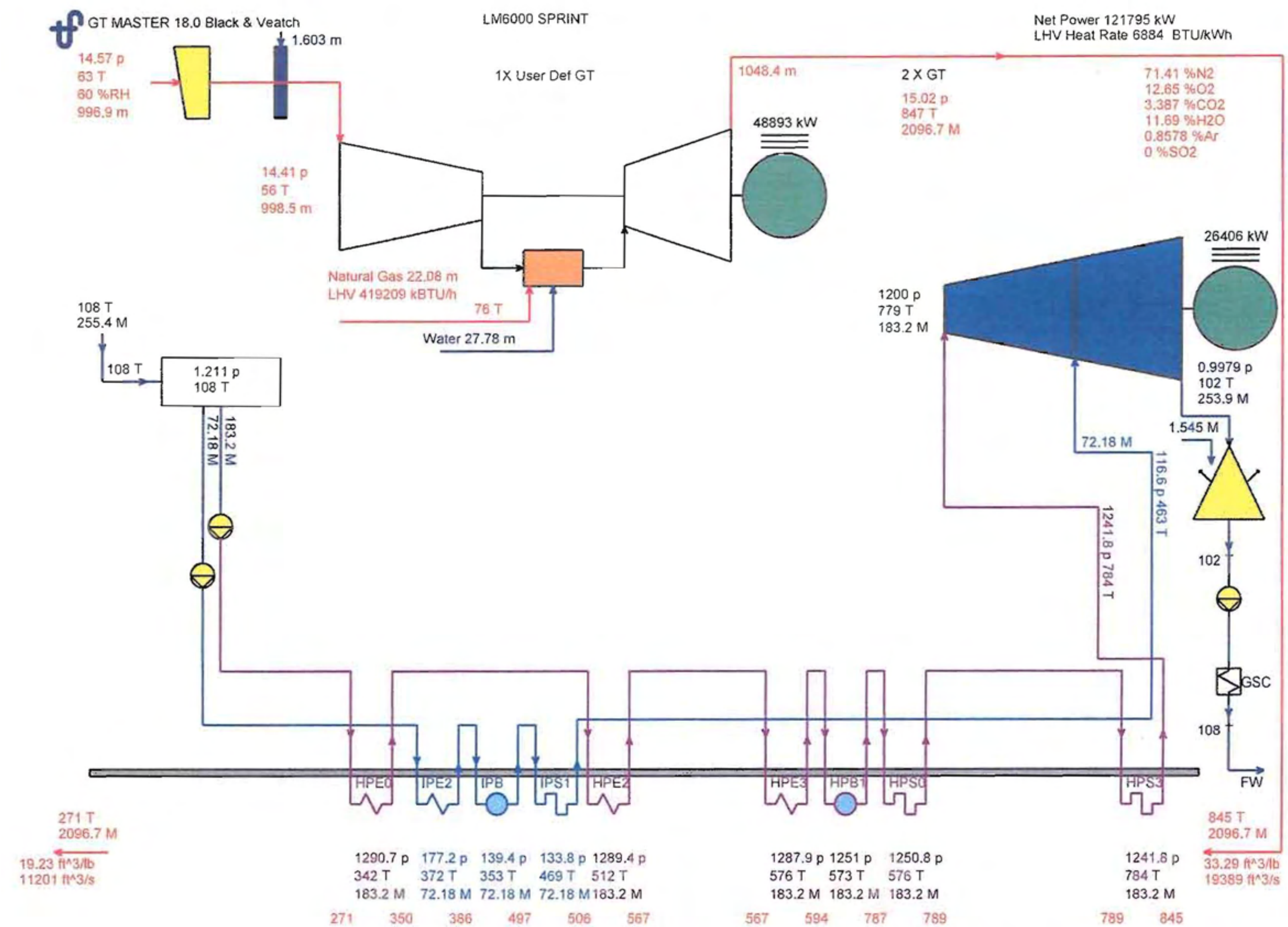


FIGURE 2-4A
BASE LOAD 63ºF HEAT AND MASS BALANCE DIAGRAM
GWF HENRIETTA COMBINED CYCLE POWER PLANT PROJECT
KINGS COUNTY, CALIFORNIA

CH2MHILL

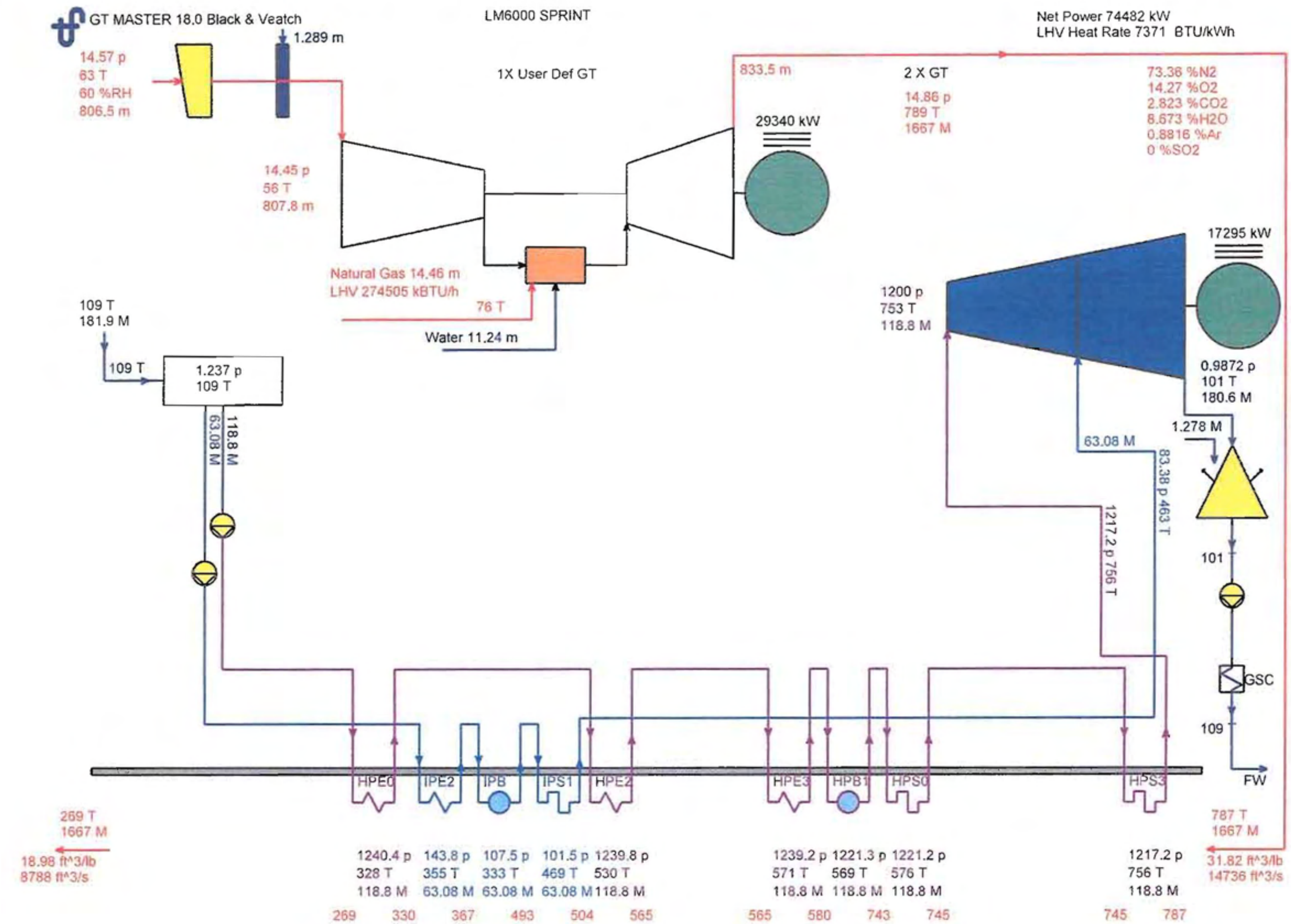


FIGURE 2-4B
60 PERCENT LOAD 63°F HEAT AND MASS BALANCE DIAGRAM
GWF HENRIETTA COMBINED CYCLE POWER PLANT PROJECT
KINGS COUNTY, CALIFORNIA

CH2MHILL

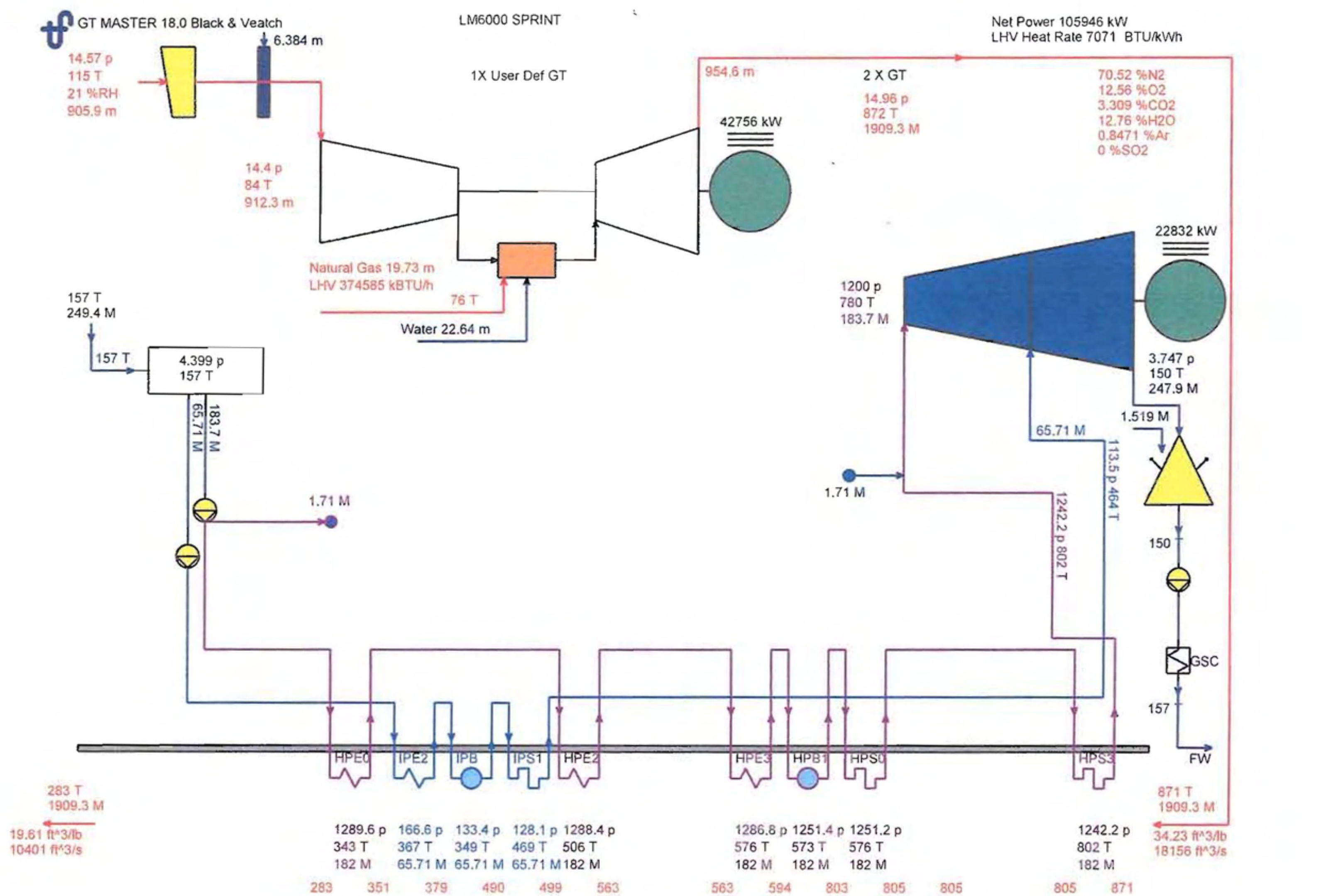


FIGURE 2-5A
BASE LOAD 115°F HEAT AND MASS BALANCE DIAGRAM
GWF HENRIETTA COMBINED CYCLE POWER PLANT PROJECT
KINGS COUNTY, CALIFORNIA

CH2MHILL

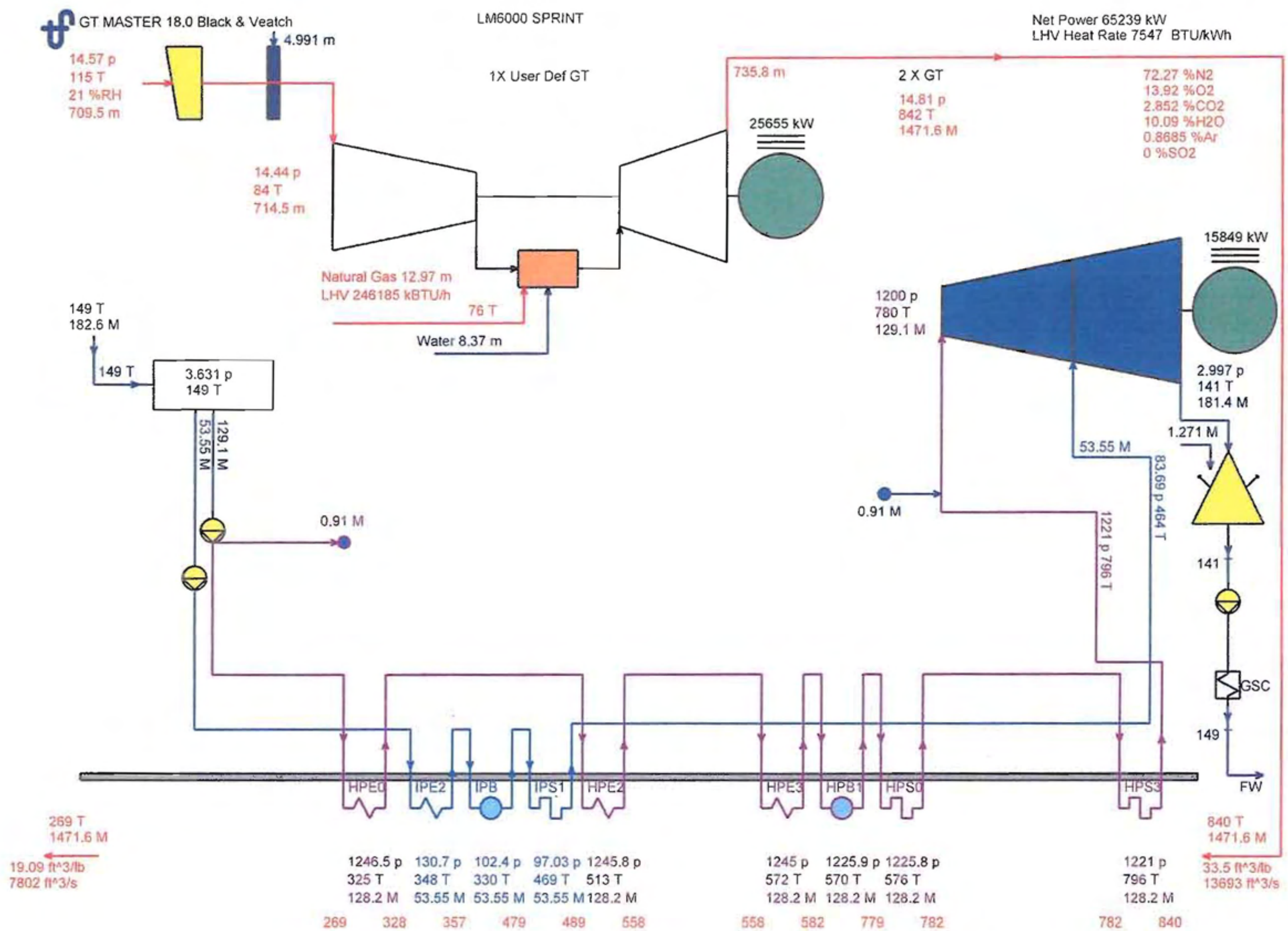


FIGURE 2-5B
60 PERCENT LOAD 115ºF HEAT AND MASS BALANCE DIAGRAM

GWF HENRIETTA COMBINED CYCLE POWER PLANT PROJECT
KINGS COUNTY, CALIFORNIA

CH2MHILL

9-Jun-08
GWF
Henrietta Combinad Cycle Conversion
LM6000PC-SPRINT Combined Cycle Emissions, Revision 4

Case Number	1	2	3	4	5	6
CTG Model	LM6000	LM6000	LM6000	LM6000	LM6000	LM6000
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Load	100%	60%	100%	60%	100%	60%
CTG Inlet Air Cooling	Off	Off	Evap. Cooler	Evap. Cooler	Evap. Cooler	Evap. Cooler
CTG Steam/Water Injection	Water	Water	Water	Water	Water	Water
Ambient Temperature, F	15	15	63	63	115	115
HRSG Duct Firing	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired
Fuel Sulfur Content (grains/100 standard cubic feet)	0.25	0.25	0.25	0.25	0.25	0.25
Ambient Conditions						
Ambient Temperature, F	15.0	15.0	63.0	63.0	115.0	115.0
Ambient Relative Humidity, %	92.0	92.0	60.0	60.0	21.0	21.0
Atmospheric Pressure, psia	14.569	14.589	14.569	14.569	14.569	14.569
Combustion Turbine Performance						
CTG Performance Reference	GE	GE	GE	GE	GE	GE
CTG Inlet Air Conditioning Effectiveness, %	0	0	85	85	85	85
CTG Compressor Inlet Dry Bulb Temperature, F	15.0	15.0	56.1	56.1	84.6	84.6
CTG Compr. Inlet Relative Humidity, %	92.1	92.1	92.9	92.9	79.4	79.4
Inlet Loss, in. H2O	4.5	4.5	4.5	4.5	4.5	4.5
Exhaust Loss, in. H2O	12.0	12.0	12.0	12.0	12.0	12.0
CTG Load Level (percent of Base Load)	100%	60%	100%	60%	100%	60%
Gross CTG Output, kW	49,967	29,970	48,893	29,340	42,756	25,655
Gross CTG Heat Rate, Btu/kWh (LHV)	8,412	9,152	8,574	9,356	8,761	9,596
Gross CTG Heat Rate, Btu/kWh (HHV)	9,309	10,128	9,489	10,354	9,696	10,620
CTG Heat Input, MBtu/h (LHV)	420.3	274.3	419.2	274.5	374.6	246.2
CTG Heat Input, MBtu/h (HHV)	465.2	303.6	463.9	303.8	414.6	272.5
CTG Water/Steam Injection Flow, lb/h	22,457	10,639	18,510	11,235	13,804	8,370
Injection Fluid/Fuel Ratio	1.0	0.7	0.8	0.8	0.7	0.7
CTG Exhaust Flow, lb/h	1,119,571	860,648	1,048,369	833,496	954,633	735,795
CTG Exhaust Temperature, F	785	732	847	789	873	842
Combustion Turbine Fuel						
Total CTG Fuel Flow, lb/h	22,140	14,450	22,090	14,460	19,730	12,970
CTG Fuel Temperature, F	76	76	76	76	76	76
CTG Fuel LHV, Btu/lb	18,981	18,981	18,981	18,981	18,981	18,981
CTG Fuel HHV, Btu/lb	21,006	21,006	21,006	21,006	21,006	21,006
HHV/LHV Ratio	1.1067	1.1067	1.1067	1.1067	1.1067	1.1067
CTG Fuel Composition (Ultimate Analysis by Weight)						
Ar	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
C	68.44%	68.44%	68.44%	68.44%	68.44%	68.44%
H2	21.38%	21.38%	21.38%	21.38%	21.38%	21.38%
N2	8.80%	8.80%	8.80%	8.80%	8.80%	8.80%
O2	1.37%	1.37%	1.37%	1.37%	1.37%	1.37%
S	0.00074%	0.00074%	0.00074%	0.00074%	0.00074%	0.00074%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Fuel Sulfur Content (grains/100 standard cubic feet)	0.25	0.25	0.25	0.25	0.25	0.25
Stack Exhaust Analysis - Volume Basis - Wet						
Ar	0.92%	0.93%	0.91%	0.92%	0.90%	0.90%
CO2	3.18%	2.72%	3.38%	2.80%	3.30%	2.82%
H2O	9.33%	7.27%	10.39%	8.68%	11.45%	10.12%
N2	73.08%	74.34%	72.39%	73.30%	71.51%	72.20%
O2	13.49%	14.73%	12.93%	14.30%	12.84%	13.95%
SO2 (after SO2 oxidation)	0.000010%	0.000010%	0.000010%	0.000010%	0.000010%	0.000010%
SO3 (after SO2 oxidation)	0.000005%	0.000004%	0.000005%	0.000004%	0.000005%	0.000004%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Stack Exit Temperature, F	288	284	272	269	283	269
Stack Diameter, ft (estimated)	9.6	9.6	9.6	9.6	9.6	9.6
Stack Flow, lb/h	1,119,571	860,648	1,048,369	833,496	954,633	735,795
Stack Flow, scfm	250,784	191,494	235,534	186,425	215,429	165,431
Stack Flow, acfm	363,861	276,411	334,430	263,663	310,415	234,105
Stack Exit Velocity, ft/s	83.2	63.2	76.5	60.3	71.0	53.6
Stack NOx Emissions with the Effects of Selective Catalytic Reduction (SCR)						
NOx, ppmvd (dry, 15% O2)	2.0	2.0	2.0	2.0	2.0	2.0
NOx, lb/h as NO2	3.4	2.2	3.4	2.2	3.0	2.0
NOx, lb/MBtu (HHV) as NO2	0.0073	0.0073	0.0073	0.0073	0.0073	0.0073
SCR NH3 slip, ppmvd (dry, 15% O2)	5.0	5.0	5.0	5.0	5.0	5.0
SCR NH3 slip, lb/h	3.1	2.0	3.1	2.0	2.8	1.8

9-Jun-08
GWF
Henrietta Combined Cycle Conversion
LM6000PC-SPRINT Combined Cycle Emissions, Revision 4

Case Number	1	2	3	4	5	6
CTG Model	LM6000	LM6000	LM6000	LM6000	LM6000	LM6000
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Load	100%	60%	100%	60%	100%	60%
CTG Inlet Air Cooling	Off	Off	Evap. Cooler	Evap. Cooler	Evap. Cooler	Evap. Cooler
CTG Steam/Water Injection	Water	Water	Water	Water	Water	Water
Ambient Temperature, F	15	15	63	63	115	115
HRSG Duct Firing	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired
Fuel Sulfur Content (grains/100 standard cubic feet)	0.25	0.25	0.25	0.25	0.25	0.25
Stack CO Emissions with the Effects of Catalytic Reduction (CO Catalyst)						
CO, ppmvd (dry, 15% O2)	3.00	3.00	1.80	1.58	1.75	1.75
CO, lb/h	3.10	2.04	1.80	2.25	1.75	2.63
CO, lb/MBtu (HHV)	0.01	0.01	0.00	0.01	0.00	0.01
Stack SO2 Emissions without the Effects of SO2 Scrubber, after SO2 Oxidation						
SO2, ppmvd (dry, 15% O2)	0.14	0.14	0.14	0.14	0.14	0.14
SO2, lb/h	0.33	0.21	0.33	0.21	0.29	0.19
SO2, lb/MBtu (HHV)	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007
Stack VOC Emissions with the Effects of Catalytic Reduction (CO Catalyst)						
VOC, ppmvd (dry, 15% O2)	2.0	2.0	0.8	0.8	0.8	0.8
VOC, lb/h as CH4	1.2	0.8	0.5	0.3	0.4	0.3
VOC, lb/MBtu (HHV)	0.0025	0.0025	0.0011	0.0010	0.0010	0.0010
PM10 with the Effects of SO2 Oxidation [includes (NH4)2-(SO4)]						
PM10 Emissions - Front and Back Half Catch						
PM10, lb/h	2.2	2.1	2.2	2.1	2.1	2.1
PM10, lb/MBtu (HHV)	0.0046	0.0068	0.0046	0.0068	0.0051	0.0075
PM2.5 with the Effects of SO2 Oxidation [includes (NH4)2-(SO4)]						
PM2.5 Emissions - Front and Back Half Catch						
PM2.5, lb/h	2.2	2.1	2.2	2.1	2.1	2.1
PM2.5, lb/MBtu (HHV)	0.0046	0.0068	0.0046	0.0068	0.0051	0.0075
Additional Emissions						
CTG Exhaust						
O2, lb/h	171,178	142,728	154,101	134,909	140,023	116,793
CO2, lb/h	55,528	36,241	55,403	36,267	49,484	32,530
H2O, lb/h	66,610	39,687	69,768	46,119	70,295	47,729

Notes:

1. The emissions estimates shown in the table above are per stack. Emission estimates are expected and do not include any margin. Permitting margins should be applied by permitting engineer.
2. The dry air composition used is 0.98% Ar, 78.03% N2 and 20.99%O2.
3. Standard conditions are defined as 59° F, 14.696 psia, Norm conditions are defined as 32° F, 14.696 psia.
4. All ppm values are based on CH4 calibration gas.
5. The CTG performance and emissions is based on GE APPS data.
6. The VOC/UHC ratio is assumed to be 20% for natural gas firing (typical for GE turbines).
7. UHC values shown do not include the effects of oxidation in the CO catalyst.
8. The O2 reduction in the CO catalyst is negligible and not included in the analysis.
9. The H2O increase in the SCR catalyst is negligible and not included in the analysis.
10. The front half catch of particulate emissions is assumed to be half the amount of the front and back half catch.
11. Ammonium sulfates created downstream of the SCR are included in front half particulates and front&back half particulates. The assumption that 100% SO3 is converted to ammonium sulfates results in "worst case" particulate emissions.
12. B&V estimates of lb/h of pollutant emissions were adjusted, where applicable, to meet the values specified by GWF (VOC and PM10). VOC estimates for all cases except emissions on 15°F were adjusted based on 100% load emissions at 63F provided by GWF. All the PM10 emissions were adjusted based on value provided by GWF at 100% load on 63°F case.
13. SCR and CO Catalyst are included for emission reduction and are designed to control NOx and CO emissions to meet emission limits provided by GWF. The combined cycle limits for NOx, CO and VOC are set to 2.0 ppmvd @15% O2, 3.0 ppmvd @15%O2 and 2.0 ppmvd @15% O2 respectively as per GWF guidelines. VOC conversion across the CO catalyst is assumed to be 30% for 63°F and 115°F ambient cases. VOC catalyst efficiency for 15°F cases is adjusted so that VOC at stack equals target level of 2 ppmvd @ 15%O2.
14. Sulfur content in fuel gas was assumed to be 0.25 grains/100 SCF.
15. The estimated PM2.5 emissions are assumed to be 100% of PM10 emissions as per GE.
16. SO2 oxidation rate of 20% in CO catalyst was used for emission estimates. Permitting engineer should apply necessary margins if the assumed SO2 oxidation rate in CO catalyst varies from 20%.
17. The estimates for SO2 do not account for any reduction in SO2 emissions because of the oxidation of SO2 to SO3 in CTG, SCR and CO catalyst respectively.
18. SO3 and subsequent PM10 and PM2.5 values are calculated based on the SO2 to SO3 conversion rates noted for the CTG, SCR and CO catalyst.
19. The estimated ammonia slip (lb/hr) in SCR is based on the ammonia slip concentration (5 ppmvd @15%O2) as per GWF specified limits.
20. A equivalent stack diameter of 12 ft is used for stack velocity estimation.
21. Estimated stack temperatures are obtained from Thermoflow estimated combined cycle performance data.

Owner GWF
Plant Henrietta Combined Cycle Conversion
Project No. 161035.005
Title LM6000PC-SPRINT Simple Cycle Emissions, Revision 3

Computed By VRP
Date 6/05/2008

5-Jun-08
GWF
Henrietta Combined Cycle Conversion

LM6000PC-SPRINT Simple Cycle Emissions, Revision 3

Case Number	1	2	3	4	5	6
CTG Model	LM6000	LM6000	LM6000	LM6000	LM6000	LM6000
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Load	100%	60%	100%	60%	100%	60%
CTG Inlet Air Cooling	Off	Off	Evap. Cooler	Evap. Cooler	Evap. Cooler	Evap. Cooler
CTG Steam/Water Injection	Water	Water	Water	Water	Water	Water
Ambient Temperature, F	15	15	63	63	115	115
HRSG Duct Firing	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired
Fuel Sulfur Content (grains/100 standard cubic feet)	0.25	0.25	0.25	0.25	0.25	0.25
Ambient Conditions						
Ambient Temperature, F	15.0	15.0	63.0	63.0	115.0	115.0
Ambient Relative Humidity, %	92 0	92.0	60.0	60.0	21.0	21.0
Atmospheric Pressure, psia	14.569	14.569	14.569	14.569	14.569	14.569
Combustion Turbine Performance						
CTG Performance Reference	GE	GE	GE	GE	GE	GE
CTG Inlet Air Conditioning Effectiveness, %	0	0	85	85	85	85
CTG Compressor Inlet Dry Bulb Temperature, F	15.0	15.0	56.1	56.1	84.6	84.6
CTG Compr. Inlet Relative Humidity, %	92.1	92.1	92.9	92 9	79.4	79.4
Inlet Loss, In. H2O	4.5	4.5	4.5	4.5	4.5	4 5
Exhaust Loss, In. H2O	12 0	12.0	12.0	12.0	12.0	12.0
CTG Load Level (percent of Base Load)	100%	60%	100%	60%	100%	60%
Gross CTG Output, kW	49,967	29,970	46,893	29,340	42,756	25,655
Gross CTG Heat Rate, Btu/kWh (LHV)	8,412	9,152	8,574	9,356	8,761	9,598
Gross CTG Heat Rate, Btu/kWh (HHV)	9,309	10,128	9,489	10,354	9,696	10,620
CTG Heat Input, MBtu/h (LHV)	420.3	274.3	419 2	274 5	374.6	246.2
CTG Heat Input, MBtu/h (HHV)	465.2	303.6	463.9	303.8	414.6	272.5
CTG Water/Steam Injection Flow, lb/h	22,457	10,639	18,510	11,235	13,804	8,370
Injection Fluid/Fuel Ratio	1.0	0.7	0.8	0.8	0.7	0.7
CTG Exhaust Flow, lb/h	1,119,571	860,648	1,048,369	833,496	954,633	735,795
CTG Exhaust Temperature, F	785	732	847	789	873	842
Combustion Turbine Fuel						
Total CTG Fuel Flow lb/h	22 140	14,450	22,090	14,460	19,730	12 970
CTG Fuel Temperature F	76	76	76	76	76	76
CTG Fuel LHV, Btu/lb	18,981	18,981	18,981	18,981	18,981	18,981
CTG Fuel HHV, Btu/lb	21,006	21,006	21,006	21,006	21,006	21,006
HHV/LHV Ratio	1.1067	1.1067	1.1067	1.1067	1.1067	1 1067
CTG Fuel Composition (Ultimate Analysis by Weight)						
Ar	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
C	68.44%	68.44%	68.44%	68.44%	68.44%	68.44%
H2	21.38%	21 38%	21.38%	21.38%	21.38%	21.38%
N2	8.80%	8.80%	8.80%	8.80%	8.80%	8.80%
O2	1.37%	1.37%	1.37%	1.37%	1.37%	1.37%
S	0.00074%	0.00074%	0.00074%	0.00074%	0.00074%	0.00074%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Fuel Sulfur Content (grains/100 standard cubic feet)	0.25	0.25	0.25	0.25	0.25	0.25
Stack Emissions						
Stack Exhaust Analysis - Volume Basis - Wet						
Ar	0.92%	0.93%	0.91%	0.92%	0 90%	0.90%
CO2	3.18%	2.72%	3 38%	2.80%	3.30%	2.82%
H2O	9.33%	7.27%	10.39%	8.68%	11.45%	10.12%
N2	73.08%	74.34%	72.39%	73.30%	71.51%	72.20%
O2	13.49%	14.73%	12.93%	14.30%	12.84%	13.95%
SO2 (after SO2 oxidation)	0.000010%	0.000010%	0.000010%	0.000010%	0.000010%	0.000010%
SO3 (after SO2 oxidation)	0.000005%	0.000004%	0.000005%	0.000004%	0.000005%	0.000004%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Stack Exit Temperature, F	785	732	847	789	873	842
Stack Diameter, ft (estimated)	9.6	9.6	9.6	9.6	9.6	9.6
Stack Flow, lb/h	1,119,571	860,648	1,048,369	833,496	954,633	735,795
Stack Flow, scfm	250,784	191,494	235,534	186,425	215,429	165,431
Stack Flow, acfm	605,501	442,680	597,570	451,755	557,187	418,177
Stack Exit Velocity, ft/s	139	101	137	103	127	96
Stack NOx Emissions with the Effects of Selective Catalytic Reduction (SCR)						
NOx, ppmvd (dry, 15% O2)	3.6	3.6	3.6	3.6	3.6	3.6
NOx, lb/h as NO2	6.1	4.0	6 1	4.0	5.4	3 6
NOx, lb/MBtu (HHV) as NO2	0.0131	0.0131	0.0131	0.0131	0.0131	0.0131
SCR NH3 slip, ppmvd (dry, 15% O2)	10.0	10.0	10.0	10.0	10.0	10.0
SCR NH3 slip, lb/h	6.2	4.1	6.2	4.1	5.6	3.7
Stack CO Emissions with the Effects of Catalytic Reduction (CO Catalyst)						
CO, ppmvd (dry, 15% O2)	3.0	3.0	1.8	2.9	2.2	2.7
CO, lb/h	3.1	2.0	1 8	2.1	2.2	1.8
CO, lb/MBtu (HHV)	0.0067	0.0067	0.0039	0.0069	0.0053	0 0066
Stack SO2 Emissions without the Effects of SO2 Scrubber						
SO2, ppmvd (dry, 15% O2)	0.14	0.14	0.14	0.14	0.14	0.14
SO2, lb/h	0.33	0.21	0.33	0.21	0.29	0.19
SO2, lb/MBtu (HHV)	0.0007	0.0007	0 0007	0.0007	0.0007	0.0007

5-Jun-08
GWF
Henrietta Combined Cycle Conversion

LM6000PC-SPRINT Simple Cycle Emissions, Revision 3

Case Number	1	2	3	4	5	6
CTG Model	LM6000	LM6000	LM6000	LM6000	LM6000	LM6000
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Load	100%	60%	100%	60%	100%	60%
CTG Inlet Air Cooling	Off	Off	Evap. Cooler	Evap. Cooler	Evap Cooler	Evap. Cooler
CTG Steam/Water Injection	Water	Water	Water	Water	Water	Water
Ambient Temperature F	15	15	63	63	115	115
HRSG Duct Firing	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired
Fuel Sulfur Content (grains/100 standard cubic feet)	0.25	0.25	0.25	0.25	0.25	0.25
Stack VOC Emissions with the Effects of Catalytic Reduction (CO Catalyst)						
VOC, ppmvd (dry, 15% O2)	2.0	2.0	0.8	0.8	0.8	0.8
VOC, lb/h as CH4	1.2	0.8	0.5	0.3	0.4	0 3
VOC, lb/MBtu (HHV)	0.0025	0.0025	0.0011	0.0010	0.0010	0.0010
PM10 with the Effects of SO2 Oxidation						
PM10 Emissions - Front and Back Half Catch						
PM10, lb/h	2.2	2.1	2.2	2 1	2.1	2.1
PM10, lb/MBtu (HHV)	0.0046	0.0068	0.0046	0.0068	0.0051	0.0075
PM2.5 with the Effects of SO2 Oxidation						
PM2.5 Emissions - Front and Back Half Catch						
PM2.5, lb/h	2.2	2.1	2.2	2.1	2.1	2.1
PM2.5, lb/MBtu (HHV)	0.0046	0.0068	0.0046	0.0068	0.0051	0.0075
Additional Emissions						
CTG Exhaust						
O2, lb/h	171,178	142,728	154,101	134,909	140,023	116,793
CO2, lb/h	55,528	36,241	55,403	36,267	49,484	32,530
H2O, lb/h	66,610	39,687	69,768	46,119	70,295	47,729

Notes

1 The emissions estimatas shown in the table above are per stack Emission estimates are expected and do not include any margin. Permitting margins should be applied by permitting engineer.

2. The dry air composition used is 0.98% Ar, 78.03% N2 and 20.99%O2.

3. Standard conditions are defined as 59° F, 14.696 psia. Norm conditions are defined as 32° F, 14.696 psia.

4. All ppm values are based on CH4 calibration gas.

5. The CTG performance and emissions is based on GE APPS data.

6 The VOC/UHC ratio is assumed to be 20% for natural gas firing (typical for GE turbines).

7 UHC values shown do not include the effects of oxidation in the CO catalyst

8. The O2 reduction in the CO catalyst is negligible and not included in the analysis.

9. The H2O increase in the SCR catalyst is negligible and not included in the analysis.

10 The front half catch of particulate emissions is assumed to be half the amount of the front and back half catch

11. Ammonium sulfates created downstream of the SCR are included in front & back half particulates. The assumption that 100% SO3 is converted to ammonium sulfates results in "worst case" particulate emissions.

12 B&V estimates of lb/h of pollutant emissions were adjusted, where applicable, to meet the values specified by GWF (VOC and PM10) VOC estimates for all cases except emissions on 15°F were adjusted based on 100% load emissions at 63F provided by GWF. All the PM10 emissions were adjusted based on value provided by GWF at 100% load on 63°F case

13 SCR and CO Catalyst are included for emission reduction and are designed to control NOx and CO emissions to meet permit limits provided by GWF The revised simple cycle permit limits for NOx, CO and VOC are 3.6 ppmvd @15% O2, 3 0 ppmvd @15%O2 and 2.0 ppmvd @15% O2 respectively. VOC conversion across the CO catalyst is assumad to be 30% for 63°F and 115°F ambient cases VOC catalyst efficiency for 15°F cases is adjusted so that VOC at stack equals target level of 2 ppmvd @ 15%O2

14. Sulfur content in fuel gas was assumed to be 0.25 grains/100 SCF

15. The estimated PM2.5 emissions are assumed to be 100% of PM10 emissions as per GE

16. SO2 oxidation rate of 20% in CO catalyst was used for emission estimates. Permitting engineer should apply necessary margins if the assumed SO2 oxidation rate in CO catalyst varies from 20%.

17 The estimates for SO2 do not account for any reduction in SO2 emissions because of the oxidation of SO2 to SO3 in CTG, SCR and CO catalyst respectively.

18 SO3 and subsequent PM10 and PM2.5 values are calculated based on the SO2 to SO3 conversion rates noted for the CTG, SCR and CO catalyst.

19. The estimated ammonia slip (lb/hr) in SCR is based on the ammonia slip concentration (10 ppmvd @15%O2) as per GWF specified simple cycle permit limits

The auxiliary boiler will be equipped with an ultra-low oxides of nitrogen burner capable of exhaust NOx concentrations 6 ppmvd at 3 percent oxygen.

Carbon Monoxide and Volatile Organic Compound Emission Control

CO and VOCs emissions will be controlled using an oxidation catalyst located in the OTSGs. CO would be controlled to 3 ppmvd or less at 15 percent oxygen, and VOCs would be controlled to 2 ppmvd or less at 15 percent oxygen while operating under both combined and simple cycle modes.

The auxiliary boiler will be equipped with an ultra-low oxides of nitrogen burner capable of exhaust CO concentrations of 50 ppmvd corrected to 3 percent oxygen.

Particulate and Sulfur Dioxide Emission Control

Particulate and sulfur dioxide emissions will be controlled by using inherently low sulfur natural gas as the sole fuel for the CTGs and auxiliary boiler. In addition, the CTGs will employ high-efficiency inlet air filtration to remove particulate matter from the inlet air.

Continuous Emission Monitoring

CEM systems will sample, analyze, and record fuel gas flow rate, exhaust gas flow rate, NO_x and CO concentration levels, and percentage of oxygen in the stack exhaust gas. This system will generate emission data reports in accordance with permit requirements and will send alarm signals to the plant control room when emission levels approach or exceed pre-selected limits.

Operating Schedule

The GWF Henrietta would be operated by existing GWF personnel. GWF Henrietta is maintaining the current provision to operate the facility of up to 8,000 hours per year (excluding start up and shutdown hours). Table 1 presents the operating schedule for GWF Henrietta. The number of GWF Henrietta start ups and shutdowns are based on the fact that a "combined cycle start up or shutdown" will first require a simple cycle start up or shutdown as a result of the operational requirements of the OTSG.

TABLE 1

GWF Henrietta Annual Operating Hours per CTG

	Number of Starts and Shutdowns	Hours Per Start up/Shut Down	Total Annual Hours
Simple Cycle			
Startups	325	0.167	54
Shutdowns	325	0.167	54
Steady State	-		1,350
Combined Cycle			
Hot Starts	250	1	250
Warm Starts	50	1	50
Cold Starts	25	1	25
Shutdowns	325	0.33	107
Steady State	-	-	6,650
Total Annual Hours per CTG			**8,541**

Emissions Estimates

GWF Henrietta's CTGs have the capability of operating in either a simple cycle or combined cycle mode. As such, the emission concentrations for both modes differ slightly for NO_X. Table 2 presents the emissions concentrations for both operating modes.

TABLE 2
GWF Henrietta Maximum Operating Emission Concentrations per CTG

Pollutant	Simple Cycle Mode ppmvd at 15% Oxygen	Combined Cycle Mode ppmvd at 15% Oxygen
NO_X	3.6	2
CO	3	3
VOC	2	2
SO_2	<1	<1
$PM_{10/2.5}$ [a]	0.0009	0.0009
Ammonia	10	5

a. $PM_{10/2.5}$ concentrations are in units of grains per standard dry cubic feet.

Table 3 shows the maximum start up and shutdown hourly emissions for both operating modes. These emissions are based on vendor data, which showed no difference in combined cycle start up emissions for cold, warm, and hot start ups. Therefore, only one combined start up emission rate is shown in Table 3. As noted above, a combined cycle start up or shutdown will first require a simple cycle start up or shutdown. This means the total combined cycle start up or shutdown emissions are the sum of the simple cycle start up or shutdown emissions and the combined cycle start up/shut down emissions. The total combined start up/shut down emissions are represented in Table 3 by the rows titled "Total Combined Cycle Start Up" and "Total Combined Cycle Shutdown", respectively.

TABLE 3
GWF Henrietta Start Up and Shutdown Emissions per CTG

	NO_X	CO	VOC	$PM_{10/2.5}$	SO_2
Simple Cycle					
Start (lb/event)	7.7	7.7	0.7	0.1	0.1
Stop (lb/event)	7.7	7.7	0.7	0.2	0.1
Combined Cycle					
Start Up (lb/event)	6.1	3	0.5	2.2	0.3
Shutdown (lb/event)	2.1	1.0	0.2	0.8	0.1
Total Combined Cycle Start Up	13.8	10.7	1.2	2.3	0.4
Total Combined Cycle Shutdown	9.8	8.7	0.9	1.0	0.2

Table 4 presents the maximum hourly operating emission rates for both operating modes, including start up and shutdown emissions. These emissions rates are based on the CTGs emissions operating at base load at an ambient air temperature of 15 °F. The attachment contains emission estimates for the CTGs under both operating modes at 2 load conditions (base and 60 percent) and three ambient air temperatures. Start up and shutdown hourly emission rates include the balance of the hour filled in with CTG emissions operating at base load at an ambient air temperature of 15 °F.

TABLE 4
GWF Henrietta Maximum Hourly Emissions per Unit

	NO_X lb/hr	CO lb/hr	VOC lb/hr	$PM_{10/2.5}$ lb/hr	SO_2 lb/hr	NH_3 lb/hr
Simple Cycle						
Start Up	12.8	10.3	1.7	2.0	0.3	-
Shutdown	12.8	10.3	1.7	2.0	0.3	-
Normal Operating	6.1	3.1	1.2	2.2	0.3	6.2
Combined Cycle						
Start Up	17.2	13.8	2.4	4.5	0.7	-
Shutdown	4.4	3.1	1.0	2.3	0.3	-
Normal Operating	3.4	3.1	1.2	2.2	0.3	3.1
Fire Pump	2.8	0.7	<1	<1	<1	-
Auxiliary Boiler	<1	1.6	<1	<1	<1	-

Expected daily and annual emissions for the proposed project are presented in Table 5. The daily emissions presented in Table 5 are based the emission rates presented in Table 4, and includes 2 starts/shutdowns (for both operating modes), and the balance of the day with the CTG operating at base load at an ambient temperature of 15 °F. Annual emissions are based on the operating schedule presented in Table 1 and CTG base load emissions at the annual ambient temperature of 63 °F. The auxiliary boiler annual emissions are based on a 42 MMBtu/hour (HHV) firing rate and a maximum of 4,000 hours of operation annually. The fire pump was assumed to be a Tier III engine with an operate schedule of 50 hours per year for testing and maintenance. Emission estimates for the simple and combined cycle operations at three ambient temperatures and minimum and maximum operating rates are attached.

TABLE 5

GWF Henrietta Maximum Daily and Annual Emissions Estimate[a]

	NO_X lb	CO lb	VOC lb	$PM_{10/2.5}$ lb	SO_2 Lb	NH_3 lb
Daily Emissions for Simple Cycle Operation per CTG	173	103	31	52	8	145
Daily Emissions for Combined Cycle Operation per CTG	118	100	30	53	8	64
Annual Emissions per CTG	38,508	20,183	4,682	18,709	2,765	28,985
Total Annual Emissions for both CTGs	77,016	40,366	9,364	37,418	5,530	57,970
Annual Fire Pump Emissions[b]	139.0	34.0	0.0	3.9	0.0	0
Annual Auxiliary Boiler	1,237	6,273	840	1,176	101	0
Annual Emergency Diesel Generator (Existing)	243.3	6.2	2.1	1.5	8.9	0
Total Facility Emissions	78,635	46,680	10,206	38,599	5,640	57,970
Total Facility TPY	39.3	23.3	5.1	19.3	2.8	29.0

a. All emissions estimates include start up and shutdown emissions, as shown in Table 1.

b. Fire pump VOC emissions are included in the NO_X emissions.

Emission Offsets

Table 6 presents a summary of the SJVPACD emission offset applicability requirements for GWF Henrietta. The post project emissions are compared with SJVAPCD Rule 2201 emission offset thresholds. Since post-project emissions of NO_x and $PM_{10/2.5}$ would exceed SJVAPCD Rule 2201 emission offset thresholds, GWF Henrietta is required to provide emission offsets for the amount of project emission change. Since post-project CO, VOC, and SO_2 emissions do not exceed the offset threshold, there is no SJVAPCD requirement that the project emissions change for these pollutants be offset.

TABLE 6
GWF Henrietta Emission Offset Applicability Analysis

Description	NO_x Pounds	CO Pounds	VOC Pounds	$PM_{10/2.5}$ Pounds	SO_2 Pounds
Post Project Potential to Emit[a]	78,635	46,680	10,206	38,599	5,640
SJVAPCD Reg 2201 Offset Thresholds	20,000	200,000	20,000	29,200	54,750
Emission Offsets Required By SJVAPCD Reg 2201[b]	Yes	No	No	Yes	No

[a]See Table 5 - Total Facility Emissions.

[b]Offset are required when Post-Project Potential to Emit exceeds the Rule 2201 thresholds listed above. Post-project CO and SO_2 emissions do not exceed the thresholds of 200,000 lb/yr and 54,750 lb/yr, respectively and are therefore not subject to emission offset requirements under Rule 2201.

Table 7 presents a summary of the proposed mitigation for GWF Henrietta. When the HPP was originally permitted, SJVAPCD (and the California Energy Commission) required the surrender of emission reduction credits for all project emissions. Because the original HPP was fully offset, the project emissions change is calculated as the difference between the proposed post-project potential to emit and the currently permitted (and previously offset) emission levels. This calculation, reflected in the row titled "Project Emissions Change," shows that GWF Henrietta would result in an increase in PM_{10} emissions, the only pollutant subject to emission offset requirements under Rule 2201. GWF Henrietta proposes to provide 20,385 pounds of the surplus NOx mitigation (reflecting a ratio of NO_x to PM_{10} of 2.38:1 and a ratio of NOx to VOC of 1:1).

TABLE 7
GWF Henrietta Mitigation Summary

Description	NO_x Pounds	CO Pounds	VOC Pounds	$PM_{10/2.5}$ Pounds	SO_2 Pounds
Post Project Potential to Emit	78,635	46,680	10,206	38,599	5,640
Currently Permitted Emissions (2 Turbines)	99,020	43,660	5,688	32,000	5,280
Project Emissions Change	-20,385	3,020	4,518	6,599	360
NOx reduction for VOC increase @ 1:1 ratio (CEQA Mitigation)	4,518	--	-4,518	--	--
NOx reduction for PM10/2.5 increase @ 2.38:1 ratio	15,706	--	--	-6,599	--
Net Emission Change with Proposed Mitigation	-161	0	0	0	360

Attached are completed San Joaquin Valley Air District forms for the turbines (for both simple and combined cycle operating mode) and the fire pump. Also included is the Title V permit modification form and compliance certificate.

In addition to the above information, we are including a filing fee check in the amount of $325.

GWF Energy LLC looks forward to working with the District staff. If you have any questions, please call me.

Respectfully,

Mark Kehoe
Director of Environmental and Safety Programs

Attachments

c: Doug Wheeler, GWF Energy LLC

SJVAPCD

Authority to Construct

Application Forms

San Joaquin Valley Air Pollution Control District

www.valleyair.org

Permit Application For:

[ ] ADMINISTRATIVE AMENDMENT [X] MINOR MODIFICATION [ ] SIGNIFICANT MODIFICATION

1. PERMIT TO BE ISSUED TO: GWF Energy LLC – GWF Henrietta Combined Cycle Plant

2. MAILING ADDRESS:

STREET/P.O. BOX: 4300 Railroad Avenue

CITY: : Pittsburg STATE: CA 9-DIGIT ZIP CODE: 94565

3. LOCATION WHERE THE EQUIPMENT WILL BE OPERATED:

STREET: 16027 25th Ave CITY: Lemoore

SW ¼ SECTION 34 TOWNSHIP 19S RANGE 19E

INSTALLATION DATE: July 2009

4. GENERAL NATURE OF BUSINESS: Electric Generation

5. DESCRIPTION OF EQUIPMENT OR MODIFICATION FOR WHICH APPLICATION IS MADE (include Permit #'s if known, and use additional sheets if necessary)

1. Modification of the simply cycle GE LM6000 turbines to allow operation in either combined cycle or simple cycle mode

6. TYPE OR PRINT NAME OF APPLICANT: Mark Kehoe

TITLE OF APPLICANT: Vice President, Environmental and Safety Programs

7. SIGNATURE OF APPLICANT: Mark Kehoe DATE: 8-1-08

PHONE: (925) 431-1440
FAX: (925) 431-0518
EMAIL: mkehoe@gwfpower.com

For APCD Use Only:

DATE STAMP	*FILING FEE RECEIVED :* $ *CHECK#:*
	DATE PAID:
	PROJECT NO: *FACILITY ID:*

San Joaquin Valley
Unified Air Pollution Control District

TITLE V MODIFICATION - COMPLIANCE CERTIFICATION FORM

I. TYPE OF PERMIT ACTION (Check appropriate box)

[ ] SIGNIFICANT PERMIT MODIFICATION
[x] MINOR PERMIT MODIFICATION

[ ] ADMINISTRATIVE AMENDMENT

COMPANY NAME: GWF Energy LLC – GWF Henrietta Combined Cycle Plant	FACILITY ID: C- 3929
1. Type of Organization:[X] Corporation [ ] Sole Ownership [ ] Government [ ] Partnership [ ] Utility	
2. Owner's Name: GWF Energy LLC	
3. Agent to the Owner:	

II. COMPLIANCE CERTIFICATION (Read each statement carefully and initial **all** circles for confirmation):

MK Based on information and belief formed after reasonable inquiry, the equipment identified in this application will continue to comply with the applicable federal requirement(s).

MK Based on information and belief formed after reasonable inquiry, the equipment identified in this application will comply with applicable federal requirement(s) that will become effective during the permit term, on a timely basis.

MK Corrected information will be provided to the District when I become aware that incorrect or incomplete information has been submitted.

MK Based on information and belief formed after reasonable inquiry, information and statements in the submitted application package, including all accompanying reports, and required certifications are true accurate and complete.

I declare, under penalty of perjury under the laws of the state of California, that the forgoing is correct and true:

Mark Kehoe ____________________ 8-1-08 ____________________

Signature of Responsible Official Date

Mark Kehoe

Name of Responsible Official (please print)

Vice President, Environmental and Safety Programs

Title of Responsible Official (please print)

San Joaquin Valley Air Pollution Control District

www.valleyair.org

Permit Application For:

[ ] AUTHORITY TO CONSTRUCT (ATC) - New Emission Unit
[X] AUTHORITY TO CONSTRUCT (ATC) - Modification Of Emission Unit With Valid PTO/Valid ATC
[ ] AUTHORITY TO CONSTRUCT (ATC) - Renewal of Valid Authority to Construct
[ ] PERMIT TO OPERATE (PTO) - Existing Emission Unit Now Requiring a Permit to Operate

1. PERMIT TO BE ISSUED TO: GWF Energy LLC – GWF Henrietta Combined Cycle Plant

2. MAILING ADDRESS:
STREET/P.O. BOX: 4300 Railroad Avenue
CITY: Pittsburg STATE: CA 9-DIGIT ZIP CODE: 94565-6006

3. LOCATION WHERE THE EQUIPMENT WILL BE OPERATED:
STREET: 16027 25th Ave CITY: Lemoore
SW /4 SECTION 34 TOWNSHIP 19S RANGE 19E

WITHIN 1,000 FT OF A SCHOOL? [ ] YES [X] NO

S.I.C. CODE(S) OF FACILITY (*If known*): 4911

4. GENERAL NATURE OF BUSINESS: Electricity Generation

INSTALL DATE: July 2009

5. TITLE V PERMIT HOLDERS ONLY: Do you request a COC (EPA Review) prior to receiving your ATC (*If yes, please complete and attach a Compliance Certification form (TVFORM-009)*? [X] YES [ ] NO

6. DESCRIPTION OF EQUIPMENT OR MODIFICATION FOR WHICH APPLICATION IS MADE (include Permit #'s if known, and use additional sheets if necessary)

Conversion of the existing simple cycle GE LM6000 turbine to allow operation in both combined cycle turbine and simple cycle mode

7. PERMIT REVIEW PERIOD: Do you request a three- or ten-day period to review the draft Authority to Construct permit? Please note that checking "YES" will delay issuance of your final permit by a corresponding number of working days. See instructions for more information on this review process.
[ ] 3-day review
[ ] 10-day review
[X] No review requested

8. HAVE YOU EVER APPLIED FOR AN ATC OR PTO IN THE PAST? [X] YES [ ] NO
If yes, ATC/PTO #: C-3929-1

9. HAVE ALL NECESSARY LAND-USE AUTHORIZATIONS BEEN OBTAINED? (*If "No" is checked, please attach explanation*) [X] YES [ ] NO

10. IS THIS APPLICATION SUBMITTED AS THE RESULT OF EITHER A NOTICE OF VIOLATION OR A NOTICE TO COMPLY? [ ] YES [X] NO
If yes, NOV/NTC #:

Optional Section

11. CHECK WHETHER YOU ARE A PARTICIPANT IN EITHER OF THESE VOLUNTARY PROGRAMS:
"Healthy Air Living (HAL)"
[ ]Yes [ ]No [X]Send info
"INSPECT"
[ ]Yes [ ]No [X]Send info

12. TYPE OR PRINT NAME OF APPLICANT: Mark Kehoe

TITLE OF APPLICANT: Director, Environmental and Safety Projects

13. SIGNATURE OF APPLICANT: Mark Kehoe DATE: 8-1-08

PHONE #: (925) 431-1440
FAX #: (925) 431-0518
E-MAIL: mkehoe@gwfpower.com

FOR APCD USE ONLY:

DATE STAMP:

FILING FEE RECEIVED: $ CHECK #:
DATE PAID:
PROJECT #: FACILITY ID:

San Joaquin Valley Air Pollution Control District
Supplemental Application Form

Gas Turbines

Please complete one form for each gas turbine.

This form must be accompanied by a completed Application for Authority to Construct and Permit to Operate form

PERMIT TO BE ISSUED TO: GWF Energy LLC – GWF Henrietta Combined Cycle Plat

EQUIPMENT DESCRIPTION

Equipment Details	☐ Industrial Frame ☒ Aero Derivative ☐ Other: ______		
	Manufacturer: General Electric	Model: LM6000	Serial Number: 191361
	☒ Simple Cycle ☐ Combined Cycle ☐ Co-generation ☐ Other: ______		
	Nominal (ISO) Rating: 60 MW (at 1 atm, 59°F, 60% Relative Humidity)		
	Is the unit equipped with an auxiliary/duct burner? ☐ Yes ☒ No (Note: If yes, please complete a *Boiler, Steam Generator, Dryer, and Process Heater Supplemental Application form* for the unit.)		
Rule 4703 Type of Use and Emissions Monitoring Provisions	☐ Peaking Unit - limited to no more than 877 hrs/yr of operation ☐ Emergency Standby - limited to less than 200 hrs/yr of operation ☒ Full Time - must have either a Continuous Emission Monitoring System (CEMS) or an alternate emissions monitoring plan (must be approved by the APCO) ☒ CEMS, please specify all pollutants monitored: ☒ NO_x ☒ CO ☒ O_2 ☐ Other: ______ ☐ Alternate Emissions Monitoring Plan (please provide details in additional documentation)		
Fuel Use Meter	☒ Gaseous Fuel Meter ☐ Liquid Fuel Meter ☐ None		
Process Data	Will this unit be used in an electric utility rate reduction program? ☐ Yes ☒ No		
Combustor(s)	Manufacturer: General Electric	Model: LM6000	Number of Combustors: 1
	Maximum Heat Input Rating (for all combustors @ ISO standard conditions): 465 MMBtu/hr		
	Water Injection: ☒ Yes ☐ No	Dry Low NO_x Technology: ☐ Yes ☒ No	
	Steam Injection: ☐ Yes ☒ No	Other NO_x Control Technology: SCR	

EMISSIONS DATA

Note: See District BACT and District Rule 4703 requirements for applicability to proposed unit at http://www.valleyair.org/busind/pto/bact/chapter3.pdf and http://www.valleyair.org/rules/currntrules/r4703.pdf

Primary Fuel	Fuel Type: ☒ Natural Gas ☐ LPG/Propane ☐ Diesel ☐ Other: ______	
	Higher Heating Value: __Btu/gal or 1020 Btu/scf	Sulfur Content: _ % by weight or 0.25 gr/scf
	Maximum Fuel Use @ HHV: 0.456 MM scf/hr or __gal/hr	Rated Efficiency (EFF_{Mfg}): 49.57%

Primary Fuel Emissions Data

Operational Mode	Steady State (ppmv)	Steady State (lb/MMBtu)	Start-up (ppmv)	Start-up (lb/hr)	Shutdown (ppmv)	Shutdown (lb/hr)
Nitrogen Oxides	3.6			46.2		46.2
Carbon Monoxide	3			46.2		46.2
Volatile Organic Compounds	2			4.2		4.2
Duration			0.17 hr/day	54 hr/yr	0.17 hr/day	54 hr/yr

% O_2, dry basis, if corrected to other than 15%: ______ %

EMISSIONS DATA (continued)

Secondary Fuel	When will the secondary fuel be used? ☐ Primary fuel curtailment ☐ Simultaneously with primary fuel ☐ Other: ________						
	Fuel Type: ☐ Natural Gas ☐ LPG/Propane ☐ Diesel ☐ Other: ________						
	Higher Heating Value: ______ Btu/gal or ______ Btu/scf			Sulfur Content: ______ % by weight or ______ gr/scf			
	Maximum Fuel Use @ HHV: ______ scf/hr or ______ gal/hr			Rated Efficiency (EFF_{Mfg}): ______ %			
Secondary Fuel Emissions Data	Operational Mode	Steady State (ppmv)	Steady State (lb/MMBtu)	Start-up (ppmv)	Start-up (lb/hr)	Shutdown (ppmv)	Shutdown (lb/hr)
	Nitrogen Oxides						
	Carbon Monoxide						
	Volatile Organic Compounds						
	Duration (please provide justification)			____ hr/day	____ hr/yr	____ hr/day	____ hr/yr
	% O_2, dry basis, if corrected to other than 15%: ______ %						
Source of Data	☒ Manufacturer's Specifications ☐ Emission Source Test ☐ Other ________ (please provide copies)						

EMISSIONS CONTROL

Emissions Control Equipment (Check all that apply)	☒ Inlet Air Filter/Cooler	☒ Lube Oil Vent Coalescer
	☒ Selective Catalytic Reduction - Manufacturer: TBD Model: TBD ☒ Ammonia (NH_3) ☐ Urea ☐ Other: ________ ☒ Oxidation Catalyst - Manufacturer: TBD Model: TBD Control Efficiencies: NO_x 92 %, SO_x NA % PM_{10} NA %, CO 95 %, VOC NA	
	☐ Other (please specify):	
	For units equipped with exhaust gas NO_x control equipment and rated < 10 MW, or rated ≥ 10 MW but operated < 4,000 hr/yr, one may choose at least one of the following alternate emission monitoring schemes in lieu of a CEMS (each option below must be approved by APCO on a case-by-case basis. Please include a detailed proposal for each option chosen): ☐ Periodic NO_x emission concentration ☐ Turbine exhaust O_2 concentration ☐ Air-to-Fuel ratio ☐ Flow rate of reducing agents added to turbine exhaust ☐ Catalyst inlet and outlet temperature ☐ Catalyst inlet and exhaust O_2 conc. ☐ Other operational characteristics as approved by the APCO (specify on attached sheet)	

HEALTH RISK ASSESSMENT DATA

Operating Hours	Maximum Operating Schedule: 24 hours per day, and 1458 (including startup and shutdown) hours per year		
Receptor Data	Distance to nearest Residence	6450 feet	Distance is measured from the proposed stack location to the nearest boundary of the nearest apartment, house, dormitory, etc.
	Direction to nearest Residence	Northeast	Direction from the stack to the receptor, i.e. Northeast or South.
	Distance to nearest Business	400 feet	Distance is measured from the proposed stack location to the nearest boundary of the nearest office building, factory, store, etc.
	Direction to nearest Business	North	Direction from the stack to the receptor, i.e. North or Southwest.
Stack Parameters	Release Height	91.5 feet above grade	
	Stack Diameter	86 X 122 inches at point of release	
	Rain Cap	☐ Flapper-type ☐ Fixed-type ☒ None ☐ Other: ________	
	Direction of Flow	☒ Vertically Upward ☐ Horizontal ☐ Other: ____° from vert. or ____° from horiz.	
Exhaust Data	Flowrate: 605,501 acfm	Temperature: 785 °F	
Facility Location	☐ Urban (area of dense population) ☒ Rural (area of sparse population)		

FOR DISTRICT USE ONLY

Date:	**FID:**	**Project:**	**Public Notice:** [ ] Yes [ ] No
Comments:			

San Joaquin Valley Air Pollution Control District
Supplemental Application Form

Gas Turbines

Please complete one form for each gas turbine.

This form must be accompanied by a completed Application for Authority to Construct and Permit to Operate form

PERMIT TO BE ISSUED TO: GWF Energy LLC – GWF Henrietta Combined Cycle Plant

EQUIPMENT DESCRIPTION

Equipment Details	☐ Industrial Frame ☒ Aero Derivative ☐ Other: ______		
	Manufacturer: General Electric	Model: LM6000	Serial Number: 191374
	☐ Simple Cycle ☒ Combined Cycle ☐ Co-generation ☐ Other: ______		
	Nominal (ISO) Rating: 60 MW (at 1 atm, 59°F, 60% Relative Humidity)		
	Is the unit equipped with an auxiliary/duct burner? ☐ Yes ☒ No (Note: If yes, please complete a *Boiler, Steam Generator, Dryer, and Process Heater Supplemental Application form* for the unit.)		
Rule 4703 Type of Use and Emissions Monitoring Provisions	☐ Peaking Unit - limited to no more than 877 hrs/yr of operation ☐ Emergency Standby - limited to less than 200 hrs/yr of operation ☒ Full Time - must have either a Continuous Emission Monitoring System (CEMS) or an alternate emissions monitoring plan (must be approved by the APCO) ☒ CEMS, please specify all pollutants monitored: ☒ NO_x ☒ CO ☒ O_2 ☐ Other: ______ ☐ Alternate Emissions Monitoring Plan (please provide details in additional documentation)		
Fuel Use Meter	☒ Gaseous Fuel Meter ☐ Liquid Fuel Meter ☐ None		
Process Data	Will this unit be used in an electric utility rate reduction program? ☐ Yes ☒ No		
Combustor(s)	Manufacturer: General Electric	Model: LM6000	Number of Combustors: 1
	Maximum Heat Input Rating (for all combustors @ ISO standard conditions): 465 MMBtu/hr		
	Water Injection: ☒ Yes ☐ No	Dry Low NO_x Technology: ☐ Yes ☒ No	
	Steam Injection: ☐ Yes ☒ No	Other NO_x Control Technology: SCR	

EMISSIONS DATA

Note: See District BACT and District Rule 4703 requirements for applicability to proposed unit at http://www.valleyair.org/busind/pto/bact/chapter3.pdf and http://www.valleyair.org/rules/currntrules/r4703.pdf

Primary Fuel	Fuel Type: ☒ Natural Gas ☐ LPG/Propane ☐ Diesel ☐ Other: ______	
	Higher Heating Value: __ Btu/gal or 1020 Btu/scf	Sulfur Content: _ % by weight or 0.25 gr/scf
	Maximum Fuel Use @ HHV: 0.456 MM scf/hr or __ gal/hr	Rated Efficiency (EFF_{Mfg}): 49.57%

Primary Fuel Emissions Data

Operational Mode	Steady State (ppmv)	Steady State (lb/MMBtu)	Start-up (ppmv)	Start-up (lb/hr)	Shutdown (ppmv)	Shutdown (lb/hr)
Nitrogen Oxides	2			6.1		6.3
Carbon Monoxide	3			3.1		3.3
Volatile Organic Compounds	2			1.2		1.2
Duration			1.0 hr/day	325 hr/yr	0.33 hr/day	107 hr/yr
% O_2, dry basis, if corrected to other than 15%: ______ %						

EMISSIONS DATA (continued)

Secondary Fuel	When will the secondary fuel be used? ☐ Primary fuel curtailment ☐ Simultaneously with primary fuel ☐ Other: ________						
	Fuel Type: ☐ Natural Gas ☐ LPG/Propane ☐ Diesel ☐ Other: ________						
	Higher Heating Value: ______ Btu/gal or ______ Btu/scf			Sulfur Content: ______ % by weight or ______ gr/scf			
	Maximum Fuel Use @ HHV: ______ scf/hr or ______ gal/hr			Rated Efficiency (EFF_{Mfg}): ______ %			
Secondary Fuel Emissions Data	Operational Mode	Steady State (ppmv)	Steady State (lb/MMBtu)	Start-up (ppmv)	Start-up (lb/hr)	Shutdown (ppmv)	Shutdown (lb/hr)
	Nitrogen Oxides						
	Carbon Monoxide						
	Volatile Organic Compounds						
	Duration (please provide justification)			______ hr/day	______ hr/yr	______ hr/day	______ hr/yr
	% O_2, dry basis, if corrected to other than 15%: ______ %						
Source of Data	☒ Manufacturer's Specifications ☐ Emission Source Test ☐ Other ________ (please provide copies)						

EMISSIONS CONTROL

Emissions Control Equipment (Check all that apply)	☒ Inlet Air Filter/Cooler	☒ Lube Oil Vent Coalescer
	☒ Selective Catalytic Reduction - Manufacturer: TBD Model: TBD ☒ Ammonia (NH_3) ☐ Urea ☐ Other: ________	
	☒ Oxidation Catalyst - Manufacturer: TBD Model: TBD	
	Control Efficiencies: NO_x 92 %, SO_x NA % PM_{10} NA %, CO 95 %, VOC NA	
	☐ Other (please specify):	
	For units equipped with exhaust gas NO_x control equipment and rated < 10 MW, or rated ≥ 10 MW but operated < 4,000 hr/yr, one may choose at least one of the following alternate emission monitoring schemes in lieu of a CEMS (each option below must be approved by APCO on a case-by-case basis. Please include a detailed proposal for each option chosen): ☐ Periodic NO_x emission concentration ☐ Turbine exhaust O_2 concentration ☐ Air-to-Fuel ratio ☐ Flow rate of reducing agents added to turbine exhaust ☐ Catalyst inlet and outlet temperature ☐ Catalyst inlet and exhaust O_2 conc. ☐ Other operational characteristics as approved by the APCO (specify on attached sheet)	

HEALTH RISK ASSESSMENT DATA

Operating Hours	Maximum Operating Schedule: 24 hours per day, and 7082 (including startup and shutdown) hours per year		
Receptor Data	Distance to nearest Residence	6450 feet	Distance is measured from the proposed stack location to the nearest boundary of the nearest apartment, house, dormitory, etc.
	Direction to nearest Residence	Northeast	Direction from the stack to the receptor, i.e. Northeast or South.
	Distance to nearest Business	400 feet	Distance is measured from the proposed stack location to the nearest boundary of the nearest office building, factory, store, etc.
	Direction to nearest Business	North	Direction from the stack to the receptor, i.e. North or Southwest.
Stack Parameters	Release Height	91.5 feet above grade	
	Stack Diameter	86 X 122 inches at point of release	
	Rain Cap	☐ Flapper-type ☐ Fixed-type ☒ None ☐ Other: ________	
	Direction of Flow	☒ Vertically Upward ☐ Horizontal ☐ Other: ____ ° from vert. or ____ ° from horiz.	
Exhaust Data	Flowrate: 363,861 acfm	Temperature: 288 °F	
Facility Location	☐ Urban (area of dense population) ☒ Rural (area of sparse population)		

FOR DISTRICT USE ONLY

Date:	**FID:**	**Project:**	**Public Notice: [ ] Yes [ ] No**
Comments:			

San Joaquin Valley Air Pollution Control District

www.valleyair.org

Permit Application For:

[ ] AUTHORITY TO CONSTRUCT (ATC) - New Emission Unit
[X] AUTHORITY TO CONSTRUCT (ATC) - Modification Of Emission Unit With Valid PTO/Valid ATC
[ ] AUTHORITY TO CONSTRUCT (ATC) - Renewal of Valid Authority to Construct
[ ] PERMIT TO OPERATE (PTO) - Existing Emission Unit Now Requiring a Permit to Operate

1. PERMIT TO BE ISSUED TO: GWF Energy LLC – GWF Henrietta Combined Cycle Pant

2. MAILING ADDRESS:
STREET/P.O. BOX: 4300 Railroad Avenue
CITY: Pittsburg STATE: CA 9-DIGIT ZIP CODE: 94565-6006

3. LOCATION WHERE THE EQUIPMENT WILL BE OPERATED:
STREET: 16027 25th Ave. CITY: Lemoore
SW /4 SECTION 34 TOWNSHIP 19S RANGE 19E

WITHIN 1,000 FT OF A SCHOOL? [ ] YES [X] NO

S.I.C. CODE(S) OF FACILITY (*If known*): 4911

4. GENERAL NATURE OF BUSINESS: Electricity Generation

INSTALL DATE: July 2009

5. TITLE V PERMIT HOLDERS ONLY: Do you request a COC (EPA Review) prior to receiving your ATC (*If yes, please complete and attach a Compliance Certification form (TVFORM-009)*? [X] YES [ ] NO

6. DESCRIPTION OF EQUIPMENT OR MODIFICATION FOR WHICH APPLICATION IS MADE (include Permit #'s if known, and use additional sheets if necessary)

Conversion of the existing simple cycle GE LM6000 turbine to allow operation in either a combined cycle or simple cycle mode.

7. PERMIT REVIEW PERIOD: Do you request a three- or ten-day period to review the draft Authority to Construct permit? Please note that checking "YES" will delay issuance of your final permit by a corresponding number of working days. See instructions for more information on this review process.
[ ] 3-day review
[ ] 10-day review
[X] No review requested

8. HAVE YOU EVER APPLIED FOR AN ATC OR PTO IN THE PAST? [X] YES [ ] NO
If yes, ATC/PTO #: C-3929-2

9. HAVE ALL NECESSARY LAND-USE AUTHORIZATIONS BEEN OBTAINED? (*If "No" is checked, please attach explanation*) [X] YES [ ] NO

10. IS THIS APPLICATION SUBMITTED AS THE RESULT OF EITHER A NOTICE OF VIOLATION OR A NOTICE TO COMPLY? [ ] YES [X] NO
If yes, NOV/NTC #:

Optional Section

11. CHECK WHETHER YOU ARE A PARTICIPANT IN EITHER OF THESE VOLUNTARY PROGRAMS:
"Healthy Air Living (HAL)"
[ ]Yes [ ]No [X]Send info
"INSPECT"
[ ]Yes [ ]No [X]Send info

12. TYPE OR PRINT NAME OF APPLICANT: Mark Kehoe

TITLE OF APPLICANT: Director, Environmental and Safety Projects

13. SIGNATURE OF APPLICANT: Mark Kehoe DATE: 8-1-08

PHONE #: (925) 431-1440
FAX #: (925) 431-0518
E-MAIL: mkehoe@gwfpower.com

FOR APCD USE ONLY:

DATE STAMP:

FILING FEE RECEIVED: $ CHECK #:
DATE PAID:
PROJECT #: FACILITY ID:

San Joaquin Valley Air Pollution Control District
Supplemental Application Form

Gas Turbines

Please complete one form for each gas turbine.

This form must be accompanied by a completed Application for Authority to Construct and Permit to Operate form

PERMIT TO BE ISSUED TO: GWF Energy LLC – GWF Henrietta Combined Cycle Plant

EQUIPMENT DESCRIPTION

Equipment Details	☐ Industrial Frame ☒ Aero Derivative ☐ Other:		
	Manufacturer: General Electric	Model: LM6000	Serial Number: 191374
	☒ Simple Cycle ☐ Combined Cycle ☐ Co-generation ☐ Other:		
	Nominal (ISO) Rating: 60 MW (at 1 atm, 59°F, 60% Relative Humidity)		
	Is the unit equipped with an auxiliary/duct burner? ☐ Yes ☒ No (Note: If yes, please complete a *Boiler, Steam Generator, Dryer, and Process Heater Supplemental Application form* for the unit.)		
Rule 4703 Type of Use and Emissions Monitoring Provisions	☐ Peaking Unit - limited to no more than 877 hrs/yr of operation ☐ Emergency Standby - limited to less than 200 hrs/yr of operation ☒ Full Time - must have either a Continuous Emission Monitoring System (CEMS) or an alternate emissions monitoring plan (must be approved by the APCO) ☒ CEMS, please specify all pollutants monitored: ☒ NO_x ☒ CO ☒ O_2 ☐ Other: ☐ Alternate Emissions Monitoring Plan (please provide details in additional documentation)		
Fuel Use Meter	☒ Gaseous Fuel Meter ☐ Liquid Fuel Meter ☐ None		
Process Data	Will this unit be used in an electric utility rate reduction program? ☐ Yes ☒ No		
Combustor(s)	Manufacturer: General Electric	Model: LM6000	Number of Combustors: 1
	Maximum Heat Input Rating (for all combustors @ ISO standard conditions): 465 MMBtu/hr		
	Water Injection: ☒ Yes ☐ No	Dry Low NO_x Technology: ☐ Yes ☒ No	
	Steam Injection: ☐ Yes ☒ No	Other NO_x Control Technology: SCR	

EMISSIONS DATA

Note: See District BACT and District Rule 4703 requirements for applicability to proposed unit at http://www.valleyair.org/busind/pto/bact/chapter3.pdf and http://www.valleyair.org/rules/currntrules/r4703.pdf

Primary Fuel	Fuel Type: ☒ Natural Gas ☐ LPG/Propane ☐ Diesel ☐ Other:	
	Higher Heating Value: __Btu/gal or 1020 Btu/scf	Sulfur Content: _ % by weight or 0.25 gr/scf
	Maximum Fuel Use @ HHV: 0.456 MM scf/hr or __gal/hr	Rated Efficiency (EFF_{Mfg}): 49.57%

Primary Fuel Emissions Data	Operational Mode	Steady State (ppmv)	Steady State (lb/MMBtu)	Start-up (ppmv)	Start-up (lb/hr)	Shutdown (ppmv)	Shutdown (lb/hr)
	Nitrogen Oxides	3.6			46.2		46.2
	Carbon Monoxide	3			46.2		46.2
	Volatile Organic Compounds	2			4.2		4.2
	Duration			0.17 hr/day	54 hr/yr	0.17 hr/day	54 hr/yr
	% O_2, dry basis, if corrected to other than 15%: ____ %						

EMISSIONS DATA (continued)

Secondary Fuel	When will the secondary fuel be used? ☐ Primary fuel curtailment ☐ Simultaneously with primary fuel ☐ Other: ______					
	Fuel Type: ☐ Natural Gas ☐ LPG/Propane ☐ Diesel ☐ Other: ______					
	Higher Heating Value: ______ Btu/gal or ______ Btu/scf			Sulfur Content: ______ % by weight or ______ gr/scf		
	Maximum Fuel Use @ HHV: ______ scf/hr or ______ gal/hr			Rated Efficiency (EFF_{Mfg}): ______ %		

	Operational Mode	Steady State (ppmv)	Steady State (lb/MMBtu)	Start-up (ppmv)	Start-up (lb/hr)	Shutdown (ppmv)	Shutdown (lb/hr)
Secondary Fuel Emissions Data	Nitrogen Oxides						
	Carbon Monoxide						
	Volatile Organic Compounds						
	Duration (please provide justification)			______ hr/day	______ hr/yr	______ hr/day	______ hr/yr
	% O_2, dry basis, if corrected to other than 15%: ______ %						
Source of Data	☒ Manufacturer's Specifications ☐ Emission Source Test ☐ Other ______ (please provide copies)						

EMISSIONS CONTROL

Emissions Control Equipment (Check all that apply)	☒ Inlet Air Filter/Cooler	☒ Lube Oil Vent Coalescer
	☒ Selective Catalytic Reduction - Manufacturer: TBD Model: TBD ☒ Ammonia (NH_3) ☐ Urea ☐ Other: ______ ☒ Oxidation Catalyst - Manufacturer: TBD Model: TBD Control Efficiencies: NO_x 92 %, SO_x NA % PM_{10} NA %, CO 95 %, VOC NA	
	☐ Other (please specify):	
	For units equipped with exhaust gas NO_x control equipment and rated < 10 MW, or rated ≥ 10 MW but operated < 4,000 hr/yr, one may choose at least one of the following alternate emission monitoring schemes in lieu of a CEMS (each option below must be approved by APCO on a case-by-case basis. Please include a detailed proposal for each option chosen): ☐ Periodic NO_x emission concentration ☐ Turbine exhaust O_2 concentration ☐ Air-to-Fuel ratio ☐ Flow rate of reducing agents added to turbine exhaust ☐ Catalyst inlet and outlet temperature ☐ Catalyst inlet and exhaust O_2 conc. ☐ Other operational characteristics as approved by the APCO (specify on attached sheet)	

HEALTH RISK ASSESSMENT DATA

Operating Hours	Maximum Operating Schedule: 24 hours per day, and 1458 (including startup and shutdown) hours per year		
Receptor Data	Distance to nearest Residence	6450 feet	Distance is measured from the proposed stack location to the nearest boundary of the nearest apartment, house, dormitory, etc.
	Direction to nearest Residence	Northeast	Direction from the stack to the receptor, i.e. Northeast or South.
	Distance to nearest Business	400 feet	Distance is measured from the proposed stack location to the nearest boundary of the nearest office building, factory, store, etc.
	Direction to nearest Business	North	Direction from the stack to the receptor, i.e. North or Southwest.
Stack Parameters	Release Height	91.5 feet above grade	
	Stack Diameter	86 X 122 inches at point of release	
	Rain Cap	☐ Flapper-type ☐ Fixed-type ☒ None ☐ Other: ______	
	Direction of Flow	☒ Vertically Upward ☐ Horizontal ☐ Other: ____° from vert. or ____° from horiz.	
Exhaust Data	Flowrate: 605,501 acfm		Temperature: 785 °F
Facility Location	☐ Urban (area of dense population) ☒ Rural (area of sparse population)		

FOR DISTRICT USE ONLY

Date:	**FID:**	**Project:**	**Public Notice: [ ] Yes [ ] No**
Comments:			

San Joaquin Valley Air Pollution Control District
Supplemental Application Form

Gas Turbines

Please complete one form for each gas turbine.

This form must be accompanied by a completed Application for Authority to Construct and Permit to Operate form

PERMIT TO BE ISSUED TO: GWF Energy LLC – GWF Henrietta Combined Cycle Plant

EQUIPMENT DESCRIPTION

Equipment Details	☐ Industrial Frame ☒ Aero Derivative ☐ Other: ____		
	Manufacturer: General Electric	Model: LM6000	Serial Number: 191361
	☐ Simple Cycle ☒ Combined Cycle ☐ Co-generation ☐ Other: ____		
	Nominal (ISO) Rating: 60 MW (at 1 atm, 59°F, 60% Relative Humidity)		
	Is the unit equipped with an auxiliary/duct burner? ☐ Yes ☒ No (Note: If yes, please complete a *Boiler, Steam Generator, Dryer, and Process Heater Supplemental Application form* for the unit.)		
Rule 4703 Type of Use and Emissions Monitoring Provisions	☐ Peaking Unit - limited to no more than 877 hrs/yr of operation ☐ Emergency Standby - limited to less than 200 hrs/yr of operation ☒ Full Time - must have either a Continuous Emission Monitoring System (CEMS) or an alternate emissions monitoring plan (must be approved by the APCO) ☒ CEMS, please specify all pollutants monitored: ☒ NO_x ☒ CO ☒ O_2 ☐ Other: ____ ☐ Alternate Emissions Monitoring Plan (please provide details in additional documentation)		
Fuel Use Meter	☒ Gaseous Fuel Meter ☐ Liquid Fuel Meter ☐ None		
Process Data	Will this unit be used in an electric utility rate reduction program? ☐ Yes ☒ No		
Combustor(s)	Manufacturer: General Electric	Model: LM6000	Number of Combustors: 1
	Maximum Heat Input Rating (for all combustors @ ISO standard conditions): 465 MMBtu/hr		
	Water Injection: ☒ Yes ☐ No	Dry Low NO_x Technology: ☐ Yes ☒ No	
	Steam Injection: ☐ Yes ☒ No	Other NO_x Control Technology: SCR	

EMISSIONS DATA

Note: See District BACT and District Rule 4703 requirements for applicability to proposed unit at http://www.valleyair.org/busind/pto/bact/chapter3.pdf and http://www.valleyair.org/rules/currntrules/r4703.pdf

Primary Fuel	Fuel Type: ☒ Natural Gas ☐ LPG/Propane ☐ Diesel ☐ Other: ____	
	Higher Heating Value: __Btu/gal or 1020 Btu/scf	Sulfur Content: _ % by weight or 0.25 gr/scf
	Maximum Fuel Use @ HHV: 0.456 MM scf/hr or __gal/hr	Rated Efficiency (EFF_{Mfg}): 49.57%

Primary Fuel Emissions Data	Operational Mode	Steady State (ppmv)	Steady State (lb/MMBtu)	Start-up (ppmv)	Start-up (lb/hr)	Shutdown (ppmv)	Shutdown (lb/hr)
	Nitrogen Oxides	2			6.1		6.3
	Carbon Monoxide	3			3.1		3.3
	Volatile Organic Compounds	2			1.2		1.2
	Duration			1.0 hr/day	325 hr/yr	0.33 hr/day	107 hr/yr
	% O_2, dry basis, if corrected to other than 15%: ____ %						

EMISSIONS DATA (continued)

Secondary Fuel	When will the secondary fuel be used? ☐ Primary fuel curtailment ☐ Simultaneously with primary fuel ☐ Other: ________	
	Fuel Type: ☐ Natural Gas ☐ LPG/Propane ☐ Diesel ☐ Other: ________	
	Higher Heating Value: ______ Btu/gal or ______ Btu/scf	Sulfur Content: ______ % by weight or ______ gr/scf
	Maximum Fuel Use @ HHV: ______ scf/hr or ______ gal/hr	Rated Efficiency (EFF_{Mfg}): ______ %

Secondary Fuel Emissions Data	Operational Mode	Steady State (ppmv)	Steady State (lb/MMBtu)	Start-up (ppmv)	Start-up (lb/hr)	Shutdown (ppmv)	Shutdown (lb/hr)
	Nitrogen Oxides						
	Carbon Monoxide						
	Volatile Organic Compounds						
	Duration (please provide justification)			______ hr/day	______ hr/yr	______ hr/day	______ hr/yr
	% O_2, dry basis, if corrected to other than 15%: ______ %						
Source of Data	☒ Manufacturer's Specifications ☐ Emission Source Test ☐ Other ________ (please provide copies)						

EMISSIONS CONTROL

Emissions Control Equipment (Check all that apply)	☒ Inlet Air Filter/Cooler	☒ Lube Oil Vent Coalescer
	☒ Selective Catalytic Reduction - Manufacturer: TBD Model: TBD ☒ Ammonia (NH_3) ☐ Urea ☐ Other: ________	
	☒ Oxidation Catalyst - Manufacturer: TBD Model: TBD Control Efficiencies: NO_x 92 %, SO_x NA % PM_{10} NA %, CO 95 %, VOC NA	
	☐ Other (please specify):	
	For units equipped with exhaust gas NO_x control equipment and rated < 10 MW, or rated ≥ 10 MW but operated < 4,000 hr/yr, one may choose at least one of the following alternate emission monitoring schemes in lieu of a CEMS (each option below must be approved by APCO on a case-by-case basis. Please include a detailed proposal for each option chosen): ☐ Periodic NO_x emission concentration ☐ Turbine exhaust O_2 concentration ☐ Air-to-Fuel ratio ☐ Flow rate of reducing agents added to turbine exhaust ☐ Catalyst inlet and outlet temperature ☐ Catalyst inlet and exhaust O_2 conc. ☐ Other operational characteristics as approved by the APCO (specify on attached sheet)	

HEALTH RISK ASSESSMENT DATA

Operating Hours	Maximum Operating Schedule: 24 hours per day, and 7082 (including startup and shutdown) hours per year		
Receptor Data	Distance to nearest Residence	6450 feet	Distance is measured from the proposed stack location to the nearest boundary of the nearest apartment, house, dormitory, etc.
	Direction to nearest Residence	Northeast	Direction from the stack to the receptor, i.e. Northeast or South.
	Distance to nearest Business	400 feet	Distance is measured from the proposed stack location to the nearest boundary of the nearest office building, factory, store, etc.
	Direction to nearest Business	North	Direction from the stack to the receptor, i.e. North or Southwest.
Stack Parameters	Release Height	91.5 feet above grade	
	Stack Diameter	86 X 122 inches at point of release	
	Rain Cap	☐ Flapper-type ☐ Fixed-type ☒ None ☐ Other: ________	
	Direction of Flow	☒ Vertically Upward ☐ Horizontal ☐ Other: _____° from vert. or _____° from horiz.	
Exhaust Data	Flowrate: 363,861 acfm	Temperature: 288 °F	
Facility Location	☐ Urban (area of dense population) ☒ Rural (area of sparse population)		

FOR DISTRICT USE ONLY

Date:	**FID:**	**Project:**	**Public Notice: [ ] Yes [ ] No**
Comments:			

San Joaquin Valley Air Pollution Control District

www.valleyair.org

Permit Application For:

[X] AUTHORITY TO CONSTRUCT (ATC) - New Emission Unit
[ ] AUTHORITY TO CONSTRUCT (ATC) - Modification Of Emission Unit With Valid PTO/Valid ATC
[ ] AUTHORITY TO CONSTRUCT (ATC) - Renewal of Valid Authority to Construct
[ ] PERMIT TO OPERATE (PTO) - Existing Emission Unit Now Requiring a Permit to Operate

1. PERMIT TO BE ISSUED TO: GWF Energy LLC – GWF Henrietta Combined Cycle Plant

2. MAILING ADDRESS:
STREET/P.O. BOX: 4300 Railroad Avenue
CITY: Pittsburg STATE: CA 9-DIGIT ZIP CODE: 94565-6006

3. LOCATION WHERE THE EQUIPMENT WILL BE OPERATED:
STREET: 16027 25th Ave CITY: Lemoore
SW /4 SECTION 34 TOWNSHIP 19S RANGE 19E

WITHIN 1,000 FT OF A SCHOOL? [ ] YES [X] NO

S.I.C. CODE(S) OF FACILITY (*If known*): 4911

4. GENERAL NATURE OF BUSINESS: Electricity Generation

INSTALL DATE: July 2009

5. TITLE V PERMIT HOLDERS ONLY: Do you request a COC (EPA Review) prior to receiving your ATC (*If yes, please complete and attach a Compliance Certification form (TVFORM-009)*)? [X] YES [ ] NO

6. DESCRIPTION OF EQUIPMENT OR MODIFICATION FOR WHICH APPLICATION IS MADE (include Permit #'s if known, and use additional sheets if necessary)

Installation of a 42 MMBTU/hr natural gas fired auxiliary boiler. Installation is part of the conversion of the existing simple cycle GE LM6000 turbine to allow operation in either a combined cycle or simple cycle mode.

7. PERMIT REVIEW PERIOD: Do you request a three- or ten-day period to review the draft Authority to Construct permit? Please note that checking "YES" will delay issuance of your final permit by a corresponding number of working days. See instructions for more information on this review process.
[ ] 3-day review
[ ] 10-day review
[X] No review requested

8. HAVE YOU EVER APPLIED FOR AN ATC OR PTO IN THE PAST? [X] YES [ ] NO
If yes, ATC/PTO #: C-3929

9. HAVE ALL NECESSARY LAND-USE AUTHORIZATIONS BEEN OBTAINED? (*If "No" is checked, please attach explanation*) [X] YES [ ] NO

10. IS THIS APPLICATION SUBMITTED AS THE RESULT OF EITHER A NOTICE OF VIOLATION OR A NOTICE TO COMPLY? [ ] YES [X] NO
If yes, NOV/NTC #:

Optional Section

11. CHECK WHETHER YOU ARE A PARTICIPANT IN EITHER OF THESE VOLUNTARY PROGRAMS:
"Healthy Air Living (HAL)"
[ ]Yes [ ]No [ ]Send info
"INSPECT"
[ ]Yes [ ]No [ ]Send info

HEALTHY AIR LIVING

INSPECT

12. TYPE OR PRINT NAME OF APPLICANT: Mark Kehoe

TITLE OF APPLICANT: Director, Environmental and Safety Programs

13. SIGNATURE OF APPLICANT: Mark Kehoe DATE: 8-1-08

PHONE #: (925) 431-1440
FAX #: (925) 431-0518
E-MAIL: mkehoe@gwfpower.com

FOR APCD USE ONLY:

DATE STAMP:

FILING FEE RECEIVED: $ CHECK #:

DATE PAID:

PROJECT #: FACILITY ID:

San Joaquin Valley Air Pollution Control District
Supplemental Application Form

Boilers, Steam Generators, Dryers, and Process Heaters

Please complete one form for each different piece of equipment.

This form must be accompanied by a completed Application for Authority to Construct and Permit to Operate form

PERMIT TO BE ISSUED TO: GWF Energy LLC – GWF Henrietta Combined Cycle Plant
LOCATION WHERE THE EQUIPMENT WILL BE OPERATED: SW/4, Section 34, Township 19 south, Range 19 east

EQUIPMENT DESCRIPTION

Equipment Details	☒ Boiler ☐ Steam Generator ☐ Dryer ☐ Process Heater ☐ Refinery Unit ☐ Other: ________	
	Manufacturer: TBD	
	Model: TBD	Serial Number: TBD
	Steam: ________ pph, at ________ psig ________ bhp	
	Is this a "Load-Following" unit? ☐ Yes ☒ No (Note: A load following unit is a unit with normal operational load fluctuations and requirements which exceed the operational response range of an Ultra-Low NO_X burner system operating at 9 ppmv NO_X.)	
	☐ Indirect-Fired ☒ Direct-Fired	
	Flue Gas Recirculation: ☐ Forced FGR ☒ Induced FGR ☐ None	
	Is an O_2 Controller present? ☐ No ☒ Yes, Manufacturer: TBD	
Rules 4305/4306 Type of Use and Emissions Monitoring Provisions	☐ Low Use - limited to less than 9 billion Btu/year, must have fuel use meter ☐ Tune the unit at least twice per calendar year in accordance with District Rule 4304 ☐ Operate the unit in a manner that maintains exhaust O_2 concentration ≥ 3.00% by volume on a dry basis ☐ Limited Use - limited from 9 billion Btu/year to 30 billion Btu/year, must have fuel use meter ☒ Full Time - limited from greater than 30 billion Btu/year to full time operation (8,760 hrs/year)	
	Note: Low Use units must identify operational characteristics recommended by the manufacturer, which can be monitored on a monthly basis (please provide details in additional documentation).	
	Note: Limited Use or Full Time units must have either a Continuous Emission Monitoring System (CEMS) or one of the following alternate emissions monitoring plans ☒ CEMS, please specify all pollutants monitored: ☒ NO_x ☒ CO ☒ O_2 ☐ Other: ________________ ☐ Monitoring of NO_x, CO, and O_2 concentrations ☐ Periodic determination of flue gas recirculation rate by temperature measurement ☐ Periodic determination of flue gas recirculation rate by O_2 measurement ☐ Monitoring of burner mechanical adjustments and O_2 concentration ☐ Monitoring of the flue gas recirculation valve(s) setting ☐ Other Alternate Monitoring Plan (approved on a case by case basis), attach details ☐ Dryer - No Alternate Monitoring Required	
	Note: See District policy (SSP-1105) for additional details of pre-approved alternate emissions monitoring plans, at: http://www.valleyair.org/policies_per/Policies/SSP 1105.pdf	
Fuel Use Meter	☒ Gaseous Fuel Meter ☐ Liquid Fuel Meter ☐ None	
Primary Burner	Manufacturer:	Type: ☐ Standard ☐ Low NO_x ☒ Ultra Low NO_x
	Model:	Serial Number:
	Maximum Heat Input Rating: ___42 MMBtu/hr	Annual Heat Input: ___168 billion Btu/year
Secondary Burner (if more than one burner is present)	Manufacturer:	Type: ☐ Standard ☐ Low NO_x ☐ Ultra Low NO_x
	Model:	Serial Number:
	Maximum Heat Input Rating: ________ MMBtu/hr	Annual Heat Input: ________ billion Btu/year

EMISSIONS DATA

Note: See District BACT and District Rules 4305 and 4306 requirements for applicability to proposed unit at http://www.valleyair.org/busind/pto/bact/chapter1.pdf, http://www.valleyair.org/rules/currntrules/r4305.pdf, and http://www.valleyair.org/rules/currntrules/r4306.pdf.

Primary Fuel	Fuel Type: ☒ Natural Gas ☐ LPG/Propane ☐ Diesel ☐ Other: ________						
	Higher Heating Value: ______ Btu/gal or 1020 Btu/scf			Sulfur Content: ______ % by weight or 0.25 gr/scf			
Primary Fuel Emissions Data	Operational Mode	Steady State (ppmv)	Steady State (lb/MMBtu)	Start-up (ppmv)	Start-up (lb/hr)	Shutdown (ppmv)	Shutdown (lb/hr)
	Nitrogen Oxides		0.0074				
	Carbon Monoxide		0.037				
	Volatile Organic Compounds		0.005				
	Duration (please provide justification)			______ hr/day	______ hr/yr	______ hr/day	______ hr/yr
	% O_2, dry basis, if corrected to other than 3%: ______ %						
Secondary Fuel	Fuel Type: ☐ Natural Gas ☐ LPG/Propane ☐ Diesel ☐ Other: ________						
	Higher Heating Value: ______ Btu/gal or ______ Btu/scf			Sulfur Content: ______ % by weight or ______ gr/scf			
	How will the secondary fuel be used? ☐ Secondary full-time fuel ☐ Backup for primary fuel ☐ Other: ________						
Secondary Fuel Emissions Data	Operational Mode	Steady State (ppmv)	Steady State (lb/MMBtu)	Start-up (ppmv)	Start-up (lb/hr)	Shutdown (ppmv)	Shutdown (lb/hr)
	Nitrogen Oxides						
	Carbon Monoxide						
	Volatile Organic Compounds						
	Duration (please provide justification)			______ hr/day	______ hr/yr	______ hr/day	______ hr/yr
	% O_2, dry basis, if corrected to other than 3%: ______ %						
Source of Data	☒ Manufacturer's Specifications ☐ Emission Source Test ☐ Other ________ (please provide copies)						
Additional Emissions Control Equipment	☐ Selective Catalytic Reduction - Manufacturer: ________ Model: ________ ☐ Ammonia (NH_3) ☐ Urea ☐ Other: ________						
	☐ Non-Selective Catalytic Reduction - Manufacturer: ________ Model: ________						
	Control Efficiencies: NO_x ______ %, SO_x ______ %, PM_{10} ______ %, CO ______ %, VOC ______ %						
	☐ Other (please specify):						

HEALTH RISK ASSESSMENT DATA

Operating Hours	Maximum Operating Schedule: 24 hours per day, and 4000 hours per year		
Receptor Data	Distance to nearest Residence	6350 feet	Distance is measured from the proposed stack location to the nearest boundary of the nearest apartment, house, dormitory, etc.
	Direction to nearest Residence	Northeast	Direction from the stack to the receptor, i.e. Northeast or South.
	Distance to nearest Business	360 feet	Distance is measured from the proposed stack location to the nearest boundary of the nearest office building, factory, store, etc.
	Direction to nearest Business	North	Direction from the stack to the receptor, i.e. North or Southwest.
Stack Parameters	Release Height	30 feet above grade	
	Stack Diameter	20 inches at point of release	
	Rain Cap	☐ Flapper-type ☐ Fixed-type ☒ None ☐ Other: ________	
	Direction of Flow	☒ Vertically Upward ☐ Horizontal ☐ Other: _____ ° from vert. or _____ ° from horiz.	
Exhaust Data	Flowrate: 7200 acfm	Temperature: 300 °F	
Facility Location	☐ Urban (area of dense population) ☒ Rural (area of sparse population)		

FOR DISTRICT USE ONLY

Date:	**FID:**	**Project:**	**Public Notice: [ ] Yes [ ] No**
Comments:			

San Joaquin Valley Air Pollution Control District

www.valleyair.org

Permit Application For:

[X] AUTHORITY TO CONSTRUCT (ATC) - New Emission Unit
[ ] AUTHORITY TO CONSTRUCT (ATC) - Modification Of Emission Unit With Valid PTO/Valid ATC
[ ] AUTHORITY TO CONSTRUCT (ATC) - Renewal of Valid Authority to Construct
[ ] PERMIT TO OPERATE (PTO) - Existing Emission Unit Now Requiring a Permit to Operate

1. PERMIT TO BE ISSUED TO: GWF Energy LLC – GWF Henrietta Combined Cycle Plant

2. MAILING ADDRESS:
STREET/P.O. BOX: 4300 Railroad Avenue
CITY: Pittsburg STATE: CA 9-DIGIT ZIP CODE: 94565-6006

3. LOCATION WHERE THE EQUIPMENT WILL BE OPERATED:
STREET: 16027 25th Ave CITY: Lemoore
SW /4 SECTION 34 TOWNSHIP 19S RANGE 19E

WITHIN 1,000 FT OF A SCHOOL? [ ] YES [X] NO

S.I.C. CODE(S) OF FACILITY (*If known*): 4911

4. GENERAL NATURE OF BUSINESS: Electricity Generation

INSTALL DATE: July 2009

5. TITLE V PERMIT HOLDERS ONLY: Do you request a COC (EPA Review) prior to receiving your ATC (*If yes, please complete and attach a Compliance Certification form (TVFORM-009)*)? [X] YES [ ] NO

6. DESCRIPTION OF EQUIPMENT OR MODIFICATION FOR WHICH APPLICATION IS MADE (include Permit #'s if known, and use additional sheets if necessary)

Installation of an emergency diesel fired 460 horsepower Cummins CFP15E-F10 (or equivalent) internal combustion engine used to drive a fire water pump.

7. PERMIT REVIEW PERIOD: Do you request a three- or ten-day period to review the draft Authority to Construct permit? Please note that checking "YES" will delay issuance of your final permit by a corresponding number of working days. See instructions for more information on this review process.
[ ] 3-day review
[ ] 10-day review
[X] No review requested

8. HAVE YOU EVER APPLIED FOR AN ATC OR PTO IN THE PAST? [X] YES [ ] NO
If yes, ATC/PTO #: C-39229

9. HAVE ALL NECESSARY LAND-USE AUTHORIZATIONS BEEN OBTAINED? (*If "No" is checked, please attach explanation*) [X] YES [ ] NO

10. IS THIS APPLICATION SUBMITTED AS THE RESULT OF EITHER A NOTICE OF VIOLATION OR A NOTICE TO COMPLY? [ ] YES [X] NO
If yes, NOV/NTC #:

Optional Section

11. CHECK WHETHER YOU ARE A PARTICIPANT IN EITHER OF THESE VOLUNTARY PROGRAMS:
"Healthy Air Living (HAL)"
[ ]Yes [ ]No [X]Send info
"INSPECT"
[ ]Yes [ ]No [X]Send info

12. TYPE OR PRINT NAME OF APPLICANT: Mark Kehoe

TITLE OF APPLICANT: Director, Environmental and Safety Projects

13. SIGNATURE OF APPLICANT: Mark Kehoe DATE: 8-1-08

PHONE #: (925) 431-1440
FAX #: (925) 431-0518
E-MAIL: mkehoe@gwfpower.com

FOR APCD USE ONLY:

DATE STAMP:

FILING FEE RECEIVED: $ CHECK #:
DATE PAID:
PROJECT #: FACILITY ID:

San Joaquin Valley Air Pollution Control District
Supplemental Application Form

Emergency/Low-Use IC Engines for Non-Agricultural Operations

Please complete one form for each engine.

This form must be accompanied by a completed Application for Authority to Construct and Permit to Operate form

PERMIT TO BE ISSUED TO: GWF Energy LLC - GWF Henrietta Combined Cycle Plant
LOCATION WHERE THE EQUIPMENT WILL BE OPERATED: 16027 25th Ave, Lemoore, CA

EQUIPMENT DESCRIPTION

Engine Details	Engine Manufacturer: Cummins		Number of Cylinders: 6
	Engine Model: CFP15E-F10		Engine Year of Manufacture: 2009 or 2010
	Engine Serial Number: TBD		Engine Tier Rating: III
	Engine Certification Family Number: 8CEXL015AAH		
	Engine's Type of Combustion: ☐ Rich-Burn ☐ Lean-Burn ☒ 4-Stroke ☐ 2-Stroke		
	Engine Manufacturer's Maximum Rated Power Output (per the data plate): 460 bhp		
	Engine's Rated Power Output for the Process the Engine Serves: 460 bhp		
Process Data	Process the Engine Serves: Fire pump		
	Electrical Power Generation Only	Generator Manufacturer:	Model:
		Power Output: ______ kW	
	Will this equipment be used in an electric utility rate reduction program? ☐ Yes ☒ No		
Fuel Data	Fuel Type: ☒ Diesel ☐ Natural Gas ☐ LPG/Propane ☐ Gasoline ☐ Other: ______		
	For "Other" fuels only: Higher Heating Value: ______ Btu/scf, or ______ Btu/gal, For "Other" fuels only: An Ultimate Fuel Analysis or the combustion F-Factor ______dscf/MMBtu		
	Sulfur Content: ______ gr/100 scf (gaseous fuel) or 0.0015 % by weight (liquid fuel)		
	Fuel Consumption at Maximum Rated Output: 22.5 gal/hr, or ______ scf/hr		
Rule 4702 Type of Use	☐ Emergency Standby - Limited exclusively to power primary mechanical or an electrical generator during periods of unscheduled power outages beyond the control of the operator, and limited from 20 to 100 hrs/yr (depending on the engine's PM_{10} emission factor) for maintenance and testing purposes only. ☐ This engine is specifically used to power a pump for a municipal water supply. ☐ I request the higher opacity limit of 40% with the corresponding operational limits of 30 minutes per week and 2 hours per month for maintenance and testing. (CH&SC 41701.6) ☐ I request the lower opacity limit of 20%. ☐ This engine is specifically used to provide power at a health care facility. (CH&SC 1250) ☐ This engine is subject to Office of Statewide Health Planning and Development (OSHPD) requirements. ☒ Special Case Emergency - Limited exclusively to preserve or protect property, human life, or public health during a disaster or a state emergency (e.g. fire or flood) and limited to 20 to 100 hrs/yr (depending on the engine's PM_{10} emission factor) for maintenance and testing purposes only. ☒ This engine is specifically used to power a direct-drive firewater pump. ☒ This firewater pump engine is subject to National Fire Protection Association (NFPA) requirements. ☐ Low Use - Limited to ≤ 200 hrs/yr of operation for **ALL** purposes combined, including maintenance and testing.		

Hour Meter	Note: All engines are required to have either a nonresettable elapsed time meter or an alternate device, method, or technique, approved by the APCO, for determining elapsed operating time. ☒ Equipped with a Nonresettable Elapsed Operating Time Meter ☐ Alternate Method (please provide details): ______

EMISSIONS CONTROL

Emissions Control Equipment (Check all that apply)	☒ Positive Crankcase Ventilation	☒ 90% Efficient crankcase emission control device
	☒ Turbocharger	☒ Intercooler/Aftercooler
	☒ Automatic Air/Fuel Ratio or O_2 Controller - Manufacturer: TBD	
	☐ Non-Selective Catalytic Reduction: Manufacturer: ______ Model: ______ Control Efficiencies: NO_X ____ %, SO_X ____ %, PM_{10} ____ %, CO ____ %, VOC ____ %	
	☐ Particulate Filter - Manufacturer: ______ Model: ______ Control Efficiency: ______ %	
	☐ Other (please specify):	

EMISSIONS DATA

Note: See District BACT and District Rule 4702 requirements for applicability to proposed engine at http://www.valleyair.org/busind/pto/bact/chapter3.pdf and http://www.valleyair.org/rules/currntrules/r4702.pdf.

	Pollutant	(g/bhp-hr)	(g/kW-hr)	(ppmvd)
Emissions Data	Nitrogen Oxides (NO_x)	2.66		
	Volatile Organic Compounds (VOC)	0.086		
	NO_x + NMHC	2.747		
	Particulate Matter (PM_{10})	0.078		
	Carbon Monoxide	0.671		
	% O_2, dry basis, if corrected to other than 15%: ______ %			
Source of Data	☒ Manufacturer's Specifications ☐ Emissions Source Test ☐ CARB/EPA Certification ☐ Other ______ **Note: please provide copies of all sources of emissions data.**			

HEALTH RISK ASSESSMENT DATA

Operating Hours	Maximum Operating Schedule: 24 hours per day, and 50 hours per year		
Receptor Data	Distance to nearest Residence	6350 feet	Distance is measured from the proposed stack location to the nearest boundary of the nearest apartment, house, dormitory, etc.
	Direction to nearest Residence	Northeast	Direction from the stack to the receptor, i.e. Northeast or South.
	Distance to nearest Business	360 feet	Distance is measured from the proposed stack location to the nearest boundary of the nearest office building, factory, store, etc.
	Direction to nearest Business	North	Direction from the stack to the receptor, i.e. North or Southwest.
Stack Parameters	Release Height	12 feet above grade	
	Stack Diameter	6.06 inches at point of release	
	Rain Cap	☒ Flapper-type ☐ Fixed-type ☐ None ☐ Other: ______	
	Direction of Flow	☒ Vertically Upward ☐ Horizontal ☐ Other: ____ ° from vert. or ____ ° from horiz.	
Exhaust Data	Flowrate: 2881 acfm	Temperature: 883 °F	
Transportable	Is this engine transportable? ☐ Yes ☒ No Note: This is used for health risk assessment purposes only.		
Facility Location	☐ Urban (area of dense population) ☒ Rural (area of sparse population)		

Cummins Fire Power

EPA Tier 3 Emission Data
Fire Pump NSPS Compliant

CFP15E-F10 Fire Pump Driver

Type: 4 Cycle; In-Line; 6 Cylinder
Aspiration: Turbocharged, Charge Air Cooled

15 PPM Diesel Fuel																		
		Fuel Consumption		**D2 Cycle Exhaust Emissions**											**Exhaust**			
				Grams per BHP - HR					**Grams per kW - HR**						Temperature		Gas Flow	
RPM	BHP	Gal/Hr	L/hr	NMHC	NOx	NMHC+NOx	CO	PM	NMHC	NOx	NMHC+NOx	CO	PM		°F	°C	CFM	L/sec
1470	382	19.9	75.3												957	514	2500	1180
1760	460	22.5	85.2												883	473	2881	1360
1900	488	23.6	89.3	0.086	2.661	2.747	0.671	0.078	0.116	3.568	3.684	0.900	0.105		826	441	3099	1463
2100	488	24.7	93.5												844	451	3308	1561
2250	380	19.6	74.2												743	395	3473	1639

The emissions values above are based on CARB approved calculations for converting EPA (500 ppm) fuel to CARB (15 ppm) fuel.

300-500 PPM Diesel Fuel																		
		Fuel Consumption		**D2 Cycle Exhaust Emissions**											**Exhaust**			
				Grams per BHP - HR					**Grams per kW - HR**						Temperature		Gas Flow	
RPM	BHP	Gal/Hr	L/hr	NMHC	NOx	NMHC+NOx	CO	PM	NMHC	NOx	NMHC+NOx	CO	PM		°F	°C	CFM	L/sec
1470	382	19.9	75.3												957	514	2500	1180
1760	460	22.5	85.2												883	473	2881	1360
1900	488	23.6	89.3	0.104	2.781	2.886	0.671	0.089	0.14	3.730	3.870	0.900	0.120		826	441	3099	1463
2100	488	24.7	93.5												844	451	3308	1561
2250	380	19.6	74.2												743	395	3473	1639

QSX15 Base Model Manufactured by Cummins Inc.
- Using fuel rating 10663

Reference EPA Standard Engine Family: 8CEXL015AAH

No special options needed to meet current regulation emissions for all 50 states

Test Methods:

EPA/CARB Nonroad emissions recorded per 40CFR89 (ref. ISO8178-1) and weighted at load points prescribed in Subpart E, Appendix A, for Constant Spe Engines (ref. ISO8178-4, D2).

Diesel Fuel Specifications:

Cetane Number: 40-48
Reference: ASTM D975 No. 2-D

Reference Conditions:

Air Inlet Temperature: 25°C (77°F)
Fuel Inlet Temperature: 40°C (104°F)
Barometric Pressure: 100 kPa (29.53 in Hg)
Humidity: 10.7 g/kg (75 grains H_2O/lb) of dry air; required for NOx correction

Restrictions: Intake Restriction set to a maximum allowable limit for clean filter; Exhaust Back Pressure set to maximum allowable limit.

Tests conducted using alternate test methods, instrumentation, fuel or reference conditions can yield different results.

Revision Date: 23JAN2008

San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

SEP 0 5 2008

Mark Kehoe
GWF Energy LLC - Henrietta
4300 Railroad Avenue
Pittsburg, CA 94565

Re: Notice of Receipt of Complete Applications
Project Number: C-1083176

Dear Mr. Kehoe:

The San Joaquin Valley Air Pollution Control District (District) has received your Authority to Construct applications for the modification of two 46.9 MW simple-cycle peak-demand power generating gas turbine systems to convert them to allow operation in both combined cycle mode and simple cycle mode and the installation of one 460 bhp diesel fired emergency internal combustion engine powering a firewater pump and one 42.0 MMBtu/hr natural gas fired boiler, located at 16027 25th Avenue in Lemoore, CA. Based on our preliminary review, the applications appear to be complete. This means that your applications contain sufficient information to proceed with our analysis. However, during the processing of your applications, the District may request additional information to clarify, correct, or otherwise supplement, the information on file.

According to District Rule 2201, Section 5.3, *Final Action*, please be aware that the District will not be able to issue the final Authority to Construct (ATC) permits for this project until the requirements of the California Environmental Quality Act have been fully satisfied by the Lead Agency.

Per your request, the Authority to Construct will be issued with a Certificate of Conformity (COC). Your project will therefore go for EPA Review per District Rule 2520 for a 45-day period at the conclusion of our analysis, prior to the issuance of the final Authority to Construct.

We will begin processing your applications as soon as possible. In general, complete applications are processed on a first-come first-served basis.

It is estimated that the project analysis process will take 111 hours, and you will be charged at the weighted hourly labor rate in accordance with District Rule 3010. This estimate includes the following major processing steps: Determining Completeness (11 hours), Engineering Evaluation (45 hours), BACT Analysis (25 hours), Health Risk Assessment (10 hours), CEQA Analysis (10 hours) and Permit Preparation (10 hours). The current weighted labor rate is $90.00 per hour, but please note that this fee is revised annually to reflect actual costs and therefore may change. No payment is due at this time; an invoice will be sent to you upon completion of this project.

Please note that this letter is not a permit and does not authorize you to proceed with your project. Final approval, if appropriate, will be in the form of an Authority to Construct permit after application processing is complete. If you have any questions, please contact Mr. Jim Swaney at (559) 230-5900.

Sincerely,

David Warner
Director of Permit Services

Jim Swaney, P.E.
Permit Services Manager

DW:ddb

San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

RECEIVED

SEP 08 2008

GWF Corporate Office

SEP 05 2008

Mark Kehoe
GWF Energy LLC - Henrietta
4300 Railroad Avenue
Pittsburg, CA 94565

Re: Potential Federal PSD Applicability
District Project # C-1083176
Conversion of Existing Simple Cycle Power Plant to Allow Combined Cycle and Simple Cycle Operation

Dear Mr. Kehoe:

This letter is to inform you that the above referenced project may trigger federal Prevention of Significant Deterioration (PSD) requirements. PSD is a pre-construction approval process that regulates pollutants for which the Valley is in attainment (i.e., nitrogen oxides, sulfur oxides, and carbon monoxide).

The San Joaquin Valley Air Pollution Control District does not have delegation from EPA to implement the federal PSD program. This letter is to inform you that your company is responsible for contacting Gerardo Rios of U.S. EPA at (415) 972-3974 for information on PSD applicability and requirements relative to this project. If PSD approval is required, you must receive EPA's PSD permit prior to construction.

Sincerely,

David Warner
Permit Services Director

Jim Swaney, P.E.
Permit Services Manager

DW:ddb

cc: Gerardo Rios, USEPA Reg. IX
75 Hawthorne St.
San Francisco, CA 94205

Environmental and Safety Department

GWF Energy LLC

Memo

To: Dustin Brown, Permits Engineer - SJVAPCD

From: Mark Kehoe

CC: J. Swaney, D. Wheeler

Date: September 15, 2008

Re: GWF Hanford ATC – GWF Henrietta ATC Amendment

Dustin,

Per our discussions recently, GWF Energy LLC has elected to amend our ATC applications for both the Hanford (C-4140-1 and C-4140-2) and Henrietta (C-3929-1 and C-3929-2) in terms of the NOx limits while operating in simple cycle mode. GWF in our applications of August 1, 2008 had proposed a limit of 3.6 ppmvd for each unit. Given the District has identified a source LM-6000 that is operating with a limit of 2.5 ppmvd GWF has identified a SCR catalyst vendor that can provide a guarantee that our units will meet the 2.5 ppmvd. Attached for your information is a proposal quotation from Haldor Topsoe that provides us with the assurance we will be able to comply with the 2.5 ppmvd concentration of NOx while operating in simple cycle mode.

Additionally, GWF proposed to reduce the fuel sulfur limitation for the Hanford (C-4140-1 and C-4140-2) units by amending the application for fuel sulfur from 0.25 grains per 100 dry standard cubic foot (gr/scf) to 0.24 gr/100dscf to avoid the requirement for SO_2 emission reduction credits that would be required if the limit were 0.25 gr/100dscf. Attached for your consideration is a data sheet that provides both the fuel analysis from Hanford as well as that of Henrietta. Keep in mind we are only requesting a modification to the fuel sulfur limit at Hanford.

If you have any questions regarding the requested amendments or the information provided, please feel free to contact me at 925.431.1440.

ATTACHMENT D

Biological Resources

Plant and Wildlife Surveys for the Henrietta Peaker Plant in Support of Future Amendment Filing with the California Energy Commission

PREPARED FOR: Mark Kehoe, Director of Environmental and Safety Programs/ GWF Power Systems Company, Inc.

PREPARED BY: Gary Santolo/CH2M HILL
Virginia Dains/Consulting Biologist
Marjorie Eisert/CH2M HILL

COPIES: Dave Stein/BAO

DATE: July 11, 2007

PROJECT NUMBER: 359658.A1.01

In order to support the California Energy Commission filing of an Amendment to an Application for Certification for the GWF Power Systems Henrietta Peaker Plant, spring botanical and wildlife surveys were conducted of the project site and surrounding areas.

Field Methods

Reconnaissance-level wildlife and floristic surveys of the Henrietta Peaker project site were conducted on April 26, 2007. The entire site was surveyed on foot and a list of plant and wildlife species was compiled. Habitats were assessed for their potential to support rare plant species and were compared to descriptions of special plant communities known from the San Joaquin Valley. A list of special-status plants known from the vicinity of the project was compiled and used to assess habitats and target surveyed areas. No herbarium collections were made. Habitats within a one-mile radius of the site were assessed for their potential to support wildlife and special-status plant species.

Limitations of the Survey

No systematic or protocol-level surveys were conducted during this site visit. The 2007 spring flowering season was not typical due to drought conditions in the San Joaquin Valley. Low rainfall in the winter and spring can produce conditions unfavorable to annual plant species. Drought year observations in habitats appropriate for some rare species can provide questionable negative findings. If appropriate habitats are not present, plants would not be expected to occur on site regardless of seasonal variability.

Results

Vegetation

The Henrietta Peaker project site is devoid of natural vegetation or natural communities. The site has been altered by current and past industrial development and is currently maintained with ornamental plantings and weed control. The stormwater retention basin on the property supports a collection of wetland species dominated by swamp grass (*Crypsis schoenoides*) along with small patches of cattail (*Typha latifolia*) and annual beard grass (*Polypogon monspeliensis*). Elsewhere on the property, unused corners provide temporary habitat for introduced weedy annual grasses and herbs such as rip-gut brome (Bro*mus diandrus*), red brome (*Bromus rubens*), or cheeseweed (*Malva parviflora*). The adjoining agricultural fields were planted as closely spaced row crops and field borders were clear of other weedy species. The graveled work yards and storage areas have eliminated all naturally-occurring communities.

Special-status Plants

The special-status plants of the San Joaquin Valley are largely associated with alkaline soils of scrub, grasslands, or seasonal wetland habitats. These habitats including Valley sacaton grassland and valley sink scrub (Holland 1986, Sawyer and Keeler Wolf 1995) are also considered worthy of conservation. The large scale conversion of these natural habitats to agricultural use has eliminated habitats capable of supporting these species.

None of these habitats are found within the Henrietta Peaker plant site or project area (one-mile radius around the plant site). None of the special-status plants known from the San Joaquin Valley area were noted on the project site due to the lack of appropriate habitats. Special-status plant species potentially occurring in the vicinity of the project site are listed in Table 1. A list of plant species observed during the survey is included in Table 2.

Wildlife

The Henrietta Peaker project site is devoid of natural vegetation or natural communities and provides minimal wildlife habitat. The site has been altered by current and past industrial and agricultural development and is currently maintained with ornamental plantings cultivation, and weed control. The ornamental plantings in front of the facility are used by blackbirds for nesting. The species observed were typical of disturbed habitats in the Central Valley.

The adjoining agricultural fields support some small prey for the predators listed in Table 3 and likely others such as gopher snake (*Pituophis melanoleucus*), great horned owl (*Bubo virginianus*), and red fox (*Vulpes vulpes*). The graveled work yards and storage areas within the facility likely provide little foraging or roosting and resting habitat for birds and mammals.

Special-status Wildlife

The California Natural Diversity Data Base (CNDDB) was queried for special-status species potentially occurring at the site (Table 4). The CNDDB provides information on sightings that have been reported to the Natural Heritage Division of the California Department of

Fish and Game and, therefore, only provides historic information on presence in areas within the quadrangle(s) that have been surveyed. The CNDDB does not provide information on areas within the quadrangle(s) queried that have not been surveyed and the absence of a species in the data base does not infer absence of the species in the quadrangle(s). No special-status wildlife species were observed during the site visit and none are expected to occur due to lack of appropriate habitat and/or sign (i.e., burrows, scat, prey remains, etc.). No playa areas that would support species such as the snowy plover or standing water that would support amphibians or turtles was observed and no burrows typical of burrowing owls, kangaroo rats, or kit fox were observed during the site visit.

References

California Natural Diversity Data Base. 2007. California Natural Diversity Data Base Report for Lemoore, Hanford, Westhaven, Vanguard, Burrel, Stratford, Guernsey, Riverdale, and Laton Quadrangles. California Department of Fish and Game, Sacramento, CA.

Hickman, J. C. 1993. The Jepson Manual - Higher Plants of California. University of California Press, Berkeley, CA.

Holland, R. F. 1986. Preliminary descriptions of the terrestrial natural communities of California. State of California, The Resources Agency, Department of Fish and Game, Sacramento, California.

Sawyer, J. O., and T. Keeler-Wolf. 1995. A Manual of California Vegetation. In cooperation with The Nature Conservancy and the California Department of Fish and Game. California Native Plant Society. Sacramento, California.

California Native Plant Society. 2001. Inventory of Rare and Endangered Vascular Plants of California. CNPS Special Publication No. 1 (Sixth Edition). California Native Plant Society, Rare Plant Scientific Advisory Committee. Sacramento, CA.

California Native Plant Society. 2007. Online inventory of rare and endangered plants web application. http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi , accessed on Jun. 13, 2007 08:16c.

TABLE 1. SPECIAL-STATUS PLANTS KNOWN OR POTENTIALLY OCCURRING IN THE VICINITY OF THE HENRIETTA PEAKER PLANT PROJECT SITE
GWF Power Systems Henrietta Peaker Plant Survey

Scientific name Common Name	Status[1] Fed/CA/ CNPS	General Habitat Description	Flowering Time	Potential Occurrence In The Henrietta Peaker Project Area or Adjacent Habitats
Lepidium jaredii ssp. *Album* Panoche pepper-grass	--/--/1B.2	Alluvial fans and washes, valley and foothill grassland	February - June	Not present; no appropriate habitat
Atriplex depressa Brittlescale	--/--/1B.2	Chenopod scrub, meadows and seeps, playas, valley and foothill grassland vernal pools, alkaline clay	May - October	Not present; no appropriate habitat
Atriplex subtilis Subtle orache	--/--/1B.2	Valley and foothill grasslands	August - October	Not present; no appropriate habitat
Delphinium recurvatum Recurved larkspur	--/--/1B.2	Chenopod scrub, valley and foothill grassland, alkaline	March - May	Not present; no appropriate habitat
Atriplex erecticaulis Earlimart orache	--/--/1B.2	Valley and foothill grassland, alkaline	August - September	Not present; no appropriate habitat

Source: CDFG 2007, CNPS 2001, and USFWS 2007
[1] CNPS 1B.2—Plants considered rare and fairly endangered in California (20-80% occurrences threatened) in California and elsewhere.

TABLE 2. LIST OF PLANT SPECIES OBSERVED ON THE HENRIETTA PEAKER PROJECT SITE DURING FIELD SURVEYS, APRIL 26, 2007
GWF Power Systems Henrietta Peaker Plant Survey

Scientific Name	Common Name	Family
Atriplex patula	spear oracle	Chenopodiaceae
Atriplex semibaccata	Australian saltbush	Chenopodiaceae
Bergia texana	Texas bergia	Elatinaceae
Bromus diandrus	ripgut brome	Poaceae
Bromus hordeaceus	soft chess	Poaceae
Bromus madritensis ssp. *rubens*	red brome	Poaceae
Conyza canadensis	Canada horseweed	Asteraceae
Crypsis schoenoides	swamp grass	Poaceae
Cynodon dactylon	bermuda grass	Poaceae
Epilobium brachycarpum	autumn willowweed	Onagraceae
Erodium cicutarium	red-stemmed filaree	Geraniaceae
Helianthus annuus	common sunflower	Asteraceae
Heliotropium curassavicum	seaside heliotrope	Boraginaceae
Hordeum depressum	low barley	Poaceae
Hordeum murinum ssp. *leporinum*	foxtail barley	Poaceae
Lactuca serriola	prickly lettuce	Asteraceae
Lepidium nitidum	shining pepper-grass	Brassicaceae
Leptochloa filiformis	red sprangletop	Poaceae
Lolium multiflorum	Italian rye-grass	Poaceae
Malva parviflora	cheeseweed	Malvaceae
Medicago sativa	alfalfa	Fabaceae
Phalaris paradoxa	hood canarygrass	Poaceae
Polygonum arenastrum	common knotweed	Polygonaceae
Polypogon monspeliensis	annual beard grass	Poaceae
Schinus molle	Peruvian pepper tree	Anacardiaceae
Sesuvium verrucosum	western sea-purslane	Aizoaceae
Sisymbrium irio	London rocket	Brassicaceae
Sonchus oleraceus	common sow thistle	Asteraceae
Spergularia rubra	red sandspurry	Caryophyllaceae

TABLE 2. LIST OF PLANT SPECIES OBSERVED ON THE HENRIETTA PEAKER PROJECT SITE DURING FIELD SURVEYS, APRIL 26, 2007
GWF Power Systems Henrietta Peaker Plant Survey

Scientific Name	Common Name	Family
Triticum aestivum	common wheat	Poaceae
Typha latifolia	broadleaf cattail	Typhaceae
Vulpia myuros	rattail fescue	Poaceae

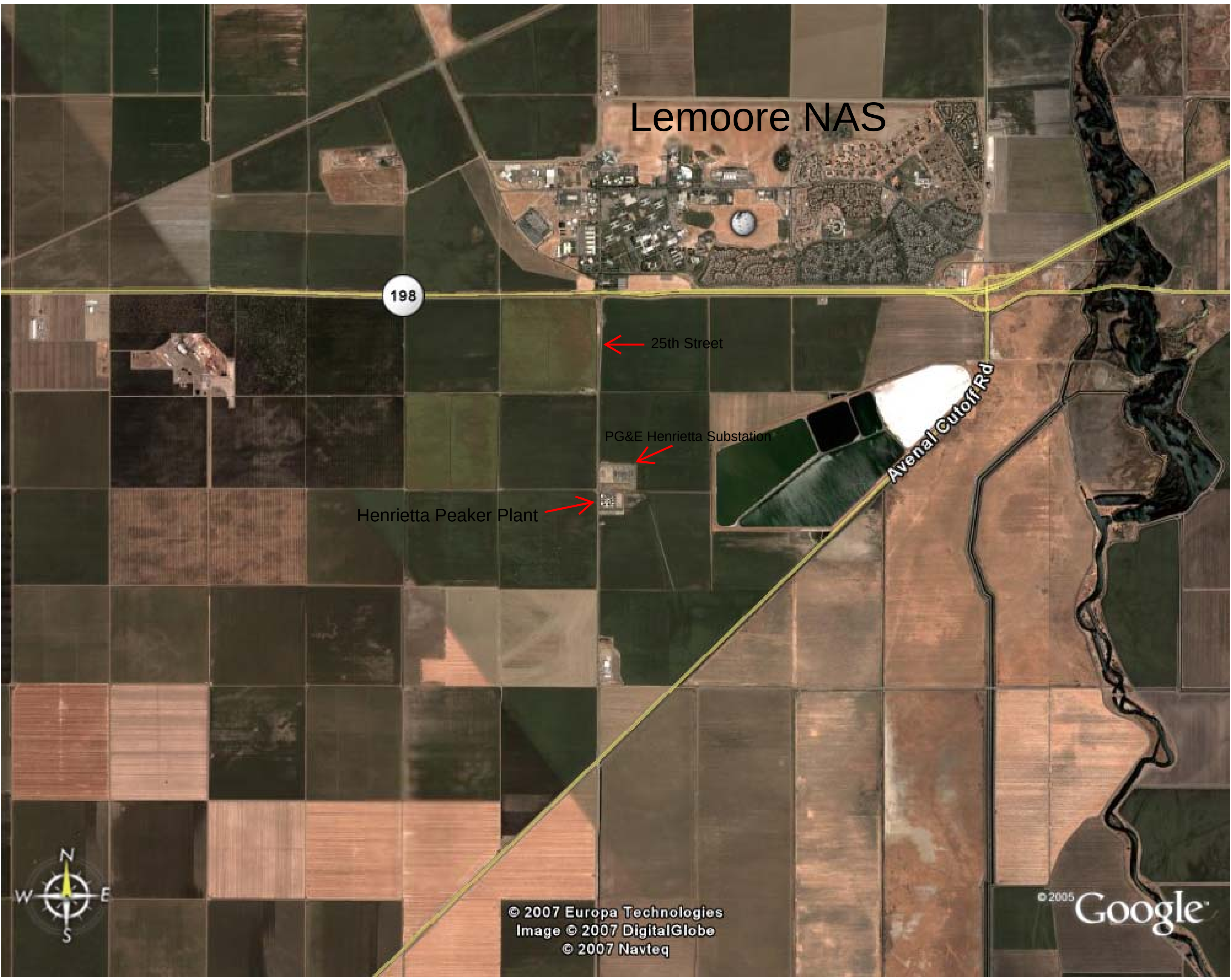
TABLE 3. WILDLIFE OBSERVED DURING APRIL 26, 2007 HENRIETTA PEAKER PROJECT SITE VISIT
GWF Power Systems Henrietta Peaker Plant Survey

Common Name	Scientific Name	Observation Comments
Birds		
Killdeer	*Charadrius vociferus*	In gravel areas
Mourning Dove	*Zenaida macroura*	In ornamental shrubs
Northern Mockingbird	*Mimus polyglottos*	
Loggerhead Shrike	*Lanius ludovicianus*	Carrying a cricket - fed on fence.
European Starling	*Sturnus vulgaris*	
House Finch	*Carpodacus mexicanus*	
White-crowned Sparrow	*Zonotrichia leucophrys*	
Red-winged Blackbird	*Agelaius phoeniceus*	Nesting in ornamental shrubs
Mammals		
Coyote	*Canis latrans*	Scat observed along fence

TABLE 4. SPECIAL-STATUS WILDLIFE KNOWN OR POTENTIALLY OCCURRING IN THE VICINITY OF THE HENRIETTA PEAKER PLANT
GWF Power Systems Henrietta Peaker Plant Survey

Common Name	Scientific name	Status[1] Fed/CA	Potential Occurrence in the Henrietta Peaker Project Area or Adjacent Habitats
California tiger salamander	*Ambystoma californiense*	FT/SC	Not present; no appropriate habitat.
Western spadefoot	*Spea (=Scaphiopus) hammondii*	--/SC	Not present; no appropriate habitat.
Western pond turtle	*Emys (=Clemmys) marmorata*	--/SC	Not present; no appropriate habitat.
Blunt-nosed leopard lizard	*Gambelia sila*	FE/SE	Not present; no appropriate habitat.
Giant garter snake	*Thamnophis gigas*	FT/ST	Not present; no appropriate habitat.
Swainson's hawk	*Buteo swainsoni*	--/ST	Potential foraging habitat; no appropriate nesting habitat.
Western snowy plover	*Charadrius alexandrinus nivosus*	FT/SC	Not present; no appropriate habitat.
Burrowing owl	*Athene cunicularia*	--/SC	Not present; no burrows found.
Tricolored blackbird	*Agelaius tricolor*	--/SC	Not present; no appropriate habitat.
Fresno kangaroo rat	*Dipodomys nitratoides nitratoides*	FE/SE	Not present; no burrows found.
Tipton kangaroo rat	*Dipodomys nitratoides nitratoides*	FE/SE	Not present; no burrows found.
San Joaquin kit fox	*Vulpes macrotis mutica*	FE/SE	Not present; no burrows found.

Notes:
Source – CNDDB 2007
FE – Listed as Endangered by the U.S. Fish and Wildlife Service
FT – Listed as Threatened by the U.S. Fish and Wildlife Service
SE – Listed as Endangered by the California Department of Fish and Game
ST – Listed as Threatened by the California Department of Fish and Game
SC – California Species of Special Concern


Lemoore NAS
198
25th Street
PG&E Henrietta Substation
Henrietta Peaker Plant
Avenal Cutoff Rd
N
W
E
S
© 2007 Europa Technologies
Image © 2007 DigitalGlobe
© 2007 Navteq
©2005
Google

	Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
1	Actinemys marmorata western pond turtle	ARAAD02030			G3G4	S3	SC
2	Agelaius tricolor tricolored blackbird	ABPBXB0020			G2G3	S2	SC
3	Ammospermophilus nelsoni Nelson's antelope squirrel	AMAFB04040		Threatened	G2	S2	
4	Athene cunicularia burrowing owl	ABNSB10010			G4	S2	SC
5	Buteo swainsoni Swainson's hawk	ABNKC19070		Threatened	G5	S2	
6	Caulanthus californicus California jewel-flower	PDBRA31010	Endangered	Endangered	G1	S1.1	1B.1
7	Charadrius alexandrinus nivosus western snowy plover	ABNNB03031	Threatened		G4T3	S2	SC
8	Coelus gracilis San Joaquin dune beetle	IICOL4A020			G1	S1	
9	Dipodomys nitratoides exilis Fresno kangaroo rat	AMAFD03151	Endangered	Endangered	G3T1	S1	
10	Dipodomys nitratoides nitratoides Tipton kangaroo rat	AMAFD03152	Endangered	Endangered	G3T1	S1	
11	Falco columbarius merlin	ABNKD06030			G5	S3	
12	Gambelia sila blunt-nosed leopard lizard	ARACF07010	Endangered	Endangered	G1	S1	
13	Lanius ludovicianus loggerhead shrike	ABPBR01030			G4	S4	SC
14	Masticophis flagellum ruddocki San Joaquin whipsnake	ARADB21021			G5T2T3	S2?	SC
15	Monolopia congdonii San Joaquin woollythreads	PDASTA8010	Endangered		G3	S3.2	1B.2
16	Nycticorax nycticorax black-crowned night heron	ABNGA11010			G5	S3	
17	Onychomys torridus tularensis Tulare grasshopper mouse	AMAFF06021			G5T1T2	S1S2	SC
18	Perognathus inornatus inornatus San Joaquin pocket mouse	AMAFD01061			G4T2T3	S2S3	
19	Spea hammondii western spadefoot	AAABF02020			G3	S3	SC
20	Taxidea taxus American badger	AMAJF04010			G5	S4	SC
21	Valley Sink Scrub	CTT36210CA			G1	S1.1	
22	Vulpes macrotis mutica San Joaquin kit fox	AMAJA03041	Endangered	Threatened	G4T2T3	S2S3	

	Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
1	Actinemys marmorata western pond turtle	ARAAD02030			G3G4	S3	SC
2	Charadrius alexandrinus nivosus western snowy plover	ABNNB03031	Threatened		G4T3	S2	SC
3	Dipodomys nitratoides nitratoides Tipton kangaroo rat	AMAFD03152	Endangered	Endangered	G3T1	S1	
4	Valley Sink Scrub	CTT36210CA			G1	S1.1	

ATTACHMENT E

Water Resources

AGREEMENT

This Agreement is made and entered into as of November 6, 2001, by and between the County of Kings ("County") and GWF Energy, LLC ("GWF").

WHEREAS, GWF is planning to construct an electrical power plant known as Henrietta Peaker Project ("HPP") located near the Lemoore Naval Air Station which needs 200 acre-feet of additional water to serve the proposed project; and

WHEREAS, GWF owns the rights to SWP entitlement within the boundaries of Tulare Lake Basin Water Storage District ("TLBWSD") which cannot be delivered directly to the proposed HPP plant unless a series of exchange arrangements are entered; and

WHEREAS, the County entered into a contract (Kings County Agreement No. 67-38) on August 31, 1967 with the State of California, Department of Water Resources ("DWR"), for an entitlement of 4000 acre feet of State Water Project water for municipal, industrial and recreational uses (hereinafter "SWP"); and

WHEREAS, with respect to such SWP water entitlement, the County entered into an exchange agreement (Kings County Agreement No. 67-18; hereinafter "Exchange Agreement") on April 26, 1967 with the TLBWSD whereby the County exchanged its SWP water from the California Aqueduct with the TLBWSD for an equivalent entitlement of the TLBWSD water from the Kings River (herein called "Kings River Agreement"); and

WHEREAS, TLBWSD and the County are willing to enter into an exchange arrangement with GWF to accommodate GWF's desire to effectively use 200 acre-feet of the County's SWP entitlement at the HPP site; and

WHEREAS, GWF has assigned the 200 acre-feet of its SWP Entitlement to TLBWSD for the purpose of obtaining the rights to utilize 200 acre-feet of the County's SWP entitlement for use at GWF's proposed HPP plant; and

WHEREAS, the County is willing to grant GWF the rights to utilize said 200 acre-feet under the terms and conditions of this Agreement for the purposes of creating jobs and increasing the County's tax base.

KINGS COUNTY AGREEMENT NO. 01-165

THEREFORE IT IS AGREED BY AND BETWEEN THE PARTIES AS FOLLOWS:

1. For the term of the Exchange Agreement, the County hereby grants the right to utilize 200 acre-feet of the County's SWP entitlement right for use at the HPP site. In the event GWF abandons the project or terminates the HPP plant for any reason, this agreement shall terminate, and GWF agrees to execute any documents necessary to release the subject SWP entitlement back to the County.

2. GWF hereby undertakes and assumes all of the obligations imposed on the County by its SWP agreement with DWR, as amended, as the same are applicable to the 200 acre feet of SWP water entitlement, including particularly, but not by way of limitation, all DWR billings relating to the subject SWP entitlement, State Water Contractors billings, and for all other costs in any way associated with or related to the delivery or use of the water by GWF. GWF shall reimburse County within thirty (30) days of invoice. Billings from the County shall be sent to GWF at the following address: 4300 Railroad Avenue, Pittsburg, CA 94565, c/o Douglas Wheeler.

3. GWF shall be responsible for making all of the necessary wheeling arrangements for the delivery of the subject SWP entitlement to the HPP site from the California Aqueduct. If necessary, the County shall assist and cooperate in GWF's efforts to obtain a wheeling agreement; GWF shall reimburse the County for any costs and expenses incurred by the County in doing so.

4. GWF shall not rent, lease, lend, hypothecate, convey, transfer or assign in any way, any interest in SWP water acquired under the terms hereof without the prior express written consent of the County.

In Witness Whereof the Parties have executed this Agreement as follows:

GWF Energy, LLC.

By: ______________________

Title: D.W. Wheeler, Vice President

Dated: Nov. 7, 2001

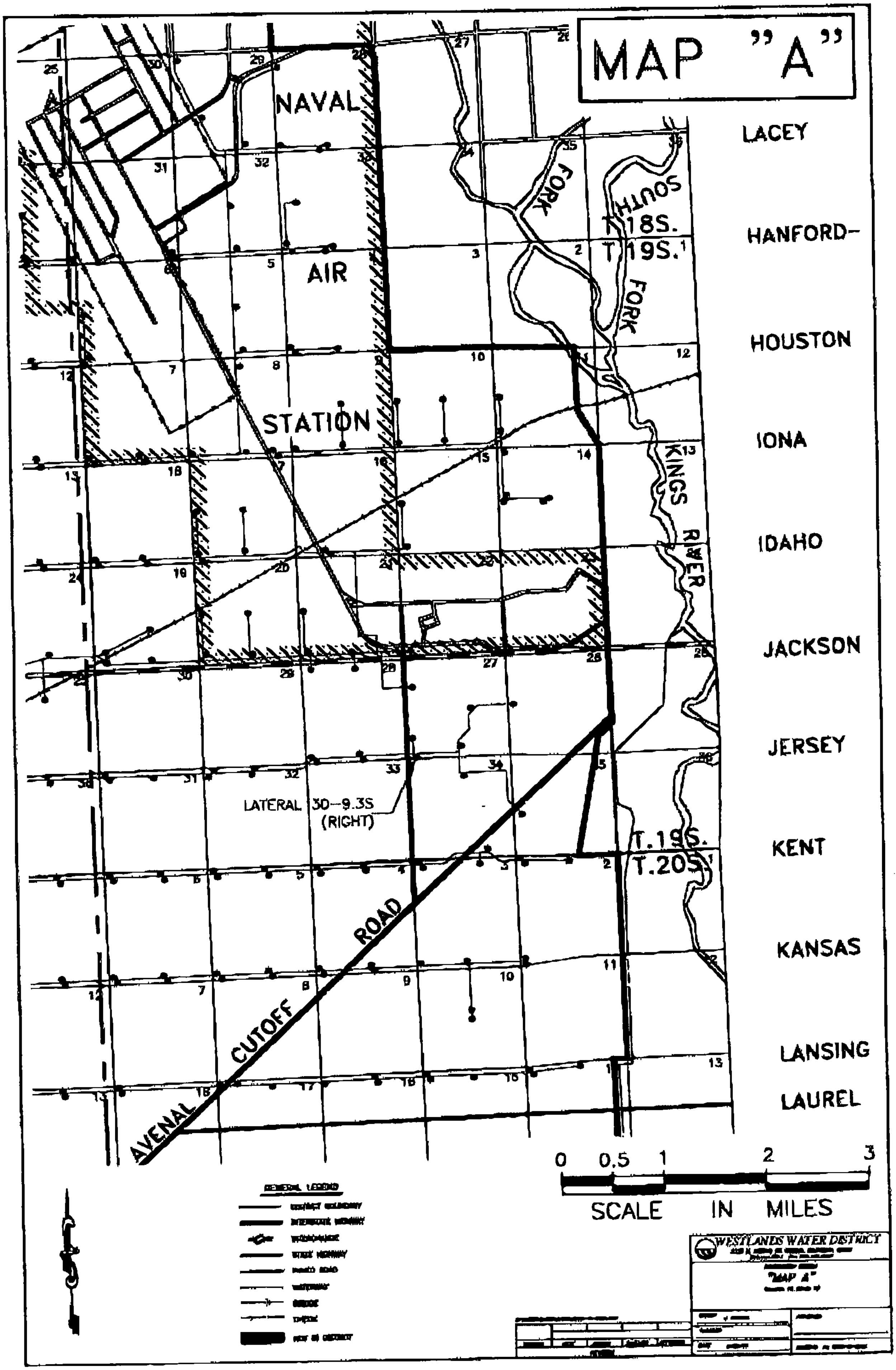
County of Kings

By: ______________________

Tony Oliveira
Chairman, Board of Supervisors

Dated: **NOV 06 2001**

h/water/gwf-swp1


MAP "A"
NAVAL
AIR
STATION
LACEY
HANFORD-
HOUSTON
IONA
IDAHO
JACKSON
JERSEY
KENT
KANSAS
LANSING
LAUREL
SOUTH FORK
FORK
KINGS RIVER
T.18S.
T.19S.
T.19S.
T.20S.
LATERAL 30-9.3S (RIGHT)
AVENAL CUTOFF ROAD
0 0.5 1 2 3
SCALE IN MILES
GENERAL LEGEND
WESTLANDS WATER DISTRICT
"MAP A"

Agreement for Conveyance of Water to Lands Within the State Water Project Service Area Located in Westlands Water District

Conveyee: GWF Energy, LLC
C/O Doug Wheeler

Address: 4300 Railroad Avenue
Pittsburg, CA 94565

REQUEST FOR CONVEYANCE

Conveyee has requested that Westlands Water District ("District") provide wheeling for water through District facilities for delivery to lands within the District's service area. Pursuant to California law (Water Code Section 1810-1814), the District may provide such wheeling if and when conveyance capacity is available and no other legal user of the water is harmed. The District has determined that capacity exists at the requested location subject to normal operational and maintenance activities and events outside of the District's control described in paragraph 7 of the terms and conditions of this agreement.

The water will be conveyed through District Lateral 30, meter location 30-9.3S for use in Section 34, Township 19 South, and Range 19 East.

Conveyee has an eligible and available water supply, independent of Conveyee's District water supply, and Conveyee shall provide such water for conveyance through District's distribution system to the delivery point (hereinafter referred to as "Conveyance Water").

TERMS AND CONDITIONS

The purpose of this letter agreement is to provide a basis for water conveyance service by the District. The District agrees to convey up to 200 AF of State Water Project (SWP) Conveyance Water through District facilities for use by Conveyee subject to the following terms and conditions:

1. Each month, Conveyee shall make available SWP water to meet Conveyee's demands, which amount will be deducted from the District's schedule for surface water delivered into the District. Upon the request of District, prior to any SWP water being conveyed hereunder in any District water year (March 1 through February 28 following), Conveyee shall provide a letter from the appropriate State Water Project contractor identifying the supply of SWP water available for Conveyee's use.

2. Any changes to existing District distribution system facilities necessary in order to transport the Conveyance Water shall be subject to the approval of the District and shall be made at the expense of Conveyee. The District will not furnish, maintain, or install facilities required to transport Conveyance Water beyond District boundaries, unless approved by the appropriate agencies, including but not limited to the US Bureau of Reclamation ("Reclamation"), Department of Water Resources ("DWR"), and Department of Health Services. Upon termination of this agreement, any additional non-District facilities at the connection points shall be removed at the expense of Conveyee. Conveyee is required to install and maintain the water meter required at this location per District specifications. Conveyee is also responsible for any costs to the District to review plans, inspect facilities and test the water meter to insure the meter meets the District performance standard of +/- two percent (2%).

3. All Conveyance Water transported pursuant to this agreement shall be measured by the District at the delivery point. All measurements shall be final and conclusive, except that upon request of District or Conveyee, the accuracy of such measurements will be investigated and any meter malfunctions, if any, will be corrected at the District's discretion. This action may necessitate billing corrections.

4. Conveyee will pay to the District a rate that includes the District's conveyance charge and any costs incurred by the District not covered by the conveyance charge to convey the water. The District's conveyance charge is calculated annually after the end of the fiscal year and reflects the per acre-foot cost of transporting water, including O&M costs, overhead and facilities depreciation, and is adjusted for any revenues that are appropriately allocated to the transportation activity.

5. Payment will be required prior to the conveyance of Conveyance Water. The rate per acre-foot billed will be based on an estimate of all costs for all Conveyance Water to the delivery point. Actual charges will be determined in May of each year following the Water Year in which the water was used. Any adjustment to the original charges will be billed at that time.

6. Conveyee shall immediately terminate its delivery of Conveyance Water upon the exhaustion of such water. If Conveyee fails to immediately take the foregoing action or pay any District charges when due, District shall terminate the conveyance of water by whatever means District deems necessary and appropriate. At the District's discretion, conveyance of water may be resumed after a termination; provided, Conveyee provides additional Conveyance Water and pays any applicable charges and/or costs to resume such service, all as determined by District.

7. The operational procedures and requirements of Reclamation and DWR generally applicable to the delivery of water to the District shall be applicable to the transportation of Conveyance Water in accordance with this agreement. In the event of a reduction in the capacity of the distribution system, whereby capacity to convey this water no longer exists or is reduced due to the water delivery demands of the

District's water users, then delivery of Conveyance Water will be terminated or reduced until such time as conveyance capacity is again available. The District may also temporarily discontinue delivery of Conveyance Water for the purpose of investigation, inspection, maintenance, repair or replacement of any District facilities used in providing service. The District will give appropriate notice of any such discontinuance except in the case of an emergency in which case no notice need be given. The District shall not be responsible for any claim for damage arising by reason of its inability to deliver the Conveyance Water to Conveyee due to conveyance limitations.

8. Conveyee shall indemnify and hold the District harmless from any liability, claim, damage, or claim of damage of any nature whatsoever, including any legal action brought by any third party, with respect to property damage, degradation of water quality or supplies, personal injury or death, or any violation of applicable county, state or federal law arising out of or connected with the pumping, control, carriage, conveyance, handling, use, disposal, delivery, or distribution of Conveyance Water subject to this Agreement. This indemnification, shall include the defense of the District in any legal action brought by a third party against the District's conveyance of water subject to this Agreement, and shall include Conveyee's pro-rata payment of the District's legal expense incurred in the defense of any such legal action.

9. The District does not warrant the quality of water to be transported pursuant to this Agreement.

10. This Agreement shall be become effective upon its execution by each of the parties hereto and will continue until terminated by either party upon 60 days written notice to the other party.

DISTRICT	CONVEYEE
Dave Ciapponi, Assistant General Manager	Signature
3/25/05	D.W. Wheeler, Vice-President
Date	Print Name
	3/21/2005
	Date

ATTACHMENT F

Visual Analysis Methodology

ATTACHMENT F

Visual Resources Evaluation Methodology

Introduction

The methodology applied in preparing this assessment of the proposed Project's potential visual resource impacts is the same methodology now being used by the staff of the California Energy Commission. The CEC's first application of this methodology was in its evaluation of the environmental impacts of the proposed Roseville Energy Project. This appendix explaining the methodology is drawn from and is essentially the same as Appendix VR-1 of the Visual Resources section of the Draft and Final Staff Assessments that CEC staff prepared for that project (CEC, 2004).

The CEC Staff's Methodology

The analysis of potential impacts to visual resources caused by construction or operation of any power plant or related facility largely involves answering the four questions found in Appendix G of the CEQA Guidelines, under Aesthetics. The four questions that must be addressed regarding whether the potential impacts of a project are significant are:

1. Would the project have a substantial adverse effect on a scenic vista?
2. Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State Scenic Highway?
3. Would the project substantially degrade the existing visual character or quality of the site and its surroundings?
4. Would the project create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?

The visual analysis typically distinguishes between three different impact durations: temporary impacts, typically lasting no longer than two years; short-term impacts, generally lasting no longer than five years; and long-term impacts, which are impacts with a duration greater than five years. In general, short-term impacts are not considered significant.

In addition to visiting the project area for personal observation of how and whether a particular view is experienced, a search is made for other evidence to determine if the local community values a particular view that might be affected by the project. This includes searching the applicable planning documents covering the area produced by local governments and community groups, as well as searches for any other type of evidence showing whether valued scenic vistas exist within the project's viewshed. Professional observations and evaluations of the project site are relied on to make initial determinations of visual character or quality of the area, in comparison with all other landscapes in California, but due deference is also given to plans and policies adopted by governmental bodies concerning the value of visual resources within the project area.

Each of the four checklist questions are answered for each part of the project both during construction and during operation, including any related facility such as a transmission line or gas pipeline. To answer the first checklist question ("Would the project have a substantial adverse effect on a scenic vista?"), a determination must first be made of whether a scenic vista exists within the viewshed of the various aspects of the project, and then a determination must be made of whether the project would have a substantial adverse effect on that vista.

To help make these determinations, visual resource professionals often answer a series of questions developed to help focus the analysis, and examine various ways that the project could create an impact to scenic vistas. In conducting this analysis, a list is used that was developed by the CEC's Visual Resources staff for each of the four CEQA guideline questions, drawing upon published methodologies and academic resources (Smardon et al., 1986), as well as on past experience with other power plant siting cases. Questions the CEC staff developed to help determine whether the project would significantly affect a scenic vista include:

1. Is the project located in the scenic view of a local/state/federal-designated scenic vista?
2. Is there compelling evidence to show that the view is designated/valued by the local community?
3. Will the project eliminate or block views of valuable visual resources?
4. Would the project create a water vapor plume that could have an adverse effect on a state/federal/local-designated scenic vista?

To help answer the second CEQA checklist question ("Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State Scenic Highway?"), CEC staff developed the following questions:

1. Is the project located in the scenic view from a local/state/federal-designated scenic highway?
2. Does the project site or its immediate vicinity contain scenic resources, such as trees, rock outcroppings, or historic structures that could be damaged by the project?
3. Would the project create a water vapor plume that could have an adverse effect on the view from a local/state/federal-designated scenic highway?

To answer the third question ("Would the project substantially degrade the existing visual character or quality of the site and its surroundings?"), CEC staff identifies a set of issues to be assessed to determine the existing visual character and quality of the project area and then how the project would affect the character and quality of the project viewshed. To assess whether the project has the potential to substantially degrade the present visual character or quality, personal observation and such tools as visual simulations are used to determine if an impact is significant and mitigation is required to reduce the impact to a less-than-significant level. To make that determination, many factors are examined, such as: how many viewers can see a particular view and for how long, collectively called "viewer exposure"; and to what degree the project would change the aspects of a given view, such as whether the project's components would block a particular view. To help determine how the community rates and values the visual character and quality of a given site, and whether the project would substantially alter the present visual character or quality, CEC staff developed the following questions:

1. How many residential, recreational, and traveling (motorist) viewers have views of the project?
2. Is the project site properly zoned?
3. Would a conditional use permit and/or height variance have been required from the city/county (if so what conditions would the city/county place on the power plant)?
4. Does the project conform to the clear written declarations of local/state/federal agencies to protect designated visual resources of importance or the valued aesthetic character of a neighborhood (said declaration must be clear, concise, and uncompromised by conflicting declarations, and be an official action of the governing body [City Council/ Board of Supervisors] such as a General Plan element, zoning ordinance, or design guideline)?
5. Will the project substantially alter the existing viewshed, including any changes in natural terrain?
6. Does the project substantially change the existing setting?
7. Has landscaping been proposed as part of the project?
8. Would the project create a water vapor plume that could have an adverse effect on a KOP view?

The process of answering these questions includes an examination of the present views within the project viewshed in terms of aesthetics – i.e., by examining the various aspects that together define the quality of a view – followed by an assessment of how the various aspects of the aesthetics of the view would be affected by the project, which conversely could be described as an analysis of how well the project area can absorb the various aspects of the project into the landscape.

To answer the fourth CEQA Guidelines checklist question ("Would the project create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?"), the project's lighting plans are analyzed to ensure they fit with established norms for low-impact lighting designs, and then answers the following questions to determine if a potential for impact from night-lighting exists:

1. With application of standard best practices for lighting control, would light or glare be reduced to acceptable levels?
2. Will the project result in significant amounts of backscatter light into the nighttime sky?

References

California Energy Commission. 2004. Final Staff Assessment for the Roseville Energy Park Project – Visual Resources chapter.

Smardon, R.C., J.F. Palmer, and J.P. Felleman. 1986. Foundations for Visual Project Analysis. John Wiley & Sons, New York.

APPENDIX G

Reference CD