3.0

FACILITY DESCRIPTION AND LOCATION

3.1 INTRODUCTION

El Segundo Power II LLC proposes to construct and operate a nominally rated 630 MW combined cycle electric generating unit on the property of the existing El Segundo Generating Station (ESGS) in El Segundo, California.

The El Segundo Power Redevelopment Project (ESPR) will be constructed and operated without ratepayer support as a part of this existing “merchant plant.” The project will supply capacity and energy to California’s restructured electric market. El Segundo Power II LLC anticipates the new combined cycle unit’s output will be sold both into the California Power Exchange and to large wholesale customers.

ESGS has been operating as an electric generating station since May 1955. The facility is currently comprised of four gas-fired conventional, electric power generating units. The plans for the proposed project include demolition of the existing power blocks of Units 1 and 2 and construction of a combined cycle plant within the footprint of the demolished units. Station net power output will increase approximately 280 MW with the addition of the combined cycle plant.

The new combined cycle unit will consist of two combustion turbine generators (CTGs), two heat recovery steam generators (HRSGs), and one steam turbine generator (STG). Heat rejection for the STG will be accomplished with an existing deaerating, steam surface condenser connected to an existing ocean circulating water system, previously utilized by two conventional steam power plants. Natural gas will be the only fuel utilized by the two new CTGs. Natural gas will be supplied to the combined cycle unit by Southern California Gas Company (SoCalGas), the current supplier of natural gas to the El Segundo Generating Station.

Electricity generated by the El Segundo Power Redevelopment Project will be delivered to the existing Southern California Edison (SCE) substation located on a separate parcel immediately adjacent to the El Segundo Generating Station property. From SCE’s El Segundo 230 kV substation, electricity will be transmitted to users by the existing transmission and distribution network.

Water will be supplied to ESPR from three sources: potable city water from the City of El Segundo, reclaim water from the West Basin Municipal Water District, and Santa Monica

Bay seawater from the existing intake structure currently serving Units 1 and 2 at the generating station. New pipelines for city water and reclaim water will be constructed to supply the needs of the redeveloped facility.

Sanitary wastes will be directed to a new interconnection with the municipal sanitary sewer operated by the City of Manhattan Beach Public Works Department. Plant process wastewater will be directed to the existing retention pond on the power plant property and effluent from this pond will be discharged to Santa Monica Bay via the existing circulating water system outfall.

3.2 FACILITY LOCATION

ESPR is located in El Segundo, California, a City in Los Angeles County. The project will be constructed at the El Segundo Generating Station (ESGS), an existing power plant operated by NRG El Segundo Operations, Inc. The ESGS site is located at 301 Vista Del Mar, situated approximately 2.5 miles southwest of the Los Angeles International Airport and west of the San Diego Freeway (I-405) on the eastern shore of Santa Monica Bay. The site is bordered by Vista Del Mar and the Chevron refinery to the east, 45th Street in the City of Manhattan Beach on the south, Santa Monica Bay on the west, and Chevron Marine Terminal on the north.

The ESGS site is approximately 33 acres in size. The location of the site and the associated pipeline routes are shown in Figures 3.2-1 and 3.2-2. An aerial view of the ESGS is shown in Figure 3.2-3. Primary access to the site will be from the north on Vista Del Mar via West Imperial Highway, Glenn Anderson Freeway (I-105), and the San Diego Freeway (I-405).

The ESGS site is located at Township 3 South, Range 15 West, on the Venice USGS Quadrangle Map. There is no applicable USGS section number. The site is comprised of three parcels. The existing ESP II generating units are located on APN 4138-029-002, a parcel approximately 24.7 acres in size, owned by El Segundo Power LLC. The existing Southern California Edison (SCE) Substation is located on APN 4138-029-800, a parcel approximately 2.25 acres in size, owned by SCE. The existing SCE tank farm is located on APN 4138-029-801, a parcel approximately 9.0 acres in size, currently owned by SCE but under negotiation for purchase by El Segundo Power LLC. This third parcel will be used for laydown, staging, and parking during construction.

3.3 SITE DESCRIPTION

3.3.1 Topography

As shown on Figure 3.3-1A, the northern end of the existing ESGS site has been graded and paved with the top of asphalt pavement varying from Elevation 18 feet to Elevation 20 feet mean lower low water (MLLW) in the area of the proposed power block.

As shown on Figure 3.3-1B, the existing topography at the south end of the site slopes down from the entrance road to the retention basin and fuel oil tank areas at a 1.5 to 1 slope. Elevations vary from a high point at the gatehouse of 90 feet down to Elevation 39 feet at the fuel tank area and down to Elevation 25 feet at the retention basin area. The existing fuel oil tank area is level and is surrounded by an earthen containment berm.

The final grade for the new power block area, as shown on Figure 3.5-1A, will be similar to the existing grade. The power block complex will be at a level elevation of 20 feet and the top of pavement will slope down at the drop inlet locations to Elevation 18 feet.

The final grade for the fuel oil tank area, as shown on Figure 3.5-1B, will be similar to the existing topography with grades sloping from Elevation 40 feet down to new drop inlets at Elevation 38 feet. The existing earthen berm will remain unchanged except that a portion of the berm along the west side will be removed to allow road access into the tank area.

A new Administration/Maintenance Building will be situated on a level area located north of the fuel oil tank area and east of the retention basin. The existing elevation of 25 feet in this area will remain unchanged. A portion of the building will extend into the existing slope and therefore, the lower level building wall will also serve as a retaining wall.

3.3.2 Geologic Setting and Seismology

The geology, seismic setting, and soil conditions at the site are discussed in detail in Section 5.3, and are summarized herein.

The site is located in the southwestern portion of the Los Angeles Structural Basin, which forms the transition between the northern portion of the Peninsular Ranges Physiographic Province and the southern portion of the Transverse Ranges Physiographic Province of California.

The Peninsular Range Province is characterized by northwest-trending mountains and valleys formed largely by a system of active right-lateral, strike-slip faults with a similar trend. The Transverse Range Province is characterized by east-west trending mountains and intervening valleys that were formed by a series of east-west trending fold belts and active left-lateral reverse and thrust faults. Over geologic time, the site has been influenced by fluvial, marine, and littoral depositional processes as sea levels have risen and fallen and as tectonic forces have changed the regional landscape.

The site is underlain by a thick, interbedded sequence of Quaternary clays, silts, sands, and gravels. These quaternary deposits are underlain by Tertiary sedimentary rocks, including claystones, siltstones, and sandstones. Schist and gneissic basement rocks lie beneath the sedimentary rocks at depths of about 6,700 feet.

3.3.2.1 Subsurface Conditions

The available boring data indicate that the foundation-related subsurface conditions are characterized by a sequence of interbedded Pleistocene sand and gravel, and clay deposits. The underlying stratigraphy of these deposits has been divided on the basis of hydrogeologic units. The site vicinity is underlain by three relatively shallow aquifers separated by aquitards/aquicludes (geologic layers that tend to slow down or prevent vertical groundwater movement) within a depth of approximately 100 feet below ground surface. The stratigraphic units, in descending order, consist of the Old Dune sand, Manhattan Beach clay, the Gage sand, El Segundo clay and the Silverado sand. The Manhattan Beach clay which separates the Old Dune sand from the Gage sand is present at the southern end of the site and absent beneath the site under existing Units 1 and 2. Generalized geologic cross sections are shown on Figures G-5 and G-6 in Appendix G. The following provides a description of the stratigraphic units, underlying the top 1-foot (plus or minus) consisting of asphalt and gravel subgrade, in descending order underlying the powerblock of Unit 1 and 2.

Old Dune/Gage Sand: consisted of generally brown, medium dense, silty fine to medium grained sand, poorly graded (SP) with lenses of sandy gravel (GP) and occasional cobbles. The Old Dune/Gage Sand extends to 57 feet below ground surface. Corrected SPT blow counts average 25 blows per foot.

El Segundo Aquitard: consisted of generally dark gray, very stiff, wet, high plasticity clay (CH) containing minor amounts of shell fragments and interbeds of generally brown, dense, wet, fine grained sand (SM), poorly graded trace to some silt. The El Segundo aquitard soils started beneath the Old Dune/Gage Sand and extended to a depth of about 70 feet. The estimated total thickness of the aquitard is approximately 10 feet based on the boring log for existing well EOW-25. Corrected SPT blow counts in this layer average 21 blows per foot.

Silverado Sand: consisted of generally brown, dense, wet, fine to medium grained sand (SW), well graded, with gravel. This layer was encountered below the El Segundo aquitard, and is known to extend to a depth of about 96 feet below ground surface. The total thickness of the aquifer on the site is unknown.

3.3.2.2 Seismic Conditions

The site seismicity is discussed in detail in Section 5.3, Geologic Hazards and Resources. The El Segundo site is located within Zone 4 of the California Building Code. The site is situated between active fault traces of the Newport-Inglewood fault to the east and the Palos Verdes fault, offshore to the west (Figure G-3 in Appendix G). Both faults are right-lateral, strike-slip with slip rates of approximately 1.0 mm per year. The maximum credible earthquake for the Palos Verdes fault is 7.1 magnitude and 6.9 magnitude for the Newport-Inglewood fault. Peak ground acceleration for alluvium conditions is 0.46g with 10 percent exceedance in 50 years from the California Division of Mines and Geology (DMG) Open-File Report 98-27, Seismic Hazard Evaluation of the Venice Quadrangle. No active (Holocene) or potentially active (Quaternary) faults were found to cross the site in this review. The hazard for ground rupture is negligible.

3.3.2.3 Liquefaction Potential

The means and methods of addressing the possible effects of soil liquefaction (i.e., vertical settlement and lateral spreading) will be in accordance with accepted engineering practice and applicable California agency guidelines including but not limited to DMG Special Publication SP-117.

The means and methods of addressing soil liquefaction if needed at the site may include but not be limited to the following:

- **Stone Columns –** This method of ground improvement for addressing liquefaction is performed by injecting columns of compacted gravel below the required treatment area in a uniformly spaced pattern (5 to 10 feet on-center) to depths of 40 to 50 feet below existing site grades. The stone columns can be capped off with a drainage relief blanket of additional gravel at the bottom of the planned excavation. Stone columns promote liquefaction potential mitigation by means of site densification, enhanced radial drainage of earthquake-induced excess pore water pressure, and improved vertical subgrade support for conventional shallow foundations. Stone columns also provide a significant level of shear resistance to potential lateral spreading. Installation of stone columns at the plant site would be performed after site demolition but before foundation construction phases. The installation would require the use of a crane with specialized vibro-equipment and other ancillary equipment. The stone columns would not be visible upon completion of construction.

- **Jet Grouting –** This method of ground improvement for addressing liquefaction involves high-pressure radial injection of cement grout slurry into the subsurface soils in a pattern and depths to the stone column method. This method significantly hardens the treated soil columns but does not densify the interstitial soil between columns nor does it promote radial drainage of earthquake-induced excess pore water pressure. The installation period, equipment, and visibility would be similar to that of the stone columns.

- **Compaction Grouting –** This method of ground improvement for addressing liquefaction involves high-pressure injection of a no-slump sand/cement grout that compacts loose soils at depth. Small diameter steel injection pipes are driven or drilled to the required depths and then are pumped with grout at specified pressures and volume takes at incremental stages of withdrawal from the ground. Compaction grouting reduces the liquefaction potential by densification and by providing high vertical support capacity. The installation period, equipment, and visibility would be similar to that of the stone columns with the exception that a crane would not be needed.

- **Deep Dynamic Compaction –** This method of ground improvement for addressing liquefaction is performed by dropping a heavy weight (50 to 100 tons) from a selected height (50 to 100 feet) several times at discrete locations. This method can mitigate liquefaction potential of sandy soils by direct impact densification to depths of 30 to 40 feet below the struck ground surface. After the deep densification is completed, an ironing pass using a lower impact energy level is often performed prior to final site grading. Attenuation of shock vibrations may limit the applicability of this method. The installation period, equipment, and visibility would be similar to that of the stone columns.

- **Vibro-Concrete Columns –** This method of ground improvement for addressing liquefaction is very similar to stone columns with the exception that concrete is used rather than gravel. However, radial drainage of earthquake-induced excess porewater pressure is not promoted. Therefore, the vertical load capacity of the ground is greatly improved. The installation period, equipment, and final visibility would be similar to that of the stone columns.

- **Chemical Grouting –** This method of ground improvement for addressing liquefaction is similar to jet grouting, with the exception that a slowly injected (permeation) microfine cement paste is used rather than a high-pressure injected cement grout slurry. The installation period, equipment, and final visibility would be similar to that of the stone columns.

- **Remedial Earthwork –** This method of ground improvement for addressing liquefaction involves the overexcavation and recompaction of loose and weak soils beneath the project site. Treatment of soils below the groundwater table would require an extensive dewatering program in order to maintain a stable and dry working area. To a lesser extent, partial mitigation of soil liquefaction potential is possible by performing an overexcavation and recompaction of the soils above the groundwater table. A uniformly thick pad of compacted fill soil beneath the site can mask a significant portion of potential differential settlement that could occur due to simple volumetric strain of the underlying soils unassociated with lateral spreading. The lateral spreading hazard at the site is unaffected by this method of ground improvement. Overexcavation and recompaction would require the use of conventional earthmoving equipment.

- **Deep Foundations –** Deep foundation systems could be utilized to address the potential effects of soil liquefaction to the extent that structural settlements are minimized. Driven steel H-piles or precast prestressed concrete piles extending 50 to 60 feel below finish grade may be considered. The size, number, and distribution pattern of these types of deep foundation systems would minimize the settlements and reduce the lateral spreading hazard. Driven deep foundations would require the use of a crane with a pile hammer and other ancillary construction equipment. The piles would not be visible at the end of construction.

3.3.2.4 <u>Slope Stability</u>

Potential slope instability along the easterly portion of the project site will be addressed during the design level geotechnical investigation. Safety factors for various design conditions will be appropriately evaluated in accordance with accepted engineering practice and applicable California agency guidelines including but not limited to DMG Special Publication SP-117. The means and methods of addressing the possible effects of slope instability, if needed at the site, may include, but not be limited to soil nailing, wall system, or a soldier beam and lagging structure to act as a deflection device. Construction within the slope area, if needed, will impact the existing vegetation and require revegetation.

- **Soil Nailing –** Soil nailing of the slope to prevent potential instability would require angle drilling and installation of grouted steel reinforcing bars that extend 20 to 40 feet into the slope. Soil nails could be required to extend greater than 50 feet into the slope if the effects of lateral spreading are also to be addressed by this means. The soil nails would have a uniform spacing of 5 to 50 feet on-centers and be inclined roughly 10 to 20 degrees from horizontal. Drilling and installation would require that equipment be mobilized on the slope face and that a heavy mobile anchorage point be provided at the top of the slope. The ends of the soil nails would project less than one foot out of the face of the slope and be integrated into a shotcrete facing covering the entire slope face. Installation of the shotcrete facing would require that all existing vegetative cover be removed. The shotcrete facing can be pigmented and textured as desired.

- **Retaining Wall –** Construction of a new, higher retaining wall at the site would improve the overall stability of the site slopes. The retaining wall could be about 10 to 15 feet higher than the top of the existing low retaining wall located along the east side of the site at the toe of the subject slope. The retaining wall could then be backfilled with compacted fill soil at an inclination of 2:1 (horizontal to vertical) or flatter. The existing vegetation would be removed and replaced in-kind. The retaining wall could be made of either conventional reinforced concrete or a mechanically stabilized earth system. The existing low retaining wall would likely have to be replaced or incorporated into the new retaining wall design. Construction would require the use of conventional excavation and earthmoving equipment.

- **Slope Debris Collector/Deflector –** As a means of addressing the potential impact of slope sloughing, it could be possible to design and construct a slope debris deflector directly behind the existing low retaining wall and pipe rack. This system could include, but not be limited to, a continuous steel sheet pile wall or soldier beam and lagging system. The system would have to be high enough to collect and retain sloughed soils as well as to force soils that overtop the device to land on the level paved areas below without impacting the pipe rack. The upper deflector portion of this system would require that the top be provided with some type of protective canopy over the top of the pipe rack. The sheet piling or soldier piles could be installed directly over and behind the existing retaining wall. Construction would require a crane and other ancillary equipment. Only the lower few feet of the existing slope vegetation would be impacted.

3.3.2.5 Shoreline Erosion

Shoreline erosion is an ever-present geologic hazard along the westerly side of the project site. Shoreline protection structures and beach nourishment are means of addressing shoreline erosion that have been used in the past in the project area. Repair and enhancement of existing shoreline protection structures and beach nourishment are considered methods for shoreline erosion that would reduce potential impacts. If implemented as part of the project design, erosion control methods will be designed and permitted in accordance with applicable rules and regulations of local, State, and Federal agencies.

- **Beach Nourishment –**Addressing the effects of shoreline erosion (i.e., storm wave runup and overtopping) utilizing beach nourishment can be implemented by using excavated clean native sands from the plant site excavation. These sands can be hauled directly to the adjacent beach area south of the existing groin. The inflated beach profile could enhance the overall dry width and elevation of the public beach as well as significantly reduce the potential impacts to the plant site. This seaward extension of the beach free-face can also help address the potential effects of liquefaction-induced lateral spreading by increasing the distance of the mean high tide line from the plant site. Beach nourishment would require the use of conventional earthmoving equipment on the shoreline. The visual result would be to have a wider beach. However, use of the bike path would be temporarily interrupted.

- **Rock Revetment –** The existing rock revetment along the western edge of the adjacent bike path can be either enhanced or maintained as necessary to ensure that landward retreat of the shoreline is arrested if the beach width becomes severely degraded due to storm wave conditions. Modifications to the revetment can consist of restacking, interlocking adjustments, and placement of additional rock (as necessary). Revetment work would require conventional earthmoving and rock handling equipment. The visual result to the shoreline would not be significant. However, use of the bike path would be temporarily interrupted.

3.3.3 Hydrological Setting

The plant is located in the City of El Segundo in Los Angeles County. The area exhibits relatively mild temperatures throughout the year. The annual average daily temperature is 62.7ºF, with the coldest average daily temperature occurring in January at 56.0ºF and the warmest average daily temperature occurring in August at 70.3ºF. Daily temperature changes are typically less than 15 degrees in spring and summer and about 20 degrees in fall and winter. In general, seasonal temperature changes are small and the percent humidity high in this region due to its proximity to the coast. El Segundo’s rainy season occurs mainly in the winter months, with the amount of precipitation increasing with elevation on the nearby foothills.

The annual normal rainfall, as measured at Los Angeles International Airport, is 12.01 inches. The annual average for days with rainfall greater than or equal to 0.01 inch is 34 days. Rainfall events greater than or equal to 1.0 inch occur at an annual average of only 3 days.

3.3.3.1 Surface Water

Within the proposed power block area, the site has been graded and paved to direct all surface runoff to existing drop inlets. Stormwater is collected, sent through an oil water separator, and the effluent is discharged to the ocean through the existing Discharge No. 001.

Within the fuel oil tank area, all stormwater is currently collected within the containment berm and then periodically pumped out to the adjacent areas beyond the berm. After the redevelopment project has been implemented, all stormwater will be collected, sent through an oil water separator, and the effluent discharged to the ocean through the existing Discharge No. 002.

The area in which the new Administration/Maintenance Building will be located collects surface runoff in an existing drop inlet system and routes the stormwater through an oil water separator prior to being discharged to the ocean via the Discharge No. 002.

3.3.3.2 Groundwater

Groundwater was encountered in the Old Dune/Gage Sand Aquifer generally at 12 feet below ground surface under unconfined conditions. This would correspond to approximately Elevation 8.0 MLLW. Groundwater elevations monitored in the Old Dune/Gage Sand Aquifer indicate that the water levels are tidally influenced. Differences in elevation indicate changes of approximately 0.3 foot on the western side of the site. As measured on December 15, 1997, the direction of groundwater flow in the Old Dune/Gage Aquifer was generally to the northwest at a gradient of 0.0015 feet/foot.

3.4 FACILITY DESCRIPTION

3.4.1 Overview

ESPR will involve the complete demolition and removal of Units 1 and 2 on the ESGS site, except for the steam cycle heat rejection system (i.e., circulating water system) which utilizes water from Santa Monica Bay. Following the demolition/removal portion of the redevelopment effort, a new combined cycle power plant is to be constructed on the site with the addition of Units 5, 6, and 7 in the location previously occupied by Units 1 and 2.

Units 5 and 7 will be General Electric Model PG7241FA combustion turbine generators (CTG), each with an ISO base load gross output of 171.7 MW. Each CTG will be equipped to burn a single fuel (i.e., natural gas) with an evaporative cooling system installed on the inlet air for use when the ambient temperatures exceeds 59°F. Gross output of each hydrogen-cooled generator will be increased to a peak load of 183.4 MW with steam injection (at 59°F and site elevation).

A combined cycle configuration will be established with the addition of heat recovery steam generators (HRSGs) to the exhaust outlets of Units 5 and 7 and the addition of a Unit 6 steam turbine generator (STG). Unit 6 will be equipped with a General Electric reheat, double flow, down exhausting condensing steam turbine with nominal throttle steam conditions of 1,815 psia, 1050°F, and 1050°F reheat temperature and a hydrogen-cooled generator with a peak generating output of approximately 288 MW. Peak generating output of the STG will be accomplished with supplemental firing of the HRSGs.

The power cycle is depicted on Figure 3.4-1 (Sheet 1 of 5). Performance estimates for the combined cycle plant are summarized in the remaining sheets of Figure 3.4-1. Performance estimate summaries are included for a hot day (ASHRAE summer 1.0 percent design condition), an average day (ISO condition), and a cold day (ASHRAE winter 99.0 percent design condition).

A dry, low NO_x (DLN) combustor system will be used to control the nitrogen oxide (NO_x) concentration of the exhaust emissions exiting each CTG. An additional, post-combustion NO_x control system, a selective catalytic NO_x reduction (SCR) system, will be provided in each HRSG to further reduce the NO_x concentration. The SCR system for each HRSG will inject ammonia into the exhaust gas stream upstream of a catalyst bed that will reduce the nitrogen oxides to inert nitrogen. An oxidation catalyst system will also be incorporated into the air quality control system to control emissions of carbon monoxide (CO).

Aqueous ammonia is currently utilized and stored in a 20,000 gallon tank on the El Segundo Generating Station site, but the addition of SCRs on Units 5 and 7 will require a significant increase of ammonia usage. To avoid increased truck traffic for delivery of aqueous ammonia to the plant site, ESPR will purchase aqueous ammonia from the adjacent Chevron Refinery and install a pipeline directly connecting the refinery aqueous ammonia production system to the on-site storage tank.

3.4.1.1 Reference Literature

The design, engineering, procurement, and construction activities on the project will be in accordance with various predetermined codes, industry standards, and project-specific practices. The various engineering codes and design standards that will be utilized during the implementation of the project have been summarized in Appendices A through E. Along with presenting a listing of laws, ordinances, codes, and applicable standards, design criteria are outlined for civil, structural, mechanical, control systems, and electrical engineering.

3.4.2 Site Layout

The plant general arrangement is depicted on Figure 3.4-3A. A three dimensional view and an elevation view of the power block of the combined cycle plant are illustrated on Figure 3.4-3B and Figure 3.4-3C, respectively. These drawings show the location and size of the proposed combined cycle plant facilities.

The power block (i.e., two CTGs, two HRSGs and associated stacks, and the single STG) will be constructed in an area of about 5.5 acres. The two exhaust stacks will have a height of 250 feet above grade to comply with air quality standards. Surrounding the power block is a network of roads for fire equipment and facility maintenance access. The administration building, maintenance building, water treatment facilities, storage tanks, and natural gas compression equipment will be located in other areas of the site.

The plant facilities have been arranged to afford optimum use of the property as well as to ensure ease of operation.

Investigations and evaluations have been conducted to define the specific facility equipment requirements and the suitability of the proposed project site to accommodate these facilities.

3.4.3 Combustion Turbine Generator, HRSG, and Steam Turbine

3.4.3.1 Combustion Turbine Generators

The two CTGs (new Units 5 and 7) convert the thermal energy produced by the combustion of natural gas into mechanical energy required to drive the generator and the CTG compressor.

Air is supplied to the CTG through an inlet air filter, inlet air evaporative cooling system, and associated air inlet ductwork. Downstream of the inlet air filters and the air cooling section, the air is compressed in the compressor section of the combustion turbine and then exits through the compressor discharge casing to the combustion chambers. Fuel is supplied to the combustion chambers where it is mixed with the compressed air and the mixture ignited. The high-temperature, pressurized gas produced by the combustion section expands through the turbine blades, driving the turbine, the electric generator, and the CTG compressor.

Exhaust gas from the CTG is directed through internally insulated ductwork to the HRSG. Steam generated in the HRSG is admitted to the steam turbine for electric power generation.

The CTGs will have the capability for power augmentation during peak load periods with steam injection. The source of steam for steam injection for power augmentation will be from a main steam extraction.

The combined cycle CTG system includes:

- Two combustion turbine generators each rated at 171.7 MW (nominal) at ISO conditions.

- NO_x emissions at the CTG exhaust, upstream of the HRSG, are controlled by dry low, NO_x combustors to 9 parts per million (without steam injection), volumetric dry (ppmvd) at 15 percent O_2.

The CTG auxiliary equipment includes:

- Inlet air filter system
- Inlet air evaporative cooling system
- Closed cooling water system (air-cooled)
- Fuel gas system
- Lubricating and hydraulic oil system
- Duplex lube oil coolers
- Compressor wash system (on-line and off-line capability)

- Fire protection systems
- Turbine and generator controls.

3.4.3.2 Heat Recovery Steam Generators

The HRSG transfers heat from exhaust gases of the CTG to feedwater to produce steam for the steam turbine operation. The HRSG is designed and constructed to operate at the maximum exhaust gas flow and temperature ranges of the CTG.

The HRSG will be of a sliding-pressure, supplemental fired, triple-pressure reheat type steam generator design with vertical gas flow complete with feedwater stop and check valves, steam stop valves, relief valves, continuous and intermittent blowdown valves, selective catalytic NO_x reduction, oxidation catalyst, and all necessary piping, valves, and instrumentation. The high pressure (HP), intermediate pressure (IP), and low pressure (LP) sections each consist of an economizer, evaporator, and superheater section. Both the HP and IP systems are fed with saturated LP water from the drum. Therefore, the LP drum functions as a feedwater storage tank for both the HP and IP systems. The HRSG design will also include provisions necessary to allow ease of maintenance and accessibility.

An SCR system (including aqueous ammonia injection system for proper SCR operation) is provided to control NO_x concentration in the stack exhaust. An oxidation catalyst is also provided to control CO emissions. Access space is provided to permit maintenance on the SCR system.

Supplemental firing with the use of duct burners provides additional heat for increased steam generation up to and including ASME Code permissible overpressure operation to achieve peak plant output.

Each HRSG is complete with inlet and outlet ductwork and a steel stack.

3.4.3.3 Steam Turbine Generator

The STG (new Unit 6) system consists of a steam turbine, gland steam system, lube oil system, hydraulic control system, and a hydrogen cooled generator with all required accessories.

A 3,600 rpm, condensing-extraction type reheat steam turbine with downward flow exhaust will be furnished. The steam turbine generator is designed for a peak output of 280 MW with HP inlet throttle pressure at the ASME Code permissible 5 percent overpressure condition of 1,905 psia.

3.4.4 Heat Rejection System

Power cycle heat rejection will consist of a two-pass deaerating, steam surface condenser and a once-through circulating water system using water from the Santa Monica Bay for cooling. The circulating water system intake structure including pumps, valves, and the inlet and outlet piping previously utilized by Units 1 and 2, the two units proposed to be demolished, will be reused by the new combined cycle plant. The circulating water flow rate will remain the same and the temperature difference across the intake and outfall will stay within the 20^{o}F limit of the California Thermal Plan.

Two feedwater heaters and a drain cooler have been included in the design to permit peak load operation without rejecting excessive heat to the ocean. The use of feedwater heaters will have a slight adverse effect on plant efficiency. With the feedwater heaters in service, plant efficiency will drop by approximately 0.5 percent. Feedwater heating will only be placed in service when peak generation is required.

The condenser air removal system will utilize either steam jet air ejectors or mechanical vacuum pumps for both hogging and holding of condenser vacuum. The condenser and its auxiliaries will be designed to accept steam turbine bypass flow during unit startup.

The circulating water system will provide cooling water for condenser heat rejection as well as for the closed loop, component cooling water system.

3.4.5 Major Electrical Equipment

3.4.5.1 AC Power Transmission

An overall one-line diagram of the proposed GE 7FA combined cycle facility electrical generation and distribution system is shown in Figure 3.4-4. Power produced at the facility by the combustion turbines and steam turbine generators will be 18 kV. The output of each combustion turbine generator and steam turbine generator is connected by isolated phase bus to a two-winding, oil-filled generator step-up transformer. Surge arrestors at the high-voltage bushings protect the transformers from surges in the 230 kV system resulting from lightning strikes or other system disturbances. The transformers are set on concrete pads with oil containment provided. A fire detection system is provided. Fire walls are installed between the transformers to protect each transformer from a fire on the other transformer. The primary side of each step-up transformer is terminated on the 230 kV switchyard/transmission line. There are 230 kV high-voltage circuit breakers and associated disconnect switches on the primary side of the main step-up transformers, as indicated on Figure 3.4-4.

3.4.5.2 AC Power Distribution

Auxiliary power to the facility loads is supplied by one double-ended 4160 V metal-clad switchgear/motor controller lineup. Two oil-filled, two-winding unit auxiliary transformers supply primary power; each transformer will be rated 12/16/20 MVA, OA/FA 65 C rise, 18-4.16 kV -Y connection. The high-voltage side of the unit auxiliary transformer is connected to the combustion turbine generator isophase bus between the generator circuit breaker and the main step-up transformer. The AC Power Distribution System will be designed so that the loss of one unit auxiliary transformer will not limit the plant output capability.

The 4160 V switchgear/motor controller lineups supply power to the various 4000 V motors and to the secondary unit substation (SUS) transformers rated 4160 to 480 V for 480 V power distribution. The switchgear has vacuum breakers for the main feeds and vacuum breakers or fused contactors for power distribution. The 4160 V system is resistance-grounded to limit the maximum ground fault current.

The SUS transformers will be either outdoor, oil filled, or indoor dry type, each supplying 480 V, 3-phase to the SUS buses through normally closed SUS main circuit breakers. The neutral of the 480 V system is solidly grounded with individual feeder ground fault detection.

The secondary unit substations provide power to the motor control centers (MCC). The MCCs distribute power to all 460 V motors, to 480 V power panels, and to other intermediate 480 V loads. The 480 V power panels distribute power to small 480 V loads.

Power for the 120/208 VAC power supply system is provided by the 480 V MCCs and 480 V power panels. Transformation of 480 V power to 120/208 V power is provided by 480-120/208 V dry-type power and lighting transformers.

3.4.5.3 DC Power Supply

The DC power supply system for balance-of-plant loads consists of one 125 VDC battery system, with one 125 VDC full-capacity battery charger, metering, ground detector, and distribution panel. Additional 125 VDC systems are also supplied as part of each combustion turbine package.

The balance-of-plant 125 VDC system supplies control power to the generator circuit breakers, step-up transformers, and 4160 V switchgear, to the 480 V load centers, and to critical control circuits. The system also supplies power to the emergency DC motors.

Under normal operating conditions, the battery chargers supply DC power to the DC loads. The battery chargers receive 480 V, 3-phase AC power from one of the MCCs and continuously charge the batteries while supplying power to the DC loads. The 125 DC system is an ungrounded system, and a ground detector detects grounds on the DC power supply system.

3.4.5.4 Essential Service AC (UPS)

The facility essential service 120 VAC, single-phase, 60 Hz power source will supply AC power to essential Distributed Control System loads and to unit protection and safety systems that require uninterruptible AC power. The essential service AC system and its DC power supply system are both designed to supply critical safety and unit protection control circuits.

The essential service AC system consists of one full-capacity charger and inverter, one dedicated 125 VDC battery system, a solid-state transfer switch, a manual bypass switch, an alternate source transformer and voltage regulator, and AC panelboards.

When the normal 480 V source of power to the system fails, the dedicated 125 VDC battery powers the inverter to the panelboards. The solid-state transfer switch continuously monitors both the inverter output and the alternate AC source. The transfer switch automatically transfers essential AC loads without interruption from the inverter output to the alternate source upon loss of the inverter output.

A manual bypass switch isolates the inverter-static transfer switch for testing and maintenance without interruption to the essential service AC loads.

3.4.5.5 Loss of AC Power

In the event of a total loss of auxiliary power, or in situations when the utility system is out of service, the emergency power needed to keep emergency lighting and critical process systems powered will be provided by batteries. Emergency lighting will be by the use of lighting battery packs. The CTG and STG critical loads, like turbine lube oil, are powered from 125 VDC battery systems.

Recharging of a battery occurs when 480 V power returns from the AC power supply (480 V) system. The rate of charge depends on the characteristics of the battery, battery charger, and the connected DC load during charging; however, the maximum recharge time is eight hours.

3.4.6 Fuel Gas System

Natural gas will feed the combustion turbines and the HRSG duct burners. Natural gas will continue to enter the plant at the existing metering station location. Natural gas for Units 5 and 7 combustion gas turbines will be metered separately and proceed to the natural gas compression station. Natural gas for Units 3 and 4 and Units 5 and 7 HRSG duct burners will be regulated down in pressure and then metered prior to continuing to the final use point.

Natural gas from the metering station will enter the compression station at a pressure between 130 and 260 psig and near ambient temperature. The natural gas will have entrained liquid and solid particles removed prior to being compressed to 450 psig. The compressed natural gas will then be filtered and continue to the fuel gas heaters for each respective combustion turbine. The fuel gas heaters will heat the natural gas from approximately 245°F to approximately 370°F using a steam extraction as the heating medium. From the fuel gas heaters, the natural gas will be filtered and proceed through a flow meter to the combustion turbine inlet. Outlet cooling of the natural gas, if required for start-up and recirculation, will be provided using ambient air fin fan coolers.

A key advantageous feature of the ESPR is the use of existing natural gas supply pipelines for the ESGS. No new offsite natural gas pipelines are required. In addition, Southern California Gas has indicated a more than sufficient supply of natural gas to meet additional demand for the ESPR.

3.4.7 Water Supply and Treatment

Water will be supplied to the El Segundo Generating Station from three sources: potable city water from the City of El Segundo (Metropolitan Water District of Southern California), reclaim water from the West Basin Municipal Water District, and Santa Monica Bay seawater from the facility's existing intake structure. A back-up city water source will continue to be supplied from the City of Manhattan Beach potable water system.

The facility will have the capability of using city water as potable water, service water, and firewater during operation. The reclaim water, single-pass reverse osmosis (RO) product water, will be used as the supply to the cycle makeup treatment system. In the future, double-pass RO product water will be available to increase the efficiency of the facility's cycle makeup treatment equipment. The seawater will be used as the source of the new combined cycle facility's once-through condenser for heat rejection.

3.4.7.1 Water Supply Requirements

The expected daily and annual water use for the El Segundo Generating Station are listed in Tables 3.4-1 and 3.4-2, respectively. The water supply requirements also include domestic uses and miscellaneous plant uses. The once-through circulating water system duty includes component cooling system loads.

TABLE 3.4-1

DAILY WATER SUPPLY REQUIREMENTS

Water Source	Average Usage[1]	Peak Usage[2]
City of El Segundo (Metropolitan Water District of Southern California)		
Potable Water	750 gal/day	750 gal/day
Plant and Equipment Drains	25,000 gal/day	25,000 gal/day
Makeup to Evaporative Cooler	44,000 gal/day	85,000 gal/day
Quench Water	23,000 gal/day	33,000 gal/day
Total City Water	93,000 gal/day	144,000 gal/day
West Basin Municipal Water District		
Makeup to HRSG Cycle	64,000 gal/day	100,000 gal/day
CT Steam Injection	0 gal/day	340,000 gal/day
Total Reclaim Water	64,000 gal/day	440,000 gal/day
Seawater		
Once-Through Cooling Water	206,000,000 gal/day	206,000,000 gal/day

[1] Daily average based on 59°F average annual ambient temperature, not firing the HRSGs, no steam injection to the CT, evaporative coolers on, assumed for 24-hour day.

[2] Daily average for peak load operation based on 83°F ambient temperature, the HRSGs fired, 12 hours of steam injection to the CT, evaporative coolers on, assumed for 24 hour day.

Average annual water supply requirements will vary, depending on the capacity factor of the overall facility.

3.4.7.2 Water Quality and Balance

The average quality of city water, reclaim water, and seawater supplies is listed in Table 3.4-3. Water use of the three sources is shown on the water balance diagrams (Figure 3.4-5 and Figure 3.4-6).

TABLE 3.4-2

ANNUAL WATER USE

Water Source	Annual Average[1]	Annual Maximum[2]
City of El Segundo (Metropolitan Water District of Southern California)	97 acre-ft/yr	104 acre-ft/yr
West Basin Municipal Water District[3,4]	112 acre-ft/yr	120 acre-ft/yr
Seawater	215,000 acre-ft/yr	231,000 acre-ft/yr

1 Annual average is estimated as the daily average x 365 days x 93 percent.
2 Annual maximum is estimated as the daily average x 365 days x 100 percent.
3 Annual average reclaim water demand is estimated as the peak daily use x 42 days + the average daily use x 323 days the quantity x 93 percent.
4 Annual maximum reclaim water demand is estimated as the peak daily use x 42 days + the average daily use x 323 days the quantity x 100 percent.

TABLE 3.4-3

EXPECTED WATER SUPPLY QUALITY (mg/L as ions, except as noted)

Constituent	City of El Segundo	West Basin Municipal Water District	Seawater
Calcium	46	0.06	400
Magnesium	19	0.03	1,100
Sodium	59	4.8	11,000
Potassium	3	0.34	380
M-Alkalinity as $CaCO_3$	100	14	NR
Sulfate	129	ND	1,900
Chloride	60	2.7	19,000
Nitrate (as N)	0	0.13	0.59
Fluoride	0.20	0.10	0.7
Aluminum	0.08	ND	0.1
Silica	NR	0.14	0.01-7.0
TDS	440	25	33,000
PH	8.2	7.4	7.7-8.3
TSS	NR	ND	3.0
BOD5	NR	NR	1.0
COD	NR	NR	49

NR = Not Reported.
ND = Not Detected.

3.4.7.3 Water Treatment Requirements

Potable water and service water will be supplied through interconnections with the City of El Segundo's existing distribution system. This system serves domestic customers in the local area and, hence, no additional treatment is required. The service water will be directed to the 450,000 gallon Service/Fire Water Storage Tank for distribution. City water will be used as the source of makeup for the evaporative coolers, for HRSG blowdown quench water, and for miscellaneous plant uses.

Reclaim water will be treated by portable cycle makeup treatment equipment, which will be regenerated offsite, to supply demineralized makeup water to the steam cycle, the auxiliary cooling system, and the combustion turbines for steam injection.

Seawater, supplied to the facility for heat rejection in the once-through condenser and component cooling water system heat exchangers, will require intermittent biological growth control in the condenser.

3.4.7.3.1 Makeup Water for Power/Steam Turbine Production. Reclaim water will be directed from the West Basin Municipal Water District to the cycle makeup treatment system. This system will include a permanently installed forwarding pump and rental RO/ demineralization equipment that will be regenerated offsite. Demineralized water produced by the cycle makeup treatment system will be stored in one Demineralized Water Storage Tank with a capacity of 400,000 gallons.

High purity water used in the steam cycle will be treated by the cycle chemical feed system to minimize corrosion and scale formation. The system will feed an oxygen scavenger chemical and a neutralizing amine to the feedwater for dissolved oxygen control and cycle pH control. Sodium phosphate will be added to the HRSG boiler water to control pH and minimize scale formation. The design will provide for automatic feed of oxygen scavenger and amine. Feed of phosphate to the HRSG steam drum will be manually initiated based on boiler water phosphate residual and pH.

3.4.7.3.2 Circulating Cooling Water Treatment. The circulating water will enter the plant through the existing intake structure and be directed to the once-through component cooling water system heat exchangers and the once-through condenser. The circulating water will return to the ocean through the existing outfall structure.

To control biological growth, the condenser tubes will be intermittently injected with chlorine, for a maximum of two hours per unit per day. To further minimize chemical treatment, the plant will temporarily "heat treat" the circulating water system by reversing the intake and discharge point. The "heat treatment" warms the water enough to remove encrusting marine organisms in the system. This "heat treatment", which occurs approximately every six weeks, will be performed in accordance with the existing National Pollutant Discharge Elimination System (NPDES) permit.

3.4.7.4 Wastewater Discharge

HRSG blowdown, evaporative cooler blowdown, and oily water separator effluent from plant and equipment drains will be routed to the existing retention basin. The effluent from the retention basin will be directed to the existing circulating water system outfall, Discharge No. 001, when the existing Units 3 and 4 are not operating. During operation of Units 3 and 4, the effluent from the retention basin will be discharged into Discharge No. 002.

Stormwater drains from potentially contaminated areas in the new combined cycle facility power block area will be directed to an oil water separator. The effluent from the oil water separator will be discharged into the existing circulating water system outfall, Discharge No. 001.

A key advantageous feature of ESPR is the removal of sanitary waste water discharge from the facility to ocean outfall. ESPR will redirect sanitary wastewater to the City of Manhattan Beach Municipal Sanitary Sewer, in accordance with the City Public Works Department's discharge requirements.

Expected average steady-state waste streams and flow rates for the facility based on summer-time operating conditions are shown on the water mass balance diagrams, Figures 3.4-5 and 3.4-6. Characterization of the process wastewater streams is shown in Table 3.4-4.

3.4.7.4.1 Treatment and Disposition of Liquid Process Wastes. Process wastewater to be discharged from the facility will be disposed through the existing outfall structures and will be discharged in accordance with the El Segundo Generating Station's NPDES permit.

Sanitary drains will be discharged to the City of Manhattan Beach sewer lines in accordance with the city's discharge requirements.

Estimated volumes of the facility's liquid wastewater discharge are shown in Table 3.4-5. Process waste streams will be sampled in accordance with the existing monitoring and reporting program to ensure that the chemistry of the process waste is within the limits of the discharge permits.

TABLE 3.4-4

EXPECTED PROCESS WASTE CHARACTERIZATION[1]
(mg/L as ions, except as noted)

Constituent	Circulating Water Discharge	Existing Retention Basin Effluent	Combined Waste to Outfall 001	Sanitary Waste to Sewer
Calcium	400	43	400	50
Magnesium	1,100	18	1,100	20
Sodium	11,000	57	11,000	60
Potassium	380	3	380	3
M-Alkalinity, as $CaCO_3$	NR	97	NR	100
Sulfate	1,900	123	1,900	130
Chloride	19,000	58	19,000	60
Nitrate	0.59	0	0.59	0
Fluoride	0.7	0.18	0.7	0.20
Aluminum	0.1	0.06	0.1	0.08
Silica	0.01-7.0	1	0.01-7.0	NR
TDS	33,000	420	33,000	440
pH	7.7-8.3	8.1	7.7-8.3	8.2
TSS	3.0	<1	3.0	500
Phosphate	NR	4	0	NR
Ammonia	NR	0	0	5
Oil and grease	NR	0	0	NR
BOD5	1.0	ND	1.0	400
COD	49	ND	49	100

NR = Not Reported
[1] All numbers are approximate.

3.4.7.4.2 Water Treatment System Solid Wastes. The generating facility will not generate significant or routine water treatment system solid waste.

3.4.8 Waste Management

The construction of the facility will generate nonhazardous wastes and small quantities of hazardous wastes. A summary of the construction waste streams and management is shown in Table 3.4-6. For the purpose of fair discussion, construction includes site preparation, demolition, and new facility construction.

TABLE 3.4-5

ESTIMATED LIQUID PROCESS WASTEWATER VOLUMES TO DISCHARGE[1]

Waste Stream	Source	Qty/Day
Circulating Water Return	Condenser	206,000,000 gal
Stormwater Oil Water Separators Effluent	Plant and equipment drains, area precipitation runoff	3,100 gal
Existing Retention Basin Effluent	HRSG, oil water separator effluent	80,000 gal
Total Effluent to Outfall 001	Circulating water and oil water separator effluent	207,000,000 gal
Total Effluent to City Sewer	Sanitary drains system	750 gal

[1] All numbers are approximate based on peak discharge conditions.

Nonhazardous solid wastes during construction include debris and other materials requiring removal during site grading and excavation, excess concrete, lumber, scrap metal, empty nonhazardous chemical containers, and office materials. All nonhazardous wastes will be recycled to the greatest extent practical and the remainder removed on a regular basis by a certified waste handling contractor.

Operation of the facility will also generate wastes resulting from processes, routine facility maintenance, and office activities. The operating waste streams and management methods are summarized in Table 3.4-7. All nonhazardous wastes during operation of the facility will be recycled to the greatest extent practical and the remainder removed on a regular basis by a certified waste handling contractor.

3.4.9 Management and Disposal of Hazardous Materials and Hazardous Wastes

3.4.9.1 Chemicals

A key advantageous feature of the ESPR is the use of a new aqueous ammonia line to deliver ammonia to the site. Transportation of ammonia to the site for Unit 3's SCR system via highways will be eliminated as the normal means of providing ammonia onsite.

A variety of chemicals will be stored and used during construction and operation of the facility. A list of chemicals anticipated to be used is provided in Table 3.4-8. The storage, handling, and use of these chemicals will be conducted in accordance with all applicable laws, ordinances, regulations, and standards.

TABLE 3.4-6

SUMMARY OF CONSTRUCTION AND START-UP WASTE STREAMS AND MANAGEMENT METHODS[1]

Waste Stream	Waste Classification	Amount	Treatment
Scrap wood, steel, glass, plastic, paper, calcium, silicate insulation, mineral wood insulation, asphalt and concrete	Non-hazardous	20-40 cu yd/wk	Waste disposal facility or recycle
Empty hazardous material containers – drums	Recyclable Hazardous	1 cu yd/wk	Recondition or recycle
Used and waste lube oil during CT and ST Lube Oil Flushes	Recyclable Hazardous	<55 gallons per flush period, approximately 3 week duration	Recycle
Oil absorbent mats from CT and ST lube oil flushes and normal construction	Non-hazardous	Mats per month, as needed	Waste disposal facility or laundry (permitted to wash rags)
Oily rags generated during normal construction activities lube oil flushes	Non-hazardous	3-4 55 gallon drums a month	Waste disposal facility or laundry (permitted to wash rags)
Spent batteries; lead acid	Hazardous	2 batteries/year	Recycle
Spent batteries; alkaline type, Sizes AAA, AA, C and D	Hazardous Recyclable	60 batteries/month	Recycle
HRSG and Preboiler Piping cleaning waste	Hazardous	200,000 gal per cleaning	Hazardous waste disposal facility or recycle
Sanitary Waste-Portable Chemical Toilets and Construction Office Holding Tanks	Sanitary	600 gpd	Pumped by licensed contractors and transported to sanitary water treatment plant
Soil	Recyclable Non-hazardous, Hazardous	<20,000 cubic yards	Soil recycling facility or Class I or III facility
Construction wastewater from dewatering operations	Non-hazardous	65 million gallons	Carbon adsorption and discharge under NPDES permit
Granular actuated carbon	Non-hazardous recyclable	Exchange 40,000 pounds of carbon per week (4 vessels)	Hazardous waste facility or recycle

[1] All numbers are estimates.

Chemicals will be stored in chemical storage facilities appropriately designed for their individual characteristics. Bulk chemicals will be stored outdoors in aboveground storage tanks, with the exception of aqueous ammonia solution that will be stored in the existing onsite underground storage tank. Other chemicals will be stored and used in their delivery containers. All hazardous chemical storage areas will be surrounded by curbs or dikes to contain the chemicals in the event of leaks or spills. Secondary containment areas for chemical storage areas will be sized to hold the entire contents of the largest single storage tank. Any chemical spills in these areas will be removed with portable equipment and reused or properly disposed.

Safety showers and eyewash stations will be provided in or adjacent to chemical storage and use areas. Safety equipment will be provided for personnel use if required during chemical containment and cleanup activities. All personnel working with chemicals will be trained in proper handling and emergency response to chemical spills or accidental releases. Hose connections will be provided near chemical storage and feed areas to flush spills and leaks, and absorbent materials will be stored onsite for spill cleanup.

3.4.9.2 Hazardous Wastes

Water removed from excavations during site preparation and construction will be processed through carbon filters. These used carbon filters constitute hazardous waste and will be sent to the manufacturer for processing and/or recycling as appropriate.

Small quantities of hazardous wastes will possibly be generated over the course of construction. These may include waste paint, spent construction solvents, and spent welding materials. All hazardous wastes generated during facility construction and operation will be handled and disposed of in accordance with applicable laws, ordinances, regulations, and standards. Hazardous wastes will be either recycled or disposed of in a licensed Class I disposal facility, as appropriate. Managed and disposed of properly, these wastes will not cause significant environmental or health and safety impacts.

Some hazardous wastes are generated, including spent catalyst from the SCR and CO systems, used oils from equipment maintenance, and oil-contaminated materials such as spent oil filters, rags, or other cleanup materials. Spent catalyst (approximately 50 cubic meters) is returned to the manufacturer on the order of every 3 to 8 years for metals reclamation and/or disposal. Used oil generated will be recycled, and oil or heavy metal contaminated materials (e.g., filters) requiring disposal will be disposed of in a Class I waste disposal facility.

TABLE 3.4-7

OPERATING WASTE STREAMS AND MANAGEMENT METHODS[1]

Waste Stream	Waste Classification	Amount	Treatment
Used hydraulic fluids, oils, grease, oily filters	Recyclable Hazardous	< 5 gallons/day	Recycle
Spent batteries; lead acid	Recyclable, Hazardous	2 batteries/year	Recycle
SCR catalyst	Hazardous	3 to 5 years	Recycle
Oxidation Catalyst (CO)	Recyclable, Hazardous	3 to 5 years	Recycle
Used oil from oil/water separator	Recyclable, Hazardous[2]	50 gallons/year	Recycle
Oily rags	Non-hazardous	55 gallons/2months	Laundry (permitted to wash oil rags)
CTG used air filters	Non-hazardous	1,000 filters	Recycle
CTG water wash	Non-hazardous	7,200 gallons/year	Waste disposal facility
CTG detergent wash	Hazardous	<1,000 gallons/year	Recycle
HRSG periodic operational chemical cleaning	Hazardous	50,000 gallons per HRSG cleaning (Approx. 2 cleanings every 5 years)	Hazardous waste disposal facility (by licensed subcontractors)

[1] All numbers are estimates.
[2] Under California regulations.

Other occasional waste streams include alkaline or acid cleaning solutions used during preoperational chemical cleaning of the boiler and preboiler systems of the HRSG, acid cleaning solutions from chemical cleaning of the HRSG after the unit is put into service, and turbine wash and HRSG gas side wash waters. Boiler cleaning may be conducted on a 3 to 5 year cycle. Waste generated during each cleaning operation will be temporarily stored onsite in portable tanks and disposed of offsite by the chemical cleaning contractor at an appropriate disposal facility.

3.4.10 Emissions Control and Monitoring Equipment

This section describes the emissions controls and continuous emission monitoring (CEM) equipment. The combustion and post combustion emission control technologies presented below will optimize emissions reductions consistent with normal operational practices. The El Segundo Power Redevelopment Project will utilize dry low-NO_x (DLN) combustion combined with catalyst technology to control nitrogen oxide and carbon monoxide emissions. Combustion design with clean fuels shall be used to minimize emissions of other pollutants.

TABLE 3.4-8

ANTICIPATED CHEMICAL USAGE AND STORAGE[1]

Material	Purpose	Usage/Day	Maximum Amount Stored	Storage Type
Neutralizing amine solution	Feedwater pH control	5 lb	800 gal	Portable vessel
Oxygen scavenger solution	Feedwater oxygen control	2.5 lb	800 gal	Portable vessel
Di-, tri-sodium phosphate solution	Boiler water pH/scale control	5 lb	800 gal	Portable vessel
Aqueous ammonia (approximately 29%) $NH_4(OH)$	NO_x emissions control	1,500 gal	20,000 gal	Existing tank
Hydrochloric acid HCl	Chemical cleaning of HRSG	As needed	Temporary only	Portable vessel
Ammonium bifluoride NH_4HF_2	Chemical cleaning of HRSG	As needed	Temporary only	Portable vessel
Citric acid	Chemical cleaning of HRSG, feedwater systems	As needed	Temporary only	Portable vessel
EDTA chelant	Chemical cleaning of HRSG, feedwater systems	As needed	Temporary only	Portable vessel
Sodium hypochlorite NaOCl (12.5%)	Biofouling Control in Circulating Water	13 gal	360 gal	Portable vessel
Sodium nitrite $NaNO_2$	Chemical cleaning of HRSG	As needed	Temporary only	Portable vessel
Diesel fuel oil	Diesel fire pump	0	100 gal	Tank, UL C.S.
Sulfuric acid for station batteries	Electrical/ctrl building	0	600 gal	Battery
	Combustion turbine	0	732 gal	Battery
	Miscellaneous	0	100 gal	Battery
Hydrogen	Generator cooling	800 cu ft	70,000 cu ft	Tank, C.S.

[1]Note: All numbers are approximate.

3.4.10.1 NO_x Emissions

A dry, low NO_x combustor system will be provided to control the oxides of nitrogen (NO_x) concentration in the CTG/HRSG exhaust gas. This combustion emission control technology reduces peak flame temperature for natural gas fired units by staging combustors and premixing fuel with air prior to combustion in the primary zone. Typically, this occurs in four distinct modes: primary, lean-lean, secondary, and premix. In the primary mode, fuel is supplied only to the primary nozzles to ignite, accelerate, and operate the unit over a range of low- to mid-loads and up to a set combustion reference temperature. Once the first combustion reference temperature is reached, operation in the lean-lean mode begins when fuel is also introduced to the secondary nozzles to achieve the second combustion reference temperature. After the second combustion reference temperature is reached, operation in the secondary mode begins by shutting off fuel to the primary nozzle and extinguishing the flame in the primary zone. Finally, in the premix mode, fuel is reintroduced to the primary zone for premixing fuel and air. Although fuel is supplied to both the primary and secondary nozzles in the premix mode, there is only flame in the secondary stage. The premix mode of operation occurs at loads between 50 and 100 percent of base load and provides the lowest NO_x emissions. Due to the intricate air and fuel staging necessary for dry low-NO_x combustor technology, the gas turbine control system becomes a very important component of the overall system.

A selective catalytic reduction system (SCR) in the HRSG will provide further reduction of NO_x. This is an add-on control technology in which ammonia will be injected into the exhaust gas stream in the presence of a catalyst bed to combine with NO_x in a reduction reaction forming nitrogen and water. For this reaction to proceed satisfactorily, the exhaust gas temperature must be maintained between 450°F and 850°F. The SCR equipment will include a reactor chamber, catalyst modules, ammonia storage system, ammonia vaporization and injection system, and monitoring equipment and sensors. The reactor chamber would be located in an appropriate zone of the HRSG where the catalyst will be the most effective at all loads. The ammonia injection is located upstream of the catalyst. SCR is a commercially available, demonstrated control technology currently employed on several combined cycle combustion turbine projects capable of very low NO_x emissions (< 2.5 ppmvd) with control efficiencies up to 98 percent.

3.4.10.2 CO Emissions

Combustor designs lower CO emissions concurrently with NO_x emissions.

To further reduce CO emissions, an oxidation catalyst will be used. An oxidation catalyst consists of a noble metal catalyst section incorporated into the combustion turbine exhaust. The catalyst promotes oxidation of CO to carbon dioxide (CO_2) at much lower temperatures (650°F to 1150°F) than possible for oxidation without the catalyst. The control efficiency is primarily a function of gas residence time and can exceed 90 percent. For this project, the exhaust gas temperature of approximately 850°F is in the proper design range for the selected catalyst.

3.4.10.3 <u>VOC Emissions</u>

Volatile organic compounds (VOCs) include all unburned hydrocarbons except methane. VOC emissions are low due to proper combustion controls in the combustion turbine. No other controls are required for VOC control.

3.4.10.4 <u>Particulates</u>

Particulate emissions are minimized through the use of natural gas. In addition, inlet air filtration is used to minimize airborne particulate ingestion into the combustion turbine. Particulate emission from combustion of natural gas is minimal as compared to other types of fossil fuels.

3.4.10.5 <u>Emission Monitoring</u>

The project will install a continuous emissions monitoring system (CEM) which will sample, analyze, and record the concentration of carbon monoxide, oxides of nitrogen, and oxygen/ carbon dioxide in the flue gas. The system generates a log of emissions data and provides alarm signals to the control room when the level of emissions exceeds pre-selected limits. Continuous compliance with the NO_x emission limits will be demonstrated with the CEM system based on the applicable averaging time designated.

3.4.11 Fire Protection

The fire protection systems limit personnel injury, loss of life, property loss, and plant downtime due to fire. The existing firewater system at ESGS will be upgraded significantly as part of the addition of the new combined cycle plant. The current locations of the existing fire/service water storage tank and associated electric motor-driven firewater pump are scheduled to be used as a maintenance accessway in the redeveloped plant. Relocation of the firewater system components (i.e., tank and pumps) will be necessary and construction logistics require the final system to be implemented at a later point in the construction schedule.

Since permanent firewater system components will not be available for an extended period of time, an interim firewater system will be constructed to not only protect the remaining power generators, Units 3 and 4, and the areas south of Unit 4, but also to protect the construction area. The interim fire protection system would be comprised of a series of mobile fractionation tanks (to store firewater) located south of the Unit 4 boiler and a firewater pump of the same capacity as the current primary firewater pump. Temporary piping will be installed around the north side of Unit 3 to complete the firewater loop around the remaining power block and close the north end of the existing station firewater loop. Hydrants will be provided on the north side of Unit 3 to provide protection for the construction site.

As backup to the interim system fire system components, the plant will rely upon the existing 6-inch water mains from the city water systems of El Segundo and Manhattan Beach. Final configuration of the interim system, including capacity of the mobile fractionation tanks and the arrangement of the pump(s), piping, and valves, will be established through close communication with the City of El Segundo Fire Department and the insurer of the plant, Hartford Steam Boiler. The frequency and types of system verification tests will also be established with these agencies. The interim system will be in place prior to removal of the existing firewater system from service.

In the final configuration of the redeveloped plant, the firewater supply and pumping system will provide the code required quantity of fire-fighting water to yard hydrants, hose stations, and water spray and sprinkler systems. Two sources of firewater will be provided. The primary source will be either a new tank or the existing fire/service water storage tank relocated and the secondary source will be the new water main line from the City of El Segundo. The fire/service water storage tank will have capacity reserved for firewater use only, in accordance with NFPA 13.

A 100 percent capacity, electric motor-driven pump will take suction from the fire/service water storage tank. A 100 percent capacity diesel engine-driven pump will take suction from the city water line and will operate as the backup pump to the electric motor-driven pump. Both pumps will be capable of supplying maximum water demand for any automatic sprinkler system plus water for fire hydrants and hose stations.

The new firewater distribution system required for Units 5, 6, and 7, the new administration building, maintenance shop, and warehouse will be incorporated into the existing firewater distribution system. The performance of the existing firewater distribution system will not be changed with the addition of the new loop and new services. A new fire main loop will be installed around Units 5, 6, and 7. This loop will connect into the existing fire main loop currently serving Units 3 and 4, the switchyard, and the existing fuel oil storage tank area. A line from the new loop will also service the new administration, maintenance shop, and warehouse. This new line will also connect to the existing fire main loop near the location of the new administration building.

The new firewater system will have sectionalizing valves so that a failure in any part of the system can be isolated while allowing the remainder of the system to function properly. Fire hydrants with hose houses will be spaced at approximately 250-foot intervals around the new fire loop. The hydrants will be located and the hose houses equipped in accordance with NFPA 24 and local fire codes. Valves requiring periodic testing will be accessible.

An electric motor-driven jockey pump will maintain water pressure in the firewater distribution headers. During fire conditions, the electric motor-driven fire pump will start automatically when pressure in the firewater distribution header drops. The motor-driven pump will take suction under a positive head from the fire/service water storage tank. Once started, the pump will continue to run until manually stopped. Discharge from the pump will be connected to the underground yard loop.

The diesel engine-driven pump will start automatically when the motor-driven pump fails to start and/or the pressure in the firewater distribution header drops below its set point; the pump will continue to run until manually stopped. Fire pump installation will be in accordance with NFPA 20.

Fixed fire protection systems will be provided for the steam turbine bearings and lube oil equipment, and station transformers. Sprinkler and fixed spray systems will be designed and installed in accordance with NFPA 13 and NFPA 15, respectively.

In addition to the fixed fire protection system, portable CO_2 and dry chemical extinguishers will be located throughout the plant (including the switchgear rooms), with size, rating, and spacing in accordance with NFPA 10. Handcart CO_2 extinguishers will also be provided in the turbine area as necessary for specific hazards.

Local building fire alarms will be provided in accordance with NFPA 72. All materials will be free of asbestos and will meet the fire and smoke rating requirements of NFPA 255.

3.4.12 Plant Auxiliaries

3.4.12.1 Lighting

Lighting is provided in building interiors, offices, control and maintenance areas, building exterior entrances, outdoor equipment platforms and walkways, transformer areas, and power block perimeter roads.

A key feature of the ESPR will be the use of shielded lighting, timers, and other means of reducing unnecessary glare and visual disturbance offsite.

Emergency lighting from DC battery packs is provided in areas of normal personnel traffic to permit egress from the area in the event of failure of the normal lighting system. In major control equipment areas and electrical distribution equipment areas, emergency lighting permits equipment operation to allow auxiliary power to be reestablished.

3.4.12.2 Grounding

The electrical system is susceptible to ground faults, lightning, and switching surges, which result in unit ground potential rises. A grounding system provides an adequate path to permit the dissipation of ground fault currents and minimizes the ground potential rise.

The station grounding grid is designed with adequate capacity to dissipate heat from ground current under the most severe fault conditions in areas of high ground fault current concentration. The grid spacing is such that safe voltage gradients are maintained.

Bare conductors are installed below grade in a grid pattern. Each junction of the grid is bonded together by either an exothermal welding process or mechanical connectors.

Ground resistivity readings performed as part of the subsurface investigations are used to determine the necessary numbers of ground rods and grid spacing to ensure safe step and touch potentials under fault conditions.

Grounding cables are brought from the ground grid to connect to building steel and nonenergized metallic parts of electrical equipment.

Isolated grounding conductors to the ground grid will be provided for sensitive control systems.

3.4.12.3 Cathodic Protection and Lightning Protection

There is cathodic protection for buried carbon steel pipes and structures (except rebar), taking into account cathodic protection and grounding influences associated with any existing cathodic protection system to which the facility is adjacent and connected. Cathodic protection is by an impressed current system, a sacrificial system, protective coatings, or a combination of these.

Lightning protection is furnished for buildings and structures in accordance with NFPA 78. Lightning protection for the switchyards is in accordance with industry practice.

3.4.12.4 Distributed Control System

A distributed control and information system (DCS) provides modulating control, digital control, and monitoring and indicating functions for operation of the plant power block systems.

Plant operation is controlled from the cathode ray tube (CRT) type control consoles and the auxiliary control panels that will be located in the existing control room of Units 3 and 4.

The DCS provides coordinated control among the CTGs, STG, HRSGs, and balance-of-plant equipment. The CTGs and STG control systems interface with the DCS via a data 1ink and/or hardwired I/O. Limited monitoring and control will be available from the DCS for the CTGs and STG. The HRSGs and balance-of-plant equipment will be monitored and controlled via the DCS.

The DCS will provide monitoring and alarming of pollutant concentrations in the exhaust gas stream from the continuous emissions monitoring systems via hardwired inputs.

A sequence-of-events (SOE) function will be an integral part of the DCS.

Annunciation will primarily be done in the DCS. Major packaged subsystems (i.e., gas compressor skids, etc.) may have a local alarm system with a single trouble alarm to the control room.

3.4.13 Heating, Ventilating, and Air Conditioning

The heating, ventilating, and air conditioning (HVAC) system will provide an acceptable environment for personnel comfort and equipment operation within the plant buildings.

The HVAC system will be designed in accordance with the Uniform Building Code and the Uniform Mechanical Code as prescribed by the California Code of Regulations.

Air conditioning in the control and administrative areas will maintain a suitable environment for plant personnel. If required for proper equipment operation, humidity control will be provided in the control room.

Outside air ventilation systems will be provided for buildings where air conditioning is not required. Electric heaters will be used for winter heating if required.

Normally occupied plant areas, including toilet areas, will be supplied with fresh air in accordance with the Uniform Building Code, ASHRAE Standard 62, and the California Code of Regulations.

3.4.14 Plumbing

Plumbing systems will supply potable water to all fixtures and will collect and convey sanitary wastes to a collection sump where a lift system will force the sanitary wastes to an interconnection with the City of Manhattan Beach sewer system.

Stormwater flows with potential for oil contamination will be directed to an oil/water separator before being discharged to the circulating water outfall.

3.5 FACILITY CIVIL/STRUCTURAL FEATURES

This section describes the buildings, structures, and other civil/structural features that will constitute the facility as shown on Figure 3.4-2A and B (Site Arrangement Plan).

3.5.1 Power Block

The power block complex will have three areas: two areas will each consist of one combustion turbine generator (CTG), one heat recovery steam generator (HRSG), one stack, one auxiliary transformer, and one generator step-up transformer. The third area will consist of one steam turbine generator (STG) and one generator step-up transformer. Each power block area will also contain the balance-of-plant (BOP) mechanical and electrical equipment.

The CTGs, HRSGs, and STGs will not be enclosed in buildings. The CTGs and HRSGs will be supported on reinforced concrete mat foundations at grade. The STGs will be supported on reinforced concrete pedestals mounted on a base mat at grade level. The CTGs, CTG accessories, and generators will incorporate noise attenuation features provided by manufacturers. The condensers will also be supported by the STG pedestals and base mats. Individual reinforced pads at grade will be used to support the BOP mechanical and electrical equipment.

3.5.2 Stacks

Each HRSG will be provided with a self-supporting steel stack. The stacks will include the associated appurtenances, such as sampling ports, exterior ladders, side step platforms, a lighting system, and electrical grounding. Each stack will be supported by the HRSG structural steel and will be equipped with aviation obstruction lighting as required by the FAA.

3.5.3 Buildings

Administration and maintenance facilities will be recommended in a new administration/ maintenance building. The building will be a multi-story steel frame structure supported by reinforced concrete walls on the lower level and a reinforced concrete mat foundation.

3.5.4 Yard Tanks

Yard water storage tanks will include the following:

- Demineralized Water Storage Tank
- Service/Fire Water Storage Tank
- Condensate Storage Tank

Tanks for the storage of chemicals are discussed in Section 3.4.9.

Yard storage tanks will be vertical, cylindrical, field-erected steel tanks supported on a suitable foundation consisting of either a reinforced concrete ring wall with an interior bearing layer of compacted sand for the tank bottom, or a reinforced concrete mat.

3.5.5 Roads

New facilities will be served by the road network shown on Figure 3.4-2A and B (Site Arrangement Plan). The existing asphalt paved entrance road off of Vista Del Mar Road will be used for access to the new power block and administration areas. The Administration/ Maintenance Building parking lot and the areas adjacent to the new power blocks will also be asphalt paved.

3.5.6 Fencing

The existing facility currently utilizes chain link security fencing topped with barbed wire around the perimeter of the facility site, substation, and other areas requiring controlled access. Fencing provided around the perimeter of the new power block area will match the existing. The existing controlled access gate located at the entrance off of Vista Del Mar Road will be used for access to the new power block area.

3.5.7 Site Drainage

A site grading and drainage plan is provided on Figure 3.5-1. The northern portion of the existing site, where the new power block will be located, has been leveled to create a plant grade with an approximate elevation of 20 feet. Runoff from this area of the site is currently routed through a system of drop inlets and storm drain pipes, through an oil water separator, and then to the ocean via the existing Discharge No. 001.

Site drainage for the new power block area will be similar to the existing system. The area will be graded and sloped to drop inlets and the stormwater will be discharged to the ocean through the existing discharge structure after being routed through an oil water separator.

The existing tank area on the south end of the site has been leveled to an elevation of 39 feet with an earthen containment berm around the perimeter. Runoff is currently collected within the berm and then pumped out to adjacent areas after a storm event.

The tank area will be regraded to slope down to new drop inlets and the stormwater will be routed to an oil water separator and the effluent discharged to the ocean through the existing Units 3 and 4 discharge structure, Discharge No. 002.

The Administration/Maintenance Building area has been leveled to an elevation of 25 feet and currently collects runoff through a system of drop inlets and storm drain pipes, which tie back into the Unit 3 and 4 discharge structure.

Site drainage for the Administration/Maintenance area will be similar to the existing system. Runoff will be directed to drop inlets and routed to the Unit 3 and 4 discharge structure through the existing storm drain pipes and oil water separator.

3.5.8 Sanitary Sewer System

Sanitary wastes from the proposed and existing generating plants will be discharged via a new pipeline to the municipal sanitary sewer that is operated by the City of Manhattan Beach Public Works.

Connection to this existing sanitary sewer will be on the south end of the site and will include the addition of approximately 150 feet of pipeline beyond the south property line. The average wastewater discharge is expected to be approximately 750 gpd from the proposed and existing units.

Construction of the proposed sewer line will meet water quality requirements under Federal rules, as well as local limits established by the City of El Segundo and the City of Manhattan Beach.

The pipeline will be constructed of PVC material approximately 3 inches in diameter buried under a minimum of 24 inches of compacted soil.

3.5.9 Earthwork

Excavation work 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. Materials suitable for backfill will be stored in stockpiles at designated locations using proper erosion protection methods. Excess material will be removed from the site and disposed of at an acceptable location. Disposal of contaminated material encountered during excavation will comply with applicable federal, state, and local regulations.

The existing site topography shown on Figure 3.3-1A and B consists of a level area for the power block complex at about Elevation 20 feet. Based on results of previous subsurface investigations as discussed in Appendix G, the soils below final grade will consist of controlled compacted fill and natural, dense sand soils.

Graded areas will be smooth, compacted, free from irregular surface changes, and sloped to drain. Cut and fill slopes for permanent embankments will be designed to withstand the appropriate design level ground motion for Seismic Zone 4. For slopes requiring soil reinforcement to resist seismic loading, geogrid reinforcement will be used for fills and soil nailing for cuts. Slopes for embankments will be no steeper than 2:1 (horizontal:vertical). Construction will be at the existing plant grade which is fairly level so 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 done in layers of uniform, specified thickness. Soil in each layer will be properly moistened to facilitate compaction to achieve the specified density. To verify compaction, representative field density and moisture-content tests will be made during compaction. Structural fill supporting foundations, roads, parking areas, etc., will be compacted to at least 90 percent of the maximum dry density as determined by ASTM D1557. 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.

Subgrades (original ground), sub-bases, and base courses of roads will be prepared and compacted in accordance with Caltrans requirements. Testing will be in accordance with ASTM and Caltrans standards.

3.5.10 Perimeter Wall

The existing masonry perimeter wall on the western edge of the site, west of Units 3 and 4, will be extended north and south. Currently, a chain link fence with slats provides a barrier in these areas. As a geo-hazard safety and reliability enhancement, this chain link fence will be converted to a masonry wall. The height of this wall will be between 5 and 10 feet. For impact purposes, this wall is modeled and treated as a 10-foot high wall.

3.6 TRANSMISSION FACILITIES

3.6.1 On-site Transmission Facilities

Three new generator step-up transformers will be connected to the existing 230 kV plant switchyard via overhead lines supported from steel structures. The overhead lines will extend from the new generator step-up transformers to the on-site plant switchyard. The overhead lines will follow the same path as the existing overhead lines associated with the Units 1 and 2.

3.6.1.1 Electrical Interconnection Points

The on-site overhead 230 kV transmission lines will be owned, operated and maintained by the generation facility owners. The system will consist of two overhead circuits that will extend from the generator step up transformers to positions within the existing switchyard owned and operated by Southern California Edison Co., (SCE). The high-voltage side of Unit 5 combustion turbine generator (CTG) step-up transformer will be connected to the existing plant switchyard in the position that is currently occupied by Unit 1. The high-voltage side of the step-up transformers serving Unit 6 steam turbine generator (STG) and Unit 7 CTG will be combined on one circuit and will be connected to the existing switchyard in the position that is currently utilized by Unit 2. The lines will be designed to meet or exceed minimum mechanical strength requirements and electrical and safety related clearances as required by the State of California Electrical Safety Orders for Overhead Line Construction; General Order No. 95 (*aka* "GO 95").

3.6.1.1.1 <u>Conductor</u>. The two overhead lines (three phases per overhead line) will be sized for the maximum output of one combustion turbine generator and the steam turbine generator. This will result in each overhead line being sized to carry a maximum load of 607 MVA. Each phase of each overhead line will consist of two sub-conductors. Each conductor will be a 795-kcmil ACSR "Condor," an aluminum conductor with steel reinforcement. ACSR conductors combine low electrical resistance of 1350 alloy aluminum strands with the high strength of the steel strands.

The operating characteristics of the twin-bundled 795-kcmil ACSR conductor is as follows:

Load Condition	Load Per Circuit	Sub-Conductor Amps	Sub-Conductor Temperature [1, 2]
Maximum Output	607 MVA	762 Amps	179^{o}F

[1] Criterion for conductor temperature calculations: full sun at 12 noon, 2-feet/second wind, 109.4^o F ambient conditions, coefficient of emissivity 0.5, coefficient of absorptivity 0.5, elevation 0 feet above sea level, and latitude 34^o.

[2] Conductor temperatures are calculated using the IEEE Method for Calculation of Bare Overhead Conductor Temperatures.

The operating temperatures for the transmission line are well within the safe thermal capacity of the 795-ACSR "Condor" conductor.

3.6.1.1.2 Structure Types. All structure types to be provided for the overhead line structures will be single shaft, tubular steel poles, designed to provide at least 30 feet of conductor-to-ground clearance at mid-span. Each line will be provided with a steel sky line arrangement located above the phase conductors to minimize the possibility of lightning strikes to the phase conductors.

3.6.1.1.3 Foundations. Foundations required to support the overhead line structures will be circular drilled concrete piers with steel reinforcing and structural steel anchor bolts.

3.6.1.1.4 Structure Locations. Overhead line structures will be located in the same corridor as the existing lattice steel structures. Lattice structures will be removed and replaced with the tubular steel poles as required.

3.6.1.1.5 Access to Structures. As indicated previously, all of the overhead line structures are located on the power plant facility property. Access to the new single shaft tubular steel structures will be from the power plant facility property. Access to the transmission line structures will be maintained at all times for the purposes of all required inspection, maintenance and repairs by qualified personnel. The lines will not be accessible to the general public because they will be located within the confines of the generation facility perimeter security fence. Adequate provisions will be utilized to prevent climbing of the structures by non-qualified employees.

3.6.2 Off-Site Transmission Facilities

This section discusses the impact of the transmission interconnection between the El Segundo Power Redevelopment Project and the Southern California Edison (SCE) system. Included in this section are:

- A description of the existing transmission system which will be utilized for the proposed interconnection

- Analysis of the incremental impact of ESPR and the associated transmission interconnection's impact on operation of the SCE transmission system and

- Identification of the potential for occasional operational limitations on the El Segundo Power Plant.

Preliminary Interconnection Study.

At the time of printing, the final interconnection study was not yet delivered by SCE. Due to last-minute changes in SCE's predicted system demand and supply, SCE has indicated that they would like additional time to prepare a better interconnection analysis with more accurate cost estimates. SCE has provided preliminary information and analysis on the interconnection allowing the project description to fully mature.

In order to initiate review of this project and to make best efforts at providing the study, ESP II proposes to submit the final interconnection study as soon as it is received. ESP II anticipates that this will be provided not later than January 12, 2001. ESP II understands that, if possible, the CEC staff will consider the study prior to rendering a data adequacy determination.

The following information is based on studies commissioned by ESP II and by preliminary information provided by SCE. It is clear that ample capacity exists to deliver an additional 280 megawatts of power to the SCE grid, and that no new transmission line will be required. Appendix Q contains preliminary interconnection study information.

3.6.2.1 Electric Transmission Lines, Descriptions and Operation

Transmission Line Description. The onsite transmission line work is described in Section 3.6.1. The existing transmission facilities in the immediate vicinity of the El Segundo project are owned by SCE. These consist of an onsite 230 kV switchyard containing circuit breakers for each existing generation unit, arranged in a double bus configuration, and two SCE-owned transmission lines that leave the site and are part of the SCE transmission system. One of these lines goes directly to El Nido Substation, the other goes to Chevmain Substation (a consumer substation at the Chevron El Segundo refinery), then to El Nido Substation. Each of the two lines is essentially the same length between El Segundo and El Nido, and therefore shares load equally during normal operation because of virtually identical impedance.

The two lines share the same right-of way and tower structures between El Nido and El Segundo, except for a short looping of one line through Chevmain. Just beyond the Chevmain location, both of the circuits continue underground through a high pressure, oil filled, pipe type cable system for approximately one half mile. This section traverses a commercial development. The lines then continue overhead again for the balance of the distance to El Nido. Figure 3.6-1 presents the general circuit arrangements and the 230 kV transmission system in the vicinity of El Segundo and El Nido.

Transmission Line Design. The two overhead circuits are constructed with double bundled 1033 kcmil ACSR conductor per phase. These subconductors are arranged in a vertical configuration with a spacing of approximately eight to twelve inches. The pipe type cable system consists of two conductors per phase for each line. The conductors are 3000 kcmil copper with three conductors per pipe (ABC phases in each pipe). The pipe is filled with insulating oil that is pressurized to approximately 200 pounds per square inch. The design of this system is such as to essentially match or exceed the current carrying capacities of the overhead lines for most operational contingencies.

This original circuit design will generally accommodate N-1 or single line outage contingencies for the existing generation. The existing generation is:

Unit	Net Output (MW)
1	175
2	175
3	302
4	302
Total	954

Based on NERC/WSCC evaluation methodologies, the maximum energy transfer capability of each line is 945 MW, or 2370 Amperes for an N-1 (one line out) contingency involving the El Segundo - Chevron, Chevron - El Nido or El Segundo - El Nido lines. An outage on any one of these lines will continue to require the reduction of generation output by tripping specific units at El Segundo. Outages of other 230 kV lines out of El Nido, in combination with light loading conditions at El Nido, may also require some restricted operation at El

Segundo to maintain appropriate system voltage levels as well as power and VAR flows. Reduction of output from El Segundo is already well established as a mitigation measure to relieve overloading of the on the El Segundo-El Nido line, a procedure referenced as SCE Operating Procedure No. 211. (See Appendix Q for OP 211)

The proposed net dependable generation (maximum output) for the completed project at El Segundo is:

Unit	Net Output (MW)
3	335
4	335
5, 6 and 7	651
Total	1321

3.6.2.2 Power Flow Studies

Figure 3.6-1 presents a single-line diagram representing the results of a power flow analysis using the 1998 WSCC Summer Heavy Load Base Case with a NW/SW Interchange Schedule of 3900MW AC and 3100MW DC. Figure 3.6-2 presents the FCITC Limits Report with Base Case, Summer Heavy Loading data associated with the power flow study depicted in Figure 3.6-1. The Limits Report also presents various line-out contingencies, with the resulting load flow patterns.

Figure 3.6-3 presents a similar analysis using a 1998 WSCC Light Autumn Load Base Case with a NW/SW Interchange schedule of 1880 MW AC and 1840 MW DC. Figure 3.6-4 presents the associated FCITC Limits Report for the Light Autumn Base Case portrayed in Figure 3.6-3. Line out contingencies, load flows and line loading conditions are also presented.

The studies, performed by Stone & Webster as part of an overall transmission capabilities analysis during project development, confirm that the next level of limitation on transfer capability from El Segundo after loss of a line to El Nido Substation is over 600 MW above the existing maximum output level for the El Segundo project. This in turn indicates that the additional 280 MW of generation provided by the proposed El Segundo Power Redevelopment Project is well within the mitigation capability of existing operating procedures, specifically SCE Operating Procedure No. 211.

3.6.2.3. Compliance with Utility Reliability and Planning Criteria

Compliance with utility reliability and planning criteria will require some degree of a Remedial Action Scheme (RAS) or interruptive tripping of selected ESGS units. The preliminary interconnection study (Appendix Q, to be filed when received) will provide the definitive methods to be employed. At this time, ESP II commits to taking the appropriate steps to ensure safe and reliable interconnection.

3.7 PIPELINES

3.7.1 Introduction

The ESPR project includes the following new offsite facilities:

- Reclaim water supply line (in same trench as potable water supply line)
- Potable water supply line (in same trench as reclaim water supply line)
- Sanitary sewer line
- Aqueous ammonia line.

The new offsite facilities associated with the proposed project are shown on Figure 3.2-1. Brief descriptions of the proposed facilities are presented in the following sections. Additional information regarding construction of these proposed facilities is presented in Section 3.9.2, Section 3.9.3, and in Table 3.9-5. A new natural gas supply pipeline will not be required, as mentioned in Section 3.4.6.

3.7.2 Reclaim Water Supply Line

Reclaim water from the West Basin Municipal Water District will be supplied to the El Segundo Generating Station for use, after treatment, as makeup to the steam cycle, makeup to the closed-loop auxiliary cooling system, and for steam injection to the combustion turbines. The El Segundo Power Redevelopment Project proposes to install a new 10-inch diameter reclaim water pipeline from the tie-in point in the City of El Segundo to the plant site.

The new pipeline will begin at a tie-in point on an existing 12-inch diameter reclaim water main near the intersection of Richmond Street and El Segundo Boulevard. The pipe will be routed west along El Segundo Boulevard through an alternate water line study area, west on Grand Avenue and then turning south on Vista Del Mar. The purpose of the alternate water line study area is to allow maximum flexibility to insure minimum impacts and maximum compliance with final city evaluations. Immediately north of the power plant property, the new reclaim water pipeline will be routed under Vista Del Mar at an overpass that is currently utilized by Chevron Refinery for routing pipe.

Construction of the proposed water line will meet the requirements established by the state and the City of El Segundo. The pipeline will be constructed of 10-inch diameter HDPE pipe and will extend approximately 1.75 miles from the tie-in point to the termination point within the plant site.

3.7.3 Potable Water Supply Line

City water from the City of El Segundo will continue to be utilized as the primary source of firewater for the El Segundo Generating Station. Ocean water is currently used as the secondary source of firewater, and because of the potential for contaminating the firewater system with saltwater, the El Segundo Power Redevelopment Project proposes to install a new 14-inch diameter city water pipeline from the City of El Segundo to the plant site.

The new pipeline will begin at a tie-in point on an existing 18-inch diameter city water main at the intersection of Eucalyptus Drive and El Segundo Boulevard. The pipe will be routed west along El Segundo Boulevard through an alternate water line study area, west on Grand Avenue and then turning south on Vista Del Mar. Immediately north of the power plant property, the new city water pipeline will be routed under Vista Del Mar at an overpass that is currently utilized by Chevron Refinery for routing pipe.

Construction of the proposed water line will meet the requirements established by the state and the City of El Segundo. The pipeline will be constructed of 14-inch diameter HDPE pipe and will extend approximately 1.45 miles from the tie-in point to the termination point within the plant site. Approximately 1.55 miles of the new city water line will be routed parallel to the new reclaim water line and installed within a trench shared by both pipelines.

3.7.4 Sanitary Sewer Line

Sanitary waste from the plumbing fixtures within the El Segundo Generating Station is currently treated onsite and the effluent discharged to the Pacific Ocean through the station's circulating water system discharge. In the El Segundo Power Redevelopment Project, sanitary wastes from the proposed combined cycle plant and existing generating plant will be discharged via a new line to the municipal sanitary sewer that is operated by the City of Manhattan Beach. Connection to the city sewer will necessitate construction of a lift station on the plant site, the routing of pipe onsite to the south property line, and the routing of approximately 150 feet of forced flow sewer line from the site to an existing manhole at the intersection of The Strand and 45th Street. The average sanitary waste discharge will be approximately 750 GPD from the El Segundo Generating Station.

Construction of the proposed sewer line will meet the requirements established by the state and the cities of El Segundo and Manhattan Beach. The pipeline will be constructed of 3-inch diameter PVC pipe and buried under a minimum of 24 inches of compacted soil.

3.7.5 Aqueous Ammonia Line

Aqueous ammonia (29% solution) is currently in use at the El Segundo Generating Station in a selective catalytic NO_x reduction (SCR) system in service on one of the existing thermal units. The ammonia solution is currently stored onsite in a 20,000-gallon tank on the southeast corner of the switchyard. Because of the addition of SCRs on Units 5 and 7, an increase in ammonia usage will occur. To reduce increased truck traffic to deliver aqueous ammonia to the plant site, the ESPR proposes to purchase aqueous ammonia from Chevron Refinery and install a pipeline directly connecting the refinery aqueous ammonia production system to the existing ESGS onsite storage tank.

The new pipeline will begin at a tie-in point within the Chevron Refinery and will be routed above ground to the north perimeter fence of the power plant site via the existing pipeline support structures serving Chevron's marine terminal facilities. These pipelines pass under Vista Del Mar immediately north of the ESGS property. The new line will continue southward along the existing ESGS retaining wall to the existing aqueous ammonia storage tank located south of the SCE switchyard. Construction of the proposed aqueous ammonia line will meet the requirements established by the state, the City of El Segundo, and applicable industry codes and standards. The pipeline will be constructed of 3-inch diameter carbon steel pipe.

3.8 SITE PREPARATION

Site Preparation activities will take place over a four-to-six month period prior to construction of the new generation facilities. For planning purposes, site preparation is divided into two phases: pre-demolition and demolition. The various aspects of site preparation are listed below in Sections 3.8.1 and 3.8.2. The remainder of this section describes various aspects of site preparation logistics, including workforce estimates, equipment estimates, and procedures.

3.8.1 Pre-Demolition Activities

Pre-demolition activities include:

1. Geotechnical preparations for demolition (i.e., sheet piling for dewatering, shoring for upslope, etc.)

2. Install interim firewater/service water tank(s), pumps, pipe, power, and controls

3. Install new or relocated Communication Room equipment in a combination of either a temporary structure or new facilities (i.e., new SCE switchyard building, new Administration building, new room in Units 3 and 4 control room, etc.)

4. Install replacement or relocate/repair existing condensate tank(s) to serve Units 3 and 4. Provide transfer pumps, pipe, power, and controls as required.

5. Install new water supply line(s) from cities of El Segundo and Manhattan Beach to provide firewater/service water to Units 3 and 4.

6. Cut and cap gas pipe(s) that currently serve Units 1 and 2.

7. Cut and cap auxiliary steam line tying Units 3 and 4 to Units 1 and 2.

8. Cut and cap reclaim water supply to Units 1 and 2 circulating water pumps.

9. Upgrade Units 3 and 4 Bearing Cooling Water system to alleviate dependency on Units 1 and 2 cooling water supply.

10. Construct new administration building or contract/install temporary space (i.e., office trailers). Provide necessary power, water, and sewer as required.

11. Cut and cap hydrogen and nitrogen gas lines to Units 1 and 2.

12. Disconnect 4kV cross-tie between Units 1 and 2 and Units 3 and 4.

13. Disconnect fiber optic data network line between Units 1 and 2 and Units 3 and 4.

14. Install new turbine lubricating oil storage tank(s) or relocate existing tanks from Unit 1. Determine disposition of centrifuge located in Units 1 and 2.

15. Cut and cap instrument and service air intertie between Units 1 and 2 and Units 3 and 4. Install new compressor(s) and air dryer(s) on Units 3 and 4 or relocate existing compressors from Units 1 and 2.

16. Final abatement of Units 1 and 2, as needed.

3.8.2 Demolition Activities

Demolition of Unit 1 and 2 facilities will commence following completion of the pre-demolition activities. Demolition will include the following activities:

1. Mobilize Plant Shutdown and Demolition
2. Demolition/Heavy Wrecking
3. Pull Down Units 1 and 2 elevation 20 foot - 90 foot
4. Demolish at grade and below grade concrete
5. Crush onsite asphalt/concrete rubble
6. Mass haul asphalt/concrete
7. Demobilization.

Demolition activities will be followed by facility construction, as described in Section 3.9. The transition from site preparation to construction involves careful management of sub-grade soils following excavation of all sub-grade structures in the new building footprints.

Removal of existing Unit 1 and Unit 2 foundations will require excavations ranging from 5 to almost 20 feet deep. The deeper foundation removal excavations are located at the existing condensers and the cooling water pipes leading to the intake/discharge structure. It is anticipated that groundwater control will be provided for these excavations such that the base will be stable for placing structural fill. Structural fill will be brought up to the new power plant construction site working platform. Some new plant construction activities may take place prior to bringing up structural fill to the new site working platform. These activities may include ground improvement measures, deep foundation construction, constructing foundation mats, or laying the cooling water pipes.

3.8.3 Site Preparation Schedule and Workforce

Site preparation will take place over a four to six month period prior to construction of new power generating facilities. The schedule is based on a double-shift, 6 day work week. Table 3.8-1 indicates the project demolition craft manpower by month for the ESPR Project. An estimated peak of 49 craft and professional personnel is anticipated for demolition in month 3 following mobilization of manpower and equipment to demolish Units 1 and 2. A general contractor will be selected for structural demolition and removal activities. The general contractor for specialty work portions, as needed, will select subcontractors.

TABLE 3.8-1

DEMOLITION STAFFING SCHEDULE

DEMOLITION OF UNITS 1 & 2						
Months After Notice to Proceed	**1**	**2**	**3**	**4**	**5**	**6**
Laborers	6	40	24	24	20	10
Foreman	2	3	3	3	2	1
Operating Engineers	5	10	11	10	10	3
Crane Operators	2	1	4	4		
Miscellaneous Operators/Truck Operations	7	12	12	11	7	15
Manual Staff Subtotal	**22**	**66**	**54**	**53**	**39**	**19**
Superintendents	1	2	2	2	2	1
Site Assistant Project Manager	1	1	1	1	1	1
Contractor Staff Subtotal	2	3	3	3	3	2
Total Staff	**24**	**69**	**57**	**56**	**42**	**21**

3.8.4 Site Preparation Plans

3.8.4.1 <u>Mobilization</u>

The demolition general contractor will mobilize after completion of pre-demolition activities. The general contractor will perform and verify facility de-energization prior to commencing work in and around the power plant. The initial efforts will include verification of utility de-energization, final abatement and removal of Regulated Building Materials (RBM) and Asbestos Containing Materials (ACM), and establishment of laydown areas and construction parking.

3.8.4.2 Site Preparation Office Facilities

Offices will be set up in a trailer or modular facilities on the ESGS property. These will be utilized to manage the day to day aspects of the construction efforts of the Owner, Engineer, Contractor, and subcontractors. Temporary water, power, communications, and sanitary facilities will be established to service the construction offices, as needed.

3.8.4.3 Site Preparation Parking

A worker parking facility will be established onsite. This area will provide adequate parking space for demolition personnel and visitors during demolition. The area will be maintained for stability and safety. Offsite locations may be utilized for worker parking (see Figure 3.2-1).

3.8.4.4 Laydown and Storage

Areas will be established within the site boundary. The general contractor will size, transport, and remove all materials generated during demolition activities, from the site, on a continuous basis and deliver debris to an approved landfill for disposal. One or more offsite locations may be utilized during the demolition phase for temporary staging activities (see Figure 3.2-1).

3.8.4.5 Emergency Facilities

Emergency services will be coordinated with the local fire department and hospital. The existing facility services will also be utilized as available and capable. An urgent care facility will be contacted to set up non-emergency physician referrals. First-aid kits will be provided around the site and regularly maintained. At least one person trained in first aid will be part of the construction staff. In addition, all foreman and supervisors will be given first-aid training.

Fire extinguishers will be located throughout the site at strategic locations at all times during demolition.

3.8.4.6 Site Preparation Utilities

During site preparation, temporary utilities will be provided for the construction offices, laydown areas, and the project site.

Temporary construction power will be supplied by strategically distributed utility-furnished power and by portable generators. Area lighting will be provided and located for safety and security.

Demolition water will be provided by available onsite sources and distributed to the construction area. Drinking water will be distributed daily. Average daily use of water for site preparation activities is expected to be about 8,000 gallons.

Portable toilets will be provided throughout the site.

3.8.4.7 Site Services

The following site services will be provided, either by separate contract or incorporated into individual construction subcontracts for the ESPR Project:

- Environmental Health Safety Training
- Site Security
- Site first aid
- Furnishing and servicing of sanitary facilities
- Trash collection and disposal
- Disposal of hazardous materials and waste in accordance with local, state, and federal regulations.

3.8.4.8 Demolition Materials and Equipment

Construction equipment planned for use during the demolition phase is listed in Table 3.8-2.

Truck deliveries will occur Monday through Saturday between 6:00 a.m. and 6:00 p.m. For off hauling of demolished materials, trucking activities will occur between 6:00 am and 12:00 p.m. to support the period of double shift. Heavy equipment will be delivered before or after curfew. The maximum haul rates will vary depending upon the activity and present field conditions and the amount of organic debris, rubble, and scrap generated on a daily basis. Estimated average daily frequency of truck deliveries is shown in Tables 3.8-3 and 3.8-4. Trucks are to be licensed, street legal, not overweight, and shall travel on established truck routes, with required tarping, and in compliance with all state and local jurisdictions. Site access will be controlled for personnel and vehicles.

TABLE 3.8-2

DEMOLITION EQUIPMENT USAGE

	EQUIPMENT: AVERAGE NUMBER/DAY/MONTH					
Demolition Schedule After Notice to Proceed	**1**	**2**	**3**	**4**	**5**	**6**
Crawler Excavator w/Breaker	1			3	3	
Crawler Excavator w/Grapple	1	1	1	1	1	
Crawler Excavator w/Shear		2	3			
Crawler Excavator w/Pulverizer	1			2	2	
Skid Steel Loader	2	2	2	2	2	2
Track Loader	1	2	2	2	2	
Rubber Tire Loader	1	1	1	1	1	2
Water Truck	1	1	1	1	1	1
Stomper				1		
Hydro-Crane		2	2			
Crawler Crane		2	2			
Portable Crusher						1
Bottom Dumps				5		15
Ten Wheeler with Dump Bins	1	1	1	1	1	1
Semi-End Dumps	3	7	7	5	5	3
Tractor/Trailer	1	1	1	1	1	1
Total	**13**	**22**	**23**	**25**	**19**	**26**

TABLE 3.8-3

SCHEDULE OF TRUCK DELIVERIES/DEMOLITION MATERIALS
(Excluding Heavy Equipment Deliveries)

	Total Number Of Trips Per Month					
Months After Notice to Proceed	**1**	**2**	**3**	**4**	**5**	**6**
Equipment Services	2	4	4	3	2	1
Oxygen & Propane	10	25	15	15	10	6
Diesel Fuel	8	25	25	25	15	10
Drinking Water	4	4	4	4	4	4
First Aid Supplied	1	1	1	1	1	1
Small Tools & Supplies	4	4	4	4	2	2
Trench Plate	2	1		3		
Subtotal	**31**	**64**	**53**	**55**	**34**	**24**
Average Daily	**1.5**	**3**	**2.5**	**2.5**	**1.5**	**1**

TABLE 3.8-4

HEAVY EQUIPMENT DELIVERY SCHEDULE

	Number of Mobilizations & Demobilizations per Month					
Months After Notice to Proceed	**1**	**2**	**3**	**4**	**5**	**6**
Excavator	4			2		6
Skid Steer Loader	1	1	1		1	2
Track Loader	1	1				2
Rubber Tired Loader	1				1	4
Water Truck	1					1
Stomper				1	1	
Cranes		4		4		
Portable Crusher						2
Total Heavy Equipment Deliveries	**8**	**7**	**1**	**7**	**3**	**17**
Average per day	**0.4**	**0.3**	**0.1**	**0.3**	**0.1**	**1**

3.9 PROJECT CONSTRUCTION

Following removal of Units 1 and 2 and during the addition of structural fill and the establishment of the construction site working platform, construction activities associated with the new combined cycle plant will begin. These activities will include ground improvement measures, deep foundation construction, construction of foundation mats, and the setting of new circulating water pipe.

Following completion of site preparation activities, construction and startup of the ESPR from the start of site mobilization to commercial operation is expected to take a minimum of 20 months. Construction of this facility is expected to take place with many activities taking place in series rather than concurrently due to site space constraints. The overall sequence of construction and startup includes construction foundations, installing major piping and equipment, connecting major site interfaces, erecting major structures, and startup/testing. The schedule and staffing requirements are described in the following sections by major components.

3.9.1 Power Plant Facility

3.9.1.1 Construction Schedule and Workforce

The construction and startup schedule for the ESPR is displayed on Figure 3.9-1. The construction and startup schedule is based on a double-shift through the site preparation period and the construction of the major equipment foundations and pedestals. This will be followed by a single-shift, 5-day workweek basis. Overtime and additional shift work may be used to maintain or enhance the construction schedule.

Separate construction efforts, in parallel with the power plant facility's construction and startup schedule, will construct offsite utilities.

Table 3.9-1 and Figure 3.9-2 indicate the projected total construction craft manpower by month for the El Segundo Power Redevelopment Project. An estimated peak of 422 craft and professional personnel is anticipated in month 11 following construction mobilization for the new combined cycle facility.

3.9.1.2 Construction Plans

The construction staging and laydown area, as well as the construction worker parking area, will be at the locations indicated on Figure 3.2-1. A general contractor will be selected for the design, procurement, and construction of the facility. The general contractor for specialty work portions, as needed, will select subcontractors.

TABLE 3.9-1

CONSTRUCTION STAFFING SCHEDULE

Month After Construction Mobilization	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Generating Facility																				
Insulation Workers										5	10	17	19	27	27	25	25	9	8	6
Boilermakers					8	11	24	26	31	31	31	28	26	24	15	15	5	5	4	4
Bricklayers and Masons			1	1	3	5	3	3	3	2	2	1	1	1	1	1	1	1	1	
Carpenters	12	15	28	40	50	64	39	42	38	34	29	25	25	23	18	15	10	5	5	4
Electricians	4	4	13	13	24	20	24	34	37	42	47	52	55	52	44	33	26	13	8	6
Ironworkers	3	8	11	19	24	21	53	36	39	36	33	26	21	15	13	10	10	5	5	
Laborers	16	23	38	48	54	64	37	40	42	39	39	37	37	29	29	21	18	10	8	6
Millwrights				5	5	12	7	10	14	14	16	13	13	10	10	9	9	4	4	2
Operating Engineers	4	7	11	9	9	13	13	16	17	18	19	19	19	15	14	12	8	5	3	2
Plasterers								1	1	3	3	5	4	5	2	2				
Painters								1	1	3	3	5	4	5	5	5	5	5	4	2
Pipefitters	4	9	16	20	31	31	40	53	56	87	93	101	102	81	72	30	27	24	15	3
Sheetmetal Workers									3	5	8	10	10	13	15	16	14	13	5	2
Sprinklerfitters								1	1	1	1	2	3	5	9	8	8	5	1	
Teamsters	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1
Surveyors	2	2	4	7	7	9	4	4	4	4	4	4	4	4	3	3	1	1		
Manual Staff Subtotal	**47**	**70**	**124**	**164**	**217**	**252**	**246**	**269**	**289**	**326**	**340**	**347**	**345**	**311**	**279**	**207**	**168**	**106**	**72**	**38**

TABLE 3.9-1

(CONTINUED)

Month After Construction Mobilization	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Contractor Staff	5	13	24	37	48	48	35	37	45	45	49	49	47	44	41	34	30	13	11	6
Subtotal	**52**	**83**	**148**	**201**	**265**	**300**	**281**	**306**	**334**	**371**	**389**	**396**	**392**	**355**	**320**	**241**	**198**	**119**	**83**	**44**
Pipelines																				
Carpenters										3	3	3								
Electricians											2	2								
Laborers									7	8	8	7								
Operating Engineers									2	6	6	2								
Painters												2								
Pipefitters										2	2	2								
Surveyors	2	2					2	2	2	2	2	2								
Teamsters									2	6	6	4								
Manual Staff Subtotal	**2**	**2**					**2**	**2**	**13**	**27**	**29**	**24**								
Contractor Staff	1	1					1	1	2	4	4	2								
Subtotal	**3**	**3**					**3**	**3**	**15**	**31**	**33**	**26**								
TOTAL	**55**	**86**	**148**	**201**	**265**	**300**	**284**	**309**	**349**	**402**	**422**	**422**	**392**	**355**	**320**	**241**	**198**	**119**	**83**	**44**

3.9.1.2.1 Mobilization. The general contractor will mobilize within six months after full notice to proceed or immediately following the completion of the preceding demolition of the existing Units 1 and 2. The initial efforts will include sitework, establish site grading and storm water control, and establish the laydown areas and construction parking.

3.9.1.2.2 Construction Office Facilities. Construction offices will be set up in trailer or modular facilities on the ESGS property. These will be utilized to manage the day to day aspects of the construction efforts of the Owner, Engineer, Contractor, and subcontractors. Temporary water, power, communication, and sanitary facilities will be established to service the construction offices, as needed.

3.9.1.2.3 Construction Parking. A construction parking facility will be established onsite and/or at a location within close proximity to the plant site. This area will provide adequate parking space for construction personnel and visitors during construction. The area will be maintained for stability and safety. Construction workers will be bussed to and from the established offsite location at the beginning and end of each work shift.

3.9.1.2.4 Laydown and Storage. Areas will be established within the site boundary, as well as at a location within close proximity to the site. Laydown and storage will be handled in three phases. Those items requiring long term storage will be located at the offsite facility shown in Figure 3.2-1. Components scheduled to be placed into their final location will be staged onsite in the area of the currently abandoned fuel oil storage tanks at the south end of the property. Components located here will be temporary and on a revolving short-term basis. As construction logistics allow, some items will be located directly in the work area, which will be incorporated into the facility or its final location in the very near term.

3.9.1.2.5 Emergency Facilities. Emergency services will be coordinated with the local fire department and hospital. The existing facility services will also be utilized as available and capable. An urgent care facility will be contacted to set up non-emergency physician referrals. First-aid kits will be provided around the site and regularly maintained. At least one person trained in first aid will be part of the construction staff. In addition, all foremen and supervisors will be given first-aid training.

Fire extinguishers will be located throughout the site at strategic locations at all times during construction.

3.9.1.2.6 Construction Utilities. During construction, temporary utilities will be provided for the construction offices, laydown areas, and the project site.

Temporary construction power will be supplied by strategically distributed utility-furnished power and by portable generators. Area lighting will be provided and located for safety and security.

Construction water will be provided by available onsite sources and distributed to the construction area. Drinking water will be distributed daily. Average daily use of construction water is expected to be about 5,000 gallons. During hydrotest, water usage is estimated at 20,000 gallons per day. Used hydrotest water will be discharged into the existing retention pond.

Portable toilets will be provided throughout the site.

3.9.1.2.7 **Site Services**. The following site services will also be provided, either by separate contract, or incorporated into individual construction subcontracts for the El Segundo Power Redevelopment Project:

- Environmental Health and Safety Training
- Site security
- Site first aid
- Construction testing (e.g. NDE, Hydro, Soil, Concrete)
- Furnishing and servicing of sanitary facilities
- Trash collection and disposal
- Disposal of hazardous materials and waste in accordance with local, state, and federal regulations.

3.9.1.2.8 **Construction Materials and Equipment**. Construction equipment planned for use in the construction of the El Segundo Power Redevelopment Project is listed in Table 3.9-2.

Truck deliveries will occur weekdays between 6:00 a.m. and 6:00 p.m. During the period of double shift work, it is expected that deliveries will also be required at other hours outside of the delivery times described herein to support the second shift activities. These deliveries are expected to be primarily concrete. Estimated average daily frequency of truck deliveries is shown in Table 3.9-3. Materials such as concrete, pipe, wire and cable, fuels, reinforcing steel, and small tools and consumables will be delivered to the site by truck.

Most of the heavy equipment items will be transported by rail to the common shipping depot nearest to the site. Rail deliveries will be off-loaded and transported to the site by common carrier. Table 3.9-4 indicates the projected delivery of major equipment components. There remains the likelihood that equipment may also be received by ship.

TABLE 3.9-2

CONSTRUCTION EQUIPMENT USAGE

Construction Schedule - Month After Mobilization	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Generating Facility																				
Air Compresssors																				
Ingersoll Rand, diesel, 185 cfm, 75%, 8 hrs/day, 5 days/wk		**3**	**3**	**5**	**5**	**8**	**11**	**13**	**16**	**16**	**16**	**16**	**16**	**10**	**10**	**9**	**3**	**1**		
Paving Equipment																				
Asphalt paver, Cat, AP-800B, diesel, 102 hp, 85%, 8 hrs/day, 5days/wk																**2**	**2**	**2**	**2**	
Compactors																				
Cat, CS-563, diesel, 145 hp 65%, 8hrs/day, 5 days/wk	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**			**1**	**1**	**1**	**1**	
Portable Compression Equipment																				
Multiquip, Jumping Jack, MRT-80L, gas/oil, 2 cycle, 3.3 hp, 60%, 8hrs/day, 5 days/wk	**1**	**1**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**1**	**1**			**1**	**1**	**1**	**1**	
Multiquip, Plate Compactor, MVC-62H, gasoline, 4.6 hp, 60%, 8 hrs/day, 5 days/wk		**1**	**1**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**1**	**1**	**1**			**1**	**1**	**1**	**1**	
Concrete Vibrators																				
North Rock, flex shaft vibrator, electric, 15 amps, 50%, 8hrs/day, 5days/wk		**2**	**2**	**5**	**5**	**6**	**6**	**6**	**6**	**6**	**5**	**5**	**4**	**2**	**2**					
Light Towers																				
Magnum, Nightbuster 5000, 440000lumen, 6000W, 15.5 hp, 70%, 10 hrs/day, 5 days/wk	**2**	**2**	**2**	**2**	**2**	**2**	**2**													
Dozer																				
Cat, D8U, diesel, 285 hp, 70%, 8 hrs/day, 5 days/wk	**1**	**1**	**2**	**2**	**2**	**2**	**2**	**2**	**1**	**1**	**1**	**1**	**1**			**1**	**1**	**1**	**1**	
Excavator, Backhoe																				
Cat, 312, diesel 84 hp, 75%, 8 hrs/day, 5 days/wk	**1**	**1**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	
Excavator, Loader																				
Cat, 936 F, diesel, 200 hp, 80%, 8 hrs/day, 5 days/wk	**1**	**1**	**1**	**1**	**1**	**1**														
Cat, 938 F, diesel, 140 hp, 80%, 8 hrs/day, 5 days/wk	**1**	**1**	**2**	**2**	**1**	**1**														
Excavator, Motor Grader																				
Cat, 140G, diesel, 150 hp, 90%, 8hrs/day, 5 days/wk	**1**	**1**	**1**	**1**	**1**	**1**										**1**	**1**	**1**	**1**	
Cranes, 225 Ton																				

TABLE 3.9.2

(CONTINUED)

Construction Schedule - Month After Mobilization	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Manitowoc, 4100W, diesel, 350 hp, 70%, 8 hrs/day, 5 days/wk						**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**							
Cranes, 150 Ton						**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**							
Manitowoc, diesel, 250 hp, 70%, 8 hrs/day, 5 days/wk																				
Cranes, 40 Ton			**1**	**1**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**1**	**1**				
Grove, RT700B, diesel, 185 hp, 50%, 8 hrs/day, 5 days/wk																				
Cranes, 20 Ton		**1**	**1**	**3**	**3**	**4**	**4**	**4**	**4**	**4**	**3**	**3**	**3**	**2**	**2**	**1**	**1**			
Grove, RT400, diesel, 185 hp, 50%, 8 hrs/day, 5 days/wk																				
Water Trucks				**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**				
International, diesel, 600 gal, 50%, 8hrs/day, 5days/wk																				
Welders		**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**				
Multiquip, GA 3600, gasoline, 7.5 hp, 70%, 8 hrs/day, 5 days/wk																				
Multiquip, BLW-300SS, diesel, 23 hp, 75%, 8 hrs/day, 5 days/wk		**1**	**3**	**4**	**8**	**8**	**9**	**15**	**16**	**20**	**20**	**20**	**20**	**20**	**15**	**14**	**7**	**3**	**3**	**2**
Trucks, Fuel/Lube			**1**	**1**	**1**	**3**	**3**	**5**	**5**	**6**	**6**	**6**	**6**	**6**	**4**	**3**	**1**			
International, diesel, 210 hp, 50%, 8 hrs/day, 5 days/wk																				
Trucks, Large		**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**				
Cat, D200, articulated truck, diesel, 180 hp, 65%, 8 hrs/day, 5 days/wk																				
Ford flatbed, diesel, 180 hp, 80%, 8 hrs/day, 5 days/wk	**1**	**1**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**2**							
Radios	**3**	**3**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**3**	**3**	**2**	**1**	
Hand held radios																				
Tanks, Fuel/Lube	**4**	**9**	**16**	**20**	**23**	**23**	**26**	**26**	**26**	**31**	**31**	**32**	**31**	**29**	**23**	**21**	**16**	**8**	**8**	**4**
750 gallons each																				
Truck, Concrete Pump		**1**	**1**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**1**	**1**		
International, diesel, 190 hp, 60%, 8/5																				
Subtotal		**1**	**2**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**1**				
Water Supply Pipeline	**17**	**34**	**53**	**69**	**76**	**84**	**88**	**96**	**99**	**109**	**105**	**104**	**102**	**83**	**68**	**66**	**40**	**23**	**20**	**6**
Air Compresssors																				
Ingersol-Rand diesel, 185 cfm, 76%, 8 hrs/day, 5 days/wk																				

TABLE 3.9.2

(CONTINUED)

Construction Schedule - Month After Mobilization	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Compactors									**1**	**1**	**1**	**1**								
Cat, CS-563, diesel, 145 hp 65%, 8 hrs/day, 5 days/wk																				
Portable Compression Equipment									**1**	**1**	**1**	**1**								
Multiquip, Jumping Jack, MRT-80L, gas/oil, 2 cycle, 3.3 hp, 60%, 8hrs/day, 5days/wk																				
Multiquip, Plate Compactor, MVC-62H, gasoline, 4.6 hp, 60%, 8 hrs/day, 5 days/wk									**1**	**1**	**1**	**1**								
Concrete Vibrators									**2**	**2**	**2**	**2**								
North Rock, flex shaft vibrator, electric, 15 amps, 50%, 8 hrs/day, 5 days/wk																				
Dozer											**1**	**1**								
Cat, D6U, diesel 265hp, 70%, 8 hrs/day, 5 days/wk																				
Excavator, Backhoe									**1**	**1**	**1**	**1**								
Cat, 312, diesel, 84 hp, 75%, 8 hrs/day, 5 days/wk																				
Excavator, Loader									**1**	**1**	**1**	**1**								
Cat, 900F, diesel, 150 hp, 75%, 8 hrs/day, 5 days/wk																				
Paving Equipment									**1**	**1**	**1**	**1**								
Asphalt paver, Cat, AP-800B, diesel, 102 hp, 85%, 8 hrs/day, 5days/wk																				
Excavator, Motor Grader											**1**	**1**								
Cat, 140G, diesel, 150 hp, 90%, 8 hrs/day, 5 days/wk																				
Cranes, 40 Ton									**1**	**1**	**1**	**1**								
Grove, RT700B, diesel, 185 hp, 50%, 8 hrs/day, 5 days/wk																				
Cranes, 20 Ton									**1**	**1**	**1**	**1**								
Grove, RT400, diesel, 185 hp, 50%, 8 hrs/day, 5 days/wk																				
Water Trucks												**1**								
International, diesel, 500 hp, 50%, 8 hrs/day, 5 days/wk																				
Trucks, Fuel/Lube									**1**	**1**	**1**	**1**								
International, diesel, 210 hp, 50%, 8 hrs/day, 5 days/wk																				
Radios									**1**	**1**	**1**	**1**								
Hand held radios																				
Subtotal	**3**	**3**							**3**	**4**	**4**	**3**								

TABLE 3.9.2

(CONTINUED)

Construction Schedule - Month After Mobilization	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
TOTAL	3	3							15	16	18	18								
	20	37	53	69	76	84	88	96	114	125	123	122	102	83	68	66	40	23	20	6

TABLE 3.9-3

CONSTRUCTION SCHEDULE FOR TRUCK DELIVERIES OF EQUIPMENT

(Excluding Heavy Equipment Deliveries)

Month After Construction Mobilization	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Equipment and Materials																				
Generating Facility																				
Heat Recovery Steam Generators							5	20	30	39	44	34	34	25	14	10				
Combustion Turbine/Generator							5	13	25	32	34	29	19	10	10					
SteamTurbine/Generator									3	5	8	10	7	7	3	3				
Mechanical Equipment			5	5	16	16	32	32	54	54	53	53	32	26	13	5	3			
Electrical Equipment and Materials		3	3	8	8	11	16	16	32	32	32	43	37	27	16	16	5	5		
Piping, Supports & Valves		3	4	8	14	27	43	43	53	54	64	53	32	26	16	5	5			
Concrete and Rebar		50	197	245	484	484	105	87	43	17	9									
Miscellaneous Steel/Architectural				5	5	16	27	32	32	26	10	5								
Consumables/Supplies	14	16	35	38	43	43	43	43	43	46	46	46	46	37	37	27	27	10	10	3
Contractor Mobilization & Demobilization	11	11	16	10	5										3	10	16	10	10	3
Construction Equipment	5	5	11	8	8	5	5	5	4	4	2	2	1	1	3	3	5	3	3	
Subtotal	**30**	**88**	**271**	**327**	**583**	**602**	**281**	**291**	**319**	**309**	**302**	**275**	**208**	**159**	**115**	**79**	**61**	**28**	**23**	**6**
Average Daily	**1.4**	**4.2**	**12.9**	**15.6**	**27.8**	**28.7**	**13.4**	**13.9**	**15.2**	**14.7**	**14.4**	**13.1**	**9.9**	**7.6**	**5.5**	**3.8**	**2.9**	**1.3**	**1.1**	**0.3**
Supply Pipeline																				
Electrical Equipment and Materials										4	4	4								
Piping, Supports & Valves									10	12	10	4								
Concrete and Rebar									12	23	4	4								
Miscellaneous Steel/Architectural											2	4								
Consumables/Supplies									8	12	12	4								
Construction Equipment								2	10	2		9	3							
Subtotal								**2**	**40**	**53**	**32**	**29**	**3**							
Average Daily								**0.1**	**1.9**	**2.5**	**1.5**	**1.4**	**0.1**							

TABLE 3.9-4

HEAVY EQUIPMENT TRUCK DELIVERIES SCHEDULE

Month After Construction Mobilization	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Major Equipment																				
Generating Facility																				
Heat Recovery Steam Generators					18	4		18	4											
Combustion Turbine/Generator						4			4											
SteamTurbine/Generator							6													
Main Transformers								1	2											
Total	**0**	**0**	**0**	**0**	**18**	**8**	**6**	**19**	**10**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

3.9.2 Pipelines

3.9.2.1 Introduction

Separate underground reclaim water supply and firewater supply pipelines will be constructed to the ESGS. The reclaim water pipeline will be constructed from the tie-in point on the West Basin Municipal Water District existing main at the intersections of Richmond Street and El Segundo Boulevard. The firewater pipeline will be constructed from the tie-in point on the City of El Segundo existing main at the intersections of Eucalyptus Drive and El Segundo Boulevard. The size and routings of these pipelines are as discussed in Sections 3.7.2 and 3.7.3.

Additionally, a forced flow, sanitary sewer pipeline will be installed offsite from the south site boundary to an existing city sewer manhole (associated with the City of Manhattan Beach Public Works Department) in the intersection of The Strand and 45th Street. The size and routing of this pipeline is discussed in Section 3.7.4.

3.9.2.2 Construction Schedule and Workforce

The construction activities involved with the pipelines will be coordinated with the agencies having jurisdiction in the areas of the routing. The onsite portion will take place during the early phases of the construction effort to minimize impacts with onsite traffic flow, as well as foundation construction. It is anticipated this would be completed within the first 4 months following initial construction mobilization. The offsite portion will be scheduled to be performed within 3 to 4 months and in a period that minimizes community impacts.

The workforce is expected to be a maximum of 33 people for the offsite portion of the work.

3.9.2.3 Construction Plans

3.9.2.3.1 Construction Activities. Initial activities will entail surveying for the construction of the pipelines. This information will be utilized in the design of the pipeline as topographic and feature details will be established. Property line surveys are also performed to develop legal land descriptions of any required right of way easements. This work typically consists of two or three individuals with equipment and a light utility vehicle. Surveying efforts will resume just in advance or in conjunction with the construction efforts to lay out the final designed location for installation.

Pipeline construction operations can be broken down into six major activities: 1) clearing and grading; 2) trenching; 3) stringing pipe and fittings; 4) line-up and connecting; 5) backfill, restoration and cleanup; and 6) hydrotesting.

Clearing and Grading. Clearing and grading includes the removal of brush, trees, paving, concrete, and any other obstructions from the pipeline right-of-way and grading the cleared area as required to facilitate an efficient installation process. The total area of disturbance for the pipelines would be approximately 13 acres. This is based upon a total pipeline routing of 1.88 miles and a 45-foot width of disturbance, and any additional space disturbed as a result of having to perform modifications to existing facilities to accommodate the new pipeline installations, and construction staging areas. One front-end loader, concrete and asphalt cutting equipment, a dump truck, and a road grader will likely be used. Crew size will be about 6 people.

Trenching. The main section of pipe trench can be dug using backhoes. These backhoes will likely include a tracked hoe as well as a rubber-tired backhoe. In areas of existing underground encounters, it is expected that hand digging will also be utilized. A dump truck may also be necessary to move excavated material to temporary staging locations. Crew size will be about 5 people.

Stringing Pipe and Fittings. The stringing of pipe and fittings is expected to be performed on a daily basis for same day installation. This is due largely to the expected congestion along the routing of the pipelines. If space allows, the pipe sections will be delivered by semi tractor-trailers and unloaded and strung end to end along the pipeline route or portions of the route. This unloading operation will likely utilize a boom truck, small crane, or fork lift. The crew size will be about 4 people.

Line-up and Connecting. The installation, or line-up and connecting, of the pipelines will likely be push-on or butt fusion type joints for the long straight rows. Pipe runs with curvature will include bends (11¼, 22 ½, 45 and 90 degrees) and allowable joint deflection. Joints on curved runs will consist of push-on joints with restraints if butt fusion piping is not utilized. This effort will be supported with a side boom or tire mounted crane, or possibly with the tracked hoe used for the trenching effort. The crew size will be about 5 people.

Backfill and Cleanup. Backfilling and cleanup efforts entail utilizing the previously excavated material, provided it is free of large rocks, and organic matter. This material is placed back directly over the pipe. If the previously excavated material is unsuitable for backfilling, fine sand or sifted earth is placed over the pipe to a shallow depth and the remaining earth, cleaned of the organic material, is placed back in the trench. The area is then compacted and smoothed down and returned to grade. This work will be performed with a dozer, grader, and compaction equipment. Any surfacing (i.e., concrete, paving, sod) that was destroyed will then be restored. This crew size will be 4 to 5 people.

Hydrotesting. The pipelines will then be tested by filling with water and brought to a specified test pressure, and held for a specified duration. One low pressure and one high-pressure pump will probably be used. This crew size will be about 3 people.

3.9.3 Land Disturbance

A summary of estimated land disturbance for the ESPR, including construction and operation phases for the generation facility, pipelines, and other facilities is presented in Table 3.9-5.

3.9.3.1 Earthmoving Offsite.

Offsite disturbance areas will be as identified in Section 3.9.2.1 for the construction of the pipelines. Other areas affected may include any location preparation and possible surface upgrading at the established construction parking area (6+ acres) and at the offsite laydown and storage areas (12+ acres). These areas are as identified in Sections 3.9.1.2.3 and 3.9.1.2.4.

Additional construction and/or upgrading is expected to be likely at the rail car unloading facility. This work may involve upgrading existing trackage or building a new rail spur near an existing railroad siding location. Additional surface preparation may also be required to support the unloading and temporary staging of the material and equipment at the rail car unloading facility.

At the location of the ESPR Project, the land disturbance will be within the boundaries of the existing ESGS property. An exception will be with the incoming aqueous ammonia supply piping which will enter the north side of the power plant property from Chevron Refinery's property on the west side of Vista Del Mar.

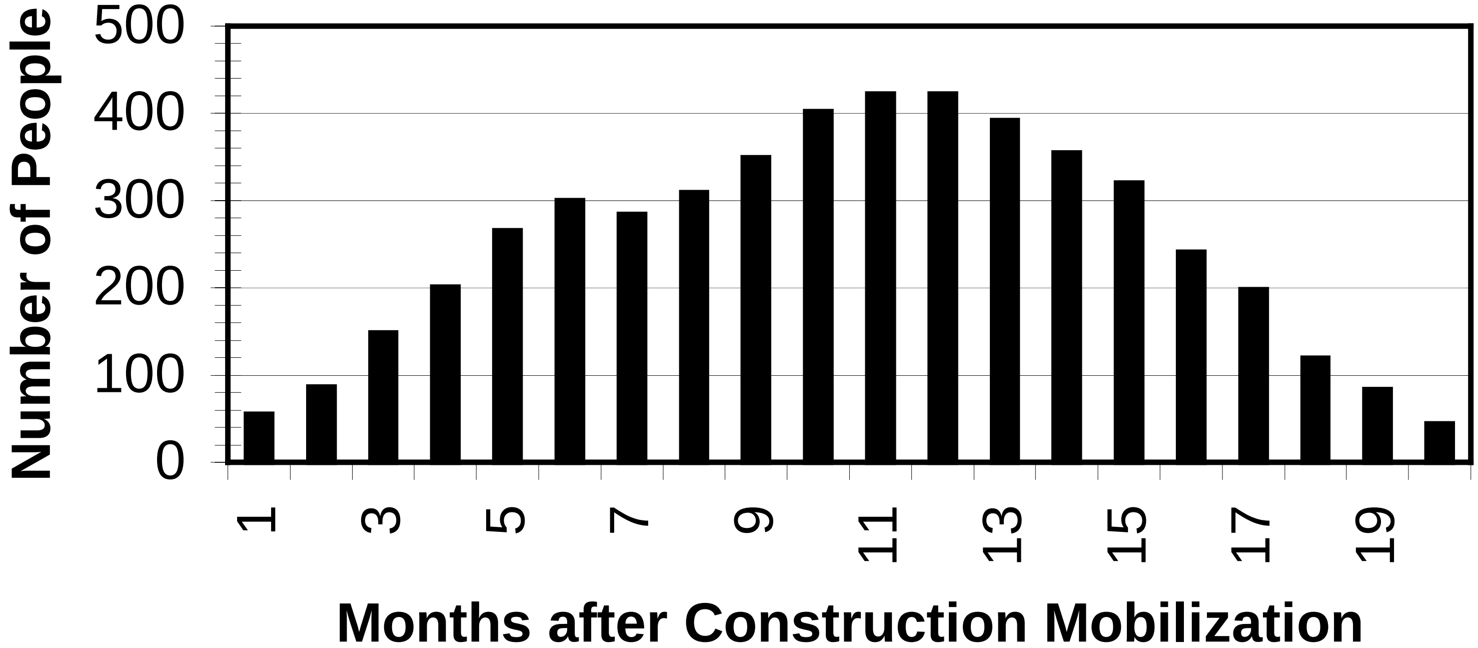
TABLE 3.9-5

ESTIMATED LAND DISTURBANCE

Project Component/Item	Unit Area		Length/	Acreage Subtotal	
	Construction	Operation	Frequency of Units	Construction	Operation
GENERATION FACILITY					
Areas of construction within the ESGS existing plant site					
Generation Islands	—	—	—	5.51 ac	5.51 ac
Tanks	—	—	—	0.5 ac	0.11 ac
Gas compressor				.15 ac	.15 ac
Existing Tank Area for laydown/ staging	—	—	—	6.7 ac	6.7 ac
Area outside existing fence but still within ESGS Property					
Storm Sewer[1]	60 foot width	—	900 ft. long	1.24 ac	.1 ac
OFFSITE FACILITIES[1]					
Construction Parking	—	—	—	6 ac	0
Construction Laydown and Storage	—	—	—	12 ac	0
PIPELINES[1]					
Reclaim Water and Firewater Pipelines	40 foot width	20 foot width	1.75 miles	8.48 ac	4.24 ac
Additional possible modifications of existing installations to accommodate pipeline	—	—	—	2.5 ac	0.5 ac
Forced Main Sanitary Sewer	45 foot width	20 foot width	150 ft.	0.15 ac	0.007 ac

[1]Following construction, the land surface would generally be allowed to return to its preconstruction use.

Figure 3.9-2 El Segundo Generating Facility Construction Workforce



3.10 FACILITY OPERATION

3.10.1 Introduction

This section discusses operation and maintenance procedures that would be undertaken by the Applicant to ensure safe, reliable, and environmentally acceptable operation of the facility, transmission systems, and offsite pipelines. Additional information regarding operation is presented in Appendix D (Control Systems Engineering Design Criteria) with respect to coordinated control and monitoring of the power plant systems.

Operation of the proposed ESPR is expected to require up to about 50 full-time employees. Plant operations will be controlled from the operator's panel, which will be located in the existing control room of Units 3 and 4. A distributed control and information system (DCS) will provide modulating control, digital control, and monitoring and indicating functions for operation of the plant power block systems.

Information on material deliveries and waste disposal during the operational phase is included in Section 3.4.8 (Waste Management) and 3.4.9 (Management and Disposal of Hazardous Materials and Hazardous Wastes). Information on facility availability, major planned maintenance activities, and equipment redundancy is included in Section 5.19 (Power Plant Reliability and Efficiency).

3.10.2 Power Plant Facility

The ESPR includes the addition of a high efficiency combined cycle plant (Units 5, 6, and 7) with a net plant output of 631 MW. Normally, the combined cycle power block will operate in a base load mode.

3.10.2.1 Operation with Seasonal Variation in Ambient Temperature

Output from the combustion turbine generators (CTGs) is sensitive to the temperature and density of the ambient air taken into the combustion turbine (CT) inlet and used in the combustion process. Evaporative coolers have been added to the CTs to reduce the inlet air temperatures when ambient temperatures exceed 50°F. This reduces the impact of ambient temperature on electrical output during the summer peaks when the electrical customer's usage is at its highest.

3.10.2.2 Annual Operating Practices

Generally, the combined cycle plant will be operated to provide its maximum electrical output throughout the year. To start the plant from a zero percent dispatched operating mode, power will be backfed through the 230 kV transmission lines to start the CTs. The turbine will be fired with natural gas. Once the turbine has been fired and brought to full speed, the CTG can be synchronized with the existing transmission grid. The STG is loaded sequentially after the CTG(s) is loaded.

Planned maintenance will be coordinated to reduce the impact of having a unit shut down for maintenance and overhauls. Normally, this work will be planned during the winter periods when the need for electricity is reduced.

3.10.2.3 Control Philosophy

The control system will consist of a state-of-the-art, integrated microprocessor-based distributed digital control and monitoring system (DCS). The control system will provide for startup, shutdown, and control of plant operation limits, and will provide protection for the equipment.

Interlock and logic systems will be provided via hard-wired relays, the DCS, or programmable controllers.

Process switches (i.e., pressure, temperature, level, etc.) used for protective functions will be connected directly to the DCS and the protective system.

3.10.2.4 Degree of Automation

The plant will be designed with a high degree of automation in order to reduce the required actions performed by operating personnel. Where it is not beneficial, systems will not be automated. Through subsystem automation and a distributed control system, the number of individual control switches and indicators that confront the operator will be greatly reduced. This will reduce the complexity and size of the control room consoles and panels for Units 5, 6, and 7.

3.10.2.5 Centralized Control

The majority of the equipment required to support the operation of the plant will be located in the existing control room for Units 3 and 4. The control room contains the DCS cathode ray tube (CRT) type control consoles and the auxiliary control panels. In addition, the control room contains the alarm, utility, and log printers.

Local control panels or stations will be furnished only where operator attention is required to set up a system for operation, or where the equipment requires intermittent attention during plant operation. Main control room indication and control will only be duplicated for those variables critical to plant availability.

3.10.2.6 Distributed Control and Monitoring System (DCS)

3.10.2.6.1 DCS System Configuration. Functionally distributed and redundant microprocessor-based subsystem controllers will communicate with the main control room via a redundant high-speed communications network. The communications network will provide unit-wide data access for centralized operation and engineering functions, through CRTs.

Remote I/O capability will be provided to allow the DCS to interface with remote equipment and to reduce the quantity of long cable runs.

3.10.2.6.2 DCS Functions and Tasks. The DCS will perform the following functions and miscellaneous tasks:

- Perform analog and digital plant control functions to accommodate a consistent operator interface for controlling the power plant equipment.
- Monitor both analog and digital signals to provide the operator/engineer with access to the data around the network.
- Perform alarm monitoring in the main control room for the entire plant.
- Provide graphic displays for all systems and equipment, including electrical systems and controller faceplates.
- Provide data logging and reporting via displays and printed reports.
- Provide long-term data storage of process history.

3.10.2.7 Reliability

Critical functions and parameters will have redundant sensors, controls, indicators, and alarms. The system will be designed such that critical controls and indications do not fail due to a failure in the control system implementation of redundancy logic. Control systems in general, and especially the protection system, will be designed according to stringent failure criteria.

Measurement redundancy will be provided for all critical plant parameters. DCS microprocessors will be fully redundant with automatic tracking and switchover capability in the event of a failure of the primary microprocessor. Two fully redundant data communications networks will be provided. The system will permit either network to be disconnected and reconnected while the system remains on-line and in control. The control system will incorporate on-line self-diagnostic features to verify proper operation of system hardware, software, and related support functions such as control power, field contact interrogating power, and the system modules in position.

3.10.3 Pipelines

The West Basin Municipal Water District and the City of El Segundo (Metropolitan Water District of Southern California) will own, operate, and maintain the reclaim water and city water supply pipelines, respectively. As owners of the offsite water supply pipelines and associated facilities, they will operate and maintain these lines in accordance with applicable regulations and their normal operating procedures. Although the water supply pipelines and associated facilities will be constructed as a part of the ESPR Project, they will be built to the standards and requirements of the districts.

Operation and maintenance of the natural gas pipeline will be performed by Southern California Gas Company (SoCalGas) in accordance with applicable Federal Energy Regulatory Commission and Department of Transportation regulations. This existing pipeline will continue to receive periodic inspections as a part of SoCalGas' pipeline maintenance program.

Sanitary waste will be discharged to the existing municipal sewer system operated by the City of Manhattan Beach Public Works Department. The connection to the system will be built, owned and operated by the Public Works Department.

The aqueous ammonia pipeline will be built, owned, and operated through an agreement between Chevron Refinery and El Segundo Power II LLC. Operation and maintenance of the pipeline will be performed in accordance with applicable regulations and industry standards.

3.11 FACILITY CLOSURE

Facility closure can be either temporary or permanent. Facility closure can result from two circumstances: 1) the facility is closed suddenly and/or unexpectedly due to unplanned circumstances, such as a natural disaster or other unexpected event (e.g., a temporary shortage of facility fuel); or 2) the facility is closed in a planned, orderly manner, such as at the end of its useful economic or mechanical life or due to gradual obsolescence. The two types of closure are discussed in the following sections.

3.11.1 Temporary Closure

Temporary or unplanned closure can result from a number of unforeseen circumstances, ranging from natural disaster to economic forces. For a short-term unplanned closure, where there is no facility damage resulting in a hazardous substance release, the facility would be kept “as is,” ready to re-start operating when the unplanned closure event is rectified or ceases to restrict operations.

3.11.2 Permanent Closure

The planned life of the generation facility is 30 years. However, if the facility were economically viable at the end of the 30-year operating period, it could continue to operate for a much longer period of time. As power plant operators continuously upgrade their generation equipment, and maintain the equipment up to industry standards, there is every expectation that the generation facility will have value beyond its planned life.

3.11.3 Closure Mitigation

At the time of facility closure, decommissioning will be completed in a manner that: 1) protects the health and safety of the public; and 2) is environmentally acceptable. Prior to a planned closure, the Owner will submit a specific decommissioning plan that will include the following:

- Identification, discussion, and scheduling of the proposed decommissioning activities to include the power plant and other pertinent facilities constructed as part of the project.

- Description of the measures to be taken that will ensure the safe shutdown and decommissioning of all equipment, including the draining and cleaning of all tankage, and the removal of any hazardous waste.

- Identification of all applicable laws, ordinances, regulations, and standards (LORS) in effect at the time, and how the specific decommissioning will be accomplished in accordance with the LORS.

- Notification of State and Local Agencies, including the CEC.

- Once land is used for industrial or commercial purposes, it rarely reverts back to its natural state. Reuse of the land will be encouraged in this case, as opposed to taking additional land for future industrial or commercial purposes. If the plant site is to return to its natural state, the specific decommissioning plan will include a discussion covering the removal of all aboveground and underground objects and material.

3.12 FACILITY DESIGN LAWS, ORDINANCES, REGULATIONS AND STANDARDS

3.12.1. Overview

Table 3.12-1 provides an overview of the more detailed presentation of facility design LORS in Appendices A-F. Generally, ESPR will be constructed in accordance with all applicable LORS. Table 3.12-1 indicates specific facility design LORS, which agencies enforce them, and where conformance with that LORS is discussed.

TABLE 3.12-1

LORS RELATED TO FACILITY DESIGN

LORS	Applicability	Conformance (section)
Need for Facility Demand Conformance		Section 2.0, Project Objectives
Federal		
	None applicable.	
State		
	None applicable.	
Local		
	None applicable.	
Project Siting and Construction		
Federal		
Uniform Building Code,	Incorporated in and is superseded by the California Building Code (CBC), 1998.	Section 5.3, Geologic Hazards and Resources
State		
Cal. PRC 2690-2699.6 and 25523(a); 14 CCR § 3270 – 3725; 20 CCR § 1752(b) & (c).	Protect environment quality and assure public health.	Section 3.4.5.16
State Fire Marshall	Boiler and Pressure Vessel Code Inspection	Appendix A-F
Local		
California Building Code (CBC) Appendix Chapter 33.	Control excavation, grading, and construction, to safeguard life and property welfare.	Sections 3.3.3.4, 5.3, 5.4 and 5.5

TABLE 3.12-1
(CONTINUED)

LORS	Applicability	Conformance (section)
El Segundo Improvement Standards	Meet Design Criteria	Section 3.5, Facility Civil/Structural Features
Industry		
"Foundations and Civil Engineering Design Criteria"	Meet design criteria.	Appendix A
"Structural and Seismic Engineering Design Criteria" (Appendix D).	Meet design criteria.	Appendix D
"Mechanical Engineering Design Criteria" (Appendix C) and "Control Systems Engineering Design Criteria" (Appendix D).	Meet design criteria.	Appendix C, Appendix D
"Control Systems Engineering Design Criteria" (Appendix D) and "Electrical Engineering Design Criteria" (Appendix E).	Meet design criteria.	Appendix D, Appendix E
Project Design and Operation		
Federal		
Occupational Health & Safety Act of 1970 (OSHA), 29 USC 651 et seq.; 29 CFR 1910 et seq.; and 29 CFR 1926 et seq.	Meet employee health and safety standards for employer-employee communications, electrical operations, and chemical exposures.	Section 5.16.4.1
Department of Labor, Safety and Health Regulations for Construction Promulgated Under Section 333 of the Contract Work Hours and Safety Standards Act, 40 USC 327 et seq.	Meet employee health and safety standards for construction activities. Requirements addressed by CCR Title 8, General Construction Safety Orders.	Section 5.16.4.1
Uniform Fire Code, Article 80, 79, 4.	Meet requirements for the storage and handling of hazardous materials (Article 80), flammable and combustible liquids (Article 79), and for obtaining permits (Article 4).	Section 5.16.4.1

TABLE 3.12-1
(CONTINUED)

LORS	**Applicability**	**Conformance (section)**
National Fire Protection Association (See Table 7.4-1 for list of standards).	Meet standards necessary to establish a reasonable level of safety and property protection from the hazards created by fire and explosion.	Section 5.16.4.1
14 CFR Part 77, "Objects Affecting Navigable Airspace."	Completion of "Notice of Proposed Construction or Alteration" (NCPA), FAA Form 7460-1H.	Section 3.6, Transmission Facilities; Section 4.2, Transmission Line Safety and Nuisance
Advisory Circular No. 70/7460, "Obstruction Marking and Lighting."	Meet FAA standards for marking and lighting of obstructions as identified by FAR Part 77.	Section 5.9
Advisory Circular 70/7460-2I, "Proposed Construction or Alteration of Objects that May Affect the Navigable Airspace."	Notify FAA prior to construction, as appropriate.	Section 5.9
14 CFR Part 91 "Air Traffic and General Operating and Flight Rules."	Comply with restrictions governing the operation of aircraft, including helicopters.	Section 5.9
49 USC § 1348, Subdivision (a).	Comply with Secretary of Transportation policy regarding safety of aircraft and utilization of airspace.	Section 5.9
47 CFR § 15.25, "Operating Requirements, Incidental Radiation."	Mitigation for any device that causes communications interference.	Sections 3.5 and 5.18
Title 49 CFR, Part 192-Transportaion of Natural and Other Gas by Pipeline	Construction must conform to DOT standards.	Section 3.7, Pipelines
State		
California Code of Regulations, Title 8.	Meet requirements for a safe and hazard-free working environment. Categories of requirements include General Industry Safety Orders, General Construction Safety Orders, Electrical Safety Orders.	Section 5.16.4.2

TABLE 3.12-1
(CONTINUED)

LORS	Applicability	Conformance (section)
California Clean Air Act, California Health & Safety Code 39650 et seq.	Meet requirements for Best Available Control Technology to minimize exposure limits to toxic air pollutants and possible risk assessments for carcinogen pollutants.	Section 5.16.4.2
California Public Resources Code §25523(a); 20CCR §1752, 1752.5, 23002309 and Division 2, Chapter 5, Article 1, Appendix B Part (i), California Energy Commission CEC		Section 5.16.4.2
California Health & Safety Code, Part 6, Section 44300 et seq.	Estimate emissions for listed air toxic pollutants and submit inventory to air district for major sources of criteria air pollutants. Follow-up from air district may require a health risk assessment.	Section 5.16.4.2
California Health and Safety Code §25500 to 25541; 19 CCR §§2720-2734.		Section 5.16.4.2
20 CCR, Appendix B, Subdiv. (a), (d) (g) and Subdiv. (a), (h), §§ 1741 through 1744 and § 1752 "Information Requirements for a Non-geothermal Application."	Compliance with applicable laws for safety and reliability.	Each appropriate environmental section, for instance Section 5.6 for Biological Resources
Cal. Pub. Res. Code, § 25000 et seq., Warren-Alquist Act, § 25520 Subdivision (g).	Provide description of transmission line including the right of way.	Sections 3.3.3.4, 3.6 and 5.18
General Order 52(GO-52) CPUC, "Construction and Operation of Power and Communication Lines."	Prevent or mitigate inductive interference.	Section 5.18 Appendix A-F
General Order 95 (GO-95) CPUC, "Rules for Overhead Electric Line Construction".	Design and construct line in compliance with GO-95.	Section 5.18 Appendix A-F
Radio & Television Interference (RI/TVI) Criteria.	RI/TVI mitigation requirements if applicable.	Section 5.18 Appendix A-F

TABLE 3.12-1
(CONTINUED)

LORS	Applicability	Conformance (section)
Local		
City of El Segundo Zoning Ordinance.	Provide safety setbacks as required by El Segundo Fire Department.	Section 5.9
City of El Segundo Municipal Code Title 6 Chapter 6.21	Provide implementation of the hazardous material inventory and emergency response program	Section 5.16.4.3
City of El Segundo General Plan Element.	Design and construct in compliance with policies.	Sections 3.4 and 5.9
Standard specifications for Water Distribution Facilities.	Construction must conform to standards and related specifications.	Sections 3.4 and 5.5
Standard Subdivision Improvement Agreement and Rule 15. None applicable.	Construction must conform to standards and related specifications.	N/A
Industry		
EPRI, NERC, various codes and standards for components.	EPRI and NERC trade associations guidelines will be followed.	Appendix A-F
Various	Industry codes and trade association standards are typically requirements of the manufacturers of equipment - see text (3.12.2) for partial listing.	Section 3.12.2 Appendix A-F
ANSI/AWWA C151/A21.5.	Construction must conform to standards and related specifications.	Section 3.4 and Appendix A-F

3.12.2 Facility Design

The following fundamental engineer fields are analyzed and discussed, where indicated, for LORS compliance.

3.12.2.1 Civil and Structural Engineering

The design of all structures and facilities will be based on the codes, specifications, industry standards, and regulations, and other reference documents in effect at the time of design. Applicable codes and industry standards with respect to the project's engineering design criteria, construction and operation are summarized in Appendix A, "Foundations and Civil Engineering Design Criteria," and Appendix B, "Structural and Seismic Engineering Design Criteria."

3.12.2.2 Mechanical Engineering

The design of all structures and facilities will be based on the codes, specifications, industry standards, and regulations, and other reference documents in effect at the time of design. Applicable codes and industry standards with respect to the project's engineering design criteria, construction and operation are summarized in Appendix C, "Mechanical Engineering Design Criteria." Applicable sections of system control design criteria, as summarized in Appendix D, "Control Systems Engineering Design Criteria," will also be considered.

3.12.2.3 Electrical Engineering

The design of all structures and facilities will be based on the codes, specifications, industry standards, and regulations, and other reference documents in effect at the time of design. Applicable codes and industry standards with respect to the project's engineering design criteria, construction and operation are summarized in Appendix E, "Electrical Engineering Design Criteria." Applicable sections of system control design criteria, as summarized in Appendix D, "Control Systems Engineering Design Criteria," will also be considered.

3.12.3 Typical Codes and Standards for Construction and Design

The following are typical codes and standards for general plant construction and design; additional codes and standards may be utilized depending on the final plant design and equipment selection.

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 311.4R	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

Air Conditioning and Refrigeration Institute (ARI)

- ARI 430-1989 Central Station Air Handling Units

American Institute of Steel Construction (AISC)

- Structural steel will be designed, fabricated, and erected in accordance with the American Institute of Steel Construction (AISC) Manual of Steel Construction - Allowable Stress Design.
- Code of Standard Practice for Steel Buildings and Bridges
- Manual of Steel Construction - Allowable Stress Design
- Specification for Structural Steel Buildings - Allowable Stress Design and Plastic Design
- Allowable Stress Design Specification for Structural Joints Using ASTM A325 or A490 Bolts

American Iron and Steel Institute (AISI)

- 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.
- Specification for the Design of Cold-Formed Steel Structural Members

Air Movement and Control Association (AMCA)

AMCA-210 - 1985 Laboratory Methods of Testing Fans for Rotating
AMCA-500 - 1989 Test Methods for Louvers, Dampers and Shutters

American Gas Association (AGA)

American Petroleum Institute (API)

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

<u>American Society of Civil Engineers (ASCE)</u>

ASCE 7	Minimum Design Loads for Buildings and Other Structures

American Society for Testing Materials (ASTM)

- 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.

ASTM A53	Seamless and Welded Black and Hot Dipped Zinc Coated Carbon Steel Pipe
ASTM AIOS	Forgings, Carbon Steel, for Piping Components
ASTM A82	Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
ASTM A106	Seamless Carbon Steel Pipe for High-Temperature Service
ASTM A108	Standard Specification for Steel Bars, Carbon, Cold Finished, Standard Quality
ASTM A126	Gray Iron Castings for Valves, Flanges and Pipe Fittings
ASTM A123	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM Al 34	Pipe, Steel, Electric Fusion (Arc Welded) -Sizes NPS 16 and Over
ASTM A153	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

ASTM A182	Forged or Rolled Alloy Steel Pipe Flanges, Forged Fittings and Valves and Parts for High Temperature Service
ASTM A216	Steel Castings, Carbon Suitable for Fusion Welding for High-Temperature Service
ASTM A217	Steel Castings, Martensitic Stainless and Alloy, for Pressure Containing Parts Suitable for High Temperature Service
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 A312	Seamless and Welded Austenitic Stainless Steel Pipe
ASTM A335	Seamless Femtic Alloy Steel Pipe for High-Temperature Service
ASTM A351	Steel Castings, Austenitic-Ferritic (Duplex) for Pressure-Containing Parts
ASTM A358	Electric Fusion Welded Austenitic Chromium Nickel Alloy Steel Pipe for High Temperature Service
ASTM A395	Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperature
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 A530	General Requirements for Specialized Carbon and Alloy Steel Pipes
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 A774	Specification for As-Welded Wrought Austenitic Stainless Steel Fittings for General Corrosion Service at Low and Moderate Temperatures
ASTM A789	Specification for Seamless and Welded Femtic/Austenitic Stainless Steel Tubing for General Service
ASTM A790	Specification for Seamless and Welded Fenitic/Austenitic Stainless Steel Pipe
ASTM 843	Seamless Red Brass Pipe, Standard Size
ASTM 875	Seamless Copper Tube
ASTM 888	Seamless Copper Water Tube
ASTM 8209	Specification for Aluminum and Aluminum-Alloy Sheet and Plates
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 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 C494	Standard Specification for Chemical Admixtures for Concrete
ASTM C533	Calcium Silicate Block and Pipe Thermal Insulation
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 D396	Standard Specification for Fuel Oils
ASTM Dl 145	Standard Method of Sampling Natural Gas
ASTM D2239	Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter
ASTM D2447	Polyethylene (PE) Plastic Pipe Schedules 40 and 80 Based on Outside Diameter
ASTM D2791	Test Methods for Continuous Determination of Sodium in Water
ASTM D2880	Specification for Gas Turbine Fuel Oils
ASTM D3035	Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter

ASTM D3350	Polyethylene Plastic Pipe and Fillings
ASTM D4057	Practice for Manual Sampling of Petroleum and Petroleum Products
ASTM D4418	Standard Practice for Receipt, Storage, and Handling of Fuels for Gas Turbines
ASTM D4519	Test Method for On-Line Determination of Anions and Carbon Dioxide by Cation Exchange and Degassed Cation Conductivity,
ASTM D4865	Guide for Generation and Dissipation of Static Electricity in Petroleum Fuel Systems
ASTM D5391	Test Methods for Electrical Conductivity and Resistivity of a Flowing High Purity Water Sample
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

American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)

Handbook:	Fundamentals — 1997
Handbook:	HVAC Applications - 1995
Handbook:	HVAC Systems and Equipment - 1996
Handbook:	Refrigeration —1998
Standard:	15-1994 Safety Code for Mechanical Refrigeration
Standard: 52-1976	Method of Testing Air Cleaning Devices Used in General Ventilation for Removing Particulate Matter
Standard: 62-1989	Ventilation for Acceptable Indoor Air Quality
Standard: 90.1-1989	Energy Efficient Design of Buildings

American Society of Mechanical Engineers (ASME)

ASME B16.1	Standard for Cast Iron Pipe Flanges and Flanged Fittings ASME B16.3 Malleable Iron Threaded Fittings
ASME B16.5	Pipe Flanges and Flanged Fittings
ASME B16.9	Factory Made Wrought Steel Buttwelding Fittings
ASME B16.10	Face-to-Face and End-to-End Dimensions of Valves
ASME B16.1 1	Forged Fittings, Socket Welded and Threaded
ASME B16.18	Cast Copper Alloy Solder-Joint Pressure Fittings
ASME B16.22	Wrought Copper & Copper Alloy Solder-Joint Pressure Fittings
ASME 816.24	Cast Copper Alloy Pipe Flanges and Fittings
ASME 816.34	Valves - Flanged, Threaded, and Welding End

ASME 816.42	Ductile Iron Pipe Flanges and Flanged Fittings, Classes 150 and 300
ASME B31.1	Power Piping
ASME 831.5	Refrigeration Piping
ASME B31.9	Building Services Piping
ASME 836.10	Welded and Seamless Wrought Steel Pipe
ASME 836.19	Stainless Steel Pipe
ASME STS-1	Steel Stacks
ASME TDP-1	Recommended Practices for the Prevention of Water Damage to Steam Turbines Used for Electrical Power Generation, Fossil Fuel Plants
ASME BPV	Sec-I Boiler and Pressure Vessel Code, Section I
ASME BPV	Sec-VIII -- Boiler and Pressure Vessel Code, Section VIII, Rules for Construction of Pressure Vessels, Division 1, Unfired Pressure Vessel Code, Division 2 - Alternative Rules
ASME PTC 19	Power Test Code 19, Section 11: Water and Steam in the Power Cycle
ASME PTC 31	Power Test Code 31, Section 4.3: Sampling for Suspended Solids
ASME PTC 3.1	Performance Test Code for Diesel & Burner Fuels
ASME PTC 3.3	Performance Test Code for Gaseous Fuels

American Welding Society (AWS)

- Welding procedures and qualifications for welders will follow the recommended practices and codes of the American Welding Society (AWS).

AWS D1.4	Structural Welding Code - Reinforcing Steel

American Water Works Association (AWWA)

AWWA Cl 10	Ductile Iron and Gray Iron Fittings, 3 in. Through 48 in. for Water and Other Liquids
AWWA Clii	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
AWVVA C304	Design of Prestressed Concrete Cylinder Pipe AWWA C502 Dry-Barrel Fire Hydrant
AWWA C906	Polyethylene (PE) Pressure Pipe and Fittings, 4 in. Through 63 in. for Water Distribution
AWWA D100	Welded Steel Tanks for Water Storage
AWWA Ml 1	Water supply practices, Pipe - Design and Installation

California Energy Commission

- Recommended Seismic Design Criteria for Non-Nuclear Generating Facilities in California

California Occupational Health and Safety Administration (OSHA and CAL-OSHA)

- Design and construction will conform to federal and California Occupational Safety and Health Administration (OSHA and CAL-OSHA) requirements.

Chartered Institute of Building Services Engineers (CIBSE)

- Guide-A

Crane Technical Paper

410 Flow of Fluids Through Valves, Fittings and Pipe

Concrete Reinforcing Steel Institute (CRSI)

- Manual of Standard Practice
- 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

Factory Mutual (FM)

- Roof covering design will comply with the requirements of the Factory Mutual (FM)

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)

General Electric Standards

- Station Designers Handbook

GEK 27060B	Design Recommendations for Steam Piping Systems Connected to Steam Turbine Generators

Heat Exchange Institute (HEI)

- Standard for Power Plant Heat Exchangers
- TEMA (Tubular Exchanger Manufacturers Association)

Hydraulic Institute (HI)

- Standards for Centrifugal, Rotary & Reciprocating Pumps

International Society for Measurement & Control

ISA S7.3	Quality Standard for Instrument Air

Metal Building Manufactures Association (MBMA)

- Low Rise Building Systems Manual

National Environmental Balancing Bureau (NEBB)

- Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems - 1992

National Fire Protection Association (NFPA)

Roof covering design will comply with the requirements of the National Fire Protection Association (NFPA).

NFPA 10	Portable Fire Extinguishers
NFPA 12	Carbon Dioxide Extinguishing Systems
NFPA 13	Installation of Sprinkler Systems
NFPA 14	Installation of Standpipe and Hose Systems
NFPA 15	Water Spray Fixed Systems for Fire Protection
NFPA 22	Standard for Water Tanks for Private Fire Protection

NFPA 24	Private Fire Service Mains and Their Appurtenances
NFPA 30	Flammable and Combustible Liquids Code
NFPA 70	National Electric Code
NFPA 72	Protective Signaling Systems
NFPA 80	Standard for Fire Doors and Fire Windows
NFPA 85	Fire Protection for Electric Generating Plants
NFPA 850	Recommended Practice for Fire Protection for Electric Generating Plants
NFPA 90A	Installation of Air Conditioning and Ventilating Systems
NFPA 90B	Installation of Warm Air Heating and Air Conditioning Systems

Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)

- HVAC Duct Construction Standards, Metal and Flexible, First Edition-1985

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 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) Section 2-111, et seq.; Section 3-100, et seq.; Section 4-106, et seq.; Section 5-102, 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 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

Steel Structures Painting Council (SSPC)

- Steel Structures Painting Manual, Volume 2, Systems and Specifications

- 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.

Underwriters Laboratory (UL)

UL-555-1990 Fire Dampers
UL-1025-1991Electric Air Heaters
UL-1042-1987Electric Baseboard Heating Equipment
UL-1046-1986Electric Central Air Heating Equipment
National Board Rules for Boiler Blow-off Tanks

CIVIL/ARCHITECTURAL

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 California Building Code (CBC), 1998 Edition as amended by the Los Angeles County Code, will govern.

International Conference of Building Officials

California Building Code (CBC)

Seismic standards and criteria will follow the California Building Code (CBC).

Los Angeles County Building Code

Uniform Building Code (UBC), 1997Uniform Building Code is mentioned but specifics of Chapter 708 are not. Chapter 708 includes:

a) 7006 (Grading Plans)
b) 7009 (Cuts)
c) 7012 (Terraces)
d) 7013 (Erosion Control)

e) 7015 (Final Report)
f) Figure 16-1 (Minimum Basic Wind Speeds)
g) Table 16-H, Method 1 (Wind Velocity Pressure Coefficients)
h) Figure 16-2 (Seismic Zone Map)
i) Appendix 15, Figure A-16-1 (Ground Snow Loads)
j) Section 1909 (Load Factors and Load Combinations Reinforced Concrete)
k) Section 1612 (Load Factors and Load Combinations Steel Structures)

- Standard Plumbing Code (SPC), 1997
- ASCE 7-95
- ACI 318-95/318R-95, Building Code Requirements for Structural Concrete and Commentary
- CRSI Manual of Standard Practice
- AISC Specification for Structural Steel Buildings, Allowable Stress and Plastic Design, 1989
- AWS Dl *.1*, American Welding Society Structural Welding Code for Steel
- ASTM, American Society for Testing and Materials Standards (as applicable)
- AASHTO-HS-20-44 (Truck Support Structures)
- Occupational Safety and Health Standard (OSHA),
  a) Walking and Working Surfaces, Subpart D
  b) Lighting
- ANSI/ASME STS-1-1992 (Steel Stacks)
- ASTM A 615, ASTM a 36, ASTM A 572, ASTM A 325, ASTM A 490, ASTM A 307, and ASTM A 185 (Steel Grades)
- ASTM C270, ASTM C129, and ASTM C 476 (Concrete Grades)
- NFPA 101, National Fire Protection Association, Life Safety Code
- NFPA 850, National Fire Protection Association, Recommended Practice of Fire Protection for Electric Generating Plants

ELECTRICAL:

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.

ANSI C2-1993	National Electrical Safety Code
ANSI C37.06-1987 (R1994)	Standard - AC High Voltage Circuit Breakers Rated on a Symmetrical Current Basis-Preferred Ratings and Related Required Capabilities
ANSI C37.010-1979 (R1989)	Application Guide for AC High Voltage Circuit Breakers Rated on a Symmetrical Current Basis

ANSI C50.41-1982	Polyphase Induction Motors for Power Generating Stations
ANSI C57.12.51-1981 (R1989)	Requirements for Ventilated Dry-Type Power Transformers 501 kVA and Larger, Three-Phase with High-Voltage 601 to 34500 Volts, Low Voltage 208Y/120 to 480 Volts
ANSI C57.19.00-1991	General Requirements and Test Procedure for Outdoor Power Apparatus Bushing
ANSI/IEEE 422-1986	Guide for the Design and Installation of Cable Systems in Power Generating Substations
ANSI/IEEE 525-1993	Design and Installation of Cable Systems in Substations
ANSI/IES RP7-1 990	Practice for Industrial Lighting
ANSI/IEEE C37.13-1990	Low Voltage AC Power Circuit Breakers Used in Enclosures
ANSI/IEEE C37.20.1-1993	Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear
ANSI/IEEE C37.20.2-1994	Metal-Clad and Station-Type Cubicle Switchgear
ANSI/IEEE C37.21-1985 (R1992)	Control Switchboards
ANSI/IEEE C57.12.00-1993	General Requirements for Liquid-Immersed Distribution, Power and Regulating Transformers
ANSI/IEEE C57.13-1978 (R1987)	Requirements for Instrument Transformers
ANSI/IEEE C57.1 15-1992	Guide for Loading Mineral-Oil Immersed Power Transformers Rated in Excess of 100 MVA
ANSI/IEEE 80-1986 (R1991)	Safety in AC Substation Grounding
ANSI/IEEE 141-1993	Recommended Practice for Electric Power Distribution for Industrial Plants
ANSI/IEEE 142-1 991	Grounding of Industrial and Commercial Power Systems
ANSI/IEEE 242-1986 (R1991	Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems
ANSI/IEEE 399-1990	Recommended Practice for Power Systems Analysis
IEEE 485-1983	Recommended Practice for Sizing Large Lead Storage Batteries for Generating Stations and Substations
ANSI/IEEE 1119-1988 (R1993)	Guide for Fence Safety Clearances in Electric-Supply Stations
NEMA MG1-1993	Motors and Generators
NEMA MG2-1989	Safety Standard for Construction and Guide for Selection, Installation and Use of Electric Motors and Generators

NEMA SG3-1990	Low Voltage Power Circuit Breakers
NEMA SG4-1 990	Alternating Current High-Voltage Circuit Breakers
ANSI/NEMA 250-1991	Enclosures for Electrical Equipment
ANSI/NFPA 70-1993	National Electrical Code
NEMA PE1-1992	Uninterruptible Power System
ASTM E 84	Insulation Flame Spread
NFPA/ANSI Cl, Article 500	Initiation Criteria
ANSI 2, Article 127	Generator Station Hazardous Area Criteria for Electrical Protection
NEC Article 500, Standard 497M	Classification of Hazardous Elements
NEC Articles 501 and SO2	Standards for Construction of Electrical Equipment in Hazardous Areas
ANSI/IES RP-7-1979	Industrial Lighting
ANSI/IES RP-8-1 979	Roadway Lighting

I&C STANDARDS:

- American Society of Mechanical Engineers (ASME):
- PTC 19.3, “Temperature Measurement”
- PTC 19.5, “Flow Measurement”
- Fluid Meters, 6~h Edition
- B31.1, “Power Piping”
- American National Standards Institute (ANSI)
- ANSI/FCI 70-2, “Control Valve Seat Leakage Classifications”
- B 16.5, “Pipe Flanges and Flanged Fillings”
- B 16.34, “Valves — Flanged and Bull Welding End”
- Electronic Industries Association (EIA):
- RS-232C, “Interface Between Data Terminal Equipment and Data Communications Equipment”
- Institute of Electrical and Electronics Engineers (IEEE):
- 518, “Guide for the Installation of Electrical Equipment to Minimize Electrical Noise Inputs to Controllers from External Sources”
- 142, “ANSI/IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems
- 802.4, “Ethernet”
- 472, “Surge Withstand Capability”
- 998, “Lighting Protection Systems”
- Instrument Society of America (ISA):
- MC 96.1, “Temperature Measurement Thermocouples”
- RP 3.2, “Flange Mounted, Sharp Edge Orifice Plates for Flow Measurements”

- S5.1, “Instrumentation Symbols and Identification”
- S5.2, “Binary Logic Diagrams for Process Operations”
- S5.4, “Instrument Loop Diagrams”
- S5, “Graphic Symbols for Process Displays”
- S50.1, “Compatibility of Electronic Signals For Industrial Process Instruments”
- SSI.1, “process Instrumentation Terminology”
- ANSI/ISA S75.01, “Control Valve Sizing Equations”
- ANSI/ISA S75.02, “Control Valve Capacity Procedure”
- 70 “National Electric Code”
- National Electrical Manufacturers Association (NEMA):
- 4, “Class Enclosure”
- ICS 1,”General Standards for Industrial Controls and Systems”
- 250, “Enclosures for Electrical Equipment (1,000 Volts Maximum)”
- Scientific Apparatus Makers Association (SAMA):
  PMC 20.1, “Process Measurement and Control Terminology “PMC 22.1, “Functional
- Diagramming of Instrument and Control Systems”

Gas Turbine Generator Codes and Standards

The following are codes and standards for gas turbine generators in addition to those listed under Section 7.1 This list is typical for gas turbine-generator design; additional codes and standards may be utilized depending on the final plant design and equipment selection.

ANSI/ASME 7-1 995	Minimum Design Loads for Buildings and Other Structures
ANSI/ASME Bi .1-1989	Unified Inch Screw Threads
ANSI/ASME Bi .20.1-1983	General Purpose (Inch) Pipe Threads
ANSI/ASME B16.21 -1 992	Nonmetallic Flat Gaskets for Pipe Flanges
ANSI/IEEE C37.90.1-1 989	Surge Withstand Capability Tests for Protective Relays and Relay Systems
ANSI/IEEE C37.1O1-1993	Guide for Generator Ground Protection as Applicable to High Impedance Grounding
ANSI/IEEE C57-1995	Compilation of all C57 Transformer Standards
ANSI C50.10-1990	Rotating Electrical Machinery — Synchronous Machines
ANSI C50. 13-1989	Rotating Electrical Machinery — Cylindrical Rotor Synchronous Generators
ANSI C50.14-1977	Requirements for Combustion Gas Turbine-Driven Cylindrical Rotor Synchronous Generators
ANSI/IEEE 100-1996	Dictionary of Electrical and Electronics Terms
NEMA TRI-1 993	Transformers, Regulators, and Reactors

NFPA 497A-1 992	Classification of Class I Hazardous (Classified Locations for Electrical Installations in Chemical Process Areas)
NFPA 8506-1995	Standard on Heat Recovery Steam Generator Systems
ANSI S1.4-1983	Specification for Sound Level Meters
ANSI S1.13-1995	Methods for the Measurement of Sound Pressure Levels
ANSI/SAE/J 1 84-Feb. 1987	Qualifying a Sound Data Acquisition System
ANSI/ASME B31 .3-1996	Chemical Plant and Petroleum Refinery Piping Gas Turbine Piping Systems
ANSI/ASME PTC-36-1 985	Measurement of Industrial Sound
ANSI B133.2-1997	Basic Gas Turbine
ANSI B133.3-1981	Gas Turbine-Procurements Standard Auxiliary Equipment
ANSI B133.4-1978	Gas Turbine Control and Protection Systems
ANSI B133.5-1978	Gas Turbine Electrical Equipment
ANSI B133.8-1977	Gas Turbine Installation Sound Emissions
ANSI/IEEE C37-1 995	Guides and Standards for Circuit Breakers, Switchgear, Substations, and Fuses
ANSI/IEEE C37.1-1 994	Definition, Specification, and Analysis of Systems
ANSI/IEEE C37.2-1996	Electrical Power Systems Device Function Numbers
AGMA 6011-H97	Specifications for High-Speed Helical Gear Units
ANSI/IEEE 421.1-1996	Definitions for Excitation Systems for Synchronous Machines
EIAITIA RS-232E-1 991	Interface Between Data Terminal Equipment and Data Circuit Terminating Equipment Employing Serial Binary Interchange
ANSI/ASME 846.1-1995	Surface Texture
ANSI Y14.SM-1994	Dimensioning and Tolerancing
ANSI Y14.15-1 996	Electrical and Electronics Diagrams (On-Bas Gas Turbine and Accessory Bas Equipment)
ANSI Y14.17-1966	Fluid Power Diagrams
ANSI Y14.36-1978	Surface Texture Symbols
ANSI/IEEE 315-1975	Graphic Symbols for Electrical and Electronics Diagrams
ANSI Y32.10-1967	Graphic Symbols for Fluid Power Diagrams
ANSI Y32.11-1961	Graphic Symbols for Process Flow Diagrams in the Petroleum and Chemical Industries
ANSI/ASME Y32.2.3-1949	Graphic Symbols for Pipe Fillings, Valves, and Piping
ANSI/AWS A2.4-1998	Symbols for Welding, Brazing, and Nondestructive Examination
ISO 7919-1-1986	Mechanical Vibrations — Measurements on Rotating Shafts and Evaluation
ISO 10816 (Draft)	Mechanical Vibrations — Evaluation of Machine Vibration by Measurements of Nonrotating Parts

TEMA C, 7th Edition	Mechanical Standards for Class C Heat Exchangers Crane Lifts; Factor of Safety
OSHA Regulations No.	Crane Lifts; Factor of Safety,1910-179-1995

Steam Turbine Generator Codes and Standards

The following are codes and standards for steam turbine-generators in addition to those listed under Section 7.1 and 7.2. This list is typical for steam turbine-generator design; additional codes and standards may be utilized depending on the final plant design and equipment selection.

IEEE 122	Speed Governing of Steam Turbine
IEEE 32	Neutral Grounding Devices
IEEE 112	Test Procedures for Polyphase Induction Motors and Generators
IEEE 113	Test Code for Direct Current Machines
IEEE 114	Test Procedures for Single-Phase Induction Motors
IEEE 115	Test Procedures for Synchronous Machines
IEEE 116	Test Code for Carbon Brushes
ANSI C50.10-1977	General Requirements for Synchronous Machines
ANSI C50.13-1 977	Requirements for Cylindrical Rotor Synchronous Generators
ANSI C42	Definition of Electrical Terms
IEEE Std. 421-1972	IEEE Standard Criteria and Definitions for Excitation Systems for Synchronous Machines
IEEE Std. 421A-1978	IEEE Guide for Identification, Testing, and Evaluation of the Dynamic Performance of Excitation Control Systems
ANSI C68. 1	Measurement of Voltage in Dielectric Tests
IEEE 1	General Principals Upon Which Temperature Limits are Based on the Rating of Electrical Equipment
NEMA 107	Methods of Measurements of Radio Influence Voltage of High Voltage Apparatus
NEMA ICS1	Industrial Control
NEMASGI	Electric Power Connectors
NEMATRI	Transformers, Regulators, and Reactors
NEMAWD	General Purpose Wiring Devices
ASME	Performance Test Codes

Adequacy Issue: Adequate ____ Inadequate ____

DATA ADEQUACY WORKSHEET

Revision No. 0 Date ____

Technical Area: **Project Overview** Project: ____ Technical Staff: ____

Docket: ____ Technical Senior: ____

SITING REGULATIONS	INFORMATION	AFC PAGE NUMBER AND SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Cal. Code Regs., tit. 20, §1704, (a) (3) (A)	Descriptions of all significant assumptions, methodologies, and computational methods used in arriving at conclusions in the document.	Throughout	NA	
Cal. Code Regs., tit. 20, §1704, (a) (3) (B)	Descriptions, including methodologies and findings, of all major studies or research efforts undertaken and relied upon to provide information for the document; and a description of ongoing research of significance to the project (including expected completion dates; and	Throughout	NA	
Cal. Code Regs., tit. 20, §1704, (a) (3) (C)	A list of all literature relied upon or referenced in the documents, along with brief discussions of the relevance of each such reference	Throughout	NA	
Cal. Code Regs., tit. 20, §1704, (a) (4)	Each principal subject area covered in a notice or application shall be set forth in a separate chapter or section, each of which shall identify the person or persons responsible for its preparation.	Throughout	NA	
Appendix B (a) (1) (A)	A general description of the proposed site and related facilities, including the location of the site or transmission routes, the type, size and capacity of the generating or transmission facilities, fuel characteristics, fuel supply, water supply, pollution control systems, and other general characteristics.	Sections 1.2, 1.3, 3.2, 3.4 and 3.5 pp. 3.4-1 through 3.4-28, Figure 3.2-1		
Appendix B (a) (1) (B)	Identification of the location of the proposed site and related facilities by section, township, range, county and assessors parcel numbers.	Sections 1.3.1 and 3.3		

Adequacy Issue: Adequate ____ Inadequate ____ DATA ADEQUACY WORKSHEET Revision No. 0 Date ____________

Technical Area: **Project Overview** Project: ____________ Technical Staff: ____________

Docket: ____________ Technical Senior: ____________

SITING REGULATIONS	INFORMATION	AFC PAGE NUMBER AND SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Appendix B (a) (1) (C)	A description of and maps depicting the region, the vicinity, and the site and its immediate surroundings.	Sections 3.2 and 3.3; Figure 3.2-1		
Appendix B (a) (1) (D)	A full-page color photographic reproduction depicting the visual appearance of the site prior to construction, and a full-page color simulation or artist's rendering of the site and all project components at the site, after construction.	Section 1.2; Figures 5.13-4A and 5.13-4B		
Appendix B (a) (1) (E)	In an appendix to the application, a list of current assessor's parcel numbers and owners' names and addresses for all parcels within 500 feet of the proposed transmission line and other linear facilities, and within 1000 feet of the proposed powerplant and related facilities.	Appendix O		
Appendix B (a) (2)	Project Schedule: Proposed dates of initiation and completion of construction, initial start-up, and full-scale operation of the proposed facilities.	Sections 1.4 and 3.9		
Appendix B (a) (3) (A)	A list of all owners and operators of the site(s), the power plant facilities, and, if applicable, thermal host, the geothermal leasehold, the geothermal resource conveyance lines, and the geothermal re-injection system, and a description of their legal interest in theses facilities.	Section 1.5		
Appendix B (a) (3) (B)	A list of all owners and operators of the proposed electric transmission facilities.	Section 1.5		

Adequacy Issue: Adequate ____ Inadequate ____

DATA ADEQUACY WORKSHEET

Revision No. 0 Date ____

Technical Area: **Project Overview** Project: ____ Technical Staff: ____

Docket: ____ Technical Senior: ____

SITING REGULATIONS	INFORMATION	AFC PAGE NUMBER AND SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Appendix B (a) (3) (C)	A description of the legal relationship between the applicant and each of the persons or entities specified in subsections (a)(3)(A) and (B).	Section 1.5		
Appendix B (b) (1) (A)	Maps at a scale of 1:24,000 (1" = 2000'), along with an identification of the dedicated leaseholds by section, township, range, county, and county assessor's parcel number, showing the proposed final locations and layout of the power plant and all related facilities;	Figures 3.2-1, 3.4-2A and 3.4-2B		
Appendix B (b) (1) (B)	Scale plan and elevation drawings depicting the relative size and location of the power plant and all related facilities;	Figure 3.4-3B and 3.4-3C		
Appendix B (b) (1) (C)	A detailed description of the design, construction and operation of the facilities, specifically including the power generation, cooling, water supply and treatment, waste handling and control, pollution control, fuel handling, and safety, emergency and auxiliary systems, and fuel types and fuel use scenarios; and	Sections 3.4 and 3.7		
Appendix B (b) (2) (A)	Maps at a scale of 1:24,000 of each proposed transmission line route, showing the settled areas, parks, recreational areas, scenic areas, and existing transmission lines within one mile of the proposed route(s).	NA		

Adequacy Issue: Adequate ____ Inadequate ____

DATA ADEQUACY WORKSHEET

Revision No. 0 Date ____

Technical Area: **Project Overview** Project: ____ Technical Staff: ____

Docket: ____ Technical Senior: ____

SITING REGULATIONS	INFORMATION	AFC PAGE NUMBER AND SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Appendix B (b) (2) (B)	A full-page color photographic reproduction depicting a representative above ground section of the transmission line route prior to construction and a full-page color photographic simulation of that section of the transmission line route after construction.	NA		
Appendix B (c)	In a section entitled, "Demand Conformance" provide a discussion explaining how the proposed project conforms with the requirements of Public Resources Code § 25524 or Public Resources Code § 25540.6(a)(5). If the provisions of Public Resources Code § 25523.5 are applicable, explain how the project conforms with the requirements of this section. Additional data adequacy requirements may be contained in the Electricity Report applicable pursuant to Title 20, California Code of Regulations, § 1720.5.	Section 2.2		
Appendix B (d) (1)	A copy of any study or analysis required by the terms of the Commission's Final Decision on the NOI, and a brief summary of the results of the study or analysis.	NA		
Appendix B (d) (2)	Updates of any significant information which has changed since the Commission's Final Decision on the NOI.	NA		
Appendix B (e) (1)	A discussion of how facility closure will be accomplished in the event of premature or unexpected cessation of operations.	Section 3.11		

Adequacy Issue: Adequate ____ Inadequate ____ **DATA ADEQUACY WORKSHEET** Revision No. 0 Date ____________

Technical Area: **Facility Design** Project: ____________ Technical Staff: ____________

Project Manager: ____________ Docket: ____________ Technical Senior: ____________

SITING REGULATIONS	INFORMATION	AFC PAGE NUMBER AND SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Appendix B (g) (14) (B) (iii)	Water inundation zones, such as the 100-year flood plain and tsunami run-up zones.	Section 5.5.1.1.2		
Appendix B (g) (14) (D) (i)	Precipitation and storm runoff patterns; and	Section 5.5.1.1.2		
Appendix B (g) (14) (D) (ii)	Drainage facilities and design criteria.	Section 3.5.7 Appendix A		
Appendix B (g) (14) (E) (ii)	The effects of construction activities and plant operation on water quality; and	Section 5.5 Appendix S and T		
Appendix B (g) (14) (iii)	The effects of the project on the 100-year flood plain or other water inundation zones.	Section 5.5.1.1.2		
Appendix B (h) (1) (A)	Tables which identify laws, regulations, ordinances, standards, adopted local, regional, state, and federal land use plans, and permits applicable to the proposed project, and a discussion of the applicability of each. The table or matrix shall explicitly reference pages in the application wherein conformance, with each law or standard during both construction and operation of the facility is discussed;	Section 3.12		

Adequacy Issue: Adequate ____ Inadequate ____ **DATA ADEQUACY WORKSHEET** Revision No. 0 Date ____________

Technical Area: **Facility Design** Project: ____________ Technical Staff: ____________

Project Manager: ____________ Docket: ____________ Technical Senior: ____________

Siting Regulations	Information	AFC Page Number and Section Number	Adequate Yes or No	Information Required to Make AFC Conform with Regulations
Appendix B (h) (1) (B)	Tables which identify each agency with jurisdiction to issue applicable permits and approvals or to enforce identified laws, regulations, standards, and adopted local, regional, state and federal land use plans, and agencies which would have permit approval or enforcement authority, but for the exclusive authority of the commission to certify sites and related facilities.	Section 3.12		
Appendix B (h) (2)	A discussion of the conformity of the project with the requirements listed in subsection (h)(1)(A).	Section 3.12 Appendix A-F		
Appendix B (h) (3)	The name, title, telephones number, and address, if known, of an official within each agency who will serve as a contact person for the agency.	Section 3.12		
Appendix B (h) (4)	A schedule indicating when permits outside the authority of the commission will be obtained and the steps the applicant has taken or plans to take to obtain such permits.	Section 3.12		
Appendix B (i) (1) (A)	A description of the site conditions and investigations or studies conducted to determine the site conditions used as the basis for developing design criteria. The descriptions shall include, but not be limited to, seismic and other geologic hazards, adverse conditions that could affect the project's foundation, adverse meteorological and climatic conditions, and flooding hazards, if applicable.	Sections 3.3 and 5.5.2.1.2 Appendix G		
Appendix B (i) (1) (B)	A discussion of any measures proposed to improve adverse site conditions.	Appendix G		

Adequacy Issue: Adequate ____ Inadequate ____

DATA ADEQUACY WORKSHEET

Revision No. 0 Date ____________

Technical Area: **Facility Design** Project: ____________ Technical Staff: ____________

Project Manager: ____________ Docket: ____________ Technical Senior: ____________

Siting Regulations	Information	AFC Page Number and Section Number	Adequate Yes or No	Information Required to Make AFC Conform with Regulations
Appendix B (i) (1) (C)	A description of the proposed foundation types, design criteria (including derivation), analytical techniques, assumptions, loading conditions, and loading combinations to be used in the design of facility structures and major mechanical and electrical equipment.	Appendix A, and G		
Appendix B (i) (1) (D)	For each of the following facilities and/or systems, provide a description including drawings, dimensions, surface-area requirements, typical operating data, and performance and design criteria for protection from impacts due to adverse site conditions:	See below		
Appendix B (i) (1) (D) (i)	The power generation system;	Section 3.4.3		
Appendix B (i) (1) (D) (ii)	The heat dissipation system;	Section 3.4.4		
Appendix B (i) (1) (D) (iii)	The cooling water supply system, and, where applicable, pre-plant treatment procedures;	Section 3.4.7		
Appendix B (i) (1) (D) (iv)	The atmospheric emission control system;	Section 3.4.10		
Appendix B (i) (1) (D) (v)	The waste disposal system and on-site disposal sites;	Section 3.4.7.4		
Appendix B (i) (1) (D) (vii)	The geothermal resource conveyance and re-injection lines (if applicable);	NA		
Appendix B (i) (1) (D) (viii)	Switchyards/transformer systems; and	Sections 3.6.1 and 3.6.2		

Adequacy Issue: Adequate ____ Inadequate ____

DATA ADEQUACY WORKSHEET

Revision No. 0 Date ____

Technical Area: **Facility Design** Project: ____ Technical Staff: ____

Project Manager: ____ Docket: ____ Technical Senior: ____

Siting Regulations	Information	AFC Page Number and Section Number	Adequate Yes or No	Information Required to Make AFC Conform with Regulations
Appendix B (i) (1) (D) (ix)	Other significant facilities, structures, or system components proposed by the applicant.	Section 3.7		

Adequacy Issue: Adequate ____ Inadequate ____

DATA ADEQUACY WORKSHEET

Revision No. ____ Date ____________

Technical Area: **Transmission System Eng.** Project: ____________ Technical Staff: ____________

Project Manager: ____________ Docket: ____________ Technical Senior: ____________

Siting Regulations	Information	AFC Page Number and Section Number	Adequate Yes or No	Information Required to Make AFC Conform with Regulations
Appendix B (i) (2) (A)	A discussion of the need for the additional electric transmission lines, substations, or other equipment, the basis for selecting principal points of junction with the existing electric transmission system, and the capacity and voltage levels of the proposed lines, along with the basis for selection of the capacity and voltage levels.	Sections 3.6.1. and 3.6.2		
Appendix B (i) (2) (B)	A discussion of the extent to which the proposed electric transmission facilities have been designed, planned, and routed to meet the transmission requirements created by additional generating facilities planned by the applicant or any other entity.	Section 3.6.2 Appendix Q		

Adequacy Issue: Adequate ____ Inadequate ____ **DATA ADEQUACY WORKSHEET** Revision No. ____ Date ____________

Technical Area: **Transmission System Eng.** Project: ____________ Technical Staff: ____________

Project Manager: ____________ Docket: ____________ Technical Senior: ____________

SITING REGULATIONS	INFORMATION	AFC PAGE NUMBER AND SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Appendix B (b) (2) (C)	A detailed description of the design, construction, and operation of any electric transmission facilities, such as power lines, substations, switchyards, or other transmission equipment, which will be constructed or modified to transmit electrical power from the proposed power plant to the load centers to be served by the facility. Such description shall include the width of rights of way and the physical and electrical characteristics of electrical transmission facilities such as towers, conductors, and insulators. This description shall include power load flow diagrams which demonstrate conformance or nonconformance with utility reliability and planning criteria at the time the facility is expected to be placed in operation and five years thereafter; and	Sections 3.6.2, 3.6.2.1, and 3.6.2.2 Appendix Q		
Appendix B (b) (2) (D)	A description of how the route and additional transmission facilities were selected, and the consideration given to engineering constraints, environmental impacts, resource conveyance constraints, and electric transmission constraints.	NA		
Appendix B (g) (18) (A)	The locations and a description of the existing switchyards and overhead and underground transmission lines that would be affected by the proposed project.	Sections 3.6.1.1 and 3.6.2 Figure 3.3-1A, Appendix Q		

Adequacy Issue: Adequate ____ Inadequate ____

DATA ADEQUACY WORKSHEET

Revision No. ____ Date ____________

Technical Area: **Transmission System Eng.** Project: ____________ Technical Staff: ____________

Project Manager: ____________ Docket: ____________ Technical Senior: ____________

SITING REGULATIONS	INFORMATION	AFC PAGE NUMBER AND SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Appendix B (g) (18) (B)	An estimate of the existing electric and magnetic fields from the facilities listed in (A) above and the future electric and magnetic fields that would be created by the proposed project, calculated at the property boundary of the site and at the edge of the rights of way for any transmission line. Also provide an estimate of the radio and television interference that could result from the project.	Sections 5.18.1 and 5.18.2		
Appendix B (g) (18) (C)	Specific measures proposed to mitigate identified impacts, including a description of measures proposed to eliminate or reduce radio and television interference, and all measures taken to reduce electric and magnetic field levels.	Section 5.18.4		
Appendix B (h) (1) (A)	Tables which identify laws, regulations, ordinances, standards, adopted local, regional, state, and federal land use plans, and permits applicable to the proposed project, and a discussion of the applicability of each. The table or matrix shall explicitly reference pages in the application wherein conformance, with each law or standard during both construction and operation of the facility is discussed;	Section 3.5		

Adequacy Issue: Adequate ____ Inadequate ____

DATA ADEQUACY WORKSHEET

Revision No. ____ Date ____

Technical Area: **Transmission System Eng.** Project: ____ Technical Staff: ____

Project Manager: ____ Docket: ____ Technical Senior: ____

SITING REGULATIONS	INFORMATION	AFC PAGE NUMBER AND SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Appendix B (h) (1) (B)	Tables which identify each agency with jurisdiction to issue applicable permits and approvals or to enforce identified laws, regulations, standards, and adopted local, regional, state and federal land use plans, and agencies which would have permit approval or enforcement authority, but for the exclusive authority of the commission to certify sites and related facilities.	Sections 3.12 and 5.18		
Appendix B (h) (2)	A discussion of the conformity of the project with the requirements listed in subsection (h)(1)(A).	Section 3.12 Appendix A-F		
Appendix B (h) (3)	The name, title, phone number, and address, if known, of an official within each agency who will serve as a contact person for the agency.	N/A	N/A	
Appendix B (h) (4)	A schedule indicating when permits outside the authority of the commission will be obtained and the steps the applicant has taken or plans to take to obtain such permits.	NA	N/A	