

# Engineering

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This section and its related appendices, together with Sections 2, 5, 6, and 7, present information concerning the design and engineering of the WCEP. Section 10.1 describes the design of the project facilities with reference to Section 2, the Project Description. Section 10.2 discusses the reliability of the WCEP, and Section 10.3 presents the estimated thermal efficiency of the facility. Section 10.4 describes the LORS applicable to the WCEP engineering, and Section 10.5 identifies agencies that have jurisdiction, and provides the contact persons within those agencies. Section 10.6 contains references cited.

## 10.1 Facility Design

Detailed descriptions of the WCEP are provided in Section 2.1. Design for safety is provided in Section 2.2, Facility Safety Design.

Summary descriptions of the design criteria are included in: Appendix 10A, Civil Engineering Design Criteria; Appendix 10B, Structural Engineering Design Criteria; Appendix 10C, Mechanical Engineering Design Criteria; Appendix 10D, Electrical Engineering Design Criteria; Appendix 10E, Control Engineering Design Criteria; and Appendix 10F, Chemical Engineering Design Criteria. A geotechnical assessment of the WCEP site, including soil borings, has been completed (CHJ Incorporated, 2005) and the report is included in Appendix 10G, Geologic and Foundation Design Criteria.

Design and engineering information and data for the following systems are found in the following parts of the AFC:

- **Power Generation**— See Section 2.1.4 regarding the combustion turbine generators (CTG) and Appendix 10C and Sections 2.2.5 through 2.2.13, which describe the various plant auxiliaries.
- **Heat Dissipation**— See Section 2.1.8, Plant Cooling Systems, and Appendix 10C.
- **Cooling Water Supply System**— See Sections 2.1.7, Water Supply and Use; 2.1.8, Plant Cooling System; and 8.15, Water Resources; and Appendix 10F.
- **Air Emissions Control Systems**— See Sections 2.1.11, Emissions Control and Monitoring; and 8.1, Air Quality.
- **Waste Disposal Systems**— See Sections 2.1.9 and 8.14, Waste Management.
- **Noise Abatement Systems**— See Section 8.7, Noise; and Appendix 10C.
- **Switchyard/Transformer Systems**— See Sections 2.1.5, Major Electrical Equipment and Systems; 2.1.13.2, Grounding; 2.1.14, Interconnection to Electrical Grid; 5, Electrical Transmission; and Appendix 10D, Electrical Engineering Design Criteria.

## 10.2 Reliability

This section discusses the availability of fuel, the expected service life of the plant, and the degree of reliability to be achieved by the WCEP.

### 10.2.1 Fuel Availability

WCEP will be connected to Southern California Gas Company's (SoCalGas's) existing high-pressure 30-inch-diameter natural gas pipeline that runs within a utility easement on the WCEP project parcel. There is sufficient capacity in SoCalGas' existing line to deliver the required quantity of gas to the WCEP. It is conceivable that SoCalGas' pipeline could become temporarily inoperable if there is a breach in the pipeline upstream or from other causes such as a compressor failure, resulting in fuel being unavailable at the WCEP. The WCEP facility has no backup fuel supply and would, therefore, have to be shut down until the situation was corrected.

SoCalGas will own and operate the metering facility to measure the gas supply to WCEP. A pipeline Supervisory Control and Data Acquisition (SCADA) system will provide flow rate and pressure data to SoCalGas and WCEP. Communication with SoCalGas gas line operations will be by dedicated telephone lines or other means, such as Cellular Digital Pocket Data (CDPD).

### 10.2.2 Plant Availability

Due to WCEP's predicted high efficiency relative to other units traditionally used for peaking service, it is anticipated that the facility will normally be called upon to operate at annual capacity factors between 20 and 40 percent. The facility will be designed to operate between 50 and 100 percent of base load to support dispatch service and automatic generation control in response to customer demands for electricity.

WCEP will be designed for an operating life of 30 years. Reliability and availability projections are based on this operating life. Operation and maintenance procedures will be consistent with industry standard practices to maintain the useful life status of plant components.

The percent of time that the power plant is projected to be operated is defined as the "service factor." The service factor considers the amount of time that a unit is operating and generating power, whether at full or partial load. The projected service factor, which considers the projected percent of time of operation, differs from the equivalent availability factor (EAF), which considers the projected percent of energy production capacity achievable.

The EAF may be defined as a weighted average of the percent of full energy production capacity achievable. The projected EAF for WCEP is estimated to be approximately 92 to 98 percent.

The EAF, which is a weighted average of the percent of energy production capacity achievable, differs from the "availability of a unit," which is the percent of time that a unit is available for operation, whether at full load, partial load, or standby.

There is a significant potential for seismic ground shaking to affect the plant site in the event of a large magnitude earthquake occurring on fault segments located near WCEP and a moderate potential for expansive soils (shrink-swell) hazards (see Section 8.4, Geological Hazards and Resources).

The WCEP will be designed to ensure high reliability, including the redundancy of critical components (see Section 2.3.2, Redundancy of Critical Components).

Deterioration of output capacity and efficiency of the WCEP over time, called performance degradation, is expected to be on the order of 2 to 3 percent over a 3-year period. Cleaning, maintenance, or overhaul will recapture most of the loss. Over the expected 30-year life of the facility, the estimated total, non-recovered loss in output and efficiency will be on the order of 1 to 2 percent.

### 10.3 Efficiency

The maximum thermal efficiency that can be expected from each individual CTG is approximately 45 to 47 percent (higher heating value basis). This level of efficiency will be achieved by the WCEP when the CTGs are operating at 100 percent of base load. Other types of operations, particularly those at less than full gas turbine output, will result in lower efficiencies. WCEP will be designed as a peaking facility to serve load during periods of high demand and is therefore expected to typically operate at no more than a 40 percent annual capacity factor. Because the capacity will be sold through contract and the prices that will be offered for spot purchases are unknown at this time, the exact mode of operation cannot be described.

The maximum annual generation from the facility, based on the expected permitted operating limits, estimated to be between 1,487 and 1,530 gigawatt hours.

### 10.4 Laws, Ordinances, Regulations, and Standards

The LORS that are applicable to the design of the WCEP are referenced in Table 10.4-1 below. LORS applicable to the environmental areas of the AFC (Sections 8.1 through 8.16) are contained within each of the environmental sections. The project will conform to all of these LORS.

TABLE 10.4-1  
Applicable Laws, Ordinances, Regulations, and Standards

LORS	Location in AFC for Facility Design Compliance	Conformance
<b>Federal</b>		
Occupational Safety and Health Act (OSHA)— 29CFR1910 and 29CFR126	Section 10	Meet Requirements
Environmental Protection Agency (EPA)— 40CFR60, 40CFR75, 40CFR112, 40CFR302, 40CFR423, 40CFR50, 40CFR100, 40CFR260, 40CFR300, and 40CFR400	Section 8 & 10	Meet Requirements

TABLE 10.4-1  
Applicable Laws, Ordinances, Regulations, and Standards

LORS	Location in AFC for Facility Design Compliance	Conformance
Federal Aviation Administration (FAA)—Obstruction Marking and Lighting AC No. 70/74601H	Section 6 & 10	Meet Requirements
<b>California</b>		
California Code of Regulations (CCR)— Title 8, Sections 450 and 750 and Title 24, 1995, Titles 14, 17, 19, 20, 22, 23, and 26.	Section 10	Meet Requirements
California Department of Transportation (Cal-DOT)—Standard Specifications	Section 10	Meet Requirements
California Occupational Safety and Health Administration (Cal-OSHA)—Regulations and Standards	Section 10	Meet Requirement
California Business and Professions Code— Sections 6704, 5730, and 6736	Section 10	Meet Requirements
California Vehicle Code—Section 35780	Section 10	Meet Requirements
California Labor Code—Section 6500	Section 10	Meet Requirements
<b>Local</b>		
City of Industry—Regulations and Ordinances	Section 10	Meet Requirements
Los Angeles County—Regulations and Ordinances	Section 10	Meet Requirements
<b>Industrial</b>		
Civil Engineering Design Criteria	Appendix 10A	Meet Design Criteria
Structural Engineering Design Criteria	Appendix 10B	Meet Design Criteria
Mechanical Engineering Design Criteria	Appendix 10C	Meet Design Criteria
Control Engineering Design Criteria	Appendix 10E	Meet Design Criteria
Chemical Engineering Design Criteria	Appendix 10F	Meet Design Criteria
Geologic and Foundation Design Criteria	Appendix 10G	Meet Design Criteria

The Appendices to Chapter 10 contain the discipline design criteria that will be used in design. Appendix 10A and Appendix 10B address the physical design criteria for the site-related features, structures, and foundations of the WCEP.

Appendices 10C through 10F provide the design criteria for the WCEP system and equipment, including the codes and standards that apply to the design, materials, fabrication and erection of the system and equipment.

Appendix 10G, Geologic and Foundation Criteria discussed foundation design criteria and includes, as an attachment, the project geotechnical report and the results of a subsurface investigation, laboratory testing program, and geotechnical assessment for the WCEP (CHJ Incorporated, 2005).

## 10.5 Involved Agencies and Agency Contacts

Building permits for the WCEP would be issued by the City of Industry, Department of Engineering. A point of contact is provided in Table 10.4-2. A detailed schedule for submittal of all plans and specifications that require review by the Chief Building Official (CBO) will be prepared well in advance of the start of construction of the WCEP.

TABLE 10.4-2  
Agency Contacts

Agency	Contact	Telephone
City of Industry Engineering Department	John Ballas City Engineer	(626) 333-2211

## 10.6 References

CHJ Incorporated. 2005. Geotechnical Investigation, 911 Bixby Drive, Walnut Energy Site. City of Industry, CA. Prepared for TIC-The Industrial Company.