Appendix F
Chemical Engineering Design and Criteria

1.0 INTRODUCTION

This appendix summarizes the codes, standards, criteria, and practices that will be generally used in the design and installation of chemical engineering systems for the Pio Pico Energy Center (PPEC). More specific project information will be developed prior to construction of the project to support detailed design, engineering, material procurement specification, and construction specifications as required by the California Energy Commission (CEC).

2.0 CODES AND STANDARDS

The design of the chemical engineering systems and components will be in accordance with the applicable laws, ordinances, and regulations of the federal government, State of California, and local agencies, as well as industry standards. The most current issue or revision of rules, regulations, codes, ordinances, and standards at the time of filing this Application for Certification will apply, unless otherwise noted. If conflicts exist between cited documents, the more conservative requirements will apply.

The following codes and standards are applicable to the chemical aspects of the facility:

- American National Standards Institute (ANSI) - ANSI B3 1.1-Power Piping Code
- American Society of Mechanical Engineers (ASME) - ASME-Performance Test Code 31, Ion Exchange Equipment
- American Society for Testing and Materials (ASTM)
  - ASTM D859-94 - Referee Method B for Silica as Silicon Dioxide (SiO_2)
  - ASTM D888-96 - Referee Method A for Dissolved Oxygen
  - ASTM D513-96 - Referee Method D for Carbon Dioxide (CO_2)
- Occupational Safety and Health Administration (OSHA)
- Underwriters Laboratories (UL)
- American Waterworks Association (AWWA) - WWA 2540-95-Method C for Total Dissolved Solids

Other recognized standards will be used as required to serve as design, fabrication, and construction guidelines when not in conflict with the above-listed standards.

The codes and industry standards used for design, fabrication, and construction will be the codes and industry standards, including all addenda, in effect as stated in equipment and construction purchase or contract documents.

3.0 GENERAL CRITERIA

3.1 WATER SOURCES

Potable water will be provided for drinking water and domestic services at PPEC. The facility process water will be obtained from the Otay Water District. PPEC will divert water to a raw/service water 500,000-gallon storage tank and use this as process water storage.

3.1.1 Cooling System Water

Makeup water will be pumped or gravity fed from the raw water storage tank to the facility wet/dry cooling system as required. Water will be blown down from the wet cooling system to help maintain proper water chemistry; the cycles of concentration will be approximately 3 to 5. Acid will be added in proportion to makeup water flow for pH control. Chemical feed systems will also supply water-conditioning chemicals that minimize corrosion, scaling, and biological growth.

3.1.2 Combustion Turbine Inlet Evaporative Cooling Water

Makeup water to the combustion turbine inlet evaporative coolers will be from the raw water storage tank. Blowdown from the coolers will be used to maintain the manufacturer's recommended water chemistry.

3.1.3 Service Water and Sanitary Use Water

Potable water will be available at service water hose connections located around the facility and will supply sanitary water at the facility (i.e., showers, sinks, toilets, safety showers, eye wash stations).

3.1.4 Demineralized Water

Demineralized water produced by on-site treatment systems will be injected into the combustion turbines to control the formation of nitrogen oxides (NOx). The demineralized water system will consist of an ultrafiltration system, reverse osmosis (RO) system, and a mixed-bed deionizer. The demineralized water will be stored in a 240,000-gallon demineralized water storage tank.

3.1.5 Construction Water

Water sources for construction will be from an on-site water supply from the Otay Water District.

3.1.6 Fire Protection Water

Water for fire protection will be provided from the Otay Water District as a primary source. In addition, 250,000 gallons of the 500,000-gallon raw water tank will be available through an electric pump for backup fire protection water.

3.2 CHEMICAL STORAGE

3.2.1 Storage Capacity

Chemical storage tanks will, in general, be sized to store a minimum of 1.5 times the normal bulk shipment. The aqueous ammonia storage tank for the selective catalytic reduction systems (SCRs) will be 20,000 gallons.

3.2.2 Containment

Chemical storage tanks containing corrosive or hazardous fluids will be surrounded by curbing. Curbing and drain piping design will allow a spill of 110% of the full tank capacity without overflowing the curbing. For multiple tanks located within a single curbed area, the largest tank will be used to size the curbing and drain piping.

3.2.3 Closed Drains

Waste piping for volatile liquids and wastes with offensive odors will use closed drains to control noxious fumes and vapors.

3.2.4 Coatings

Tanks, piping, and curbing for chemical storage applications will be provided with appropriate protective coatings.

3.3 WASTEWATER DISPOSAL

The process wastewater will be disposed of through a connection to the San Diego County sewer system in Alta road adjacent to the project site.