CHEMICAL ENGINEERING DESIGN AND CRITERIA

Chemical Engineering Design 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 Panoche Energy Center (PEC). 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 mechanical systems and components will be in accordance with the laws and regulations of the federal government, the State of California, County of Fresno and local ordinances, and 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 there are conflicts between cited documents, the more conservative requirements will apply.

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

- ANSI-American National Standards Institute
- ANSI B31.1-Power Piping Code
- ASME-American Society of Mechanical Engineers
- ASME-Performance Test Code 31, Ion Exchange Equipment
- ASTM-American Society for Testing and Materials
- ASTM D859-94--Referee Method B for Silica as SiO2
- ASTM D888-96Referee Method A for Dissolved Oxygen
- ASTM D513-96Referee Method D for CO2
- OSHA-Occupational Safety and Health Administration
- UL-Underwriters Laboratories
- AWWA-American Waterworks Association
- WWA 2540-95-Method C for TDS

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

Bottled water will be provided for drinking water at PEC. The only other water source will be from brackish wells that will provide water to a 500,000 gallon storage tank.

3.1.1 Circulating Water

Makeup water will be pumped from the raw water storage tank to the cooling tower basin as required. Water will be blown down from the basin to help maintain proper water chemistry, the cycles of concentration will be approximately 3. 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 CT Inlet Evaporative Cooling Water

Makeup water to the combustion turbine inlet evaporative coolers will be a mixture of demineralized water (2/3) and raw water (1/3). Blowdown from the coolers will be used to maintain 6.0 cycles-of-concentration.

3.1.3 Service Water and Sanitary Use Water

Raw water will be chlorinated for use at service water hose connections located around the facility and also as the supply of sanitary water (i.e. showers, sinks, toilets, safety showers, eye wash stations). Service water will be treated as necessary to meet all federal, state, and local requirements for human contact. Signs will be posted to alert personnel that sanitary water is not potable quality and should not be consumed.

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 NO_x. The demineralized water system will consist of a 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 trucked in or obtained from an onsite water supply well.

3.1.6 Fire Protection Water

Water for fire protection will be provided from the 500,000-gallon raw water tank by an electric pump, with an emergency diesel backup pump.

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 SCR 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 via deep well injection. Monitoring will be provided for the well flow and pressure.