Appendix 2F
Chemical Engineering Design Criteria

APPENDIX 2F

Chemical Engineering Design Criteria

2F.1 Introduction

This appendix summarizes the codes, standards, criteria, and practices that will be generally used in the design and construction of chemical engineering systems for the Hidden Hills Solar Electric Generating System. More specific project information will be developed during execution of the project to support detailed design, engineering, material procurement specification and construction specifications.

2F.2 Design Codes and Standards

The design of chemical engineering systems for the project will be in accordance with the laws and regulations of the federal government, the State of California, County of Inyo ordinances, and industry standards. The current issue or edition of the documents at the time of filing this Application for Certification will apply, unless otherwise noted. In cases where conflicts between the cited documents exist, requirements of the more conservative document will be used.

2F.2.1 Chemical Engineering Codes and Standards

The following codes and standards have been identified as applicable, in whole or in part, to chemical engineering design and construction of power plants.

- ANSI B31.1 Power Piping Code
- ASME Performance Test Code 31, Ion Exchange Equipment
- American Society for Testing and Materials (ASTM)
- California Building Standards Code (CBSC)
- Occupational Safety and Health Administration (OSHA)
- Steel Structures Painting Council Standards (SSPC)
- Underwriters Laboratories (UL)
- American Water Works Association (AWWA)

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.

2F.3 General Criteria

2F.3.1 Design Water Quality

2F.3.1.1 Power Plant Facility Wells

Water for the Project will be obtained from six wells - two at each Power Block and two at the common area. The wells at each Power Block will supply all general water requirements such as process needs for the steam turbines, and auxiliary equipment and sanitary needs.

2F.3.1.2 Demineralized Water System

High quality (HQ) demineralized water will be used for power cycle make up. Minimum quality requirements for HQ demineralized water are as follows:

- Silica, as SiO_2 ≤ 20 µg/l
- Specific Conductivity ≤ 0.2 µS/cm
- Iron as Fe ≤ 20µg/l

Intermediate quality (IQ) demineralized water will be used for the wet surface air cooler spray and mirror washing. The IQ demineralized water will be the highest practical quality. Minimum quality requirements for mirror cleaning water will be as follows:

- Total dissolved solids 20 mg/L
- Silica as SiO_2 0.9 mg/L
- pH 6 to 8

2F.3.1.3 Construction Water

Groundwater will be used for construction.

2F.3.1.4 Fire Protection Water

The source of water for fire protection will be site wells. The fire protection water will be stored in a service/fire water tank. The tank will have a minimum capacity of 2 hours of firewater reserved in the bottom of the tank.

2F.3.2 Chemical Conditioning

2F.3.2.1 Circulating Water System Chemical Conditioning

Condensate-feedwater chemical conditioning will consist of an oxygen scavenger and a neutralizing amine for pH control.

Boiler chemical feed is expected to consist of ammonia and an oxygen scavenger to control boiler water pH and to minimize scale formation and provide boiler water buffering capacity.

2F.3.3 Chemical Storage

2F.3.3.1 Storage Capacity

Chemical totes (returnable delivery containers) or tanks containing corrosive fluids will be surrounded by curbing. Curbing design will allow a full-tote/tank capacity spill without

overflowing the curbing. For multiple totes/tanks located within the same curbed area, the largest single tote/tank will be used to size the curbing. For outdoor chemical containment areas, additional containment volume will be included for storm water. Totes will be the preferred method of chemical storage with tanks only being used where a tote based storage solution is not available.

2F.3.3.3 Coatings

Tanks, piping, and curbing for chemical storage applications will be provided with a protective coating system. The specific requirements for selection of an appropriate coating will be identified prior to equipment and construction contract procurements.

2F.3.4 Wastewater Treatment

Boiler blowdown and other plant process wastewaters will be collected and treated prior to discharge to the wastewater treatment system. The majority of the wastewater treatment will be recycled for reuse within the plant.

Sanitary sewage will be collected in a septic tank and the overflow discharged to a leach field. Sludge will be removed from the septic tank on an as needed basis by a sanitary service and disposed of offsite.