APPENDIX 10F

Chemical Engineering Design Criteria

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10F.1 Introduction

Control of the design, engineering, procurement, and construction activities on the project will be completed in accordance with various predetermined standard practices and project specific programs/practices. An orderly sequence of events for the implementation of the project is planned consisting of the following major activities:

- Conceptual design
- Licensing and permitting
- Detailed design
- Procurement
- Construction and construction management
- Startup, testing, and checkout
- Project completion

The purpose of this appendix is to summarize the general chemical engineering design criteria for the project. These criteria form the basis of the design for the chemical components and systems of the project. More specific design information is developed during detailed design to support equipment and erection specifications. It is not the intent of this appendix to present the detailed design information for each component and system, but rather to summarize the codes, standards, and general criteria that will be used.

Subsection 10F.2 summarizes the applicable codes and standards and Subsection 10F.3 includes the general criteria for design water quality, chemical conditioning, chemical storage, and wastewater treatment.

10F.2 Design Codes and Standards

The design and specification of all work will be in accordance with the laws and regulations of the federal government and the state of California and local codes and ordinances. Industry codes and standards partially unique to chemical engineering design to be used in design and construction are summarized below.

- 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 Waterworks 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.

10F.3 General Criteria

10F.3.1 Design Water Quality

10F.3.1.1 Highgrove Energy Facility Wells

The existing wells at the Highgrove Energy Facility will supply all general water requirements such as process needs for the combustion turbines, and evaporative cooling.

Typical water analyses for the wells are presented in Subsection 8.14, Water Resources.

10F.3.1.2 Demineralized Water System

The high quality demineralized water will provide makeup for water injection to the combustion turbine. In addition, cycle makeup water will be used to supply water for various other uses such as combustion turbine inlet air evaporative cooling and combustion turbine water washes.

The demineralized water will be the highest practical quality. Minimum quality requirements for cycle makeup water will be as follows:

- Total dissolved solids—0.1 milligram per liter (mg/L)
- Silica as SiO_2—0.005 mg/L
- Specific conductance—0.1 microsiemen per centimeter (µS/cm)
- pH—6.5 to 7.5

10F.3.1.3 Construction Water

Water for use during construction will be supplied by the existing wells, or supplied by Riverside Highland Water Company.

10F.3.1.4 Fire Protection Water

The source of water for fire protection will be a potable water line from the Riverside Highland Water Company located in Taylor Street. 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.

10F.3.2 Chemical Conditioning

10F.3.2.1 Circulating Water System Chemical Conditioning

Circulating water chemical conditioning will consist of chemicals to minimize the formation of mineral scale and biofouling. Scaling will be controlled by the use of sulfuric acid for alkalinity adjustment in conjunction with scale inhibitors. Chlorination using sodium

hypochlorite will be used to minimize biofouling of the condenser tubes and the cooling tower. Systems will also be provided for the feeding of alternate biocides, such as stabilized bromine, sodium bromide, or a non-oxidizing biocide.

10F.3.3 Chemical Storage

10F.3.3.1 Storage Capacity

Chemical storage tanks will, in general, be sized to store a maximum of 10,000 gallons. One 16,000-gallon tank will be provided for the storage of aqueous ammonia for the selective catalytic reduction (SCR) systems.

10F.3.3.2 Containment

Chemical storage tanks containing corrosive fluids will be surrounded by curbing. Curbing and drain-piping design will allow a full-tank capacity spill without overflowing the curbing. For multiple tanks located within the same curbed area, the largest single tank will be used to size the curbing and drain piping. For outdoor chemical containment areas, additional containment volume will be included for stormwater.

10F.3.3.3 Closed Drains

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

10F.3.3.4 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.

10F.3.4 Wastewater Treatment

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

Sanitary wastewater will be discharged to the City of Grand Terrace sanitary sewer system.