

APPENDIX E
CHEMICAL ENGINEERING DESIGN CRITERIA

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

E.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, Contra Costa County, City of Antioch, California ordinances, and industry standards. 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)
- National Association of Corrosion Engineers (NACE)

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.

E.3 GENERAL CRITERIA

E.3.1 Design Water Quality

E.3.1.1 Process Makeup Water and Potable Water

New facilities will be added at the Delta Diablo Sanitation District's Bridgehead Lift Station (BLS) facility to upgrade raw sewage to Reverse Osmosis feedwater quality in a membrane bioreactor sewage treatment process. This recycled sewage plant effluent will meet all process water needs at MLGS, including demineralized water, service water and combustion turbine evaporative cooling water. Anticipated water chemistry for the water supply is presented in Chapter 2, Project Description, Table 2.5-3.

Potable water will be supplied by the City of Antioch, and will be used only for drinking, domestic, and shower/eyewash needs.

E.3.1.2 Demineralized Water System

Makeup to the steam cycle will be high purity demineralized water. This water will also be used for combustion turbine water washes.

Minimum demineralized water quality will be as follows:

- Total organic carbon – 0.100 mg/L
- Silica as SiO₂ – 0.010 mg/L
- Specific conductance – 0.1 microSiemen per centimeter (μS/cm)
- pH – 6.5 to 7.5

E.3.1.3 Construction Water

Water for use during construction will be supplied by the existing Contra Costa Power Plant water system, condensate from the existing site, and by water truck deliveries.

E.3.1.4 Fire Protection Water

The source of water for fire protection will be the existing site fire water supply.

E.3.2 Chemical Conditioning

E.3.2.1 Cycle Chemical Conditioning

To control corrosion and deposit formation in the heat recovery steam generator (HRSG)/steam turbine cycle, neutralizing amine and oxygen scavenger will be added to the condensate and/or feedwater, and a mixture of phosphates may be added to the HRSG drums.

There is no steam generating unit for the simple cycle plant option.

E.3.2.2 Circulating Water System Chemical Conditioning

There is no cooling water requirement for the MLGS.

E.3.3 Chemical Storage

E.3.3.1 Storage Capacity

Chemical storage tanks will, in general, be sized to store a maximum of 10,000 gallons. Aqueous ammonia storage tanks will have a capacity of 20,000 gallons for the storage of aqueous ammonia for the selective catalytic reduction (SCR) systems.

E.3.3.2 Containment

Chemical storage tanks containing toxic 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.

E.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.

E.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.

E.3.4 Wastewater Treatment

Cleaning wastes from pre-operational and operational chemical cleaning of the gas turbines and boiler systems of the HRSG will be collected, treated, and disposed offsite by the chemical cleaning contractor. Other plant process wastewaters will be collected and discharged back to DDSD's BLS.