SECTION 10.0

Engineering

10.1 Introduction

In accordance with California Energy Commission (CEC) regulations, this section, together with the engineering appendices and Sections 2.0, 6.0 and 7.0 (Project Description, Gas Supply and Water Supply, respectively), presents information concerning the design and engineering of the LSP South Bay, LLC (LSP) South Bay Replacement Project (SBPR). Subsection 10.2 provides an overview of the design of the facility with reference to Section 2.0, Project Description. Subsection 10.3 discusses the reliability of the SBRP. Subsection 10.4 presents the estimated thermal efficiency of the facility.

10.2 Facility Design

A detailed description of the SBRP is provided in Subsection 2.3, Generating Facility Description, Design, and Operation. Design for safety is provided in Subsection 2.3.11 Facility Safety and Emergency Systems.

Summary descriptions of the design criteria are included in the following appendices:

- Appendix 10.1, Civil Engineering Design Criteria
- Appendix 10.2, Structural Engineering Design Criteria (including foundation design criteria)
- Appendix 10.3, Mechanical Engineering Design Criteria
- Appendix 10.4, Electrical Engineering Design Criteria
- Appendix 10.5, Control Engineering Design Criteria

Appendix 10.6 includes a geotechnical report for the project anticipating soil conditions.

Design and engineering information and data for the following systems are found in the following sections of this AFC:

- **Power Generation**—See Subsection 2.3.4, Combine-Cycle Unit CTGs, HRSGs, STG and various plant auxiliaries.
- **Heat Dissipation**—See Subsection 2.3.5, Cooling System for Heat Rejection, and Appendix 10.3.
- **Air Emission Control System**—See Subsection 2.3.7, Air Emission Control and Monitoring, and Section 8.1, Air Quality.
- **Hazardous Waste**—See Subsection 2.3.9.3 and Section 8.12, Hazardous Materials Handling.

- **Noise Abatement System**—See Section 8.5, Noise.
- **Switchyards/Transformer Systems**—See Section 2.3.11, Major Electrical Systems and Equipment; Section 5.0, Electric Transmission; and Appendix 10.4.

10.3 Facility Reliability

This section discusses the availability of fuel, and the expected service life of the plant and the degree of reliability to be achieved by the SBRP.

10.3.1 Fuel Availability

Natural gas will be purchased from numerous gas suppliers and delivered to the SBRP by San Diego Gas and Electric (SDG&E). SDG&E is the transporter of natural gas in the San Diego region. A new natural gas pipeline to supply the SBRP will connect to two existing high pressure natural gas pipelines that current supply natural gas to the existing South Bay Power Plant (SBPP). These existing natural gas pipeline are located approximately 0.7 miles north of the SBRP (see Section 6.0).

10.3.2 Plant Availability

The SBRP will employ two heavy-duty frame CTs fueled by natural gas in a 2 on 1 combined cycle arrangement. Combined cycle plants with natural gas firing have proven high reliability. Generating plants with heavy frame CTs operating in continuous service have commonly demonstrated operating availability factors well above 90 percent over several years.

Availability factors, forced outage data, and scheduled outage data are based on manufacturer's data, manufacturer's guarantees, and operating experience of similar facilities.

Combined cycle units in continuous duty service with advanced technology CTs that have been available for some time have demonstrated an equivalent Forced Outage Factor (FOF) of 2.5 percent or less.

The BOP and support systems will have installed spare pumps and equipment typical of combined cycle plants now operating. The equivalent FOF associated with BOP equipment and systems is less than 0.5 percent. The demonstrated equivalent FOF for the ST and BOP is 1.0 or less.

The Scheduled Outage Factor includes planned outages and maintenance outages such as minor maintenance, off-line water washing, and planned maintenance outages. The planned outages are based on hours of operation (combustion inspection in Years 1, 2, 4, and 5, hot gas path inspection in Year 3, and major inspection in Year 6 for baseload units) and will involve disassembly of the CTs to various degrees. The experience with other similarly sized CTs includes planned outages and interim maintenance time with high confidence in the forecasts of time required for both planned outages and minor maintenance. Planned outages will be scheduled during off-peak energy demand periods.

There are no known geologic hazards other than the remote possibility of a major earthquake (see Section 8.15).

Special design features are included in the SBRP design to ensure power plant reliability, including redundancy of critical components (see Subsection 2. 3.13.3, Equipment Redundancy).

10.4 Thermal Efficiency

This 2-on-1 combined cycle plant is one of the most efficient power plant arrangements available today. Combined cycle plants are much more efficient than most typical fossil fired steam units and simple cycle CT units due to the recovery of the CT exhaust gas heat in the HRSGs. 2-on-1 combined cycle plants can have efficiencies greater than 45 percent (HHV) where as typical steam boiler thermal units will have efficiencies around 35 percent (HHV) and simple cycle CT units will have efficiencies around 37 percent (HHV).

Plant fuel consumption will depend on the operating profile of the power plant. Maximum fuel consumption for peaking operation under extreme cold conditions is approximately 4,800 million BTU/HR. (HHV basis).