4.1 FACILITY SAFETY

This section discusses the PEF 1x0 Expansion design measures and practices that will address safety of the workers and public. To the extent practicable, the PEF Expansion will share common safety procedures, equipment, and facilities with the existing PEF. A complete description of the shared common safety procedures is in Section 4.0 of 99-AFC-7 included in Attachment A, Project Description Materials, appended to this application.

4.1.1 Natural Hazards

The primary natural hazards of potential concern to a generating plant located in the general project area (southern Kern County) are seismic activity, wind, blowing sand and heat. This section discusses the risks presented by these natural hazards and the design measures used to offset these risks. The mitigation measures described in 99-AFC-7 and the CEC Conditions of Certification for the approved PEF ensure that natural hazards do not pose a significant risk to the existing PEF. The Applicant proposes to apply the applicable Conditions of Certification for the existing PEF to the PEF Expansion. The Conditions of Certification for the PEF are included in Section 9.0 of this application. With the implementation of the applicable Conditions of Certification, no significant unavoidable adverse impacts are anticipated due to construction or operation of the PEF Expansion.

4.1.1.1 Seismic Hazards

The Geological Hazards and Resources Section 5.3 of 99-AFC-7 (included for reference as part of Attachment B of this application) discusses the geological characteristics near the approved PEF that present a seismic risk to the generating plant and its linear facilities. To protect these facilities from seismic risks, all design and construction will be in conformance with current California Code Seismic Zone 4 requirements. The structural and seismic engineering design criteria to be used for the project remain unchanged from 99-AFC-7. The Structural and Seismic Engineering Design Criteria for 99-AFC-7 are included in Attachment A, Project Description Materials appended to this application.

4.1.1.2 Wind and Dust Hazards

All buildings associated with the existing PEF were designed for wind loads stated in the current edition of the California Building Code (CBC). In addition, particular care was taken

to minimize sand and grit intrusion for areas that are occupied by personnel, and for the main equipment locations. Building housing offices, shops, electrical equipment, and other enclosures are designed to minimize dust intrusion. Temporary structures will be erected to protect equipment during major overhauls and other maintenance that may require opening of the turbine enclosures.

During construction, the use of wind breaks for sand build-up, similar to snow fence, will reduce but not stop the flows of sand blown by wind. Other techniques will include the use of water over the ground surface to enhance dust control and construction of temporary enclosures to reduce wind effect.

4.1.1.3 Heat

All buildings have been designed with the appropriate climate controlled environment for protection of both personnel and equipment. This includes air conditioning, insulation, landscaping, overhead covers, ventilation, appropriate use of glass, and color selection to reduce heat retention.

4.1.2 Safety Precautions and Emergency Systems

Safety precautions and emergency systems implemented as part of the existing PEF design and construction will be extended to the PEF Expansion project to ensure safe and reliable operation of project facilities. This includes administrative controls, such as classroom and hands-on training in operating and maintenance procedures, and general safety items. The existing maintenance program will work with the system design and monitoring features to enhance safety and reliability for both the existing PEF and PEF Expansion.

The existing PEF safety, auxiliary, and emergency systems consisting of lighting, direct current (DC) backup for controls, fire and hazardous materials safety systems, security systems, and natural gas, steam, and chemical safety systems will be used for PEF Expansion. The PEF Expansion will use the existing PEF utilities and services such as emergency power, plant and instrument air, fire suppression, and potable water systems.

The laws, ordinances, regulations, and standards that are applicable or potentially applicable to the PEF Expansion, in the context of the public and occupational safety and health protection measures, are addressed in Section 7.0, Compliance with Laws, Ordinances, Regulations, and Standards (LORS) of this application.

4.1.2.1 Safety Precautions

4.1.2.1.1 Worker Safety. Consistent with the standard operating procedures of the existing PEF, PEF Expansion will implement programs to assure that compliance with federal and state occupational safety and health program requirements is maintained. In addition to compliance with these programs, plant-specific programs that effectively assess potential hazards and mitigate them on a routine basis will also be implemented. The PEF Expansion will coordinate with the existing PEF to ensure that all worker safety requirements are met. A more complete discussion of worker safety applicable to both projects is provided in the Worker Safety Section 5.17 of this application.

4.1.2.1.2 Hazardous Materials Handling. Hazardous materials will be stored and used at the PEF Expansion during both construction and operation, consistent with the handling methods for the approved PEF. Design and construction of hazardous materials storage and dispensing systems will be in accordance with applicable codes, regulations, and standards. Hazardous materials storage areas will be adequately curbed or diked to contain spills or leaks.

Potential hazards that are associated with hazardous materials will be further mitigated by implementing a hazards communication (HAZCOM) program. This program involves thorough training of employees on proper identification, handling, and emergency response to spills or accidental releases.

Emergency eyewashes and showers will be provided at appropriate locations. Appropriate Personnel Protective Equipment (PPE) will also be provided during both construction and operation of the Facility. A more detailed discussion of hazardous materials handling is presented in Section 5.15 of this application.

4.1.2.1.3 Security. The existing PEF plant site is enclosed by a security fence with an access gate. The PEF Expansion site is within the existing PEF plant site. In addition to the perimeter security fence, the substation and transformer area is fenced and within the access gates. Security is maintained on a 24-hour basis with either surveillance devices or personnel.

4.1.2.1.4 Public Health and Safety. The existing PEF programs implemented to protect worker health and safety will also benefit public health and safety will also apply to the PEF Expansion. Facility design will include controls and monitoring systems to minimize the potential for upset conditions that may result in public exposure to acutely hazardous materials. Development and implementation of an Emergency Response Plan, a HAZCOM program, a Spill Prevention Control Plan, safety programs, and employee training will mitigate potential public health impacts associated with operation of the project. The Worker

Safety Section 5.17 of 99-AFC-7 included for reference and appended to this application as Attachment N, includes a detailed description of the safety programs.

In addition, the Applicant will coordinate with local emergency responders by providing them with copies of the plant site Emergency Response Plan; conducting plant site tours to point out the location of hazardous materials and safety equipment; and encouraging these providers to participate in annual emergency response drills.

4.1.2.2 Emergency Systems

4.1.2.2.1 Fire Protection Systems. The PEF Expansion will use the on-site fire protection systems provided by the existing PEF and will be supported by local fire protection services. A detailed description of the fire protection systems is described in Section 3.0 Facility and Location Description of this application. The Facility and Location Description Section 3.0 of 99-AFC-7 is included for reference and appended to this application as part of Attachment A, Project Description Material.

Portable and fixed fire suppression equipment and systems will be included in the fire protection system. Portable fire extinguishers will be placed at strategic locations throughout the project site. Smoke detectors, sprinkler systems, and fire hydrants with hoses will be utilized. Based on detailed design, the fixed fire protection system may also include a carbon dioxide or a deluge spray system.

Employees will be given fire safety training including instruction in fire prevention, the use of portable fire extinguishers and hose stations, and reporting fires to the local fire department. Employees will only suppress fires in the incipient stage. Fire drills will be conducted at least twice each year for each work area.

Kern County Fire Department Station 55 will continue to provide primary fire protection, fire fighting, and emergency response services to the PEF site. The County Fire Marshal will perform a final fire safety inspection upon completion of construction and, thereafter, will conduct periodic fire safety inspections.

4.1.2.2.2 Emergency Response. The existing PEF has an Emergency Response Plan (ERP), which will be modified to encompass the PEF Expansion. The updated ERP will address potential emergencies including chemical releases, fires, and injuries, and will describe emergency response equipment and its location, evacuation routes, procedures for reporting to local emergency response agencies, responsibilities for emergency response, and other actions to be taken in the event of an emergency.

Employee response to an emergency will be limited to an immediate response to minimize the risk of escalation of the accident or injury. Employees will be trained to respond to fires, spills, earthquakes, and injuries. A first-aid facility with adequate first-aid supplies and personnel qualified in first-aid treatment will be provided onsite.

4.1.3 Aviation Safety – Power Generation Facility Stacks

The Federal Aviation Administration (FAA) completed an aeronautical study for the 213 feet PEF HRSG Stacks. The study determined that the stacks should be marked and/or lighted in accordance with FAA Advisory Circular 70/7460-1K. Subsequent to the CEC approval of the license amendment to lower the HRSG stacks to 150 feet, a second FAA study was completed. FAA Advisory Circular 70/7460-1K requires that all airspace obstructions over 200 feet in height or in close proximity to an airfield have obstruction lighting. Since the existing stacks are 150 feet and there is no airfield in close proximity to the site, the 131 feet proposed PEF Expansion stack do not require obstruction lighting.

4.2 TRANSMISSION LINE SAFETY AND NUISANCE

To the extent practicable, the PEF Expansion shares common auxiliary equipment and facilities with the existing PEF. The PEF Expansion requires no modifications to the existing PEF offsite linear facilities including electric transmission. The PEF Expansion has no significant incremental impacts on aviation safety, audible noise, radio interference, induced currents, or electric or magnetic fields relative to the existing PEF. A complete discussion of transmission line safety and nuisance for the existing PEF is included in the Safety and Reliability Section 4.0 of 99-AFC-7 included for reference as part of Attachment A, Project Description Materials, of this application.

4.3 RELIABILITY AND AVAILABILITY

This section discusses the expected facility availability, equipment redundancy, ability to respond to varying utility needs for power, maintenance program, fuel availability, water availability, and project quality control measures for the PEF Expansion.

4.3.1 Facility Availability

The PEF Expansion will employ a heavy-duty frame gas turbine fueled by natural gas. Gas turbines with natural gas firing have proven in the past few years to provide much higher availability than other types of power plants of comparable size. Generating plants with heavy frame gas turbines operating in continuous service have commonly demonstrated operating availability well above 90 percent over several years.

4.3.1.1 Range of Availability

Availability varies from year to year due to random causes and the structure of the overhaul cycle. Forced unavailability changes somewhat from year-to-year because the numbers and lengths of forced outages vary randomly. Planned unavailability varies in a more predictable fashion. Typically, gas turbines are overhauled on a six-year cycle with relatively short outages (on the order of one week to ten days) in years one, two, four and five. A somewhat longer outage (on the order of two to three weeks) occurs in year three and a major outage (on the order of four to seven weeks depending on size) in year six. The gas turbine work usually controls the planned outages length. In years one, two, four, and five the availability of the PEF Expansion unit expressed as a percent can be expected to be in the mid 90s. In year three, availability will be in the upper 80s to mid 90s and in year six in the low to upper 80s. However, all of the planned outages will be scheduled for the spring season, and most other maintenance and repair work will be performed during off-peak hours (typically, weekends and eight hours per night on weekdays).

4.3.1.2 Basis for Forecasts of Availability

There has been insufficient operating experience with advanced technology gas turbines to provide hard data on forced outage factors or maintenance and planned outage times.

4.3.1.2.1 Forced Outage Factor. The advanced F-class combustion turbine generator unit operating in peaking service is expected to have an equivalent forced outage factor (FOF) of 1.5 to 2.5 percent or less for the entire simple cycle.

Several components of a Frame F-class CTG can be responsible for a forced outage. Most forced outages in heavy frame CTGs of mature design are caused by their auxiliaries and controls. The heavy rotation machinery in mature gas turbine designs rarely experience catastrophic failure and hence forced outage. Any developing damage is usually found during the regular inspections, and the affected part is replaced with little delay. Finally, DLN combustors are complex and can slow the disassembly and reassembly of the CTG.

4.3.1.2.2 Planned Outage Factor and Maintenance Outage Factor. The planned outage factor and maintenance outage factor include minor maintenance, off-line water washing and planned maintenance outages. The planned outages (combustion inspections, hot gas path inspections, and major inspections) involve disassembly of the gas turbine to various degrees.

4.3.1.3 Degradation in Output from Fouling and Wear

All gas turbines degrade in output from their new and clean conditions because of fouling and wear. “Non-recoverable” degradation from equipment wear increases rapidly in the first few thousand fired hours, and then slows. Most of the degradation due to wear will be recovered during the major inspections. Degradation due to fouling is corrected by frequent on-line and less frequent off-line waterwashing.

4.3.1.4 Summary of Availability

The PEF Expansion is expected to provide high availability and to be more responsive than most generation facilities to system demand during periods of peak load, particularly during periods of high ambient temperature. PEF Expansion outage rates are expected to be low. Planned outages will be scheduled during the spring hydrogeneration peak. Most other outages will occur during off-peak periods.

4.3.2 Equipment Redundancy

The combustion turbine generator subsystems include the combustion turbine, inlet air cooling/fogging system, lube oil system, starting system, generator and excitation systems, and combustion turbine control and instrumentation. Redundancy is provided in combustion turbine subsystems where practical. For example, the lube oil system consists of redundant pumps, filters, and coolers, but redundant bearings are obviously impractical. The microprocessor-based control system consists of redundant microprocessors, as well as redundant sensors for critical measurements. Technology advancements, as well as redundancy as illustrated above, have led to extremely high reliability for the combustion turbine type considered for the PEF Expansion.

4.3.3 Fuel Availability

To the extent practicable, the PEF Expansion shares common auxiliary equipment and facilities with the existing PEF. The PEF Expansion will utilize the same source of fuel as the existing PEF and requires no modifications to the existing fuel gas supply pipeline. Figure 3.1-4 shows the route of the existing PEF fuel gas supply pipeline. A complete description of the PEF fuel gas supply pipeline is included in the Facility Description and Location Section 3.0 of 99-AFC-7 for reference and appended to this application as part of Attachment A, Project Description Materials.

4.3.3.1 Source of Natural Gas Supply

The fuel for the existing PEF and the PEF Expansion will be natural gas supplied from the Kern River/Mojave Pipeline. The Kern River Gas Transmission Company and Mojave Pipeline Company initiated service in 1992. The Kern River Pipeline stretches 900 miles from Opal, Wyoming to Kern County California, with a 700 MMcf/day capacity. The Mojave Pipeline originates in Topock, Arizona connecting with El Paso's interstate pipeline, and runs 370 miles to Kern County, California. The Mojave Pipeline capacity is 400 MMcf/day.

The Kern River and Mojave Pipelines interconnect near Daggett, California in a jointly owned pipeline with a capacity of 1100 MMcf/day. The Kern River/Mojave Pipeline is divided into two laterals: the east side lateral serves Kern County's east-side oil fields; the west lateral extends to McKittrick and interconnects with SoCal Gas at Wheeler Ridge. The existing PEF and the PEF Expansion projects will be served by the west-side lateral that passes within six miles of the site.

The PEF Expansion will increase fuel gas demand by up to 41.5 MMcf/day, bringing the total peak winter demand to approximately 166 MMcf/day for the entire 910 MW PEF project.

4.3.3.2 Availability of Gas

As stated in the CEC's 1995 natural gas market outlook, California has a total natural gas resource base of 1,056 trillion cubic feet (TCF) for surrounding basins. This resource base is expected to satisfy current production levels for the next 60 years. Therefore, sufficient supplies of natural gas are projected to be available throughout the life of the project. Further, new pipelines have increased the supply diversity into the region through new access routes to multiple supply basins. These activities have largely eliminated the risk of supply curtailment in the region and have allowed access to more competitively priced supplies.

4.3.4 Water Availability

Water requirements for the PEF Expansion will be supplied through the approved PEF water supply from WRMWSD Line 14-G via a 24-inch diameter raw water line as shown on Figure 3.1-4. A complete discussion of the availability of water for the existing PEF is included for reference as part of Attachment D – Water Resources Materials appended to this application.

The PEF Expansion design provides for an additional 160 MW of power output with minimal impact on water resources. Annual water demand for the 910 MW project remains less than 5,000-acre feet. Further, peak demand from WRMWSD is maintained at less than 10.5 cubic feet per second. When peak demand reaches the contractual limit of 10.5 cubic feet per

second, water is supplied from storage tanks. Depleted water storage is made up during off-peak periods. As proposed, the water usage for the 910 MW project will comply with the water supply agreement made between the WRMWSD and the PEF, LLC as part of approved PEF 750 MW project.

4.3.5 Project Quality Assurance/Quality Control

This section summarizes the Quality Assurance/Quality Control (QA/QC) Program that will be applied to the PEF Expansion. This program remains unchanged from the approved PEF. The objective of the QA/QC Program will be to maximize confidence that systems and components will be designed, fabricated, stored, transported, installed, and tested in accordance with the technical codes and standards appropriate for a power plant.

4.3.5.1 Quality Assurance

The Quality Assurance Program activities will generally be divided into the following stages:

- Conceptual Engineering – Typical activities include technical screening studies, preliminary evaluation of permitting requirements, development of plant cycle design criteria, estimation of plant performance, definition of site specific characteristics, and estimation of the plant capital costs to support economic studies.
- Detailed Design – Typical activities include preparation of specifications, drawings, lists and other technical data needed to describe, illustrate, or define systems, structures, or components of the plant. This work will be performed by a firm duly qualified and licensed in the State of California. Firms will be selected through a competitive procurement process administered by the Applicant. It is anticipated that multiple contracts will be required to support design and construction of the PEF Expansion.
- Procurement Specification Preparation – Work includes preparing and issuing formal, documented "packages" for suppliers of equipment, material or services. The specifications are reviewed by the Applicant and/or Applicant's Engineer prior to issuance for compliance with the project's technical and commercial requirements. The suppliers' proposals are formally evaluated against the package before a purchase order or contract is awarded.
- Supplier's Control and Surveillance – Typical activities are those that the suppliers perform as required by their purchase order. These activities assure that the products or services to be provided conform to the requirements of the purchase order or contract.
- Supplier Data Review – These activities include reviewing selected supplier drawings, data, instruction, procedures, plans, and other documents to monitor conformance to the

requirements of the purchase order or contract. Visits to supplier shops will be conducted as appropriate.

- Shipping and Receipt Inspections – These activities will generally be performed during construction. They include inspection and review of products during manufacture and/or at the time of shipment and delivery to the construction site.
- Construction/Installation – These activities include inspection and review of the construction storage, equipment and component installation, cleaning and initial testing of systems, and components at the plant site.
- System/Component/Plant Testing – These activities ensure that the plant is tested, commissioned, and started up in a documented and controlled manner. This is done to confirm system safety, and that the performance of systems and components conforms to the technical requirements and all guarantees. All such work is to be documented in detail.

4.3.5.2 Quality Control Records

The following quality control records will be maintained, as a minimum, for review and reference:

- Approved Environmental Permits
- Required Building Permits
- Project Procedures and Instruction Manual
- Design Calculations and Equipment Specifications
- Project Design Basis and Criteria
- Quality Assurance Audit Reports
- Piping and Instrument Diagrams
- One-Line and Three-Line Diagrams
- Conformance to Construction Record Drawings
- Procurement Specifications (Contract Issuance and Change Orders)
- Purchase Orders and Change Orders, and
- Contractor/Supplier's QA/QC Records

For equipment purchase orders or services contracts, the contractors will prepare a list of qualified suppliers and subcontractors. Before a purchase order or contract is awarded,

contractors will evaluate supplier/subcontractor record of accomplishment, financial condition, and personnel capability, past project performance and QA/QC program. The evaluation may also include a survey of the supplier's facilities.

The contractor will be responsible for providing documentation of all work performed in accordance with the quality requirements specified in the Contract between the Applicant and the contractor.