California Public Utilities Commission

2015 Audit of

LOS ESTEROS CRITICAL ENERGY FACILITY

DECEMBER 2015

STAFF REPORT

PREPARED BY THE ELECTRIC SAFETY AND RELIABILITY BRANCH OF THE SAFETY AND ENFORCEMENT DIVISION

Edmund G Brown, Jr., Governor

TABLE OF CONTENTS

TABLE OF FIGURES

TABLE OF PHOTOS

1. Introduction

This is the 2015 Audit Report of the Los Esteros Critical Energy Facility ("Los Esteros" or "the plant") prepared by the California Public Utilities Commission's ("CPUC's" or "Commission's") Electric Safety and Reliability Branch (ESRB) . ESRB audited the plant for compliance with Commission General Order 167, which includes Operation, Maintenance, and Logbook Standards for power plants.

In January 2010, ESRB initiated an audit of Los Esteros. ESRB visited the plant in July 2010. From May 2011 to August 2013, the plant repowered and became a combined-cycle facility. ESRB revisited the plant from July 13 to 17, 2015 to conclude the audit. ESRB observed plant operation, inspected equipment, reviewed document, and interviewed plant staff. From these activities, ESRB evaluated whether the plant needed improvement in operation or maintenance policies and whether the plant's programs and procedures met various Operation, Maintenance, and Logbook Standards.

ESRB found 30 violations of Operation and Maintenance Standards. These violations affect reliable plant operation and present safety hazards to workers. In its July 2015 re-audit, ESRB resolved 19 of the 30 violations with the plant. Eleven violations, Findings 20 to 30, remain opened and require corrective action.

2. Power Plant Performance

ESRB reviewed Los Esteros's performance metrics.[1] The following factors represent Los Estero's operational profile in 2014:

Table 1: Los Estero's Performance Metrics in 2014

Net Capacity Factor (NCF)	9.5%
Equivalent Availability Factor (EAF)	95.7%
Start Reliability (SR)	96%
Forced Outage Factor (FOF)	0.8%

- NCF measures how well a plant operates, relative to its full capacity. For example, a 50% NCF indicates a plant generates just half of what it can produce.

- EAF measures a plant's availability to produce power. For example, if a plant breaks down frequently and is unavailable to produce power, EAF will be low.

- SR calculates the ratio of actual starts to attempted starts. The SR index suggests how well a company maintains a plant and trains the operators, e.g. if operated properly, a well-maintained plant starts reliably.

[1] The Commission requires jurisdictional plants to self-report outage data to a database maintained by the North American Electric Reliability Corporation or NERC.

- Finally, FOF measures forced outages, i.e. how frequently a plant is forced offline. A low FOF is desirable.

3. Violations Requiring Corrective Action

Finding 1 – The plant's entry road lacked a street sign.

A street sign and a sign identifying the plant were missing on the road leading to the plant. This can delay the arrival of emergency personnel responding to fires or accidents at the plant, a violation of Operation Standard[2].

The street sign "**Thomas Foon Chew Way**" was missing at the intersection of Zanker Road, where the plant shares its entrance with PG&E and Silicon Valley Power. This entrance has a security gate controlled by the plant's operator. Vehicles must travel approximately half a mile past this security gate to arrive at the plant's two entries. One entry has a remote controlled security gate and the other has a manually locked security gate (See Figure 1). It was not apparent to visitors which gate is the correct entryway.

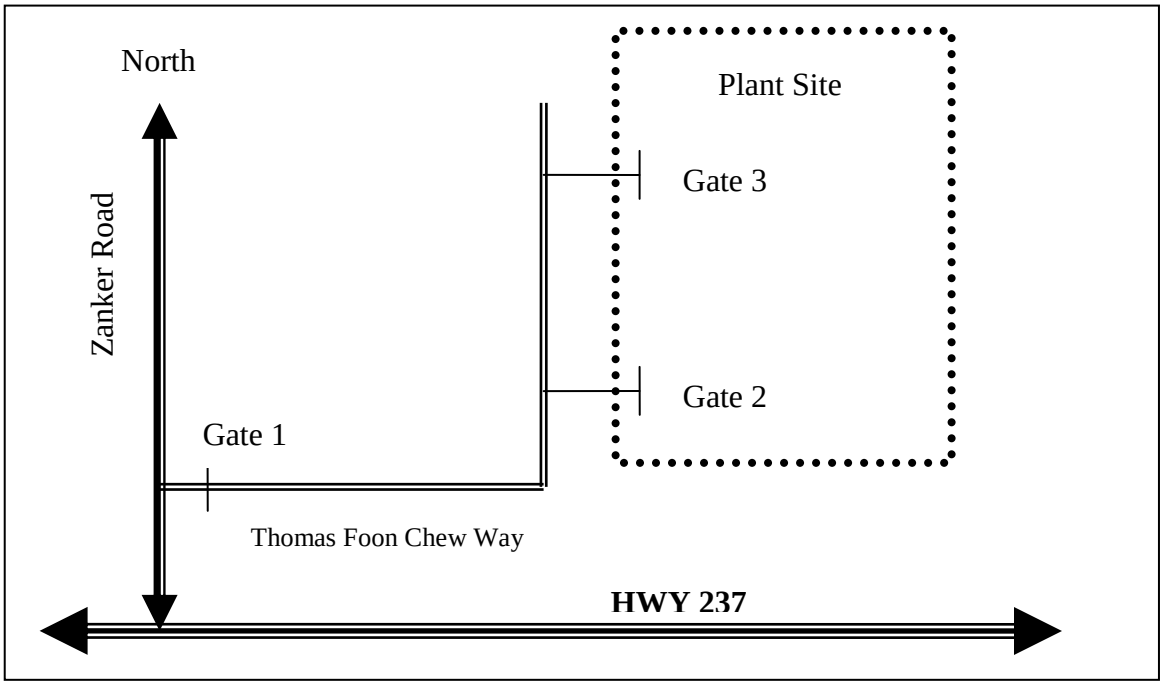

Figure 1: Schematic of the plant's entry road and main gates (not-to-scale).

In response, the plant posted a street sign and a company sign at Gate 1. The plant also posted a directional sign at Gate 2 to direct visitors to Gate 3, which is the plant's main entrance. No further corrective action is required at this time.

[2] Operation Standard 21: Plant Security; Guideline A.11

Finding 2 – The plant's LOTO Procedure was incomplete.

The plant's LOTO Procedure was incomplete because it included only three of fifty-five "Energy Isolation Control Procedures"[3], a violation of Operation Standard[4]. The control procedure identifies all power sources and energy isolation points for a multi-energy source device. This enables workers to lock all sources out to safely isolate a piece of equipment for repairs.

In the absence of the control procedures, worker performs a Job Safety Analysis (JSA) and applies for a Safe Work Permit (SWP) prior to commencement of any electrical work. The JSA studies the safety aspect of a job and identifies relevant safety measures. The SWP ensures workers obtain proper permits for a job, such as a confined-space entry permit or a hot work permit.

For a multi-energy source device, the need to identify and lock all isolation points is addressed via JSA and SWP. Auditor reviewed the plant's revised LOTO Procedure and found it compliant with industry practice. No further corrective action is required at this time.

Finding 3 – The plant failed to follow a contractor's maintenance recommendation.

The plant failed to follow a contractor's recommendation for maintaining its equipment, a violation of Operation Standard[5]. Based on vibration and lube oil analysis, a contractor found anomalies with the gas turbines and several motors. However, the plant failed to address them. The contractor's predictive maintenance reports[6] identified corrective action for the following equipment:

1. Lube oil in CT2 and 3 might be contaminated and should be resampled within 30 days
2. Bearing on CT4's spring motor should be replaced due to high vibration
3. Bearing on RO Pump C should be replaced ASAP due to high vibration
4. Coupling on fuel gas compressor should be realigned or replaced due to high vibration
5. Transducer must be installed on the cooling tower's Fan A gearbox

In response, the plant explained that it had corrected all issues during its August 2013 combined-cycle upgrade. The plant has refurbished, and in some cases, upgraded or completely replaced equipment. Auditor inspected the equipment and reviewed applicable work orders for the work completed. No further corrective action is required at this time.

[3] Section 8 of Calpine's Safety and Health Procedure, SHG-15: Lockout/Tagout/Tryout, 2010 Rev 6
[4] Operation Standard 14: Clearances; Guidelines C & H
[5] Operation Standard 7: Operation Procedures and Documentation; Guideline B
[6] Predictive Maintenance Reports for Oil and Vibration Analysis dated March 10 and May 21, 2010

Finding 4 – The plant failed to post warning signs to prevent worker's entrapment.

The plant failed to post warning signs on the gas turbine compartments to prevent worker's entrapment, a violation of Operation Standard[7].

Unauthorized entry into these compartments may entrap personnel because its doors are virtually locked shut by the differential atmospheric air pressure created by the compartments ventilation fan. While these compartments do not meet the definition of a confined space and are not listed in the plant's Confined Space Procedure[8], the plant should mitigate the entrapment hazard because of its licensing agreement with the California Energy Commission.

In response, the plant stated and Auditor confirmed that it has an on-site entry procedure[9] that requires plant personnel to obtain authorized signature before entering the compartment. Auditor recommended and the plant posted a warning sign on the compartment door to require a completed form with authorized signature before entry. No further corrective action is required at this time.

Photo 1: Turbine compartment lacked a warning sign.

[7] Operation Standard 8: Plant Status and Configuration; Guideline A.10
[8] Calpine's Los Esteros Confined Space Entry Procedure dated June 29, 2015
[9] Los Esteros System Operating Procedure, SOP-30 Turbine and GEN. Compartment Entry

Finding 5 - The plant's Confined Space Procedure did not include a calibration schedule for air analyzers.

The plant's Confined Space Procedure did not include a schedule for calibrating air analyzers, a violation of Operation Standard[10]. Worker uses air analyzers or sniffers to test atmospheric conditions of a confined space before entry. Confined spaces may contain hazardous gas or insufficient oxygen for human occupancy. Therefore, air analyzers are crucial to ensure worker's safety when working in a confined space and should be calibrated regularly.

In response, the plant revised its Confined Space Procedure. The procedure now requires the plant to calibrate air analyzers monthly.[11] Further, the plant created a work order in Maximo (the plant's work management system) that recurs monthly to remind operator to calibrate the analyzer.[12] The plant explained that in spite of the monthly calibration, workers also conduct a "bump test" on the analyzer before each use. The "bump test" checks whether the analyzer behaves normally when exposed to normal ambient. For example, when exposed to ambient, the analyzer should pick up an oxygen level of around 20%.

In regards to Auditor's recommendation to obtain a spare or backup analyzer (the plant only has one analyzer), the plant stated that it can obtain a backup analyzer from Calpine's Agnews Power Plant nearby. No further corrective action is required at this time.

Finding 6 – The plant failed to detect and repair gas leaks at the fuel gas compressors.

The plant failed to detect and repair gas leaks at the fuel gas compressors, a violation of Operation Standards[13]. During a walkdown, Auditor noticed a strong odor of natural gas at the fuel gas compressors, indicating a leak in the system. The plant compresses natural gas to about 600 psi for the gas turbines to operate. Natural gas is highly flammable. At the right concentrations, the gas can ignite and explode. The plant should survey all pipefittings regularly to detect and repair any gas leaks.

In response, the plant explained that operators frequently use a gas detector during their daily rounds to detect leaks. The leak in-questioned was minor and outside of the gas's explosive range, and poses no safety risks. Further, the plant uses a technology called "optical gas imaging" where the plant scans and takes thermal images of gas lines and valves to look for leaks. If a leak occurs, it causes a temperature difference that can be detected by thermal imaging. The plant conducts this test every two years and uses the results to trend and schedule preventive repairs. No further corrective action is required at this time.

[10] Operation Standard 11: Operation Facilities, Tools and Equipment; Guideline H
[11] Calpine's Los Esteros Confined Space Entry Procedure dated June 29, 2015, Section 5.6 – Atmospheric Testing
[12] A work order printout from Maximo showed the plant calibrated the analyzer from January to July 2015
[13] Operation Standard 1: Safety; Guideline A and Operation Standard 13: Routine Inspections; Guideline O

Photo 2: Fuel gas compressors at the gas yard.

Finding 7 – The plant failed to mitigate a trip hazard.

The plant failed to mitigate a trip hazard at a frequently used ramp, a violation of Operation Standard[14]. Auditor noticed workers utilized a handrail gap as a shortcut to enter a building. However, the gap was not meant to be an entry. It was too narrow, the step was too high, and an abutting storm drain posed a trip hazard.

[14] Operation Standard 1: Safety; Guideline A

Photo 3: Trip hazard at a building ramp.

In response, the plant abated the hazard by reconfiguring the ramp. The plant bridged the handrail gap and added a side entry for better access. Further, the plant thickened the concrete pad to reduce the steps' height. No further corrective action is required at this time.

Photo 4: Reconfigured ramp to mitigate trip hazards.

Finding 8 – The plant's secondary assembly point was not marked.

The plant's secondary assembly point was not marked. In an emergency evacuation, workers gather at one of two assembly points. It is important that the plant identify these areas so workers know where to assemble. In response, the plant posted proper signage at its secondary assembly point. No further corrective action is required at this time.

Finding 9 – The plant lacked proper procedure for an air switch.

The plant lacked proper operating procedure for an air switch, which resulted in a worker's injury in April 2009, a violation of Operation Standard[15].

In response, the plant analyzed the root cause and implemented the following corrective actions:

- Developed a detailed operating procedure
- Posted the procedure and added warning signs on the switch
- Briefed workers on the switch's hazard
- Informed Calpine's fleets of this hazard

Auditor reviewed the procedure and inspected the switch to verify postings of the procedure and warning signs. The switch is a 4 kV vertically racked air switch. It shuts power to the plant's two chillers, which the plant uses to chill inlet air for the gas turbines. The plant has four of these switches, all located inside the 4 kV load center. Since the 2009 injury, the plant has not had any incident involving these switches. No further corrective action is required at this time.

[15] Operation Standard 7: Operation Procedures and Documentation; Guidelines A thru J

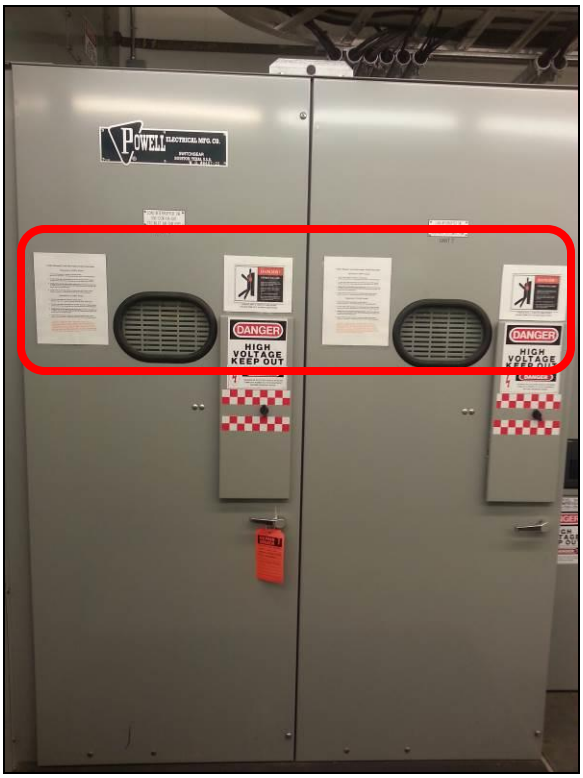

Photo 5: Operating procedure and warning signs posted on an air switch.

Finding 10 – The plant delayed critical maintenance.

The plant delayed critical maintenance in order to meet company metrics, a violation of Maintenance Standard[16]. Calpine measures plant performance based in part on how much time a plant spends in outages. In March 2010, Unit 4's gas turbine failed and resulted in a lengthy outage. To compensate, the plant cancelled repair outages for Units 1 and 3 in order to meet Calpine's metrics.

In the re-audit, Auditor reviewed a list of repair backlogs from April 1 to June 30. The list had 79 mid priority repairs, a backlog comparable to similar-sized combined-cycle plants. Auditor found no urgent opened orders or evidence that would suggest the plant delayed critical maintenance. No further corrective action is required at this time.

[16] Maintenance Standard 3: Maintenance Management and Leadership; Guideline A.1

Finding 11 – The plant failed to implement corrective actions identified in its RCA reports.

The plant failed to implement corrective actions identified in its RCA reports for incidents that compromised worker safety and equipment reliability, a violation of Operation Standard[17].

The following RCA corrective actions were not implemented:

- Create log/round sheets to document routine inspection for the switchyard and relay house as recommended in RCA# 09-05 dated September 27, 2009
- Implement a preventive maintenance program for the GTG breakers as recommended in RCA# 08-04 (this recommendation stemmed from several failures between January 1, 2008 and November 24, 2008)
- Create a startup procedure for the gas turbine inlet air as recommended in RCA# 09-07 dated December 9, 2009

In the re-audit, Auditor reviewed procedures and found that the plant had completed the corrective actions. No further corrective action is required at this time.

Finding 12 - The plant lacked a thermography inspection program.

The plant lacked a thermography inspection program, a violation of Operation Standard[18]. While the plant conducts routine thermographic inspections, it lacked a formal program. A formal program is important because it defines the what, when, where, why, and how of the inspections. For example, a thermography inspection report[19] lacked the following key information:

- Plant megawatt output
- Plant status and configuration
- Plant ambient condition
- Time data was recorded
- Equipment load and/or speed
- Recorded thermographic image

In response, the plant explained that thermography is part of Calpine's Predictive Maintenance (PDM) Program. Auditor reviewed the program. It includes thermography and describes it in more details. However, it still lacked key information. The plant explained that Calpine's PDM group retains key equipment data and works closely with the contractor. The contractor is the subject matter expert and conducts the actual thermographic inspection. Once data is gathered, Calpine works closely with the contractor to analyze and interpret the data. No further corrective action is required at this time.

[17] Operation Standard 16: Participation by Operations Personnel in Work Orders; Guideline B
[18] Operation Standard 7: Operation Procedures and Documentation; Guideline D
[19] Predictive Maintenance Report, Infrared Thermography, dated May 9, 2009

Finding 13 – The plant failed to maintain cooling water chemistry.

The plant failed to maintain cooling water chemistry, a violation of Maintenance Standard[20]. Proper chemistry is important because it affects scaling and corrosion in feed and cooling water systems.

Auditor noted the cooling water pH from July 1 through July 15, 2010 exceeded its upper limit of 7.2.[21] The actual reading was about 8.5. The plant explained that it had replaced its sulfuric acid tank with a new system, which failed to control pH. Despite the excursion, the plant failed to take proper corrective action.

In the re-audit, the plant explained that it had installed new HRSGs and water control systems during its combined-cycle upgrade. The new system has a higher pH tolerance and better monitoring. Auditor reviewed records and real-time readings and found the water pH to be within tolerance. No further corrective action is required at this time.

Finding 14 – The plant failed to conduct an arc flash study.

The plant failed to conduct an arc flash study, a violation of Operation Standard[22] and industry standards[23] [24]. The study analyzes how much hazardous energy a piece of energized electrical equipment can release and expose to workers should it undergo an arc fault. The information allows the plant to set the proper PPE level requirement for workers.

In the re-audit, Auditor reviewed an arc flash study conducted by CH2MHILL dated December 2013. It analyzed and documented the hazard at Los Esteros and superseded an older study. Auditor inspected high-voltage (4 and 13 kV) load centers and verified proper warning labels affixed on breakers. Auditor also verified that the plant has proper protective clothing. No further corrective action is required at this time.

[20] Maintenance Standard 15: Chemistry Control; Guideline C
[21] Daily Operations Water Chemistry Report
[22] Operation Standard 1: Safety; Guideline A
[23] National Fire Protection Association NFPA 70E-2004, Annex K states:
"The majority of hospital admissions due to electrical accidents are from arc-flash burns, not from shocks. Each year more than 2,000 people are admitted to burn centers with severe arc-flash burns. Arc-flashes can and do kill at distances of 10 ft."
[24] National Electrical Safety Code NESC C2-2007, Rule 410.A.3 states:
"Effective as of January 1, 2009, the employer shall ensure that an assessment is performed to determine potential exposure to an electric arc for employees who work on or near energized parts or equipment. If the assessment determines a potential employee exposure greater than 2 cal/cm^2 exists, the employer shall require employees to wear clothing or a clothing system that has an effective arc rating not less than the anticipated level of arc energy."

Finding 15 – The plant failed to record routine operating data.

The plant failed to record routine operating data, a violation of Operation Standard[25]. Auditor reviewed a sample round sheet and noted the plant recorded only offline data; online data was not recorded. Online data is important because it allows the plant to monitor equipment's operating condition. The data also helps the plant to trend and schedule preventive repairs.

In the re-audit, the plant explained that it now uses a software called "Roundskeeper" to record operating data. Operator carries a tablet to record data during his or her round, which he or she conducts three times a day (morning, afternoon, and evening).

The software allows the plant to set lower and upper limits for any readings. If a reading falls out-of-range, the software alerts the operator. This helps inexperienced operators who are less familiar with a piece of equipment's operating range. Instruments also measure the same data and send it directly to the plant's DCS, which also has alarm setpoints. Auditor accompanied an operator on a round and observed the software's application. No further corrective action is required at this time.

Finding 16 - The plant failed to manage control system alarms.

The plant failed to manage control system alarms, a violation of Operation Standard[26]. Auditor saw excessive nuisance alarms in the plant's DCS. Further, most alarms were silent except for emission alarms. Some alarms were visually masked because they displayed the wrong information.

The plant must better manage alarms to ensure safe and reliable operation. Excessive nuisance alarms can deluge an operator with large amounts of data. This can overwhelm the operator, and hinder his or her ability to process information and make sound decision.

In response, the plant explained that the nuisance alarms were due to incompatibility between the control system and user interface. The original control system was a Siemens TXP system. The plant upgraded the system's interface with an Emerson product, which resulted in compatibility issues and triggered the nuisance alarms.

The plant changed to a complete Emerson system when it upgraded to a combined-cycle plant in August 2013. Since then, the plant has not had as many nuisance alarms. In addition to Emerson, the plant also uses a GE and Mitsubishi system for its gas and steam turbine, respectively. However, the plant has not had any issues with these systems. No further corrective action is required at this time.

[25] Operation Standard 13: Routine Inspections; Guidelines L, M, and N
[26] Operation Standard 13: Routine Inspections; Guideline P

Finding 17 – The plant's Ammonia Offload Procedure needed correction.

The plant's Ammonia Offload Procedure[27] needed correction, a violation of Operation Standard[28]. The procedure erroneously states that operator should fill the storage tank up to a point that triggers a high-level alarm. This causes a nuisance alarm each time an operator fills the tank.

In response, the plant explained that operator should not fill the tank above 80% without management approval. An overfill horn goes off at 95%. Therefore, if an operator follows the procedure, he or she will not cause a nuisance alarm. Auditor reviewed the current procedure. No further corrective action is required at this time.

Finding 18 - The plant was understaffed.

The plant was understaffed, a violation of Operation Standard[29]. Auditor noted the plant had a single operator during night shifts. This created a safety risk because the operator cannot summon for help if he or she becomes impaired. Also, the plant lacked an outside operator, even during day shifts, to monitor and record operating data (Finding 15). Finally, insufficient staffing led the plant to delay contractor-recommended and RCA corrective actions (Findings 3 and 11).

In the re-audit, Auditor found that the plant has addressed the issue of staff shortage. On the maintenance side, the plant was short-staffed up until early 2015. This resulted in a backlog of repair orders. At one point, the Instrumentation Controls and Electrical group was down to one technician due to a competitive job market. Since then, the plant has hired two more technicians, and the group is now fully staffed. On the operation side, Auditor saw no evidence of staff shortage. The plant now has two operators on-duty during the day and at night. No further corrective action is required at this time.

Finding 19 – The plant's safety orientation needed improvement.

The plant's safety orientation needed improvement, a violation of Operation Standard[30]. The orientation made no mention of safety training that workers are required to take if they perform hazardous work. For example, worker who works in a confined space would have to be trained on the plant's confined space entry procedure. Worker who handles ammonia or other hazardous chemicals would have to be acquainted with the plant's accidental release program or spill prevention counter measures.

In response, the plant explained that its orientation only provides an overview of the plant's safety risks. The plant also uses the JSA and SWP process to address job-specific risks. The

[27] Ammonia Storage and Unloading Procedure, SOP-21
[28] Operation Standard 7: Operation Procedures and Documentation; Guideline C
[29] Operation Standard 9: Engineering and Technical Support; Guideline D
[30] Operation Standard 1: Safety; Guideline B

JSA studies the safety aspect of a job and identifies relevant safety measures, including additional training. The SWP ensures workers obtain proper permits for a job, such as a confined-space entry permit or a hot work permit. No further corrective action is required at this time.

Finding 20 – The plant's Contractor Safety Procedure needs clarification.

The plant's Contractor Safety Procedure[31] needs clarification, a violation of Operation Standard[32]. The procedure defines safety contact in a confusing manner. For example, Section 1.6 states, "In the event of multiple shifts, the Contractor Representative shall identify a primary contact for safety for each shift" and "In the event that a subcontractor is on a Calpine site unsupervised by the Affected Contractor (e.g., chemical delivery) the subcontractor shall be considered the safety contact". However, the procedure fails to define who the safety contact actually is (e.g. job title) or what his or her responsibilities are.

Further, Section 3 (Acronyms and Definitions) defines **Contractor Representative** as the person who has the ultimate responsibility and decision-making authority while working at the plant. However, Section 4 (Responsibility) refers to that person as the **Affected Contractor Representative** instead. To avoid confusion, Auditor recommends that the plant revise its procedure so that definitions stay consistent throughout the document.

Finding 21 - The plant fails to repair hotspots.

The plant fails to repair hotspots, a violation of Operation Standards[33]. Auditor reviewed a thermography inspection report[34] and noted hotspots at the gas turbines' exhaust cylinders[35]. Thermal images showed the cylinder registered a temperature well above 500°F.

[31] Contractor Safety Procedure, EHS-14
[32] Operation Standard 7: Operation Procedures and Documentation; Guideline C
[33] Operation Standard 1: Safety; Guideline A and Operation Standard 13: Routine Inspections; Guideline O
[34] Infrared Thermography Predictive Maintenance Report by RTSI dated July 25, 2014
[35] The cylinder connects the gas turbine's exhaust diffuser to an expansion joint.

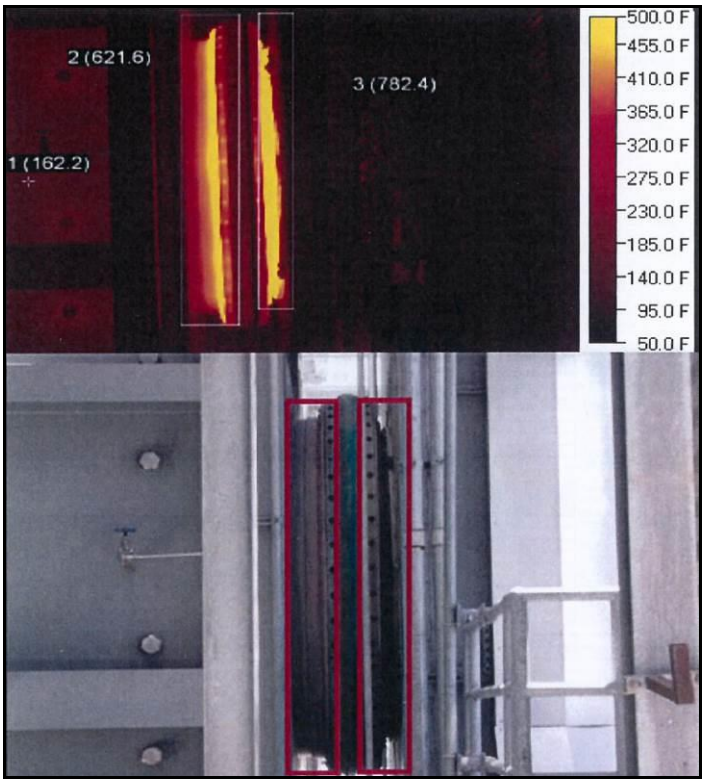

Figure 2: Thermal image of a gas turbine exhaust cylinder.

Exhaust cylinders have had a failure history that resulted in outages at Calpine's Metcalf Energy Center. In March 2007, connector bolts failed on Unit 1's cylinder.

Photo 6: Connector bolts failed at Metcalf's Unit 1. *Source: March 22, 2007 File Photo*

Three months later in June 2007, Unit 2's cylinder also failed. This resulted in a forced outage that lasted more than a week.

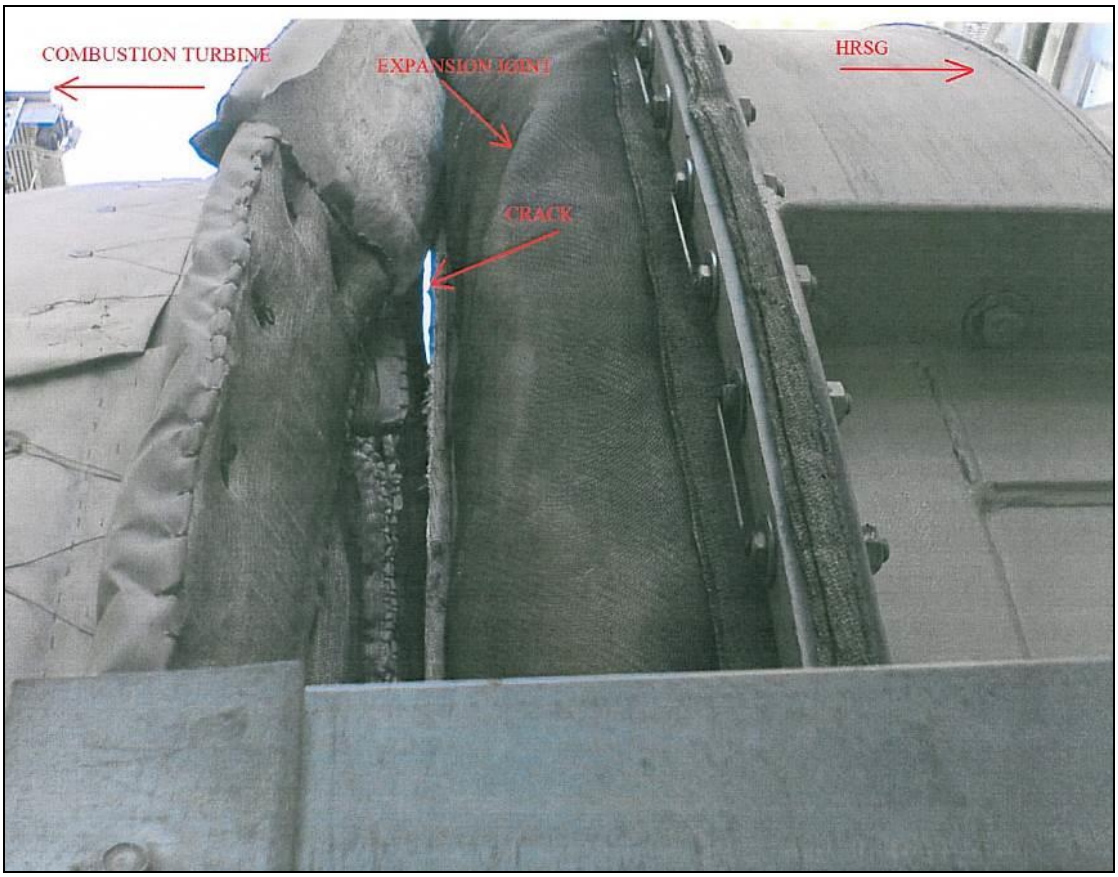

Photo 7: Unit 2's cylinder split opened at flange. *Source: Calpine*

Aside from affecting reliability, hotspots also present a burn risk hazard for workers.[36] The plant must take corrective action to repair hotspots.

Finding 22 - Plant procedure exposes workers to safety hazards.

Plant procedure exposes workers to safety hazards, a violation of Operation Standard[37]. Auditor noticed that, per plant procedure, operator has to climb on pipes and lean over a safety guardrail in order to shut off valves before they can access a restricted area. Operators have already damaged pipe insulation on the pipes over which they must climb in order to access a shutoff valve. Operator also has to lean over a guardrail in order to shutoff a CO_2 valve. The plant should implement engineering control to mitigate this hazard.

[36] California Code of Regulations, Title 8, Section 3308 requires "pipes or other exposed surfaces having an external surface temperature of 140°F or higher and located within 7 feet measured vertically from floor or working level or within 15 inches measured horizontally from stairways, ramps, or fixed ladders shall be covered with a thermal insulating material or otherwise guarded against contact."
[37] Operation Standard 1: Safety

Photo 8: Operator maneuvered pipes and conduits in order to access a shutoff valve.

Photo 9: Operator leaned over a guardrail to shutoff a CO_2 valve.

Finding 23 - The plant fails to mitigate fall hazards at elevated platforms.

The plant fails to mitigate fall hazards at elevated platforms, a violation of Operation Standard[38]. Auditor noticed elevated platforms at the gas turbines lacked platform ladders and swing gates to prevent fall hazards. Worker uses the platforms routinely to perform repairs. Elevated work surfaces are a major source of workers' injuries that often result in lost production and increased workers' compensation costs. The plant should mitigate this hazard.

Finding 24 - The plant's physical security needs improvements.

The plant's physical security needs improvement, a violation of Operation Standard[39]. Auditor noticed the following deficiencies:

- The Zanker Road gate is left open due to a dysfunctional closer

[38] Operation Standard 1: Safety
[39] Operation Standard 21: Plant Security; Guideline A

- The gate cameras malfunction periodically and are unreliable
- The security fence is not monitored
- The perimeter fence lacks barbed wire
- The outer perimeter fence lacks “No Trespassing” signs
- The entry gate lacks a “Prohibited Items” sign as required by the “Physical Security Plan”
- The plant lacks an effective procedure to minimize multiple personnel passing through a security checkpoint on a single pass
- The south perimeter fence has excessive vegetation obscuring the view and provides an intrusion path

Photo 10: Perimeter walls are not monitored and lack barbed wire to deter intruders.

Photo 11: South perimeter wall has excessive vegetation providing an intrusion path.

Finding 25 - The plant lacks inventory control and condition review of its spill kits.

The plant lacks inventory control and condition assessment of its Spill Prevention Control and Countermeasure (SPCC) kits, a violation of Operation Standard[40]. The plant has spill kits throughout the facility to mitigate hazmat spills. However, Auditor found the contents of those kits to be inconsistent. Moreover, the absorbency capacity of each kit is not apparent. Auditor found no evidence that the plant checks the inventory of spill kits regularly and restocks them as needed. Auditor noted that workers used the kits for minor drips and leaks without replenishing them. This defeats the purpose of a kit. Further, the plant does not assess the condition of the spill kits. In at least one occasion, worker was unable to open the container lid of a kit.

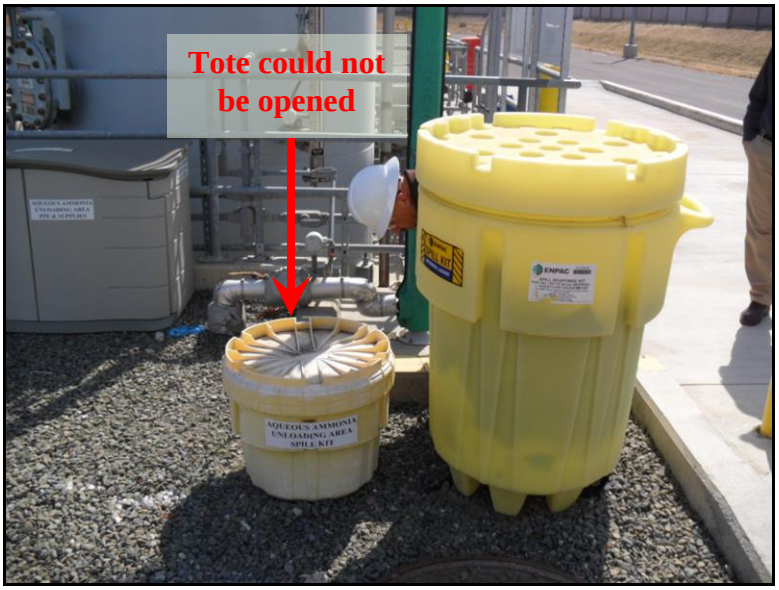

Photo 12: Spill kits at the ammonia storage tank.

Finding 26 - The plant fails to repair defects in its fire protection system.

The plant fails to repair defects in its fire protection system, a violation of Operation Standard[41]. The plant has not repaired the following defects:

- Missing shut target PIV #39
- Missing open target PIV #44
- Missing site glass PIV #44
- Missing alignment of shut target at valves #4, #14, and #15
- Pump House Alarm (printer error)

[40] Operation Standard 10: Environmental Regulatory Requirements; Guideline A
[41] Operation Standard 28: Equipment and Systems

Further, the plant also fails to replace 43 corroded fire sprinkler heads. Corroded sprinklers will not discharge water properly and affect their fire-fighting ability.

Finding 27 - The plant's walkdown inspection needs improvements.

The plant's walkdown inspection needs improvements, a violation of Operation Standard[42]. In a routine walkdown, Auditor observed that operator frequently checked only one box on the round sheet after he had inspected multiple pieces of equipment. This practice is discouraged because it breeds complacency. Often times, this causes operator to miss or overlook crucial instruments or system components.

Auditor also noticed the round sheet has general headings with no separation of tasks due to equipment location. For example, during the "turbine aux system inspection", if the operator is on the "A" side of the turbine, he would walk to the "B" side before checking off a general heading called "Electricals". This process would repeat itself for each heading such as "Hydraulics" and so on. For simplicity and accuracy, all headings should be listed on separate sheets ("A" side and "B" side), thereby allowing the operator to complete one side before having to move to the opposite side.

Finding 28 - The plant's work management process causes confusion.

The plant's work management process causes confusion, a violation of Operation Standard[43]. The plant installs red tags to identify equipment in need of repair after a work order is created in Maximo, the plant's work management system. However, the process does not ensure that workers remove the tags after the equipment has been repaired. Auditor saw an unusual number of red tags on equipment, and many were very old; one dated back to February 2011.

Finding 29 - The plant fails to train staff on its Emergency Action Plan.

The plant fails to train staff on its Emergency Action Plan (EAP), a violation of Operation Standard[44]. Auditor questioned the control room operator on emergencies response. The operator performed adequately on fire and injury scenarios but had difficulty with disaster and security scenarios. The plant must ensure workers are well trained and familiarized with the EAP in response to all types of emergencies.

[42] Operation Standard 13: Routine Inspections
[43] Operation Standard 16: Participation by Operations Personnel in Work Orders
[44] Operation Standard 20: Preparedness for On-Site and Off-Site Emergencies

Finding 30 - The plant's EAP needs improvements.

The plant's EAP needs improvements, a violation of Operation Standard[45]. First, Auditor noted that in an emergency, the plant does not provide first responders with dedicated radios and frequency. This can significantly delay or adversely affect emergency response.

Second, in an emergency, operator is to inform the operation and maintenance managers. However, their contact numbers are not readily available in the control room. In an urgent situation, workers often panic, making phone numbers handy (as in speed-dials) can avoid unnecessary delays.

Third, the plant does not make its emergency phone number easily accessible to visitors and contractors. Auditor recommends the plant to provide the number on a card or a hardhat's sticker, or require workers to program the number into their cell phones as speed-dials.

Finally, the plant has no public address system. In an emergency, information may mean the difference between life and death. The bullhorn that the plant currently uses is not effective as it can be easily drowned out by equipment noise.

[45] Operation Standard 20: Preparedness for On-Site and Off-Site Emergencies