Final Report on the Audit of Potrero Power Plant
For Conformance with General Order 167

Electric Generation Performance Branch
Consumer Protection and Safety Division

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California Public Utilities Commission

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Audit Number: GO167-1001

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EXECUTIVE SUMMARY AND CONCLUSIONS

This Final Report concludes the Consumer Protection and Safety Division's (CPSD's) audit of the Potrero Power Plant. Starting in October 2004, CPSD audited the plant for compliance with the California Public Utilities Commission's General Order 167, which includes operation and maintenance standards for power plants. The audit team reviewed plant data and visited the plant site.

On August 22, 2005, CPSD issued its Preliminary Report, which found eight potential violations of Operation and Maintenance Standards. Although the plant disputes many of CPSD's findings and their characterization as violations, the plant agreed to take corrective actions, summarized below.

Finding 1.1 CPSD Auditors found uncovered junction boxes and loose wiring. Potrero closed the junction boxes and repaired the wiring.

Finding 1.2 CPSD Auditors found oil accumulation in the collection pan of the Lube Oil Supply Pump to the Main Boiler Feed Pump, an obvious fire hazard. Potrero added two extra drain holes, allowing it to drain properly. Potrero should inspect the plant regularly for unsafe conditions.

Finding 2.1 Plant security was inadequate as evidenced by graffiti and an instance of vandalized plant equipment. Potrero improved security [redacted] The plant will remove graffiti from buildings. Potrero will [redacted] Potrero is required to report on the progress of proposed security improvements by September 30th, 2007, and to submit an analysis of the effectiveness of the security system by June 2009.

Finding 2.2 Unit 4, 5 and 6's gas turbines repeatedly broke down due to fuel contamination, reportedly from rust on the inside wall of the fuel storage tank. Potrero modified piping, added pressure instrumentation, and changed the way the plant operates the fuel system. The plant will make additional improvements to the filtration system.

Finding 2.3 Potrero lacked procedures to determine whether contractors were qualified to perform the work assigned to them, lacked adequate records documenting that contractors had received

safety training and had no record of site evacuation drills. Potrero adopted a new operating order which, among other things, requires a safety orientation for all contractors and visitors to Potrero, including a record of the training showing the trainer name, employer name, and date of training. Potrero will keep the records on file in its main office. In addition, Potrero will conduct evacuation drills annually. Potrero should keep records listing the names of contract employees working on site, signed by a responsible manager and indicating that Potrero considers each qualified.

Finding 2.4 An auditor witnessed contractors working unsafely, for example, standing on piping far above the ground without proper fall protection. Potrero will revise its safety procedures to ensure that all contractors receive safety training and are monitored.

Finding 2.5 Potrero lacked a formal work order for a repair to the piping of the plant's fire protection system. Without a formal work order, staff could forget to perform or complete important safety modifications. Potrero should submit a work order procedure which states that work activities affecting the safety and operation of the power plant must be entered into the work order system, tracked to completion and recorded.

Finding 2.6 An outdoor emergency placard, designating an emergency evacuation assembly area, had fallen to the ground. Potrero replaced the placard and created a work order to inspect emergency signs and equipment annually.

CPSD is satisfied that Potrero's corrective actions will adequately address the issues raised in the preliminary report.

INTRODUCTION

This Final Report concludes the Consumer Protection and Safety Division's (CPSD's) audit of the Potrero Power Plant, owned by Mirant Corporation. CPSD audited the plant for compliance with the California Public Utilities Commission's (the Commission's) General Order 167. GO 167 includes Operation and Maintenance Standards for power plants, adopted in May and December of 2004, respectively, under Public Utilities Code section 761.3

In October 2004, CPSD contacted Potrero to schedule the audit visit, and requested pertinent documents and data. CPSD's audit team, including Chuck Magee, Ron Lok, Chris Lee, Chris Parkes, and Rick Tse, reviewed this material. On November 15-17, 2004, and January 4, 2005, the team visited the plant, inspecting equipment, examining documents, observing plant operations, and interviewing plant staff and managers.

CPSD issued its Preliminary Audit Report ("Preliminary Report") dated August 22, 2005, and the plant submitted its response on October 10, 2005. CPSD and Potrero met and conferred on December 16, 2005 and September 20, 2006. In response to these meetings and subsequent staff inquiries, Potrero provided additional documentation.

In the Preliminary Report, CPSD identified eight potential violations of various Maintenance and Operation Standards.[1] Although the plant disputes many of CPSD's findings and their characterization as violations, the plant agreed to take corrective actions, summarized below.

Finding 1.1	CPSD Auditors found uncovered junction boxes and loose wiring. Potrero closed the junction boxes and repaired the wiring.
Finding 1.2	CPSD Auditors found oil accumulation in the collection pan of the Lube Oil Supply Pump to the Main Boiler Feed Pump, an obvious fire hazard. Potrero added two extra drain holes, allowing it to drain properly. Potrero should inspect the plant regularly for unsafe conditions.

[1] While Operation Standards were not in effect during the on-site audit in November, 2004, those standards took effect in June 2005 (180 days after the Commission's December 2004 Decision adopting them). During the audit, staff observed problems with the security of the plant, which the staff believed were potential violations of Maintenance Standards regarding plant safety. Once Operation Standards took effect, these problems also became potential violations of the Operation Standard on plant security.

Finding 2.1 Plant security was inadequate as evidenced by graffiti and an instance of vandalized plant equipment. Potrero improved security by [redacted] The plant will remove graffiti from buildings. Potrero will [redacted] Potrero is required to report on the progress of proposed security improvements by September 30th, 2007, and to submit an analysis of the effectiveness of the security system by June 2009.

Finding 2.2 Unit 4, 5 and 6's gas turbines repeatedly broke down due to fuel contamination, reportedly from rust on the inside wall of the fuel storage tank. Potrero modified piping, added pressure instrumentation, and changed the way the plant operates the fuel system. The plant will make additional improvements to the filtration system.

Finding 2.3 Potrero lacked procedures to determine whether contractors were qualified to perform the work assigned to them, lacked adequate records documenting that contractors had received safety training and had no record of site evacuation drills. Potrero adopted a new operating order which, among other things, requires a safety orientation for all contractors and visitors to Potrero, including a record of the training showing the trainer name, employer name, and date of training. Potrero will keep the records on file in its main office. In addition, Potrero will conduct evacuation drills annually. Potrero should keep records listing the names of contract employees working on site, signed by a responsible manager and indicating that Potrero considers each qualified.

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completion and recorded.

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Auditors targeted parts of the plant for special examination, after reviewing reports from CPSD inspections of outages at the plant.[2] These parts included:

A. Unit 3's boiler,
B. Maintenance procedures for the gas turbines of Units 4, 5, and 6,
C. Root cause analysis of fuel contamination for Units 4, 5, and 6,
D. Plant Security,
E. Plant Safety Program,
F. Employee and Contractor training and work qualification,
G. Physical equipment safety (certifications, safety guards on rotating machinery, fall protection).

Section 1 of this report discusses safety hazards that required immediate corrective action. Section 2 of the report discusses other potential violations of Operation and Maintenance Standards. Section 3 describes other audit activities where auditors found no apparent violations.

[2] CPSD inspects plants when mechanical or other failure reduces plant capacity by 50 megawatts or more.

PLANT DESCRIPTION AND PERFORMANCE

Potrero Power Plant (Potrero) is located east of Potrero Hill, in the Central Basin area of San Francisco. Owned by the Mirant Corporation, the plant consists of Units 3, 4, 5, and 6. In 1981, Pacific Gas and Electric Company, the plant's original owner, retired and dismantled Units 1 and 2, which were boiler powered. Unit 3 is a 206 megawatt (MW) boiler-powered unit, and Units 4, 5, and 6 are oil-fired, gas-turbine peaking units, each with 52 MW capacity and black-start capability. Unit 3 began commercial operation in 1965, and Units 4, 5 and 6 began operation in 1976. The California Independent System Operator (CAISO) has designated all units at Potrero as Reliability-Must-Run (RMR), because the units are required to maintain the reliability of San Francisco's power supply.

Historical outage data from the Commission's outage inspection reports and CAISO outage data included numerous forced outages throughout the year 2004 due to plugged fuel system filters in Units 4, 5, and 6. These issues are discussed further in the body of this report.

SECTION 1—Safety Hazards Requiring Immediate Corrective Action

Maintenance Standard 1 – Safety:

The protection of life and limb for the work force is paramount. The company behavior ensures that individuals at all levels of the organization consider safety as the overriding priority. This is manifested in decisions and actions based on this priority. The work environment, and the policies and procedures foster such a safety culture, and the attitudes and behaviors of individuals are consistent with the policies and procedures.

Assessment Guidelines:

A. Individuals at all levels in the organization contribute to the safety culture of the work environment through:
   1. Demonstrating a great respect for safety in all actions and decisions.
   2. Demonstrating a questioning attitude by challenging existing conditions, considering the potential adverse consequences prior to proceeding, and willingness to stop work in the face of uncertainty.
   3. Demonstrating a willingness to identify problems and ensure they are corrected.
   4. Accepting accountability for their own performance, including recognizing shortfalls and acting to improve.
   5. Holding their co-workers accountable for their performance.
   6. Using peer checking as a means of protecting themselves and others.

B. Managers in the organization contribute to the safety culture of the work environment through:
   1. Establishing standards and clearly communicating expectations that safety is the highest priority.
   2. Maintaining an environment that welcomes identification and communication of problems.
   3. Reinforcing individual behaviors that promptly and forthrightly identify problems.

C. Work practice norms in the organization promote the safety culture through:
   1. Appropriate defenses, such as technical accuracy, precautions, cautions and notes, are explicitly embedded in procedures, processes, and equipment configuration to minimize the occurrences and consequences of inappropriate actions.
   2. Clearly defined responsibility and authority for implementing a conservative approach with respect to stopping activities and seeking assistance or guidance when faced with uncertain conditions are

communicated to all personnel. This expectation is reinforced frequently.
3. Ensuring safety concerns are promptly identified and resolved.
4. Training which reinforces safety practices and expected behaviors.

Finding Number 1.1 – Unsafe Wiring

Unsafe wiring observed at the Potrero Power Plant is a potential violation of Maintenance Standard 1 - Safety. Wiring should be routed using approved methods. Electrical boxes should be adequately closed. A CPSD auditor observed several instances of exposed wiring during a physical inspection of the plant.

- The auditor found open junction boxes with exposed wires in the Unit 3 boiler area. These wires were cut at both ends and therefore were de-energized. However, the boxes and fittings should be closed to prevent confusion and to prevent accidental re-energizing of these wires. (See Photos 1 and 2)

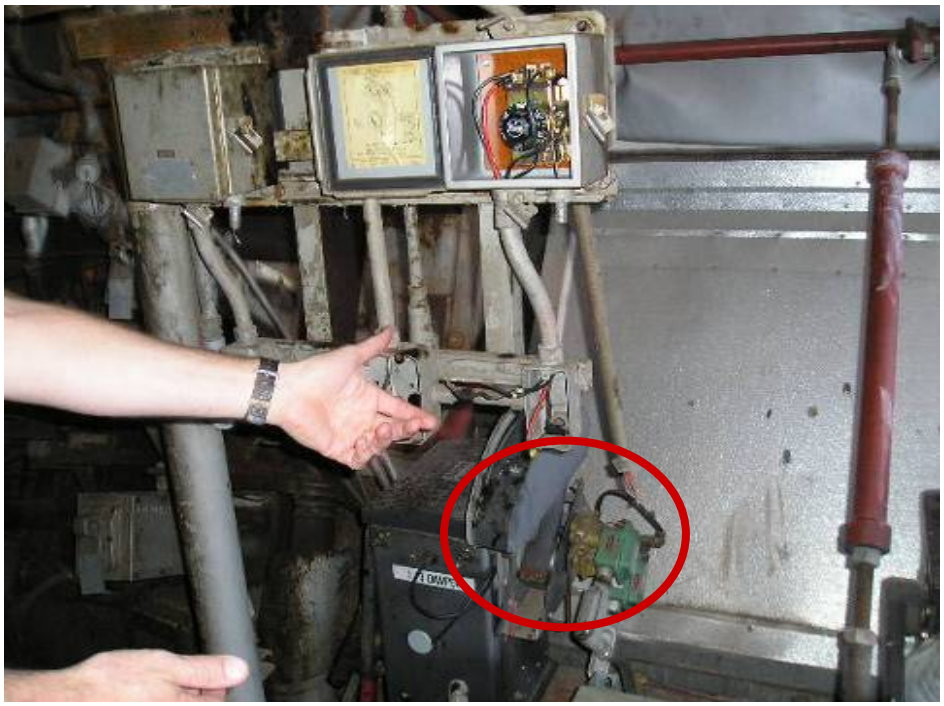


Photo 1 Uncovered wiring

Photo 2 Uncovered wiring

Photos 1 and 2 are opposite ends of a de-energized wire abandoned in place. No covers on the electrical boxes.

- The auditor found exposed wiring not enclosed by conduit on Unit 3 Elevation 17, Column 11-L. This wiring, which hung loosely on and above the deck, appeared to be energized because it was connected to an outdoor light. The wiring is vulnerable to mechanical damage, is exposed to the elements and may be mistaken for de-energized wiring that has been abandoned. The National Electric Code contains no approved methods for running exposed wiring along the floor. (See Photos 3 and 4)

Photo 3 Loose wiring at Elevation 17, Column 11-L – See Photo 4 for close-up view.

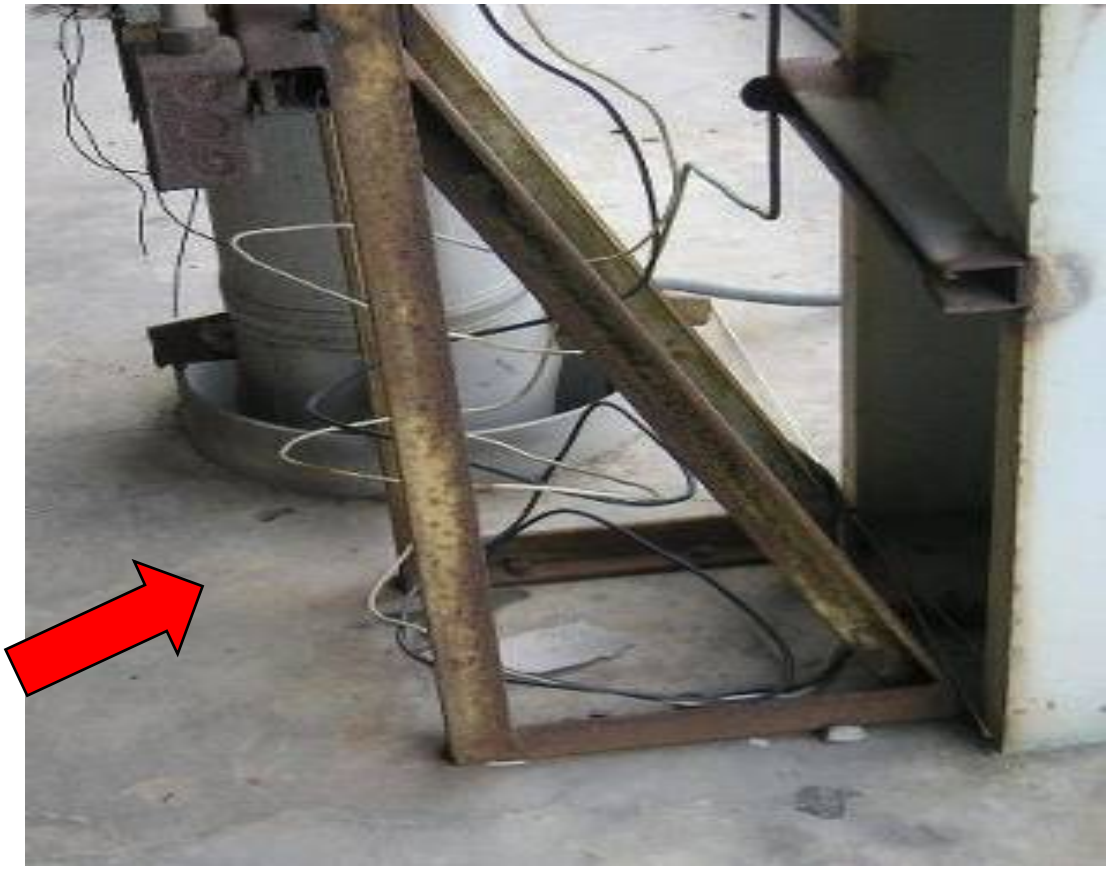


Photo 4 Loose wiring

Photo 4 is an enlarged view of photo 3 and shows possible live wiring without conduit leading to a street light attached to this deck.

- The auditor observed an open junction box with exposed, energized wiring in the Unit 3 boiler area. Connections, covered by electrical tape, are exposed to the elements, and could easily degrade, subjecting workers to electrical shock. The 1999 edition of the National Electric Code, Section 370-17 (a) states, "Openings through which conductors enter shall be adequately closed." See Photo 5.

Photo 5 Open electrical box

Photo 5 shows an open electrical box, with wires covered only by electrical tape. The wiring in this box is energized, as evidenced by the lights on the box above it.

Exposed wiring was observed on the Unit 3 boiler structure, as seen in Photos 1 thru 5. Locations were reported to Mirant at the time of the audit.

Outcome and follow-up

CPSD auditors notified plant management of this finding during the audit visit. CPSD auditors verified on subsequent inspections that Potrero has corrected the wiring. Potrero should inspect the plant regularly for unsafe conditions.

Finding Number 1.2 – Oil Fire Hazard

A fire hazard found at the Potrero Power Plant is a potential violation of Maintenance Standard 1 - Safety. The CPSD auditor observed a large pool of oil contained in the oil pan on the skid of the Lube Oil Supply Pump to the Main Boiler Feed Pump. The pool of oil was a potential fire hazard. The pan's drain hole appeared to be located at the highest point of the drain pan preventing the oil from draining completely. (See Photo 6)

Photo 6 Pooling of oil was observed on the skid of the Lube Oil Supply Pump to the Main Boiler Feed Pump.

Outcome and follow-up

CPSD auditors notified plant management of this finding during the audit visit. On subsequent inspections, CPSD auditors verified that Potrero had installed two extra drain holes in the oil pan to prevent oil from pooling there. Potrero should inspect the plant regularly for unsafe conditions.

SECTION 2—Potential Violations of Operation and Maintenance Standards

Operation Standard 21 - Plant Security

To ensure safe and continued operations, each GAO provides a prudent level of security for the plant, its personnel, operating information and communications, stepping up security measures when necessary.

Assessment Guideline A:

Each generation facility is secure and considers the following concerns:

1. Protection of Personnel
2. Exterior Perimeter Security
3. Key Control
4. Intrusion Detection and Response
5. Protective Lighting
6. Material Handling
7. Computer Security
8. On-Site Building Access
9. Major Equipment and Switchyard Security
10. Parking Facility Access
11. Access to the site by non-employees
12. Security Personnel Screening and Training
13. Varying levels of security

Maintenance Standard 1 – Safety:

The protection of life and limb for the work force is paramount. The company behavior ensures that individuals at all levels of the organization consider safety as the overriding priority. This is manifested in decisions and actions based on this priority. The work environment, and the policies and procedures foster such a safety culture, and the attitudes and behaviors of individuals are consistent with the policies and procedures.

Assessment Guideline C.3:

Work practice norms in the organization promote the safety culture in that safety concerns are promptly identified and resolved.

Maintenance Standard 11 - Plant Status and Configuration:

Station activities are effectively managed so plant status and configuration are maintained to support reliable and efficient operation.

Finding Number 2.1 - Plant Security

CPSD Auditors found Potrero Power Plant potentially in violation of Operation Standard 21 and Maintenance Standards 1 and 11. The power plant lacks adequate physical security, resulting in reliability and safety issues.

Intrusions by unauthorized personnel onto the property of the Potrero site have resulted in stolen and damaged power plant equipment, and in one instance, caused Potrero's Unit 4 to go off-line. The intrusions appear to be regular events as demonstrated by the amount of graffiti on the areas bordering the public streets. CPSD auditors noted the following which indicate that intruders have entered the plant site repeatedly and placed plant security at risk:

- There is extensive graffiti on the abandoned old boiler building area (see photos 7 through 11).
- On 1/5/04 intruders damaged the Unit 4 water injection 480 V breaker by prying open the access door of breaker box 52-33-9B. The plant took Unit 4 out of service for two days while repairs were made (see photo 12).
- [redacted]
- According to the Plant Manager, intruders had been recently observed on the project site.

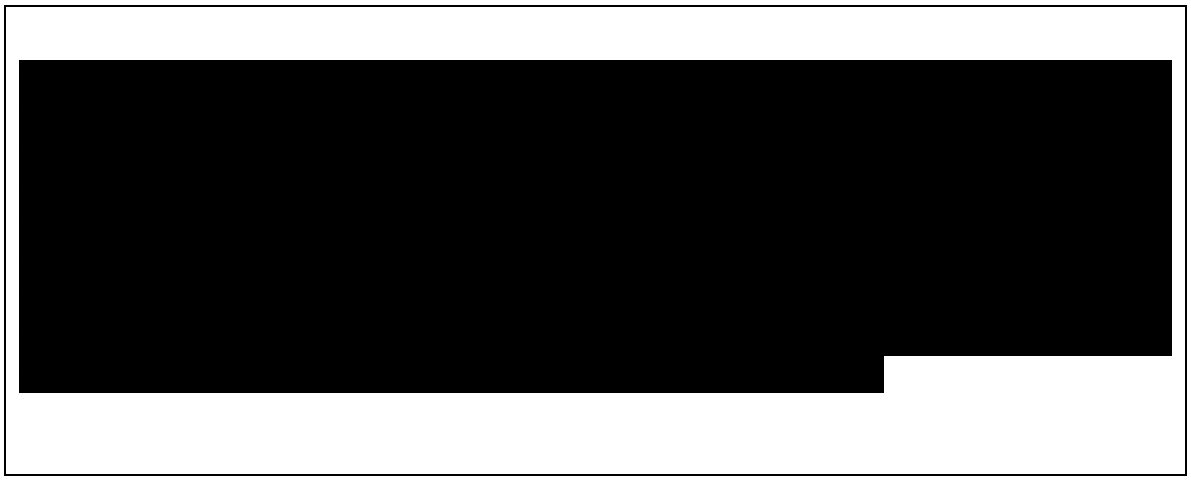


Photo 7 Diagram of the Potrero Power Plant Site; intruders have painted graffiti on the abandoned old boiler building (Legend "J" in the diagram above) that formerly housed the Units 1 and 2 boilers.

Photo 8 "Tagging" observed [redacted] Mirant property that is adjacent to the peaker units. [redacted]

Photo 9 More "Tagging". [redacted]

Photo 10 [redacted]

Photo 11 [redacted]

Photo 12 An intruder had tripped this Circuit Breaker (52-33-9B) causing a previous outage

When auditors asked what Mirant planned to do to prevent intrusions, the Plant Manager responded [redacted] CPSD is concerned that this scheme will not adequately address the security concerns at the Potrero plant [redacted]

Continued intrusions may have dangerous consequences for plant staff and the public because the plant has recently installed a Selective Catalytic Reduction (SCR) system. The SCR system, which will reduce routine emissions of nitrogen oxides from the plant, includes [redacted] Damage to the system could also force the shutdown of the power plant, reducing the reliability of San Francisco's power supply.

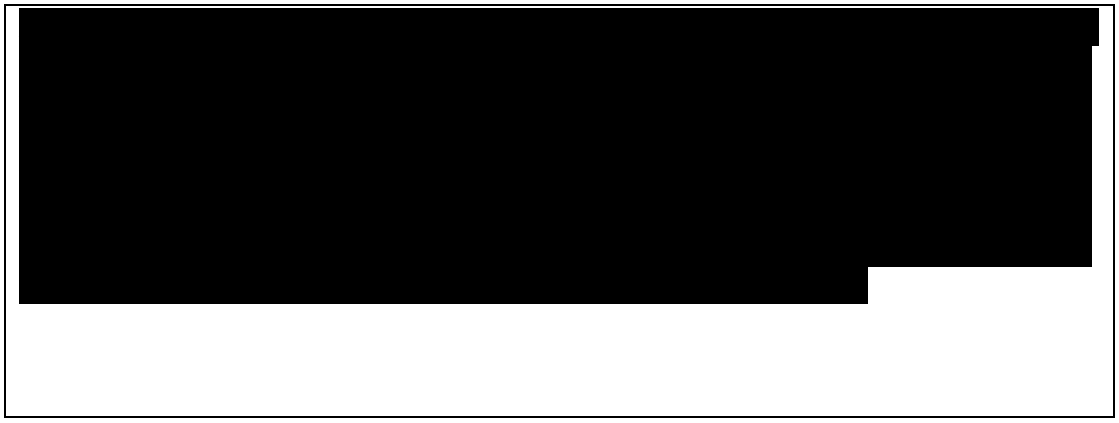


Photo 13 Ammonia Storage Tank for Unit 3 SCR

Outcome and Follow-up

In response to the preliminary audit report and "meet and confer" meetings, Potrero has agreed to improve security.

1.

2.

3.

4. No Trespassing Signs – Potrero has purchased and plans to install "No Trespassing" signs.

5. Graffiti – Potrero has experimented with various graffiti removal techniques and will soon remove graffiti from Station A.

6.

7. Intention to Prosecute Intruders – Potrero has notified the San Francisco District Attorney's Office that it intends to prosecute trespassers.

Schedule

Potrero plans to before the end of the first quarter of 2007.

CPSD believes that Potero's actual and planned security improvements are reasonable steps. Potrero has responded to CPSD concerns in two important ways

Potrero is required to report to CPSD on the progress of all proposed plant security improvements by September 30, 2007. In addition, Potrero is required to report to CPSD whenever an intrusion occurs in the future. Finally, in June of 2009, Potrero should submit an analysis of the effectiveness of its security system.

Maintenance Standard 4 - Problem Resolution and Continuing Improvement:

The company values and fosters an environment of continuous improvement and timely and effective problem resolution.

Assessment Guideline 2.B:

Problem Reporting, Root-Cause Analysis, and Corrective Actions:
A systematic approach and process is used to identify and report problems, determine the cause(s) and establish corrective actions to prevent recurrence. Attributes of successful programs include:

1. Encouraging employees to report problems at low thresholds of significance.
2. Using a graded approach to significance, and performing more extensive root cause determination to those problems having high significance, and trend and track those with low significance.
3. Trending capability on information such as "cause code" or equipment or process involved.
4. Tracking of corrective actions to closure.

Maintenance Standard 13 - Equipment Performance and Material Condition:

Equipment performance and material condition support reliable plant operation. This is achieved using a strategy that includes methods to anticipate, prevent, identify, and promptly resolve equipment performance problems and degradation.

Assessment Guideline 2.A:

Plant equipment operates on demand.

Assessment Guideline 2.B:

Personnel exhibit a low tolerance for equipment and material condition problems by identifying deficiencies and advocating resolution.

Assessment Guideline 2.N:

Equipment problems receive appropriate attention and timely resolution, based on priorities established through the work management process. Technical support is available to resolve equipment problems.

Finding Number 2.2 – Fuel Contamination and Forced Outages

Potrero Units 4, 5 and 6 have chronic fuel problems, which have not been resolved, resulting in potential violations of Maintenance Standards 4 (Problem Resolution), and 13 (Equipment Performance and Monitoring). Furthermore, Mirant's limited root-cause analysis of the fuel problem raises questions about the plant's approach to problem resolution. Between 8/6/03 and 7/13/05, Units 4, 5 and 6 were forced out-of-service at least 32 times when contaminants in the fuel clogged fuel lines or filters. Potrero Management is aware of the problem, and argues that further action is unnecessary because the plant meets the performance requirements of its RMR contract with the ISO. Furthermore, Mirant states that the solution identified by the plant—repairing the interior of a rusting fuel tank—is not cost effective.

CPSD inspectors have documented the fuel issues at Potrero many times on routine outage inspection reports. The outages have been due to particles in the fuel that have clogged fuel strainers, filters, and fuel modulator valves. Consequently, in this audit, the auditors examined the maintenance program for the gas turbines and fuel storage system.

Mirant supplied a document titled, "Diesel Fuel Issues with Potrero Gas Turbines - Investigation and Corrective Actions Taken" (MIR(CPUC)000448),[3] which Mirant says identifies the root cause of the fuel contamination as rust particulate in the fuel originating from surface corrosion on the inside surface of the storage tank. The document contains a list of both short and long term solutions to the problem, but concludes that the only effective long-term solution is to drain the 5.2 million gallon storage tank, and to sandblast and recoat its internal surface. The cost is estimated to be several hundred thousand dollars. As stated above, Mirant doesn't consider draining, sandblasting and recoating the tank to be cost effective.

Plant staff stated that Mirant had decided not to repair the interior of the tank because:

- "Repairs have almost always been completed quickly."
- "Usually, if one engine fails to start, other engines are able to be started in their place."'
- "We have not exceeded the allowed Maintenance Hours provided for in our RMR Contract on any of our Units this year or any year. i.e., we are providing the level of service our RMR contract pays us for."

Regarding the cause of the rust, plant staff explained that the tank has a floating lid. Because the fuel tank inventory is at a low level, a large portion of the inside walls of the tank are exposed to the elements and have rusted. These rust particles contaminate the fuel.

[3] The document, which appears to be the summary of a root cause analysis, has no date, but appears to have been written in 2004. CPSD requested the entire root cause analysis report but never received it.

To try to correct the problem, Mirant has:

1. Streamlined the process of cleaning fuel system strainers and changing filters.
2. Replaced low-pressure (5 psi) fuel alarm switches with 20 psi switches to allow filters to tolerate more rust particles before shutting down the engines.
3. Shut down the fuel recirculation pump at the storage tank to avoid stirring up rust particles in the tank.
4. Shut down the engine fuel recirculation pumps to reduce fouling of the engine fuel system strainers.
5. Modified filter drain and vent systems within the engine, adding pressure instrumentation , and added filter housing drains outside of the engine.

Mirant also plans to:

- Replace the remaining engine fuel heaters with piping manifolds.
- Study installation of parallel filters so that one filter can operate while the other is changed, enabling the Operations Crew to change out the filters while the unit is running. Currently, the Maintenance Crew does this work during unit outages.

The persistent problems with the fuel tank, the very limited nature of the root cause analysis, and Mirant's above responses raise a number of issues with Mirant's approach to problem solving and equipment maintenance. Mirant's one-page root cause analysis lists conclusions but lacks supporting details and analysis. Therefore, we ask the following questions:

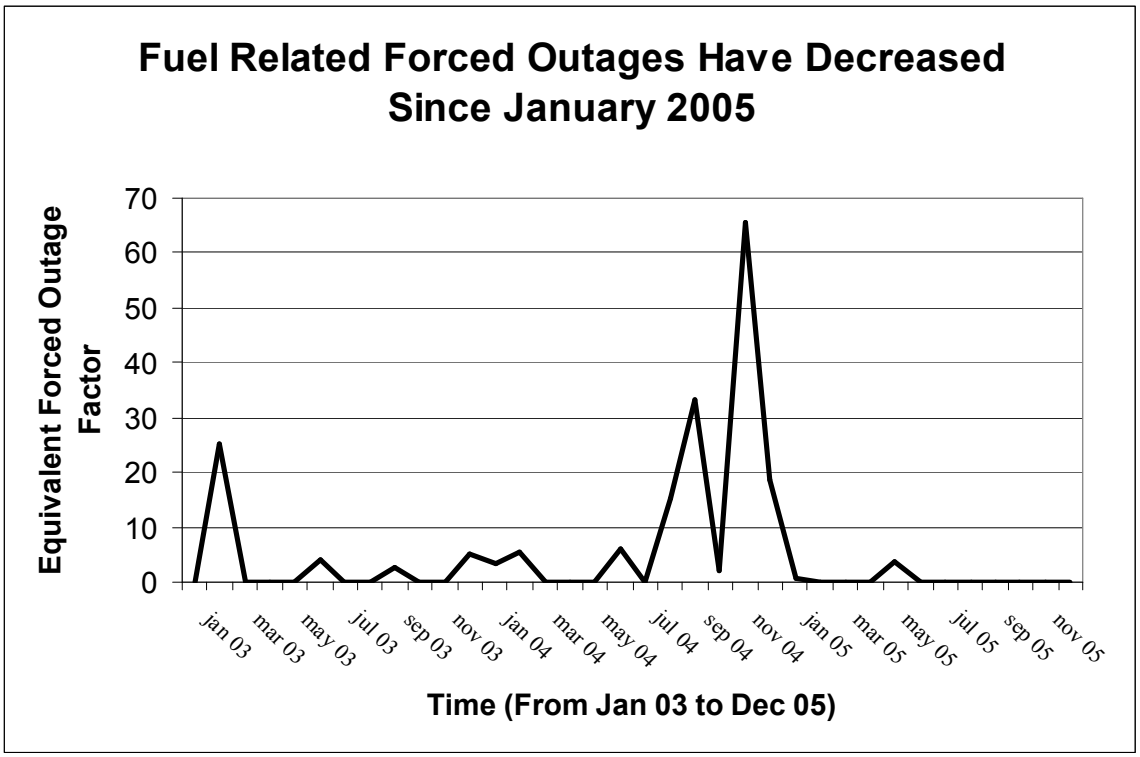
- Could Mirant have prevented problems with the tank by monitoring the tank's condition and taking quick action? Did Mirant anticipate the effects of low fuel levels on the condition of the tank wall?
- Could the particles come from other sources such as equipment, piping, contaminated fuel delivery, or fuel treatment? Did Mirant analyze these possibilities? If so, are cost effective solutions available, such as better monitoring of fuel deliveries?
- Could Mirant solve the problem by modifying the fuel system layout?

CPSD staff recommended that the plant study other, possibly cheaper methods of removing contaminants from fuel. CPSD staff also recommended that the Commission officially notify the ISO about the potential for better performance at Potrero, to determine whether further improvements such as sand blasting and cleaning the fuel tanks are cost-effective. The collective cost to customers of a power outage can easily total millions of dollars, so the cost of several hundred thousand dollars to clean the fuel tanks appears to be cost-effective.

Outcome and Follow-up

Studies by both Potrero and CPSD have confirmed that the performance of Units 4, 5 and 6 has improved since the modifications to the fuel system. First, in response to the preliminary audit report, Potrero sent an analysis showing that fuel related outages have decreased. Potrero analyzed the forced outage factors[4] for the units using NERC GADS data for the years 2003 thru 2005. The data shows that the forced outage factors have decreased dramatically since January, 2005, as shown in Figure 1. CPSD staff confirmed that the GADS data supported Potrero's conclusion.

Figure 1.



Source: CPSD Staff using GADS data

Second, Potrero showed that in 2005, the units started more reliably than in 2004. Potrero compared actual starts to failed starts for the units, again using NERC GADS data for those years.

[4] The equivalent forced outage factor is a measure of a unit's forced outages during times of demand. The equivalent forced outage factor should be as low as possible.

Figure 2. After Fuel System Changes in 2004, Potrero Starts More Reliably

Year of Operation	Number of Attempted Starts	Number of Failed Starts	Fail Starts per 100 Attempted Starts	Total Annual Operating Hours
2003	158	4	2.53	818.2
2004	170	10	5.88	915.7
2005	139	2	1.43	909.9

Source: CPSD Staff using GADS data

CPSD verified Potrero's analysis using the NERC GADS database at the CPUC. The table above shows that from the year 2004 to 2005 the gas turbines "failed-to-start-rate" improved from 5.88 to 1.43 failed starts for every 100 starts attempted.

While it's clear that Potrero's performance has improved, it may be reasonable for Potrero to make further improvements. To judge whether further improvements are reasonable, CPSD compared Potrero's performance to that of other North American plants.

Figure 3. Potrero's Gas Turbine Performance Compares Favorably to North American Units in 2005

Peaker Plant(s)	Primary Fuel	Average Age (Years)	Average (MW/unit)	Starting Reliability (%)	Equivalent Availability (EAF) %	Equivalent Forced Outage Rate (EFOR)d
Potrero Units 4, 5, & 6	Oil	29.00	52	97.69	95.98	11.04
California-40 Units	Gas	13.67	33	94.24	91.85	2.23
National-207 Units (USA/Canada)	Oil/Gas	25.68	27	95.59	88.82	10.63

Source: CPSD Staff using GADS data

CPSD confirmed that Potrero's gas turbines now perform as reliably as comparable North American units, based on GADS data. CPSD first compared Potrero's gas turbine performance to other gas turbines of similar size located in the United States and Canada. Figure 3 indicates that Potrero has a better Equivalent Availability Factor (95.98 vs. 88.82) than the National average and a similar Equivalent Forced Outage Rate during times of demand (11.04 vs.10.63%).[5] The Potrero units also have a better Start Reliability factor than the National average (97.69 vs. 95.59).

[5] From the NERC GADS database. Figure 3 compares forced outages due to all causes, at simple-cycle peaking turbines, with capacities between 25 and 55 Megawatts.

CPSD also compared Potrero's units to gas turbines in California; however, we could not find enough oil-fired units to create a statistically significant sample. We did however compare Potrero's turbines to other California turbines which burn natural gas. Potrero's Equivalent Forced Outage Rate during times of demand is higher (11.04 vs. 2.23) than that of the comparison group probably because Potrero's units are older and use fuel oil. (See Figure 3.)

To assure that the turbines continue to perform reliably, the plant should complete planned changes to the fuel filtration system and take immediate corrective action if fuel-related problems arise again

Maintenance Standard 5 - Maintenance Personnel Knowledge and Skills:

Maintenance personnel are trained and qualified to possess and apply the knowledge and skills needed to perform maintenance activities that support safe and reliable plant operation.

Assessment Guideline 2.E:

Training and evaluation methods and standards are sufficient to verify trainee and contractor competence for assigned functions.

Assessment Guideline 2.G:

Contract maintenance technicians and other non-plant maintenance personnel possess knowledge and skills equivalent to those of station maintenance personnel for their assigned functions and are task-qualified prior to independent work assignment.

Maintenance Standard 6 - Training Support:

A systematic approach to training is used to achieve, improve, and maintain a high level of personnel knowledge, skill, and performance.

Assessment Guideline 2.I:

Workers from off site, such as contractors or workers from other facilities are appropriately trained and task-qualified before they work independently.

Assessment Guideline 2.J:

General employee training provides plant personnel, contractors, and visitors with a basic understanding of employee responsibilities and safe work practices and with the knowledge and practical abilities necessary to effectively implement their work.

Finding Number 2.3 – Safety, Qualification and Training of Contract Workers

CPSD Auditors found Potrero potentially in violation of Maintenance Standards 5 and 6 with regard to qualification and training of contract personnel. First, the company does not ensure that contract employees are trained and qualified to perform their tasks but instead relies solely on contracting companies to hire trained and qualified personnel. Second, although the company trains and tests **Mirant** employees on safety, the plant, Potrero does not ensure that all **contract personnel** see and understand the plant's safety video. Finally, evacuation drills are infrequent and safety materials conflict regarding the location of evacuation areas.

We note that such violations may have practical consequences. Auditors saw contractors working without proper fall protection (see Finding 2.4).

WORKER TRAINING, QUALIFICATION and RECORDS

The plant does not ensure that contract personnel are trained or qualified for their assigned tasks. The Plant Manager stated that Mirant only hires qualified, reputable contractors with proven track records and that the Plant trusts the contractor to provide trained, qualified personnel. According to the Plant Manager, the plant requires contract workers to view a nine-minute video on the plant's safety procedures. However, in general, Mirant does not keep records to ensure that contract personnel are trained or qualified for assigned tasks, nor does the plant track how the contractor qualifies, trains, or keeps records on contract personnel.

CPSD auditors interviewed the Project Manager from Babcock and Wilcox (B&W), a contractor who was on-site at the time of the audit. We requested copies of training and qualification records for B&W personnel. In response, B&W provided a "New Hire Orientation Acknowledgement." In this document, contract personnel initial a list of company policies and procedures after they have viewed a safety video (see above).

According to the B&W's Project Manager, only 70% of the B&W personnel, including subcontractors, had completed the "New Hire Orientation Acknowledgement".

SAFETY VIDEO ORIENTATION

As discussed above, plant documents indicate that not all contract personnel had viewed the plant's safety video. Further, the plant does not test to ensure that contract personnel had retained information from the safety video.

A CPSD auditor asked Three B&W contract foremen about the safety video.

- Two foremen reported seeing a Potrero safety video.
- The third foreman reported seeing a safety video for the Pittsburg Plant. Since the on-site video describes the location of Potrero's evacuation area, the Pittsburg video would not be as effective as a Potrero video.
- When the auditor asked what the foreman would do if someone was injured, all three foremen correctly said they would inform the plant operator. None of the foremen initially gave the correct number to dial on the plant telephone, though two of them immediately corrected themselves.
- Two of the foremen could not identify the location of Potrero's evacuation area.

EVACUATION PROCEDURES

Evacuation drills are infrequent and safety materials conflict regarding the location of evacuation areas. The CPSD auditor interviewed several Mirant employees about evacuation procedures at the plant. The employees stated that evacuation drills are infrequent. Some said they had not participated in a drill during the past year. The lack of drills is particularly problematic for contract employees, who are relatively unfamiliar with the plant. Moreover B&W's safety plan instructs contract personnel to evacuate to the "West (back) side of the BWCCI office trailer", which is in conflict with the location described on Potrero's safety video, which is located along the plant's South fence. CPSD believes that more frequent evacuation drills, training, and testing are necessary to ensure that employees and contract personnel are aware of the plant's evacuation procedures.

Outcome and follow-up

<u>Contractor Qualifications to Perform Work Assigned</u>

The Potrero Plant Manager responded that the plant ensures that it has trained and qualified contractors by selecting contractors from union halls with membership standards assuring that the contractors are qualified journeymen. If necessary, Potrero conducts due diligence such as verifying references, training and certifications before the contractor is hired.

Potrero should keep records listing the names of contract employees working on site, signed by a responsible manager and indicating that Potrero considers each contract employee to be qualified.

Contractor Safety Training and Safety Video

Potrero has improved its safety training for contractors. First, it will assign a Safety Coordinator to inspect ongoing work for safety violations at least daily. Second, Potrero adopted a new operating order[6] which requires a safety orientation for all contractors and visitors to Potrero and a record of the training showing the trainer name, employer name, and date of training. Potrero will keep the records on file in its main office. Third, Potrero also submitted an updated "Contractor Safety Orientation Program,"[7] which lists various training issues, including:

- Safety video presentation
- Working at heights
- Emergency response and evacuation
- Emergency phone numbers and contacts
- Reporting unsafe worker actions
- Confined space entry Training records.

Potrero should revise this document to:

1. Require instructors to confirm that workers have understood the material presented,
2. Require workers to report unsafe work conditions, and
3. Affirm each worker's right and duty, consistent with Potrero's safety policies, to call a halt to unsafe activities.

Potrero also submitted "Overhaul Safety Coordinator Guidelines" which outlines the many safety duties of the Overhaul Safety Coordinator. The document requires the coordinator to inspect, at least daily during overhauls, work in progress at the site, to assure compliance with safety and health rules and regulations.

Potrero should revise this document to include all significant work by contractors, whether during an overhaul or not.

Evacuation Procedures

Potrero now requires annual evacuation drills. As stated in Operating Order No. 37, "Potrero staff will conduct a Plant Evacuation Drill at least annually. Drills will be scheduled at a time of year and time of day that includes as many employees and regular contractors as feasible."

[6] Operating Order No. 38, dated 9/1/06
[7] One page of which is dated 5/16/06

Maintenance Standard 1 – Safety:

The protection of life and limb for the work force is paramount. The company behavior ensures that individuals at all levels of the organization consider safety as the overriding priority. This is manifested in decisions and actions based on this priority. The work environment, and the policies and procedures foster such a safety culture, and the attitudes and behaviors of individuals are consistent with the policies and procedures.

Assessment Guidelines:

A. Individuals at all levels in the organization contribute to the safety culture of the work environment through:
   1. Demonstrating a great respect for safety in all actions and decisions.
   2. Demonstrating a questioning attitude by challenging existing conditions, considering the potential adverse consequences prior to proceeding, and willingness to stop work in the face of uncertainty.
   3. Demonstrating a willingness to identify problems and ensure they are corrected.
   4. Accepting accountability for their own performance, including recognizing shortfalls and acting to improve.
   5. Holding their co-workers accountable for their performance.
   6. Using peer checking as a means of protecting themselves and others.

B. Managers in the organization contribute to the safety culture of the work environment through:
   1. Establishing standards and clearly communicating expectations that safety is the highest priority.
   2. Maintaining an environment that welcomes identification and communication of problems.
   3. Reinforcing individual behaviors that promptly and forthrightly identify problems.

C. Work practice norms in the organization promote the safety culture through:
   1. Appropriate defenses, such as technical accuracy, precautions, cautions and notes, are explicitly embedded in procedures, processes, and equipment configuration to minimize the occurrences and consequences of inappropriate actions.
   2. Clearly defined responsibility and authority for implementing a conservative approach with respect to stopping activities and seeking assistance or guidance when faced with uncertain conditions are communicated to all personnel. This expectation is reinforced frequently.
   3. Ensuring safety concerns are promptly identified and resolved.
   4. Training which reinforces safety practices and expected behaviors.

Finding Number 2.4 - Contractor Performing An Unsafe Lift (No Fall Protection)

A CPSD auditor found a potential safety violation of Maintenance Standard 1 when he observed Potrero contract personnel working on piping more than 10 feet above the ground without fall protection, in violation of the plant's safety procedures. A CPSD auditor watched contract personnel hoist and move a pump skid through a narrow pathway on the side of the boiler. The narrow pathway was surrounded by platforms and a large-diameter insulated steam pipe. Contract personnel were pushing and pulling the pump skid to move it beyond the steam pipe. During this process, a worker with no fall protection, bounced on a cross-bar at a height exceeding 10 feet. Another worker, also without fall protection, was observed standing on the insulated steam pipe, at a height exceeding 10 feet. The worker steadied himself by leaning against another pipe. In addition, during this operation, another worker stood on a ladder that was not adequately supported and was unstable. (See photos 14 through 17) Because personnel were working more 6 feet off the ground, failure to use fall protection violated Mirant's safety procedures.

The auditor immediately informed the Plant Manager that he had a concern about the contractor's operations. The Plant Manager replied that he had full confidence in the contractor. When the auditor insisted, the Plant Manager walked to the site, where he confirmed that the workers were not following proper safety procedures. The Plant Manager later sent the auditor a copy of a safety report on the incident, which stated that plant and contractor staff had reviewed proper safety precautions with those involved in the incident.

Although plant management did respond to the safety hazards in this case, CPSD is concerned about the possibility of several systematic safety problems, in particular that:

- The plant relies solely or primarily on its contractors to assure the safety of contract workers,
- Workers did not realize or did not consider it serious that they were engaging in unsafe practices.
- The plant did not detect these unsafe practices, and finally
- Workers themselves did not report or take action to correct unsafe practices by fellow workers, indicating lack of training in proper safety procedures and/or a reluctance to report unsafe practices.

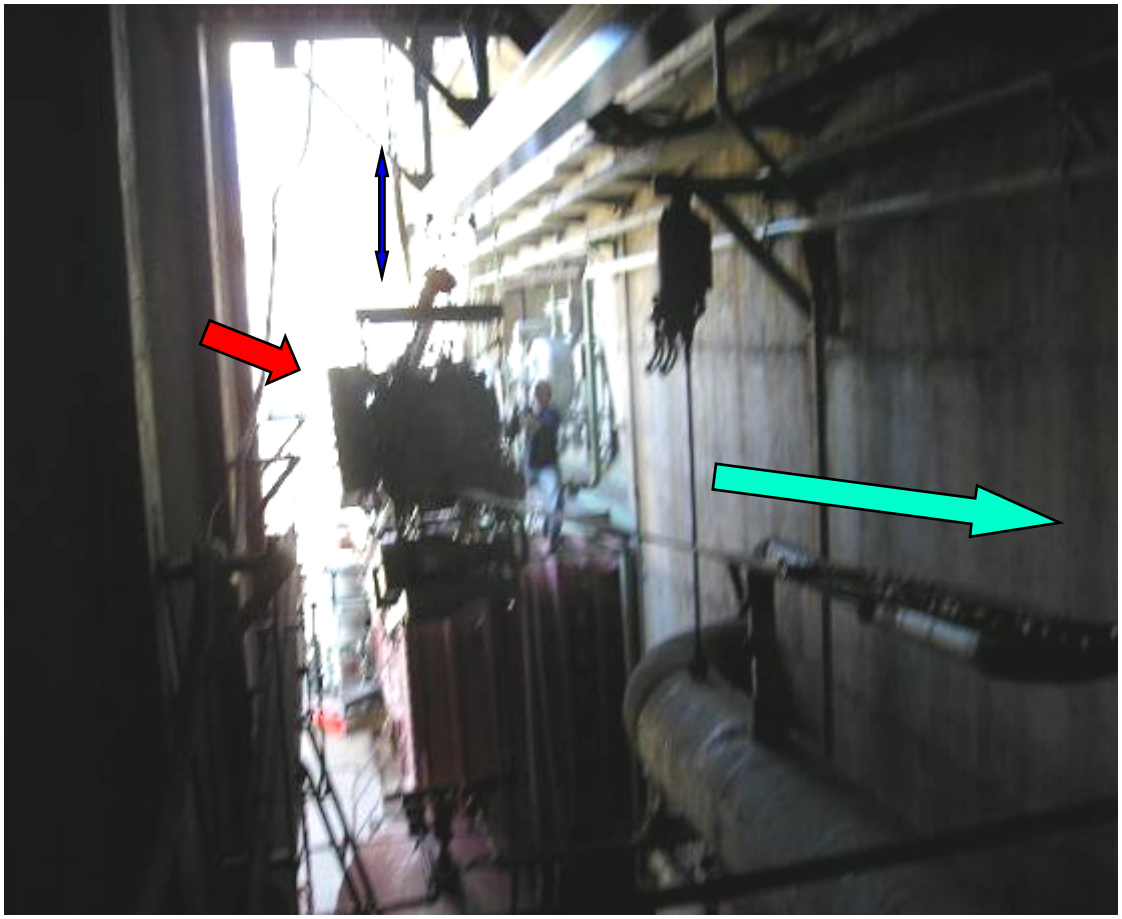


Photo 14 Worker standing on metal crossbar is without fall protection. The red arrow points to a structure suspended from above. It is being pulled forward in the direction of the green arrow towards the camera.

Photo 15 The ladder is not secure. The top right of the ladder (blue arrow) swings back and forth rapidly approximately 6 inches or more from the wall as the worker is attempting to position the hanging structure. Note: The structure on the pulley has moved closer to the camera. It is now close to the steam pipe insulation (red arrow) on the right, forward and above the person standing below.

Photo 16 Auditor returned with other CPSD staff and plant staff to observe personnel, including contractors. Note: structure has been lowered.

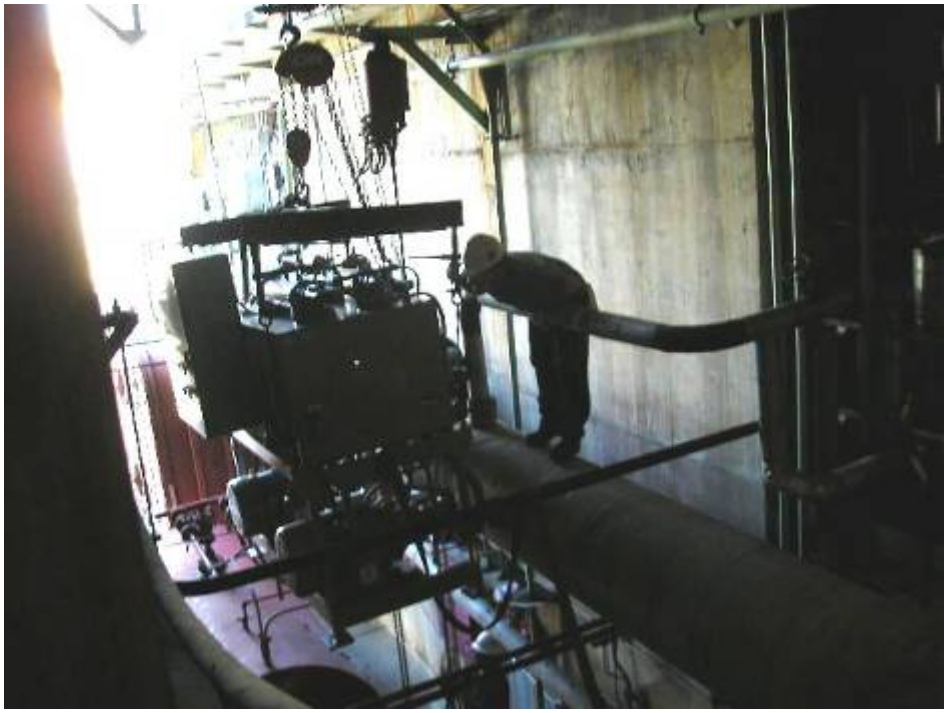


Photo 17 Worker lacks fall protection (Worker on pipe is near red arrow in Photo 15.) When CPSD auditors expressed safety concern, the plant manager responded that a worker on a steam pipe may be a safety concern and went to the lower level to discuss the concerns with the workers involved.

Outcome and follow-up

In response to the preliminary audit report and "meet and confer" meetings, Potrero changed its safety program. As stated in Finding 2.3, Potrero Power Plant's new Operating Order No. 38, requires that all contractors receive Contractor Safety Orientation Training, which includes a video addressing working at heights and the use of fall protection. In addition, Potrero submitted a document titled, "Overhaul Safety Coordinator-Guidelines" which requires the Overhaul Safety Coordinator to:

- Develop a safety plan
- Meet with overhaul package managers and foremen to clarify plan and exchange safety concerns
- Attend employee contractor safety meetings and tailboards whenever possible
- Conduct regular (at least daily) inspections of work in progress at the site checking for compliance with plant, industry & regulatory safety, health rules and regulations.
- Conduct regular safety walks of the job site with representatives of contractors, employees and management.
- Report results (positive and negative) and ensure prompt resolution of safety problems.
- Update plant personnel on safety information
- Maintain high visibility on the job site.

As currently written this document applies only to overhauls. The Overhaul Safety Coordinator would not have prevented the above incident since it occurred before the start of an overhaul. As stated in Finding 2.3, Potrero should revise this document to include all significant work by contractors, whether during an overhaul or not.

In addition to these documents, Potrero sent to CPSD Mirant's "Key Rules of Safety Policy," dated 8/3/06, which states Mirant's safety policy and philosophy. The document also discusses and contains links to information regarding the following safety issues.

- Switching and Tagging (aka Lock Out Tag Out)
- Confined Space Work
- Fall Protection
- Grounding (needed for electrical work)
- Personal Protective Equipment
- Shoring and Trenching

The document states that any employee or contractor violating any of the Key Rules will be subject to disciplinary action.

Potrero should incorporate Mirant's Key Rules into all safety orientations for employees and contractors.

Maintenance Standard 10 - Work Management:

Work is identified and selected based on value to maintaining reliable plant operation. Work is planned, scheduled, coordinated, controlled, and supported with resources for safe, timely, and effective completion.

Assessment Guideline A.4:

Requested and approved work activities are tracked until dispositioned. The status of incomplete and pending work activities is maintained and readily accessible.

Finding Number 2.5 – Inadequate Repair Records

CPSD auditors could not find records for a repair on the fire sprinkler system. The lack of repair records is a potential violation of maintenance standards because there can be no guarantee that needed repairs have been made.

Simplex Grinnell, an independent consulting company specializing in inspection of fire protection systems, performed a semi-annual fire inspection in accordance with National Fire Protection Association (NFPA) Standard 25[8] and issued a report dated 11/3/04 on the condition of the Unit 3 turbine fire sprinkler system. The inspection report stated that the system was not certified because a brace needed to be installed on piping for the #1 bearing discharge nozzle. A CPSD auditor inspected the piping and confirmed that the repair had been made, but did not find any records of that repair.

Outcome and follow-up

In response to the preliminary audit report, Potrero stated that because it corrected the problem immediately, it did not see a reason to record the fix in the work order system. CPSD disagrees, especially since this was a safety related modification. Without a work order and record of the required repair, a worker could be distracted by other work and simply forget to perform the repair. All repairs affecting the safety and operation of the power plant must be entered into the work tracking system, tracked to completion and recorded in accordance with the Maintenance Standard quoted above.

Potrero should submit a work order procedure which states that work activities affecting the safety and operation of the power plant must be entered into the work order system, tracked to completion and recorded.

[8] The Simplex Grinnell fire inspector, Jacob Romero, verified that the inspection criteria for this power plant are National Fire Protection Association (NFPA) Standard 25.

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

The GAO plans for, prepares for, and responds to reasonably anticipated emergencies on and off the plant site, primarily to protect plant personnel and the public, and secondarily to minimize damage to maintain the reliability and availability of the plant.

Among other things, the GAO:
A. Plans for the continuity of management and communications during emergencies, both within and outside the plant,
B. Trains personnel in the emergency plan periodically, and
C. Ensures provision of emergency information and materials to personnel.

Maintenance Standard 1 – Safety:

The protection of life and limb for the work force is paramount. The company behavior ensures that individuals at all levels of the organization consider safety as the overriding priority. This is manifested in decisions and actions based on this priority. The work environment, and the policies and procedures foster such a safety culture, and the attitudes and behaviors of individuals are consistent with the policies and procedures.

Assessment Guideline C.3:

> Work practice norms in the organization promote the safety culture through ensuring safety concerns are promptly identified and resolved.

Finding Number 2.6 - Sign Designating An Emergency Evacuation Area Is Missing

The evacuation assembly area of the Potrero Power Plant is not clearly marked, a potential violation of Maintenance Standard 1 - Safety and Operation Standard 20 – Preparedness for On-Site and Off-Site Emergencies. Evacuation assembly area signs are important to the safety of plant staff during emergencies. The signs identify safe areas of the plant for staff to assemble in the event that they must evacuate the plant.

A CPSD auditor notified the Plant Manager that the main sign identifying the evacuation assembly area had faded and was not readable. In addition, two of the signs posted on the fence in the assembly area, labeled "contractors" and "mechanical maintenance," indicating where specific groups should assemble, had fallen off the fence and were lying on the ground.

Outcome and Follow-up

CPSD verified on a subsequent plant inspection that Potrero has replaced the signs and secured them in their proper locations. In addition, Potrero created Work Order 17209, which recurs annually, to inspect emergency signage and equipment. CPSD is satisfied with Potrero's corrective actions.

SECTION 3 - Other Observations

The CPSD audit staff made other observations during the maintenance audit, which did **not** result in a potential finding of violation of the Maintenance Standards. The observations below cover various key items such as: maintaining safety manuals, lock out and tag out requirements, the safety training of plant personnel, the plant's vendor drawing system, turbine maintenance, boiler chemistry, and work management.

Maintenance Standard 1 – Safety:

The protection of life and limb for the work force is paramount. The company behavior ensures that individuals at all levels of the organization consider safety as the overriding priority. This is manifested in decisions and actions based on this priority. The work environment, and the policies and procedures foster such a safety culture, and the attitudes and behaviors of individuals are consistent with the policies and procedures.

Assessment Guideline C.3:

Work practice norms in the organization promote the safety culture through appropriate defenses, such as technical accuracy, precautions, cautions and notes, are explicitly embedded in procedures, processes, and equipment configuration to minimize the occurrences and consequences of inappropriate actions.

Observation Number 3.1 – Safety Manuals

Maintenance Standard 1 requires that the plants keep their safety manuals up to date. The plant initially provided a hard copy of the plant's Health and Safety Program manual, which had an expiration date of December 31, 2003. The plant has since clarified that the current manual is available on-line to all employees. The CPSD auditor verified that the on-line manual is up to date.

Maintenance Standards 1 – Safety:

The protection of life and limb for the work force is paramount. The company behavior ensures that individuals at all levels of the organization consider safety as the overriding priority. This is manifested in decisions and actions based on this priority. The work environment, and the policies and procedures foster such a safety culture, and the attitudes and behaviors of individuals are consistent with the policies and procedures.

Assessment Guideline C.1:

Work practice norms in the organization promote the safety culture through appropriate defenses, such as technical accuracy, precautions, cautions and notes, are explicitly embedded in procedures, processes, equipment configuration to minimize the occurrences and consequences of inappropriate actions.

Maintenance Standard 11 – Plant Status and Configuration:

Station activities are effectively managed so plant status and configuration are maintained to support reliable and efficient operation.

Assessment Guideline A.7:

The position of valves important to operation are known and accurately recorded. Administrative controls for clearance tagouts or locked valves prevent unauthorized and inadvertent operation while allowing access for off-normal operation.

Assessment Guideline A.8:

Independent (or concurrent, if appropriate) verification of component position is performed for equipment important to safety and/or critical to reliable plant operation.

Assessment Guideline A.9:

Checklists or other comparable means are used to verify that proper conditions are established for each mode of plant operation and for mode changes.

Assessment Guideline A.10:

Procedures are implemented to control the placement of caution, warning, information, and other similar tags on plant equipment and operator aids in the plant

Assessment Guideline A.11:

> Procedures are implemented to control the placement, removal, and periodic review of temporary modifications for equipment, such as electrical jumpers, lifted leads, mechanical jumpers, hoses, pipe blanks, and spool pieces.

Observation Number 3.2 – Lock and Tag Out Requirements

Maintenance Standards 1 and 11 require power plants to have procedures and controls, which protect workers from injuries caused by contact with energized equipment while conducting routine maintenance activities. This program is called a clearance program or lock-out and tag-out program. A CPSD auditor reviewed the plant's written procedure and asked plant staff to demonstrate how those procedures are carried out.

Potrero's lock-out and tag-out procedures (clearances) require plant personnel to mechanically disable and/or electrically de-energize equipment (lock out) so that work can be performed safely. The equipment is also tagged so that personnel know exactly which equipment is disabled and/or de-energized.

Potrero staff initiate lock-out clearances by creating a document called a "ticket." Since plant personnel are much more familiar with the plant, equipment, and procedures than are contractors, only plant personnel can create tickets. Contractors may request a lock-out clearance from plant personnel, but they are not allowed to create an actual ticket.

Potrero's Operations Supervisor stated that all plant employees and contractors are aware of lock-out and tag-out requirements. He further stated that the plant requires contractors to watch a safety video, which, among other things, outlines the clearance procedure. The Operations Supervisor also provided a copy of the plant's manual and standards.

The CPSD auditor asked the Operations Supervisor to describe and demonstrate Potrero's clearance procedures. In response, to demonstrate the employees' knowledge and understanding of the clearance process, the Operations Supervisor asked his control room operators to create a sample clearance ticket for the condensate feed pumps. The auditor observed the following during this impromptu demonstration:

1. A control room operator created a request sheet (ticket) for this clearance. Mirant's outage computer program includes a listing of the major electrically operated equipment in the plant. When the operator selected the Condensate Feed Pump, a list of tags, with a description of where they should be placed, was displayed on the monitor.
2. The computer printed individual clearance tags and a check-off list, requiring initials of the operator, to verify placement of the tags.

3. The checkoff/sign-off list was given to an operator who, with the auditor, proceeded to the room where an associated high voltage breaker for the pump was located. The operator donned the protective safety wear required because of the danger of an arc flash when opening a high voltage circuit breaker. The operator then actually demonstrated opening and closing the circuit breaker ("racked-out" and "racked-in") and showed where the clearance tag would be placed if this had been an actual clearance. The operator then signed off the check list for completing this step in the clearance process.
4. The CPSD auditor and operator then proceeded to the Condensate Feed Pump, where the operator showed the auditor the valves that would be mechanically isolated and tagged if this had been an actual clearance. Again, the operator signed off the check list for completing the step in the clearance process.
5. The auditor and operator returned to the control room with the signed-off check list. The operator stated that in an actual clearance this list would be given to another operator who would physically check to see if the tags were correctly placed.
6. In an actual clearance, after all approvals and checks are complete, the condensate pump would be added to a "tag" board in the control room which all personnel consult to determine which equipment in the plant is currently cleared.

Maintenance Standard 1 – Safety:

The protection of life and limb for the work force is paramount. The company behavior ensures that individuals at all levels of the organization consider safety as the overriding priority. This is manifested in decisions and actions based on this priority. The work environment, and the policies and procedures foster such a safety culture, and the attitudes and behaviors of individuals are consistent with the policies and procedures.

Assessment Guideline C.4:

Work practice norms in the organization promote the safety culture through training which reinforces safety practices and expected behaviors.

Maintenance Standard 5 - Maintenance Personnel Knowledge and Skills:

Maintenance personnel are trained and qualified to possess and apply the knowledge and skills needed to perform maintenance activities that support safe and reliable plant operation.

Assessment Guideline 2.E:

Training and evaluation methods and standards are sufficient to verify trainee and contractor competence for assigned functions.

Assessment Guideline 2.G:

Contract maintenance technicians and other non-plant maintenance personnel possess knowledge and skills equivalent to those of station maintenance personnel for their assigned functions and are task-qualified prior to independent work assignment.

Maintenance Standard 6 - Training Support:

A systematic approach to training is used to achieve, improve, and maintain a high level of personnel knowledge, skill, and performance

Assessment Guideline 2.I:

Workers from off site, such as contractors or workers from other facilities are appropriately trained and task-qualified before they work independently.

Assessment Guideline 2.J:

General employee training provides plant personnel, contractors, and visitors with a basic understanding of employee responsibilities and safe work practices and with the knowledge and practical abilities necessary to effectively implement their work.

Observation Number 3.3– Safety Training Program

Maintenance Standard 1 requires that power plants make the safety of plant personnel a high priority and Maintenance Standards 5 and 6 require training of plant personnel. CPSD Auditors reviewed the training course material and training records of plant personnel. It appears that the training material and Mirant plant personnel annual training are consistent with the plant's safety training program. (Note: This applies only to safety training of Mirant plant personnel. Safety training of contract personnel is the subject of Findings 2.3 and 2.4)

The CPSD auditor reviewed the plant's Safety Training Program. Twelve site-specific courses are available for the maintenance and operation staff. The staff is required to successfully complete all 12 courses once every year. Many of the courses are computer-based, while others are in-class training led by an instructor. The courses are:

- Bloodborne Pathogens
- Confined Spaces
- Ergonomics
- Facilities Emergency Plan
- Fire Extinguisher
- Hazcom
- Hazmat & Waste Management
- Hearing Conservation
- Pollution Prevention
- Spill Prevention & Storm Water Control
- Forklift Operation
- Safety at Heights

Photo 18

Photo 19

Photo 20

Photo 21

Photo 22

Photo 23

Photo 24

Photo 25

Warning, information, and clearance tags were observed throughout the plant which is a good indicator and an essential part of a good safety program.

Maintenance Standard 8 - Maintenance Procedures and Documentation:

Maintenance procedures and documents are clear and technically accurate, provide appropriate direction, and are used to support safe and reliable plant operation. Procedures must be current to the actual methods being employed to accomplish the task and are comprehensive to ensure reliable energy delivery to the transmission grid.

Assessment Guideline 2.H:

Procedures, documents, drawings, and other work-related references are readily accessible, authorized, clearly identified, controlled, technically accurate, and up to date.

Maintenance Standard 11 - Plant Status and Configuration

Station activities are effectively managed so plant status and configuration are maintained to support reliable and efficient operation.

Assessment Guideline A.1:

Operations personnel are cognizant of the status of plant systems and equipment under their control and of the nature of work being performed.

Assessment Guideline B.4:

Plant design and status documents are accurate and accessible to station personnel.

Observation Number 3.4 – Plant Drawings

Maintenance Standards 8 and 11 require that plant drawings be accurate and up to date to support the reliable operation of the plant. To verify compliance with this standard, the auditor reviewed equipment drawings and compared the drawings to physical equipment to determine the overall accuracy and reliability of the plant's vendor drawing system.

First, in order to observe the plant's filing system for drawing, documentation controls, and the method of updating and revising equipment drawings, the auditor asked that the Plant Manager locate an Original Equipment Manufacturer (OEM) vendor print for the main fuel gas shutoff valve for the Unit 3 boiler fuel gas supply system. The auditor witnessed the following steps for retrieving an OEM vendor print:

1. The Plant Manager used a piping and instrumentation diagram to locate the valve tag number.

2. He then used the valve tag number to find the valve drawing number on the instrumentation index list.
3. The Plant Manager then located the valve drawing in the file cabinet.
4. An inspection of the valve drawing confirmed that the valve matched the tag number and description of the valve on the piping and instrumentation diagram.

Next, the auditor requested that the Operations Supervisor verify that the boiler safety valve tag numbers, observed by the auditor on certified valve test reports, were correct. The Operations Supervisor verified the tag numbers on the piping and instrumentation diagram and then physically verified, with the auditor, the valve numbers shown on the metal tags attached to the boiler safety valves.

Maintenance Standard 9 - Maintenance Procedures Use: Conduct of Maintenance:

Maintenance is conducted in an effective and efficient manner so equipment performance and material condition effectively support reliable plant operation.

Assessment Guideline 2.H:

Effective maintenance practices are followed.

Observation Number 3.5 – Turbine Maintenance

The CPSD auditors reviewed the maintenance program of the Potrero Power Plant gas turbine peakers, for compliance with Maintenance Standard 9.

Pratt & Whitney, the Original Equipment Manufacturer (OEM) of the gas turbines in Units 4, 5 and 6, recommends a Hot Section Inspection and maintenance on all critical components of the gas turbine. The Hot Section Inspection (HSI) involves the disassembling, inspection, and calibration of the engine components through which hot exhaust gas flows. According to the Preventive Maintenance Work Schedule (PMWS) that was presented to the CPSD auditors, Potrero currently performs this maintenance on an annual basis. Further, Potrero regularly inspects the ISO meter, station batteries, critical protective relays, 480 kV breakers, free turbine supports, and replaces fuel filters and strainers. The plant lacks a periodic maintenance schedule for other critical systems and subsystems related to ignition, lube oil, inlet air, vibration monitoring, fire protection, and water injection. The OEM manual recommends regular maintenance of these major components.

In response to the CPSD auditor's inquiry regarding the lack of periodic maintenance on the above components, the Plant Manager replied that their current PMWS was developed based on needs and cost benefits. Preventive maintenance is not performed on every system and subsystem per OEM recommendations, because the need does not exist, based on operating experience. It would not be cost-effective to implement a

comprehensive maintenance program if certain systems do not have a history of failure. The Plant Manager emphasized that their current PMWS is sufficient to support reliable plant operation and that it is an evolving document that would be expanded as conditions change.

The auditor conducted a search of the CPSD Outage Inspection Database to verify the Plant Manager's contention that the plant's selective maintenance of the gas turbines is cost-effective. The auditor reviewed Potrero Power Plant inspection reports written since the beginning of our power plant inspection program in December, 2000. The auditor did not find any outages that were a result of a failure of any of the gas turbine components not addressed in Potrero's PMWS. Therefore, Potrero's maintenance of the gas turbines appears reasonable and cost-effective.

Maintenance Standard 10 - Work Management Process: Work Management:

Work is identified and selected based on value to maintaining reliable plant operation. Work is planned, scheduled, coordinated, controlled, and supported with resources for safe, timely, and effective completion.

Assessment Guideline B.4:

Requested and approved work activities are tracked until dispositioned. The status of incomplete and pending work activities is maintained and readily accessible.

Observation Number 3.6 – Work Management

The CPSD auditors reviewed the work management program of the power plant for compliance with Maintenance Standard 10.

Potrero Power Plant uses Maximo, a widely used asset and service management software, to handle the procurement of parts and materials and to manage preventive maintenance work orders. The Operation Manager explained that work management is one of the key management systems of Maximo. It allows the tracking of planned and unplanned maintenance activities from initial work order request through completion. He further stated that all plant staff are allowed to originate work order requests. However, only management personnel have the authority to approve work order requests. One of the roles of an Operation Manager is to approve and prioritize work order requests based on the value of maintaining reliable plant operation.

The Operation Manager provided a demonstration of Maximo. He randomly retrieved a work order on his computer and demonstrated that work order stages are tracked until completion of the work, when the work order will be closed out and designated as "retired". The auditor was able to see work orders, both active and closed, and dates for repair work on a turbine shaft lube oil pump. The auditor also observed several other

work orders, both active and closed. The Operation Manager further explained that the status of any work order at any given time is accessible by all plant staff at computer terminals throughout the plant. Information such as work description, work order approval status, and work priority are also readily available.

Maintenance Standard 15 - Chemistry Control:

Chemistry controls optimize chemistry conditions during all phases of plant operation and system non-operational periods.

Assessment Guideline 2.A:

Chemistry specifications and methods of control are clearly established for systems requiring corrosion control. Chemical and biological contaminants are kept to a practical and achievable minimum level.

Assessment Guideline 2.B:

Sufficient parameters are measured to detect abnormal conditions or changes to conditions. Limits for key parameters are established based on industry technical guidance, where applicable.

Assessment Guideline 2.C:

Action levels are established and emergency actions are planned and implemented for key chemistry parameters. Out-of-specification conditions and abnormal chemistry are corrected in a timely manner.

Assessment Guideline 2.D:

Chemistry parameters are maintained within specified bands. Sampling frequency provides timely detection of chemistry trends.

Assessment Guideline 2.E:

Corrective actions are taken before chemistry specifications are exceeded.

Assessment Guideline 2.F:

Bulk chemicals, laboratory chemicals, corrosive agents, organic chemicals, and cleaning agents are controlled to prevent improper use or inadvertent introduction into plant systems.

Observation Number 3.7 – Boiler Chemistry

The CPSD auditor examined various elements of the Unit 3 boiler chemistry program for compliance with Maintenance Standard 15 by conducting interviews with the plant chemical technician, and observing the over-all house keeping of chemical test and storage areas. In addition, one of the methods for measuring the success of a boiler chemical treatment program is to observe the number of forced outages due to boiler tube leaks on a long-term basis. The auditor searched the CPSD Power Plant Inspection Database for this information.

First, the auditor interviewed the plant's Chemical Technician, responsible for water chemistry for the Unit 3 boiler and the water injection system for the gas turbines of Units 4, 5, and 6. He said that the plant changed from a boiler "batch" feed system to a continuous feed system a few years ago and that this change benefited the boiler by stabilizing the critical water chemistry control parameters. This enabled the plant to stabilize, control, and correct out-of-compliance water chemistry more easily. The Chemical Technician demonstrated the plant's chemical monitoring system by accessing the plant's water chemistry program from a remote desktop computer which continuously monitors several key chemical parameters from the Unit 3 boiler feedwater, steam drum, and condenser. The auditor was able to verify that water chemistry was within specified limits at that time by viewing the computer monitor. The water chemistry monitoring program is shared amongst, and may be accessed by, other Mirant plants located in the Bay Area.

Next, the auditor observed the chemical lab, sample panels, chemical injection feed pumps, and the boiler chemical storage areas. Following are the auditor's observations:

1. The chemistry lab is located in a trailer where the chemicals were neatly stored and contained. The work area was clean and well lit. The auditor did not smell any chemical odors or fumes.
2. The water treatment sample panels are located on the ground level adjacent to the chemical injection pumps. Other than a couple of sample probes that needed to be replaced, the area looked well-maintained and clean.
3. The continuous feed injection pumps and associated storage tanks are located in a curbed concrete containment area to mitigate accidental spillage. The chemical storage tanks appeared to be properly labeled and secured. This area appeared to be clean and well maintained.
4. Eye wash and emergency showers were located next to the chemical lab and continuous feed injection pumps.
5. The Material Safety Data Sheets (MSDS) were available and reviewed against the active chemicals being used for the plant's water treatment program.

Lastly, based on the CPSD's outage inspection records, the auditor found that the Potrero Unit 3 boiler plant has only had three forced outages due to boiler tubes leaks in the past three years. This is a good performance record considering that this boiler is 40 years old. It appears that the water chemistry program at Potrero Unit 3 is effective.

Additional Miscellaneous Observations

In addition to the numbered observations, the following equipment and/or systems were also audited:

Unit 3:

- Certificate from the National Board of Boiler and Pressure Vessel Inspectors
- Permit from CAL-OSHA or certified boiler inspector to operate a steam boiler
- Test and inspection records for boiler drum and superheater safety valves
- MSDS sheets for hazardous chemicals used on site and specifically, boiler water treatment chemicals
- Inventory list showing the quantity of all chemicals being stored on site
- Boiler burner system valves and instrumentation – documentation that these devices are Factory Mutual listed and that these devices have been field inspected and tested
- Most recent steam turbine overspeed trip test records

Units 3, 4, 5 and 6:

- Fire Protection System inspection records for the past year
- Fire pump performance test and inspection documents signed by the insurance carrier
- Emergency action or response plan
- Lockout/Tagout procedures
- Confined space entry procedures

Everything appeared to be in order. There were no audit findings in these areas.