FINAL REPORT ON THE AUDIT OF THE ETIWANDA POWER PLANT

CONDUCTED UNDER GENERAL ORDER 167
TO DETERMINE COMPLIANCE WITH
OPERATION, MAINTENANCE, AND LOGBOOK STANDARDS

ELECTRIC GENERATION PERFORMANCE BRANCH
CONSUMER PROTECTION AND SAFETY DIVISION
CALIFORNIA PUBLIC UTILITIES COMMISSION
505 VAN NESS AVENUE
SAN FRANCISCO, CA 94102

March 27, 2008

Richard W. Clark, Director
Consumer Protection and Safety Division

TABLE OF FIGURES

Executive Summary

This is the Final Report from the audit of the Etiwanda Power Plant prepared by the Consumer Protection and Safety Division (CPSD) of the California Public Utilities Commission (CPUC). CPSD audited the plant for compliance with the Commission's General Order 167, which includes Operation, Maintenance, and Logbook Standards for power plants.

On May 5, 2006, CPSD notified Etiwanda of the audit and requested pertinent documents and data. CPSD staff visited the plant site from June 4, 2006 through June 8, 2006 in order to observe plant operations, inspect equipment, examine documents, and interview plant staff and managers. The CPSD Audit Team reviewed specific incidents and problems in plant operation to evaluate whether the plant needed improvements in operation and maintenance processes, training, or policies. The Audit Team also examined whether the plant's programs and procedures met various Operation, Maintenance, and Logbook Standards.

CPSD sent Etiwanda a Preliminary Audit Report on July 13, 2007. Etiwanda responded with a Corrective Action Plan (CAP) on August 21, 2007. CPSD and Etiwanda resolved all outstanding issues in an October 23, 2007 conference call. The audit team leader visited the plant on December 12, 2007 to verify completion of several corrective actions and clarify some minor issues. Etiwanda cooperated fully throughout the entire audit process. CPSD now issues this Final Report.

In the Preliminary Audit Report, CPSD identified 13 potential violations of various standards. Auditors found no safety hazards requiring immediate action. Upon further review, CPSD changed one potential finding to an observation. Reliant submitted a Corrective Action Plan which agreed with many of staff's recommendations. As described below, CPSD and Reliant agreed on a CAP that will resolve all major issues.

> Finding 2.1. CPSD found that the plant failed to establish and follow clear test procedures for turbine overspeed. In response, the plant rewrote the procedures, requiring annual full overspeed tests according to clear step-by-step instructions.
>
> Finding 2.2. CPSD found that the plant deferred needed maintenance prescribed by the plant's own equipment condition assessment. In response, the plant hired a new manager for the program, developed a new schedule and procedure, and performed much of the high priority work from the original schedule. By December 31, 2008, the plant agrees to provide CPSD with repair records for all the original high priority items and all boiler and piping repairs listed on the original schedule.

Finding 2.3. CPSD found that the plant fails to maintain proper hydrazine levels in the condensate and feedwater during normal operations. In response, the plant is refurbishing the entire chemistry lab by installing a system which continuously monitors water chemistry. CPSD requests that the plant provide photos of the refurbished lab and the plant's report on the refurbishment project on completion.

Finding 2.4. CPSD found that the plant's work management system contains obsolete work orders, as well as cooling tower inspection orders that don't match the plant's maintenance plan. In response, the plant updated the work management system.

Finding 2.5. CPSD found that the plant failed to identify and correct hazards to foot and vehicle traffic, including standing water on the turbine deck, loose grating in a walkway, and a two-foot hole in a dirt road adjacent to the plant. In response, the plant corrected these hazards.

Finding 2.6. CPSD found that the plant fails to calibrate all test equipment. In response, the plant hired a contractor to implement a comprehensive test program. The plant monitors the calibration through a website.

Finding 2.7. CPSD found that the plant fails to use written checklists for all daily inspections. In response, as part of a Reliant corporate initiative to improve policies and procedures, Etiwanda will begin using checklists for inspections, including the daily inspection. CPSD requests that the plant submit quarterly updates on the effort.

Finding 2.8. CPSD found that the plant fails to maintain chemistry equipment calibration logs. In response, the plant created comprehensive calibration logs.

Finding 2.9. CPSD found that the plant fails to follow chemistry lab housekeeping procedures. In response, the plant cleaned and organized the chemistry lab and fume hood, and posted a sign prohibiting storage in the fume hood.

Finding 2.10. CPSD found that the plant fails to mark evacuation areas. In response, the plant added evacuation signs to both evacuation areas.

Finding 2.11. CPSD found that plant security entered an incorrect list of visitors on site in the plant gate log. In response, the plant created a new business manager position to oversee the work of the security personnel.

Finding 2.12. CPSD found that a plant report describes abandoned fire hose stations as "Missing." In response, the plant audited all fire station equipment and updated fire system inspection lists. The plant removed all unused hose stations.

Introduction

Beginning in May 2006, CPSD audited the Etiwanda Generating Station to determine whether the plant was in compliance with General Order (GO) 167. GO 167 includes Maintenance, Operation, and Logbook standards for power plants.[1] The audit team included Ben Brinkman, Winnie Ho, Chris Lee and Alan Shinkman.

CPSD conducted the audit through an examination of plant performance, data requests and a visit to the plant site. First, the team examined outage reports by CPSD staff, as well as databases maintained by California Independent System Operator (ISO). On May 5, 2006, the team notified the plant of the audit. The team visited the plant site from June 4, 2006 to June 8, 2006, examining documents, interviewing staff, inspecting equipment, and observing operations. At the conclusion of the site visit, the team presented the plant with a data request.

CPSD sent Etiwanda a Preliminary Audit Report on July 13, 2007. Etiwanda responded with a Corrective Action Plan (CAP) on August 21, 2007. Etiwanda agreed with all but four of the report's recommendations. CPSD and Etiwanda held a conference call on October 23, 2007 during which the four outstanding issues were resolved. The audit team leader visited the plant on December 12, 2007 to verify completion of several corrective actions. Etiwanda cooperated fully throughout the entire audit process.

Plant Description

Reliant's Etiwanda Generating Station sits in the industrial outskirts of Rancho Cucamonga, east of Los Angeles. At one time, the plant consisted of five units. In 2003, the plant retired Units 1, 2, and 5, and mothballed Units 3 and 4. Reliant returned Units 3 and 4 to service in 2004 when CAISO awarded those units Reliability-Must-Run (RMR) contracts.[2] Units 3 and 4 remained on RMR contracts at the time of the site visit, but CAISO released them from these contracts for 2007.

The plant now consists of Units 3 and 4, which generate 320 Megawatts (MWs) each, for a total of 640 MW. Commissioned in 1962, Units 3 and 4 utilize General Electric (GE) steam turbines and controlled-circulation boilers manufactured by Combustion Engineering. While most boilers have the firebox below and water tubes above, this boiler reverses that configuration, using pumps to drive water through the boiler. Unlike most of California's conventional steam plants, Etiwanda is located inland and utilizes a

[1] Further information on the Commission's Power Plant Performance program may be found at the Commission's Web Site at
http://www.cpuc.ca.gov/PowerPlantStandards.

[2] The California Independent System Operator (CAISO) had declared Units 3 and 4 to be Reliability Must Run (RMR) units to preserve the stability of the grid, but concluded this contract as of 2007. From the CAISO website, RMR is "an annual process that identifies geographical areas with local reliability issues in the ISO Control Area along with measures to remediate those issues. Reliability Must Run Contracts are a means of ensuring power availability within identified areas."

cooling tower. The plant discharges used water to the Inland Empire Utilities Agency wastewater treatment plant, which reclaims the water for reuse.

Plant Performance

CPSD studied the performance of Etiwanda's active units, numbers 3 and 4.[3] Staff examined detailed data for 2003-2006 (note that Reliant mothballed the plant briefly in 2004), and more aggregated data for 1998-2003. Like many conventional boiler units in California, Etiwanda ran at low capacity factors; from 2004-2006 Units 3 and 4 ran at 12% and 15% respectively.

For 2004 to 2006, Etiwanda units performed as well or better than similar California units in almost all categories. Although the units started slightly less reliably than other plants, they outperformed other plants on all other measures. Unit 4's EFORd (a measure of the plant's forced outages when the ISO needed it) was particularly low: 3.14 compared with the California average of 9.95. Unit 3's EFORD was roughly 8. Overall availability was 90%.

In the years before the plant was mothballed, the plant operated similarly, except that its overall availability was somewhat lower; around 80%. The plant took relatively more scheduled outages during this period. EFORd was around 8 for both units.

While overall performance has been good, a number of specific incidents reduced plant capacity significantly. If the plant had prevented these problems, its performance would have been much better.

- Unit 3's turbine problems (see Observation 3.4) increased EFORd and reduced equivalent availability in the 4th quarter of 2004.
- A cooling tower collapsed in July 2005, during a Stage 2 emergency (See Observation 3.10). The collapse affected neither EAF nor EFORd significantly during this period. However, during the 2nd and 3rd quarters of 2006, resulting repairs to the cooling tower reduced overall availability significantly. The plant completed repairs just before the heat storms of 2006, reducing EFORd during this critical period.
- In the third quarter of 2003, prior to mothballing, brushes short-circuited on Unit 4's low pressure generator, causing an extended outage in August and September of 2003. The plant's root cause analysis showed that a contractor's technician had misaligned the generator's brushes. EFORd spiked to 70 for that quarter.

[3] CPSD examined indices established by the North American Electric Reliability Council (NERC). The study includes six performance indices: (1) Equivalent forced outage rate during demand (EFORd), (2) Equivalent Availability Factor (EAF), (3) Net Capacity Factor (NCF), (4) Start Reliability (SR), (5) Scheduled Outage Factor (SOF), and finally (6) Forced Outage Factor (FOF). A lower EFORd indicates fewer equivalent forced outage hours when ISO needs the unit to generate, and is therefore generally better than a higher EFORd.

Therefore, the audit team evaluated the plant's root cause analysis practices (Observation 3.5), plant oversight of contractor work (Observation 3.10), and employee training (Observation 3.11).

Audit Scope

The team looked broadly at the plant's compliance with standards, and also focused on problems identified from the plant's operating history. Major incidents and problems include:

- Bearings that failed after Units 3 and 4 returned to service. In particular, immediately after reactivation, Unit 3's steam turbine bearings failed several times (as described in Observation 3.4) The failures led to lengthy and expensive outages during October 2004 to November 2004. As discussed in Observation 3.4, the plant conducted several stages of root cause analysis. Ultimately, the plant concluded that the grease hardened on Unit 3's turbine shaft during the year the plant was mothballed, causing the bearing problems.
- Structural failure of the plant's cooling tower. In November 2004, Etiwanda hired a contractor to upgrade the cooling tower for Unit 4. Without notifying Etiwanda, the contractor substituted a part not specified by plans. In July of 2005, that cooling tower partially collapsed, shutting the plant down and contributing to a Stage 2 Electrical Emergency. As described in Observation 3.10, Etiwanda improved oversight of contractors.

The audit also examined the plant's compliance with specific standards, including those covering:

A. Logbooks, training, and human resources,
B. Equipment, parts, and tools,
C. Water chemistry,
D. Boiler maintenance and operation,
E. Regulatory compliance,
F. Engineering support,
G. Safety, including hazardous material handling, fire and spill prevention and response, and
H. Maintenance and operations planning, performance, and documentation.

The team visited the plant site from June 4, 2006 to June 8, 2006. Team members toured the plant, including the generating units, the control room, the warehouse, chemistry lab, mechanical shop and electrical shop. Plant staff demonstrated the plant's maintenance management software. CPSD auditors attended a plant shift change (tailboard) meeting, and a training session in which plant staff extinguished test fires. CPSD auditors reviewed numerous documents and interviewed plant staff. CPSD auditors requested and reviewed additional documents after the site visit.

The audit findings and observations are described below, along with relevant Standards and Guidelines. Section 1 of CPUC audit reports contain findings of potential violations that pose safety hazards that require immediate corrective action. Auditors found no Section 1 violations at Etiwanda.

Section 2 includes findings of potential violations that require corrective action as soon as reasonably possible.

Finding 2.1. In the Preliminary Audit Report, CPSD found that the plant failed to establish and follow clear test procedures for turbine overspeed. In response, the plant rewrote the procedures, requiring annual full overspeed tests and including clear step-by-step instructions.

Finding 2.2. In the Preliminary Audit Report, CPSD found that the plant deferred some needed maintenance activities, which were prescribed by the plant's condition-based maintenance assessment. In response, the plant hired a new manager for the condition-based maintenance program, and developed a new schedule and procedure. Additionally, the plant performed much of the high priority work from the original schedule, including repairs to the cathodic protection system. The plant provided an updated repair schedule. By December 31, 2008, the plant agrees to provide CPSD with repair records for all the original high priority items and all boiler and piping repairs listed on the original schedule.

Finding 2.3. In the Preliminary Audit Report, CPSD found that the plant fails to maintain proper hydrazine levels in the condensate and feedwater during normal operations. In response, the plant is refurbishing the entire chemistry lab by installing or replacing various analyzers (including the hydrazine analyzer), sensors, and alarms that will feed continuous data into a centralized PI database. Reliant headquarters will remotely monitor plant activities via PI data. The plant plans to complete the $70,000 refurbishment project by the end of March 2008. EGPB requests that the plant provide photos of the refurbished lab and the plant's report on the refurbishment project.

Finding 2.4. In the Preliminary Audit Report, CPSD found that the plant's work management system contains obsolete work orders, as well as cooling tower inspection orders that don't match the plant's maintenance plan. In response, the plant updated the work management system, removing the obsolete work orders, the first quarter of 2007. The plant changed the frequency of preventive maintenance (PM) for cooling tower inspections to match that in the maintenance governance. The plant sent copies of these changes in PM to CPSD.

Finding 2.5. In the Preliminary Audit Report, CPSD found that the plant fails to identify and correct hazards to foot and vehicle traffic. First, auditors found a pool of standing water on the turbine deck. Second, an auditor nearly tripped on a piece of grating in front of the West Boiler Circulating Water Pump. Third, in

2005, plant personnel received minor injuries when their truck fell into a two-foot hole on one of the plant's dirt roads.

In response, the plant took corrective steps and set procedures in place to address the hazards to foot traffic. The plant placed non-skid surface all over the turbine deck, including the area where water had accumulated at the time of the onsite audit visit. In response to the loose grating piece found on a walkway, the plant manager now conducts monthly housekeeping inspections. The plant also welded down several areas of loose grating.

With regard to the erosion on a dirt road which caused an injury, the plant reemphasized to the staff the importance of following plant vehicle procedures and the incident reporting process. The plant called Southern California Edison (SCE), which owns the road, to request repairs.

Finding 2.6. In the Preliminary Audit Report, CPSD found that the plant fails to assure the calibration of all test equipment. In response, the plant contracted a company called TRANSCAT to track and calibrate all test equipment, including multimeters. TRANSCAT notifies the plant electronically when calibration is due, and calibrates the equipment on the plant site. The plant has access to all calibration data through a website.

EGPB requested the latest TRANSCAT calibration report for review.

Finding 2.7. In the Preliminary Audit Report, CPSD found that the plant fails to use written checklists for all daily unit "walkdown" inspections. In response, as part of a Reliant corporate initiative to improve policies and procedures, Etiwanda will begin using checklists for most inspections, including the daily walkdowns. The CPSD inspector reviewed progress on the checklists in December 2007. The plant intends to implement the new checklists during 2008. CPSD requests that the plant submit quarterly updates on the effort.

Finding 2.8. In the Preliminary Audit Report, CPSD found that the plant fails to maintain calibration logs for equipment that monitors feedwater chemistry. In response, the plant created equipment calibration logs. The logs list the inspection cycle, calibration date, and calibration data for each piece of equipment in the lab. In addition, during a December 12, 2007 plant visit, EGPB staff saw stickers on equipment showing dates for the last calibration and next one due.

Finding 2.9. In the Preliminary Audit Report, CPSD found that the plant fails to follow chemistry lab housekeeping procedures. In response, the plant removed storage material from the fume hood area, and posted a sign indicating no storage in the fume hood. During a December 12, 2007 plant visit, EGPB staff found the chemistry lab clean. No further action is needed.

Finding 2.10. In the Preliminary Audit Report, CPSD found that the plant fails to mark evacuation areas. In response, the plant added evacuation signs to both evacuation areas. CPSD verified this corrective action on December 12, 2007.

Finding 2.11. In the Preliminary Audit Report, CPSD found that plant security entered an incorrect list of visitors on site in the plant gate log. In response, the plant created a new business manager position to oversee the work of the security personnel. One of the responsibilities of the business manager is to periodically check the gate logs for accuracy. The plant submitted to CPSD sample copies of gate logs that have been checked and signed by the business manager.

Finding 2.12. In the Preliminary Audit Report, CPSD found that a plant report describes abandoned fire hose stations as "Missing." In response, the plant audited all fire station equipment and updated fire system inspection lists. The plant removed all unused hose stations.

Section 3 contains observations of plant activities where auditors found no apparent violations.

Observation 3.1. Reliant Regularly Audits its own Plants and Rates its own Performance.

Observation 3.2. The Plant Maintains Extensive Procedures and a List of Approved Contractors.

Observation 3.3. The Plant Bases Employee Compensation on Performance Evaluations.

Observation 3.4. The Plant Thoroughly Investigated Turbine Bearing Failures.

Observation 3.5. The Plant Maintains and Uses a Detailed Procedure for Root Cause Analysis.

Observation 3.6. According to a Detailed Procedure, the Plant Tracks Important Inventory by Project.

Observation 3.7. The Plant's Document Control Room is Neat and Organized.

Observation 3.8. General Housekeeping and Equipment Labeling are Good.

Observation 3.9. The Plant Keeps Predictive Maintenance Reports.

Observation 3.10. The Plant Has Improved Its Procedures and Technical Support for Contract Work.

Observation 3.11. The Plant Utilizes a Training Program.

Observation 3.12. The Plant Provides Security for the Plant and Personnel.

Observation 3.13. The Plant Follows Tagout Procedures and is Implementing a Lockout Procedure.

Observation 3.14. The Plant Tests its Fire System Annually.

Observation 3.15. The Plant Held an Evacuation Drill and Implemented Changes as a Result.

Observation 3.16. The Plant Holds Daily Staff Meetings

Observation 3.17. The Plant's Chemistry Lab Procedures are Comprehensive.

Observation 3.18 Auditors Found No Significant Difference between Plant Logs and other Reported Information.

SECTION 1 FINDINGS

Staff found no safety hazards requiring immediate correction.

SECTION 2 FINDINGS

Operations Standard 7, "Operation Procedures and Documentation," states:

> *"Operation procedures exist for critical systems and states of those systems necessary for the operation of the unit including startup, shutdown, normal operation, and reasonably anticipated abnormal and emergency conditions. Operation procedures and documents are clear and technically accurate, provide appropriate direction, and are used to support safe and reliable plant operation. Procedures are current to the actual methods being employed to accomplish the task and are comprehensive to ensure reliable energy delivery to the transmission grid."*

Operation Standards 28, "Equipment and Systems," states:

> *"GAO complies with these Operation Standards (1-27) considering the design bases (as defined in the Appendix) of plant equipment and critical systems. The GAO considers the design basis of power plant equipment when as required by other standards it, among other things:*
>
> *A. Establishes procedures for the operation of critical systems at each unit (Ref. Standard No. 7).*
>
> *B. For each system, identifies critical parameters that require monitoring (Ref. Standard No. 8 and 13).*
>
> *C. For each critical parameter, establishes values at which to increase observation of the system or take actions to protect it (Ref. Standard No. 8 and 13).*
>
> *D. Assures that systems are monitored and actions are taken (Ref. Standard 8 and 13)."*

Finding 2.1. The Plant Fails to Establish and Follow Clear Test Procedures for Turbine Overspeed.

The plant failed to establish and follow clear test procedures for turbine overspeed. First, the plant's test procedure is poorly written and unclear. Second, the plant failed to conduct tests every year, as its procedures apparently require. Finally, reminders in the work scheduling system appear ineffective.

The plant's test procedure (ETS-00-TU-PO02) is poorly written and unclear. First, the procedure fails to clearly explain when to use an overspeed test (where operators run the turbine at 110% of synchronous speed) versus an oil trip test (where operators inject oil into the turbine governor). Second, while the procedure requires annual testing, it is

unclear whether an oil trip test alone meets this requirement. Third, the procedure appears to allow the plant to omit the annual test if the turbine has tripped at any time during that year, failing to specify that only trips caused by overspeeding satisfy this procedure. Fourth, procedures require testing during outages, when the plant customarily carries no load; but the procedure also requires testing only after the unit carries 24-30 percent of load. The two requirements appear contradictory.

For Unit 4, the plant failed to conduct overspeed tests every year as the procedure appears to require. Records show an overspeed test on Unit 4 in 2004 and on Unit 3 in 2006. The plant manager stated that the plant conducted many oil trip tests in 2005, but no overspeed test on either unit. In late June 2006, on three consecutive days, Unit 4's overspeed protection scheme tripped even though the turbine was operating normally. Resulting outages totaled over 60 hours. In response, the plant tightened the governor linkage, reset the trip speed, and replaced electrical monitoring equipment.[4] CPSD believes that proper tests might have detected these problems and prevented the outages.

Finally, reminders in the work scheduling system appear ineffective. Reminders for overspeed tests (ETS04TUOPO01) appear every six months, even though procedures call for tests only during outages. Apparently staff routinely ignores these reminders.

Final Outcome and Follow-up

In response to the Preliminary Audit Report, the plant rewrote its overspeed test procedures to clearly require full overspeed tests at least every twelve months. The new procedures detail required tests step-by-step, and are consistent with the reminders in the work scheduling system. CPSD auditors verified the new procedures, and will check the plant's 2008 overspeed trip test records for compliance. The plant states that staff did not ignore reminders; rather they performed "oil-trip" tests.

Maintenance Standard 10, "Work Management," states**:**

> *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.*

Finding 2.2. The Plant Delayed Evaluation of Needed Maintenance.

The plant delayed evaluation of needed maintenance until after the summer peak, potentially violating operating and maintenance standards. In particular, a week before the audit visit, on May 31, 2006, the plant compiled the results of a survey of plant staff on which 164 plant systems required maintenance.[5] Work included reconnecting the

[4] From an independent audit required under a settlement between Reliant and the CPUC, titled "Independent Audit of Unit Outages Related to Joint Settlements of FERC Dockets."
[5] "Etiwanda Generating Station Critical Equipment Schedule." This document is dated May 31, 2006.

plants cathodic protection system, and adding several work orders to the computerized work management system. The plant manager stated that he would add work orders soon, but delay major maintenance items until after the summer season. While CPSD applauds the plant's initiative in identifying needed work, and generally supports scheduling maintenance in off-peak periods, CPSD is concerned that some of these latter items could and should have been completed before the end of the peak season, including possibly, repairs to the cathodic protection system.

Final Outcome and Follow-up

In response to the Preliminary Audit Report, the plant hired a new manager for the condition-based maintenance program, and developed a new schedule and procedure. Additionally, the plant performed much of the high priority work from the original schedule, including repairs to the cathodic protection system. The plant provided an updated repair schedule. By December 31, 2008, the plant agrees to provide CPSD with repair records for all the original high priority items and all boiler and piping repairs listed on the original schedule.

Maintenance Standard 8, "Maintenance Procedures and Documentation", states:

> *"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."*

Maintenance Standard 15, "Chemistry Control", states:

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

Operations Standard 12, "Operations Conduct", states:

> *"To ensure safety, and optimize plant availability, the GAO conducts operations systematically, professionally, and in accordance with approved policies and procedures. The GAO takes responsibility for personnel actions, assigns personnel to tasks for which they are trained, and requires personnel to follow plant and operation procedures and instructions while taking responsibility for safety. Among other things:*
>
> *A. All personnel follow approved policies and procedures. Procedures are current, and include a course of action to be employed when an adopted procedure is found to be deficient."*

Finding 2.3. The Plant Fails to Maintain Proper Hydrazine Levels in the Condensate and Feedwater.

The plant fails to maintain proper hydrazine levels in the condensate and feedwater during normal operations, a potential violation of maintenance and operations standards. First, during normal operation, hydrazine levels in condensate and feedwater often exceed allowable limits. Second, even though plant procedures require continuous monitoring during such excursions, the plant fails to do so, in part because monitors are broken.

During normal operation, hydrazine levels in condensate and feedwater often exceed the limit stated in plant procedures of 20 parts per billion (ppb), in part because the plant's chemistry technician believed that those higher concentrations are acceptable. The technician stated that acceptable hydrazine levels fall between 20 to 120 ppb during normal operations By contrast, the plant's chemistry lab procedures require hydrazine levels in condensate and feedwater to be 20 ppb or less. Above this level, the procedure

states that contaminants collect and corrode ferrous material in the feedwater system.[6] . Boiler sheets show daily test readings exceeding 20 ppb on the following days:

Date	**Unit 3 N_2H_4 -DI**	**Unit 3 N_2H_4 -EI**	**Unit 4 N_2H_4 -DI**	**Unit 4 N_2H_4 -EI**
2/14/06	37	62	25	21
2/16/06	20	26	12	10
2/17/06	56	48	14	10
2/21/06	18	33	13	7
2/23/06	36	26	49	45
3/2/06	98	90	62	54
3/3/06	26	20	62	52
3/7/06	221	224	86	87
3/8/06	181	191	79	86
3/9/06	79	74	70	81
3/10/06	24	14	32	31
3/14/06	133	119	49	43
3/15/06	52	47	60	51
3/16/06	46	38	15	22
3/17/06	69	63	38	33
3/21/06	25	20	42	33
3/22/06	21	18	29	20
3/24/06	24	20	47	40
3/27/06	71	61	58	54
3/28/06	36	30	18	12
3/30/06	42	37	26	20
3/31/06	45	41	20	14

Even though plant procedures require continuous monitoring during excursions,[7] the plant fails to do so, in part because monitors are broken. Instrumentation that continuously monitors and controls hydrazine levels broke down in October 2004, and the plant has not fixed it. As a result, the chemical technician must manually test and control the hydrazine levels, which he cannot do continuously. Therefore the plant cannot effectively control hydrazine levels during excursions.

[6] Procedures titled "Etiwanda Generating Station Chemistry Lab." Section 10.2, "Rationale for Action Levels" states that "action levels for control parameters at critical sample points were developed to provide guidance on the relative need for corrective action in the event of cycle chemistry excursions. Normal target values are defined as values associated with long term stability. A safe margin has been provided to avoid concentration of contaminants on the surfaces."

Section 10.4, "Rationale for Target Values of Individual Parameters" states that hydrazine concentration at the plant has "an upper limit of 20 ppb" since there is evidence linking higher hydrazine level with corrosion of ferrous material in the feedwater train.

[7] "Etiwanda Generating Station Chemistry Lab" procedures, more specifically, Section 4.2, titled "Chemistry Control for the Deaerator Inlet," requires continuous sampling of hydrazine levels during excursions.

Final Outcome and Follow-up
In response to the Preliminary Audit Report, the plant is refurbishing the entire chemistry lab by installing or replacing various analyzers (including the hydrazine analyzer), sensors, and alarms that will feed continuous data into a centralized PI database. Reliant headquarters will remotely monitor plant activities via PI data. The plant plans to complete the $70,000 refurbishment project by the end of March 2008.

EGPB requests that the plant provide photos of the refurbished lab and the plant's report on the refurbishment project.

Maintenance Standard 10, "Work Management," states:

> *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.*

Finding 2.4. Work Management System Contains Obsolete Work Orders and Conflicts with the Plant's Maintenance Plan.

The plant's work management system contains obsolete work orders, as well as inspection orders that don't match the plant's maintenance plan, both potential violations of maintenance and operations standards. First, the plant's work management system shows 38 open work orders dated prior to 2005, including number 33931894, dated May 7, 2002. According to the maintenance manager, the plant completed some of these work orders. The plant cancelled the others in 2003, while mothballing the plant. The plant failed to remove these work orders from the work management system. Second, the work management system and the plant's Maintenance Governance list different frequencies for cooling tower inspections. That Governance states that operators, the maintenance manager, and the plant engineer will conduct daily, quarterly and annual, and weekly inspections, respectively.[8] Entries in the work management system, however, schedule such inspections every six months. Apparently, after specifying inspection intervals in the work management system, the plant adopted the conflicting Maintenance Governance.

Final Outcome and Follow-up
The plant updated the work management system, removing the obsolete work orders, the first quarter of 2007. The plant changed the frequency of PMs for cooling tower inspections to match that in the Maintenance Governance. The plant sent copies of these

[8] Maintenance Governance (ETS-ZM-CW-PR01 Ver.1, Sections 2.1 – 2.3)

changes in PM to CPSD. Upon review, CPSD agrees the changes satisfactorily address the conflict between the work management system and the maintenance governance.

Maintenance Standard 1 – Safety states:

> *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.*

Finding 2.5. The Plant Fails to Identify and Correct Hazards to Foot and Vehicle Traffic.

The plant fails to identify and correct hazards to foot and vehicle traffic, a potential violation of maintenance and operations standards. First, auditors found a pool of standing water on the turbine deck. Second, an auditor nearly tripped on a piece of grating in front of the West Boiler Circulating Water Pump. Third, in 2005, plant personnel received minor injuries when their truck fell into a two-foot hole on one of the plant's dirt roads.

Auditors found a pool of standing water on the Unit 3 and 4 turbine deck. Wind sometimes blows the exhaust steam condensate to this area of the deck, causing water to accumulate on the ground. The plant staff said the water does not harm the equipment, which is designed for outdoor use. CPUC believes that the wet ground poses a potential danger, as people may slip and fall. Therefore, the area should be barricaded or coned off to alert people and to prevent unnecessary entry into the area. (See Figure 1 below)

Figure 1. Water creates hazard in walkway.

Figure 2. The plant added non-slip surface to the walkways.

During the plant tour, the auditors saw a piece of grating lying on a platform in front of the West Boiler Circulating Water Pump. The grating piece was lying partially in the

walkway. Since the grating is the same as the platform grating, it was not readily visible, and posed a trip and fall hazard. The plant engineer moved it to the side so that it would not be in the walkway.

Erosion of dirt roads (for example, the one leading to the center well pump) poses potential danger to those driving through in a car or truck. On February 23, 2005, a company truck on that road fell into a 2-foot hole created by erosion, causing very minor injuries to the people in the truck.

Final Outcome and Follow-up

The plant took corrective steps and set procedures in place to address the hazards to foot traffic. The plant placed non-skid surface all over the turbine deck (Figure 2 above), including the area where water had accumulated at the time of the onsite audit visit. In response to the loose grating piece found on a walkway, the plant manager now conducts monthly housekeeping inspections. The plant also welded down several areas of loose grating.

With regard to the erosion on a dirt road which caused an injury, the plant reemphasized to the staff the importance of following plant vehicle procedures and the incident reporting process. The plant called Southern California Edison (SCE), which owns the road, to request repairs.

Maintenance Standard 1, "Safety," states:

> *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 2.C states:

> *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.*

Operations Standard 13, "Routine Inspections," states:

> *Routine inspections by plant personnel ensure that all areas and critical parameters of plant operations are continually monitored, equipment is operating normally, and that routine maintenance is being performed. Results of data collection and monitoring of parameters during routine inspections are utilized to identify and resolve problems, to improve plant operations, and to identify the need for maintenance. All personnel are trained in the routine inspections procedures relevant to their responsibilities. Among other things, the GAO creates, maintains, and implements routine inspections by:*
>
> *D. Monitoring routine inspections.*

Maintenance Standard 18, "Maintenance Facilities and Equipment," states:

> *Facilities and equipment are adequate to effectively support maintenance activities.*

Finding 2.6. The Plant Fails to Assure the Calibration of All Test Equipment.

The plant fails to assure the calibration of test equipment, a violation of the plant's procedures, and a potential violation of maintenance standards. First, the plant lacks computerized, recurring work orders for calibration of safety equipment. Second, plant

procedures fail to specify which non-safety equipment requires regular, formal, and traceable calibration, and which does not. [9]

The plant lacks computerized, recurring work orders for calibration of safety equipment. For example, electricians must remember when to calibrate the gas detection meters. The CPSD auditor checked a gas detection meter and found a calibration certificate attached. However CPSD is concerned that the plant's informal procedure is inadequate, because these meters are critical to safety and reliability, and because multiple individuals use the meters.

Second, plant procedures fail to specify which non-safety equipment requires regular, formal, and traceable calibration, and which does not. Instead, this decision is left to individual staff judgment. The plant attaches calibration stickers to some pieces of equipment (e.g. gloves and hotsticks) but not others. While the plant sends out some equipment for regular calibration, the plant calibrates fluke meters and meggers as needed. Electricians explained that they use fluke meters and meggers only for "ballpark" measurements and therefore send these meters for calibration only when they detect a problem. CPSD is concerned that over time, without clear written guidance, staff practices could become inconsistent, introducing maintenance errors.

Final Outcome and Follow-up

The plant contracted a company called TRANSCAT to track and calibrate all test equipment, including multimeters. TRANSCAT notifies the plant electronically when calibration is due, and calibrates the equipment on the plant site. The plant has access to all calibration data through a website.

EGPB requested the latest TRANSCAT calibration report for review.

[9] Reliant's high-level policy, Performance Objectives for Mini-FPPAT, Guideline M.5.E, requires that "Measurement and test equipment is calibrated and controlled to ensure accuracy and traceability," but the plant lacks detailed procedures to implement this policy.

Operations Standard 13, "Routine Inspections," states:

> *Routine inspections by plant personnel ensure that all areas and critical parameters of plant operations are continually monitored, equipment is operating normally, and that routine maintenance is being performed. Results of data collection and monitoring of parameters during routine inspections are utilized to identify and resolve problems, to improve plant operations, and to identify the need for maintenance. All personnel are trained in the routine inspections procedures relevant to their responsibilities. Among other things, the GAO creates, maintains, and implements routine inspections by:*
>
> *A. Identifying systems and components critical to system operation (such as those identified in the guidelines to Standard 28).*
>
> *B. Establishing procedures for routine inspections that define critical parameters of these systems, describe how those parameters are monitored, and delineate what action is taken when parameters meet alert or action levels.*
>
> *C. Training personnel to conduct routine inspections.*
>
> *D. Monitoring routine inspections.*

Finding 2.7. The Plant Lacks Checklists for Some Daily Inspections

According to the plant manager, the plant fails to use written checklists for all daily unit "walkdown" inspections, in conflict with its own performance objectives,[10] and potentially violating maintenance and operations standards. Although the plant maintains detailed inspection procedures, some procedures lack checklists. While plant staff demonstrated knowledge of equipment and operations,[11] the lack of checklists may lead staff to overlook details, or to fail to report equipment conditions to following shifts. Without documentation, the plant cannot confirm that staff made required inspections, or track the history of equipment problems. The plant manager stated that the plant plans to adopt a system that utilizes Personal Digital Assistants (PDAs), to record some of the inspection activities, particularly the chemical levels in various storage areas and reservoirs.

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10 Reliant "Performance Objectives for Mini-FPPAT, Guideline O.2.A" audit guidelines states:
"Check sheets or other comparable means are used to ensure that proper conditions are established for each mode of plant status and for mode shifts."

[11] The plant manager and training officer explained that the plant trains operators over a three-year apprenticeship. Auditors interviewed a yard operator who correctly delineated the entire list of yard operator, or "number 3 operator" duties listed in the "Operators Routine Duties and Inspections" documents. The operator quoted meter readings and chemical levels. Therefore, CPSD has no evidence that there exists a problem with operator knowledge or training on the daily walkdown.

Plant checklists include those for Resource Recovery and Conservation Act (RCRA) inspections, an End of the Month Report, Unit 3 and 4 Start-up and Shutdown Inspections, and the Boiler / Unit Walkdown Checklist (which the plant uses occasionally). The plant uses additional checklists at critical times, such as unit startup and shutdown.

Final Outcome and Follow-up

As part of a Reliant corporate initiative to improve policies and procedures, Etiwanda will begin using checklists for most inspections, including the daily walkdowns. The CPSD inspector reviewed progress on the checklists in December 2007. The plant intends to implement the new checklists during 2008. CPSD requests that the plant submit quarterly updates on the effort.

Maintenance Standard 8, "Maintenance Procedures and Documentation", states:

> *"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."*

Operating Standards 11, "Operations Facilities, Tools and Equipment", states:

> *"Facilities and equipment are adequate to effectively support operations activities."*

Operations Standard 12, "Operations Conduct", states:

> *"To ensure safety, and optimize plant availability, the GAO conducts operations systematically, professionally, and in accordance with approved policies and procedures. The GAO takes responsibility for personnel actions, assigns personnel to tasks for which they are trained, and requires personnel to follow plant and operation procedures and instructions while taking responsibility for safety. Among other things:*
>
> *A. All personnel follow approved policies and procedures. Procedures are current, and include a course of action to be employed when an adopted procedure is found to be deficient."*

Operating Standards 17, "Records of Operation", states:

"The GAO assures that data, reports and other records reasonably necessary for ensuring proper operation and monitoring of the generating asset are collected by trained personnel and retained for at least five years, and longer if appropriate."

Finding 2.8. The Plant Fails to Maintain Calibration Logs for the Equipment that Monitors Feedwater Chemistry.

The plant fails to maintain calibration logs for equipment that monitors feedwater chemistry, a potential violation of plant procedures and maintenance and operation standards. The plant's procedures[12] require the plant's chemical technician to develop and maintain a calibration log on site. Further, the plant must calibrate testing equipment such as the conductivity meter, pH meter, and spectrophotometer annually to ensure

[12] Etiwanda Generating Station Chemistry Lab, Section 2.3, Calibration and Performance Checks states that the conductivity meter, pH meter, and spectrophotometer must be calibrated annually and that "an instrument calibration log will be developed and maintained by the Chemical Technician on site."

accurate test readings. However, the chemical technician and the chemistry lab supervisor stated that the plant calibrates these instruments as needed, without keeping a log or using the plant's computerized work management system. CPSD is concerned that failure to document and track calibration could lead to problems in the plant's water chemistry, damaging feedwater equipment and piping.

Final Outcome and Follow-up

In response to the Preliminary Audit Report, the plant created equipment calibration logs. The logs list the inspection cycle, calibration date, and calibration data for each piece of equipment in the lab. In addition, during a December 12, 2007 plant visit, EGPB staff saw stickers on equipment showing dates for the last calibration and next one due (see Figure 3).

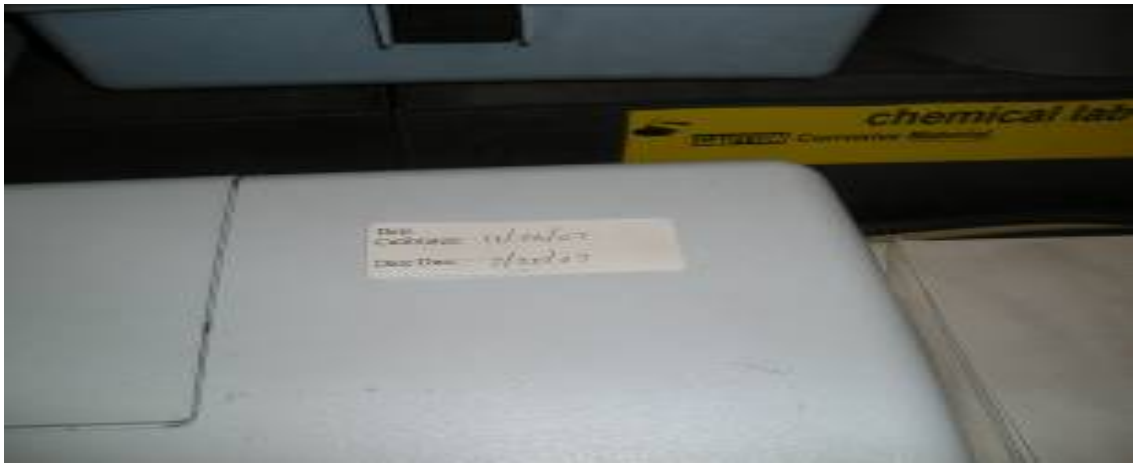

Figure 3. The plant added calibration stickers on equipment.

Maintenance Standard 1, "Safety," states:

> *"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."*

Maintenance Standard 8, "Maintenance Procedures and Documentation", states:

> *"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."*

Operating Standards 1, "Safety", states:

> *"The protection of life and limb for the work force is paramount. GAOs have a comprehensive safety program in place at each site. The company behavior ensures that personnel 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 personnel are consistent with the policies and procedures."*

Operations Standard 12, "Operations Conduct", states:

> *"To ensure safety, and optimize plant availability, the GAO conducts operations systematically, professionally, and in accordance with approved policies and procedures. The GAO takes responsibility for personnel actions, assigns personnel to tasks for which they are trained, and requires personnel to follow plant and operation procedures and instructions while taking responsibility for safety. Among other things:*
>
> *A. All personnel follow approved policies and procedures. Procedures are current, and include a course of action to be employed when an adopted procedure is found to be deficient."*

Finding 2.9. The Plant Fails to Follow Chemistry Lab Housekeeping Procedures.

The plant fails to follow its housekeeping procedures in the chemistry lab, a potential violation of maintenance and operations standards. The plant's chemistry lab procedures require aisles to be clear from obstructions, and fume hoods to be clean and clear for work. The procedure states, "Hoods should never be used as storage areas." However, the auditor found several violations of these procedures.

During a tour of the lab on June 5, the auditor saw boxes, chairs, and other items apparently stored in the aisle behind the instrumentation panel (see Figure 4). These items obstructed pedestrian traffic and prevented one from safely walking the length of the aisle. The auditor also saw chemical/reagent boxes and storage bins housed in the fume hood (see Figure 5).

The plant cleared the aisles of debris by June 7, 2006 but continued to use the fume hood as a storage area.

Final Outcome and Follow-up

During a December 12, 2007 plant visit, EGPB staff found the chemistry lab clean. The plant removed storage material from the fume hood area, and posted a sign indicating no storage in the fume hood (see Figure 6).

No further action is needed.

Figure 4. The plant left clutter in the chemistry lab

Figure 5. The plant used the fume hood for storage.

Figure 6. The plant cleaned and placed a warning sign on the fume hood.

Maintenance Standard 1 – Safety states:

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.

Finding 2.10. The Plant Fails to Mark Evacuation Areas

While the plant has established evacuation areas, it has failed to post signs at those areas, a potential violation of maintenance and operations standards. During safety orientations for visitors and contractors, the plant provides and discusses a handout designating the evacuation assembly areas. The plant also conducts evacuation drills, during which the Control Room Operator announces over the public address system which assembly area to use. CPSD believes that in addition to these efforts, the plant should mark the evacuation areas with clearly visible signs to prevent potential confusion or delays during evacuations.

Final Outcome and Follow-up

The plant added evacuation signs to both evacuation areas. CPSD verified this corrective action on December 12, 2007 (see Figure 7).

Figure 7. The plant added signs to evacuation areas.

Maintenance Standard 1 – Safety states:

> *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.*

Finding 2.11. Plant Security Entered an Incorrect List of Visitors on Site in Plant Gate Log.

On at least one day, the plant's gate log was inaccurate, a potential violation of maintenance and operations standards. The gate log, an electronic spreadsheet, records the times that visitors and contractors enter and exit the facility each day. The security officer enters the information on the computer in the guard station. On June 7, the security officer correctly entered the entry and exit times for the auditors. On June 8, the auditors arrived early, but the security officer copied the log from the previous day. As a result, the plant lacked an accurate record of visitors at the site.

Final Outcome and Follow-up
The plant created a new business manager position to oversee the work of the security personnel. One of the responsibilities of the business manager is to periodically check the gate logs for accuracy. The plant submitted to CPSD sample copies of gate logs that have been checked and signed by the business manager.

Maintenance Standard 8 – Maintenance Procedures and Documentation states:

> *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.*

Finding 2.12. A Plant Report Describes Abandoned Fire Hose Stations as "Missing."

Inspection reports of the plant's fire control system refer to abandoned equipment as "missing," a potential violation of maintenance and operation standards. In particular, the Hose Station report of May 4, 2006 states that stations #67 and #72 are "missing".

The report offered no explanation on these "missing" hose stations, but the plant engineer said the two stations have been abandoned. The report should show that the two hose stations are abandoned. The stations themselves should be so labeled to avoid confusion during emergency response.

Final Outcome and Follow-up
The plant audited all fire station equipment and updated fire system inspection lists. The plant removed all unused hose stations.

SECTION 3. OBSERVATIONS

Operations Standard 3, "Operations Management and Leadership," states

> *Operations management establishes high standards of performance and aligns the operations organization to effectively implement and control operations activities.*

Operations Standard 4, "Problem Resolution and Continuing Improvement," states:

> *The GAO values and fosters an environment of continuous improvement and timely and effective problem resolution.*

Maintenance Standard 3, "Maintenance Management and Leadership," states:

> *Maintenance managers establish high standards of performance and align the maintenance organization to effectively implement and control maintenance activities.*

Maintenance Standard 4, "Problem Resolution and Continuing Improvement," states:

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

Observation 3.1. Reliant Regularly Audits its own Plants and Rates its own Performance.

Fossil Plant Performance Assessment Team (FPPAT) Audits

Reliant regularly selects one of its power plants for what Reliant calls a Fossil Plant Performance Assessment Team (FPPAT) audit. Reliant sends staff from other Reliant

plants to perform the audit. The CPSD auditor reviewed Reliant audit procedures[13] and found that they cover administration, safety and environmental policies, and maintenance and operations activities of the plants. Reliant scheduled such an audit of Etiwanda in 2006, but postponed it due to CPSD's GO167 audit.

Performance Indices

Etiwanda calculates three plant performance indices, according to detailed Reliant procedures, which determine team bonuses for the plant. The three indices are the Safety Performance Index (SPI), the Environmental Performance Index (EPI), and the Maintenance Performance Index (MPI). CPSD auditors reviewed checklists used to calculate Etiwanda's EPI and SPI for the first quarter of 2006. In these internal evaluations, the plant assigns points to over 70 environmental and 60 safety performance measures, and calculates what percentage of total points it attains. The plant reported scores of 98% for environmental and 95% for safety performance, respectively. Environmental criteria include air quality, solid waste, water quality, spill prevention, and regulatory training. Safety criteria include training, procedures, incident prevention and reporting.

The plant manager stated the plant corrected all discrepancies it found during the course of the evaluation processes. For example, the plant scored zero out of five on maintenance of oil storage tanks. The plant manager stated that the plant immediately fixed leaking tanks. Auditors saw no evidence of tank leaks.

Maintenance Standard 8, "Maintenance Procedures and Documentation," states:

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.

Operations Standard 7, "Operation Procedures and Documentation," states:

Operation procedures exist for critical systems and states of those systems necessary for the operation of the unit including startup, shutdown, normal operation, and reasonably anticipated abnormal and emergency conditions. Operation procedures and documents are clear and technically accurate, provide appropriate direction, and are used to support safe and reliable plant operation. Procedures are current to the actual methods being employed to accomplish the task and are comprehensive to ensure reliable energy delivery to the transmission grid.

[13] "Performance Objective Mini FPPAT"

Observation 3.2. The Plant Maintains Extensive Procedures and a List of Approved Contractors.

The plant utilizes an extensive collection of over 200 documented procedures and processes. The plant manager and maintenance manager demonstrated Reliant's corporate intranet, where Reliant maintains many procedures. The plant also keeps hard copies of these procedures in the control room, along with plant specific maintenance and operations procedures. These procedures include detailed instructions for plant operations and maintenance tasks, and are classified in the following groups:

- System Operating Bulletins
- Regional Maintenance Policies
- Operations Policies
- Operations Procedures
- System Description
- Maintenance Procedures
- Administrative Policies

The plant also maintains a "maintenance call out book," which contains the names and contact information for all the approved vendors and contractors for the plant.

Auditors reviewed procedures that touched upon items examined during the audit. Auditors found the test procedure for turbine overspeed to be confusing; see Finding 2.1.

Maintenance Manager's Manual

The maintenance manager utilizes a "Maintenance Manager's Manual" that is common to all Reliant plants. The manual contains instructions and information on the conduct of maintenance, handling of parts, and condition-based maintenance including instructions on root cause analysis. The manual also described the Technical Service Team, Reliant experts who are available to assist any Reliant plant in the resolution of maintenance and operations problems. One section, entitled "Mobile Maintenance Team," applied only to plants outside of California, as confirmed by the plant manager.

Maintenance Standard 2, "Organizational Structure and Responsibilities," states:

The organization with responsibility and accountability for establishing and implementing a maintenance strategy to support company objectives for reliable station operation is clearly defined, communicated, understood and is effectively implemented. Reporting relationships, control of resources, and individual authorities support and are clearly defined and commensurate with responsibilities.

Maintenance Standard 4, "Problem Resolution and Continuing Improvement," states:

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

Operation Standard 3, "Operations Management and Leadership," states:

Operations management establishes high standards of performance and aligns the operations organization to effectively implement and control operations activities.

Observation 3.3. The Plant Bases Employee Compensation on Performance Evaluations.

According to the plant manager, the plant appraises each employee annually, with midyear informal discussions. The direct supervisor rates employee performance on a five-point scale. Employees who receive the lowest rating, "needs improvement," must improve performance or risk termination. The plant bases raises on the performance rating, within minimum and maximum levels for each position at the plant.

Additionally, Reliant awards team bonuses up to 5% of gross pay for meeting the performance goals discussed in Observation 3.1. The plant calls this program the "Annual Incentive Compensation Program".

The CPSD auditor reviewed the plant organization chart. The chart contained three repeat entries for the maintenance manager position: one entry listing the maintenance manager's name, and the other two entries omitting the name. The plant manager stated that he was aware of this typographical error and would correct it.

Maintenance Standard 14, "Engineering and Technical Support," states:

Engineering activities are conducted such that equipment performance supports reliable plant operation. Engineering provides the technical information necessary for the plant to be operated and maintained within the operating parameters defined by plant design.

Operations Standard 9, "Engineering and Technical Support," states:
Engineering activities are conducted such that equipment performance supports reliable plant operation. Engineering provides the technical information necessary for the plant to be operated and maintained within the operating parameters defined by plant design. Engineering provides support, when needed, to operations and maintenance groups to resolve operations and maintenance problems

Observation 3.4. The Plant Thoroughly Investigated Turbine Bearing Failures.

The plant followed its detailed procedure for root cause analysis (see Observation 3.5) to solve a turbine bearing problem. On three separate occasions in September, October, and November of 2004, thrust bearings on the Unit 3 steam turbine failed following high vibration alarms.

Following the September 2004 and October 2004 problems, the plant performed in-house root cause analysis and discovered that

- Operators ignored what they thought were false or insignificant ("nuisance") alarms,
- Operators wrote illegible entries in logs, and could not identify which alarms had activated,
- Plant contractors worked without written quality standards, and applied improper torque to parts of the steam turbine.

In response, the plant analyzed the alarm system, eliminating nuisance alarms; retrained operators; adopted typed logs in place of handwritten logs; and implemented a policy requiring all contractors to use written quality standards.

In November 2004, the plant again detected excessive turbine vibration, along with high temperature in bearing oil, which ignited. The plant asked General Electric (GE) to thoroughly analyze the problem. CPSD auditors reviewed GE's "Steam Turbine Inspection Report", which identified the main problem as grease on the turbine midstandard (a supporting structure) which solidified when Reliant mothballed Units 3 and 4. The solidified grease impeded the turbine shaft, leading to high vibration and damage to the thrust bearings. The GE report recommended two immediate corrective

actions, which the plant has implemented. First, the plant thoroughly cleaned turbine surfaces and grease lines, used better grease, and added a preventive maintenance item (#ETS-00-TU-PR02) for greasing. Second, at every startup, the plant monitors the temperature of turbine thrust bearings, and compares them to normal operating temperatures specified in GE's turbine manuals.

Observation 3.5. The Plant Maintains and Uses a Detailed Procedure for Root Cause Analysis.

The plant maintains and uses a detailed procedure for Root Cause Analysis. As part of the Condition Based Maintenance (CBM) program, plant procedures include a documented and detailed process flowchart for root cause analysis. The plant used the process to perform a detailed root cause analysis on four occasions during the two years prior to the audit. The Maintenance Manager Manual contains the flowchart, which describes how the plant should determine if a root cause analysis is necessary, and how the plant should conduct a root cause analysis. Additionally, the flowchart describes three levels of root cause analysis - the incident report, the simplified root cause analysis, and the detailed root cause analysis. The plant engineer showed the CPSD auditor a root cause notebook, which contained examples of all three types of root cause analysis.

The plant engineer stated that Reliant is currently in the process of implementing software called REASON to perform root cause analysis. REASON is a product trademark and not an acronym for any process.

Maintenance Standard 12, "Spare Parts, Material and Services," states:

Correct parts and materials in good condition, are available for maintenance activities to support both forced and planned outages. Procurement of services and materials for outages are performed in time to ensure materials will be available without impact to the schedule. Storage of parts and materials support maintaining quality and shelf life of parts and materials.

Operations Standard 11, "Operations Facilities, Tools, and Equipment," states:
Facilities and equipment are adequate to effectively support operations activities.

Observation 3.6. According to a Detailed Procedure, the Plant Tracks Important Inventory by Project.

According to a documented and detailed procedure, the plant tracks important inventory by project but distributes low-cost parts as needed. The plant maintains two distinct parts of the warehouse. In one part, plant staff tracks inventory and assigns costs to specific maintenance projects. In the other part, the plant distributes parts as needed, and restocks when inventory runs low.

In the first section of the warehouse, devoted to relatively costly items, plant staff can pick up parts only with requisitions, work orders, or planner approval on an emergency basis. A dedicated worker runs the warehouse, and performs "receiving inspections" on incoming parts. When workers take parts the dedicated warehouse worker records the transaction on an "issue sheet," which the plant later enters into the work management system. The system bills parts and employee labor to the appropriate project automatically. Generally, the system automatically reorders parts when inventory falls below set points. If necessary, planners can order special parts.

The plant warehouse's free stock area distributes small items such as fasteners and electrical lugs and connectors. The plants contracts with Westco and Fastenol to maintain electrical parts and mechanical parts, respectively.

Reliant employs a process known as "Partsco" for acquiring parts from warehouses that the company shares between all power facilities. The CPSD auditor reviewed a procedure for obtaining parts from the "Partsco" system.

Maintenance Standard 8, "Maintenance Procedures and Documentation," states:

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.

Observation 3.7. The Plant's Document Control Room is Neat and Organized.

The CPSD auditor found the document control room very neat and organized. The CPSD auditor checked a plant list of drawings against existing drawings and found no discrepancies. One of the plant's engineers took the initiative to update a list of available schematics, drawings, and other documents. The plant stores the list in a notebook, and in an Excel spreadsheet. The plant keeps these documents in a document control room. The plant stores many of the documents in blueprint format on "sticks" stored in racks.

The CPSD auditor chose a stick at random (stick 13), and compared five documents on the stick to the listing in the notebook. The CPSD inspector found no discrepancies.

Maintenance Standard 11, "Plant Status and Configuration," states:

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

Operations Standard 8, "Plant Status and Configuration," states:
Station activities are effectively managed so plant status and configuration are maintained to support safe, reliable and efficient operation.

Observation 3.8. General Housekeeping and Equipment Labeling are Good.

General plant housekeeping appeared to be very good, although a CPSD auditor observed a loose piece of metal grating on one of the walkways on the boiler (see Finding 2.5). The plant engineer immediately moved this metal out of the way. The equipment on the units and major piping appears to be well labeled. The plant uses secondary containment for hazardous wastes (Figure 8). Retired Units 1 and 2 were clean and marked with barricade tape (Figure 9).

Figure 8. The plant uses secondary containment for hazardous waste.

Figure 9. The plant cleaned and placed barricade tape around Units 1 and 2.

Maintenance Standard 7, "Balance of Maintenance Approach," states:

The maintenance program includes the proper balance of the various approaches to maintenance, e.g., preventive, predictive, or corrective. The approach is adequately documented with consideration of economics and reliability of equipment or components, and their affect on reliable operation of the unit. Operating experience is factored into the program. Maintenance procedures and documents should include the generation equipment and all those components owned by the generation owner directly connected to the plant that are an integral part of delivering power to the grid including fuel supply systems, electrical

Maintenance Standard 14, "Engineering and Technical Support," states:

Engineering activities are conducted such that equipment performance supports reliable plant operation. Engineering provides the technical information necessary for the plant to be operated and maintained within the operating parameters defined by plant design.

Observation 3.9. The Plant Keeps Predictive Maintenance Reports.

The plant keeps predictive maintenance reports. The plant stores those documents in a dedicated storage area in the document control room. That area contained four shelves of reports on predictive maintenance activities, including vibration, thermography, and oil analysis testing. The CPSD auditor reviewed a September 2004 thermography report on plant switchgear, which recommended no immediate repair.

Maintenance Standard 14 – Engineering and Technical Support, states:

> *Engineering activities are conducted such that equipment performance supports reliable plant operation. Engineering provides the technical information necessary for the plant to be operated and maintained within the operating parameters defined by plant design.*

Observation 3.10. The Plant Has Improved Its Procedures and Technical Support for Contract Work.

As a result of recent problems with the plant's cooling towers, Etiwanda has improved its management of contactor projects, through improved procedures and technical support. In November 2004, Etiwanda hired a contractor to upgrade the cooling tower for Unit 4. Without notifying Etiwanda, the contractor substituted a part not specified by plans. In July of 2005, that cooling tower partially collapsed. Reliant adopted a corporate procedure requiring the appointment of a project manager from Reliant's Technical Services office in Houston.

In 2004, Etiwanda contracted with a company specializing in cooling towers for maintenance work. In particular, the company installed a distribution basin cover, replaced the hot water deck, and installed new pipe saddle supports and discharge valves in Etiwanda's cooling tower. The contractor decided to replace existing valves with smaller ones. Etiwanda failed to require the contractor to submit such design changes for review. Whether or not the contractor notified Etiwanda of these changes, Etiwanda staff failed to review them. Etiwanda's outage planner was assigned primarily to monitor safety, not to review design changes.

On July 21, 2005, the cooling tower partially collapsed. Because a drain was too small, too much water collected in a header, whose supports were mounted in the wood of the cooling tower. When workers removed the failed pipe header, they found extensive rot and other structural damage to the wood. The combination of rot and excessive weight caused the header and one of the decks of the cooling tower to fail.

Although Etiwanda does not believe that the contractor's design change directly caused the collapse, the plant recognizes that it needs to review the engineering and technical calculations performed by its contractors. Etiwanda has assigned a liaison engineer to oversee all contracted work. Further Etiwanda has asked the engineer to review all contractor work since 2004.

Etiwanda is replacing much of the structure of the cooling tower, making extensive use of engineering support from the plant, Reliant's corporate office, and three independent contractors. The plant's engineer managed the first phase of the project, while an engineer from Reliant's corporate office is managing the second phase. The plant hired three separate contractors to design the tower using computer modeling, build the tower, and to inspect the quality of the construction.

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.

Observation 3.11. The Plant Utilizes a Training Program.

Etiwanda provides training to employees to ensure that they have the knowledge and skills to perform their jobs. Etiwanda offers training to its employees through computer-based and instructor-led training.

Employees are automatically assigned to take computer-based training depending on their responsibilities. Formerly, Etiwanda used "Plant Operation Online Learning" for its computer-based training, but switched to General Physics (GP) about 3 months before the audit. GP assigns each employee an account, which tracks training for that employee.

In addition to the computer-based training courses, the employees take instructor-led classes. These classes include Boiler Stress Training and Turbine Starting and Loading taught by Southern California Edison, and Confined Space Training by taught by David Sullivan.

On the last day of plant visit, auditors observed lockout/tag-out training as well as hands-on firefighting training conducted by an instructor from Inner-Flame (Oxnard, CA), a company specializing in fire safety training. Standing about 8 feet away, each trainee used a fire extinguisher to fight a fire in a metal structure about the size of a small trailer. Observing from about 30 feet way, auditors felt the intensity of the heat.

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.

Observation 3.12. The Plant Provides Security for the Plant and Personnel.

Etiwanda provides security for the plant and personnel.

[redacted]

[redacted]

[redacted]

Operation Standard 14 – Clearances

Work is performed on equipment only when safe. When necessary, equipment is taken out of service, de-energized, controlled, and tagged in accordance with a clearance procedure. Personnel are trained in the clearance procedure and its use, and always verify that equipment is safe before any work proceeds. Among other things:

The GAO prepares and maintains a clearance procedure. The clearance procedure contains requirements for removing a component from service and/or placing a component back into service.

The GAO ensures that personnel are trained in and follow the clearance procedure.

Observation 3.13. The Plant Follows Tagout Procedures and is Implementing a Lockout Procedure.

Etiwanda maintains a tagout clearance procedure and ensures that plant personnel follow the procedure. An auditor watched plant staff confirm the procedure for tagout # 3442, which isolated the East Heat Exchanger for Units 3 and 4 electrically and mechanically. The operator printed out the list of tags for #3442, and then another staffer walked to each physical location, checked each tag against the list, and verified that the heat exchanger had been isolated.

About 10 months ago, Etiwanda began to physically lock equipment out-of-service, rather than simply tagging it out. Some equipment, such as 4160 breakers, are not designed for locks. The plant will modify such equipment to accommodate locks.

On the final day of the plant visit, the plant trained plant staff in lockout/tagout procedures.

Maintenance Standard 1 – Safety states:

> *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.*

Observation 3.14. The Plant Tests its Fire System Annually.

The plant maintains its fire system to ensure the safety of its property and personnel. Each year, Etiwanda tests fire pump performance in October, and valve and alarm performance in May. The auditor reviewed the Electric Fire Pump Performance Test records from October 2005, which showed that five pumps passed the test. The auditor also reviewed the 2005 Annual Deluge System Inspection Reports and Annual Fire Alarm System Test and Inspection Reports for Units 3 and 4, and confirmed that the fire system passed these tests.

Maintenance Standard 1 – Safety states:

> *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.*

Observation 3.15. The Plant Held an Evacuation Drill and Implemented Changes as a Result.

An evacuation drill on September 20, 2005 raised three issues. First, some personnel on site could not hear the emergency siren or emergency instructions. Second, guards had trouble printing lists of all people on site. Third, staff found inaccuracies in the plant's log of those entering and exiting the plant. The plant addresses all of these issues during its review of the drill.

First, during the drill, the control operator started the emergency siren and ran it for one minute. Then the operator used the public address system repeatedly to announce, "This is an evacuation drill. Go to the #1 Evacuation Assembly Area in the Administration Parking Lot." Then the operator ran the siren again for one minute. People could not hear the siren (or apparently, public announcements) from the storeroom, demineralized water tanks, the guard shack, the makeup reservoir, the shop for Instrumentation & Control (I & C) employees, or the electrician's shop. The plant's safety coordinator told the auditor that the plant now uses radios to communicate with people in areas that the siren and the public announcement cannot reach.

Secondly, the guard had trouble printing out a list of people on site in part because his computer lacked an icon that could easily access the log file. Since then, the plant has added such an icon. The guard did keep a handwritten log of contractors and guests.

Lastly, a review of the log showed that the guard had recorded incorrect information on the day of the drill. The entry and exit time for a FedEx deliveryman was assigned to a UPS deliveryman, and vice versa. Plant personnel pointed out the mistake. Plant management counseled the security guard about the importance of accuracy.

Operation Standard 15 - Communications and Work Order Meetings states:

> *The availability of the generating asset and safety of personnel is ensured during the execution of work orders by adequate communications and meetings, which may be scheduled or as needed, to review work plans with all affected personnel before work begins. Clear lines of communication exist between personnel responsible for operations, maintenance and engineering groups.*

Observation 3.16. The Plant Holds Daily Staff Meetings.

On the third day of the audit, two auditors attended the 6:30 am meeting of the plant staff. During that meeting, staff raised two issues. First, a valve on the cooling tower had been accidentally cut off during refurbishing, and was replaced with a temporary plug to keep water from leaking out. Staff briefly discussed a more permanent repair. Second, staff discussed the plant gate, which had failed to open automatically and was operating in manual mode. Management announced firefighting and lockout/tag-out training the next day.

Maintenance Standard 8, "Maintenance Procedures and Documentation", states:

> *"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."*

Operating Standards 1, "Safety", states:

> *"The protection of life and limb for the work force is paramount. GAOs have a comprehensive safety program in place at each site. The company behavior ensures that personnel 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 personnel are consistent with the policies and procedures."*

Operations Standard 12, "Operations Conduct", states:

> *"To ensure safety, and optimize plant availability, the GAO conducts operations systematically, professionally, and in accordance with approved policies and procedures. The GAO takes responsibility for personnel actions, assigns personnel to tasks for which they are trained, and requires personnel to follow plant and operation procedures and instructions while taking responsibility for safety. Among other things:*
>
> *A. All personnel follow approved policies and procedures. Procedures are current, and include a course of action to be employed when an adopted procedure is found to be deficient."*

Observation 3.17. The Plant's Chemistry Lab Procedures are Comprehensive.

The chemistry lab procedures appear comprehensive, covering:

- Safety
  - Handling of equipment and chemical
  - Housekeeping

- Work habits
- Protection for eyes, face, ears, respiratory

- Chemical Control
  - Calibration of equipment
  - Reagent management
  - Standardization
  - Records and reports
  - Chemical control limits (boiler water, condensate, feedwater and make-up water)
  - Corrective actions on out-of-limit steam or water chemistry conditions
  - Testing frequency
  - Outage protection
  - Startups
  - Test procedures
- Chemical analysis (copper, hydrazine, iron, nitrate, ammonia, benzatriazole, phosphorus, and silica)

The auditor interviewed the chemical technician and observed several tests performed in the lab including pH, hydrazine, and O_2 testing from the circulating and feed water bench, plus a standardization test for pH level 7 and 10. Except as noted in Finding 2.3 and 2.9, the plant follows written procedures.

GO 167, Appendix B. "Generator Logbook Standards (Thermal)", Section II states:

> *Each generating facility shall maintain a Control Operator Log that contains the chronological history of the facility including detailed entries regarding the operations and maintenance of the facility. Where information is unit specific, information for each unit must be recorded and so identified.*
>
> *The Control Operator Log is a formal record of real time operating events as well as the overall status of the generating units and auxiliary equipment under the purview of the Control Room Operator. The log shall also contain an accurate and concise record of important and/or unusual events involving operations, maintenance, water chemistry, safety, accidents affecting personnel, fires, contractor activities, environmental matters, and any other pertinent information concerning the operation of the facility. The log shall also record communications between the facility and outside entities including but not limited to the Independent System Operator (ISO), scheduling coordinators or headquarters facilities, regulators, environmental agencies, CalOSHA or similar agencies. The log shall be maintained notwithstanding and in addition to any other similar requirements that mandate that events be recorded. The generator must collect and record all information specified in these standards. All such information must be readily available to operators, California Public Utilities Commission staff, and other authorized personnel at all times.*

GO 167, section 10.3.2 "Submission of Information to NERC" states:

> *Except for Generating Assets for which NERC does not accept data, each Generating Asset Owner shall submit generator design, performance, and event data to NERC for inclusion in GADS. Within the categories of data that NERC accepts, CPSD may specify the data the Generating Asset Owner must submit to NERC. If requested by CPSD, a Generating Asset Owner shall concurrently provide CPSD with a copy of all data submitted to NERC for inclusion in GADS.*

Observation 3.18. Auditors Found no Discrepancies between Plant Logs and other Reported Data.

The CPSD auditor reviewed GADS data, and compared that data to plant logbooks as well as data from the SLIC data for selected random dates, and found no significant

conflicts in the information provided

The following table shows the dates that were chosen, the units involved, and the corresponding GADS data, logbook entry data, and SLIC. Note that RS in GADS data is an abbreviation for Reserve Shutdown.

Unit	Date	GADS data	Logbook Entry	SLIC data	Significant Discrepancies
3	7-01-05	NO GADS DATA	Take unit 3 to AGC0Low Range	Troubleshoot combustion control computer problem	None
	7-02-05	Start time –0:17:00, Type- RS, Cause Code – 0000, Hours – 149.72, MW loss – 0	RS	NO SLIC ENTRY	None
	7-03-05	NO GADS DATA	RS	NO SLIC ENTRY	None
	7-04-05	NO GADS DATA	RS	NO SLIC ENTRY	None
	7-05-05	NO GADS DATA	RS	NO SLIC ENTRY	None
	7-06-05	NO GADS DATA	RS	NO SLIC ENTRY	None
	7-07-05	NO GADS DATA	RS	NO SLIC ENTRY	None
	7-10-05	NO GADS DATA	RS	NO SLIC ENTRY	None
	7-11-05	NO GADS DATA	RS	NO SLIC ENTRY	None
	7-12-05	NO GADS DATA	108 MW	NO SLIC ENTRY	None
	7-13-05	NO GADS DATA	316 MW	NO SLIC ENTRY	None
	7-14-05	NO GADS DATA	294 MW	Total unit performance testing	None
	7-15-05	NO GADS DATA	70 MW	NO SLIC ENTRY	None
	7-16-05	NO GADS DATA	55 MW	NO SLIC ENTRY	None

	7-17-05	NO GADS DATA	25 MW	NO SLIC ENTRY	None
	7-18-05	NO GADS DATA	Take #3 to low range AGC	NO SLIC ENTRY	None
	1-21-06	Start time 20:35:00, Type- RS, Cause Code – 0000, Hours – 197.79, MW loss – 0	Down with boiler tube leak and miscellaneous repairs – outage #763079	NO SLIC ENTRY	None
	1-22-06	NO GADS DATA	RS	NO SLIC ENTRY	None
	1-23-06	NO GADS DATA	RS	NO SLIC ENTRY	None
	1-24-06	NO GADS DATA	RS	NO SLIC ENTRY	None
	1-25-06	NO GADS DATA	RS	NO SLIC ENTRY	None
	1-26-06	NO GADS DATA	RS	NO SLIC ENTRY	None
	1-27-06	NO GADS DATA	RS	NO SLIC ENTRY	None
	1-28-06	NO GADS DATA	RS	Boiler inspection	None
	1-29-06	NO GADS DATA	In start up	NO SLIC ENTRY	None
	1-30-06	NO GADS DATA	70 MW – High range control	NO SLIC ENTRY	None
	1-31-06	Start time –0:20:00, Type- RS, Cause Code – 0000, Hours – 23.67, MW loss – 0	RS	NO SLIC ENTRY	None
	2-01-06	Start time –0:00:00, Type- RS, Cause Code – 0000, Hours – 270.97, MW loss – 0	RS	NO SLIC ENTRY	None
	2-02-06	NO GADS DATA	RS	NO SLIC ENTRY	None
	2-03-06	NO GADS DATA	RS	NO SLIC ENTRY	None
	2-04-06	NO GADS DATA	RS	NO SLIC ENTRY	None

	2-05-06	NO GADS DATA	RS	NO SLIC ENTRY	None
4	7-01-05	Start time –0:00:00, Type- RS, Cause Code – 0000, Hours – 93.08, MW loss – 0	RS	NO SLIC ENTRY	None
	7-02-05	NO GADS DATA	RS	NO SLIC ENTRY	None
	7-03-05	NO GADS DATA	RS	NO SLIC ENTRY	None
	7-04-05	NO GADS DATA	Start up	NO SLIC ENTRY	None
	7-05-05	NO GADS DATA	125 MW	NO SLIC ENTRY	None
	7-06-05	NO GADS DATA	280 MW	NORMAL OUTAGE TO COVER TRANSITIO N TO LOW RANGE	None
	7-07-05	NO GADS DATA	78 MW	NO SLIC ENTRY	None
	7-09-05	Start time –0:32:00, Type- RS, Cause Code – 0000, Hours – 48.47, MW loss – 0	RS	NO SLIC ENTRY	None
	7-10-05	NO GADS DATA	RS	NO SLIC ENTRY	None
	7-11-05	NO GADS DATA	40 MW	NO SLIC ENTRY	None
	7-12-05	NO GADS DATA	248 MW	NO SLIC ENTRY	None
	7-13-05	NO GADS DATA	320 MW	NO SLIC ENTRY	None
	7-14-05	NO GADS DATA	196 MW	NO SLIC ENTRY	None
	7-15-05	NO GADS DATA	70 MW	NO SLIC ENTRY	None
	7-16-05	Start time –0:08:00, Type- RS, Cause Code – 0000, Hrs–33.57,	RS	NO SLIC ENTRY	None

		MW loss – 0			
	7-17-05	NO GADS DATA	Start up	NO SLIC ENTRY	None
	7-18-05	NO GADS DATA	NO LOG ENTRY	NO SLIC ENTRY	None
	1-20-06	NO GADS DATA	120 MW on high range control	NO SLIC ENTRY	None
	1-21-06	Start time 20:35:00, Type- RS, Cause Code – 0000, Hours – 197.79, MW loss – 0	RS	NO SLIC ENTRY	None
	1-22-06	NO GADS DATA	RS	NO SLIC ENTRY	None
	1-23-06	NO GADS DATA	RS	NO SLIC ENTRY	None
	1-24-06	NO GADS DATA	RS	NO SLIC ENTRY	None
	1-25-06	NO GADS DATA	RS	NO SLIC ENTRY	None
	1-26-06	NO GADS DATA	RS	NO SLIC ENTRY	None
	1-27-06	NO GADS DATA	RS	NO SLIC ENTRY	None
	1-28-06	NO GADS DATA	RS	NO SLIC ENTRY	None
	1-29-06	NO GADS DATA	In start up	NO SLIC ENTRY	None
	1-30-06	NO GADS DATA	70 MW – High range control	NO SLIC ENTRY	None
	1-31-06	Start time –0:20:00, Type- RS, Cause Code – 0000, Hours – 23.67, MW loss – 0	RS	NO SLIC ENTRY	None
	2-01-06	Start time –0:00:00, Type- RS, Cause Code – 0000, Hours – 270.97, MW loss – 0	RS	NO SLIC ENTRY	None

	2-02-06	NO GADS DATA	RS	NO SLIC ENTRY	None
	2-03-06	NO GADS DATA	RS	NO SLIC ENTRY	None
	2-04-06	NO GADS DATA	RS	NO SLIC ENTRY	None
	2-05-06	NO GADS DATA	RS	NO SLIC ENTRY	None