ENCLOSURE 1

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket Nos.:	50-275 50-323
License Nos.:	DPR-80 DPR-82
Report No.:	50-275/98-13 50-323/98-13
Licensee:	Pacific Gas and Electric Company
Facility:	Diablo Canyon Nuclear Power Plant, Units 1 and 2
Location:	7 1/2 miles NW of Avila Beach Avila Beach, California
Dates:	June 21, 1998 through August 1, 1998
Inspector(s):	David L. Proulx, Senior Resident Inspector Donald B. Allen, Resident Inspector Dyle G. Acker, Resident Inspector William P. Ang, Reactor Inspector Lee E. Ellershaw, Reactor Inspector
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Attachment : Supplemental Information

EXECUTIVE SUMMARY

Diablo Canyon Nuclear Power Plant, Units 1 and 2
NRC Inspection Report 50-275/98-13; 50-323/98-13

This inspection included aspects of licensee operations, maintenance, engineering and plant support. The report covers a 6-week period resident inspection.

Operations

- The inspectors noted several minor errors in a sampling of two months of control operator and shift foreman's logs. The amount of information entered in the logs have improved compared to previous reviews (Section O1.2).

- Operator response to a high risk activity (work on 4 Kv panels for Bus G) was cautious and preparations were thorough. The repair activity was well planned to prevent inadvertent loss of power to the vital bus (Section O1.3).

Maintenance

- The licensee provided good oversight and controls for testing of main steam safety valves. The augmented testing of the MSSVs was scheduled and performed at the frequency specified in surveillance test Procedure STP M-77B, Appendix 7.1. The procedures governing the surveillance tests were technically adequate and personnel performing the surveillance demonstrated an adequate level of knowledge. The inspectors noted that test results indicated that the MSSVs lift points meet the TS 3.7.1.1 requirements (Section M1.2).

- Maintenance personnel demonstrated poor work practices in inadvertently leaving a check valve in a test gauge line. Although its installation did not impact the operability of the safety injection pump, it did raise concerns about the validity of the subsequent surveillance tests. The check valve interfered with the measurement of a significant parameter used to determine pump operability, and could have masked actual degradation of the pump. The licensee's evaluation of the data logically led to the inspection of the suction pressure connection, which ultimately determined the cause, but the delay in review of the surveillance data from the April 27 test was a missed opportunity to correct the problem earlier (Section M1.3).

- The effectiveness of the reorganization of Maintenance Services into asset teams is too recent to be evaluated. The inspectors noted the implementation of oversight controls in that coaches and technical specialists have been assigned to assist and monitor the implementation of the new organization. Both positive and negative aspects of the new methods have been identified by the licensee, including a negative trend in performance (Section M6.1).

Engineering

- The inspectors concluded that the licensee's operability evaluation (OE) for the Unit 1 containment fan cooler units (CFCUs) was adequate, pending a root cause of failure determination for CFCU 1-2. However, the inspectors considered that there was a potential for the failure of CFCU 1-2 to be due to a common cause not yet recognized; therefore, the inspectors considered that it was prudent to remove CFCU 1-2 at the earliest opportunity, to verify that the suspected root cause was valid (Section E2.1).

Report Details

Summary of Plant Status

Unit 1 began this inspection period at 100 percent power. On July 11, 1998, the unit power was down powered to 50 percent to replace control oil shuttle valves on main feedwater Pump 1-2. The unit was returned to and remained at 100 percent power throughout the remainder of the inspection period.

Unit 2 operated at 100 percent power throughout this inspection period.

I. Operations

O1 Conduct of Operations

O1.1 General Comments (71707)

Using Inspection Procedure 71707, the inspectors conducted frequent reviews of ongoing plant operations. In general, the conduct of operations was competent, professional and safety conscious.

O1.2 Operator Logs

a. Inspection Scope (71707)

The inspectors reviewed the control operator's and shift foreman's logs for the months of June and July.

b. Observations and Findings

The inspectors reviewed the shift watch list and found, in general, that the personnel assigned to the fire brigade and minimum shift crew were properly designated. However, several minor discrepancies were observed.

- The shift watch list for day shift on June 11 did not designate which individuals were satisfying the TS minimum shift crew requirements for shift foreman or senior operator license. By discussion with the shift foreman, it was apparent that the personnel were assigned on shift to meet these requirements and that this was an oversight in documentation only. In addition, the inspectors observed that blue ink is sometimes used, which results in poor or illegible photocopies. One "summary of daily operations" log had not been signed by the shift foreman as reviewed. The inspectors found a few log sheets that did not have the correct shift identified and several cases where shift turnover discussion topics were not checked off. These errors were identified to the shift foreman and properly resolved. The inspectors noted, in general, more details have been included in the logs compared to previous reviews.

c. Conclusions

The inspectors noted several minor errors in a sampling of two months of control operator and shift foreman's logs. The amount of information entered in the logs have improved compared to previous reviews.

O1.3 Operations Response to Potential Risk of Repairing 4 Kv Bus G Auxiliary Power Cubicle Door

a. Inspection Scope (71707)

On July 15, the inspectors observed operation's response to the potential for loss of startup power to the Unit 1, 4 KV vital Bus G while repairs were made to the auxiliary power cubicle door.

b. Observations and Findings

While opening the door for auxiliary power cubicle, 52-HG-13, in order to perform surveillance test Procedure STP M-75, "4 Kv Vital Bus Undervoltage Relay Calibration" on Bus G of Unit 1, the technician found one of the cubicle door bolted fittings exhibiting galling. The seismic qualification of the cubicle required these bolts to be secure. The bolt was found tight, but a work order was issued to repair the fitting. Although the breaker in this cubicle was open, the adjacent cubicle contained the startup power breaker, which was closed to provide power to the bus. The repair process required drilling out the existing fitting, with the potential for vibrations that could cause an inadvertent relay actuation that could trip the startup power breaker.

In preparations for this repair, operations personnel verified all possible loads on the bus had been transferred to an alternate bus. The operators reviewed the expected effects of a loss of power to Bus G, and reviewed the applicable alarm response and bus restoration procedures. The repair was designated a high risk activity, which resulted in additional administrative controls such as a detailed prework briefing, interruption of other concurrent activities, and increased oversight by licensee management. The inspectors observed the Operations Manager, Operations Director, Maintenance Manager, and Asset Team Leader in the control room during the briefing.

The repair was performed cautiously, using methods such as low speed drilling to reduce the risk of vibrations. The repair was completed without incident.

c. Conclusions

Operator response to a high risk activity (work on 4 Kv panels for Bus G) was cautious and preparations were thorough. The repair activity was well planned to prevent inadvertent loss of power to the vital bus.

O8 Miscellaneous Operations Issues (92700, 92901)

O8.1 (Closed) Licensee Event Report (LER) 50-275;323/96012, Revisions 0 and 1: reactor trips on Units 1 and 2 due to major western grid disturbances. A major western grid disturbance occurred on August 10 , 1996, resulting in reactor trips in both units. Unit 1 tripped on degraded bus voltage and Unit 2 tripped on loss of reactor coolant pumps (RCPs), due to tripping of two RCP supply breakers on under voltage. Unit 1 initiated a normal reactor trip response, while Unit 2 initiated a loss of forced flow (natural circulation) trip response. Operators restarted RCPs in Unit 2 approximately 1 hour later. Most equipment responded as required except for two Unit 2 containment fan coolers, one Unit 1 MSSV, and two Unit 2 MSSVs. The MSSVs lifted below their expected setpoints and the containment fan coolers tripped due to improper switch positioning by operators after a surveillance test. The improper operation of the MSSVs was reported in LER 50-275;323/96013, which was reviewed and closed in Inspection Report 50-275;323/97007. Inspection Report 50-275;323/96016 reviewed the containment fan cooler issue and concluded that the improper switch positioning was a noncited violation.

The inspectors reviewed the design of the electrical devices which initiated the reactor trips and considered that the devices functioned as designed. The inspectors reviewed the response of safety-related equipment to the trip and, except for the MSSVs, considered equipment operated as designed. The inspectors reviewed the actions taken by operators in response to the trip and considered these actions were appropriate.

II. Maintenance

M1 Conduct of Maintenance

M1.1 Maintenance Observations

a. Inspection Scope (62707)

The inspectors observed all or portions of the following work activities:

- Work Order R0174498-01 Clean/Inspect/Lube Supply Fan S-36
- Work Order R0174499-01 Clean/Inspect Discharge Damper from S-36 1-MOD-12/12A
- Work Order R0174501-01 Clean/Inspect Suction Damper to S-36 1-MOD-11/11A

- Work Order R0174502-01 — Clean/Lube/Inspect VAC-1-MOD-14, Outside Air Supply Damper Through HEPA and Charcoal Filters to S-40
- Work Order R0175311-01 — Clean/Inspect/Lube Control Room Air Cooled Condenser Fan CR36
- Work Order R0164225-01 — Clean, Inspect, & Test Relays 62-1F and T4AX-1 in Control Room Pressurization System Panel, PCRF U1
- Work Order R0174737-01 — Clean, Inspect Linestarter/Timer EH-27A, Control Room Pressurization System Duct Heater
- Work Order R0163990-01 — Inspect and Lube VAC-1-MOD-7, Control Room Main Exhaust Damper
- Work Order R0180403-01 — Clean and Inspect Component Cooling Water Heat Exchanger 2-1,

The above work orders referenced the following maintenance procedures to perform the activities:

- MP M-23.4, "Preventative Maintenance of Plant Ventilation Fans, Associated Dampers and Filters"
- MP E-50.1, "Maintenance of Thermal Overload Relays and Line Starters"
- MP E-50.30A, "Agastat Type 2400 and 7000 Series Timing Relays Maintenance"
- MP E-53.10A, "Preventative Maintenance of Limitorque Motor Operators"
- MP E-53.10E, "Preventative Maintenance of Limitorque 90 Degree Gear Drives"

b. Observations and Findings

On July 21, 1998, the inspectors observed that the saltwater side of component cooling water heat Exchanger 2-1 was very clean, and contained only a few small shells. The work was performed by the Turbine Building Maintenance Asset Team, and although none of the maintenance personnel had recently performed this work, most team members were familiar with the work requirements. The inspectors considered the work was performed as required.

On July 28-30, the inspectors observed the Control Room/Electrical Asset Team perform control room ventilation system maintenance. This team included technicians performing mechanical and electrical preventative maintenance on fans, motor operated

dampers, and electrical relays. In general, the individuals were knowledgeable of the tasks assigned and the associated equipment. One technician was receiving on-the-job training on the inspection and testing of electrical relays and was under the instructions of a qualified technician. The observed training techniques were good in that the student was allowed to perform the physical activities with sufficient oversight and review by the qualified technician.

The inspectors observed one technician request assistance from his supervisor when he found the configuration in a panel to be different than that defined in the work package. The supervisor identified that the technician, who had not worked on this panel before, had opened the wrong panel, and that the panel identification in the work package was not sufficiently clear. A good questioning attitude by the technician had prevented work being performed on the wrong component and identified a weakness in the work package. In addition, the technician identified a relay in the panel that was poorly located and would be difficult to test. The asset team leader stated that the relay location would be evaluated and the panel identification in the work package would be clarified.

The various work packages were on the job site and were signed as work progressed. The tools and test equipment were as specified in the work packages and, where applicable, were within the required calibration frequency. The various fans, filters, fan housings, and dampers were properly inspected, cleaned and lubricated. The technicians performed the work with careful attention to detail and adherence to the maintenance procedures. A technician inspecting and lubricating motor-operated dampers was very knowledgeable of the operation of the actuators and the important aspects of the inspection.

The inspectors observed the internals of the electrical panels and found them to be free of debris and dirt. There was no indication of damage, moisture intrusion, burnt or overheated wires or components, poor solder connections, or nicked or damaged insulation.

c. Conclusions

The maintenance activities were performed well in that the work was in accordance with the procedural requirements, the personnel were knowledgeable of the equipment, tools, and methods used, and the results of the maintenance appeared to be effective in ensuring the components will function as designed. Observed on-the-job training was effective in that the technician under instruction was performing the physical activities while properly supervised by a qualified technician.

M1.2 Surveillance Observations

a. Inspection Scope (61726)

Selected surveillance tests required to be performed by the TS were reviewed on a sampling basis to verify that: (1) the surveillance tests were correctly included on the facility schedule; (2) a technically adequate procedure existed for the performance of the surveillance tests; (3) the surveillance tests had been performed at a frequency specified in the TS; and (4) test results satisfied acceptance criteria or were properly dispositioned.

The inspectors observed all or portions of the following surveillances:

- STP M-77 Safety and Relief Valve Testing, Revision 20
- STP M-77B Performance Validation Program for MSSVs with X-750 Inconel Discs, Revision 1

b. Observations and Findings

Background

In November 1995, the licensee made a commitment to perform augmented testing of the MSSVs. This was due in part to the high initial lift point test results identified during surveillance testing. Testing at a shorter frequency then was required by the American Society of Mechanical Engineers code was implemented to assure satisfactory performance.

The high initial lift point phenomenon was determined to be caused by disc bonding resulting from disc galling during thermal transients of heatup/cooldown and subsequent time, pressure, and temperature service conditions. The galling was a result of differential thermal expansion between the 422SS disc and the 347SS nozzle.

The corrective action was to changeout of the disc material. The selected material, Inconel X-750, resulted in much lower differential expansions between the disc and nozzle, minimizing galling. Additionally, the discs were preoxidized to provide a passive layer expected to reduce bonding that developed over time. It was anticipated that the resulting time dependency of bonding with the minimal galling would be beyond the length of a 24-month fuel cycle.

The initial augmented test plan included testing in Mod was tested e 1 within 30 days of entering Mode 1 from Mode 4 to break the initial bond. The time between test cycles was being extended by 30 days at each successful test interval to determine the time-dependency of the sticking phenomenon.

New Inconel X-750 discs were installed in the Unit 1 MSSVs during Outage1R8 and in the Unit 2 MSSVs during Outage 2R8. The new augmented test program was based on the expectation that Mode 1 testing, following heatup from Mode 4, would be demonstrated to be unnecessary for MSSVs with the Inconel X-750 discs. Validation of this assumption was included in the test plan by comparing the test results of Leads 1 and 2, which did not have Mode 1 testing performed, to the test results of Leads 3 and 4, which did have Mode 1 testing performed in June 1997.

In August 1997, the MSSVs on all four main steam leads of Unit 1 were tested during the performance of STP M-77B, "Performance Validation Program for MSSV with X-750 Inconel Discs," Revision 1. The MSSVs on Leads 1 and 2 had not been stroked since entering Mode 1, approximately 90 days previously. The test results indicated that MSSVs with Inconel X-750 discs did not stick after 90 days of operation, and furthermore, the Mode 1 testing within 30 days of entering Mode 1 was not necessary.

Current Observations

On July 22-24, 1998, the inspectors observed the performance of portions of STP M-77B on MSSVs on Leads 3 and 4 for Unit 1 and MSSVs on Leads 3 and 4 for Unit 2. This test directed the performance of maintenance Procedure MP M-4.18A, "Verification of Lift Point Using Furmanite's Trevitest Equipment for the MSSVs." The MSSVs on Unit 2 had been in operation for approximately 120 days and had not been stroked since entering Mode 1 at the conclusion of the 2R8 outage. The MSSVs on Unit 1 had last been stroked in August 1997, approximately 330 days.

The MSSVs were tested in accordance with the maintenance procedure, test equipment was within calibration, prerequisites and precautions were satisfied, the specified number of lifts were performed, the required 10-minute wait between lifts was observed, and adjustments were made as specified to meet the as-left tolerance. Communication was established between the test personnel and the control room as specified in the procedure, as required to administratively control the position of containment isolation valves and to ensure inadvertent perturbation of main steam pressure transmitters would not cause an actuation, and to obtain required operations permission during the test. The test results satisfied the as-found and as-left requirements.

c. Conclusions

The licensee provided good oversight and controls for testing of main steam safety valves. The augmented testing of the MSSVs was scheduled and performed at the frequency specified in surveillance test Procedure STP M-77B, Appendix 7.1. The procedures governing the surveillance tests were technically adequate and personnel performing the surveillance demonstrated an adequate level of knowledge. The inspectors noted that test results indicated that the MSSVs lift points meet the TS 3.7.1.1 requirements.

The previous test results for MSSVs with Inconel X-750 have indicated that Mode 1 testing after entering Mode 1 from Mode 4 is not required. The test results continue to indicate that the MSSV setpoints remain within TS limits, and appear to support extending the test interval to demonstrate that operability will be maintained for a full cycle without mid-cycle testing.

M1.3 Unexpected Increase in Differential Pressure Developed by Safety Injection Pump 2-1 During Surveillance Testing

a. Inspection Scope (71707)

The inspectors reviewed the results of the licensee's evaluation and corrective actions for an unexpected increase in the Safety Injection Pump 2-1 differential pressure identified by a review of surveillance test results.

b. Observations and Findings

While reviewing quarterly safety injection pump test trend data, the system engineer noted that the differential pressure developed by Safety Injection Pump 2-1 had increased a total of 47.5 psid over the previous two pump runs. Although the differential pressure of 1550 psid recorded in the test performed on May 29 was within the action limits of surveillance test Procedure STP P-SIP-21, it exceeded the design criteria memorandum (DCM) S-9 maximum safeguards safety injection pump curve total developed head for the recorded 29 gpm recirculation flow. Action Request (AR) A0463440 documented the investigation and troubleshooting performed to identify the root cause. The investigation documented in this AR was indicative of a thorough and logical review of available information, including discussions with the pump vendor. The licensee concluded that the most plausible cause of the indicated increase in differential pressure was a problem in the suction pressure of the pump.

An inspection of the suction test connection identified a check valve installed in the fittings for the test gauge. This check valve was determined to be an instrument snubber used to dampen pressure pulsations. This snubber was not appropriate to be left in a borated environment due to the potential for clogging and was not used with the differential pressure instrument used during the surveillance test. The safety injection pump was tested after removing the snubber and the indicated differential pressure returned to the values recorded prior to the 2R8 outage.

A review of the surveillance test results over the past 2 years indicated that the pump differential pressure has remained very consistent until the 2R8 outage. During this outage restricting orifices were added to the safety injection system, requiring extensive postmodification flow testing. It was postulated by the licensee that the snubber was installed during the postmodification testing performed on March 8 and inadvertently left in place. The test data from tests performed on April 27 and May 29 indicated a progressive increase in differential pressure, which would be indicative of the snubber becoming clogged.

A review of documents did not identify the installation of the snubber, although the use of these snubbers was considered a standard practice for installing analog test pressure gauges. The licensee recognized the configuration control problem represented by this event and responded with lessons learned briefings to technical maintenance personnel.

The system engineer did not recognize the adverse trend following the April 27 test since the review of the test data had been reassigned to the Shift Technical Advisors from the system engineers. This was a missed opportunity to identify a potentially degraded safety injection pump. This snubber installed at the suction pressure connection resulted in masking the actual differential pressure measurement, which was a significant parameter for evaluating pump performance.

c. Conclusions

Maintenance personnel demonstrated poor work practices in inadvertently leaving a check valve in a test gauge line. Although its installation did not impact the operability of the safety injection pump, it did raise concerns about the validity of the subsequent surveillance tests. The check valve interfered with the measurement of a significant parameter used to determine pump operability, and could have masked actual degradation of the pump. The licensee's evaluation of the data logically led to the inspection of the suction pressure connection, which ultimately determined the cause, but the delay in review of the surveillance data from the April 27 test was a missed opportunity to correct the problem earlier.

M1.4 Welding

a. Inspection Scope (50500)

The NRC inspectors performed a limited review of the licensee's control of welding activities, by observation of in-process gas tungsten arc welding, and review of the applicable welding procedure specifications and their procedure qualification records.

The NRC inspectors reviewed licensee procedure requirements and records for qualifications of six welders, seven Nuclear Quality Services welding inspectors and three Nuclear Quality Services supervisors.

b. Observations and Findings

During this inspection, the NRC inspectors were able to observe partial implementation of Work Order Package CO155716, that the licensee had initiated to replace Discharge Check Valve DEG-1-236 on Starting Air Compressor 1-2B for Diesel Generator 1-2. The work order had been generated on April 24, 1998, as a result of AR A0437130, which documented that the discharge check valve had developed a slight leak by.

The welding assistant team leader conducted a tailboard session with all persons involved in the scope of the work order on July 15, 1998. Also, at that time, the

qualifications of assigned personnel (welder and welding inspector) were verified. The inspectors reviewed gas tungsten arc welding procedure Specifications WPS 5, Revision 8, and WPS 173, Revision 6, and supporting procedure qualification records WQ-1 and WQ-3, respectively, that were used to fabricate field welds FW-1, FW-2C1, FW-3C1, and FW-4, that were partially observed by the inspectors. The welding procedure specifications had been qualified in accordance with Section IX of the ASME Code.

The NRC inspectors verified, through observation and discussion with the welder, that he understood the requirements of the welding procedure specifications, and that he welded within the parameters specified for the essential and nonessential variables.

The NRC inspectors also observed the welder and welding inspector perform the specified inspections (i.e., cleanliness and fitup, and interpass temperature measurements for stainless steel Weld FW-1). However, due to the limited welding activities that was available for the NRC inspectors to observe, an inspection followup item was opened for further observance of welding and weld inspection activities (IFI 50-275/9813-01).

The NRC inspectors observed that the requirements of Procedure WQ-1, Revision 4, satisfied the requirements of Section IX of the ASME Code and AWS D1.1. The inspector verified by review of records of a random sample of six welders that welding qualifications of the welders were being maintained.

The NRC inspectors observed that Procedure WI-2, Revision 3, defined the qualification and certification requirements of Level II and Level III welding inspectors. The inspector verified by review of records of six Nuclear Quality Services (NQS) welding inspectors that weld inspector qualifications were being maintained.

The NRC inspectors observed that Procedure TQ1.ID1, Revision 3, specified the qualification requirements for inspection and inspection planning supervisors. The inspectors attempted to review the documentation of the qualifications of the past two and current supervisors of the NQS Maintenance Assessment and Inspection group. The current supervisor was appointed on July 10, 1998, was on vacation during the inspection, and had not yet taken responsibility for the group. NQS personnel could not locate the qualification Form 402-6 documentation required by Procedure TQ1.ID1, Revision 3, for the past two and current supervisors. NQS personnel initiated AR A0464857 to document the issue. NQS Personnel promptly evaluated the qualifications of the involved individuals and the impact of the lack of required documentation for the individuals. Nuclear Quality Services personnel determined that the involved individuals met the qualification requirements for inspection and inspection planning supervisors. The NRC inspectors considered that the issue was a documentation error with no safety impact.

c. Conclusions

The NRC inspectors concluded that the work package had been appropriately developed for use in replacing Discharge Check Valve DEG-1-236 on Starting Air Compressor 1-2B for Emergency Diesel Generator 1-2.

The welder and gas tungsten arc welding procedure specifications were properly qualified in accordance with Section IX of the ASME Code. The welding inspector was properly qualified in accordance with the licensee's procedure for inspector qualification. In addition, a records of selected welders and weld inspectors provided documentation of appropriate qualifications for the welders and weld inspectors.

The observed welding was performed in accordance with the specified welding procedure specifications.

M6 Maintenance Organization and Administration

M6.1 Maintenance Services Asset Team Implementation

a. Inspection Scope (62707)

The inspectors reviewed the maintenance services reorganization with licensee management and observed asset team performance during maintenance observations, documented in section M1.1 of this inspection report.

b. Observations and Findings

In July 1998, Maintenance Services was reorganized into asset teams in order to gain efficiencies and reduce costs. The licensee had reviewed maintenance organizations and practices at other nuclear plants and at nonnuclear companies. These reviews indicated that good practices were exemplified by multidiscipline teams, craft performing planning and scheduling, and single point of contact work control offices. The licensee considered that the team culture maximized efficiency, and significant savings could be made by minimizing craft waiting for other groups or support.

The asset teams included cross disciplines of craft (electrical, mechanical, and instrumentation) and support personnel (operations, engineering, planning, scheduling, and radiation protection.) With this organization it was expected that craft personnel would spend less time waiting for support, and communications would be improved between the craft and other groups, such as operations and engineering. This reorganization included changes to work processes to simplify planning, permits, and tool box work.

As a result of the reorganization some personnel were reporting to new team leaders, some personnel were assigned to work on different equipment, and personnel were working with different team members. In addition, the associated changes to work

planning and work control processes resulted in some personnel using these processes for the first time. In recognition of the potential for errors in light of the extent of the changes, individuals were identified as coaches to assist the teams and team leaders in adapting to the new organization and processes. The positives recognized by the coaches included: the team leaders are receiving good feedback from the craft on the new process, craft members have been invited to attend meetings with system engineers, craft members had expressed an interest in and had been learning to write minor maintenance work orders and to close out work orders, engineers and planners were attending pretask briefings, and unnecessary maintenance had been identified and, with the appropriate review, deleted. The coaches have also identified some weaknesses and areas for improvement, including: team leaders unfamiliar with individuals qualifications, lack of buy-in by some groups, too many meetings for work coordinators, and adverse impact on control room operations.

Technical specialists have been assigned to evaluate the implementation of the asset teams, with a focus on the impact on the quality of work being performed. Their assessment for a 1-week period was that most of the work activities reviewed were performed in accordance with procedures, and documentation of those activities was completed accurately. However, there were several events that indicated a negative trend in performance. None of the events resulted in personnel or plant safety significance, but some of them had the potential for equipment damage or personnel injury. These events included: a failure to document the installation of a test lead that resulted in the failure of a makeup water pump to start during postmaintenance testing; a failure to maintain control of access to the measurement and test equipment tool room; use of test equipment that had not been formally checked out of the tool room; a short between motor leads and an electrical box cover following maintenance; and running an extension cord under a fire door.

c. Conclusions

The effectiveness of the reorganization of Maintenance Services into asset teams is too recent to be evaluated. The inspectors noted the implementation of oversight controls in that coaches and technical specialists have been assigned to assist and monitor the implementation of the new organization. Both positive and negative aspects of the new methods have been identified by the licensee, including a negative trend in performance.

M8 Miscellaneous Maintenance Issues (92902)

M8.1 (Closed) Violation 50-275/95017-02: failure to follow procedures associated with the failure of Auxiliary Transformer 1-1 during Unit 1 seventh refueling outage. Six violations were determined to collectively be classified as a Severity Level III problem (EA 95-279: 01013, 01023, 01033, 01043, 01053, and 01063).

Summary of violations

- Failure of maintenance personnel to list a grounding device as a clearance point, as required.
- Installation and verification by maintenance personnel of a grounding device in the incorrect location.
- Failure of operations personnel to perform required verification of proper grounding device installation.
- Failure of maintenance personnel to record the location of the grounding device and log the associated caution tag.
- Failure of the temporary maintenance supervisor to perform the required verification that the grounding device was removed prior to signing that the work was complete.
- Failure of operations personnel to perform the required verification that the grounding device had been removed, prior to returning the equipment to service.

Licensee Corrective Actions

- Improved procedures for grounding device installation, labeling, and verification.
- Held meetings with all personnel to determine sources of errors and initiated focus groups to address these errors.
- Assigned procedure nonadherence as an error reduction goal for all senior managers.
- Developed a "conduct of work" document for maintenance personnel to assist employees in complying with administrative requirements.
- Issued a nonconformance report to address the corrective action program.
- Established guidelines for reporting and trending lower level problems, including changing Procedure OM7.ID10, "Quality Trend Analysis Program," to trend problems that were not necessarily quality problems.
- Developed guidelines for temporary maintenance supervisors.
- Developed an action plan to improve withstand capabilities of critical transformers.

- Developed an action plan to enhance fire protection programs related to the event.

b. Observations and Findings

The inspectors reviewed a sample of the details of the licensee's corrective actions as discussed below.

Ground Buggies

The inspectors reviewed the licensee's controls for installation of ground buggies and considered that they were adequate. The inspectors observed examples of ground buggy labeling and considered that the labeling had been improved. The inspectors noted that subsequent to the event the licensee had removed installation details from the installation procedure, which contributed to a more recent failure to properly install a ground buggy, as discussed in Inspection Report 50-275;323/98004. The licensee committed to replace the installation details. As noted in Inspection Report 50-275:323/98004, the inspectors considered that the ground buggy installation problem discussed in Inspection Report 50-275/323/98004 was the result of insufficient craft skill/training and not a failure to maintain adequate control of the work.

Procedure Compliance

The inspectors reviewed records of management actions associated with procedure noncompliance. The inspectors attended several of the briefings and meetings held just after the event, and considered that the briefings and meetings were effective in providing licensee management's position that procedure compliance improvements were necessary. The inspectors reviewed licensee records concerning procedure compliance problems and noted that the licensee records indicated an improving trend. The inspectors noted that many of the procedure compliance problems were associated with clearances. As discussed in IR 50-275;323/98011, the licensee was working on improving the clearance process via a nonconformance report. The inspectors considered that the licensee actions had improved procedure compliance, except associated with the clearance process, which was under management review for improvement.

Trending Program

The inspector discussed the licensee's event trend record (ETR) program with Nuclear Quality Services (NQS) personnel. The licensee had assigned ETR program oversight to the NQS organization.

The licensee's ETR program was contained in Inter-Departmental Administrative Procedure OM7.ID10, Revision 5, "Quality Trend Analysis Program." The licensee required an ETR be initiated for all quality related problems and provided a method for using the ETR process to document for trending other less significant problems. The

licensee's computer program for quality related problems would not allow a quality-related problem to be closed until an ETR had been generated, provided a listing of open quality related problems for which an ETR had not yet been generated, and provided information on which trends exceeded predetermined limits.

The licensee's ETR program was reviewed, in part, in NRC Inspection Report 50-275;323/98-04. This report noted that the NRC had reviewed selected ETRs, which were not generated as part of a quality related problem, and determined that the issues raised on the ETRs were not of a level which required a quality related document, such as an AR. However, this report also noted that use of the ETR program was low and that management attention was needed to strengthen the program.

The inspector noted that although the ETR information was readily available on the licensee's data base, there was no requirement for periodic review of the information. The licensee stated that they had previously recognized the need to periodically review the ETRs for negative trends. As documented in AR 453813, the licensee was in the process of changing the ETR program to include periodic NQS oversight.

The licensee acknowledged that the ETR program had not been previously used to the fullest extent, and had recently modified the instructions for preparation and issuing of ETRs. In addition, NQS personnel had recently been training engineering and maintenance personnel on the ETR process. The inspectors reviewed portions of the training material and considered the material adequate to assist in ETR processing and usage. The inspectors determined that operations had not performed any recent training of their personnel. Operations management indicated that they planned to provide ETR training to their personnel by the end of September 1998.

Maintenance Training

The inspectors reviewed the "conduct of work" document developed to assist maintenance personnel with procedure issues. The "conduct of work," document was a small pocket sized document titled "NPG Pocket Guide." The inspectors considered the Guide included helpful information related to a large number of procedure.

The inspectors reviewed the training requirements for temporary maintenance supervisors and considered that the licensee had established adequate standards.

Transformer Improvements

The inspectors reviewed the licensee actions related to fault withstand capabilities. The licensee indicated that the new startup transformers were rated to momentarily withstand a three phase bolted fault on the secondary windings, which means the transformer could withstand this type of fault until supply circuit breakers cleared the fault. The inspectors noted that the replacement Unit 1 Auxiliary Transformer 1-1 also was rated to momentarily withstand bolted faults. The inspectors considered the design

of the new startup transformers improved the capability to maintain adequate offsite power to the site.

Fire Protection

The inspectors reviewed the licensee's fire protection action plan. The inspectors noted that not all actions were yet complete, but considered that the plan and actions taken and planned were adequate.

Conclusions

The inspectors concluded that the licensee's actions completed and those planned were adequate.

III. Engineering

E2 Engineering Support of Facilities and Equipment

E2.1 OE CFCUs in Unit 1

a. Inspection Scope (37551)

The inspectors reviewed OE 97-07, "Operability of the CFCU with Stator to Motor Frame Weld Cracks," Revision 3, and associated licensee calculations, compensatory measures, inspections, and assessments.

b. Observations and Findings

The inspectors had previously reviewed OE 97-07, Revision 1, and documented this review in Inspection Report 50-275;323/97023. This inspection report describes the design of the CFCUs and discussed weld cracks found on all the CFCUs, including spares. The Unit 2 CFCUs were repaired by the vendor.

During testing of vendor repaired Unit 2 CFCUs, two CFCUs failed to start. The licensee considered the problem was caused by insufficient concentricity between the rotor and stator, which caused an unbalanced magnetic pull. The licensee attributed this condition to changes in air gap dimensions, caused by the vendor weld repairs. The licensee returned these two CFCUs to the vendor. The vendor machined the rotor and/or stator surfaces, which increased the rotor to stator air gap. The vendor provided calculations which indicated that the loss of magnetic field, caused by the increased air gap was insignificant, while it still decreased the magnetic imbalance. The air gaps were increased on all the CFCUs in Unit 2. No problems have been encountered with these units since installation in Outage 2R8.

On May 8, 1998, CFCU 1-2 failed to start in slow speed. The characteristic of the failure were similar to the two failed Unit 2 CFCUs; continuous full starting current and loud noise. The licensee considered that CFCU 1-2 had failed due to magnetic imbalance, but noted that this failure could not be tied to a weld repair, to cause a change in air gap. The licensee is unable to complete a root cause investigation until CFCU 1-2 can be removed for inspection.

The licensee, in OE 97-07, Revision 3, concluded that the remaining four Unit 1 CFCUs were operable based on:

- Inspection of the cracked welds indicated that the existing cracks would not challenge operability, even during a seismic event.
- Engineering judgement that the failure of CFCU 1-2 was caused by unbalanced magnetic pull, which would only cause a problem during starting attempts or coast down below 40 revolutions per minute.
- Continuous operation, except for required maintenance.

To support the OE, the licensee performed a calculation that indicated that a CFCU running in slow speed would not coast below 40 revolutions per minute before being sequenced into a start at slow speed during an accident coupled with loss of offsite power. Therefore, the calculation concluded that these CFCUs would not be subject to the type of failure experience by CFCU 1-2.

The licensee determined that they could not move CFCU 1-2 out of containment without use of the containment polar crane. During preparations to use the polar crane, the licensee determined that the crane would have to pass through a jet impingement zone, prohibited by TS 6.8.4f, in Modes 1-4. The licensee subsequently determined that they had moved the polar crane through jet impingement zones in the past and issued LER 98007, to report these conditions. The licensee stated that they planned to request a TS change to allow movement of the polar crane to support the replacement of CFCU 1-2.

The inspectors reviewed OE 97-07 and supporting calculations and noted that licensee calculations that addressed the potential for early release of radioactive material from containment during a worst case accident indicated that a minimum of two CFCUs were required to mitigate this release. TSs require a minimum of three CFCUs. Discussions with licensee Probabilistic Risk Assessment personnel indicated that the increase in risk of an early release for having only four of the five CFCUs initially operable was insignificant. However, the inspectors noted that since the licensee had known weld flaws in the four operating CFCUs, and a failed CFCU that has not yet been removed for root cause of failure evaluation, the potential existed for a common mode failure, although a calculation of the specific increase in risk did not appear to be possible. The licensee acknowledged that the existing unknown conditions of the Unit 1 CFCUs did not allow for a reasonable risk calculation.

c. Conclusions

The inspectors concluded that the licensee's OE for the Unit 1 CFCUs was adequate, pending a root cause of failure determination for CFCU 1-2. However, the inspectors considered that there was a potential for the failure of CFCU 1-2 to be due to a common cause not yet recognized; therefore, the inspectors considered that it was prudent to remove CFCU 1-2 at the earliest opportunity to verify that the suspected root cause was valid.

E8 Miscellaneous Engineering Issues (92700, 92903)

E8.1 (Closed) Followup Item 50-275/95015-03: 230 Kv system voltage to Diablo during peak loads. This item was opened for further staff review of the ability of the 230 Kv system to support minimum voltage requirements at the site as area loads increased and the support of the system voltage by nearby Morro Bay generation was no longer assured. The licensee identified that without the Morro Bay generation, expected future peak system loading could lower 230 Kv system voltages below the minimum required to ensure that safety-related equipment would operate as designed. The licensee installed new startup transformers, with automatic tap changers. The licensee completed the transformer replacement in 1997. The inspector reviewed Licensing Amendment Request (LAR) 98-01 and associated licensee documents and determined that under projected worse case loading on the 230 Kv system and design basis worst case site loading, licensee computer modeling indicated that the new startup transformers provided adequate voltage to safety-related equipment in both units. The inspectors noted that the staff is still reviewing the LAR.

E8.2 (Closed) Violation 50-323/97002-02: inadequate design bases for refueling water storage tank (RWST) instrumentation and spent fuel pool (SFP) temperatures. The first item in this violation reported that the licensee had three channels for tripping residual heat removal pumps on low RWST level but the design bases did not address actions to be taken when one of these channels was out of service. The second item reported that the licensee had used a minimum SFP design temperature of 68°F, and a maximum SFP design temperature of 150°F in LAR 95-01, but had not translated these requirements into operating procedures. As a result actual SFP temperature had been below the 68°F limit and for a full core off-load was calculated to reach 175°F.

Licensee corrective actions for the RWST instrumentation problem included:

- Issued instructions to bypass inoperable RWST level channels.
- Submitted an LAR to include actions associated with inoperable RWST level channels in TS, and implemented the recommended change pending NRC review.
- Issued LER 50-275;323/97005-01 to identify instances when only two channels of RWST level had been available.

Licensee corrective actions for the SFP design temperature problems included:

- Clarified that the minimum SFP design temperature was 32°F, and the maximum SFP design temperature was 150°F, but that as part of reracking the licensee was committed to maintain a 140°F limit.

- Revised DCM S-13 to provide a more detailed explanation of SFP temperature limits.

- Improved operating procedures to ensure that SFP design basis limits were maintained.

The inspectors verified that the licensee had incorporated actions associated with inoperable RWST level instrumentation into their operating instructions. The inspectors verified that calculations associated with the RWST included provisions for inoperable level instrumentation.

The inspectors reviewed DCM S-13 and operating procedures and considered that the licensee had identified and clarified the design basis temperature limits for the SFP. The inspectors reviewed licensee procedures for operation of the SFP and determined that the 140°F limit was maintained during full core off-load by maintaining flows and pressures associated with the SFP cooling system, by delaying the start of core off-load after shutdown, and by controlling the rate of core off-load. The inspectors considered that these procedures adequately incorporated the SFP design temperature limits.

E8.3 (Closed) Followup Item 50-275;323/97002-03: adequacy of RWST instrument loop design. This item was created to review the circuit design of the instruments that supply level information, alarms, and pump tripping signals associated with RWST level, based on the problems noted in Violation 50-275;323/97002-02, as discussed in Section E8.2.

Inspection Report 50-275;323/97-202, Section E1.3.3.2, discussed RWST level instrument loop design, setpoint calculations, and uncertainty calculations. This report concluded that the licensee had provided adequate margins for setpoints and indication accuracy for RWST level instrumentation.

The inspectors reviewed the licensee's calculations for the required volume of water in the RWST, including the various operational bands. The inspectors concluded that the licensee had correctly included the level instrument loop setpoints and uncertainty in the calculations which demonstrated adequate water to meet RWST design criteria.

The inspectors noted that several of the calculations associated with RWST level credit operator manual actions in their bases. The NRC staff is currently reviewing how much credit can be taken for operator actions associated with the RWST. This issue is being tracked by Unresolved Item 50-272;323/96021-07.

E8.4 (Closed) Followup Item 50-323/97019-02: adequacy of procedure for manual transfer of loads from the unit auxiliary transformer to the startup transformer. During a prejob briefing for a test in Unit 2 of a new startup transformer, licensee Operations personnel questioned whether it was acceptable to transfer the loads with a voltage mismatch of seven percent, and noted that the same procedure for Unit 1 required that the voltages be matched. Engineering personnel at the briefing did not agree on whether the mismatch would cause any potential for tripping either supply. The licensee changed the procedure to match the voltages prior to performing the test.

Subsequently, the licensee reviewed the electrical protection drawings for the startup and unit auxiliary transformers and concluded that the procedure was adequate, in that it would be acceptable to transfer the loads with a voltage mismatch of seven percent. However, since the licensee's manual transfer scheme was make before break, the licensee concluded that it was prudent to match the voltages prior to making a transfer, to protect against a failed transfer, which left the two busses paralleled.

The inspectors reviewed the licensee's protection drawings for the startup and unit auxiliary transformers and concluded that on a normal transfer, the seven percent voltage mismatch would not challenge protective device limits. Therefore, the inspectors concluded that the procedure change was an enhancement, and not the result of an inadequate procedure.

E8.5 (Closed) LER 50-275;323/97005 Revisions 0 and 1: residual heat removal system outside design basis due to inadequate administrative controls. This issue is discussed and closed in Section E8.2 as part of violation 50-275;323/97002-02.

IV. Plant Support

F4 Fire Protection Staff Knowledge and Performance

F4.1 Fire Drill (71750)

On June 27, the inspectors observed a fire brigade drill that simulated a fire in the battery storage area on the 85-foot elevation of the turbine building. In general, the response was good, with a proper emphasis on safety. The fire brigade members quickly arrived at the fire brigade staging area and properly dressed out. The fire brigade leader developed a good plan to attack the fire and gave a good briefing prior to approaching the fire. There was good support provided by additional operations personnel, including staging backup air bottles for the self-contained breathing apparatuses. The inspectors observed the postdrill critique, which included a good

discussion of both the strengths and weaknesses of their performance. Much of the criticism and recommendations for improvement came from the members of the brigade. Some areas of improvement included: some of the self-contained breathing apparatuses were not properly staged for quick use, and the crew should practice dressing out to reduce their reaction time.

V. Management Meetings

X1 Exit Meeting Summary

The inspectors presented the inspection results to members of licensee management at the conclusion of the inspection on August 3, 1998. The licensee acknowledged the findings presented.

The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

ATTACHMENT

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Licensee

W. Garrett, Director, Operations
M. Crockett, Manager, Nuclear Quality Services
R. Gray, Director, Radiation Protection
T. Grebel, Director, Regulatory Services
D. Miklush, Manager, Engineering Services
J. Molden, Manager, Operations Services
D. Oatley, Vice President and Plant Manager

INSPECTION PROCEDURES (IP) USED

IP 37551	Onsite Engineering
IP 50500	Welding
IP 61726	Surveillance Observations
IP 62707	Maintenance Observation
IP 71707	Plant Operations
IP 71750	Plant Support Activities
IP 92700	Onsite Followup of Written Reports of Nonroutine Events at Power Reactor Facilities
IP 92901	Followup - Operations
IP 92902	Followup - Maintenance
IP 92903	Followup - Engineering

ITEMS OPENED AND CLOSED

Opened

50-275/9813-01	IFI	Further observation of welding and weld inspection activities (Section M1.4)

Closed

50-275;323/96012-00 and 01	LER	Reactor trips on Units 1 and 2 due to major western grid disturbances (Section O8.1)
50-275/95017-02 (EA95-279 Numbers 01013, 01023, 01033, 01043, 01053, 01063	VIO	Failure to follow procedures associated with the failure of Auxiliary Transformer 1-1 during Unit 1 seventh refueling outage (Section M8.1)
50-275;323/95015-03	IFI	230 Kv system voltage to Diablo during peak loads (Section E8.1)
50-275;323/97002-02	VIO	Inadequate design bases for RWST instrumentation and SFP temperatures (Section E8.2)
50-275;323/97002-03	IFI	Adequacy of RWST level instrument loop design, setpoint calculations, and uncertainty calculations (Section E8.3)
50-323/97019-02	IFI	Adequacy of procedure for manual transfer of loads from the unit auxiliary transformer to the startup transformer (Section E8.4)
50-275;323/97005-00 and 01	LER	Residual heat removal system outside design basis due in inadequate administrative controls (Section E8.5)

LIST OF ACRONYMS USED

ASME	American Society of Mechanical Engineers
AR	Action Request
DCM	Design Criteria Memorandum
CFCU	Containment Fan Cooler Unit
gpm	gallons per minute
IFI	Inspection Followup Item
IP	Inspection Procedure
IR	Inspection Report
Kv	kilovolt
LAR	Licensing Amendment Request
LER	Licensee Event Report
NQS	Nuclear Quality Services
MSSV	Main Steam Safety Valve
OE	Operability Evaluation
RCP	Reactor Coolant Pump
RWST	Refueling Water Storage Tank
SFP	Spent Fuel Pool
TS	Technical Specification
VIO	Violation