U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report Nos:	50-275/85-32 and 50-323/85-29
Docket Nos:	50-275 and 50-323
License Nos:	DPR-80 and DPR-82
Licensee:	Pacific Gas and Electric Company 77 Beale Street, Room 1451 San Francisco, California 94106
Facility Name:	Diablo Canyon Units 1 and 2
Inspection at:	Diablo Canyon Site, San Luis Obispo County, California
Inspection Conducted:	August 18 - September 28, 1985

Inspectors:

R J Dodds for — 10/7/85
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R T Dodds — 10/8/85
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Summary:

Inspection from August 28, through September 28, 1985 (Report Nos. 50-275/85-32 and 50-323/85-29)

Areas Inspected: Routine inspections of plant operations, maintenance and surveillance activities, followup of on-site events, open items, and LERs, as well as selected independent inspection activities were conducted. Unit 1 test data reviews and observations of QA activities were conducted to complete the inspection startup program on Unit 1. Inspection Procedures 71707, 70307, 71710, 62703, 61726, 93702, 92700, 72570, 72592, 72572, 72302, 35501, 72400, 61720, 72600, 72624, 92702, 92701, 61711, and 72301 were applied during this inspection.

This inspection effort required 123 inspector-hours for Unit 1, and 220 inspector-hours for Unit 2 by four resident inspectors. This inspection began during an off-shift period; approximately 21 hours on Unit 1 and 43 hours on Unit 2 were accomplished during off-shift periods.

Results of Inspection: One violation related to control of warehouse access was identified (paragraph 7.b).

DETAILS

1. Persons Contacted

*J. D. Shiffer, Vice President Nuclear Power Generation
*R. C. Thornberry, Plant Manager
*R. Patterson, Assistant Plant Manager, Plant Superintendent
*J. M. Gisclon, Assistnt Plant Manager for Technical Services
*W. B. Kaefer, Assistant Plant Manager for Support Services
*C. L. Eldridge, Quality Control Manager
*R. G. Todaro, Security Supervisor
*S. D. Townsend, Assistant Plant Superintendent
*D. B. Miklush, Maintenance Manager
*J. A. Sexton, Operations Manager
*T. J. Martin, Training Manager
*W. G. Crockett, Instrumentation and Control Maintenance Manager
*T. W. Rapp, Onsite Safety Review Group Chairman
*J. V. Boots, Chemistry and Radiation Protection Manager
*W. B. McLane, Material and Project Coordination Manager
*L. F. Womack, Engineering Manager
*T. L. Grebel, Regulatory Compliance Supervisor
*R. S. Weinberg, News Service Representative
*S. R. Fridley, Senior Operations Supervisor

The inspectors interviewed several other licensee employees including shift supervisors, reactor and auxiliary operators, maintenance personnel, plant technicians and engineers, quality assurance personnel and general construction startup personnel.

*Denotes those attending the exit interview.

Note: Acronyms are used throughout this report; refer to the Index of Acronyms at the back of the report.

2. Operational Safety Verifiction

During the inspection period, the inspectors observed and examined activities to verify the operational safety of the licensee's facility. The observations and examinations of those activities were conducted on a daily, weekly or monthly basis.

On a daily basis, the inspectors observed control room activities to verify compliance with selected LCOs as prescribed in the facility TS. Logs, instrumentation, recorder traces, and other operational records were examined to obtain information on plant conditions, trends were reviewed for compliance with regulatory requirements. Shift turnovers were observed on a sample basis to verify that all pertinent information of plant status was relayed. During each week, the inspectors toured the accessible areas of the facility to observe the following:

(a) General plant and equipment conditions.

(b) Surveillance and maintenance activities.

(c) Fire hazards and fire fighting equipment.

(d) Radiation protection controls.

(e) Conduct of selected activities for compliance with the licensee's administrative controls and approved procedures.

(f) Interiors of electrical and control panels.

(g) Implementation of selected portions of the licensee's physical security plan.

(h) Plant housekeeping and cleanliness.

(i) Essential safety feature equipment alignments and conditions.

The inspectors talked with operators in the control room, and other plant personnel. The discussions centered on pertinent topics of general plant conditions, procedures, security, training, and other aspects of the involved work activities.

No violations or deviations were identified.

3. Event Followup

a. Reactor Trip on Unit 1

A reactor trip was experienced on Unit 1 at 22:02 hours on August 27. The reactor was at 100% power when one of the two main feedwater pumps tripped. The operators reduced load to compensate, however the reactor tripped on low low steam generator level. Response and recovery from the trip were in accordance with approved procedures. An immediate notification to NRC headquarters was made within one hour of the event.

Reactor startup was observed on August 28 with criticality occuring at 1407 hours. Power ascension to approximately 30% was observed. The licensee closely monitored and observed all important reactor conditions with particular emphasis on axial flux difference. Procedures for determining axial flux difference were acceptable and technical specification requirements were satisfied.

b. Reactor Trip and Safety Injection on Unit 2

At 0536 hours on August 29, a Unit 2 reactor trip occurred on steam flow/feed flow mismatch and low steam generator level for steam generator 2-4. The steam flow/feed flow mismatch was due to the reactor protection set testing, and the low steam generator level occurred because of the turbine driven auxiliary feedwater pump endurance run steam demands. Operators were involved in maintaining reactor power below an administrative limit at the time of the steam generator levels reduction. All control rods inserted and required safety-related systems responded as design.

At 0537 hours, a safety injection occurred due to high steam flow coincident with low low average reactor coolant system temperature (TAVG). Again, the high steam flow was due to the protection set II testing. The low low TAVG was due to the cooldown caused by the reactor trip coincident with the turbine driven auxiliary feedwater pump steam demand. The cooldown went from a TAVG of 547 degrees fahrenheit to 543 in about one and a half minutes to a final TAVG of about 530 after termination and stabilization of the event. The safety injection resulted in approximately 1200 gallons of boric acid injection into the reactor coolant system. Equipment actuations were as designed except that diesel generator 2-1 did not start due to a clearance for maintenance and containment spray pump 2-2 started for unexplained reasons. The containment spray pump start did not inject water into the containment because the normally closed valve to the spray system remained closed as designed. The safety injection was reset and terminated at 0540 and an unusual event was declared and notifications began at 0543.

Upon returning plant systems to normal, after the safety injection, the main steamline isolation valves could not be opened upon demand. It was understood that time was required to equalize pressure around the main steamline isolation valves inorder to open them, but the operator felt sufficient time for equalization had already elapsed. It was then conjectured that the containment spray pump start may have had something to do with the failure of the main steamline isolation valves to reopen. Therefore, the Phase B containment isolation control switch (which is a signal that starts the containment spray pump) was reset, although, there was no apparent Phase B signal actuation. The main steamline isolation valves were then successfully reopened.

The licensees investigation of the erroneous equipment operations centered on the solid state protection system designed to actuate the containment spray pump and main steamline isolation valve closure. Surveillance tests were performed to verify all associated functions of the solid state protection system were correct. Additionally, examinations of wiring and relays in the solid state protection system verified the associated systems were installed as designed. Actuating components (breakers and valves) were inspected and tested to assure proper functioning. Other solid state protection systems were actuated to verify that there were no possible interactions.

The investigations concluded the containment spray pump start could have been due to a stuck relay. This relay was replaced and bench tested. The bench testing did not provide any indication that the relay had been stuck.

Investigation of the main steamline isolation valve failure to reopen, included the above type verification and a test to determine the timing required to equalize pressure across the valve to reopen. The test revealed that insufficient time had been allowed to equalize the pressure across the valves and that the phase B reset was just coincidental.

Analysis of this event concluded operator error allowed the reactor to trip. Operators had just authorized a surveillance test procedure to commence, which tripped protection set II bistables including steam flow/feed flow mismatch. It was not recognized that with this bistable tripped, the setpoint for reactor trip on steam generator level changed from the low low level (15%) to the low level (25%). This problem was discussed with the Vice President for Nuclear Power Generation and cognizant plant management. Personnel were counseled, and a policy was established to increase formal communications controls of information, such as tripped bistables. By noting such important information on an abnormal status board. The adequacy of this corrective action will be followed under routine inspection.

No violations or deviations were identified.

4. Maintenance

The inspectors observed portions of, and reviewed records on, maintenance activities to assure compliance to approved procedures, technical specifications, appropriate industry codes and standards and workman's qualifications.

a. Unit 2 Diesel Generator 2-2

The inspector observed portions of DG 2-2 maintenance activities performed in accordance with SWF MM-2-85-441. Activities being performed included fuel injector testing, fuel and oil filter replacement, and other 18 month and 36 month inspections specified in STP M-81 "Diesel Engine Generator Inspection."

b. Auxiliary Feedwater Pump 2-1

Steam turbine driven auxiliary feedwater pump 2-1 was partially disassembled during the Unit 2 startup outage inorder to investigate suspected bearing problems. SWF # MM-2-85-462 had been originally issued to investigate and correct pump bearing trouble. However, this SWF was subsequently amended to include cleaning and inspection of turbine shaft bearings and to adjust the lube oil level. This additional work came about to evaluate any effects that may have resulted from unexpectedly high inboard turbine shaft bearing temperatures observed by plant staff and startup engineers during the 48 hour turbine driven AFW pump test conducted just prior to the outage.

The inspector observed major portions of the turbine shaft bearing mechanical maintenance work. Maintenance and QC work instructions, clearance controls and housekeeping requireemnts were reviewed and/or verified. The inspector did not discern any deficiencies or discrepancies in the performance and documentation of the maintenance activities.

c. Oxygen Analyzer for Waste Gas Decay Tanks

The inspector observed selected portions of the preventive maintenance on the subject instrumentation for Unit 1. TS requirements were satisfied for removal from service. Procedures for the examination and adjustments to the instruemnt were approved and were understood and adhered to by the I&C technician. The instrument was tested and returned to service in accordance with TS operability requirements.

d. Nuclear Instrument

Selected portions of troubleshooting of erratic readings on the subject neutron detector and instrument channel, NI 41, for Unit 1 were observed by the inspectors. The instrument was removed from service in accordance with applicable TS. An inspector verified certification for the replacement detector met licensee material control requirements. Testing to assure operability was performed in accordance with applicable STP requirements, and the system was acceptably returned to service.

e. Reactor Coolant Pump Motor

At the end of the Unit 2 low power test program RCP 2-4, upon re-start, experienced an unexpected phase-to-phase fault of the stator winding. This RCP stator was removed from containment and sent offsite for repair. Two other Unit 2 RCP motors (2-1 and 2-2) were disassembled and their stators sent away for epoxy re-coating as preventive maintenance. Inspectors observed portions of the removal, examination and installation of these motors. All work observed was in accordance with approved shop work followers and authorized clearances.

No violations or deviations were identified.

5. Surveillance

By direct observation and record review of licensee surveillance testing, the inspectors verified compliance with TS requirements and implementating plant procedures for the following items:

a. Phase A Containment Isolation Valves Exercising

An inspector observed selected portions of STP V-3S3. This test verified operablity of power operated isolation valves for flow paths associated with the reactor coolant drain tank and containment sump. Containment isolation valve stroke times were verified to be less than 10 seconds in accordance with the TS 3.6.3 and applicable surveillance requirements. Instrumentation was within calibration, and test data was accurately recorded and reviewed by senior licensed opertors.

b. Reactor Coolant System Heat Balance

An inspector observed during the first power operations the subject surveillance of Unit 2. The test was conducted at approximately 2% of power in accordance with STP R-2C. Engineering personnel conducted the test and successfully verified Unit 2 compliance with TS power levels.

c. Diesel Generator Start Testing

The inspector observed selected portions of STP M-9A on diesel generator 1-1. The diesel started and came to speed withing TS limits. The operators performing the test were knowledgeable of test purpose and methods. Stop watches used for the test were calibrated, and data was collected in accordance with the procedure and data sheet.

d. Station Battery 2-1 Service Test

STP M-12C, "Station Battery Service Test", is performed at a nominal 18 month frequency during shutown conditions to comply with TS 4.8.3.1.d. This test verified each 125 volts direct current station-battery has sufficient capacity to supply emergency loads for two hours and maintain cell voltage above 1.75 volts. STP M-11B, "Measurement of Station Battery Voltage and Specific Gravity", is normally performed just prior to this test.

The inspector evaluated the test results of STP M-11B for station battery 2-1 and found them acceptable. Test equipment hookup and system alignmnet of station battery 2-1 was verified in accordance with STP M-12C. The inspector observed a portion of the in progress 2 hour service test, including reading and recording of individual battery cell voltages. Battery voltage and current test performance results recorded on data sheets and strip charts were examined. No deficiencies or discrepancies in test conduct and battery performance were identified by the inspector.

e. Containment Isolation Valve Leak Tests

STP V-600 provides the general program instructions and acceptance criteria for conducting containment isolation valve leak tests required to verify compliance with leakage limits established by TS and ASME Section XI. A series of V-600 procedures provide specific instructions for individual containment isolation valve leak tests.

The surveillance interval for these type C tests is 24 months. All type C penetration leak tests have been scheduled for completion during the Unit 2 startup outage. Major portions of leak testing activities performed by plant engineers were observed by the inspector for isolation valves associated with penetrations No. 46, 52, and 59. The local leakage rate test of the Unit 1 containment purge supply valves (FCV-660/661) was also observed. This particular test was performed within the required 24 hours after a Unit 1 containment purge as prescribed by TS.

Test results for all observed local leak rate tests were acceptable limits. No deficiencies or discrepancies were identified during the review and observations of test activities.

No violations or deviations were identified.

6. Startup Testing

a. Initial Criticality Unit 2

The approach to initial criticality was conducted in accordance with the S/U test procedure 41.2. This procedure was consistent with the licensee's instructions to startup engineers in format and had been properly reviewed and approved. Prerequisites established proper instrument and equipment operability requirements and reactor conditions. Precautions identified manning and administrative control requirements.

The inspectors confirmed selected TS requirements during the initial criticality evolution including shift manning. During boron dilution of the RCS, the licensee's estimated critical position and calculations were verified by the inspectors and compared to predictions. Several boron analyses and the overlap of the source and intermediate range nuclear instrumentation were also observed.

For initial criticality of Unit 2, the licensee had revised the mode of dilution from "alternate dilute" to "dilute". The dilute mode places all the primary makeup water into the volume control tank rather than distributing a larger portion directly to the charging pump suction as in the alternate dilute mode (alternate dilute was used for initial criticality of Unit 1). The licensee recognized this mode of dilution places a large amount of primary water in the volume control tank which could later be a source of positive reactivity addition. This probable affect was compensated for by a conservative reduction in the water volume added to the RCS, as well as a reduction in the makeup level setpoint to the volume control tank. This test change was appropriately reviewed, approved and documented.

Dilution was terminated at an inverse count rate ratio of .24, however, the volume of diluted water (acting as positive reactivity insertion) in the volume control tank automatically charging into the RCS was sufficient to bring the reactor critical. The transient condition was observed and adequately controlled by the operators. Criticality was subsequently achieved within acceptance criteria for the startup test. However, the plan had originally been to stabilize the reactor at an inverse count rate ratio of 0.2 and then appproach criticality over a 2 to 4 hours period.

The failure to achieve a slower approach to criticality has been attributed to lack of adequate turnover concerning the effect of the dilute mode to the nuclear engineer. Without this adequate turnover, the nuclear engineer directed additional water be added to the volume control tank, which was sufficient to reach criticality.

Licensee management analyzed the event and concluded additional conservatism or description should have been provided to the nuclear engineer, but the reactor criticality evolution was conducted in a controlled and safe manner.

b. Zero Power Physics Tests - Unit 2

The inspectors observed selected portions of the following tests:

- Isothermal Temperature Coefficient and Boron Endpoint
- Measurement-Startup Test 41.3.
- Control Rods and Boron Reactivity Worth-Startup Test 41.4
- Psuedo Ejected Rod Worth-Startup Test 41.6
- Minimum Shutdown Verification and Stuck Rod Worth
- Measurement-Startup Test 41.7

All tests observed by the inspectors were conducted in accordance with requirements of the procedure or acceptable revisions to the procedure by qualified personnel. Test equipment was calibrated, and data was collected and reviewed. Acceptance criteria were met and the licensee management reviewed the results prior to authorization of continued power ascension testing. Compliance to selected TSs was observed.

c. Overall Startup Test Program

Administrative control of Unit 2 startup is controlled by S/U procedure 40.0, which is similar to that used for Unit 1. The inspector's review of the procedure indicated that tests have been identified and sequenced, responsibilities, including documentation, have been defined for the testing organizations, and specific test procedures have appropriate format and information to assure acceptable test conduct. Finally, observations have confirmed that the test program has been conducted in accordance with the S/U procedure 40.0 to-date.

d. Quality Assurance Program for Startup Testing - Unit 1

The licensee's QA program, covering operational activities associated with startup and power ascension testing on Unit 1, was reviewed by the inspector. Program requirements and procedures for conducting audits were previously evaluated, as documented in NRC IR 50-275/84-30. Five audit reports of the testing program were evaluated for compliance with applicable audit procedures. The inspector verified corrective action had been accomplished for any identified deficiencies.

e. Power Level Plateau Data Review - Unit 1

Test results for 4 startup tests were previously reviewed as described in IR 50-275/85-26. In addition, test results for the following startup tests were evaluated during this inspection period.

- RCCA Psuedo Ejection and RCCA Above Bank Position Measurements
- Pseudo Rod Drop
- Thermal Power Measurement and Statepoint Data Collection
- Nuclear Steam Supply System Acceptance Test
- Plant Trip from 100% Power

During the Plant Trip from 100% Power test, the acceptance criterion for overall resistance temperature detector response time was not met. However, the licensee dispositioned this anomaly through discussions with Westinghouse.

No violations or deviations were identified.

7. Independent Inspection

a. Control of Overtime Work

Inspectors reviewed licensee NPAP A-8, "Overtime and Emergency Relief Restrictions." The restrictions specified in this procedure were consistent with the TS requirements and other industry and NRC guidance. Additionally, exceptions to these restrictions can be approved only by the Plant Manager or Plant Superintendent. Discussions with shift foreman and other licensed operators verified their understanding and correct implementation of these restrictions.

b. Warehousing of Class 1 Material

A NRC inspector entered Warehouse B (a Class 1 material storage area) via the Southwest roll-up door at 1853 hours on September 11, 1985. The NRC inspector was not challenged or escorted when he entered the warehouse attempting to locate a QC receipt inspector. The NRC inspector then signed-in, issued himself a badge, and proceeded through the warehouse. Warehouse personnel, on duty, did not challenge the NRC inspector when he approached them at the opposite end of the warehouse. The personnel paged the swing shift material supervisor to assist the NRC inspector. As the NRC inspector was leaving the warehouse at 1902 hours, the supervisor asked him if he had been challenged upon entering the warehouse.

NPAP D-538, "Control of Material at DCPP" states in section F "Storage of Materials," "1. Access shall be limited at all times to those personnel on the current approved access list. Others shall be admitted only on a signed-in escort basis as required."

As NPAP D-538 and 10 CFR 50, Appendix B, Criterion V (Instuctions, Procedures, and Drawings) were apparently not followed, the above condition represents a violation of regulatory requirements (50-323/85-29-01). This is a repeat violation (See IR

50-275/84-03); however, the previous occurrence involved licensee contractor storage areas.

c. Class 1 Material Storage

The inspectors toured a storage area near the 500 kilovolt switchyard and found a lack of segregation of Class 1 and Non-Class 1 material. Additionally, signs labeled both Class 1 and Non-Class 1 were used to mark the same area. This issue was promptly resolved by the licensee contract personnel responsible for this storage area. The material had recently been moved and the condition was a temporary and transient one. Discussions were held with Bechtel QC engineers to insure such situations do not arise in the future.

d. Resolution of Cracked Welds

The inspector has identified two cracked socket welds (see IR 50-275/84-32 and 50-323/85-17). As stated in the latter report, the licensee evaluated the generic implications of these and one other failed weld. The inspector reviewed the licensee's investigation of generic implications as well as the metallurgical failure analysis of the RHR vent line weld and could find no generic implications in the three failed welds. Additionally, the inspector monitored portions of the licensee leak minimization program and found the results acceptable.

One apparent violation and no deviations were identified.

8. Open Item Followup

a. Quality Control Staff Systems Training (Open Item 50-275-23-01, Closed)

Plant specific systems training for the QC staff has been started and full implementation has been scheduled for next year. These activities and schedules acceptably close this open item.

b. Scope and Schedule of Audits (Open Item 50-275/85-23-02, Closed)

Section 5.a. of NRC IR 50-275/85-23 indicated the licensee "had identified one deficiency in 36 items thus far reviewed." This statement is hereby corrected to read the inspector "had identified...." Additionally, this issue should not have been identified as an open item, since all necessary corrective actions to correct this deficiency had been taken by the licensee. Accordingly, this open item is closed.

c. Diesel Generators Failure to Start (Open Item 85-99-x1, Closed)

The licensee has reported the subject problem in Special Report numbers 85-02, 85-03, 85-04, 85-07, and 85-08. The DGs failures have been examined and analyzed by the inspectors. The licensee's reports were accruate, correctly interpret regulatory guide requirements, and were timely in accordance with TS requirements.

The licensee has also conducted surveillance on DGs in accordance with TS frequency and testing requirements.

d. Reactor Coolant System Resistance Temperature Detector Calibration Error (Open Item 85-12-01, Closed)

Investigation of the subject item determined the error was with RDF manufactured resistance temperature detectors which are not used at this site. Diablo Canyon uses Sotsman detectors; therefore, this item is closed.

e. Maintenance Tracking and Trending (Open Item 85-23-09, Closed)

The subject tracking and trending maintenance equipment history has been taken over by the plant information management system. This open item is closed.

f. Plant Engineer Design Change Responsibilities (Open Item 85-23-11, Closed)

The inspector verified that the definitions of the plant engineer function have been specified in an ongoing revision to procedure C-1S1 consistent with the design change program. This open item is closed.

g. Data Review Process (Open items 85-23-04 and 06, Closed)

Licensee management has specifically counseled responsible parties for data review and concluded that improvements have been achieved. These open items are closed.

h. Procedural Use of Not Applicable (Open Item 85-23-07, Closed)

The licensee has revised operating procedures (§ series) to assure that the use of N/A (not applicable) has been clearly explained and additionally reviewed and initialed by the Shift Foreman. Also, NPAP E-4 was being revised and similar specifications have included in the draft. Therefore, this open item is closed.

No violations or deviations were identified.

9. Violation Followup

a. Material and Test Equipment Control (Open Items, 85-23-03 and 85-23-05, Closed)

The inspectors verified that the licensee's response to the subject violation was timely and that the corrective actions outlined in the response were as described. In accordance with administrative controls, this violation and response were reviewed and approved by plant management.

No violations or deviations were identified.

10. Licensee Event Report Follow-up (Units 1 and 2)

Circumstances and corrective actions described in the following LERs listed below, were examined. Review of the LER, and reporting to NRC within required time intervals by the licensee, was verified by the inspectors. The inspectors also ensured corrective actions were established and applicable events were accurately described. Accordingly, the following LERs are considered closed:

Unit 1: 85-24 through 85-30

Unit 2: 85-03 through 85-06

No violations or deviations were identified.

11. Exit

On October 4, 1985, an exit meeting was conducted with the licensee's representatives indentified in paragraph 1. The inspectors summarized the scope and findings of the inspection as described in this report. A major concern in the inspection period was the lack of operator awareness that caused the reactor trip and safety injection on Unit 2. Licensee management should continue to probe and be involved in operator activities to assure themselves that acceptable conditions are being maintained.

Index of Acromyns

ASME	American Society of Mechanical Engineers
AFW	Auxiliary Feedwater
DG	Diesel Generator
FCV	Flow Control Valve
I&C	Instrumentation and Control
IR	Inspection Report
LCO	Limiting Conditions for Operation
LER	Licensee Event Report
NI	Nuclear Instrument
NPAP	Nuclear Plant Administrative Procedure
NRC	Nuclear Regulatory Commission
PG&E	Pacific Gas and Electric Company
QA	Quality Assurance
QC	Quality Control
RCCA	Rod Control Cluster Assembly
RCP	Reactor Coolant Pump
RCS	Reactor Coolant System
STP	Surveillance Test Procedure
S/U	Start-up
SWF	Shopwork Follower
TS	Technical Specification