



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

HS

JUL 18 1984

Docket Nos.: 50-275/323

MEMORANDUM FOR: ~~Thomas J. Loya~~ Assistant Director
Division of Licensing

FROM: James P. Knight, Assistant Director
Components & Structures Engineering
Division of Engineering

SUBJECT: SUPPLEMENTAL SAFETY EVALUATION REPORT INPUT ADDRESSING
THE ALLEGATIONS CONTAINED IN A LETTER BY GAP, DATED
MAY 31, 1984 (TAC NO. 54434)

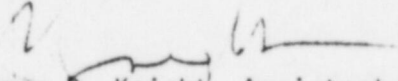
Plant Name: Diablo Canyon Units 1 & 2

Docket Nos.: 50-275/323

Responsible Branch and Project Manager: Licensing Branch No. 3,
H. Schierling

Review Status: Complete

The Equipment Qualification Branch, Division of Engineering, has reviewed the allegations contained in a letter by GAP, dated May 31, 1984 and has reviewed the PG&E maintenance and surveillance program. The results of that review are documented in the attached SSER input. We have concluded that the licensee's maintenance and surveillance program adequately addresses EQ requirements and that maintenance activities will not affect equipment qualification. Therefore, the staff considers the issue resolved for the purpose of licensing decisions.


James P. Knight, Assistant Director
Components & Structures Engineering
Division of Engineering

Enclosure: As stated

cc: V. Noonan
G. Knighton
H. Schierling
R. LaGrange
EQ Section

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Equipment Qualification Branch
Input for Supplementary Safety Evaluation Report
Pacific Gas and Electric Company
Diablo Canyon Units 1 & 2
Docket Nos. 50-275/323

Equipment Qualification Maintenance and Surveillance Program (allegations contained in a letter by GAP, dated May 31, 1984)

In response to allegations concerning the equipment qualification (EQ) maintenance and surveillance program, the staff examined the licensee's EQ maintenance and surveillance program, implementation of the procedures and training of personnel. The staff found that the maintenance and surveillance procedures are sufficient in detail and have been written and implemented to address the maintenance and surveillance concerns regarding EQ. The staff also talked to the journeyman in the instrumentation and control group and electrical group and found that journeymen are properly trained and have knowledge of these procedures. The licensee has also installed bright orange tags on all equipment items that are qualified for a harsh environment. These tags caution the craft personnel that EQ procedures should be followed during the maintenance and surveillance actions on the particular equipment.

Based on the above, the staff concludes that there is reasonable assurance that maintenance and surveillance actions will take place in accordance with well established procedures. Accordingly, the staff considers this issue adequately resolved for the purpose of licensing decisions.

JUL 20 1984

MEMORANDUM FOR: Darrell G. Eisenhut, Director
Division of Licensing, NRR

FROM: Thomas W. Bishop, Director
Division of Reactor Safety and Projects, RV

SUBJECT: DIABLO CANYON UNIT NO.1 (DN 50-275)
CONSTRUCTION STATUS AND OPERATIONAL READINESS
REPORT (MC 94300)

The Region V staff's evaluation of Diablo Canyon Unit 1 readiness for power ascension testing and full power operation is complete. Except as noted in Attachment 6 it is our conclusion that the plant systems have been properly accepted by the licensee, that requisite low power testing has been satisfactorily performed, that the Regional inspection program is current, and that outstanding items are not of such significance to preclude full power operation.

Enclosed, for your information, are summaries of reviews and assessments which contributed to our conclusion of readiness:

a. Overall Assessment

- (1) Diablo Canyon Unit 1, Full Power License Review Panel Considerations, dated June 19, 1984.

b. Assurance of Construction Quality

- (1) Summary of Installation Quality Verifications.
- (2) Summary of Licensee Quality Assurance Audits and Stop Work Orders since September 1981.

c. Special Reviews of Operational Readiness

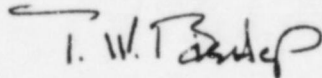
- (1) Special Team Inspection (50-275/84-07) of operating crews and management involvement during initial startup and low power testing, dated June 20, 1984.
- (2) Special Examination (50-275/84-07) of the training program for shift advisors, dated May 25, 1984.

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HARRIS

As you are aware the staff's position on allegations and design quality are being addressed in separate Supplemental Safety Evaluation Reports. Should you have comments or questions regarding the above please contact this office.



T. W. Bishop, Director
Division of Reactor Safety
and Projects, RV

Enclosures:

- (1) Diablo Canyon Unit 1, Full Power License Review Panel Considerations, June 19, 1984
- (2) Summary of Installation Quality Verifications
- (3) Summary of Licensee Quality Assurance Audits and Stop Work Orders Since September 1981
- (4) Special Team Inspection Report 50-275/84-07, June 20, 1984
- (5) Special Examination Report 50-275/OL-84-02, May 25, 1984
- (6) Items Requiring Licensee Action Prior to Exceeding 5% Power

cc w/enclosure:

J. B. Martin, RV
R. DeYoung, IE:HQ
G. Knighton, NRR
D. Kirsch, RV
P. Johnson, RV
M. Mendonca, RV

As you are aware the staff's position on allegations and design quality are being addressed in separate Supplemental Safety Evaluation Reports. Should you have comments or questions regarding the above please contact this office.

T. W. Bishop, Director
Division of Reactor Safety
and Projects, RV

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cc v/enclosure:

J. B. Martin, RV
R. DeYoung, IE:HQ
G. Knighton, NRR
D. Kirsch, RV
P. Johnson, RV
M. Mendonca, RV

RV *pjm*
P. Morrill:dh
7/19/84

PJ
P. Johnson
7/19/84

DK
D. Kirsch
7/19/84

TB
T. Bishop
7/19/84



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION V

1450 MARIA LANE, SUITE 210
WALNUT CREEK, CALIFORNIA 94596

JUN 19 1984

Enclosure (1)

MEMORANDUM FOR: John B. Martin, Regional Administrator

FROM: T. W. Bishop, Director
Division of Reactor Safety and Projects

SUBJECT: RESULTS OF DIABLO CANYON UNIT 1 FULL POWER LICENSEE
REVIEW PANEL CONSIDERATIONS

A review panel met on June 4, 1984 to consider the status of Diablo Canyon Unit 1 and the basis for full power license issuance recommendations. The attendance was as follows:

D. F. Kirsch, Chairman, RV
H. L. Canter, RV
P. H. Johnson, RV
F. A. Wenslawski, RV
M. D. Schuster, RV
G. H. Hernandez, RV
P. J. Morrill, RV
M. M. Mendonca, RV (Resident), by telephone
M. L. Padovan, RV (Resident), by telephone
T. Ross, RV (Resident), by telephone
T. Polich, RV (Resident), by telephone
G. W. Knighton, NRR, by telephone
C. I. Grimes, NRR, by telephone
B. C. Buckley, NRR, by telephone

Information considered by the panel included:

1. Status of the inspection program, testing program, enforcement actions, and construction.
2. Status of allegations
3. Status of compliance with low power operating license conditions.
4. Issues related to the 1977 NSC audit.

Mr. J. L. Crews, Senior Reactor Engineer, was subsequently contacted to determine if he was in concert with the panel because he led the inspection team onsite in examining the performance of the operating crews. Mr. Crews concurs in the conclusions and recommendations of the panel.

The panel and the Senior Resident Inspector (SRI) concluded that the state of readiness for full power licensing of Diablo Canyon Unit 1 is adequate and recommends issuance of the full power license.

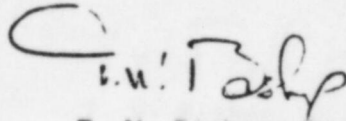
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JUN 19 1984

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Attachment 1 provides a listing of the panel's considerations and conclusions.



T. W. Bishop, Director
Division of Reactor Safety
and Projects

cc: G. Knighton, NRR
C. Grimes, NRR
H. Schierling, NRR
B. Buckley, NRR
M. Mendonca, RV (4 copies)
D. Kirsch, RV
F. Wenslawski, RV
G. Yuhas, RV
M. Schuster, RV
L. Norderhaug, RV
P. Johnson, RV
P. Morrill, RV

1. Manual Chapter 94300B (Operating License Issuance)

A. Inspection Program

The status of the inspection program prescribed by MC 2512, 2513, and 2514 was reviewed. The panel concluded that the inspections prescribed by MC 2512 and 2513 were complete and that the inspections prescribed by MC 2514 were current, consistent with present plant and testing status.

Inspections related to the Independent Verification Program (IDVP) and the licensee's Internal Technical Program (ITP) were reviewed. The panel concluded that the inspections of the IDVP and ITP were complete for Unit 1 and that some inspection of the transfer of findings and engineering to Unit 2 should be completed for Unit 2 licensing.

The panel discussed recent findings related to the Seismic Interaction Program (SIP) with the conclusion that the licensee's commitment to complete all follow-up items identified during the staff's May 1984 inspection by the end of July 1984 was acceptable. (i.e., SIP modifications and walkdowns, verify documentation is complete and accurate, complete review of "as-is" packages and verify proper engineering approval, and provide NRC with a schedule for transfer of SIP to the Nuclear Power Operations Group).

Regarding the TMI Action Plan (TAP) items, the panel concluded that these items appeared to be completed for full power operation with the exception of the PASS system which would be verified complete by RV before the plant was in Mode 1. The Region V staff has conducted an audit to verify that all TAP items are complete or on schedule. NRR is currently reviewing the Licensee's Core Damage Estimate procedure.

Regarding emergency preparedness, the inspection program has consisted of emergency exercise observations, and preoperational and routine inspections. No items of noncompliance or open items exist in this area. Recent updated FEMA findings continue to reflect adequate emergency preparedness. However, the ASLB condition requiring FEMA findings on the adequacy of the State plan is still unsatisfied.

Safeguards and security inspections have consisted of verifications of safeguards requirements and compliance. No items are required for resolution prior to full power operation.

Radiation protection inspections centered on verification of TMI full power requirements and the licensee's programmatic compliance. One item of noncompliance in this functional area was issued during the period from January 1, 1983, to May 31, 1984. This inspection effort has not to date identified any open items or concerns that should be restrictive to full power operation. No items are required for resolution prior to full power operation.

B. Testing Program

The licensee has successfully completed the core loading and low power (< 5%) testing program, including natural circulation testing on May 23, 1984. As required by the staff, the operators from each shift have satisfactorily participated in the natural circulation tests.

Procedures for the required power ascension tests have been completed and approved. No significant deficiencies were identified during the reviews of these procedures. The NSSS supplier (Westinghouse) has completed review and acceptance of the low power testing program prior to starting the power ascension test program.

C. Enforcement Actions

The following list tabulates the enforcement actions taken since January 1984. The low power license was reinstated on April 18, 1984.

<u>Inspection Report and Dates</u>	<u>Severity Level</u>	<u>Functional Area and Description of Non-Compliance</u>
83-37 11/14-18/83 11/28 -12/83	One Level 4	Construction - Pullman inspectors were performing inspections prior to completing required training.
83-38 11/14-18/83	One Level 4	Radiation Protection - Personnel in the containment did not evacuate when the evacuation alarm sounded and three individuals who left the containment failed to log out.
83-39 12/5-22/83	Two Level 4 and One Level 5	Fire Protection - Fire watch personnel were not aware of welding permit requirements, permits were not properly posted, and in one case a permit was not completed.
83-40 12/13-20/83	Two Level 4	Engineering - Environmental Qualification files were not subject to quality assurance program controls and in one case were not checked by a checking engineer.

<u>Inspection Report and Dates</u>	<u>Severity Level</u>	<u>Functional Area and Description of Non-Compliance</u>
83-41 11/27 - 12/31/83	Two Level 4 and One Level 5	Operations - Welding was being done with no fire-watch or extinguisher, the Solid State Protection System was removed from service without written procedures, the containment equipment hatch was ajar when required to be closed and the jumper log for the pressurizer pressure transmitters incorrectly indicated that the transmitters were not bypassed.
84-01 1/3-6/84	One Level 5	Construction - Connection 794 in the turbine building had been accepted by H. P. Foley QC despite lack of weld fusion and omissions of portions of stitch welds.
84-02 1/1 - 2/4/84	One Level 4	Operations - Redundant fans for the control room ventilation were improperly aligned to the same power supply.
	One Level 4 (Unit 2)	Construction - Excessive undercut on a structural steel weld in the containment annulus and missing washers at a bolted structural connection.
84-03 2/5 - 3/24/84	One Level 4	Quality Assurance/Construction - Access of personnel to control material storage was not controlled.
84-04 4/2-9/84	One Level 4	Construction - An electrical raceway supports a non-conformance report was lost and two welds were not inspected.
84-06 4/7-17/84	One Level 3 (\$50,000 C.P.)	Operations - Licensee disabled a portion of the ECCS system (high pressure core injection via the Boron injection tank) for 15 hours.

The construction items of non-compliance do not appear to be major pervasive problems but do indicate a need to continue examinations of Unit 2 with NRC and contract personnel resources. The operations items of non-compliance culminated in an enforcement conference held on May 1, 1984, during which the staff discussed problems related to the failure of the licensee's staff to exhibit an acceptable degree of awareness of the facility Technical Specifications. The staff intends to closely monitor the licensee's management, both in the response to, and follow-up of, items related to this issue. The panel did not find that this item of non-compliance should impede the issuance of the full power license. In addition to the above, there are several enforcement actions pending as a result of allegation investigations.

D. Construction

The construction of all safety-related systems has been completed. The licensee's operating organization has accepted cognizance of all safety-related systems. A design modification to the reactor trip breakers shunt trip was required prior to exceeding 5% power and has been completed. The panel found that this would not impede the issuance of the full power license.

2. Status of Allegations

Allegations

Allegations regarding design, construction, operation and management have been submitted to the NRC since early 1983, the majority being submitted since late 1983. A specific evaluation effort for allegations was initiated in late 1983, under the Diablo Canyon Allegation Management Program (DCAMP). As of early March 1984, approximately 200 allegations had been submitted by various sources. The staff's evaluation of these allegations is presented in SSER 21 (December 1983) and SSER 22 (March 1984). The Government Accountability Project (GAP) submitted approximately 300 allegations in February and March 1984 in support of a petition, in accordance with 10 CFR 2.206, to defer any licensing action. Another approximately 250 allegations have since been submitted in letters by GAP and Joint Intervenors. Most of all the allegations are identical or very similar. Some of the allegations are being investigated by the Office of Investigations.

As discussed in SSER 22, the staff applied certain criteria for determining which allegations must be resolved on a priority basis. Prior to reinstatement of the low power license, the staff had evaluated each allegation in sufficient detail and concluded that none are of such safety significance to preclude low-power operation. The staff has identified allegations in the following areas that require resolution before a full-power decision:

- ° Piping and piping supports;
- ° Containment paint;

- Systems interactions;
- RHR system low flow alarm;
- As-built drawings;
- Bolts on containment liner.

The staff is continuing its evaluation of all allegations and will present the results in a future report.

The staff has met a number of times with individuals making allegations or raising concerns. In some cases, the individuals have requested confidentiality and are represented by GAP. An official transcript has been taken of the meetings whenever possible. The staff is currently reviewing the meeting transcripts to determine if they include any specific allegations or concerns not already included in those submitted.

3. Status of Compliance with Low Power Operating License Conditions

The licensee has successfully completed the low power test program consistent with Section 14 of the Diablo Canyon Final Safety Analysis Report (FSAR) and NRC approved changes.

- a. The on-site phase of the Region V Special Team Inspection of the operating crews (directed by the Commission as a condition of low power authorization) was concluded on May 23, 1984, with the observation of the natural circulation tests and associated training of the operating crews.

Preliminary findings and conclusions by the Special Inspection Team include:

- i. Overall operating crew performance was judged to be good, with Shift Advisors effectively integrated into shift operations.
- ii. Zero power physics and low power tests demonstrated acceptable reactor and systems performance, without significant deviation from licensee/NSSS design expectations.
- iii. Licensee management, including senior corporate, involvement in the day-to-day operation of the facility was found to be substantial and effective.
- iv. Observations during the course of the Special Inspection revealed the need for improvements in the areas of (a) maintenance work planning (particularly in the use and installation of special test equipment in non-safety-related systems of the plant which offer the potential for interaction with or unnecessary challenge to reactor protection/safeguards systems); (b) procedural guidance for and the implementation of measures to provide independent verification of equipment/system alignment and status; and (c) the reliability of post trip/sequence-of-events informational systems (plant

annunciator printer and sequence of events computer) following significant transients such as loss of AC power and safety injection (ECCS) initiation. Each of these areas are receiving priority attention by licensee management for resolution prior to exceeding 5% power.

- b. In addition, on-site special inspection was conducted April 9-11 and 24-25, 1984, to evaluate the qualification training and examination of Shift Advisor Candidates. Concomitantly, a special evaluation of the Shift Advisors was conducted by the NRC Division of Human Factors Safety during the period April 10-11, 1984. These inspections/evaluations concluded that the training program for the advisors was adequate and that all Shift Advisors and Candidates more than met the minimum qualification recommended by the industry.

The licensee has completed all other low power license conditions with the exception of proof testing the Post Accident Sampling System (PASS) and obtaining NRC approval of the Core Damage Estimate procedure which is currently under review by NRR.

4. NSC Audit and Related Matters

- a. On September 9, 1983, the Joint Intervenors filed a document with the ASLAB to supplement their motion to reopen the record on Construction Quality Assurance. This document contained a report of a Nuclear Services Corporation (NSC) audit conducted August 22 - September 20, 1977 of Pullman Power Products (Pullman) from 1971 through 1977 and alleged major breakdowns in Pullman's as well as the licensee's QA programs.
- b. The Region V staff has conducted three inspections/investigations of this audit and the corrective actions taken by Pullman and the licensee (Reports 50-275/83-34, October 11-14, 1983; 50-275/83-37, November 14-18 and November 28 - December 9, 1984; and 50-275/84-16, April 2-4, 1984). One item of noncompliance (Level 4) was identified in that Pullman welding inspectors were conducting inspections prior to completing their required training. The licensee reviewed the qualifications and training of these personnel and examined a sample of welds accepted by personnel whose training might be questionable to verify the adequacy of the accepted welds. No unacceptable welds were found.

The Region V staff and subsequently Chairman Palladino have invited Quadrex Corporation (the corporate descendent of NSC) to attend a commission briefing to explain the NSC findings in more depth, however, Quadrex has declined all requests to meet with the Commission on this issue.

- c. The NSC audit has also been the subject of Congressional Staff inquiries (Dr. H. Myers, Sub-Committee on Energy and the Environment) dated March 22, March 26, and April 10, 1984. The Region V staff has provided a draft response to the March 22 and 26 questions in a draft letter forwarded to the EDOs office on June 4,

1984. The April 10 questions had not been responded to at the time of the panel's meeting.

The panel concluded that these issues were adequately addressed in the aforementioned Region V inspection reports and that there were no issues associated with the NSC audit which should preclude the granting of the full power license.

SUMMARY OF INSTALLATION QUALITY VERIFICATIONS

In its April 9, 1984 report to the Commission, the ACRS stated that the Staff should examine a sampling of actual construction details to help assure that appropriate quality has been accomplished in the construction and modification of the Diablo Canyon Nuclear Power Plant.

The Staff feels that considerable efforts and resources have been expended by the NRC Staff and others in the examination of actual construction details involved in the Diablo Canyon Nuclear Power Plant as follows.

1. The Regular NRC Inspection Program

The NRC's regular inspection program for power reactors under construction, as defined by IE Manual Chapter 2512, provides for considerable direct inspector observations and examinations in all aspects of plant construction. While careful attention is given to the applicant's management controls, quality assurance records, training procedures, and other non-hardware aspects of a construction program, a substantial portion of the inspectors' time is also given to direct inspection of actual construction details. The IE Inspection Procedures address work observation and direct inspection of completed work over a wide range of activities, including plant foundations, structural steel and concrete, safety-related pressure boundary piping and supports, mechanical systems and components, electric cables, cable trays and supports, electrical components, containment penetrations, welding and nondestructive examination practices, and plant instrumentation. Such direct inspection coverage was provided to Diablo Canyon during plant construction and subsequent modification. These inspections are documented in approximately 104 staff inspection reports for Unit 1 since 1972. The staff has issued an additional 175 inspection reports for Unit 1 in other areas (system testing, maintenance, operations, etc). Comparable inspection attention was also given to Unit 2. In addition, the subject of construction quality has been the subject of ASLB reviews and appeals.

2. NRC Follow-up on Allegations and IDVP Modifications

In excess of 20,000 hours of NRC staff effort have been devoted to the follow-up and resolution of allegations in recent months. The regular inspection program has also continued during this period, including attention to IDVP modifications. A substantial portion of this inspection effort has involved direct inspection of actual hardware or construction details. Combined, these direct inspections have specifically included examination of the following:

- o Safety-related structures (modifications to containment annulus structural steel; modifications to turbine building; fuel handling building structural steel modifications; catwalk supports; and structural steel components supplied by

Bostrom-Bergen). These examinations have included 122 structural connections involving over 1000 welds.

- ° Safety-related pressure boundaries and mechanical systems (Reexamination of 102 radiographs; 25 delta-ferrite measurements on selected stainless steel pipe welds; 549 pipe supports; containment equipment hatch integrity; valve operability and piping expansion tests; Systems Interaction Program hardware modifications; hydraulic snubbers; anchor bolts; reactor vessel assembly; component cooling water liquid penetrant tests and system tests; stainless steel pipe weld shrinkage; heating, ventilation and air conditioning systems; arrangement of accumulator discharge piping; and u-bolts attached to small bore Class I piping).
- ° Safety-related electrical systems (4 KV breaker maintenance; emergency lighting; diesel generator tests; 50 cable tray installations; 322 cable tray, conduit and raceway supports and related anchor bolts; 53 electrical cable installation, labeling and terminations; in excess of 100 conduit clamps; electrical panels and devices inside containment; and inspection of various safety-related areas to determine potential consequences of falling light fixtures).
- ° Safety-related components (support weld quality on over 100 components; reactor coolant pump seal and motor replacement; diesel generator maintenance; control rod testing; charging pumps; RHR pumps and pump rooms; containment building polar crane; dead load supports for 50 safety-related valve bodies or operators; 41 HVAC supports; and replacement of bolts in containment fan cooler structural supports).
- ° Quality of special processes (independent nondestructive examinations including radiography, ultrasonic, and delta-ferrite; visual examination of numerous field welds in piping systems and structural assemblies; and examination of weld repairs).
- ° Instrumentation, controls, and protective features (reactor trip breaker tests; RHR flow indication and low flow alarm, modifications to air ejector and gas decay tank discharge monitors; in-core thermocouple circuits; and pressurizer instrumentation).
- ° Other quality-related inspections (fire barriers, fire protection systems and fire-fighting equipment; examination of over 500 modifications to verify correctness of as-built drawings).

The staff inspection of 1283 modifications identified 33 items which did not conform to requirements. Most of these (21) involved structural connections in the Fuel Handling Building. In response, the licensee conducted a 100% reinspection of the welds in that building, and additional inspections elsewhere. Inspection of

allegations and associated hardware identified approximately twenty more construction related items of noncompliance (all of which related to procedural/administrative errors, none of which involved specific hardware inadequacies).

3. Other Quality Verifications Performed by Third Parties

Third party examinations of Diablo Canyon Nuclear Plant hardware have been instituted at the request of the NRC, by NRC contract personnel, or by other Federal agencies since 1977. These include the following:

- a. The General Accounting Office (GAO) conducted an audit of the NRC inspection program at the Diablo Canyon facilities during the weeks of May 30 and June 6, 1977, and conducted interviews with numerous craftsmen engaged in safety-related work. The GAO notified the Region V office of the audit items of concern, which identified allegations of improper workmanship by three individuals. As a consequence the Region V office conducted a special investigation during July and August, 1977 of (a) pipeway welding and structural steel, (b) seismic and pipe rupture restraints, (c) concrete anchor bolt testing, and (d) resin filter trap welding quality (Inspection Report 50-275/77-06). One item of non-compliance was issued for failure to complete a weld inspection step.
- b. In September 1981, subsequent to the licensee's discovery that portions of the seismic analysis inputs for the containment annulus were reversed, the NRC suspended the low power license. The NRC staff required that an Independent Design Verification Program (IDVP) be successfully completed by outside contractors prior to reinstatement of the license. Two major verifications of plant hardware were conducted concomitant with the IDVP.

First, in order to verify the accuracy of engineering, the IDVP contractors had to verify the "as-built" condition of the plant. These verifications took place from December 1981 through January 1984 and involved approximately 1600 man-hours total effort. The scope of these examinations is described as follows:

- o R. L. Cloud and Associates -- piping systems, pipe supports, electrical raceway supports, heating and ventilation supports, equipment supports, structural steel, and concrete structures.
- o Stone and Webster Corporation -- Auxiliary Feedwater System, Control Room Heating and Ventilation System, 4160 volt electrical system, missile barriers, and pipe rupture restraints.
- o Teledyne Engineering Services -- Oversight of the examinations described above.

This effort found many instances of inaccuracies in the engineering calculations and/or "as-built" process which required reanalysis. After the licensee had completed appropriate corrective actions, the IDVP concluded that the plant's engineering and as-built were satisfactory.

Second, Stone and Webster Corporation conducted an examination of the quality of construction of the containment (erected by G. F. Atkinson Company) and of the primary coolant system (constructed by Wismer and Becker Company) during the fall of 1982. This effort involved approximately ten experienced auditors and/or technical experts who invested approximately 800 man-hours at the site. This team found one item which required correction; that item related to documentation of an inspection of dye penetrant tests which could not be found. No hardware problems were identified.

c. ASME Code Inspections

Pullman Power was examined on four different occasions by ASME survey teams of four or five members. These surveys were conducted in October 1972, August 1977, July 1980, and August 1983. Wismer and Becker was surveyed and granted an ASME authorization in 1973. No findings resulted from the ASME surveys, although minor items were referred to the Authorized Inspector (AI) for followup.

d. Authorized Code Inspector (AI)

The California State Code Inspector served as AI for the Diablo Canyon site from the beginning of code-related construction effort through June 1975. At least one and as many as four resident AIs were stationed at the site during this period, which covered much of Pullman's construction activity and essentially all of Wismer and Becker's. After June 1975, Hartford Steam and Boiler Inspectors served as AI. A resident AI was at the site until 1976; coverage since that time (to the present) has been provided on a part-time basis.

4. Conclusion

NRC and third-party inspections at Diablo Canyon have examined a wide diversity of plant structures, systems, and components. For the greatest part, these direct observations and hardware inspection efforts have verified proper quality of construction activities. In limited cases where problems were identified, licensee corrective actions and NRC enforcement actions, where appropriate, and NRC follow-up inspections have been provided to ensure proper quality.

SUMMARY OF LICENSEE QUALITY ASSURANCE AUDITS AND STOP WORK ORDERS SINCE
SEPTEMBER 1981

The PG&E Quality Assurance Program is described in detail the "Quality Assurance Manual for Nuclear Power Plants." This manual describes the licensee's QA program for control of all activities affecting the quality of safety-related structures systems and components during the design, construction, and operation of nuclear power plants. The staff requested that the licensee compile a list of audits and stop work orders which occurred after September 1981 under this QA program. This data is enclosed as Table 1 and Table 2 which follow.

TABLE 1

SUMMARY OF QUALITY ASSURANCE AUDITS SINCE SEPTEMBER 1981

	<u>Years</u>			
	<u>1981</u> ⁽³⁾	<u>1982</u>	<u>1983</u>	<u>1984</u>
A. <u>PACIFIC GAS AND ELECTRIC CO.</u> ⁽¹⁾				
1. Audits	51	143	413 ⁽⁸⁾	38 ⁽⁹⁾
2. Findings	24	133	431	60
3. Observations ⁽⁷⁾	0	0	0	0
4. Stop Work Orders	0	2	0	1
B. <u>PULLMAN POWER PRODUCTS CORPORATION</u> ⁽²⁾⁽⁵⁾				
1. Audits	11	20	23	9
2. Findings	22	71	96	30
3. Observations	1	10	16	1
4. Stop Work Orders	0	0	0	0
C. <u>H. P. FOLEY COMPANY</u> ⁽²⁾⁽⁶⁾				
1. Audits	2	6	17	11
2. Findings	9	119 ⁽⁴⁾	65	44
3. Observations	0	0	9	7
4. Stop Work Orders	0	0	3	2

NOTES:

- (1) For period ending May 1, 1984.
- (2) For period ending May 31, 1984.
- (3) Audits from September 1981.
- (4) An audit of calibration considered each tool not in compliance as a finding. Approximately 42 findings resulted from audit.
- (5) Includes scheduled and unscheduled audits, corporate audits, agency inspections, and ASME surveys.
- (6) Includes scheduled and unscheduled audits, and corporate audits.
- (7) The customary practice of PG&E is to write findings, not observations in order to assure mandatory corrective action takes place.
- (8) Includes approximately 100 mini audits.
- (9) 38 audits completed, actually 127 audits have been assigned numbers, but the remainder are in some stage of preparation.

TABLE 2

SUMMARY INFORMATION ON LICENSEE STOP WORK ORDERS
SINCE SEPTEMBER 1981

PGandE

<u>Date Issued</u>	<u>Reason</u>	<u>Date Work Allowed to Resume</u>
June 15, 1982	Energy, Inc. QA Program for furnishing Incore Thermocouple-Computer Class 1E Isolation System was found to be deficient during an audit.	Partial - 6/21/82 Partial - 6/28/82 Complete - 8/16/82
September 29, 1982	Installation of Class 1E Cable stopped at DCPD due to deficiencies identified in the manufacturer's QA Program.	Approx. 12/8/82
January 9, 1984	Reannealing of Rupture Restraints - Meddco Metals - work stopped due to procedural deficiencies identified during an audit.	1/19/84 - Findings resolved.

H. P. FOLEY CO.

<u>Date Issued</u>	<u>Reason</u>	<u>Date Work Allowed to Resume</u>
March 7, 1984	84-02. Fourteen of 200 Electrical work requests were issued without a QA approved Work Process Traveler.	NCR 8802-1122 was generated, and closed March 24, 1984. Work was allowed to commence upon closure of the NCR.
February 23, 1984	84-01. Inadequate work packages prevented proper QC inspection and documentation of in-process work for Barton Transmitters.	New work requests were prepared and approved by QA, and work was resumed March 22, 1984.

<u>Date Issued</u>	<u>Reason</u>	<u>Date Work Allowed to Resume</u>
December 20, 1983	83-03. Procedures for Class I soldering required updating and approval, and persons assigned to soldering required certification under revised procedures.	Procedures were reviewed by PG&E Quality Control on December 13, 1983 and approved by PG&E Quality Assurance on December 21, 1983. All work resumed January 6, 1984.
December 20, 1983	83-02. Improved control of core drilling, concrete chipping, and drilling activities was required to prevent damage to embedded items.	Controls were established and work resumed on December 21, 1983.
May 13, 1983	83-01. Rev. 0, May 13, 1983. Stop work order issued for suppliers whose qualifications were expected to expire March 17, 1983.	Supplier Approval Requests were received and approved on May 14, 1983, and purchasing was resumed on May 14, 1983 for all suppliers except the three no longer used. See Revision 1 following.
May 14, 1983	83-01. Rev. 1, May 14, 1983. Three additional suppliers not on list for Rev. 0.	Vendors no longer used by H. P. Foley; qualifications were permitted to expire.



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION V

1450 MARIA LANE, SUITE 210
WALNUT CREEK, CALIFORNIA 94596

Enclosure (4)

JUN 20 1984

Docket No. 50-275

Pacific Gas and Electric Company
77 Beale Street
Room 1435
San Francisco, California 94106

Attention: Mr. J. O. Schuyler, Vice President
Nuclear Power Generation

Subject: NRC Inspection of Diablo Canyon Unit 1

This refers to the special team inspection conducted by Mr. J. L. Crews and others of this office, on April 19 - May 23, 1984 and June 12, 1984, of activities authorized by NRC License No. DPR-76.

Areas examined during this inspection are described in the enclosed inspection report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations by the inspectors.

No items of noncompliance with NRC requirements were identified within the scope of this inspection.

In accordance with 10 CFR 2.790(a), a copy of this letter and the enclosure will be placed in the NRC Public Document Room unless you notify this office, by telephone, within ten days of the date of this letter and submit written application to withhold information contained therein within thirty days of the date of this letter. Such application must be consistent with the requirements of 2.790(b)(1).

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2pp.

Should you have any questions concerning this inspection, we will be glad to discuss them with you.

Sincerely,

R. J. Pate for:
T. W. Bishop, Director
Division of Reactor Safety
and Projects

Enclosure:
Inspection Report
No. 50-275/84-07

cc w/enclosure:
P. A. Crane, PG&E
S. M. Skidmore, PG&E
R. C. Thornberry, PG&E

U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report No. 50-275/84-07

Docket No. 50-275

License No. DPR-76

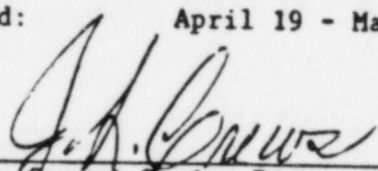
Licensee: Pacific Gas and Electric Company
77 Beale Street
San Francisco, California 94106

Facility Name: Diablo Canyon, Unit 1

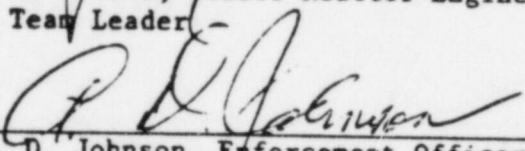
Inspection at: Diablo Canyon Site

Inspection conducted: April 19 - May 23, 1984 and June 12, 1984

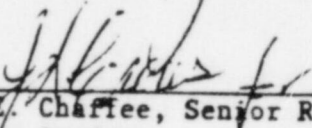
Inspectors:



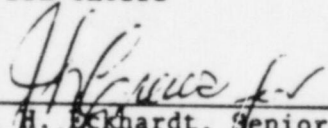
J. L. Grews, Senior Reactor Engineer and
Team Leader 6/15/84
Date Signed



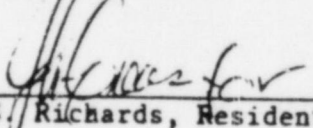
A. D. Johnson, Enforcement Officer 6/15/84
Date Signed



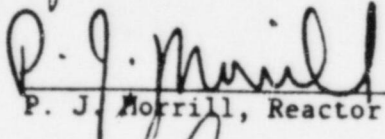
A. E. Chaffee, Senior Resident Inspector,
San Onofre 6/15/84
Date Signed



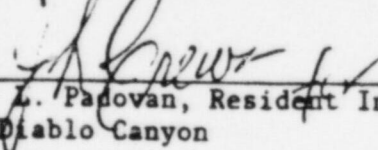
J. H. Eckhardt, Senior Resident Inspector,
Marcho Seco 6/15/84
Date Signed



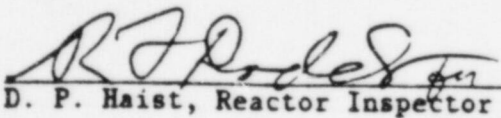
S. Richards, Resident Inspector, Trojan 6/15/84
Date Signed



P. J. Morrill, Reactor Inspector 6/15/84
Date Signed



M. A. Padovan, Resident Inspector,
Diablo Canyon 6/15/84
Date Signed



D. P. Haist, Reactor Inspector 6/15/84
Date Signed

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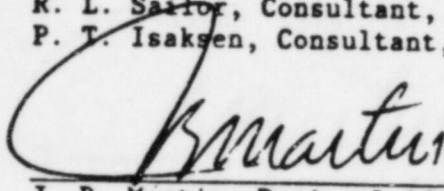
Other Accompanying Personnel:

L. R. Peterson, Consultant, Lawrence Livermore National
Laboratory (LLNL)

R. L. Sailor, Consultant, EG&G Idaho, Inc. (EG&G)

P. T. Isaksen, Consultant, EG&G Idaho, Inc. (EG&G)

Approved By:



J. B. Martin, Regional Administrator

6/18/84
Date Signed

Summary:

Inspection on April 19-May 23, 1984 and June 12, 1984 (Report No. 50-275/84-07)

Areas Inspected: Special Team Inspection of the operating crews during initial startup and low power testing. This inspection involved 657 inspection hours (including 300 hours devoted to routine inspection activities) by eight NRC personnel and 148 inspection hours by three NRC consultants.

Findings: No items of noncompliance resulted from this inspection. The NRC Resident Inspection staff is, however, continuing to examine the circumstances regarding the use of a special test device (optical isolator) in a non-safety related system without proper testing prior to use. Additional information is necessary to determine if such use was in violation of NRC requirements.

DETAILS

1. Persons Contacted

*G. A. Maneatis, Executive Vice President
*J. O. Schuyler, Vice President, Nuclear Power Generation
*J. D. Shiffer, Manager, Nuclear Power Operations
W. A. Raymond, Assistant Manager, Nuclear Power Operations
*R. C. Thornberry, Site Manager
R. Patterson, Assistant Site Manager-Plant Superintendent
J. D. Townsend, Assistant Plant Superintendent
J. M. Gisclon, Assistant Site Manager, Technical Services
T. J. Martin, Training Manager
J. A. Sexton, Manager of Operations
R. L. Fisher, Sr. Power Production Engineer
L. F. Womack, Manager, Engineering (Site)
S. N. Banton, Sr. Nuclear Engineer
B. W. Giffin, I&C Maintenance Manager
S. R. Fridley, General Operating Foreman

The inspectors also held discussions with and observed the performance of numerous other licensee employees and contractor/consultant personnel during the course of the inspection; these included Shift Foremen, Shift Advisors, Shift Technical Advisors, Senior Control Room Operators, Control Room Operators, unlicensed operations personnel startup engineers, maintenance technicians and quality assurance personnel.

*Attended Management Meeting on June 12, 1984.

2. Operating Crew Performance

Background

By Staff Requirements Memorandum, dated March 29, 1984, the Commission directed the NRC staff to "...conduct a special inspection of operating crews..." during low power operation at the Diablo Canyon Unit 1. The principal purpose of the current Special Team Inspection was to implement the special inspection directed by the Commission.

Special Inspection Team Composition and Pattern of Inspection

The inspection was carried out by senior members of the Region V staff, Senior Resident and Resident Inspectors assigned to operating power reactors in Region V, and three NRC consultants from the Lawrence Livermore National Laboratory (LLNL) and EG&G Idaho, Inc (EG&G). The latter consultants (two individuals) from EG&G currently provide contract assistance to the NRC staff in the conduct of operator license examinations for PWR (Westinghouse supplied) power reactor facilities. The consultant from LLNL is an experienced reactor physicist, and has previously served as a consultant to the NRC staff in the area of human factors evaluation of control room layout and design.

To evaluate the performance of the operating crews, members of the Special Inspection Team were assigned to essentially around-the-clock

coverage of shift operations commencing on April 19, 1984, when plant heatup in preparation for initial criticality was started. Except for the period April 22-24, 1984 during which the approach to initial criticality was discontinued for replacement of a leaking O-ring in the No. 4 Reactor Coolant Pump Seal housing, this essentially around-the-clock coverage continued through initial criticality (at 0007 hours on April 29, 1984) and until May 4, 1984. During the balance of the inspection period through May 23, 1984, when low power testing was completed, members of the Special Inspection Team visited the plant at random hours, unannounced, on May 7-11, 14-18, and 21-23, 1984.

The above pattern of inspection permitted members of the inspection team to observe the performance of each of the five operating crews as well as the conduct of portions of essentially all of the zero power physics and special low power tests.

Assessment of Operating Crew Performance

Operating crew performance was assessed based upon the Special Team's observation of (1) the conduct of scheduled plant evolutions during zero power physics and low power tests and training demonstrations (including natural circulation tests), (2) crew response to unplanned events (including one occasion on May 8, 1984 when reactor trip and Safety Injection actuation occurred), and (3) through discussions with individual operating crew members. Particular emphasis was given to the extent to which Shift Advisors (individuals under contract to the licensee to provide on-shift experience in the operation of similar licensed power reactor facilities) were integrated into the shift operations.

The overall performance of the operating crews was judged by the Special Inspection Team to be above average in plant knowledge and in the conduct of operating duties (including the use of and adherence to operating procedures) when compared to operators of power reactor facilities of similar type (Westinghouse, PWR) during the initial plant startup and early operating period.

Prior to commencement of the current inspection, on April 13, 1984, the leader of the Special Inspection Team questioned a senior licensed operator in the control room regarding the normal alignment (manual and automatic valve positions) of the Safety Injection System. The operator's response was one of apparent uncertainty regarding the proper alignment (position) of such valves. This observation, coupled with a recent event (on April 7, 1984) in which valves for the Boron Injection Tank were found to be improperly aligned (electrical motor breakers racked out) prompted a concern which was brought to the attention of licensee management. In response, prompt steps were taken by senior site management to direct special training for all licensed plant operators in the proper alignment of safety related systems of the plant and the Limiting Conditions for Operation associated with these systems. During the course of the current inspection there was not a repeat of such a response by any of the plant operators.

An instance of improper clearance and independent verification of the removal from service of a Boric Acid Transfer Pump by two non-licensed plant operators occurred during the current inspection, and is discussed in paragraph 3 of this report. Although this occurrence did not have direct impact on nuclear safety, in this instance, it did reveal a potential generic weakness in the licensee's procedures and practice with regard to the independent verification of operating activities by operations personnel.

Shift Advisors were observed to participate extensively in the conduct of plant operations and the evaluation of plant performance. Seven qualified Shift Advisors are currently utilized at the plant. Five have been assigned to the operating shifts, and thus rotate with the crews to which they are assigned. Their knowledge and experience appears to have been integrated effectively into the operating staff. These individuals were observed to confer frequently with plant operators and shift supervision. Discussions with plant operators and supervision revealed an apparent high degree of acceptance of the Shift Advisors by the operating crews. In addition to the role of providing experienced advice to the operating crew members, Shift Advisors have been assigned to special tasks for plant improvement. One such task is a special effort to reduce the number of unnecessary control room annunciator actuations during normal plant operation.

The turnover of information during shift change was observed by the Special Inspection Team on a routine basis. Individual one-to-one turnover by Shift Foremen and the Control Operators is covered by formal checklists on which the status of plant systems and instrumentation is documented during a joint "walkdown" of the control room panels. Following the one-to-one turnovers, a shift briefing is conducted by the oncoming Shift Foreman. These briefings were observed to be thorough, typically lasting approximately 20 to 30 minutes. Startup engineers were observed to participate extensively in the shift briefing to discuss testing scheduled for the shift and the expected plant response. During these shift briefings plant operator comments, questions and recommendations were encouraged. Overall, the shift turnover and briefings were observed to be thorough and effective. Observations by the Special Inspection Team did, however, reveal the need for improvements in two areas of shift turnover. During the early part of the inspection period the number of personnel in the control room area during shift briefings was observed to be large, approaching 15 or more persons on some occasions. This led to an atmosphere of potential distraction to the control operators. When this observation was brought to the attention of licensee management, shift briefings were moved to the Unit 2 area of the control room, while two to three operators remained in the Unit 1 area and were subsequently briefed separately.

Another observation by the Special Inspection Team was that shift briefings did not include participation by maintenance representatives. In response to this observation, licensee management included the regular participation by the on-shift Instrument and Control Maintenance Foreman in the shift briefings. The planned installation and use of special test equipment was a particular subject covered by these individuals.

The licensee has established a "carpeted area" of the control room wherein visual and audible surveillance of instrumentation, alarms, and reactor controls is maintained by plant operators. Access to this area was observed to be effectively controlled. Rules have been established and implemented, whereby permission to enter the "carpeted area" must be obtained from the Senior Control Operator or Control Operator. There appeared to be a strong discipline in adherence to the access control rules.

Hours of work by operations personnel were examined and found to be well within regulatory requirements. For the period April 1 through May 15, 1984, the average and maximum overtime for operations personnel regularly assigned to shift operations was as follows:

<u>Classification</u>	<u>Average Overtime*</u>	<u>Maximum Overtime*</u>
Shift Foremen	4 hours/wk	5 hours/wk
Senior Control Operators	5 hours/wk	7 hours/wk
Control Operators	4 hours/wk	6 hours/wk
Assistant Control Operators	4 hours/wk	7 hours/wk
Auxiliary Operators	4 hours/wk	8 hours/wk

* Rounded to nearest hour

The average overtime for Instrumentation and Control Technicians during a similar period, although within regulatory requirements, was somewhat higher than operations personnel, averaging approximately 14 hours per week during the period April 23 through May 19, 1984.

Additional findings regarding operating crew performance are included in the reports of NRC consultants who participated in the inspection. These reports are included as Attachments 1 through 3 to this report.

3. Equipment Control Procedures and Practices

The Special Inspection Team observed the implementation of procedures established by the licensee over the use of electrical jumpers (and lifted leads) and the removal/return to service of equipment and components important to safety.

The records of jumpers and lifted leads were examined frequently during the course of the inspection. Although administrative discrepancies (essentially in all cases errors in the current index of the active jumper log) were identified on two occasions, no actual misuse or loss of effective control over the use of electrical jumpers was identified. Errors in the current index of active jumpers were resolved in each case when it was determined that either an "active" jumper in question had been removed and the record of its use thus removed from the log without the index being updated or the record of a specific jumper's use had been improperly placed in the jumper logbook.

The Special Inspection Team observed the implementation of procedures for the removal from service and restoration of equipment on several

occasions, and except for the instance on May 15, 1984 discussed below observed no significant discrepancies. In particular, the removal of the Steam-Driven Auxiliary Feedwater Pump from service for repair on April 27, 1984 was examined in detail. The removal of the pump from service was carried out in accordance with equipment clearance procedures, including tag-out. Entry into an Action Statement of the governing technical specification was properly documented to assure return of the pump to service within the time period required.

An occurrence on May 15, 1984, involving the improper removal from service of a Boric Acid Transfer Pump (P1-2), was examined in depth by the Special Inspection Team. This occurrence was brought to the attention of the NRC inspectors who arrived at the site shortly following its discovery. Circumstances regarding the occurrence were as follows. A Clearance Request had been approved on May 14, 1984 to remove pump P1-2 from service to investigate reported motor vibration. In preparation for this work the pump was to be removed from service on the morning of May 15, 1984. Two non-licensed Auxiliary Operators (AO) were assigned to remove the pump from service by racking-out the electrical breaker for the pump motor. In accordance with procedures for independent verification of the activity, one AO was to rack-out the motor breaker and the second AO was to verify that the motor breaker had been racked-out. Clearance records indicated that this task had been completed and clearance tags (Man On The Line-Caution tags) were attached to the motor breaker panel at approximately 0509 hours on May 15, 1984. At approximately 0730 hours on May 15, 1984, Control Operators, while walking down the control room panels during shift turnover, discovered that electrical power to the breaker for pump P1-2 was on, contrary to that indicated on an information tag attached to the pump switch and the Clearance Request form. Preliminary investigation by the plant operators at that time revealed that the breaker for pump P1-2 had not been racked out at 0509 hours as previously reported by the AO's involved.

Discussions relating to this occurrence were held with licensee representatives, including the two AO's involved, from which the following information was obtained. It has become routine practice at the Diablo Canyon plant when performing independent verification of operating activities to have two persons go together when a task is performed - one performing the activity, and the other independently verifying conduct of the activity. This practice is consistent with current written procedures for independent verification, which require that independent verification be completed within 4 hours of the completion of the activity.

Consistent with the above practice two AO's went together to the motor control center for pump P1-2 on May 15, 1984. When they arrived at the motor control center the pump was observed to be running. Therefore, a request was made, via plant telephone, for operators in the control room to shut the pump off. During the course of their task the AO's related to NRC inspectors that they were engaged in conversation unrelated to their work task at the time. Upon observing that the pump had been shut off (audible and light indications were observed), the AO's proceeded to hang Man On The Line Caution tags on the breaker panel for pump P1-2 and left the area. They failed to realize that the breaker for pump P1-2 had

not been racked-out as required. When questioned by NRC inspectors, the AO's stated that they were simply inattentive to the job at the time -- they had experienced "...a lapse in concentration." Both AO's have been employed in their current jobs at the plant for approximately 18 months. Each stated that they had been trained in the applicable equipment clearance procedures and their importance since initially being assigned to their jobs. They also stated that they had performed equipment clearance tasks on many occasions in the past without error.

The licensee's clearance procedures require that in addition to the steps taken by operations personnel in removing equipment from service for maintenance the maintenance craftsman must also "walkdown the clearance" to assure himself the equipment is properly removed from service. In this instance the assigned electrician had not yet walked down the clearance in preparation for work, nor had he commenced work on the pump motor.

In considering the circumstances of the above occurrence, NRC inspectors developed a generic concern regarding the current practice of the licensee in conducting independent verification of equipment status. The specific concern is that two persons essentially arm-in-arm can and often are employed to perform a check or other operating task and independently verify the check or completion of the task at the same time. It appears that such a practice could, under circumstances similar to that which occurred on May 15, 1984, seriously compromise the "independence" of the independent verification. This concern was brought to the attention of licensee management, who acknowledged the validity of the NRC concern and committed to review and revise, as appropriate, the governing procedures and practices for independent verification. (See Paragraph 8, Management Interview).

4. Work Planning

An entry in the Control Operators log on May 14, 1984 described an event wherein spurious cycling open and closed of the pressurizer Power Operated Relief Valves (PORV's) had occurred. The plant operators responded to the event without difficulty, and no serious transient in plant operation resulted.

A review of facility records and discussions with licensee representatives revealed the following information relating to the event. The cause of the PORV cycling was attributed to the installation of defective special test equipment (an optical isolator) in the PORV control circuitry. The special test equipment, which was being installed to permit the recording of selected parameters in the pressurizer control circuitry, had not been tested for proper performance prior to installation. (The NRC resident inspection staff is continuing to examine the quality assurance program aspects of this occurrence, and will report separately their findings).

This occurrence, together with a previous observation by the Special Inspection Team relating to work by Instrumentation and Control (I&C) technicians on non-safety related systems, led to a closer examination of the work planning effort for I&C activities. The previous observation

involved work on the recorder for the main steam system of the plant--a non-safety related system. The Clearance and work order in this instance authorized calibration of the recorder while the reactor was operating. Although, this work (calibration of the recorder) was not actually performed while the reactor was operating, it could have caused unexpected oscillation of the main steam system and unnecessary challenge to the reactor protection and engineered safety features. In both instances the lack of proper work planning was evident to fully assess the effect work on non-safety related systems (particularly instrumentation and control systems) could have on safety related systems of the plant. Further discussion with licensee representatives revealed that two of four currently authorized positions in the I&C Work Planning group were unfilled. In addition, two proposed positions in this group had not yet been authorized.

NRC concerns in the work planning area were discussed with senior licensee site and corporate office management. On May 21, 1984, offers were approved for two individuals to fill vacant positions in the I&C Work Planning group. Priority attention by licensee management is currently being given to further staffing needs in the work planning area, including mechanical and electrical maintenance (See Paragraph 8, Management Interview).

Licensee management also committed to the preparation of written instructions regarding the handling and use of special test equipment as well as testing or other work on non-safety related instrumentation and control systems. (See Paragraph 8, Management Interview)

5. Initial Criticality, Zero Power and Low Power Testing

Members of the Special Inspection Team witnessed initial criticality and portions of all zero power and special low power tests. Details regarding these observations are discussed in Attachment 3.

Portions of the following Natural Circulation Demonstration Tests, including those tests repeated for the purpose of operator training for each operating crew were witnessed. The objectives of each test were successfully demonstrated. Operating crew performance was judged to be good, with no discrepancies observed.

Test 1.1 - Natural Circulation

Test 1.2 - Natural Circulation With Loss of Pressurizer Heaters

Test 1.3 - Natural Circulation at Reduced Pressure

Test 1.4 - Natural Circulation With Loss of Offsite Power

Test 1.5 - Effect of Steam Generator Isolation on Natural Circulation

6. Post-Trip Information System Reliability

Following a reactor trip and Safety Injection initiation on May 8, 1984, it was observed that information from the sequence-of-events (P-250) computer was not available due to apparent frequency drift/re-synchronization problems associated with the computer's inverter power source.

Information provided by the P-250 computer is a significant input in the licensee's post trip review procedure. Attempts during the current inspection to reproduce the conditions of May 8, 1984 were not successful in identifying the exact cause of the loss of information from the computer. Licensee management committed to a continuing priority effort to improve the reliability of this equipment.

A problem similar to that of the sequence-of-events computer was experienced with the Main Annunciator Recorder (typewriter) following a simulated loss of AC power test. As a result, attempts to obtain an alarm summary were unsuccessful. This information, like that of the sequence-of-events computer, is important during operation and for post trip reviews by plant operators. Priority attention to a resolution of this problem was committed to by licensee management. (See Paragraph 8, Management Interview)

7. Management Involvement

During the course of the inspection numerous opportunities were available to observe the involvement of both site and corporate level management in the day-to-day operation of Diablo Canyon, Unit 1.

Frequent discussions, at least weekly, were held by telephone or in person at the site with corporate level management, particularly the Executive Vice President, Manager of Nuclear Plant Operations, and Assistant Manager of Nuclear Plant Operations. Essentially daily discussions were held with senior site management.

From the above discussions a assessment was made of management involvement in plant operations. The results of this assessment are presented below.

Site Management Involvement

A significant program of site management involvement in plant operations was initiated by the licensee in early April 1984. This program, which was fully implemented prior to commencement of the current inspection, involves the assignment of one of the following senior managers on shift at all times.

Assistant Plant Manager - Technical Services
 Assistant Plant Superintendent
 Operations Manager
 Training Manager

These individuals were relieved of their normal duties and responsibilities to enable them to spend full time in the role of assessing and supporting shift personnel in the conduct of plant

operations. These shift management personnel made several recommendations for the improvement of plant operations. Among the significant recommendations made were:

- a. Reduce the administrative tasks assigned to the Control Operator by reassigning many record keeping duties not directly related to plant operation to an Assistant Control Operator.

An additional study was undertaken to further minimize the nonessential duties performed by both the Control Operator and the Assistant Control Operator.

- b. Interim changes be made to improve the timeliness of reporting the completion of surveillance testing by all departments to the Shift Technical Advisor so that a computer based status tracking system will be more current and complete. Such improvements were determined to be essential to keep plant operators better informed of the current status of these tests.
- c. Agressively pursue a program to reduce the number of outstanding electrical jumpers by more carefully scrutinizing requests for the use of jumpers. Implementation of this recommendation placed responsibility on the shift managers to approve all jumpers. This interim measure reduced the number of outstanding jumpers by more than 50 percent.
- d. Improve the timeliness of operator knowledge of plant modifications which may impact them, by having such changes documented in such a manner that they can be covered in shift briefings rather than during requalification training sessions.
- e. Continue efforts, including exchange of information with other nuclear utilities, to more effectively and efficiently handle equipment clearances and configuration control. A continuing effort in this area was recognized due to the large number of equipment and components out of service for preventive maintenance and surveillance testing.
- f. Continue an assessment program similar to that implemented by the on-shift management by assigning many of the responsibilities presently assigned to them to the Shift Advisors and Shift Technical Advisors - with periodic management review.

Corporate Office Management Involvement

During the period of the current inspection corporate office management personnel were observed at the plant on frequent occasions, including back shift hours. For example, the Manager, Nuclear Plant Operations (NPO) was at the plant more than 25 percent of the time during the period from mid-April through mid-May 1984. The Assistant Manager, NPO spent a similar period of time at the plant. These individuals were observed on other than day shift on several occasions. The Manager, NPO personally participated in a decision to discontinue the approach to initial

criticality on April 22, 1984 to perform repairs on a reactor coolant pump O-ring seal, although, leakage past the seal was at the time well within limits of the technical specifications. He expressed the view that his participation, while at the site, on this occasion was partially to demonstrate by example corporate management's support of such decisions when in the interest of prudent and safe operation.

Both the Manager, NPO and the Executive Vice President were on site at the time of initial criticality.

Daily reports of plant status are issued by the Assistant Manager, NPO. These reports are given wide distribution within the corporate office.

At least weekly discussions were held by the Special Inspection Team leader with the Executive Vice President. The status of plant operations and the findings of the inspection team were routine topics of discussion during these contacts, which revealed a high degree of awareness and personal involvement in such matters by the Executive Vice President.

Goals have been established by licensee management to insure continued management involvement in the day-to-day operation of the Diablo Canyon plant. (See Paragraph 8, Management Interview)

8. Management Interview

On June 12, 1984, a meeting was held by the leader of the Special Inspection Team with those licensee representatives indicated in Paragraph 1. The scope and findings of the inspection as described in this report were discussed. The following information and commitments were provided by licensee representatives. (References are to Paragraphs of this report where the subject is discussed)

A. Independent Verification of Operational Activities

Licensee representatives stated that a change had been made to Administrative Procedure HPAC C-104 requiring that, except for unusual circumstances such as ALARA considerations, persons performing independent verification are not to accompany the person performing the operational activity to be independently verified. (Paragraph 3)

B. Work Planning

Offers have been made to individuals to fill two vacant positions in the I&C Work Planning group. It is expected that these individuals will be on board by July 1, 1984.

Authorization has also be given to procure the contract services of six additional persons in the Work Planning section.

C. Post-Trip Information System Reliability

Testing and maintenance have identified and corrected the reliability problems experienced with both the sequence-of-events computer and the main annunciator typewriter. (Paragraph 6)

D. Management Involvement

Goals have been established for continued management involvement in the operational activities at the Diablo Canyon plant, as follows:

Corporate Office Personnel - The Manager, NPO and Assistant Manager, NPO will each average approximately four days per month at the Diablo Canyon Site.

Site Management Personnel - Senior Managers will spend approximately 20 percent of their time in the plant observing and evaluating the conduct of personnel and operational performance. (Paragraph 7)

Date 5-10-84

To Jesse Crews From R. L. Sailor *RLS*
Org. NRC Org. EG&G Idaho
Address _____ Address _____

DIABLO CANYON POWER PLANT SPECIAL INSPECTION

As a member of the on shift special inspection team at the Diablo Canyon Power Plant from April 20 to April 22, 1984, I observed the 12-8AM shift and made several plant tours to verify compliance and ensure plant cleanliness was satisfactory for startup. The operating crew was rated at an above average performance level as compared to similar vendor group operating crews. The crew operated with a "team concept" in all operations that were observed and applied a questioning attitude to any abnormalities. The crew had an above average academic knowledge level on their plant.

The Shift Advisor maintained a true advisory position with respect to control room operators. He was given the ability to observe all operations and gave his input to operators and crew supervision. This action was required very infrequently however, in the three shifts observed. The Shift Advisor appears to be effectively utilized at the Diablo Canyon Power Plant.

eb

SPECIFIC ITEMS NOTED DURING
DIABLO CANYON STARTUP OPERATION (12-8AM)

1. Noted a large number of personnel (approx. 12) "on the carpet" while the 8:00 AM shift turnover was in progress. Many of these people were not on the actual shift crew. (4-20-84)
2. All shift turnovers were excellent. (4-20 through 4-22-84)
3. The shift briefs held by the SF (L. Collins) were structured and thorough. All watchstanders are given the opportunity to report to the crew on the status of their watchstations. Coordination for evolutions is planned at the briefing. (Best I have ever seen.) (4-20 through 4-22-84)
4. Annunciator response procedures were utilized as expected when alarms were received. (4-20 through 4-22-84)
5. The heatup procedure was utilized at all times. (4-21 through 4-22-84)
6. When RCP alarms were all "locked in" on annunciator board, the watch-section placed the ACO at the alarm typewriter to monitor any additional alarms that might be received. (4-21-84)
7. Engaged in group discussion (SCO, CO, ACO, SA) to ensure that RCP seal package leakage was in fact identified and could not be considered either boundary or controlled leakage. (4-22-84)
8. When decision was made to cooldown for repairs on #4 RCP seal package, the cooldown from hot standby procedure needed to be entered midway based on the actual plant conditions. Both the CO and ACO reviewed the entire procedure to ensure no steps could be omitted prior to entry into a midpoint in the procedure. Oncoming CO performed complete review of procedure as above prior to relief. (The degas step of RCS that was necessary was in the beginning of the procedure.) (4-22-84)

Date 5-16-84To Mr. Jesse CrewsFrom P. T. IsaksenOrg. NRCOrg. INEL

Address _____

Address _____

DIABLO CANYON POWER PLANT SPECIAL INSPECTION

I was a member of the Special Inspection Team at the Diablo Canyon Power Plant from May 7 through May 11, 1984. I observed crew operations during low power operations and testing. These observations included shift relief/turnover, shift briefings, operator logs and awareness of plant/system status, procedural compliance, limiting conditions for operation and controls utilized during removal and restoration of system components from service during maintenance and surveillance testing. The overall rating of crew operations is above average.

The three Shift Advisors observed took an active interest in assessment of ongoing and upcoming significant shift activities, especially in regard to Technical Specification requirements. They appeared to be effectively utilized in their primary roles by crew members.

eb

cc: T. F. Pointer
A. J. Vinnola
P. T. Isaksen File

ATTACHMENT 2

MAY 18 1984

SPECIFIC ITEMS NOTED DURING DIABLO CANYON LOW POWER TESTING OPERATION

(5/7/84 - 5/11/84)

1. All shift briefings observed were excellent except for swingshift on 5-7-84, which did not include status and plans for Unit 1. (Unit was in Hot Standby, Mode 3.)
2. Operator response and procedure compliance for recovery from spurious safety injection on 5-8-84 was excellent.
3. Noted no discrepancies on clearance for maintenance on the Steam Driven Auxiliary Feedwater Pump.
4. All operators were aware of Technical Specification limiting conditions for operation and action statement requirements.
5. Conscientious reviews and group discussions, including Shift Advisors, for surveillances performed (i.e., STP M-16N slave relay testing for FCV-95).
6. On a plant tour, noted that the required fire watches were set and knowledgeable of their responsibilities.
7. No concerns identified on the Reactor Trip and Safety Injection, Reactor Trip Reviews on 5-6 and 5-8-84 respectively.
8. One on watch Control Operator did not know without checking graph, the control rod withdrawal limits for current plant conditions (boron concentration and reactor power). Initially reported incorrect (unconservative) value and was immediately corrected by the ACO. Control rods were well within the withdrawal limits at the time.



Lawrence Livermore National Laboratory

NUCLEAR SYSTEMS SAFETY PROGRAM

May 18, 1984
HFE 84-05-02

Jesse Crews, Senior Reactor Engineer
U.S. Nuclear Regulatory Commission, Region V
1990 N. California Boulevard
Suite 202, Walnut Creek Plaza
Walnut Creek, California 94596

Dear Mr. Crews:

Enclosed is a statement of my participation as a member of the NRC Region V Special Inspection Team during the initial reactor startup and zero power reactor physics tests at the Diablo Canyon Nuclear Power Plant, Unit 1. Included are my observations and evaluations of the reactor startup activities and zero power reactor physics tests.

Please contact me at (415) 423-0952 or FTS 8-543-0952 if further information is needed.

Sincerely,

L. Rolf Peterson
Nuclear Systems Safety Program

0025R

encl.

ATTACHMENT 3

~~0407180297~~
LPP

Observations and Comments
Initial Reactor Startup and Zero Power Reactor Physics Tests
Diablo Canyon Nuclear Power Plant, Unit 1
NRC Region V Special Inspection

by

L. Rolf Peterson
Nuclear Systems Safety Program
Lawrence Livermore National Laboratory

May 18, 1984

0025R

Observations and Comments
Initial Reactor Startup and Zero Power Reactor Physics Tests
Diablo Canyon Nuclear Power Plant, Unit 1

by
L. Rolf Peterson
Lawrence Livermore National Laboratory
May 18, 1984

I participated as a consultant member of the NRC Region V Special Inspection Team at Diablo Canyon Nuclear Power Plant, Unit 1, during April and May 1984. Prior to initial reactor criticality I was on site at Diablo Canyon from April 19 until April 22, 1984. Initial reactor criticality was achieved at 0007, April 29, 1984. After initial reactor startup, I was on site from April 30 until May 2, 1984, and from May 7 until May 9, 1984, to evaluate the zero power reactor physics tests and to observe the performance of startup and operating personnel during these tests.

The initial startup of Diablo Canyon 1 was conducted in accordance with Pacific Gas and Electric Company (PG&E) Test Procedure No. 40.0, Startup Program Master Document, Sections 13.0 through 17.0. Zero power physics tests were conducted in accordance with Section 18.0.

Detailed PG&E test procedures used in conjunction with Test Procedure 40.0 were:

Test Procedure No. 41.2	Initial Criticality
Test Procedure No. 41.3	Nuclear Design Checks
Test Procedure No. 41.4	Rod and Boron Worth Measurements During Boron Dilution
Test Procedure No. 41.5	Control Bank Worth Measurements (with Overlap) During Boron Addition
Test Procedure No. 41.6	Rod Control Cluster Assembly (RCCA) Pseudo Ejection at Zero Power
Test Procedure No. 41.7	Minimum Shutdown Verification and Stuck Rod Worth Measurement

On April 19, 1984, I attended the briefing given by Bob Fischer on the Diablo Canyon plant operations organization and the briefing on initial criticality and zero power testing given by Mike Norem (lead startup engineer) and Steve Banton (startup engineer). A synopsis of the detailed test procedures listed above was reviewed during the latter briefing.

During the remainder of this 4/19-22/84 plant visit I made complete tours of the Unit 1 turbine and auxiliary buildings and the Unit 1 containment building. I familiarized myself with the Unit 1 control room and observed preparations to heat up the plant and make the transition from Mode 5 Cold Shutdown to Mode 4 Hot Shutdown.

I reviewed in detail Test Procedure 41.2, Initial Criticality. I found that the procedure was complete and incorporated good operating practices for a safe approach to initial reactor criticality. The procedure included proper precautions to prevent an unanticipated criticality and to ensure proper detection of the neutron multiplication and neutron population by the source range detectors and the intermediate range detectors during reactor startup. The procedure incorporated proper coordination of boron dilution and control rod assembly withdrawal to ensure an orderly and safe approach to initial reactor criticality. The procedure also included proper steps after initial criticality to detect the onset of nuclear heating, to determine the flux level upper limit for zero power physics testing, to check the basic kinetic behavior of the reactor by measuring the doubling time or reactor period after a small reactivity addition, and to check the operation of the reactivity computer.

Initial reactor criticality of Diablo Canyon 1 was achieved at 0007 hours (12:07 am), April 29, 1984. The predicted boron concentration for initial criticality with all control rods withdrawn was approximately 1310 + 52 ppm. Actual measured boron concentration during initial criticality was 1344 ppm. This value was within the acceptable uncertainty tolerance of the predicted value.

During my visit to the plant on April 30 until May 2, 1984, I reviewed Test Procedures 41.3, 41.4, 41.4, 41.5, 41.6, and 41.7 and observed the progress of zero power physics tests. In the control room, I observed measurements of control rod bank reactivity worth, critical boron concentration at control rod bank endpoints, isothermal temperature coefficient, and zero power core flux distribution. These measurements were conducted using Test Procedures 41.3 and 41.4. I also observed a calibration check of the reactivity computer against reactor doubling time (reactor period) measurements in accordance with Standard Test Procedure G-8C.

The PG&E crews on shift properly followed test procedures in making all measurements. I observed that the lead startup engineer on each shift was experienced in reactor startup and test operations and understood the measurements being made. They used proper testing techniques to ensure that valid data was obtained. The PG&E startup organization also used these nuclear design checks to give less experienced personnel important on-the-job training in performing startup core physics measurements. I observed good cooperation between the PG&E startup personnel and the Westinghouse startup representatives while the nuclear design verification measurements were being made.

When I left the plant on May 2, 1984, I was satisfied that PG&E had adequate safe procedures in place for the Diablo Canyon 1 zero power physics tests and that the plant startup personnel were conducting those tests correctly and safely. PG&E completed zero power physics tests on May 6, 1984.

I visited the Diablo Canyon plant again on May 7 until May 9, 1984. During this visit I reviewed the data and results of the zero power physics tests. I also reviewed the control rod withdrawal limits imposed to ensure that a negative moderator temperature coefficient is maintained to meet Technical Specification 3.1.1.3. I concur with the rod withdrawal limits chosen by PG&E which were based on measured isothermal temperature coefficient data obtained April 30 - May 2, 1984.

On May 8, 1984, I met with PG&E startup engineers Steve Banton and Pete Sarafian and reviewed all zero power physics test data and results. In all cases except two, the measured parameters conformed to predicted design values and tolerances that were provided by Westinghouse and incorporated into the PG&E test procedures. For both exceptions, the measured values were more conservative from a safety standpoint than the predicted values.

During Test Procedure 41.7, the measured integral worth of Shutdown Control Rod Bank D was 948 pcm reactivity. This measured value exceeded the predicted value of 854 pcm with a + 10% tolerance that had been provided by Westinghouse. The measured integral reactivity worth was verified by comparison with boron concentration endpoint measurements made for Shutdown Bank D fully withdrawn and fully inserted. The PG&E startup personnel and the Westinghouse startup representative determined that the measured reactivity worth was acceptable. I concur with this evaluation. The intergral reactivity worth measurements and the boron endpoint measurements are consistent. The larger measured reactivity worth of Shutdown Bank D indicates that a greater shutdown capability is available from this control rod bank than was originally predicted.

During Test Procedure 41.6, the measured integral reactivity worth of psuedo ejection of Rod Control Cluster Assembly B-6 (RCCA B-6) of Control Bank D was 275 pcm reactivity. The predicted value provided by Westinghouse was 480 pcm with a + 10% tolerance. The worth of RCCA B-6 was measured during both boration and boron dilution with less than 1 pcm reactivity deviation.

The PG&E Startup personnel and the Westinghouse startup representative determined that this result deviated from Westinghouse design review criteria but did not violate safety review criteria. I concur with this determination. The measured worth indicates that a smaller positive reactivity increase would occur from ejection of the single rod control cluster assembly that had been predicted.

The test data supports the accuracy of the RCCA B-6 pseudo ejected rod measurements. The predicted 480 pcm reactivity worth of the single ejected control rod assembly appears to be too large. Control Bank D has nine control rod assemblies, including RCCA B-6. The Control Bank D integral worth was

measured during Test Procedure 41.4 with all other control rods withdrawn. The measured total integral worth of Control Bank D was 938 pcm reactivity. The measured 275 pcm reactivity worth for ejection of single assembly RCCA B-6 is reasonable when compared to the measured worth of the entire Control Bank D in a similar core configuration.

Conclusions

I found that PG&E had adequate and complete procedures in place to safely conduct the initial reactor startup and zero power physics tests at Diablo Canyon Nuclear Power Plant, Unit 1.

The Diablo Canyon 1 operating crews and startup personnel that I observed on shift in the control room followed the established procedures and performed competently.

I reviewed the data and results of the Diablo Canyon 1 initial reactor criticality startup and zero power reactor physics tests. I concur with the test data analyses and evaluations made by PG&E and Westinghouse startup personnel. No deviations from expected reactor nuclear design characteristics that would adversely affect safety of operations of Diablo Canyon 1 were observed during initial reactor startup and zero power reactor physics tests.



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION V

1450 MARIA LANE, SUITE 210
WALNUT CREEK, CALIFORNIA 94596

Enclosure (5)

MAY 25 1984

Docket No. 50-275

Pacific Gas and Electric Company
77 Beale Street, Room 1435
San Francisco, California 94106

Attention: Mr. J. O. Schuyler, Vice President
Nuclear Power Generation

Gentlemen:

Subject: Evaluation of Shift Advisor Examinations at the Diablo Canyon
Nuclear Power Plant

On April 9 through 11, 1984 and on April 24 and 25, 1984, the NRC evaluated the qualification, training, and examination of Shift Advisor candidates for the Diablo Canyon Nuclear Power Plant, Unit 1.

As a result of this evaluation the performance of the Training Department of Diablo Canyon was determined to be adequate to ensure that the Shift Advisors meet the minimum qualifications recommended by the industry. The training program, including quizzes and examinations, administered to the Shift Advisor candidates was determined to be adequate to assure that the Advisors had sufficient knowledge of the Diablo Canyon procedures, technical specifications, and safety related plant systems to adequately perform their duties.

At the conclusion of the audit on April 11 and 25, 1984, the findings were discussed with members of your staff as detailed in the enclosed report.

~~8426260513~~
rpp

MAY 25 1984

In accordance with 10 CFR 2.790(a), a copy of this letter and the enclosure will be placed in the NRC's Public Document Room unless you notify this office by telephone within ten days of the date of this letter and submit written application to withhold information contained therein within thirty days of the date of this letter. Such application must be consistent with the requirements of 2.790(b)(1).

Sincerely,

R. J. Pate for.
T. W. Bishop, Director
Division of Reactor Safety
and Projects

Enclosures:

1. Examination Report
No. 50-275/OL-84-02

cc w/o enclosure:

Robert Thornberry, Plant Manager
Tim Martin, Training Manager
~~John Elia, Operator Licensing Examiner~~
Don Beckham, OLB, HQ
Larry Crocker, LQB, HQ
J. Buzy, LQB, HQ
L. Bender, LQB, HQ
R. Pate, RV

EXAMINATION REPORT NO. 50-275/OL-84-02

FACILITY: Diablo Canyon Nuclear Power Plant, Unit 1

DOCKET NO: 50-275

Evaluation of Training and Examination of Shift Advisor candidates at Diablo Canyon Nuclear Power Plant, San Luis Obispo, California during April, 1984.

Auditors: RJPate for (by telcon) 5/23/84
Date
Don H. Beckham, Chief
Operator Licensing Branch
Division of Human Factors Safety

J.D. Crocker 5/23/84
Date
Lawrence D. Crocker, Section Chief
Licensee Qualifications Branch
Division of Human Factors Safety

J. J. Buzy 5/23/84
Date
Joseph J. Buzy
Licensee Qualification Branch
Division of Human Factors Safety

Louis S. Bender 5/23/84
Date
Louis S. Bender
Licensee Qualifications Branch
Division of Human Factors Safety

RJPate 5/23/84
Date
Robert J. Pate, Chief
Operations Section

John O. Elin 5/23/84
Date
John O. Elin
Operator Licensing Examiner

Approved: Robert J. Pate 5/23/84
Date
Robert J. Pate, Chief
Operations Section

SUMMARY:

The purpose of the visit was to evaluate the program of training and certification of the Diablo Canyon Shift Advisors and to assess their ability to provide adequate advise based upon their previous operating experience and their detailed knowledge of the Diablo Canyon Facility.

The licensee's training and certification program for Shift Advisors was adequate and in conformance with general industry criteria for Shift Advisors.

~~9406260576~~
gpp.

DETAILS

1. Persons Contacted

- *R. C. Thornberry, Plant Manager
- *W. G. Crockett, Senior Power Production Engineer
- *T. Martin, Training Manager
- *J. Molden, Assistant Training Manager
- *P. F. Sargent, Senior Training Instructor
- T. Nahay, Shift Advisor
- D. Fordham, Shift Advisor
- P. Snavely, Shift Advisor
- B. Lewis, Shift Advisor
- D. Riley, Shift Advisor
- E. Hyde, Shift Advisor
- D. Barkley, Shift Advisor
- J. Maley, Shift Advisor

*Indicates attendance at the exit interviews on April 11 and April 25, 1984.

2. Scope of the Evaluation:

An initial evaluation team composed of three members of the Licensee Qualifications Branch, Division of Human Factors Safety, NRR, and an Operator Licensing Examiner from Region V visited the site during the week of April 9, 1984.

This team reviewed, as part of the evaluation of the licensee's Shift Advisor Program:

- a. The resumes of the Shift Advisors.
- b. The procedure developed by the licensee which describes the duties and responsibilities of the Shift Advisor.
- c. The training program provided to the Shift Advisors by the licensee.
- d. The weekly quizzes and the final written examination administered to the first group of Shift Advisors.
- e. The results of the oral examinations administered to the first group of Shift Advisors.

Additionally, interviews were conducted with the following individuals:

- f. Three members of the facility staff who had administered portions of the Shift Advisor oral examinations.
- g. Selected members of the facility operating staff regarding the Shift Advisor program.
- h. Eight of the nine Shift Advisors.

A followup evaluation team composed of the Chief of the Operator Licensing Branch, Division of Human Factors Safety, NRR; the Chief of the Operator Licensing Section, Region V, and an Operator Licensing Examiner, Region V, visited the facility during the week of April 23, 1984.

This team, as part of the evaluation;

- a. Reviewed the final examination for the second group of Shift Advisors prior to it's administration.
- b. Monitored the licensee's administration of the final examination for the second group of Shift Advisors.
- c. Independently graded two examinations and compared the results to the facility staff's grading of the same examinations.
- d. Audited three oral examinations administered by the facility.

The evaluation team did not make a pass/fail recommendation on any individual candidate but rather evaluated the licensee's program for training and certification of these candidates.

3. Program Status

At the time of the initial NRC team visit, four Shift Advisors had completed the facility training program. Three of these Shift Advisors were working with the plant operating shifts on a 12-hour rotating shift basis. The fourth Shift Advisor was undergoing a week of training at a simulator. Five additional Shift Advisor candidates were in the licensee's training program.

The 12-hour shift schedule of the Shift Advisors contrasted to the five shift rotation scheme of the licensee's operating crews. The licensee intended to assign a Shift Advisor to each of the five shift sections upon the completion of certification of the five Shift Advisors who were in the training program. The Shift Advisor would then rotate as a shift member for both watchstanding and for requalification training. Thus the Shift Advisor would participate in the same requalification program as the shift crews.

4. Shift Advisor Procedure

The procedure governing the duties and responsibilities of the Shift Advisor was TP TO-840, "Responsibilities and Duties of the Shift Advisor." Revision 1 of this procedure, dated April 5, 1984 was in effect at the time of the audit. In accordance with this procedure, the Shift Advisor, while on duty, reports to the Shift Foreman. When not on shift duty, Shift Advisors report to the Senior Power Production Engineer (Operations). The procedure was found to describe the duties of the Shift Advisor adequately and detail his lines of communication with the operating crew.

5. Shift Advisor Qualification

The evaluation team reviewed the resumes of the Shift Advisors. All of the advisors had considerably more power plant and nuclear plant experience than the minimum proposed by the industry. In addition, three of the advisors had previous Navy Nuclear experience and two hold degrees in Engineering. All but one of the advisors had previous licensed operating experience at the RO or SRO level, or both, at commercial nuclear power plants using a Westinghouse Nuclear Steam Supply System similar to that utilized at Diablo Canyon. One advisor candidate had previous licensed experience as an RO at a facility using a Combustion Engineering Nuclear Steam Supply System (also PWR). This advisor was attending simulator training at the Zion simulator to supplement the standard Shift Advisor training.

All Shift Advisors and Shift Advisor candidates were deemed to have adequate commercial nuclear power plant experience to serve as Shift Advisors.

6. Training Program

The training program administered to the Shift Advisor candidates consisted of a four-week course covering plant procedures, technical specifications and plant systems. The training modules are drawn from the regular plant training program and each module is accompanied by a "Need-to-know" description of the learning objectives for that portion of the training. The training program was deemed to be adequate to provide the Shift Advisor with detailed information of systems and procedures specific to the Diablo Canyon facility.

7. Weekly Quizzes and Written Examination

Quizzes were administered at the end of the second and third weeks of the training program. A final written examination, administered at the completion of the four-week course concluded the written evaluation of the Shift Advisor candidates ability.

The evaluation teams reviewed the quizzes and the final examination to determine their adequacy. The written examination given to the first group of Shift Advisors consisted of about 60% questions appropriate to SRO/RO level candidates and 40% appropriate to SRO level candidates. The written examination given to the second group of Shift Advisor Candidates consisted of 23% RO level questions 57% SRO/RO level questions and 20% SRO level questions. On this examination, about 22% of the questions were Technical Specification related and 64% of the questions were specific to the Diablo Canyon facility.

The final written examination administered to the second group of Shift Advisor candidates was monitored by the second NRC evaluation team. At the conclusion of this examination, prior to grading, a copy of the responses of two of the five candidates was provided to the evaluation team for independent grading. After the facility had completed grading of the candidates' response, the resulting grades were compared. The facility grades proved to be within 1% of the grade arrived at by the evaluation team in one case and the same grade was assigned in the other.

Both evaluation teams concluded that the written examinations were an adequate and appropriate measure of the candidate's knowledge of plant specific material as presented during the training program. Additionally, the recommendations of the training department as to the capability of the candidate seemed appropriate.

8. Oral Examinations

In addition to the final written examination, each candidate was examined orally by a board of three members of the facility training and operations staff, each of whom holds an SRO license at the Diablo Canyon facility. The Oral Examinations were conducted in the control room and consisted of a walkthrough of systems, procedures, and Technical Specification requirements similar to that given on NRC license examinations.

The first evaluation team interviewed three of the five oral board members for the initial group of Shift Advisor candidates, and reviewed the written records of the oral board examinations given to the first group of Shift advisor candidates. Based upon these interviews and record reviews, the audit team concluded that the oral examination provided a valid check of the Advisor's knowledge of the facility at the SRO level, and the Advisor's duties and responsibilities while on shift.

The second evaluation team observed the oral examinations of three of the five members of the second group of Shift Advisor candidates. The questions used were varied over the two days of the oral examinations and appropriate care was taken to assure that the candidate did not have access to the previously used oral questions. The examinations appeared consistent in scope and depth and provided an adequate evaluation of the candidate's abilities. The evaluation team agreed with the recommendations of the oral board.

9. Interview of Shift Advisors

The initial evaluation team interviewed three of the four Shift Advisors who had been previously certified by the licensee and all five of the Shift Advisor candidates who were in a training status at the time of the initial visit. One Shift Advisor was attending simulator training as noted previously. Each of the Shift Advisors interviewed adequately understood his duties and responsibilities as Shift Advisor and felt that the training that he had received was adequate as a result of intensive training on the facility. The advisors generally felt that the instructors who had conducted the course were very good. Several Advisors mentioned that the training provided, though intense, was among the best that they had received at a facility.

All of the Shift Advisors reported a good working relationship with the licensee's shift crews and expected that this working relationship would improve when the Shift Advisors were assigned to a specific shift crew rather than the overlapping watch organization dictated by the lack of certified Shift Advisors.

10. Interview of Selected Shift Crew Personnel

Several members of the initial evaluation team interviewed selected shift personnel. Formal training on the role of the Shift Advisors had not been presented to the shift crews; however, the crews were briefed by the Shift Foreman on each crew as to the duties and responsibilities of the Shift Advisor. All shift members had not received or acknowledged the briefing at the time of the initial visit, since all of the crews had not been on duty since the advisors commenced shift operations. This briefing of operating personnel had been completed by the time of the second visit.

11. Conclusions

The evaluation teams concluded that:

- a. All Shift Advisors met the minimum experience recommended by the nuclear industry.
- b. The facility procedures adequately define the Shift Advisor's duties and responsibilities.
- c. The training program, including written and oral examinations was adequate to ensure that the advisors will have sufficient knowledge of the Diablo Canyon procedures, technical specifications, and systems to adequately perform their duties.
- d. The training program adequately covers the areas of responsibility of the Shift Advisor.

12. Recommendations

- a. A formal evaluation system should be established to ensure continuing assessment of Shift Advisor performance.
- b. Shift Advisors should meet the same medical requirements as licensed operators.

13. Exit Interview

At the conclusion of the team evaluations on April 11 and April 25, 1984, the evaluation teams met with the licensee representatives, as detailed in paragraph 1, and discussed the evaluation findings as detailed above.

ITEMS REQUIRING LICENSEE ACTION PRIOR
TO EXCEEDING 5% POWER

Based on a recent inspection at Diablo Canyon (50-275/84-18; in preparation), the Region V staff identified five issues related to the Post Accident Sampling System (PASS) which should be resolved prior to exceeding 5% power.

- (1) The licensee needs to verify that the sample lines can be purged and samples collected within the three hour time limit at pressures below normal operating pressure.
- (2) The Interim Post Loca Sample System (IPLSS) uses diluter valves which have demonstrated different dilution rates for different pressures and samples. The licensee must determine the dilution rates that occur for different sample locations and pressures.
- (3) The licensee must define what constitutes PASS operability since it is not defined in the Technical Specifications.
- (4) The licensee must evaluate the possible radiation dose to IPLSS operators from a ventilation duct where the IPLSS panel.
- (5) The licensee's PASS which is currently operable includes the IPLSS and a portions of the Sentry System. This equipment does not have the ability to sample for dissolved oxygen, ph, or conductivity, nor can it sample from the pressurizer, letdown line or containment sump under all conditions. This is contrary to SSER 14.

These matters were discussed with Mr. B. Buckley on June 27, 1984 and require resolution prior to operation above 5% power.