U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report No. 50-275/84-10

Docket No. 50-275 License No: DPR-76

Licensee: Pacific Gas and Electric Company

77 Beale Street, Room 1435

San Francisco, California 94106

Facility Name: Diablo Canyon Unit 1

Inspection at: Diablo Canyon Site, San Luis Obispo County, California

Inspectors: P H Johnson for M. M. Mendonca, Sr. Resident Inspector — 6/27/84 Date Signed

P H Johnson for M. L. Padovan, Resident Inspector — 6/27/84 Date Signed

P H Johnson for T. M. Ross, Resident Inspector — 6/27/84 Date Signed

Approved by: P H Johnson P. H. Johnson, Acting Chief, Reactor Projects Section 3 — 6/27/84 Date Signed

Summary:

Inspection from March 25, through May 19, 1984, (Report No. 50-275/84-10).

Areas Inspected: Routine and reactive inspection of: Plant operations, conditions, and events; maintenance; surveillance; precritical testing; initial criticality; low power testing; power ascension testing; TMI follow-up; and independent inspection. This inspection effort required 240 inspector-hours by three resident inspectors.

Results: One item of noncompliance was identified which was related to the inoperability of an automatic liquid effluent radiation control valve.

DETAILS

1. Persons Contacted

*R. C. Thornberry, Plant Manager
*R. Paterson, Assistant Plant Manager/Superintendent
*J. M. Gisclon, Assistant Plant Manager for Technical Services
*W. B. Kaefer, Assistant Plant Manager for Support Services
*C. L. Eldridge, Quality Control Manager
*R. G. Todaro, Security Supervisor
E. M. Conway, Personnel and General Services
*D. B. Miklush, Supervisor of Maintenance
J. A. Sexton, Supervisor of Operations
*J. V. Boots, Supervisor of Chemistry and Radiation Protection
*W. B. McLane, Material and Project Coordination Manager
*L. F. Womack, Engineering Manager
*B. W. Giffin, Acting Instrumentation and Control Manager
C. M. Seward, Supervisor of Quality Assurance

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

*Denotes those attending the exit interview on May 18, 1984.

2. Operating Safety Verification

During the inspection period, the inspectors observed and examined activities to verify the operational safety of the licensee's facility. The observations and examinations of those activities were conducted on a daily, weekly or monthly basis. On a daily basis, the inspectors observed control room activities to verify compliance with limiting conditions for operation as prescribed in the facility Technical Specifications. Logs, instrumentation, recorder traces, and other operational records were examined to obtain information on plant conditions, trends, and compliance with regulations. Shift turnovers were observed on a sample basis to verify that all pertinent information on plant status was relayed. During each week, the inspectors toured the accessible areas of the facility to observe the following:

a. General plant and equipment conditions.

b. Surveillance and maintenance activities.

c. Fire hazards and firefighting equipment.

d. Ignition sources and flammable material control.

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

f. Interiors of electrical and control panels.

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

h. Plant housekeeping and cleanliness.

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

3. Maintenance

a. Diesel-Generator (DG) Radiator Repair

The inspectors observed portions of the radiator repair on DG 1-3. Due to corrosion of the radiator fins, two of the radiator sections were replaced. The corrosion was attributed to the salt air environment which the radiators are exposed to. Previously, all other radiator sections on DG 1-1, 1-2, and 1-3 were replaced.

b. Reactor Coolant Pump (RCP) Seal Replacement

On April 22, 1984, during Reactor Coolant System (RCS) heatup in preparation for Unit 1 initial criticality, a seal water leak developed past an "O-ring" seal in RCP #1-4. The O-ring is located where the RCP seal water cartridge is bolted to the pump housing. Although the leak rate was well within the 10 gallons-per-minute "identified" leakage rate allowed by the Technical Specifications, the licensee decided to cooldown the RCS to Mode 5 to correct the problem, rather than proceeding further towards initial criticality. After disassembling the pump and removing the seal water cartridge, the licensee found that the telfon backing ring on the O-ring was crimped in several locations and was severed. The damage was attributed to a previous incorrect installation of the ring. Apparently, the backing ring slipped out of position during assembly, which severly damaged the backing ring and pinched the O-ring. Portions of the repair effort were observed by the inspector.

No items of noncompliance or deviations were identified.

4. Surveillance

a. Main Steam Safety Valve Testing

The inspectors observed setpoint testing of main steam safety valve RV-7. The testing was performed in accordance with mechanical maintenance procedure MP M-4.11, "Main Steam Safety Valve Setting with Hydraulic Assist." The test was accomplished with the valve in place, and with main steam header pressure greater than 775 psig but less than the safety valve setpoint. A hydraulic assist unit was then used to provide a lifting pressure against the valve spring.

The actual RV-7 setpoint was determined to be 3 psig below the setpoint valve of 1065 psig. Upon removing the hydraulic pressure, the valve properly reseated.

No items of noncompliance or deviations were identified.

5. Precritical Test Witnessing

a. RCS Heat Loss Measurements

The inspectors observed portions of a licensee's surveillance test conducted in accordance with surveillance test procedure (STP) R-20, "Determination of RCS Heat Losses and Heat Capacity." This STP measures RCS radiative and convective heat losses. The evaluation of heat losses was made by utilizing a heat balance. With essentially a constant RCS Tavg, and minimum heat inputs or losses to the RCS from the secondary system, the RCS heat losses (RCS letdown and charging) and inputs (pressurizer heaters) were controlled and monitored; such that these RCS heat losses and inputs were balanced to equal the radiative and convective heat losses.

No items of noncompliance or deviations were identified.

b. RCS Flow Coastdown Characteristics

Selected portions of startup testing, in accordance with Startup Test Procedure 7.6, which measures RCS flow characteristics during RCP coastdown, were observed by the inspectors. For different combinations of operating and tripped RCPs, reactor coolant flow rates were measured as a function of time after tripping the RCP breakers.

The four pump trip test was observed by the inspectors. The results of the test were "marginal", and were transmitted to Westinghouse for analysis. The Westinghouse analysis took flow fractions data and re-performed the Departure from Nucleate Boiling (DNB) analysis. This showed acceptable DNB results.

No items of noncompliance or deviations were identified.

c. Hot System Walkdowns.

The inspectors observed portions of the licensee's hot system walkdown. These walkdowns assured that pipe growth, due to thermal expansion, did not adversely impact the system configuration (e.g., interference or binding on supports or insulation). Where such binding occurred (e.g., a pressurizer safety valve discharge line pipe support and a RHR injection line) the supports were redesigned and modified to allow the proper thermal growth. The inspectors observed portions of this modification work on these supports.

No items of noncompliance or deviations were identified.

d. Turbine Steam Dump/Bypass Valves

Verification of steam dump system operation and correct interlock function is done utilizing STP 37.10, Addendum No. 1. "Steam Dump Performance Demonstration." This procedure tests valve operation and logic for the 40% condenser dump, the 35% atmospheric dump and the 10% atmospheric dump, without steam on the system (hot testing of the dump system has been previously performed).

The completed test procedure was reviewed by an inspector. The inspector found that the test was conducted in accordance with the approved procedure, and that the test results met acceptance criteria.

No items of noncompliance or deviations were identified.

e. Pressurizer Instrumentation and Control.

Verification of pressurizer instrumentation and control was accomplished in accordance with STP 7.10, "Pressurizer Spray and Heater Capacity and Continuous Flow Setting." This test consisted of verifying instrument responses during testing of pressurizer spray and heater capacity. The pressurizer spray capacities were checked by recording pressurizer level, spray line temperature, liquid temperature and pressure, while a transient was induced by operating both spray valves at a full open position with the heaters off. Heater capacity was checked by blocking the spray valves closed, and operating the heaters at full capacity.

The inspectors observed that test prerequisities were acceptably met, that the test was conducted in accordance with the latest revisions of test procedures or startup engineer procedure chnages, and that the acceptance criteria was verified.

No items of noncompliance or deviations were identified.

f. Loose Parts Monitors

The licensee's STP 7.7, "Vibration and Loose Parts Monitoring System," was written to verify proper operation of the Vibration and Loose Parts (V & VP) Monitoring equipment prior to initial core loading. This pre-core loading preoperational equipment check-out first verified individual vibration and loose parts channel operation (accelerometer channels). Alarm and recording functions for the following V & LP channels were verified:

Lower Reactor Vessel Channels
Upper Reactor Vessel Channels
Steam Generator A Channels
Steam Generator B Channels
Steam Generator C Channels
Steam Generator D Channels

Secondly, spectral signatures (vibration noise signal amplitude vs. frequency) were obtained to demonstrate proper spectrum analyzer and X-Y plotter operation.

The inspectors reviewed test documentation for deficiencies or difficulties, acceptance criteria were satisfied.

No items of noncompliance or deviations were identified.

6. Shutdown Margin Calculation of Inoperable Control Rods

On April 16, 1984, the licensee determined that control rod shutdown bank A was inoperable. In accordance with Technical Specification 3.1.31, the licensee performed shutdown margin calculation. The inspectors reviewed the licensee's shutdown margin determination procedure for technical adequacy. This STP R-19, "Shutdown Margin Calculation," accounted for reactivity worth as a function of burnup, boron concentration, rod position, RCS temperature, reactor power, and fission products (xenon and samarium). The inspectors also examined the total shutdown margin calculation performed by the licensee, and verified that the conditions and actions prescribed by the Technical Specifications were met.

No items of noncompliance or deviations were identified.

7. Letdown Divert Valve Leakage

During the hours preceding initial criticality, the RCS boron concentration was being reduced by adding make-up water to the RCS and letting down through Letdown Divert Valve (LCV-112A) to the Liquid Holdup Tanks (LHUTs).

After completion of RCS dilution, LCV-112A was automatically repositioned to re-align letdown flow to the Volume Control Tank. Subsequently, an RCS surveillance leak test indicated about a 3.5 gallon per minute leak rate from the RCS. In accordance with Emergency Operating Procedure ED OP-20, "Excessive Reactor Coolant System Leakage," the Shift Foreman designated the event to be a "Notification of Unusual Event," and made the appropriate notifications. An evaluation of the RCS leakage revealed that LCV-112A had leakage across its seat to the LHUTs. After cycling the valve from the control room, LCV-112A seated properly, and flow to the holdup tanks was secured.

No items of noncompliance or deviations were identified.

8. Initial Criticality

The inspectors independently observed and verified the licensee's compliance with selected Technical Specifications and license condition requirements. The inspectors verified that the source range and intermediate range nuclear instrumentation were properly calibrated, and that count rate indication and trip set points on theses instruments were acceptable.

During the approach to initial criticality, the inspectors verified that the licensee used the latest approved revision of the initial criticality startup test procedure. This verification included proper shift manning by licensed operators, satisfaction of prerequisites, review of the use of the reactivity computer and inverse countrate ratio plots, and review of on-the-spot changes to the procedure.

The inspectors also independently calculated estimated critical conditions in accordance with STP R-17. The inspectors observed reactor conditions conformance to the licensee's calculated predictions. Additionally, the inspectors observed boron concentration analysis, source and intermediate range nuclear instrumentation overlap, and neutron flux monitoring.

No items of nonconformance or deviations were identified.

9. Low Power Testing

The inspectors observed selected portions of the following Low Power Physics Tests:

a. Boron Reactivity Worths.

b. Iso Thermal Temperature Coefficients.

c. Pseudo-ejected rod worth.

d. Minimum Shutdown Margin Verification and Stuck Control Rod Worth.

e. Function Checkout of the Reactivity Computer; and

f. Boron Concentration at All-Rods-Out position.

From these observations the inspectors verified that: (1) the tests were conducted in accordance with the appropriate revisions of the test procedures; (2) minimum crew requirements were satisfied; and (3) analysis of the test results was timely and acceptable.

No items of noncompliance or deviations were identified.

10. Power Ascension Testion

a. Simulated Loss of Site AC Power Test

This was designed to verify that hot standby conditions could be maintained upon a simulated loss of all on-site and off-site AC power. Hot standby was maintained by manual control of the Auxiliary Feedwater System (AFWS) with no AC power or instrument air for 2 hours a period. Manual control of the turbine driven AFWS pump and level control valves was used to maintain steam generator levels and hot shutdown conditions with all reactor coolant pumps running. The test was performed in accordance with test procedure Number 44.3 and demonstrated acceptable control of the AFWs.

No items of noncompliance or deviations were identified.

b. Chemical and Volume Control System (CVCS) Charging and Letdown Cooldown Capability Test

This startup test procedure, Number 44.2, determined the capability of the charging and letdown system to cooldown the reactor coolant system (RCS) with steam generators isolated and one reactor coolant pump (RCP) running. From hot standby condition with two RCPs running, an RCP tripped and the steam dump system maintained no load steam pressure. The steam generators were then isolated and cooldown capability of the CVCS charging and letdown system determined from hot and cold leg temperatures for the RCS loop with the running RCP. This determination was made at maximum and minimum letdown flows. The test was conducted several times to assure acceptable training of licensed ooperators.

No items of noncompliance or deviations were identified.

11. Operational Support Staffing

An inspector verified that the qualifications of key operational support staff and operations organization satisfy licensee commitments. Certification of qualifications for the following personnel were reviewed to assure compliance with ANSI N18.1, 1971:

Plant Manager, Assistant Plant Manager/Technical Services, Assistant Plant Manager/Support Services, Quality Control Manager (QC), Sr. QC Engineers, Maintenance Manager, Engineering Manager, Senior Nuclear Engineer, Chemistry and Radiation Protection Manager, I&C Manager, Training Manager, Selected Engineers, Technicians, Mechanics, Electricians, QA Auditors, and QC Inspectors (including Receipt Inspection and NDE personnel).

This review showed the licensee to be conforming to the referenced standard.

No items of noncompliance or deviations were identified.

12. TMI Followup

I.C.7. NSS Vendor Review of Power Ascension Program (closed)

Westinghouse has reviewed and approved the licensee's power ascension program as documented in PG&E letter dated February 1, 1984 from J. O. Schuyler. This action completes this item.

I.D.2. Plant Safety Parameter Display Console (closed)

The inspectors verified installation and full implementation of the Plant Safety Parameter Display System in the control room and in the technical support center. Completion of this system inspection closes this TMI item.

II.E.1.1. Auxiliary Feedwater System (AFW) Turbine Driven AFW Pump 40 hr Endurance Run (closed)

The licensee successfully completed the 48 hour Endurance Run in accordance with Startup Test Procedure 3.7 Addendum 3. The inspectors observed selected protions of the test. This closes this TMI item.

II.E.3.1.1. Upgrade Power Supply - Vital Power to Pressurizer Heaters (closed)

The licensee has completed Startup Test Procedure Number 37.14 Addendum 1 on the vital power supply to these two banks of pressurizer heaters. This test was accepted by the licensee's operations department and completes the requirements of this TMI item.

III.D.1.1. Primary Coolant Sources Outside Containment - Leak Detection

The licensee completed tests of the Rad Waste and NSS Sampling Systems for leak rate detection by "Surveillance Test Procedure" M86E and "Radiation Control Procedure" S-1. The test established acceptable leak rates of primary coolant outside containment.

No items of noncompliance or deviations were identified.

13. Inoperability of the Automatic, Liquid Effluent Radiation Control Valve

a. Summary of Event and Findings

At 9:37 a.m. on March 31, 1984, the licensee reported to the NRC, through the ENS telephone, that the automatic, liquid effluent radiation control valve (RCV-18) failed to close during perforamnce of a quarterly surveillance test. This failure to close was due to an air line jumper which was installed around the solenoid valve (SV-223) that controls RCV-18. When a high radiation signal was simulated from the radiation monitor (RM-18) to SV-223, SV-223 changed position. However, as a result of the jumper, air was still supplied to RCV-18, and RCV-18 would not close as designed. While this condition existed, four waste water releases had been made without complying with Technical Specification requirements. At 7:43 a.m. on March 31, 1984, the jumper was removed, and RCV-18 was tested and restored to operable status.

The jumper on RCV-18 had been incorrectly left in place, and the licensee did not recognize that RCV 18 was inoperable and could not control releases from the liquid effluent pathway. These errors are due to: (1) unacceptable administrative controls on jumpers and (2) excess number of jumpers entered in the jumper log, complicated by an improper designation that this jumper was not a safety function bypass.

b. Documentation Reviewed

The inspectors reviewed the following documents:

Shift Foreman Log for 000-800 shift of March 31, 1984.

Control Operators Log for 000-800 shift March 31, 1984.

Event Notification Form, March 31, 1984, 0937.

Form G108, Diablo Canyon Project Request for Work to be Performed on Equipment or Components by Division, No. .°25, March 16, 1984.

I&C Department Work Request, Work No. DC1-84-TI-W-0116, March 19, 1984.

Clearance No. 8-5982-84, March 16, 1°84.

Shopwork Follower No. MM-1-84-237.

Clearance No. 19-2501-84, March 20, 1984.

Jumper Log No. 84-241, March 22, 1984.

Authorizations for Discharge of Liquid Radwaste Batch Nos. 84-063, 84-064, 84-065 and 84-66.

Nonconformance Report No. DC1-84-OP-N062.

Nuclear Plant Administrative Procedure (NPAP) No. C-4, Revision 1, "Bypass of Safety Functions," December 30, 1975.

NPAP C-5, Revision 1, "Jumper and Lifted Circuit Control," December 30, 1975.

NPAP C-4, Revision 2, "Bypass of Safety Functions and Control of Jumpers," October 19, 1984.

Supplement 1 to NPAP C-4, Revision 0, "Temporary Modifications, Jumpers and Lifted Circuit Log (Form 18-9102)," May 9, 1980.

NPAP C-4S1, Revision 1, "Temporary Modifications, Jumpers and Lifted Circuit Log (Form 18-9102)," May 20, 1981.

On-The-Spot Change to NPAP C-4S1, October 27, 1981.

NPAP C-4, Revision 3, "Bypass of Safety Functions and Control of Jumpers," December 1, 1981.

On-The-Spot Change to NPAP C-4, June 21, 1982 rescinded July 2, 1982.

NPAP C-4, Revision 4, "Bypass of Safety Functions and Control of Jumpers," September 9, 1982.

NPAP C-4S1, Revision 2, "Mechanical Bypass, Jumper and Lifted Circuit Log (Form 69-9102)," October 8, 1982.

NPAP C-4, Revision 5, "Bypass of Safety Function and Control of Jumpers," February 28, 1984.

NPAP C-4S1, Revision 3, "Mechanical Bypass, Jumper and Lifted Circuit Log (Form 69-9102)," April 3, 2984.

c. Description of Sequence of Events

On March 16, 1984, the General Construction (GC) Mechanical Department prepared a work request (No. 1025) to support a hydrostatic test (hydro). This work request was originally for Nuclear Plant Operations (NPO) to install a blind flange on the Equipment Drain Receiver (EDR) system. To assure hydro integrity, the clearance coordinator (a licensed operator) required that an additional point be added to the work request, i.e., a jumper to prevent opening of Flow Control Valve (FCV) 477.

On March 17, 1984, GC Mechanical transmitted work request number 1025 (Form G-108) for work to be performed by NPO under an existing clearance No. 8-5982-84 (this clearance was related to a connected system hydro on the Chemical and Volume Control System Demineralizers). This clearance established control points for a hydro on the demineralizer vent and overflow headers. The G-108 included the work to install the blind flange on the EDR system and the jumper on FCV 477.

From this work request, under the direction of a Work Planning Center Mechanical Work Planner (the Work Planning Center functions to control and schedule Maintenance and Instrumentation and Control work activities), NPO Mechanical Maintenance prepared Shopwork Follower No. MM-1-84-237. This Shopwork Follower was approved by Quality Control (QC) for inspection points on March 19, 1984. This Shopwork Follower included steps to install the blind flange and steps to notify NPO's Instrumentation and Control (I&C) shop to install and remove the jumper on FCV 477.

In the Work Planning Center, a Mechanical Planner informed an I&C Work Planner that the work on the jumper should be performed by I&C upon notification by NPO Mechanical Maintenance. In this exchange of information, the fact that the installation and removal of the jumper should await notification by Mechanical Maintenance, was lost. As discussed under Findings of this section, this loss of information emphasizes the need to control information exchanges in the Work Planning Center.

From the G108 work request, a Work Planning Center I&C Planner prepared I&C Department Work Request No. DC1-84-TI-W-0116, dated March 19, 1984, to install the jumper on FCV 477. This I&C Department Work Request also included provisions to document the jumper in the jumper log, to check that the system was on clearance, and to remove the jumper once the hydrostatic test was completed. However, this work request did not specify that the work would only be performed upon receipt of instructions from Mechanical Maintenance. Also, I&C assumed that, when the clearance for the hydro was reported "off," I&C would be informed to remove the jumper. Associated with this activity in the Work Planning Center was some concern that GC personnel did not fully understand the work control process and that scheduling activities should avoid potential confusion from the GC/NPO interface.

On March 20, 1984, the GC Mechanical Department requested a clearance to perform an hydrostatic test on the portions of the EDR system which interface with the liquid radioactive waste system. This clearance No. 19-2501-84, on portions of the EDR system, was approved by the SFM at 3:12 p.m. on March 20, 1984.

At about this time, an operator told GC Mechanical that the jumper on the FCV was not required. Work commenced on the Shopwork follower to install the blind flnage on March 20, 1984. In accordance with "an operator's" instructions, GC Mechnical informed NPO Mechanical Maintenance that the jumper on FCV 477 was not required. Since the jumper had been required by a clearance coordinator as a required clearance point, modification of that clearance point should have been processed by the clearance coordinator and not by verbal notification. This topic of use of proper authorization to change clearance request points will be discussed below.

The steps in the Shopwork Follower where I&C was to be contacted to install and remove the jumper on FCV 477 were marked N/A (not applicable) on March 21, 1984 by a mechanical maintenance foreman.

On March 22, 1984, an I&C technician completed installation of the jumper on fCV 477 in accordance with the I&C Department Work Request. An I&C foreman prepared the jumper log (No. 84-241) on March 22, 1984. This jumper log indicated that the jumper bypassed SV 223 and kept RCV 18 opened and FCV 477 closed. This jumper log incorrectly indicated that the jumper was not a bypass of a safety

function, which has been the topic of previous noncompliances (Inspection Report No. 50-275/83-41), as discussed below. The I&C work request specified that on completion of the hydro test, the jumper was to be removed. However, there was no cross reference between either clearance (8-5982-84 or 19-2501-84) and the jumper log. Subsequently, in reporting "off" the clearance, or upon completion of the hydro, there was no mechanism to assure removal of the jumper on FCV 477. Additionally, no mechanism on the work request was specified to provide notification of hydro completion.

On March 22, 1984, the I&C technician informed a NPO Mechanical Maintenance foreman that the jumper had been installed. This was the same foreman that previously marked N/A on the Shopwork Follower steps for the installation and removal of the jumper on SV 223. This foreman believed that there were appropriate controls in the I&C work request and the jumper log to assure proper control of the jumper to SV 223.

On March 26, 1984 at 4:15 p.m., the SFM reported "off" of clearance No. 19-2501-84. On March 29, 1984 at 6:20 p.m., the SFM also reported "off" clearance No. 8-5982-84, but the jumper remained in position on SV 223. Additionally, when clearance No. 19-2501-84 was reported "off", the liquid radwaste system was no longer cleared, and the licensee believed that discharges could proceed normally. During the period from March 26, 1984, when the clearance No. 19-2501-84 for the EDR system was reported "off" at 4:15 p.m., until the time that the RCV 18 was determined inoperable at 5:40 a.m. on March 31, 1984, four releases were made via the radioactive liquid effluent pathway. These releases were: (1) Batch No. 84-063 (Equipment Drain Receiver Tank 0-2) which was released from 8:54 p.m. on March 26, 1984 to 3:00 a.m. on March 27, 1984; (2) Batch No. 84-064 (Chemical Drain Tank 0-1) which was released from 11:35 a.m. to 12:42 on March 27, 1984; (3) Batch No. 84-065 (Floor Drain Receiver 0-1) which was released from 2:57 p.m. to 10:35 p.m. on March 27, 1984; and (4) Batch No. 84-066 (Floor Drain Receiver 0-2) which was released from 10:38 p.m. on March 28, 1984 to 9:12 a.m. on March 29, 1984. These releases where conducted with independent verification of system lineup to assure proper discharge. However, there was no independent sample analysis of the batch to be released, nor was there an independent calculation of release rate.

On March 31, 1984 at 5:40 a.m., during performance of Surveillance Test Procedure I-18C1, the liquid radwaste radiation monitor (RM-18) failed to close RCV-18 and open FCV 477 (STP I-18C1 is a quarterly functional test to comply with technical specification Table 4.3-8). At this time, technical specification 3.3.3.9 Table 3.3.-12) Action 40 was entered. The jumper was removed at 7:43 a.m. on March 31, 1984 and RCV 18 declared operable. The event was reported as a significant event under 10 CFR 50.72 at 9:37 a.m. on March 31, 1984.

d. Findings

The jumper on FCV 477 consisted of an air bypass line around the solenoid valve (SV) 223 that provides motive power (air) to move the FCV. In addition, SV 223 provides motive power to Radiation Control Valve (RCV) 18. On a high radiation signal from the radiation monitor on the liquid rad waste effluent line, RCV 18 is designed to close to terminate release, and FCV 477 is to open to provide a diversion path to an EDR tank for the liquid effluent. On loss of air, RCV-28 is designed to fail closed and FCV 477 fails open. Both these actions also occur on actuation of SV 223. With a jumper that provides air around SV 223, as was the case from March 22, 1984 to March 31, 1984, no change in the RCV or FCV position would occur unless air were lost.

Technical Specifications 3.3.3.9 and Table 3.3-12 ACTION statement 40 apply to the liquid radwaste effluent line radiation monitor systems, which provide automatic release termination capability. With less than the required miminum number of operable channels for this radiation monitoring system (1 channel required), this ACTION statement requires (1) two independent system alignment verifications, (2) two independent analyses of the radioactive material concentrations of the tank to be released, and (3) two independent release rate calculations. The system alignment verification was performed by normal licensee procedures. However, the independent release rate calculation and the independent analysis of radioactive concentrations were not performed. This information is based on the inspector's review of the authorizations for discharge of liquid radwaste batches for the four previously mentioned releases. This is an apparent item of noncompliance with Technical Specification requirements. (84-10-01)

From the point-of-view of radiation protection, this condition had little safety significance, since there was no radioactive material in the liquid rad waste system. Additionally, the control room alarm and radiation meter on this radiation monitoring system were still functional, so that manual operator action could have been taken to terminate release. However, from the point-of-view of unacceptable administrative controls on jumpers, which has long been a concern in the industry, this event demonstrates that prompt, effective corrective action is needed. As previously mentioned, the need to control the number of jumpers and proper designation of the jumper's effect on safety functions were identified problems to be addressed.

e. Licensee Corrective Action

As described in Nonconformance Report Number DCI-84-OP-N062, licensee corrective actions for the lack of administrative control and understanding of a jumper safety function bypass, includes: (1) a revision to Nuclear Plant Administrative Procedure (NPAP) C-4S1, "Mechanical Bypass, Jumper and Lifted Circuit Log (Form 69-9102)", to require that associated jumpers are included in the

clearance package, and that information tags on jumpered equipment are placed in a prominent location on the equipment controls or indicators. This revision also provided specific instructions on the evaluation of safety function bypass; (2) training of all departments involved in jumper log preparation on the revised NPAP C-4S1; and (3) a review and backfit of existing jumpers to the new revision of NPAP C-4S1. To date, the procedure has been revised. The licensee indicated that operations, startup, maintenance and I&C personnel have received instruction on the requirements of the revised procedure (verification of this training will be performed during a future inspection). (84-10-02) The backfitting is scheduled for May 1, 1984. (84-10-03) This event is the subject of License Event Report 84-13.

f. Procedure Development

The change to NPAP C-4S1 was the major corrective action in response to this event. Accordingly, the history of this procedure was studied to determine if procedures controlling the bypass of safety function and jumpers were acceptable. Originally, administrative control of Bypass of Safety Functions, and Jumper and Lifted Circuit Control was accomplished by two procedures, C-4 and C-5, respectively. The original procedure, C-4, referenced NRC Regulatory Guide 1.33, "Quality Assurance Program Requirements (Operation);" and C-5 referenced both this Regulatory Guide 1.33 and ANSI N18.7-1972 Revision 1, "Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants." These procedures were approved for use December 30, 1975. The original C-4 did not provide definitive guidelines for the bypass of safety function; e.g., the use of the words "Appropriate means" left much to interpretation relating to tagging and logging bypass of safety functions. NPAP C-5, "Jumper and Lifted Circuit Control," was somewhat more definitive, but placed responsibility for control of the jumper and notification of operators on the individual and supervisors involved without guidance on how to do such.

Both these original procedures were incorporated into the procedure NPAP C-4, "Bypass of Safety Functions and Control of Jumpers," on October 19, 1979. This document referenced ANSI N18.7-1976, "Administrative Controls and Quality Assurance for the Operational Phase to Nuclear Plower Plants," Reg Guide 1.33, and the PG&E "Quility Assurance Manual for Operating Nuclear Power Plants." This revision provided flow charts for: (1) obtaining approval to bypass safety functions on operable equipment, (2) obtaining approval to install jumpers, and (3) providing notification and logging of jumpers. This NPAP C-4, Revision 2 did not provide specific requirements for logging information on jumpers, but it did add requirements for independent verification of jumpers to comply with requirements of the referenced, updated ANSI standard. This revision also placed authority for determination of safety function bypass only with the SFM, and specified required authorizations for different jumper conditions.

On May 9, 1980, Revision 0 of Supplement 1 to NPAP C-4 (NPAP C-4S1), "Temporary Modifications, Jumpers and Lifted Circuit Log (Form 18-9102)," was approved. This Supplement 1 to NPAP C-4 was to provide instructions on use of the logbook and log forms to implement the requirements of NPAP C-4, which responds to the lack of specific logging instructions previously mentioned, as a recognized industry wide concern. This revision provided responsible personnel with guidance on filling the new log form and established the jumper log book in the control room.

NPAP C-4S1 was next revised on May 20, 1981 with an On-The-Spot Change issued on October 27, 1981. This revision allowed the person filling the log to designate safety function bypass with approval from the SFM. Limited instructions were provided on safety function bypass. However, this revision added requirements and instructions on notification of removal of jumpers to be in accordance with NPAP C-4. This revision also specified that independent verification of jumper installation or removal could be accomplished by functional test. The On-The-Spot Change with this revision was designed to make filling the jumper log form easier and more understandable. This On-The Spot Change clarified instructions on filling the jumper log form, and added a jumper number to the form to improve jumper tracking.

The next revision to the NPAPs associated with jumpers was on December 1, 1981. This was Revision 3 to NPAP C-4, Bypass of Safety Functions and Control of Jumpers. An On-The-Spot Change dated June 21, 1982 was rescinded on July 2, 1982 based on rejection by the NPO Manager. The revision to the C-4 procedure included several insignificant word changes, e.g., operative to operable, and added a clarifying note and requirement to independently verify all safety related jumpers. In response to Nuclear Plant Problem Reports, this revision also added specific equipment conditions as specific examples of safety function bypass, e.g., plugging of ESF room drains. The rescission of the On-The-Spot Change was administrative in nature, i.e., since NPAP C-4 is issued from the General Office, the On-The-Spot Change could not be issued from the plant. The contents of this On-The Spot change were incorporated in the next revision.

The next change to NPAP C-4 was on September 9, 1982. This revision clarified the requirements for independent verification to encompass equipment that is important to safety in accordance with the previously mentioned, rescinded On-The-Spot Change.

On October 8, 1982, a change to NPAP C-4S1 was approved. This change included several administrative changes and a change to better delineate general instructions for the preparation and control of jumper logs.

The latest revision to NPAP C-4, Revision 5, was approved on February 28, 1984. This revision indicated that the bypass of safety functions and control of jumpers must be in compliance with Technical Specifications. It also assigned responsibility for determination of safety function bypass to both the SFM and the cognizant department supervisor for jumpers on equipment in service when work is done without a PSRC approved procedure, e.g., shopwork follower. The final revision to these jumper related documents was to NPAP C-4S1, Revision 3, approved on April 3, 1984. This revision attempted to make the jumper log information more operationally oriented. For example, the jumper log form was revised to assure that consideration of the requirements of the Technical Specifications are considered and to assure that operators know if the jumper has modified a system that is operable. This revision also includes the changes required as corrective actions for this event on RCV 18. It also provides a definition for safety function bypass on the back of the jumper log form as discussed further below.

From this review of the licensee's development of the procedures related to jumpers and safety function bypass, it can be concluded that the licensee has responded to changes in industry standards, the industry-wide recognized need for improved jumper and safety function bypass control, and their own experiences. The procedures changed from little specificity. The licensee incorporated updated ANSI standards, as well as responded to plant problems. However, although the license does monitor INPOs NETWORK and other industry information, it is not clear that the licensee has agressively pursued industry experience in this area. Solely based upon industry experience, the more specific instructions on safety function bypass could have been incorporated sooner, as well as possibly direct instructions for information tags on equipment controls and/or indicators. The implementation of a program to interface more directly with other plants is underway. Personnel have been sent to Trojan and San Onofre for evaluation of several administrative control programs at those facilities. This and other efforts in this area will be examined during a future inspection. (84-10-04)

g. Incorrect Designation of Safety Function Bypass

The incorrect designation of safety function bypass, as was previously menioned, may have allowed the release of the liquid effluents without consideration of TS compliance. That is, with the proper designation of safety function bypass and with a manageable number of jumpers, the SFM who approves the batch release or one of the two operators who verify release path alignment may have determined that the automatic isolation of the release path was inoperable.

A safety function, as used in NPAP C-4 ("Bypass of Safety Functions and Control of Jumpers"), "...is considered to be any system, device, interlock or automatic control which is intended to: a. Prevent an accident which may involve significant damage to important plant equipment, release of radioactive or other harmful materials, fire, or personnel injury. b. Mitigate the consequences of such an accident... A safety function is bypassed when any action is taken which renders it incapable of performing its safety function, whether or not the function is required to be operable for the current plant status...When a safety function is bypassed in a mode when it is not required to be operable, appropriate administrative controls shall be utilized consistent with the work being performed. Such controls include those established for clearances...and controls established for jumpers. ...It is the intent of the "jumper" control provisions for equipment which is removed from service that subtle alterations which might be overlooked be logged, and that obvious alterations which are a part of the clearance of maintenance process not be logged." The jumper around the solenoid valve that provides control to the liquid effluent Radiation control valve does fall in the category of NPAP C-4 where a jumper log is required; since not only is it a safety function bypass but it was also a "subtle alteration" which was overlooked. Additionally, NPAP C-4 S1, "Mechanical Bypass, Jumper and Lifted Curcuit Log (Form 69-9102)," requires that any bypass of safety functions must be indicated on the jumper log form. Therefore, the incorrect designation that there was no safety function bypass is not acceptable implementation of NPAP C-4 S1.

The designation of no safety function bypass on the jumper log form was made by the cognizant department supervisor and approved by the SFM. The error of an incorrrect designation has been made before and was the topic of a noncompliance in Inspection Report Number 83-41. This topic had been covered in shift briefings of the operations crews by the licensee, partially in response to the mentioned item of noncompliance. Additionally, the current revision of NPAP C-4S1 was prepared, partially in response to this item of noncompliance. This revision was designed to make the jumper log more operationally oriented, i.e., clarify jumper status definitions and add a succinct definition to jumper log form of safety function bypass rather than reference back to the NPAP C-4 from NPAP C-4S1. These changes, and those previously addressed under the Nonconformance Report, were included in the latest revision of NPAP C-4S1 and came into full effect after, and somewhat in response to this RCV 18 problem.

The previous comment about a manageable number of jumpers again refered to previous inspection findings, where there were in excess of 100 jumpers in the logbook. The licensee has recognized that this number is too large to effectively control, has reduced the number of jumpers in the plant, and plans to further reduce the number of jumpers in the book to a manageable number prior to full power license issuance. This effort is underway as part of the response to corrective actions for this event on RCV 18. This effort will be examined during future inspections. (84-10-05)

h. NPO/GC Interface

The concern that GC personnel should understand NPO work scheduling and planning activities to avoid potential confusion, as mentioned above, was discussed with plant and GC management. This potential problem was raised from discussions with Work Planning Center personnel. From these discussions, NPO personnel felt that GC Mechanical personnel circumvented work request control to expedite their work. In addition to the corrective action of revising the NPAP governing jumpers and training of NPO personnel on this revision, the licensee has recognized the need to inform GC personnel of the proper work request control procedures. This is, that all work requests are to be routed through the Work Planning Center, which will plan and schedule work activities of the cognizant Maintenance or I&C departments. These instructions are also to ensure that changes to clearance hold points are to be done through authorized channels, i.e., the clearance coordinator. NPO personnel have been instructed on this requirement. The licensee has committed to inform responsible NPO and GC personnel of these requirements and the need to not circumvent the work request or clearance control systems. (84-10-06).

i. Work Planning Center Control

Finally, the information that Mechanical Maintenance would inform I&C to install and remove the jumper was not properly transmitted in the work planning center. The inspectors discussed the need for a system to control the transmittal of work packages and requests between Maintenance and I&C and even within Maintenance between the Mechanical and Electrical Shops. This finding was discussed with plant management and resolution will be followed during future inspections. (84-10-07)

One item of noncompliance was identified and no items of deviations were identified.

14. Independent Inspection

a. Clearance and "Jumper" control.

On numerous previous occasions, other NRC Inspection Reports (IR) have also documented inadequacies in the licensee's program for controlling equipment clearances and jumpers. A listing of the most recent of these IRs follows:

IR	Subject
50-275/83-19	Failure to obtain proper clearances
50-275/83-30	Failure to obtain proper cleanaces
50-275/83-31	Improper logging of the effect of jumpers
50-275/83-41	Improper logging of the effect of jumpers
50-275/84-02	Failure to obtain proper clearances

In addition, IR 50-276/83-41, contained a Notice of Violation as a result of the licensee's failure to correctly document that the safety functions of the pressurizer pressure instrumentation had been bypassed by the installation of jumpers.

In order to evaluate the licensee's progress in controlling clearances and jumpers, the inspectors have been reviewing related Diablo Canyon Nonconformance Reports (NCRs) over the last six month period. The following NCRs were found to address clearances and jumpers.

Date	NCR	Subject
12/7/83	DCI 83 QC N105	Improper clearance control
12/21/84	DCI 84 TI N039	Lifted leads
3/12/84	DCI 84 TI N047	Lifted leads
4/4/84	DCI 84 OP N062	Improper installation of a jumper
4/26/84	DCI 84 TI N077	Improper clearance control

Each of these NCRs was reviewed by a Technical Review Group (TRG) consisting of individuals from the responsible plant department (in which the nonconformance took place), quality assurance and quality control.

The inspectors noted that in three of the five TRG sessions, the TRG determined that the improper use of the clearance or jumper represented "isolated incidents" of personnel error. Obviously the TRGs (and accordingly licensee management) are not cognizant that all of the previously identified problems with clearances and jumpers are related, and indicative of a serious management control deficiency.

In discussing these findings, the licensee's QA supervisor indicated to the inspectors that an audit of the clearance request and associated tagging system was recently performed by the QA department. This QA audit identified several procedural deficiencies in the licensee's clearance request and tagging system. The corrective actions initiated by the licensee, in response to the QA audit and the identified NRC concerns, will be reviewed by the inspectors. (84-10-08).

15. Exit Meeting

On May 18, 1984 the inspectors met with licensee representatives, denoted in paragraph 1 of this report, and summarized the inspection scope and findings. The licensee acknowledged the apparent violation identified in paragraph 13 of this report.