U.S. NUCLEAR REGULATORY COMMISSION

REGION V

Report Nos.	50-206/93-29, 50-361/93-29, 50-362/93-29
Docket Nos.	50-206, 50-361, 50-362
License Nos.	DPR-13, NPF-10, NPF-15
Licensee:	Southern California Edison Company Irvine Operations Center 23 Parker Street Irvine, California 92718
Facility Name:	San Onofre Units 1, 2 and 3
Inspection At:	San Onofre, San Clemente, California
Inspection Conducted:	September 2 through October 6, 1993
Inspectors:	J. J. Russell, Acting Senior Resident Inspector D. L. Solorio, Resident Inspector C. M. Regan, Intern, NRR F. R. Huey, Enforcement Officer T. R. Meadows, Inspector
Approved By:	H. J. Wong, Chief Reactor Projects Section II
	11/3/93 Date Signed

Inspection Summary

Inspection on September 2 through October 6, 1993 (Report Nos. 50-206/93-29, 50-361/93-29, 50-362/93-29)

Areas Inspected: Routine, announced, resident inspection of Units 1, 2 and 3 Operations Program including the following areas: operational safety verification, evaluation of plant trips and events, corrective action program, bi-monthly surveillance activities, monthly maintenance activities, design changes and modifications, engineered safety feature walkdown, independent inspection, and followup of open items and items of noncompliance. Inspection procedures 37700, 61726, 62703, 71707, 71710, 92701, 92702, 92720, and 93702 were covered.

Safety Issues Management System (SIMS) Items: None

Results:

General Conclusions and Specific Findings:

Strengths:

The inspector considered that the actions of the Unit 2 control room operating crew in mitigation of a dropped control element assembly occurrence were appropriate and timely (Paragraph 4.a).

Weaknesses:

The inspector noted that extensive construction activities were being conducted in the Emergency Core Cooling System (ECCS) pump rooms of Unit 3 while the plant was in Mode 1 operations. These work activities involved the removal of a watertight hatch and propping open the watertight doors leading to these rooms. It appears that the licensee had not adequately considered the potential effects of internal flooding due to pipe breaks with the combination of hatches and doors open. In certain flooding scenarios and assumptions of seal failures, these rooms could have been flooded resulting in a potential loss of the ECCS pumps. The licensee considered that even though a large amount of work was ongoing, the work did not involve the boundary of the ECCS piping and therefore was not a significant hazard to operability of the systems. The NRC is continuing to evaluate this issue.

The inspectors also noted the following concerns regarding pre-outage work performed at Unit 3:

- Technical Specification fire doors were left open and unattended for a short period of time (less than one hour) (Paragraph 3.a).
- Sparks were falling on workmen below during a welding operation (Paragraph 6.b).
- Various tools, not in use at the time, were in the sumps for the safety injection pumps in rooms 2 and 5 of the safety equipment building. The sumps should have been free of debris (Paragraph 3.b).

The inspector noted an atmospheric dump valve in Unit 2 that was leaking steam from a bonnet drain line with no maintenance order initiated. The inspector also noted other equipment deficiencies that had maintenance planned, but no deficiency tags were evident (Paragraph 3.b).

The inspector noted that the licensee made an event notification to the Nuclear Regulatory Commission Operations Center that was somewhat confusing. The inspector also noted that the licensee provided briefings to the onsite NRC staff and the NRC project manager and also made a more clear, revised notification that same day (Paragraph 4.c).

The inspector also reviewed the Nuclear Safety Concerns program and observed six areas for improvement as well as two concerns. The concerns were that contractor personnel needed to be more thoroughly trained on the program and that there was a concern with the Maintenance department related to the confidence employees had that safety issues would be addressed (Paragraph 8).

Significant Safety Matters: None

Summary of Violations: None

Open Items Summary:

During this report period, one new followup item was opened and one was closed.

DETAILS

1. Persons Contacted

Southern California Edison Company

H. Ray, Senior Vice President, Power Systems
*R. Krieger, Vice President, Nuclear Generating Station
*R. Rosenblum, Vice President, Nuclear Engineering and Technical Support
*J. Reilly, Manager, Nuclear Engineering & Construction
B. Katz, Manager, Nuclear Oversight
*K. Slagle, Manager, Outage Management
*R. Waldo, Operations Manager
*L. Cash, Maintenance Manager
*D. Breig, Manager, Station Technical
M. Short, Manager, Site Technical Services
*M. Wharton, Manager, Nuclear Design Engineering
P. Knapp, Manager, Health Physics
*W. Zintl, Manager, Emergency Preparedness
D. Herbst, Manager, Quality Assurance
C. Chiu, Manager, Quality Engineering
G. Moore, Plant Superintendent, Unit 1
*V. Fisher, Plant Superintendent, Units 2/3
*G. Gibson, Supervisor, Onsite Nuclear Licensing
J. Reeder, Manager, Nuclear Training
H. Newton, Manager, Site Support Services
*J. Fee, Health Physics Assistant Manager
*K. O'Connor, Manager, Construction
*T. Elkins, Supervisor, Construction
*M. Herschtal, Manager, Nuclear Systems Engineering
*R. Joyce, Maintenance Manager, Units 2/3
*M. Tolson, Supervisor, Fire Protection
*P. Penseyres, Integrated Plant Operations
*T. Oubre, Corporate Attorney
*R. Giroux, Onsite Nuclear Licensing
*R. Douglas, Onsite Nuclear Licensing
*G. Plumlee, Onsite Nuclear Licensing
*R. Kaplan, Onsite Nuclear Licensing

San Diego Gas and Electric Company

*R. Erickson, Site Representative

City of Riverside

*C. Harris, Site Representative

*Denotes those attending the exit meeting on October 7, 1993.

The inspectors also contacted other licensee employees during the course of the inspection, including operations shift superintendents, control room supervisors, control room operators, QA and QC engineers, compliance

engineers, maintenance craftsmen, and health physics engineers and technicians.

2. Plant Status

Unit 1

The Unit was permanently shutdown on November 30, 1992. Primary and secondary systems remained in a "SAFSTOR" condition throughout the inspection report period.

Unit 2

The Unit began the inspection period at 98% power, and operated at 98% power until September 24, 1993. The Unit was at 98% power, instead of full rated power, in order to minimize steam generator tube degradation by operating with cold leg reactor coolant system temperature in the middle of its normal operating range. Power was reduced to 80% to support a heat treatment of the circulating water system on September 24, 1993. The Unit returned to 98% power on September 25, 1993. The Unit operated at 98% power until October 6, 1993, when control element assembly (CEA) 85 dropped to the fully inserted position during performance of the monthly CEA operability surveillance test. Reactor power immediately dropped to approximately 90%, and the licensee further reduced power to 68% within one hour of the event, as required by Technical Specifications (TS). The licensee recovered the dropped CEA and maintained power at 68% while completing the CEA operability surveillance testing. The Unit was increasing power to 98% at the end of the inspection period.

Unit 3

The Unit began the inspection period at 75% power, in support of a heat treatment of the circulating water system. The Unit reached 98% power on September 3, 1993, and operated at 98% power until the end of the inspection period. The Unit was at 98% power, instead of full rated power, in order to minimize steam generator tube degradation as described for Unit 2.

3. Operational Safety Verification (71707)

The inspectors performed several plant tours and verified the operability of selected emergency systems, reviewed the tag-out log and verified proper return to service of affected components. Particular attention was given to housekeeping, examination for potential fire hazards, fluid leaks, excessive vibration, and verification that maintenance requests had been initiated for equipment in need of maintenance. The inspectors also observed selected activities by licensee radiological protection and security personnel to confirm proper implementation of and conformance with facility policies and procedures in these areas. In addition, the inspector closely monitored the Unit 3 pre-outage preparation.

a. Fire Doors Found Open in Unit 3

On September 24 and October 4, 1993, the inspector observed that a fire door was open. TS 3.7.9 requires compensatory actions (i.e., hourly or continuous fire watch) if the door is left open longer than one hour. In both of these instances, the inspector determined that most likely the fire doors had not been open longer that one hour and therefore the licensee was in compliance with TS; however, these instances indicated that personnel were not attentive to the need to keep the fire doors closed.

The inspector discussed these observations with Maintenance and Nuclear Construction (NC) supervisors, the departments involved with keeping the fire doors open. The inspector was informed that the requirements to keep fire doors closed were reaffirmed with affected personnel in both departments. The inspector considered the licensee's corrective actions adequate.

b. Plant Walkdowns

During routine plant walkdowns, the inspectors had noted several instances which appeared to indicate a need for personnel to enhance their attention to detail while conducting plant walkdowns some of which are noted below:

- On September 15, 1993, the inspector noted a steam leak from Unit 2 atmospheric dump valve (ADV) 2HV8419 bonnet drain line which did not have a deficiency tag. Further investigation revealed that the leak on the valve had been previously repaired on August 8, 1993, and at that time was not leaking. A new maintenance order was written to repair the leak. The inspector verified that the ADV was operable.

- On September 22, 1993, the inspector noted the presence of various tools (torque wrench, duct tape, scaffolding bars, measuring tape, box wrenches, yellow health physics postings, and other materials) in the Unit 3 low pressure safety injection (LPSI) pump sumps (rooms 2 and 5) and on the pump supports. The inspector noted that a high volume of activity was ongoing prior to, and at the time that, the tools were observed, in support of the shutdown cooling/spent fuel system cross-tie modification. The inspector informed the Operations Shift Superintendent, who stated that the sumps should be free of debris. The inspector verified that above items were removed.

  The inspector was not able to determine the group responsible for the articles found in the LPSI sump. However, the majority of the activities ongoing at the time came under the responsibility of Nuclear Construction (NC). The inspector

discussed these observations with NC management, who indicated that personnel had been instructed to contact radioactive materials control personnel to have tools removed from contaminated areas when work in contaminated areas was completed.

- A high pressure safety injection pump discharge check valve had dry boric acid crystals and a corroded stem; no deficiency tag was evident.

- The power indicator light for a fire control panel for a reactor coolant pump was not lit; no deficiency tag was evident.

The inspector subsequently verified that maintenance work requests had been previously initiated for the last two components, and that both components were operable. However, it was also determined that personnel had omitted hanging deficiency tags on the components. The inspector was concerned because the above conditions were not identified by plant personnel on their tours or rounds.

Operations management performed an audit of all maintenance orders initiated for the month of September 1993, and noted that onshift operators were very successful at hanging deficiency tags on equipment when they had initiated a maintenance work request for a deficient condition. However, it was noted that non-onshift Operations personnel hung tags on a less frequent basis. As a result, Operations management indicated that they would evaluate the need to develop a plan to increase performance in accordance with their program.

During the exit meeting, senior licensee management indicted that they would review personnel performance with their expectations as outlined in procedures, and implement improvements where warranted. The inspector considered the licensee's corrective actions, both completed and proposed, adequate.

No violations or deviations were identified; additional comments and concerns associated with Unit 3 pre-outage preparation are described in Paragraphs 6 and 8 of this report.

4. Evaluation of Plant Trips and Events (93702)

a. Dropped Control Element Assembly in Unit 2

The inspector observed control room operators following a dropped control element assembly (CEA) event in Unit 2. The inspector considered the actions of the Unit 2 operating crew a strength.

On October 6, 1993, at 11:55 a.m., while Unit 2 was at 98% power, the licensee was performing monthly CEA operability surveillance testing when CEA 85, in the shutdown group, dropped to the bottom of the core. The operators attempted to retrieve the CEA, but were unable to so. The licensee commenced a power reduction to 68% approximately 15 minutes after the CEA dropped into the core, in accordance with TS 3.1.3.

The inspector noted that when the CEA dropped, reactor power dropped to approximately 90% immediately. The operators took prompt action to reduce turbine power in order to stabilize primary coolant temperature. The operators took all actions to comply with procedures and TS, demonstrating good overall plant knowledge and command and control. The inspector concluded that the operators accomplished all actions ahead of the maximum time requirements, and were always cognizant of actions that would be required if the CEA was not recovered. The inspector considered the operators' actions, including systems awareness, control board manipulations, and command and control, a strength.

The licensee attributed the dropped CEA to an intermittent signal generated by a "Hall effect" transducer. There are approximately 455 transducers per Unit. The transducer provides an output signal proportional to the current flowing through the CEA gripper coil electrical supply cables which is sent to an automatic CEA timer module (ACTM). The ACTM monitors the current to the gripper coils and reduces the current after the gripper engages the CEA. The licensee believed that the transducer generated a spurious signal to the ACTM, which reduced the current to the gripper coil before the gripper engaged the CEA.

The licensee replaced the transducer at 12:45 p.m., and withdrew the dropped CEA to its pre-drop position and completed the CEA surveillance testing, holding power at 68%. The licensee returned the Unit to 98% power at 1:17 a.m., on October 7, 1993.

The inspector will monitor the licensee's evaluation of the cause of the failed transducer during the course of routine inspection activities.

b. Loose Parts and Vibration Monitor Alarms in Unit 3

The inspector noted that loose parts/vibration monitoring system (LPVMS) alarms occurred in Unit 3 as the Unit was downpowered for a circulating water system heat treatment on September 1-2, 1993, and as the operators raised power on September 3, 1993.

The LPVMS consists of 16 piezoelectric sensors: two on the upper reactor vessel, two on the lower reactor vessel, two on each steam generator support skirt, and two on each of the four reactor coolant pumps. These sensors generate a signal when subjected to

acceleration from 0.01 g to 2000 g's. On exceeding a setpoint, this signal is processed and causes an alarm in the main control room for the particular channel in alarm, as well as vibration frequency and amplitude indication on a back panel.

The licensee received LPVMS alarms from the detectors on the steam generator (SG) E088 support skirt on September 1, 1993, as reactor power was lowered from 98% to 80% for a circulating water heat treatment. The licensee received SG E088 and SG E089 alarms on September 2, 1993, as power was reduced to 75%. The licensee also received E088 and E089 alarms on September 3, 1993, as power was raised back to 98% at the completion of the heat treatment. The licensee sent the monitor tapes for the alarms to Combustion Engineering for analysis. Based on that analysis and on the licensee's analysis, the licensee concluded that the alarms were not from a loose part, but rather were indicative of a sound outside the SG, or on its' exterior surface. The licensee based this conclusion principally on the frequency spectrum of the alarms. The sounds were of a distinct frequency, and not spread across a frequency band. If the noise had come from inside the SG, then the metal SG support skirt would have distorted the sound to spread the frequency spectrum across a band of frequencies.

The licensee also concluded that the time of the alarms correlated to times when the reactor coolant system (RCS) temperature was changing during power level changes. The licensee postulated that the sounds were coming from the SG support plates as a result of thermal expansion and contraction of the RCS. A conference call was held with Region V and NRR personnel in which the licensee made the following commitments:

- Conduct enhanced monitoring of an upcoming Unit 2 heat treatment. The licensee later informed the inspector that this was completed on September 24-25, 1993, with no unanticipated alarms received.

- Conduct enhanced monitoring of the upcoming Unit 3 heat treatment scheduled for October 8, 1993, immediately prior to the Unit 3 Cycle VII refueling outage.

- Inspect the SG base plates during the upcoming Unit 3 Cycle VII refueling outage.

- Evaluate any maintenance required on the base plates.

The inspector informed the licensee of occurrences at other sites where abnormal alarms of the LPVMS were caused by RCS pipe whip restraints being contacted by the RCS piping as it expanded during heat up. The inspector also reviewed audio tapes and an X-Y frequency plot of some of the alarms received. The inspector noted

that the sound recorded on the audio tapes reviewed sounded like a sharp metallic "ping." The inspector will review the results of the licensee's commitments and conduct a visual inspection of the base plates, to the extent possible, during routine inspection activities.

c. Licensee Event Report Notification for Units 2 and 3

The licensee made an event notification, in accordance with 10 CFR 50.46, to the NRC Operations Center on September 21, 1993. The notification involved a deficiency in the Combustion Engineering analysis for loss-of-coolant-accidents in Units 2 and 3. Although the inspector had been given a briefing on this issue, the inspector reviewed a written text of this notification and found the notification somewhat confusing. The inspector met with licensee managers to clarify the details of the notification. The licensee made a followup notification at 6:35 p.m. that same day in order to provide clarification to the NRC operations center.

The inspectors concluded that the original notification could have been more clear. The revised notification, as a stand alone document, was clear. The inspectors also noted that this notification was made as a four-hour report and that efforts had been made to communicate details of the event in briefings to the inspector and the NRR Project Manager.

No violations or deviations were identified.

5. Bi-Monthly Surveillance Activities (61726)

During this report period, the inspectors observed or conducted inspection of the following surveillance activities:

a. Observation of Routine Surveillance Activities (Unit 2)

SO23-3-3.5, "Control Element Assembly Operability Test."

b. Observation of Routine Surveillance Activities (Unit 3)

SO23-V-3.31, "Saltwater Cooling System Motor Operated Valves (MOVS) Test."

SO23-3-3.34, "Turbine Overspeed Protection Valve Operability Tests."

The inspector observed one weekly surveillance test, one surveillance test conducted as a retest following maintenance, and one monthly surveillance test. All of these tests were conducted adequately per procedure.

No violations or deviations were identified.

6. Monthly Maintenance Activities (62703)

During this report period, the inspectors observed or conducted inspection of the following maintenance activities:

a. Observation of Routine Maintenance Activities (Unit 2)

93081823000, "1E Batteries Inspection."

b. Observation of Routine Maintenance Activities (Unit 3)

93011270000 "Perform MOVATS Actuator Electrical and Lubricant Inspection and Valve Lubrication and Inspection on 3HV6494."

93072127000 "Install Tie-in Piping per Drawings S31206ML003, Sheet 2 and S31206ML063, Sheet 1. S3 Cross-tie Piping."

93072126000 "Install Piping per Drawing S31206ML063, Sheet 1 - S3 Cross-tie Piping."

The inspector observed Unit 3 piping installation work being performed per construction work order (CWO) 93072126000. This work was being performed in support of a modification to the Unit 3 containment spray (CS), shutdown cooling (SDC), and spent fuel pool (SFP) cooling systems. During the grinding and finishing of one weld, the inspector observed one instance where sparks were falling on workmen below the scaffolding at the pipe weld location. The work foreman was immediately informed and the grinding was halted until the all personnel were in a safe location. The licensee agreed to continue to emphasize attention to fire hazards, personnel safety, and housekeeping practices during maintenance activities.

93091147000 "Limit Switches (Close and Open) Corroded and Water Intrusion Exists on Close Limit Causing 22% Positive Ground on 3D5 Bus on Steam Generator 3E088 Feedwater Control Valve."

The inspector observed Unit 3 corrective maintenance to remove a ground on non-vital VDC bus 3D5. The ground was caused by corroded limit switches for SG E088's main feed regulating valve 3FV1121. The close limit switch was found to be the cause of the ground. The limit switch box was dried out, serviced, and sealed. The ground was removed.

93070837000 "Install Piping For Lines S31201ML321, ML322, ML323 and ML324, in Safety Equipment Building rooms 2, 5, 11 and the Tunnels."

93051122000 "Pull Cables From MCC to Tank Area in Radwaste Area."

The inspector observed Nuclear Construction (NC) craft personnel pulling cable into switchgear in the Unit 3 train "B" 480 volt safety-related switchgear and noted that the work order directed the craft to perform the cable pull in accordance with procedure S0123-XXVI-14.604, "Cable Installation." The inspector noted that the craft did not have a copy of the procedure at the work site.

The inspector discussed this observation with NC personnel, reviewed applicable procedures, and concluded that there was adequate justification for not having the procedure at the work location.

No violations or deviations were identified.

7. Plant Modification and Refueling Activities (37700)

Pre-refueling Outage Work in Unit 3

The inspector observed extensive construction work in Unit 3 associated with design changes to the containment spray and shutdown cooling system (SDC) while Unit 3 was operating in Mode 1. Unit 3 was scheduled for a refueling outage to commence on October 10, 1993, and this work was in preparation for completion of the design changes during the outage. Work was ongoing in both emergency core cooling system (ECCS) pump rooms in the Unit 3 safety equipment building (SEB) and involved numerous personnel, scaffolding built around and directly above the ECCS pumps, welding and grinding activities, temporary rigging of piping in the overhead, and numerous hoses and cables supporting this work. The inspector noted several concerns regarding the ongoing work, and was especially concerned that the activities were occurring while the unit was in power operations.

a. Failure to Perform Adequate 10 CFR 50.59 Review

The licensee had begun extensive preparations for the Unit 3 design change package (DCP) to cross-tie containment spray and shutdown cooling system while Unit 3 was in Mode 1 operations. The inspector noted that the watertight door to room 2, door S3001, in the Unit 3 SEB, had been blocked open on August 10, 1993. The watertight door to room 5, door S3003, in the Unit 3 SEB, had also been blocked open on August 10, 1993. Room 5 contains train "A" of ECCS components (high pressure and low pressure safety injection pumps and containment spray pump) and room 2 contains train "B" ECCS

components. These doors had been blocked open to allow stringing of electrical cabling and hoses to support welding operations. The watertight hatch leading to the SDC tunnel was removed on September 13, 1993. This SDC tunnel leads from room 10 on the -5 foot level to room 5 on the -15 foot level of the SEB. Room 10 was a piping room where saltwater cooling piping entered the SEB from the saltwater piping tunnel area of the turbine building. This combination of blocked open watertight doors and removed watertight hatch provided a path for water flow from room 10 to both rooms 5 and 2.

The inspector reviewed the Updated Final Safety Analysis Report (UFSAR), Table 3.4-2 and Sections 3.4.2.1 and 10.4.5, and noted that the plant was designed such that failure of any seismic or non-seismic equipment would not cause the failure of redundant safety related equipment. One of the design basis flooding events described in the UFSAR was a failure of one circulating water expansion joint in the turbine building, in which the resultant flood of water would fill the saltwater piping tunnel to 9 feet. The UFSAR further stated that if the BISCO seals around the piping penetrations between the SEB and the piping tunnels were to fail, rooms 9 through 14 of the SEB would flood to 6.64 feet. The UFSAR stated that the SDC piping tunnels were protected by watertight hatches. The inspector concluded that the licensee had changed the facility as described in the UFSAR because the SDC tunnel was not protected by a watertight hatch when the hatch was removed on September 13, 1993.

The inspector performed an elementary calculation to determine resultant water levels if rooms 9 through 14 flooded to 6.64 feet, using the combination of blocked open doors and removed hatches that existed. Rooms 9 through 14 were all interconnected and formed a portion of the -5 foot level of the SEB. The inspector concluded that approximately 5 feet of water could have flooded into trains "A" and "B" of the ECCS. The inspector concluded that this water level would have at least partially submerged both trains' LPSI and HPSI motors, and would have probably totally submerged both trains' LPSI motors. The inspector concluded that these motors were not environmentally qualified to operate while partially or totally submerged, and the motors would probably have failed, making both trains of the ECCS inoperable.

The inspector noted that the licensee had not evaluated having these watertight doors open and watertight hatch removed in terms of its effect on the flooding analysis, prior to making the changes noted above. This appeared contrary to 10 CFR 50.59, which states that "The holder of a license may make changes...in the facility as described in the safety analysis report...unless the proposed change involves...an unreviewed safety question...The licensee shall maintain records of changes in the facility...These records must include a written safety evaluation which provides the bases for the

determination that the change, test, or experiment does not involve an unreviewed safety question." The inspector reviewed CWO 93080144000, which was used to remove the watertight hatch and to track fire protection measures for blocking open the watertight doors. The inspector concluded that an adequate safety review, of the type specified in 10 CFR 50.59, was not performed, and therefore this appeared to be a violation. The licensee was reviewing the safety consequences of the postulated flooding event at the end of the inspection report period; therefore, this issue is considered an Unresolved Item (URI 50-362/93-29-01) pending the review of the licensee's analyses.

On September 22, 1993, the inspector informed the licensee of a concern for equipment operability in the ECCS pump rooms under design bases flood conditions with the watertight doors open and the hatch removed. Later the same day, the licensee closed the watertight door to room 2 and reinstalled the hatch in room 10 for the SDC tunnel. The inspector concluded that these actions placed the Unit in conformance with the plant as described in the UFSAR by protecting the SDC tunnel from a flood in room 10.

The inspector reviewed procedure SO123-XXIX-2.14, "Construction Work Orders," and noted that Section 5.3.2 required that a construction safety evaluation (CSE) be written for each CWO. The inspector noted that the CSE was intended to review the potential impact on the plant and public safety of all the work activities covered by the CWO. The inspector reviewed various CWOs associated with work activities involved and determined that the CSEs in these CWOs routinely did not specifically address the criteria for a safety evaluation presented in 10 CFR 50.59. The inspector questioned licensee management and was told that site procedures were screened for 10 CFR 50.59 criteria and, as work activities were performed according to these procedures, that this would ensure a 10 CFR 50.59 safety evaluation would be performed when it was required. In addition, the inspector noted that reviews of the CWOs by construction engineers, operations personnel, quality control, and equipment control personnel had not identified the potential flooding concern. The inspector concluded that there was not a procedure controlling the opening of those watertight doors or the removal of watertight hatches which had been taken credit for in the licensee's flooding analyses.

The inspector also inspected the seals that sealed the salt water cooling piping as it entered the safety equipment building from the saltwater tunnel. These seals were assumed to fail in the UFSAR analysis. The seals appeared intact and flush with the pipe and the wall opening. The inspector concluded that these seals appeared to be able to mitigate, if not stop, the flow of water into the SEB if the saltwater tunnel flooded with water.

b. Anticipated Response Times

The inspector met with representatives of Onsite Nuclear Licensing and the Nuclear Engineering Design Organization on September 29, 1993. The licensee representatives agreed that, given the 20 minute operator response time assumed in the UFSAR, both trains of HPSI and LPSI would have been inoperable due to motor wetting. However, the licensee felt that 20 minutes was unreasonable to shut off the necessary circulating water pumps and stop the flooding. Based on annunciation available in the control room (flooding alarms and alarms indicative of circulating water trouble), the licensee felt that 10 minutes was a more accurate time for the operators to act. The licensee concluded that this would result in water entry into the shutdown cooling tunnels, but not the safety pump rooms. This was because the tunnels sloped from -18 feet to -15 feet, and the amount of water would have been trapped in this space. The inspector concluded that the UFSAR used 20 minutes as a response time. An analysis for a 10 minute response time was not included in the UFSAR.

The inspector reviewed procedures, annunciators, controls, and indications available in the control room to mitigate a rupture of the circulating water expansion joint as described in the UFSAR analysis. The inspector did not find a specific procedural step that would direct an operator to secure circulating water pumps in response to this event. However, the inspector was informed by the licensee that the operators were trained, and that there was administrative guidance, to take action to minimize damage to equipment whether this action was stipulated directly in a procedure or not.

The postulated failed expansion joint in the UFSAR analysis was on the circulating pumps discharge to the condenser waterboxes. The inspector concluded that if one joint ruptured, pump amperes and waterbox differential pressure might oscillate or deviate from their original values, but the rupture would probably not bring into alarm any control room annunciators associated with the circulating pumps. The "Turbine Building Flooding" and "Turbine Building Sump Hi/Hi" alarms would probably come in. The operators were directed by the annunciator response procedure to dispatch an operator to investigate and ensure that the turbine building sump pumps were operating. Operators were directed to contact the operator dispatched if he or she did not report status in 30 minutes. In addition, the operators might see main condenser vacuum lowering. If vacuum was affected, the "Vacuum Lo" alarm would probably annunciate and the operators would enter the "Loss of Condenser Vacuum" abnormal procedure. This procedure directs actions to increase condenser vacuum, but does not specifically address actions to mitigate the circulating water rupture. If the main turbine tripped and caused a reactor trip, or if flooding in the turbine building caused a loss of secondary equipment that resulted in a

reactor trip, then the operators would enter the standard post trip actions. Consequently, the operators would take actions that were directed in the emergency operating procedures. These actions would lead the operators to place the reactor in a safe status. However, the inspector concluded that these procedures did not specifically address mitigation of a circulating water system flooding event.

The inspector was informed by Operations management that the operators, if they entered the emergency procedures, would still pursue the turbine building flooding as directed by the annunciator response as well as their training, and the skill of the craft. The inspector also concluded that as water level in the turbine building rose, various electrical grounds would result and be annunciated in the control room. The inspector concluded that these grounds, in an environment filled with water, might increase the time it would take the dispatched operator to identify the cause of the flooding.

The licensee informed the inspector that they had run a simulator scenario with two separate operating crews, using a rupture of a circulating water box outlet expansion joint. Both crews had stopped the necessary circulating water pump in 10 minutes or less. The inspector concluded that, because stopping the pump was contingent on a report from an operator dispatched to investigate, the simulator could not model this aspect of the scenario to get a rigorous estimate of anticipated response time. The inspector also concluded that the assurance that every crew would mitigate this casualty in the same manner would have been the direct procedural guidance to stop the pump in response to flooding, which the licensee did not have.

The licensee changed the annunciator response procedures mentioned above to incorporate guidance to stop equipment that was causing flooding.

c. Quality Assurance Department Reviews

The inspector interviewed the Manager of Quality Assurance (QA), and was informed that QA had performed numerous surveillance activities associated with the DCP work in the ECCS pump rooms. The QA Manager stated that QA utilized subject matter experts (SMEs) in various disciplines to assure conformance to site programs. The SMEs focused on their specific areas of expertise when performing surveillances. These QA reviews had failed to identify the potential flooding issues.

d. Personnel Evacuation

The inspector also noted on various tours of the work area that 10 to 12 people could be present at any one time in rooms 2 and 5 and in the SDC tunnels. The inspector noted that the CWOs made no mention of evacuating these spaces in the event conditions which

would cause the initiation of safety injection and possible subsequent recirculation actuation. The inspector did note that the workers were trained to evacuate an area when their personal dosimetry alarmed on high dose or dose rate. The inspector also interviewed operators who stated that, even though there was no direct procedural guidance, the control room personnel were aware of the work in the area and would probably evacuate the area following completion of standard post trip actions in the event of a safety injection. The licensee further stated that if a safety injection were to occur, then an event classification would have been made and the area evacuated as a result of the event declaration. The inspector considered these responses to concerns for personnel evacuation adequate.

e. Scaffolding and Temporary Pipe Supports and Rigging

The inspector reviewed several temporary pipe supports and rigging configurations in the ECCS pump rooms. Based on observations of the actual support configurations in the rooms and on discussions with Bechtel supervisors, these configurations appeared to meet the details specified in procedures or engineered drawings for the work. In addition, personnel from NRR reviewed scaffolding and pipe support configurations and analyses. As of the end of the inspection period, the evaluation had not been completed. This issue will be further reviewed in conjunction with Unresolved Item 50-362/93-29-01 described in Paragraph 7.a above.

f. Summary

The inspector concluded that a general failure to recognize the impact of watertight hatches and doors on system operability in the event of a flood, by QA and the reviewers of the work orders mentioned above, contributed to the failure to identify the potential to make both trains of ECCS components inoperable. The inspector further concluded that the licensee did not have a program in effect to ensure watertight doors and hatches were in a proper position to prevent design basis flooding accidents. The inspector concluded that this lack of a program and ensuing procedural guidance contributed to the failure of reviewers to identify the need for maintaining watertight doors shut and watertight hatches in place.

The licensee provided their basis for the work in Unit 3 in a letter dated September 30, 1993. The letter stated that the work was being done in a carefully controlled manner and the appropriate level of operational safety was being maintained. The safety significance of this issue will be reviewed in a subsequent inspection report.

One unresolved item was identified.

8. Independent Inspection (92720)

Review of Nuclear Safety Concerns (NSC) Program

As of September 1, 1993, the following statistics were noted with regard to the NSC files initiated by the licensee during the last three years:

	1991	1992	1993
Number of NSC concerns submitted:	24	9	5
Number of anonymous concerns:	4	1	1
Number using NSC form in box:	16	2	0
Number using NSC Hotline:	4	6	1
Average length of time to close file (weeks):	18	17	14
Longest period file was open (weeks):	48	40	24
Number of concerns substantiated:	10	3	2

The inspector reviewed the licensee's procedures and training covering the NSC program and each of the NSC files noted above, with the following observations:

- Training provided to licensee and contractor supervisory personnel does not specifically emphasize the supervisor's personal culpability for NRC enforcement action under 10 CFR 50.5.

- Licensee procedure SO123-XV-50.2, "Nuclear Safety Concerns," does not provide clear requirements for who is authorized to close out NSC files. Most files were closed out by memorandum from the Manager of Nuclear Oversight, however, some files (i.e. 91-03, 91-09 and 93-01) were closed by the NSC coordinator.

- Some files do not include clear documentation that the Senior Vice President, Nuclear (at that time), had approved designation of the group conducting the NSC investigation (i.e. 93-04 and 93-05), as specified by Directive D-008, "Nuclear Safety Concerns Program."

- Licensee procedure SO123-XV-50.2, "Nuclear Safety Concerns," does not specify clear requirements for the content of NSC closure letters to the employee raising the concern. In this regard, one NSC concern closure letter did not adequately provide details as to why the employee's concerns were not substantiated (92-06). This is especially important for concerns that are determined to be unsubstantiated. Failure to do so can result in a chilling effect of the employee and/or result in his pursuing his concerns with other organizations. Also, several NSC files were closed without sending a closure letter to the employee who raised the concern (91-11, 91-17 and 92-08). Failure to provide a formal closure letter may detract from employee confidence in the formality and thoroughness of the NSC program. Furthermore one NSC file (92-09),

involving an anonymous concern, had no closure document at all in the file.

- One NSC file (91-02) did not contain any documentation identifying the nature of the concern or it's resolution. The licensee indicated that the documentation for file 91-02 had been lost.

- As of September 1, 1993, the licensee has not performed any independent audits of the NSC program.

In light of the relatively small number of employee concerns documented in the licensee's NSC program, the inspector performed random interviews of licensee and contractor personnel in order to establish employee knowledge of and confidence in the NSC program. The results of the interviews are summarized as follows:

	OPS	MAINT	HP	SEC	ENGR	CONTR	TOTAL
Number interviewed:	12	14	7	2	5	9	49
Would first go to supervisor:	12	10	7	0	4	9	42
Would first go to NSC program:	0	4	0	2	1	0	7
Not aware of NSC program:	1	0	0	0	0	4	5
Lacks confidence in NSC program:	0	6	0	0	0	0	6
Worried about H&I* if use NSC:	0	1	0	0	0	4	5

* Harrassment & Intimidation

The inspector identified the following concerns as a result of the above described interviews:

- The fact that 4 of 9 contractor personnel stated that they were not aware of the NSC program and were worried about potential discrimination indicates a need for increased licensee emphasis on training of contractor personnel about the NSC program.

- The fact that 6 of 14 licensee maintenance personnel stated that they lacked confidence in approaching their supervisor with concerns and a lack of confidence in the NSC program indicates a potential concern in the Maintenance department.

No violations or deviations were identified.

9. Follow-Up of Previously Identified Items (92701)

a. (Closed) Followup Item (50-206/93-11-13), "Spent Fuel Pool Heat Exchanger Leaks in Unit 1."

This item involved active valve and flange leaks not identified by operators at Unit 1. The inspector had identified various leaks on valves that had not been contained and that did not have deficiency

tags or maintenance orders associated with them. The inspector was also inadvertently contaminated while in a supposedly clean area near the component cooling water (CCW) and SFP heat exchangers.

On October 5-6, 1993, the inspector walked down various systems and areas of Unit 1. The inspector noted that the saltwater drain valve for the top CCW heat exchanger, CCW-E-20A, was leaking onto the bottom CCW heat exchanger, CCW-E-20B, and onto the deck. The inspector informed the Unit 1 control room and noted that a deficiency tag was subsequently hung on the valve and a maintenance order was written. The inspector concluded that this untagged material deficiency was isolated, as the inspector noted no other untagged deficiencies. Overall, the inspector concluded that Unit 1 systems necessary for safe operation of the spent fuel pool were in adequate material condition, with deficiency tags hung where needed.

The inspector reviewed the personnel contamination log for Unit 1 and noted that no other personnel had been contaminated in the area adjacent to the CCW heat exchangers since the incident involving the NRC inspector. The inspector was informed by the licensee that over 1500 entries had been made in that area since the NRC inspector was contaminated. During plant walkdowns the inspector noted Health Physics personnel decontaminating various posted contamination areas in order to minimize those types of areas in Unit 1. The inspector concluded that the area around the CCW heat exchangers was posted properly, and that the licensee was actively ensuring the control of contamination at Unit 1.

Based on the material condition of the Unit 1 systems and areas walked down, and the lack of personnel contaminations, as noted above, this item is closed.

10. Unresolved Items

In Paragraph 7 of this report, an unresolved item was identified. An unresolved item is a matter about which more information is required to ascertain whether it is an acceptable item, a deviation, or a violation.

11. Exit Meeting

On October 1, 1993, an exit meeting was conducted with the licensee representatives identified in Paragraph 1. The inspectors summarized the inspection scope and findings as described in the Results section of this report.

The licensee acknowledged the inspection findings and noted that appropriate corrective actions would be implemented where warranted. The licensee did not identify as proprietary any of the information provided to or reviewed by the inspectors during this inspection.