U. S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket No.:	50-443
License No.:	NPF-86
Report No.:	50-443/98-01
Licensee:	North Atlantic Energy Service Corporation
Facility:	Seabrook Generating Station, Unit 1
Location:	Post Office Box 300 Seabrook, New Hampshire 03874
Dates:	February 1, 1998 - March 28, 1998
Inspectors:	Ray K. Lorson, Senior Resident Inspector Javier Brand, Resident Inspector Robert Summers, Project Engineer
Approved by:	Curtis J. Cowgill, Chief, Projects Branch 5 Division of Reactor Projects

EXECUTIVE SUMMARY

Seabrook Generating Station, Unit 1
NRC Inspection Report 50-443/98-01

This inspection included aspects of licensee operations, engineering, maintenance, and plant support. The report covers a 9-week period of resident inspection.

Operations:

- The licensee had a method for evaluating spent fuel pool (SFP) liner integrity based on the SFP sump in-leakage. However, in one instance licensee personnel did not identify that the SFP sump level alarm was non-functional which precluded use of this redundant method for monitoring the spent fuel pool liner integrity.

- The inspectors noted good operator performance during motor driven emergency feedwater pump (EFW) testing and during venting of the emergency core cooling system (ECCS) discharge piping. The operators performed these activities in accordance with the applicable procedures and demonstrated an excellent questioning attitude.

- The safety system walkdowns were a positive initiative to improve the plant material condition.

Maintenance:

- An electrician demonstrated excellent attention to detail and a questioning attitude, to detect and identify the incorrect installation of two operating mechanism springs on a safety-related breaker. The licensee determined that this condition did not render the breaker (or any other similar breakers used at Seabrook) inoperable, and initiated a plan to inspect and correct any additional non-conforming conditions prior to the end of the next refueling outage.

- The licensee performed the planned freeze seal activities well. The work package, and associated on-line maintenance and freeze seal evaluations, and management oversight were effective. The inspector identified that the level of detail provided in the freeze seal thawing instructions could have been enhanced. The licensee promptly enhanced the work instructions to address this concern.

- Safety-related degraded voltage bus testing was performed well, and the test results satisfied technical specification requirements.

- The licensee reported several examples of failure to develop adequate surveillance test procedures. The licensee subsequently revised the test procedures and properly tested each component. This licensee identified violation of failure to

develop adequate test procedures is being treated as a non-cited violation. (NCV 98-01-01)

Engineering:

- The licensee failed to implement adequate design controls to ensure that the safety-related components within the residual heat removal system pump room would remain within their required temperature limits prior to modifying the room ventilation system. A subsequent licensee analysis, performed after the NRC identified this deficiency, indicated that the modification reduced the room ventilation flow by about 50%, however, the room temperature limits would not have been exceeded. This is a violation of 10 CFR 50, Appendix B Criterion III (NOV 98-01-02)

- The licensee promptly reviewed and evaluated the identification of boric acid accumulation on a RHR drain line. The identification of this condition reflected positively on the licensee's new system walkdown program. The inspector noted that the licensee's response to this condition did not include identification of the other plant areas potentially susceptible to periodic wetting. The licensee implemented appropriate actions to address this concern.

- Operations personnel performed well by identifying the safety injection accumulator nitrogen leaks. The licensee promptly investigated the leakage and implemented appropriate repairs to reduce the leakage. Engineering properly assessed the impact of this minor leakage on the accumulator operability.

- The licensee determined that incorrectly installed coupling hubs (a condition which occurred during initial installation), caused a degraded EFW motor outboard bearing condition. The pump remained operable in this condition and the licensee implemented appropriate corrective actions to address this deficiency.

Plant Support:

- The inspector that identified four workers were performing maintenance on the "B" containment spray pump in a posted as a contaminated area without wearing any protective clothing as required by the radiation work permit and posted instructions. The licensee promptly evaluated this issue and implemented adequate corrective actions. This is a violation of Technical Specification 6.10.1. (NOV 98-01-03)

TABLE OF CONTENTS

Report Details

Summary of Plant Status

The facility operated at approximately 100% of rated thermal power throughout the inspection period with routine minor power reductions performed to support instrument calibrations and testing.

I. Operations

O1 Conduct of Operations

Using Inspection Procedure 71707, the inspectors conducted frequent reviews of ongoing plant operations. In general, routine operations were performed in accordance with station procedures and plant evolutions were completed in a deliberate manner with clear communications and effective oversight by shift supervision. Control room logs accurately reflected plant activities, and observed shift turnovers were comprehensive and thoroughly addressed questions posed by the oncoming crew. Control room operators displayed good questioning perspectives prior to releasing work activities for field implementation. The inspectors found that operators were knowledgeable of plant and system status.

O2 Operational Status of Facilities and Equipment

O2.1 Safety System Walkdowns and Status (71707, and 62707)

The inspectors routinely conducted independent plant tours and equipment walkdowns of selected portions of the primary auxiliary building, emergency diesel generator, service water, and emergency feedwater buildings. These activities consisted of verification that safety-related system configurations, power supplies, process parameters, support systems, and operational status were consistent with Technical Specification (TS) requirements, and the Updated Final Safety Analysis Report (UFSAR) descriptions. Additionally, system, component, and general area material conditions and housekeeping status were observed.

The inspectors observed a significant increase in the number of equipment deficiency tags hung on safety system components during the systematic licensee walkdowns. The inspectors reviewed selected deficiency tags and noted that the deficiencies identified minor system defects that did not present any operability concerns. The inspectors concluded that the system walkdowns were a positive licensee initiative to improve the plant material condition and will continue to follow licensee progress in this area.

O4 Operator Knowledge and Performance

O4.1 Operator Performance During Surveillance Testing

The inspectors noted good operator performance during motor driven emergency feedwater pump (EFW) testing and during venting of the emergency core cooling system (ECCS) discharge piping. The operators performed these activities in accordance with the applicable procedures and demonstrated an excellent questioning attitude.

The operators noted, while venting the ECCS discharge piping per operating procedure, OX1456.02, "ECCS Monthly Valve Verification", that the procedure acceptance criteria of "no gas observed" was not satisfied. Engineering determined that the small bubbles were due to expansion of dissolved nitrogen in the water during the venting process and revised the procedure to clarify the acceptance criteria. The operators subsequently performed the venting activity satisfactory.

The inspectors observed that the EFW surveillance test procedures did not provide clear acceptance limits for venting the pump recirculation line. The inspectors discussed this issue with station management who agreed to review this procedure.

The inspectors concluded overall good operator performance during motor driven EFW pump testing and during venting of the ECCS discharge piping. The operators performed these activities in accordance with the applicable procedures and demonstrated an excellent questioning attitude.

O4.2 Spent Fuel Pool Liner Integrity Monitoring

a. Inspection Scope

The inspectors reviewed the licensee's method for utilizing the spent fuel pool (SFP) system sump to evaluate the SFP liner integrity, and also the basis for concluding that identified leakage out of two SFP sump leak detection pipes was groundwater.

b. Observations and Findings

The SFP sump was designed to collect any leakage from the SFP liner. Seabrook USAR Section 9.1.2.2 states, in part, that, "The SFP is monitored for leakage by a series of leak detection channels located adjacent to each liner seam weld," and "by monitoring the leakage rate, any change in the integrity of the liner can be established." The inspector noted that this method of monitoring SFP liner integrity was independent to SFP level indication system.

A deficiency tag, dated February 20, 1998, stated that "two spent fuel pool leak detection pipes have groundwater leaking." The inspector reviewed the applicable system drawing and confirmed that the two potential leakage sources included:

groundwater and the spent fuel pool. The inspector questioned operations personnel and the system engineer regarding the basis for concluding that this leakage was groundwater and learned that chemistry personnel had analyzed the sump contents and determined that the leakage was not SFP water. The inspector concluded that the licensee had properly evaluated this leakage.

The system engineer indicated that the SFP sump was equipped with a level alarm set to actuate at one foot of water above the sump floor, and this volume of water was equivalent to an approximate 0.25 inch decrease in SFP water level. The SFP sump alarm response procedure required the checking of indications to confirm the SFP liner integrity. The inspector concluded that the licensee had established a method for using SFP sump in-leakage to evaluate the SFP liner condition.

The inspector questioned whether the SFP level alarm was functioning properly however, based on a report from a radiation waste technician that approximately four feet of water had been recently pumped out of the SFP sump. The licensee reviewed the alarm database and determined that the SFP sump level alarm had not actuated since January 1996. The licensee subsequently determined that the alarm level switch was not functional. The licensee replaced and verified the switch to be operational. The period of time that the alarm was non-functional was indeterminate since no data was available regarding the actual sump conditions during this period of time. The inspector concluded that the recent example where the licensee did not identify that the SFP sump alarm failed to actuate demonstrated a weakness in the identification of degraded equipment. The licensee initiated an adverse condition report (ACR) to review the program for monitoring the SFP sump.

c. Conclusions

The licensee had a method for monitoring SFP sump in-leakage as an independent confirmation of the SFP liner integrity, however, in one example, licensee personnel failed to identify that the SFP sump level alarm was non-functional which prevented use of this method.

O8 Miscellaneous Operations Issues (92901)

O8.1 (Closed) Unresolved Item 50-443/97-06-01: review of licensee decision to reduce power during September 15, 1997 feed pump oscillation event. This item refers to the operational decision to continue with a planned power reduction to about 90% power during the subject event after experiencing a failure of the rod control system. An abnormal operating procedure for the rod control system required that power evolutions be stopped when an urgent failure of the rod control system occurs. At the time of the event the "A" main feed pump governor controls were oscillating, resulting in associated high pressure steam supply pipe oscillations. While the operators had determined that this condition did not warrant an immediate plant trip or shutdown, there was concern about the possible adverse effect of the oscillations on the equipment. As a result, plans were implemented to

reduce power to either eliminate the oscillations or remove the "A" main feed pump from service so that repairs could be effected.

When the operators initiated the power reduction a failure in the rod control system occurred, such that the control rods could not be manually inserted. After determining that the control rods were still able to perform the plant trip function and that adequate shutdown margin was available, the decision was made to continue with the planned power reduction using chemical shim injection (through the emergency boration flow path). The basis for this decision was that, excepting the feed pump oscillations, the plant was stable; and, that I&C recommended that a small change in power may fix the feed pump control problem, or at least reduce the risk of the oscillations causing equipment damage. The operators were also briefed at the time that if, during the down power evolution, they believed the plant was not stable, or if they were excessively challenged, that a plant trip should be initiated.

As allowed by station procedures, the shift manager (a senior licensed operator) authorized initiating a 10% power reduction to reduce the feed pump oscillations. The basis for this decision comes from Station Management Manual Chapter 2, which permits noncompliance with procedures for very limited conditions involving either protection of the health and safety of the public, prevention of personnel injury or life threatening situations, or prevention of damage to major plant equipment. Operators concluded that the deviation from the abnormal operating procedure was acceptable in order to avoid possible damage to the main feed pump, or the associated steam supply pipe and resultant plant transient condition. Operators maintained all associated technical specification requirements within allowable conditions, such as shutdown margin and axial flux difference. The evolution was well controlled and at about 92 % power, the feed pump oscillations were significantly reduced, removing the threat to this major plant equipment.

In NRC inspection report 50-443/97-06, the inspectors questioned the appropriateness of the operator actions during the September 15 event. An unresolved item was issued pending review of the licensee's ACR findings. The licensee noted that an ACR had not been immediately initiated following the operator's decision to deviate from the operating procedure. At the time, the licensee's ACR process did not explicitly require an evaluation for this type of event. As a result, the licensee subsequently revised the guidance to require that an ACR be initiated for events where this Station Management Manual guidance was implemented. The inspectors determined during this current inspection that the operator actions were taken in accordance with station procedures. This unresolved item is closed.

II. Maintenance

M1 Conduct of Maintenance

M1.1 Incorrect Spring Location on Safety Related Breakers

a. Inspection Scope:

On February 25, during refurbishment of a "spare" 4160 volt breaker, an electrician identified that two breaker operating mechanism springs had been incorrectly interchanged by the manufacturer (ABB Services Inc.), during a previous breaker refurbishment. The springs, which included the charging carrier reset spring and the third toggle tension spring, are very similar in appearance, however one of the springs provides a greater tension force. The inspector evaluated the licensee's response to this issue, reviewed applicable documentation, and met with electrical engineering personnel.

b. Observations and Findings:

The licensee disassembled the breaker and the springs were installed as recommended by the manufacturer. The final configuration was consistent with the Seabrook breaker refurbishment procedure, and the vendor drawing. The vendor indicated that originally, these two springs were identical, but in about 1984, the charging carrier spring had been redesigned to address a concern with their use in a different style of breaker, however, the part replacement was effected on several of the vendor supplied breakers to eliminate duplicity.

The licensee identified approximately 23 other similar ABB breakers (fifteen of which are currently being used in safety related applications) that may have been affected by the possible misassembly. The licensee performed an operability determination based on a vendor supplied analysis, which concluded that interchanging the two springs did not affect the breaker operability. The vendor also recommended that the springs be installed in the correct location, and Seabrook initiated a plan to inspect all breakers and ensure adequate spring installation by the end of the next refueling outage (in 1998).

The licensee determined that this issue was not reportable under 10 CFR Part 21, "Reporting Defects and Noncompliance", because the breakers were evaluated to remain operable. The vendor initiated testing to demonstrate that the breakers with the interchanged springs (incorrect spring location) will remain operable for the entire service life (period of nine years), and is evaluating this issue for Part 21 applicability.

c. Conclusion:

The inspector concluded that a Seabrook electrician demonstrated excellent attention to detail and a good questioning attitude, to detect and identify the interchanged installation of two breaker operating mechanism springs on a safety related 4160 volt breaker. The licensee determined that this condition did not render the breaker (or any other similar breaker used at Seabrook) inoperable, and had initiated a plan to inspect and correct the situation prior to the end of the next refueling outage.

M1.2 Freeze Seal to Support Repair of a Chemical and Volume Control Valve

a. Inspection Scope:

On March 27, the inspector observed pipe freeze seal activities performed by mechanical maintenance technicians to support inspection and repairs on valve CS-V-408, which isolates the boric acid transfer pump minimum flow recirculation line. The inspector reviewed the work package, applicable procedure, interviewed the system engineer and work supervisor, and visually inspected the activities.

b. Observations and Findings:

The licensee conducted briefings prior to performing the freeze seal. The work package was thorough and included an adequate on-line maintenance assessment. Additionally, required precautions, system lineups and contingencies were included to prevent or mitigate the consequences of a freeze seal failure. The inspector observed proper field coverage by fire protection, management oversight and health physics personnel. The system engineer was knowledgeable of the evolutions, and provided good support. The oversight group performed a liquid penetrant test of the affected pipe before and after the freeze, which confirmed adequate pipe conditions.

The inspector noted that the work scope included an infrequently performed activity to speed up the freeze seal thawing process to ensure that any boron in the pipe quickly returned to solution. A heat gun with a capacity of 500°F was used, and the inspector noted that the licensee implemented controls which included continuously monitoring the pipe surface temperature to prevent exceeding a maximum temperature of 150°F. The inspector noted that the work procedure instructions could have provided additional guidance to ensure that this infrequently performed activity was performed correctly. The licensee addressed the inspector's concerns by implementing a work scope change to include additional guidance. The freeze seal and subsequent thawing process were completed successfully.

c. Conclusion:

The licensee performed the planned freeze seal activities well and effective management oversight and support were observed. The work package and associated on-line maintenance and freeze seal evaluations were adequate. The licensee implemented prompt actions to address an inspector concern regarding the level of detail provided in the work package instructions for controlling the freeze seal thawing activity.

M1.3 Safety Bus Degraded Voltage Surveillance Testing

The inspector observed electrical technicians perform safety-related bus degraded voltage testing on February 25. The inspector noted that the test activities were performed safely and in accordance with the test procedures. The inspector observed good supervisory oversight, communications, and use of self-checking practices. Measuring and test equipment were calibrated properly, and the equipment performance satisfied the TSs surveillance requirements.

M8 Miscellaneous Maintenance Issues (92902)

M8.1 (Closed) Violation 50-443/96-04-01: inoperable turbine driven emergency feedwater pump as a result of inadequate installation of mechanical seals. The inspector verified the corrective actions described in the licensee's response letter, dated August 8, 1996, to be reasonable and complete. Among the corrective actions verified were: revisions to the associated maintenance procedures describing greater detail for seal clearances and use of calibrated M&TE to verify adequate clearance; submittal of a supplement to LER 50-443/96-003 to better describe the root causes of the failure, including the repeat nature of the problem and corrective actions for that concern; and, changes to the corrective action program to provide root cause training to the management review team and SORC members, and to improve the operational experience feedback process, providing clear guidance for the types of events requiring a formal root cause analysis. No similar problems were identified.

M8.2 Licensee Event Report Review:

The following licensee event reports (LERs) are closed based on an in-office review of the LER and the planned and completed corrective actions.

- (Closed) LER 50-443/96-06-00: Missed Surveillance Requirement
- (Closed) LER 50-443/97-03-00: Missed Surveillance Turbine Trip on Reactor Trip
- (Closed) LER 50-443/97-04-00: Remote Shutdown Circuits Control Room Isolation Function Not Tested Completely

- (Closed) LER 50-443/97-017-00: Inadequate SSPS Surveillance Testing

- (Closed) LER 50-443/98-001-00: Inadequate ECCS Venting Surveillance

Each of the licensee identified LERs listed above involved the failure to develop adequate surveillance test procedures to ensure that all required system components were tested properly. In each case the licensee declared the affected system inoperable, entered TS 4.0.3 as appropriate, and successfully completed the required testing within the allotted 24 hour time period. These events were of minor significance since each system functioned properly when tested. The inspector concluded that this was not indicative of a programmatic breakdown in the surveillance test program. The licensee discovered these procedural deficiencies during design basis and operational experience reviews and corrected the applicable procedures. Additionally, the licensee implemented a generic procedure upgrade project to identify and correct any additional potentially affected procedures. This licensee identified violation of failure to develop adequate surveillance test procedures is being treated as a non-cited violation consistent with Section VII.B.1 of the NRC Enforcement Policy. **(NCV 98-01-01)**

III. Engineering

E1 Conduct of Engineering (37751)

E1.1 Residual Heat Removal System Ventilation Covers

a. Inspection Scope:

The inspectors reviewed the engineering analysis performed to install temporary covers over the ventilation duct openings in both residual heat removal (RHR) pump rooms. The covers were installed per work requests (WAS) 97W003878 and 97W003884 to redirect the ventilation flow to minimize the potential spread of contamination from minor system leakage through the bonnet studs of check valves RH-V4, and RH-V-40.

b. Observations and Findings:

The inspectors observed that the plastic covers were securely fastened to three sides of the RHR pump room ventilation duct openings. The covers reduced the area for ventilation flow and introduced an approximate 90° change in the direction of the exit flowpath. The inspectors were concerned that these covers would reduce the ventilation flow into the RHR pump room and possibly lead to a overtemperature condition and failure of safety-related components inside the room during a design basis event.

The ventilation covers were installed per Procedure MA4.8, "Control of Temporary Equipment", and were not intended to reduce the ventilation system flow. The (MA4.8) evaluation provided general information and guidance and concluded that the covers were acceptable as long as they only diverted and did not reduce the approximate 12,700 cfm of flow required to maintain the room environmental conditions. Neither the evaluation nor the work request provided any specific design or installation details to ensure that the "as built" covers would meet the design requirements.

In response to the inspector's questions, the licensee promptly removed the ventilation covers and initiated an engineering evaluation (SS-EV-98-008) to determine the impact of the covers on the ventilation system and RHR pump room temperature. The evaluation calculated that the installed covers would reduce the ventilation flow into the RHR pump rooms by about 50% to approximately 6100 cfm. This would increase the RHR pump room temperature following a loss of coolant accident about 15°F from approximately 134°F to about 149°F.

The inspector noted that the postulated temperature increase would not have exceeded the RHR pump room temperature limit of 189°F, and therefore would not have rendered any of the safety related RHR pump room components inoperable. The inspector noted that the failure to provide sufficiently detailed design instructions resulted in an inappropriate application of the MA4.8 program and a significant reduction in the ventilation flow into the RHR pump room following the installation of this modification.

Appendix B Criterion III, requires, in part, that measures be implemented to assure that the design basis is correctly translated into specifications, drawings, procedures, and instructions. Contrary to the above, adequate instructions were not developed to ensure that the RHR pump room ventilation system modification would not reduce ventilation system flowrate below an unacceptance level. This is a violation of 10 CFR 50, Appendix B, Criterion III **(VIO 50-443/98-01-02)**.

c. Conclusion:

The licensee failed to implement adequate design controls to ensure that the safety-related components within the residual heat removal system pump room would remain within their required temperature limits prior to modifying the room ventilation system. A subsequent licensee analysis, performed after the NRC identified this deficiency, indicated that the modification reduced the room ventilation flow by about 50%, however, the room temperature limits would not have been exceeded.

E2 Engineering Support of Facilities and Equipment

E2.1 Accumulation of Boron on Residual Heat Removal System (RHR) Drain Pipe Connection

a. Inspection Scope:

The RHR system engineer identified a ring of dried boric acid accumulation on the half-coupling for drain valve RH-V-105 on March 5, 1998, during a Seabrook Improvement Plan system inspection. The engineer initiated an adverse condition report (ACR 98-0782) to review this condition. The drain line is immediately below relief valve RH-V57. The boron was identified between the pipe insulation and the branch "T" fitting where the drain line connects to the "B" Train RHR system discharge piping. The inspector reviewed the licensee's response to this issue, visually inspected the piping, interviewed applicable personnel, and reviewed nondestructive test results.

b. Observations and Findings:

The licensee promptly removed the insulation and inspected the pipe. No visible evidence of leakage was noted. Additionally, the licensee performed liquid penetrant testing which revealed a linear indication in the 8 inch pipe within the heat affected area of the 3/4 inch drain line weld connection. The licensee performed ultrasonic testing to characterize the flaw, and determined that the indication was small and the pipe had adequate wall thickness. The licensee elected to repair this indication. The boron residue was attributed to previous fluid spillage when the relief valve, located above this piping, was removed for testing.

The inspectors determined that the licensee responded well to this condition, and that it did not impact plant safety. The inspectors also noted that this finding indicated that the current system walkdown inspections were thorough, and improved over previous licensee inspection activities. The inspector noted a minor weakness in that the licensee's investigation of an earlier event involving a minor through wall pipe leak below valve RC-V89 did not include a review of other plant areas where insulation was periodically wetted. The licensee subsequently identified a total of five (5) other similar configurations susceptible to periodic wetting (areas relating to relief valves RH-V13, RH-V25, SI-V101, SI-V113, and SI-V76). Inspections of these areas by the system engineer identified no boric acid deposits. Additionally, since the RC-V89 incident, workers have been instructed to exercise care to avoid wetting of insulation during relief valve removal, and to request replacement of insulation when wetted.

c. Conclusion:

The licensee promptly reviewed and evaluated the identification of boric acid accumulation on a RHR drain line. The identification of this condition reflected

positively on the licensee's new system walkdown program. The inspector noted that the licensee's response to this condition did not include identification of the other plant areas potentially susceptible to periodic wetting. The licensee implemented appropriate actions to address this concern.

E2.2 Nitrogen Leak Of Safety Injection Accumulators Supply Header

a. Inspection Scope:

On February 2, 1998, operators identified that the nitrogen pressure in the safety injection (SI) accumulators was decreasing by approximately 13.5 psig/day. The licensee performed system walkdowns, tests, and evaluations to identify the nitrogen leak source(s) and to implement repairs as necessary. The inspector evaluated the licensee's response to these issues, interviewed the system engineer and operations personnel, and reviewed the engineering evaluations.

b. Observations and Findings:

The SI accumulators are safety-related, and are required to inject borated water into the reactor coolant system (RCS) piping loops during certain postulated loss of coolant events. Technical Specifications (TS) Section 3.5.1.1, requires the accumulator pressure to be maintained between 585 and 664 psig. Nitrogen is used to pressurize and maintain the accumulators pressure within the required range.

The inspector reviewed and found acceptable a 50.59 evaluation performed to support the leak detection testing. During their investigation the licensee identified several sources of leakage including valve packing, seat, and body-to-bonnet joints. The licensee tightened the body to bonnet bolts and adjusted the packing on those valves that could be repaired at power, and initiated work requests to repair the remaining valves. One of the largest nitrogen leaks was through the packing of valve NG-V14 which the inspector noted had been recently repacked. The inspector identified that the licensee did not question whether this repeat packing deficiency was due to improper maintenance performance. The inspector discussed this observation with the system engineer who then initiated ACR 98-0771 to review this issue.

The licensee evaluated the identified seat leakage through the "D" accumulator nitrogen supply valve NG-V23 and the header manual isolation valve NG-V123 and determined that the accumulator remained operable with the minor amount of seat leakage.

c. Conclusions:

Operations personnel performed well by identifying the safety injection accumulator nitrogen leaks. The licensee promptly investigated the leakage and implemented

appropriate repairs to reduce the leakage. Engineering properly assessed the impact of this minor leakage on the accumulator operability.

E2.3 Degraded Emergency Feedwater Motor Outboard Bearing, and (Update) of Unresolved Item 97-08-05

a. Inspection Scope:

On February 4, the licensee operated the motor-driven emergency feedwater (EFW) pump to investigate abnormal lubricating oil analysis results which indicated a high tin content. The inspector reviewed these activities and the licensee's lubrication analysis program. During this review, the inspector interviewed the system engineer and the lubricating oil program coordinator, attended meetings and briefings held by the licensee, and reviewed applicable documentation.

b. Observations and Findings:

There are two EFW pumps at Seabrook required to supply water to the steam generators to remove heat from the reactor coolant system during emergency conditions. One pump is turbine driven, while the other pump is motor driven. Each pump is capable of supplying 100% of the required flow.

The pump parameters such as flow, pressure and vibration were normal during the run. The bearing temperature was approximately 179°F (below its design temperature limit of 194°F) and appeared to be steady or increasing very slightly when the run was secured. The licensee elected to open and inspect the outboard bearing following the run and identified that approximately .065 inches of material had been removed from the non-load carrying motor bearing thrust face. The licensee performed a root cause evaluation and determined the coupling hubs had been installed backwards. The condition appeared to have existed since original installation in 1987. The system engineer concluded, based on the pump test data, and bearing condition that the EFW pump was operable. The inspectors independently reviewed the data and determined that the operability determination was sound.

The licensee replaced the bearing, correctly re-installed the coupling hubs and initiated an activity to inspect the other potential coupling hub installation problems. The inspector concluded that the licensee responded well to this specific issue. The inspector questioned however, whether licensee responded properly to earlier indications of elevated tin concentrations within the motor bearing lubricating oil.

Inspection report 97-08 identified potential program deficiencies involving implementation of lubricating oil analysis program and opened unresolved item 97-08-05 to review this issue. Evaluation of the licensee's response to the motor driven EFW pump oil anomalies will be reviewed along with URI 97-08-05.

The licensee has initiated measures to address the inspectors concerns including: initiation of an evaluation team to evaluate and redesign Seabrook's lubrication program, industry bench marking and acquiring external assistance. Additionally, the oversight program performed an independent evaluation and documented extensive findings and proposed corrective actions.

c. Conclusion:

The licensee determined that incorrectly installed coupling hubs (a condition which occurred during initial installation), caused a degraded EFW motor outboard bearing condition. The pump remained operable in this condition and the licensee implemented appropriate corrective actions to address this deficiency.

E8 Miscellaneous Engineering Issues (92903)

E8.1 (Closed) Violation 50-443/96-08-01: covering floor drains in the emergency feedwater pumphouse without performance of a safety evaluation. The inspector verified the corrective actions described in the licensee's response letter, dated December 20, 1996, to be reasonable and complete. Among the corrective actions verified were: revisions to appropriate maintenance and operating procedures to ensure that 10 CFR 50.59 evaluations are performed prior to plugging or blocking floor drains; engineering development of a list of floor drains requiring engineering review prior to blocking; revisions to the Regulatory Compliance Manual to provide clear management expectations regarding 10 CFR 50.59 reviews for procedure changes; and, implementation of supervisor training for procedure revision reviews and 10 CFR 50.59 evaluations. No similar problems were identified.

E8.2 (Closed) Unresolved Item (URI) 97-07-03, Maintenance rule implementation for the control building air conditioning (CBA) system. The inspector questioned in Inspection Report 97-07 whether the licensee should have previously categorized the CBA system as an "A-1" system in response to a history of repeated CBA compressor (train) failures. During this period, the inspector reviewed the issue and noted that the Expert Panel had categorized this system as a normally operating, non-risk significant system. This type of system would not have required train level monitoring and therefore previous individual compressor failures would not have caused the maintenance rule performance criteria to be exceeded. The inspector concluded that the licensee's previous decision not to classify the CBA system as an A-1 system did not violate the maintenance rule requirements. This unresolved item is closed.

E8.3 (Closed) Escalated Enforcement Issues (EEI) 97-08-02, 97-08-03, 97-08-04, and 97-08-06. Inspection report 97-08 identified four issues that were classified as apparent violations. These issues were discussed at a pre-decisional enforcement conference on March 24. The NRC determined that three of the issues were violations of NRC Requirements and transmitted this decision in separate correspondence. These issues included EEI 97-08-03, EEI 97-08-04, and EEI 97-08-

06 which are being closed administratively. Followup licensee actions to these violations will be tracked under the following enforcement action items: 98-073-01013, 98-073-02013, and 98-073-03013.

The final issue involving operation of the safety injection system (EEI-97-08-02) was determined not to be a violation and is closed.

IV. Plant Support

R1 Radiological Protection and Chemistry Controls

R1.1 Maintenance Work In Posted Contaminated Area Without Protective Clothing

a. Inspection Scope:

On March 13, 1998, the inspector observed three maintenance technicians and one engineer performing maintenance activities on the "B" containment building spray (CBS) pump, inside a posted contamination area without any protective clothing. The activities which included sampling of the pump bearing oil, and repair of the pump inboard bearing thermocouple, were being performed under radiation work permits (RWPs) 98-R-00002, 98-R-00004, and 98-R-00011.

b. Observations and Findings:

The inspector observed that all four workers had reached across the contamination boundary with their bare hands to perform or support the maintenance activities. The inspector questioned the workers whether they had consulted with the health physics department (HP) on the acceptability of working without protection inside the contaminated boundary. One worker indicated that he had spoken with a HP technician and believed that he had been authorized to perform the maintenance activities without any additional protective clothing.

The inspector reported the events to a HP technician and notified the HP Manager. These individuals stated that they expected all personnel working inside a contaminated area to wear, as a minimum, hand protection. The inspector reviewed the applicable radiation work permits (RWP-98-R-00002, 98-R-00004, and 98-R-00011) and confirmed that all three RWPs required the use of inserts, and rubber gloves.

The inspector reviewed HP radiological surveys of the applicable areas performed before and after this event and noted that the survey levels were lower (approx. 409 DPM/100 cm) than the required posting value (greater than 1,000 DPM/100 cm). However, HP posted these areas conservatively due to the potential for varying radiological conditions. None of the four workers or the tools used became contaminated during these activities. however, the inspector was concerned that

multiple workers across a number of disciplines failed to comply with the Station HP requirements.

On March 16, 1998, HP management removed the workers' dosimetry to prevent their entry into the RCA, and initiated a full investigation of this issue (ACR 98-0882). The event was thoroughly reviewed and several corrective actions were implemented including:

- Coaching and counseling of all individuals involved
- HP management held briefings with engineering and maintenance personnel, to review this incident and reinforce HP expectations.
- Performing reviews of the rad training materials for "Contaminated Areas" boundary delineation and controls, to ensure adequate understanding of postings and to enforce contaminated area practices.
- Evaluating existing "Contaminated Area" postings, to ensure better delineation of posted boundaries.

The inspector determined that the licensee addressed this issue well and that their investigation was comprehensive.

Technical Specification (TS) 6.10.1 requires that procedures for personnel radiation protection be prepared consistent with the requirements of 10 CFR Part 20 and shall be adhered to for all operations involving personnel radiation exposure. Seabrook administrative procedure RP 9.1, "RCA Access/Egress Requirements", revision 12, dated 2/11/98, requires, in part, that personnel perform work inside the RCA in accordance with the RWP and posted instructions. Contrary to the above, on March 13, 1998, four individuals failed to comply with their RWP and posted radiological instructions. This is violation of TS 6.10.1 **(VIO 50-443/98-01-03)**.

c. Conclusion:

The inspector identified four workers performing maintenance on the "B" containment spray pump which had been posted as a contaminated area without wearing any protective clothing as required by the radiation work permit and posted instructions. The licensee promptly evaluated this issue and implemented adequate corrective actions.

S1 Conduct of Security and Safeguards Activities

S1.1 General Comment (71707, 71750)

The inspectors observed security force performance during inspection activities. Protected area access controls were found to be properly implemented during random observations. Proper escort control of visitors was observed. Security officers were alert and attentive to their duties.

F8 Miscellaneous Fire Protection Issues (92904)

F8.1 (Closed) Violation 50-443/96-03-01: two examples of staff failure to follow procedures regarding control of combustible materials and repair of emergency lights. The first example involved a failure to adhere to fire protection procedure 2.2, Rev 2, "Control of Combustibles," when, on April 18, 1996, three plastic pails of a Class I combustible (epoxy primer paint) were inappropriately stored and left unattended in the turbine building. The second example involved a failure to adhere to operations procedure OS0443.47, Revision 5, "8 Hour Emergency Lighting Units Monthly Functional Test," when, on January 28, 1996, three inoperable emergency lights were found, but not properly reported to the Unit Shift Supervisor (USS), nor was a work order initiated to restore the lights to service. The inspector verified the corrective actions described in the licensee's response letter, dated July 12, 1996, to be reasonable and complete. Among the corrective actions verified were: procedure changes to ensure the control of combustible materials, providing additional clarification of requirements for approved storage; procedure changes to ensure timely notification of the USS and initiation of work orders for inoperable emergency lighting; and, licensee records indicating that other required activities were completed. No similar problems were identified. This item is closed.

F8.2 (Closed) Violation 50-443/96-03-02: one example of inadequate fire protection procedures regarding timely restoration of inoperable emergency lighting. This violation involved two Seabrook procedures not incorporating Seabrook Design Basis Document, DBD-FP-01, "Emergency Lights," design criteria of returning emergency lights to an operable status within 30-days of being identified as inoperable. The inspector verified the corrective actions described in the licensee's response letter, dated July 12, 1996, to be reasonable and complete. Among the corrective actions verified were: procedure changes to the associated surveillance and maintenance procedures to ensure that inoperable emergency lighting would be assigned a priority 2 work request; completion of an effectiveness monitoring program in the maintenance organization to ensure that this violation did not repeat; and, a re-evaluation by the maintenance organization of other similarly "self-identified" violations where corrective actions had not been fully implemented leading to repeat violations. This latter action was considered by the inspector as a comprehensive review and self-assessment of the corrective actions program tracking system for maintenance concerns. No similar problems were identified. This item is closed.

V. Management Meetings

X1 Exit Meeting Summary

The inspectors presented the inspection results to members of licensee management, following the conclusion of the inspection period, on April 8, 1998. The licensee acknowledged the findings presented.

X3 Other NRC Activities

A pre-decisional enforcement conference was held on March 23, 1997 at the Region I office in King of Prussia, Pennsylvania. The conference was conducted to review four apparent violations of 10 CFR 50 Appendix B Criterion XVI. The NRC enforcement decision was transmitted via separate correspondence.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

W. Diprofio, Unit Director
R. White, Design Engineering Manager
J. Grillo, Technical Support Manager
G. St Pierre, Operations Manager
B. Seymour, Security Manager
J. Linville, Chemistry and Health Physics Manager
J. Vargas, Engineering Director

INSPECTION PROCEDURES USED

IP 37551:	Onsite Engineering
IP 61726:	Surveillance Observation
IP 62707:	Maintenance Observation
IP 71707:	Plant Operations
IP 71750:	Plant Support Activities
IP 92700:	Onsite Followup of Written Reports of Nonroutine Events at Power Reactor Facilities

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

NCV	98-01-01	Failure to Develop Adequate Surveillance Test Procedures
VIO	98-01-02	Failure to Implement Adequate Design Controls
VIO	98-01-03	Failure to Adhere to Radiation Work Permit and Posted Instructions

Closed

VIO	96-03-01	Failure to Follow Procedures Regarding Control of Combustible Materials and Repair of Emergency Lights
VIO	96-03-02	Inadequate Fire Protection Procedures Regarding Timely Restoration of Inoperable Emergency Lighting
VIO	96-04-01	Inadequate Emergency Feedwater Pump Maintenance
URI	97-06-01	Review of Operator Actions Following a Main Feedwater Pump Pipe Oscillations
LER	96-06-00	Missed Surveillance Requirement
LER	97-03-00	Missed Surveillance Turbine Trip on Reactor Trip
LER	97-04-00	Remote Shutdown Circuits Not Tested Completely
LER	97-17-00	Inadequate SSPS Surveillance Testing
LER	98-01-00	Inadequate ECCS Venting Procedure
NCV	98-01-01	Failure to Develop Adequate Surveillance Test Procedures
VIO	96-08-01	Covering Floor Drains Without a Safety Evaluation
URI	97-07-03	Review of Maintenance Rule Characterization of Control Building Air Conditioning Compressors
EEI	97-08-02	Operation of the Safety Injection System Test Header
EEI	97-08-03	Failure to Implement Prompt Corrective Action for a Degraded Pipe
EEI	97-08-04	Failure to Implement Prompt Corrective Actions for Degraded Control Building Air Conditioning Compressors
EEI	97-08-06	Failure to Implement Prompt Corrective Actions for a Degraded Positive Displacement Charging Pump

Discussed

URI	97-08-05	Potential Lubricating Oil Program Deficiencies

LIST OF ACRONYMS USED

ACR	Adverse Condition Report
ASME	American Society of Mechanical Engineers
CAS	Central Alarm Station
CBS	containment building spray
EDG	Emergency Diesel Generator
EFW	Emergency Feedwater
FME	Foreign Material Exclusion
gpd	gallons per day
gpm	gallons per minute
LCO	Limiting Condition for Operation
MOV	motor operated valve
MPCS	Main Plant Computer System
NSARC	Nuclear Safety and Audit Review Committee
psig	pounds per square inch gauge
QC	Quality Control
RHR	Residual Heat Removal
SG	steam generator
SIR	Station Information Report
SORC	Station Operations Review Committee
SUFP	Startup Feedwater Pump
SW	Service Water
TDEFW	Turbine Driven Emergency Feedwater Pump
TS	Technical Specifications
UFSAR	Updated Final Safety Analysis Report
WR	Work Request