APPENDIX B

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Inspection Report: 50-382/93-35

License: NPF-38

Licensee: Entergy Operations, Inc.
P.O. Box B
Killona, Louisiana

Facility Name: Waterford Steam Electric Station, Unit 3

Inspection At: Waterford Steam Electric Station, Unit 3 (Waterford 3)

Inspection Conducted: December 12, 1993, through January 29, 1994

Inspectors: E. J. Ford, Senior Resident Inspector
J. L. Dixon-Herrity, Resident Inspector
J. E. Whittemore, Reactor Inspector

Approved: William B [illegible] 3/3/94
Thomas F. Stetka, Chief, Project Branch D Date

Inspection Summary

Areas Inspected: Routine, unannounced inspection of plant status, onsite followup of events, operational safety verification, maintenance and surveillance observations, cold weather preparations, other followup, and review of licensee event reports.

Results:

- The inspectors concluded that the implementation of the component cooling water (CCW) system modification was poor for the following reasons:
  - The licensee failed to develop and implement work instructions to change the valve operating mechanisms.
  - The condition that resulted from replacing a safety-related operator with a nonsafety-related operator still existed and had not been evaluated.
  - The licensee's safety evaluation did not consider the modification's affect on train separation or single train integrity.

The licensee did not conduct adequate postmodification testing.

The failure of the design controls to provide work instructions and adequate postmodification testing was identified as a violation of Criterion III to 10 CFR Part 50, Appendix B. The licensee's evaluation for replacing the safety-related operator with a nonsafety-related operator will be reviewed as part of the violation response followup (Sections 2.2 and 2.3).

- The licensee's determination that the CCW system had been operable when the butterfly valves were partially open and that system operability would be assured with the common-mode passive failure was found to be valid. The licensee's initial actions and early followup actions were aggressive and conservative and their operability evaluation was good (Section 2.4).

- The licensee did not identify and correct the root cause of the degraded train separation when the valve's seat leakage was first identified in 1989. This inadequate corrective action was identified as the first of two examples of a violation of 10 CFR Part 50, Appendix B, Criterion XVI (Section 2.6).

- The number of steam leaks in the balance of plant was noted as a concern (Section 3.1.1).

- Although identified as a problem and repaired three times previously, interference between an adjacent structural support and the declutch lever on Main Steam Drip Pot Normal Drain Valve MS-120A caused the valve to fail to close during a surveillance. These inadequate corrective actions were identified as the second example of a violation of 10 CFR Part 50, Appendix B, Criterion XVI (Section 3.2).

- The inadequacy of a previous maintenance engineering input used in repairing Valve MS-120A was identified as a weakness (Section 3.2).

- Security personnel reacted conservatively to a noncredible telephonic threat to the plant (Section 3.3)

- An inspection followup item was opened to evaluate nodules found during preventive maintenance on the interior pipe surfaces of the auxiliary CCW systems during borescope inspections of the two trains (Section 4.3).

- The licensee made expeditious, yet conservative, efforts to repair Containment Purge Supply Valve CAP-104 (Section 5.3).

- The licensee had a well conceived and properly implemented program for freeze protection (Section 6.1).

Summary of Inspection Findings:

- Violation 382/9335-01 was opened (Section 2.2.2).
- Violation 382/9335-02 was opened (Sections 2.6 and 3.2).
- Inspection Followup Item 382/9335-03 was opened (Section 4.3).
- Inspection Followup Item 382/9334-03 was closed (Section 7.1).
- Inspection Followup Item 382/9334-07 was closed (Section 7.2).
- Inspection Followup Item 382/9334-08 was closed (Section 7.3).
- Inspection Followup Item 382/9334-09 was closed (Section 7.4).
- Inspection Followup Item 382/9334-10 was closed (Section 7.5).
- Inspection Followup Item 382/9334-11 was closed (Section 7.6).
- Inspection Followup Item 382/9334-12 was closed (Section 7.7).
- Inspection Followup Item 382/9334-13 was closed (Section 7.8).
- Inspection Followup Item 382/9334-14 was closed (Section 7.9).
- Licensee Event Report 92-14 was closed (Section 8.1).

Attachment:

- Persons Contacted and Exit Meeting

DETAILS

1 PLANT STATUS

The plant operated at full power from the beginning of this inspection period until December 16, 1993, when reactor power was briefly decreased to 97 percent in response to the removal of a reheat tube bundle from service on Moisture Separator Reheater B due to tube leaks. The plant was then returned to full power. It remained at full power until January 6, 1994, when power was lowered to approximately 93 percent to allow routine turbine valve testing. The plant was again returned to full power and remained there until the end of the report period.

2 EVENT FOLLOWUP OF CCW SYSTEM DEGRADED TRAIN SEPARATION

The normal function of the CCW system is to remove heat from plant components. Each train of CCW performs the safety-related functions of containment heat removal and rejection following a loss-of-coolant accident (LOCA) or main steam line break inside containment, by supplying cooling water to the containment fan coolers (CFCs). Although crossconnected during normal operation, when a safety injection and actuation signal is received, the system was designed to separate at the discharge of the CCW pumps. The trains were separated downstream of the CFCs under both normal and accident conditions.

In 1988 the licensee implemented a modification to the CCW system (as described in Section 2.2) that would utilize the CFCs to improve environmental working conditions inside the containment building during outages.

The performance of a special test procedure by the licensee on January 14, 1994, disclosed a previously undetected leakage of approximately 400 gpm through manual isolation butterfly valves in a crossconnection between the two trains of the CCW system downstream of the CFC loads. This leakage flow resulted in a degradation of the required train separation. The isolation valves (CC-8241A and CC-8251B), which were normally in the closed position (thus separating the two trains), were determined to be approximately 30 percent open despite an indication of fully closed.

2.1 Background

On January 25, 1994, the inspectors assessed the licensee's actions related to the event and resultant conditions. In order to assess the licensee's performance, the inspectors reviewed the sequence of events related to the discovery and evaluation of the condition. Also, a review of the licensee's immediate, followup, and proposed corrective action was performed. An abbreviated sequence of important activities follows:

12/30/93 While performing inservice testing (IST) of the CCW Pump AB discharge check valve, the required flow (6554 gpm) could not be

obtained. A newly developed test procedure was being used in order to comply with the requirements of Generic Letter (GL) 89-04, "Guidance on Developing Acceptable Inservice Testing Program," which requires that accident flow conditions be established through the safety-related check valve. The licensee declared Pump AB and the check valve inoperable.

1/5/94 The installed flow instrument used for IST was found to be out of calibration. Indicated flow was found to be 500 gpm lower than actual flow. Total flow observed during the test was 5950 gpm, which equated to an actual flow of 6450 gpm, and the flow was still less than flow required by GL 89-04 (6554 gpm).

1/7/94 An engineering evaluation confirmed that the CCW Pump AB discharge check valve was operable in accordance with requirements that existed prior to the issuance of GL 89-04. (At the time of this inspection, the licensee had not yet achieved full compliance with GL 89-04.) The IST was subsequently reperformed successfully, and CCW Pump AB and its check valve were declared operable. The evaluation recommended that a special test be developed to verify that the check valve would allow the passage of full accident flow for check valve testing as required by GL 89-04.

1/13/94 A special test procedure to verify accident flow (6554 gpm) was developed, recommended by the Plant Operations Review Committee, and approved by the Plant Manager.

1/14/94 The special test was performed with Pump AB delivering to CCW Train A. The CCW flow from CFC B indicated 400 gpm with CFC B secured. The special test procedure developed 6500 gpm flow. An engineering evaluation confirmed that the tested portion of CCW was operable, even though the revised accident flow criterion was not met. The licensee determined that accident flow was not achieved because the test procedure did not adequately mimic the flow path that would be established during accident conditions. A procedure change was initiated to provide additional flow paths to achieve the required test flow.

1/18/94 The licensee initiated troubleshooting activities that eventually identified an unexpected flow path through butterfly Valves CC-8241A and CC-8251B. These valves were determined to be partially open (30 percent) even though the manual operators indicated fully closed. The valves were installed in 1988 as part of a modification to provide chill water from a skid-mounted chiller to the CFCs during outages for improving ambient conditions in the containment building. The identified flow path provided a crossconnection that served to degrade the CCW train separation required by design during accident conditions. Maintenance personnel adjusted the manual actuators on the valves to close and lock the valves in the closed position.

1/19/94 The licensee performed an engineering evaluation that verified that the observed degradation of train separation would not adversely affect system performance during accident conditions. The evaluation also confirmed that a passive failure in the isolated, idle train would allow operators over 6 hours to isolate, repair, or otherwise mitigate the effects of the postulated passive failure. The licensee provided the NRC with a 1 hour, nonemergency notification.

1/21/94 The licensee successfully performed the revised special test procedure, and the required accident flow for the CCW check valve IST was achieved.

2.2 Modification

The inspectors reviewed the modification design and implementation in order to determine if these processes contributed to the event and the resultant degraded conditions.

2.2.1 Description of Modification

In 1988, Design Modification MP-1960 was implemented to improve atmospheric conditions in the containment building during outage periods in the warm spring and summer months. The CCW system was modified to allow the connection of a skid-mounted, portable chiller system in order to provide chilled water to the CFCs and lower the ambient temperature. The flow path for the chilled water supply was a common line into the auxiliary building that split into two train supply lines. The two supply lines, one for each train of CFCs, each contained a check valve. Each train of cooling further divided into two lines to supply the two individual CFCs within a single train. Chilled water was directed through both coolers in the train, exited each cooler, and merged into a common train outlet line. The two train outlet lines merged into one line that left the auxiliary building and returned to the chiller unit. A 6-inch butterfly valve was installed in each train's outlet line prior to merging into a single line. The event occurred when both of the butterfly valves were determined to be at least 30 percent open, which resulted in crossconnection of the two CCW trains.

2.2.2 Modification Implementation

A review of the modification implementation revealed that the butterfly valves had originally been purchased from another utility in the form of safety-related assembled units. The two units had arrived on site in the form of assemblies consisting of a valve, a pneumatic positioner, and a pneumatic actuator. According to information contained in the licensee's material management data base, the assembled units received on site were safety-related, Quality Class 1, and Seismic Category I. The inspectors reviewed a vendor technical information package that was apparently received with the assemblies. This package contained a page that stated that the

positioner and actuator, along with related limit switches, regulators, filters, and transducers, had been removed and stored in the warehouse.

The inspectors requested documentation that would indicate how the manual operators were installed on the valves. The licensee was unable to supply adequate records to support the changeout of the actuators. The inspectors asked for procurement information on the manual operators that were eventually installed in place of the pneumatic actuators. This information could not be obtained until such time as a licensee representative recognized a requisition ticket number handwritten in the margin of the mechanical bill of material within the modification package. The representative was able to back trace the ticket number and identify the purchase order number that had procured the manual, gear-driven operators that were installed on the valves.

The inspectors obtained a copy of Purchase Order WPO 15947, dated August 10, 1987. The procurement specifications for these operators included Seismic Class II and Quality Class 2. The butterfly valves were classified Seismic Class I and Quality Class 1. Therefore, the modification had installed nonsafety-related, gear-type, manual operators on safety-related valves. This condition existed at the time of this inspection activity and had not been evaluated. Although these valves should not have to be operated during accident conditions, it was necessary to operate the valves to achieve the designed train separation after they were determined to be out of position during testing. Additionally, it was not clear that CCW cooled components, other than the CFCs, would have received required flow had the valves been open greater than 30 percent during accident conditions.

The inspectors reviewed the postmodification testing and the engineering safety evaluation performed to support the adequacy of the modification implementation. The postmodification testing required by the modification was not clearly articulated. The modification testing requirements stated that testing was to be performed in accordance with Section 11 of the ASME Code. Specific Code subsections or articles were not identified. Therefore, it was apparently interpreted that hydrostatic testing of the newly-installed moderate energy piping would be sufficient.

The inspectors noted that postmodification seat leakage testing had the potential to identify a mismatch between valve indication and actual position. Therefore, the applicable version (1980) of Section 11 of the ASME Code was reviewed. Subsection IWV did not specifically require additional testing beyond a system hydrostatic test. Seat leakage testing was required only when valves were required to limit seat leakage in the performance of their safety function. There was no known acceptable method for quantifying seat leakage for adequate train separation. Seat leakage or flow performance testing was not stipulated or performed upon modification completion. There was no documentation in the modification package to indicate how the postmodification testing requirements had been determined beyond referencing Section 11 of the ASME Code.

The modification package contained documentation of an engineering safety evaluation that was performed to comply with the requirement of 10 CFR 50.59(b)(1). The inspectors reviewed this evaluation and noted the focus of the review was the integrity of the newly installed piping and how it matched the rest of the CCW system. The potential for inadvertently connecting the two safety-related trains of CCW through an added flow path was not addressed within this evaluation. Further review of the modification was conducted to determine if the installed valves were identified as normally locked-closed valves. This requirement could not be identified within the modification package; however, Administrative Procedure OP-100-009, "Control of Valves and Breakers," which was revised and approved for use on June 3, 1988, did specify and list Valves CC-8241A and -8251B to be locked and closed. The inspector compared the current licensee process for 10 CFR 50.59 evaluations with the process that existed when the modification was implemented. The current process was implemented by Site Directive W2.302, Revision 1, "10 CFR 50.59 Safety and Environmental Impact Evaluations." A review of this document, which was revised in July 1993, revealed that the evaluation process contained screening type questions that would urge an evaluator to consider safety train separation or single train integrity issues.

The failure to provide adequate process instructions for the safety-related task to modify the qualified valves is an example of inadequate design control and is a violation of Criterion III of Appendix B to 10 CFR 50. An additional example is the failure to conduct adequate postmodification testing to ensure design adequacy (382/9335-01).

2.3 Modification Implementation - Conclusions

The inspectors concluded that the implementation of the modification was poor. The licensee had failed to develop and implement work instructions to change the valve operating mechanisms. Also, the condition that resulted from replacing a safety-related operator with a nonsafety-related operator still existed and had not been evaluated. Additionally, the licensee's safety evaluation did not consider the modification effect on train separation or single train integrity. Finally, the licensee did not conduct additional postmodification testing beyond that perceived to be required by Section 11 of the ASME Code.

2.4 Licensee Initial and Followup Actions

At the first indication that led to the discovery of inadequate train separation, the licensee took initial action, performed evaluation, and initiated followup action to address the condition. This event was additionally complicated because of the licensee's ongoing effort to achieve compliance with GL 89-04. The inspectors followed up to assess the licensee's performance related to this condition.

2.4.1 Initial Actions

Although not directly related to the event, it is relevant to consider the licensee's action in response to the unsatisfactory results of inservice testing that eventually led to discovery of the condition. The procedure to test the CCW Pump AB check valve was in use for the first time. When the expected results were not achieved, personnel declared the pump and related check valve inoperable. This action was conservative because the test methodology was not questioned and the indicated performance was considered to be valid. Taking the above action ensured the operability of two separate trains of safety-related CCW. Personnel continued on two different parallel paths to create an IST test method to verify check valve operability and to evaluate the operability of CCW Pump AB. When the 400 gpm flow anomaly in Train B was discovered, the licensee quickly entered a troubleshooting phase, identified the condition (partially open valves), and determined that the trains were crossconnected. When the condition was fully understood, the affected valves were fully shut and locked.

2.4.2 Followup Action

When the inadvertent train crossconnection was eliminated, the task of evaluating the previous CCW system operability commenced. In accordance with the licensee's corrective action system, Condition Identification (CI) 289046 was initiated. This required the performance of an evaluation that verified that the 400 gpm flow rate to the other (B) train had increased Train A CFC flow, but had not degraded flow rates to other Train A safety-related components below the minimum required. The fluid entering Train B would end up in the partitioned CCW expansion tank that supplied both trains. This evaluation served to verify that the previously existing conditions would allow the CCW system to perform its intended safety function and was, therefore, operable.

The evaluation was pursued further to consider passive failure and its affect on continuing operability. The licensee provided the inspectors with analysis that bounded the leak rate of a through-wall crack in the largest diameter system piping at 455 gpm. Additionally, startup testing data was provided that verified a safety-related CCW makeup capability of greater than 600 gpm. Based on these limitations and capabilities, the source of makeup water would last for greater than 6 hours. Therefore, ample time was available to address and mitigate or eliminate the maximum credible passive failure.

The inspectors reviewed the assumptions and conclusions made in the licensee's evaluation. Additionally, it was verified with Office of Nuclear Reactor Regulation Mechanical Systems Branch personnel that the licensee's assumptions and methodology for determining the maximum leak rate due to passive failure were valid.

2.5 Licensee Actions and Operability - Conclusions

The inspectors agreed with the licensee's determination that the system had been operable when the butterfly valves were partially open. The determination that system operability would be assured with the common-mode passive failure was also valid. Based on these findings, the inspectors considered the licensee's initial actions and early followup actions to be aggressive and conservative and their operability evaluation to be good.

2.6 Inadequate Corrective Actions for Valve Leakage

The licensee initially identified that Valve CC-8251B was leaking on October 10, 1989, and reported this condition using CI 265759. This CI required that troubleshooting be performed on the valve and the stroke of the valve adjusted using Work Authorization (WA) 01047339. This CI was closed on November 6, 1989. In WA 01047339, the Step 7 results block of the work instructions documented that leakage may have been from Valves CC-8241A or -8251B. No work was performed and CI 272856 was initiated, on December 17, 1990, to correct the problem. Maintenance management personnel stated that the CI review process for scheduled work would have evaluated this required work for performance in Refueling Outage 5 and may have delayed it due to a wrong identification and characterization of the work required. This wrong description of the problem caused the licensee to believe that the task was of a low priority and that a qualified welding procedure was required to accomplish the repairs. However, a qualified procedure was not available for doing the repair action.

Because the problem still existed (and a qualifed procedure was not yet available), the inspectors concluded that the valve leakage problem identified in the CIs had not been corrected in a timely and appropriate manner. This was identified as one of two examples (refer to Section 3.2 for the second example pertaining to Valve MS-120A repairs) of a violation of 10 CFR Part 50, Appendix B, Criterion XVI, for the failure to take adequate measures to correct conditions adverse to quality (382/9335-02).

3 OPERATIONAL SAFETY VERIFICATION (71707)

The objectives of this inspection were to ensure that this facility was being operated safely and in conformance with regulatory requirements and to ensure that the licensee's management controls were effectively discharging the licensee's responsibilities for continued safe operation.

3.1 Steam Leaks

During plant tours on December 18 and 20, 1993, the inspectors noted numerous steam leaks in the secondary side of the plant. Areas noted included Moisture Separator-Reheater Drain Collector Tank 1B isolation valves, piping on the west side of the condenser between the main steam lines on the +40-foot level of the turbine building, waterbox isolation valves on the first stage heaters, a manway on Moisture Separator Reheater B, and a flow instrument line leak on

the suction line of Feedwater Pump B. All had been previously identified and documented by the licensee.

The inspectors discussed the problem areas with licensee management. The licensee's practice was to walk the turbine building down once a week to monitor identified leaks and identify new ones. On-line repairs of large leaks could be required after each leak was reviewed for its affect on personnel safety and against set financial criteria. After repair attempts, small leaks that did not endanger personnel or equipment were monitored to ensure that the leakage did not increase and were scheduled for repair during an outage.

Thirty-nine leaks were repaired on site since July 1992. Only eight of these leaks had been worked during Refuel Outage 5 (a total of 608 secondary valves were worked on during that outage). A database tracking the type of leaks and status was developed in response to the inspector's concern. The data indicated that the greatest percentage of the leaks was due to bolting or gasket problems.

A goal of zero steam leaks was being discussed by the licensee for the upcoming year. A number of enhancements was scheduled for installation during the next refueling outage. Vent and drain valves installed without caps were to be capped and seal welded. Sixty valves with limited access for packing adjustment were scheduled to be replaced with improved bellows-type valves. The licensee was also considering implementing a special crew to proactively address steam leaks.

3.2 Isolation Valve MS-120A Operability

On January 2, 1994, Main Steam Drip Pot Normal Drain Valve MS-120A, a containment isolation valve, failed to close during the performance of Surveillance Procedure OP-903-094, Revision 7, "ESFAS Subgroup Relay Test-Operating." The motor-operated valve breaker overloads were found in the open position. The valve was properly declared inoperable, closed, and deenergized within the time limits specified by Technical Specification 3.6.3, and Condition Report 94-08 was written to track corrective actions. During troubleshooting by electrical maintenance personnel, the valve's declutch lever was found resting against and held down in the declutched position by an adjacent structural support. This caused the motor to disengage from the drive gears, preventing the valve from closing on demand. This condition was recorded in Condition Report 94-026. The overloads were tested and no problems were found.

Maintenance engineering personnel and electrical maintenance supervision stated that the declutch lever was removed and replaced with a lever that was heated and bent to prevent interference with the structural support. An engineering evaluation authorized the modification and contained calculations demonstrating noninterference. The handle that was removed appeared to have been previously modified in a similar manner but not enough to completely avoid interference with the structural support.

The inspectors reviewed the corrective maintenance history for the valve with the licensee on January 7, 1994, and two CI reports were found that appeared to address the interference between the lever and the support. The event that caused the lever to become jammed had not been identified, but the licensee suspected that the lever had been bumped or fallen upon during painting activities that had occurred in that space since the last surveillance test. The valve had been operable the last time Procedure OP-903-094 was performed on November 13, 1993.

The work for CI 251421 was completed on December 14, 1987, under WA 01005408. This package required that the rigid restraint be adjusted to prevent the declutch lever from hitting the platform support. CI 266587 was completed on January 16, 1990, under WA 01050372. It identified a problem with the declutch lever locking while the valve was being operated manually. The clutch tripper assembly was inspected and adjusted and the declutch lever was filed, as authorized by maintenance engineering input, to eliminate friction between the lever and a support. CI 273518, the third CI issued, was completed on April 5, 1991, and required MOVATS testing following the rebuild of the operator during Refuel Outage 4. The declutch lever was found hitting against the support, causing the valve to stay in manual when the valve was stroked electrically. The January 16, 1990, maintenance input was used as authorization to modify the lever a second time.

Although the problem was identified in 1987, 1990, and 1991, corrective actions taken failed to prevent the failure of the valve on January 2, 1994, due to the interference between the declutch lever and an adjacent structural support. The maintenance engineering input provided in 1990 addressed thermal growth, but was deficient in that it did not use this information to calculate the extent the lever should have been modified. A calculation completed by design engineering on January 6, 1994, showed growth could cause movement up to 1.4 inches. The previous trend of problems was not used to require a check after the last modification was made in 1991 to ensure that the modification would accomplish its intended function. The valve was inoperable from the time the lever jammed, sometime after November 13, 1993, until January 2, 1994, when the condition was identified during surveillance testing. Had the valve failed to close when required, a main steam flow path would have been established to the main condenser. The condenser vacuum pumps' discharges were monitored and a filtered release path provided if an increased radioactive discharge level was sensed. This was identified as a second example of a violation for the failure to take adequate measures to correct conditions adverse to quality (382/9335-02).

The corrective actions taken in response to the failure on January 2, 1994, were found to be complete and in accordance with procedure. The inspectors verified that there was adequate clearance between the handle and the structural support. These actions should prevent a repeat of the failure due to interference with the support.

3.3 Noncredible Threats

On January 8, 1994, control room supervision informed the inspectors that two bomb threats had been received the night before. At approximately 2:25 a.m. and 2:26 a.m., security shift supervision received two bomb threats by telephone. The calls did not meet credibility criteria and were classified as noncredible threats. Operations personnel and security teams conducted a search of the facility with negative results.

3.4 Conclusions

The number of steam leaks in the balance of plant was noted as a concern by the inspectors and NRC senior management. Although identified as a problem and repaired three times previously, interference between an adjacent structural support and the declutch lever on Valve MS-120A caused the valve to fail to close during a surveillance. The failure to implement effective corrective actions was identified as a violation. The inadequacy of a previous engineering input used in repairing Valve MS-120A contributed to this violation. Security personnel reacted in a conservative manner to telephonic bomb threats, which were evaluated as noncredible.

4 MONTHLY MAINTENANCE OBSERVATION (62703)

The station maintenance activities affecting safety-related systems and components listed below were observed and documentation reviewed to ascertain that the activities were conducted in accordance with approved WAs, procedures, Technical Specifications, and appropriate industry codes or standards.

4.1 VOTES Test of Valve MS-120A

On January 6, 1994, the inspectors observed as VOTES testing was performed on Valve MS-120A in response to the event discussed previously in Section 3.2 of this report. The inspectors noted that all equipment was within the calibration dates and that the electrical maintenance personnel were performing the test in accordance with WA 0111418 and Maintenance Procedure ME-007-047, Revision 1, "VOTES Testing of MOVs." The quality assurance and design engineering departments had representatives observing the test. Maintenance engineering personnel performed an analysis of the data at the work site. All data taken were found to be within the acceptance criteria for the valve.

4.2 Auxiliary Component Cooling Water (ACCW) Pump B Relay Test

On January 6, 1994, the inspectors observed electrical maintenance personnel test ACCW Pump B OCX Relay ACCEREL 3B-6J. The work was accomplished in accordance with WA 01117416 and Maintenance Procedure ME-007-033, Revision 3, "G.E. Auxiliary Relay 12HGA14." The procedure was followed verbatim and independent verification was properly performed. Electrical maintenance supervision observed the test portion of the task. The as-found relay pickup

voltage was slightly lower than the limits required in the procedure acceptance criteria. The relay was adjusted in accordance with the procedure so that the voltage was within the acceptance criteria limits. Through discussions with electrical maintenance supervision, the inspector verified that this did not affect the operability of the relay or the breaker. The relay was in an alarm circuit, which would cause an ACCW Pump B motor overload alarm in the control room. Good electrical practices were used throughout the performance of the task.

4.3 Borescope Inspection of ACCW Pump B

On January 6, 1994, the inspectors observed as preventive maintenance was performed on ACCW Pump B. The tasks included lubricating the pump bearings and couplings per WA 01116982 and using a borescope to inspect the interior of the pump and suction and discharge piping per WA 01117188. The first task proceeded as planned and no concerns were noted. The second was delayed to revise the procedure requirement to cut a vent line on the ACCW discharge piping to access the interior of the pump and piping. An approved change was made to the package to allow the removal of the pump's water side oil cooler inlet valve (Valve ACC-1014B) to provide an inspection access point for the borescope probe. Once the change was made, the task proceeded without further incident. The onsite quality assurance nondestructive examination group performed the inspection.

When the oil cooler was removed, the water inlet strainer was full of what appeared to be green plastic shavings. Valve ACC-1014B was disassembled and similar green shavings were found inside. The inspector later discussed the possible affects of the shavings on the system with system engineering supervision. The oil cooler had been added as an enhancement to the pump several years before due to a finding that the pump ran at higher than desired bearing temperatures. Although the higher temperatures did not affect the pump's operability, the enhancement was made to ensure the pump's continued reliability. The strainer was installed in the line to keep debris in the system out of the cooler. The remainder of the system was designed to be open so this small debris would not affect its operability. The strainer was cleaned regularly as part of the preventive maintenance program.

During the inspection, nodules were identified on the interior of the pipe. The pump interior surfaces were clean. The height of one nodule measured approximately .075 inch. A video recording was made of the anomaly to allow further examination and evaluation. On January 25, 1994, the inspector observed as ACCW Pump A was inspected using a borescope and the same condition was found. Water samples were taken during both tasks to be tested and contractors were brought onsite to review and evaluate the recording of ACCW Pump B. Further analysis was scheduled to be done during Refuel Outage 6. This issue will be tracked as an inspection followup item to review the results of the examination and the licensee's evaluations (382/9335-03).

4.4 Emergency Generator A (EGA) Pressure Control Valve Repair

During a tour of the diesel rooms on January 10, 1994, the inspectors heard air escaping in the vicinity of a bank of air control valves on EGA. Further investigation revealed that Control Air 80 lb. Pressure Control Valve EGA-408A had a condition tag (CI 288950) attached documenting a leak at the base of the valve.

Later that day, the inspectors observed as the leak was repaired under WA 01117730. The suspected cause was a leaking diaphragm. The task involved reworking the valve and checking to ensure that it was set at the required 80 psig. The inspectors verified that the diesel was properly tagged out to perform the repair. The tags were attached to the correct components and the components were found in the correct position. A discrepancy was noted in the component nomenclature on one tag. The inspectors questioned operations personnel. They explained that the two new systems, one used to label the components and one to develop tagouts, were recently developed at the same time and had not yet been compared to eliminate the differences in nomenclature. The system used in developing the permanent identification tags on the components in the plant used the correct nomenclature. The licensee plans to use a software program to compare the systems and correct the differences. The task of reworking the valve was completed under the observation of a peer inspector to ensure the parts were correct and that the valve was rebuilt correctly.

The inspectors noted that the case for this particular valve was constructed of plastic, while the remaining valves on EGA and Emergency Generator B were constructed of metal. The inspectors questioned the difference between the valves. Instrument and controls personnel explained that the plastic pressure control valves had been replaced with the metal valves at the suggestion of the diesel manufacturer during Refuel Outage 5 due to a problem with cracking of the plastic casing. After replacing EGA-408A, a leak developed and the plastic valve was put back into service in its place. The licensee intended to replace the valve with a new metal valve during the next outage (due to the length of time the diesel would have to be out of service to complete the replacement). Later discussion with system engineering personnel revealed that either valve was approved for use in that application. They also clarified that these valves could not affect the operability of the diesel during an emergency start.

4.5 Charging Pump AB Outage

On January 14, 1994, the inspectors observed as the packing was replaced on Charging Pump AB. The work was done in accordance with WA 01115811 and Maintenance Procedure MM-006-021, Revision 0, "Charging Pump Maintenance." After the plungers were removed, they were inspected by system engineering and mechanical maintenance personnel and measurements were recorded for trending. Quality assurance personnel verified the cleanliness of the system after all packing was removed and observed as the pump was reassembled. Health physics personnel assigned to the job ensured the workers in the contaminated area did

not inadvertently back out of the limited work area and that the requirements of the radiation work permit were met. The job proceeded as planned and no concerns were noted.

4.6 Conclusions

The inspectors observed a variety of maintenance activities involving motor-operated valve postmaintenance VOTES testing, pump-relay voltage adjustments and preventive maintenance activities, diesel generator air pressure control valve repairs, and charging pump packing replacement. All observed activities were performed in accordance with procedural requirements and were amply and appropriately supported by personnel from quality assurance, engineering, and the maintenance departments, as well as health physics personnel. It was also noted that the licensee ensured operability and proper alignment upon completion of maintenance and that Technical Specification limiting conditions for operation were met.

An inspection followup item was opened to evaluate nodules found on the interior pipe surfaces of the ACCW systems during borescope inspections of the two trains.

5 BIMONTHLY SURVEILLANCE OBSERVATION (61726)

The inspectors observed the surveillance testing of safety-related systems and components listed below to verify that the activities were being performed in accordance with the licensee's programs and the Technical Specifications.

5.1 Retest of Essential Chiller A

On January 2, 1994, Essential Chiller A failed to start during the performance of Surveillance Procedure GP-903-094, Revision 7, "ESFAS Subgroup Relay Test - Operating." The licensee determined the cause to be the AB Chiller Assignment Switch Isolation Panel A relay and repaired the problem. The inspectors observed as Section 7.9 of the surveillance procedure was repeated on January 3, 1994. Essential Chiller A was started prior to commencing the surveillance. The nonsafety loads were realigned from Train B to Train A and Chilled Water Compressor A was stopped. The surveillance was completed. Essential Chiller B was restarted and allowed to stabilize prior to proceeding with the surveillance. Chilled Water Compressor A was then stopped as required and the surveillance was completed according to the procedure. Upon receipt of an actuation signal, the system realigned as designed and Essential Chiller A started. The inspector noted that instrumentation calibration was current and that the component was properly tagged out of service. A review of a portion of the test results showed that the Technical Specification requirements were met.

5.2 Special Test of CCW Pump Discharge Check Valves

On January 21, 1994, the inspector observed as personnel conducting Special Test Procedure 01117875, Revision 0, Change 2, "Component Cooling Water

Discharge Check Valve Test," were briefed and the first of four parts of the test were performed.

The brief was complete and stressed good communication. The current plant conditions and the effect of the special test procedure on the plant were discussed. Precautions and the different perturbations that might occur were covered in great detail. Control room access was restricted to limit distractions during both the briefing and the test.

The first part of the test consisted of placing full accident flow through Train A, while the flow in the other train was minimized to verify that the discharge check valve on the aligned CCW Pump AB passed the required flow. The test proceeded without incident, with the exception that the relief valves on the shutdown heat exchanger lifted when CCW Loop AB was unisolated after the test data was taken. They reclosed after the shutdown heat exchanger isolation valve was manually closed momentarily. Design engineering personnel evaluated the incident and determined that the pressure that had been put on the system to cause the reliefs to lift had not damaged the system. The licensee was reviewing the procedure at the end of the inspection period to assess what enhancements could be recommended. The discharge check valve for CCW Pump AB was verified to have passed a minimum of 6554 gpm. The licensee proceeded to test the discharge check valve on CCW Pump A with the same results.

The remainder of the test was delayed until January 24, 1993, due to scheduling and Technical Specification considerations. The discharge check valve for CCW Pump B was tested successfully on January 24, 1993, and the CCW Pump AB discharge valve with the pump aligned to Train B was scheduled to be tested at a later date.

5.3 Containment Purge Valve Operability

On January 25, 1994, the licensee completed Surveillance Procedure EAR-001-002, Revision 2, "Containment Purge Valve Leak Test," and found that the Containment Purge Supply Valves CAP-103 and -104 did not meet the acceptable leakage limit. When pressurized to greater than or equal to 44 psig, the valves were required to have a leakage less than or equal to 63,070 sccm. The leakage identified was approximately 104,000 sccm. The licensee determined that the seal on Valve CAP-104 was leaking and made the required adjustments to the seal. The inspectors noted that the licensee's efforts to identify and correct the problem were expeditious, yet conservative.

The inspector observed as the surveillance test was repeated. All the equipment used was within its calibration date. The repeated test was completed in accordance with Procedure EAR-001-002 and WA 01118749. The shift technical advisor department personnel completing the test carefully monitored the test rig for leakage and followed the procedure verbatim. The leakage rate identified was approximately 35,000 sccm, well under the leakage rate limit.

5.4 Conclusions

Instrumentation calibration was current and components were properly tagged out of service. A review of a portion of the surveillance test results showed that the Technical Specification requirements were met. Briefings were complete and plant conditions and the effect of the special test procedure on the plant were discussed. Precautions and perturbations which might occur were covered in detail. Control room access was restricted to limit distractions during both the briefing and the test.

The licensee made expeditious, yet conservative efforts to repair Containment Purge Supply Valve CAP-104.

6 COLD WEATHER PREPARATIONS (71714)

The inspectors observed precautions taken by the licensee prior to the onset of cold weather to determine whether safety-related systems were effectively protected against extreme cold weather.

6.1 Review of Cold Weather Preparations

The inspectors reviewed System Operation Procedure OP-002-007, Revision 7, "Freeze Protection and Temperature Maintenance." This procedure provided for placing the site freeze protection system and temperature maintenance panels in service, ensuring that they remained in service during cold weather, and provided actions to take to protect other affected areas of the plant. The procedure was found to be complete and comprehensive. Inspection by the inspectors of temporary structures revealed that they were well constructed and would withstand inclement weather.

The inspectors completed tours to verify that the temporary structures and heat sources would not adversely affect operations, that the heat sources were operable, and that the equipment was still easily accessible. Plywood that was to be staged to cover air intakes for the fire pumps was properly stored. The inspectors verified that the checklist the licensee had developed for these protective measures had been completed.

Through observation in the control room, discussion with operations personnel, and review of the maintenance schedule, the inspectors noted that work related to cold weather protection was appropriately completed just prior to or as cold weather commenced. The inspectors noted that operations personnel contacted the National Weather Service daily after the temperatures went below 40°F, as required by procedure, and that the shift verified at least once each shift that the temporary structures and heat sources were operable and not interfering with plant operations.

6.2 Conclusions

The licensee had a well-conceived and properly implemented program for freeze protection.

7 FOLLOWUP (92701)

7.1 (Closed) Inspection Followup Item 382/9334-03: Lack of Design Calculation

This item identified a weakness in that no calculations existed to verify the ability of pressure isolation valves on the safety injection system to close against postulated differential pressures. The licensee developed calculations in response to this concern. The inspectors reviewed the section of Motor-Operated Valve Design Basis Review Calculation SI.001, Revision 2, applicable to the valves addressed in the item, Valves SI-401A and -401B, and determined that the calculations were complete.

7.2 (Closed) Inspection Followup Item 382/9334-07: Material Condition of SI-108A and -108B

The material condition of Low Pressure Safety Injection Pump Suction Header Check Valves SI-108A and -108B raised a concern over the lack of preventive and corrective maintenance on these valves and the possibility of affects on the response to, or mitigation of, an intersystem LOCA. In response to this concern, the valves were added to the licensee's check valve program and were inspected during Refuel Outage 4 under WAs 01072840 and 01072845. During Refuel Outage 5, the valve seats were replaced with all metallic seats. Since being added to the program, the valves have been checked using nondestructive examination (ultrasonic) about once every other cycle and inspected internally every seventh cycle in accordance with Administrative Procedure UNT-006-022, Revision 6, "Check Valve Monitoring Maintenance and Trending Program." With the replacement of the seating material and addition to the check valve program, the concern was eliminated.

7.3 (Closed) Inspection Followup Item 382/9334-08: Calculations for Valves SI-108A and -108B

A weakness was noted in that no calculation verifying the flow velocities through Valves SI-108A and -108B existed. Flow velocities greater than 8 feet/second could adversely affect the valves in certain configurations and would require action to be taken during the system installation. The licensee developed Calculation Number EC-M91-041, Revision 0, "Velocity of Water through Check Valves SI-108A and B during All Flow Conditions," in response to the concern. The inspectors reviewed the calculation and found that the flow velocities ranged from 0.14 feet/second (during low pressure safety injection pump surveillance tests) to 5.60 feet/second (during the injection mode). The calculation verified that the flow velocity concerns did not apply to this application.

7.4 (Closed) Inspection Followup Item 382/9334-09: Failure to Identify Radioactive Leaks

Several previously unidentified leaks were found on several safety injection components. CIs were issued by the licensee prior to the end of the

inspection. Three of the components were reworked via WAs 01029269, 01073987, and 01062486. The fourth component, Valve SI-503B, was visually inspected, but no evidence of leakage could be detected.

7.5 (Closed) Inspection Followup Item 382/9334-10: Lack of Recorder for Volume Control Tank Level

This item noted the lack of a dedicated recorder to monitor volume control tank level. This device could be used to detect a loss of reactor coolant system inventory. The licensee reviewed the need and justification for the additional recorder. They determined they had the ability to monitor this level using the plant monitoring computer and to trend it on the main control board by trend assignment. With this capability, the cost to add a dedicated recorder was found to be unjustified.

7.6 (Closed) Inspection Followup Item 382/9334-11: Inaccessibility of SI-106A and -106B from Floor Level

Valves SI-106A and -106B, and SI-407A and -407B were noted to be inaccessible from the floor level preventing the use of these valves in isolating an intersystem LOCA. The licensee had design engineering personnel review the concerns. Valves SI-106A and -B could be manipulated using handswitches in the main control room or on the remote shutdown panel. With a loss of offsite power, the position of the valves would be controlled using nitrogen accumulators located outside of the safety injection pump room. The accumulators would support operation of the valves for up to 10 hours. Due to the location of the accumulators, the licensee would have the ability to recharge them, if necessary. Operator action to recharge the accumulators was credited in the Final Safety Analysis Report, whereas manual operation was not.

It was determined that Valves SI-407A and -407B could be operated manually using a 20-foot extension ladder if there was need to do so. These valves would normally be manipulated using handswitches in the main control room or on the remote shutdown panel. Although these valves were designed to fail-as-is, they were equipped with pneumatic/hydraulic operators that fail closed. In the event of a power failure, these valves would fail closed and isolate the intersystem LOCA.

Due to the control redundancy and availability of a backup nitrogen supply, the inspectors found that the inability to manually operate the valves was not a safety concern.

7.7 (Closed) Inspection Followup Item 382/9334-12: Component Label Readability Concerns

Inaccessibility and poor labeling of valves in the reactor auxiliary building were noted to be a concern. The inspectors noted the ongoing relabeling of equipment in the reactor auxiliary building. The existing metal labels were being replaced with larger, color-coded, easy-to-read metal labels. The new

labels were larger and used black lettering on a white background, allowing reading of the labels from a distance. In addition, Site Directive W4.202, Revision 0, "System and Component Labeling," was developed using INPO and EPRI guidelines on labeling.

7.8 (Closed) Inspection Followup Item 382/9334-13: Procedural Weaknesses

This item addressed several concerns with the format of the emergency operating and annunciator response procedures, the use of standardized plant nomenclature, and the failure to use a locked valve/breaker signoff sheet when manipulating valves and breakers.

The licensee reviewed the concern over formats and a numbered table of contents in the emergency operating procedures and determined that their current format was satisfactory. However, the emergency operating procedures were revised to use standardized plant nomenclature. The annunciator response procedures for Cabinets M and N were reviewed and revised to ensure consistency between identical annunciators on opposite trains. However, the licensee elected not to include page numbers on the table of contents for the annunciator response procedures. The inspectors found the alpha-numeric reference easy to use. Operations supervision had drafted a letter to operations personnel, dated May 17, 1993, explaining why a locked valve/breaker deviation sheet should have been used in the example cited in the item and emphasizing the requirement to follow Procedure OP-100-009, "Control of Valves and Breakers."

7.9 (Closed) Inspection Followup Item 382/9334-14: Lack of Guidance for Scenario Involving Low Pressure Safety Injection Pump Leakage

A simulation scenario capability existed for small, low pressure safety injection pump leaks in the pump room, but the scenario was not being used in training. This was identified as a concern. The inspectors reviewed training records and discussed the concern with operations training personnel. This training was provided to operations personnel in August and September 1992 in preparation for Refuel Outage 5. A different scenario, involving an intersystem LOCA between the reactor coolant system and shutdown cooling heat exchanger, was scheduled for training in preparation for Refuel Outage 6.

8 ONSITE REVIEW OF LICENSEE EVENT REPORTS (92700)

8.1 (Closed) Licensee Event Report 92-14: Component Not Environmentally Qualified/Inadequate Engineering Evaluation

In October 1992 during a review of equipment qualification records, the licensee determined that postaccident remote operation of the Reactor Coolant System Loop 1 Hot Leg Sample Isolation Valve RC-104 could be required to obtain a sample for the postaccident sampling system, but the valve might not be available because certain required components were not environmentally

qualified. The root cause was an inadequate engineering evaluation which concluded that postaccident remote operability of Valve RC-104 was not required.

Immediate corrective actions included the replacement or reconfiguration of components to ensure the postaccident operability of Valve RC-104. Other postaccident sampling system components located in harsh environments were reviewed to ensure that the components were environmentally qualified if necessary. Eight other valves in the system were identified as being documented on the environmental qualification list, but the qualified life of the valves had not been exceeded. The alignment solenoid valves for the primary sample sink and postaccident sampling system had exceeded their qualified life and were restored to a qualified configuration. No further action was considered necessary as the condition had been identified through an ongoing effort to upgrade environmental qualification files. The effort was completed September 28, 1993. The condition was also discussed during an industry events seminar which was completed on October 21, 1993. With the complete revision of the environmental qualification files and training provided, this condition was no longer a concern.

ATTACHMENT

1 PERSONS CONTACTED

1.1 Licensee Personnel

*R. E. Allen, Security and General Support Manager
*R. G. Azzarello, Director, Design Engineering
*R. F. Burski, Director, Nuclear Safety
*A. M. Cillufa, Maintenance Engineering Supervisor
*T. J. Gaudet, Operational Licensing Supervisor
*P. A. Gropp, Systems Engineering Mechanical Supervisor
*J. G. Hoffpauir, Maintenance Superintendent
*J. B. Houghtaling, Technical Services Manager
L. W. Laughlin, Licensing Manager
*J. V. Messina, Chemistry Engineer
*D. F. Packer, General Manager, Plant Operations
*D. L. Shipman, Planning and Scheduling Manager
*R. S. Starkey, Operations and Maintenance Manager
D. W. Vinci, Operations Superintendent

*Denotes personnel that attended the exit meeting. In addition to the above personnel, the inspectors contacted other personnel during this inspection period.

2 EXIT MEETING

An exit meeting was conducted on February 4, 1994. During this meeting, the inspectors reviewed the scope and findings of the report. The licensee did not express a position on the inspection findings documented in this report. The licensee did not identify as proprietary any information provided to, or reviewed by, the inspectors.