ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Inspection Report: 50-313/95-26
50-368/95-26

Licenses: DPR-51
NPF-6

Licensee: Entergy Operations, Inc.
1448 S.R. 333
Russellville, Arkansas

Facility Name: Arkansas Nuclear One, Units 1 and 2

Inspection At: Russellville, Arkansas

Inspection Conducted: October 30 through November 3, 1995

Inspectors: M. Runyan, Reactor Inspector, Engineering Branch
Division of Reactor Safety

C. Myers, Reactor Inspector, Engineering Branch
Division of Reactor Safety

Approved: C.S.V.D. 11-21-95
C. VanDenburgh, Chief, Engineering Branch — Date
Division of Reactor Safety

Inspection Summary

Areas Inspected (Units 1 and 2): Routine, announced inspection of the followup of engineering issues.

Results (Units 1 and 2):

Engineering

- The inspectors identified two concerns related to the licensee's ongoing effort to address pressure locking and thermal binding of power-operated gate valves. The licensee intended to use analytical techniques in lieu of a modification or procedure change to justify operability of six valves for an extended period of plant operation. Additionally, the licensee had not considered the potential for motor-operated valves to be over stressed on a periodic basis because of regularly-occurring pressure locking or thermal binding conditions for those valves that are not inherently protected against motor-stall events. These issues will be reviewed further as a part of the resolution of Generic Letter 95-07 (Section 1.6).

- The inspectors found that following manual operation, the licensee did not electrically stroke motor-operated valves in all cases before returning the valve to standby safety-related service. The inspectors considered the licensee's practice to be inconsistent with their Generic Letter 89-10 program and industry practice (Section 1.3.1).

Summary of Inspection Findings:

- Inspection Followup Item 313/9313-01; 368/9313-01 was closed (Section 1.1).
- Inspection Followup Item 313/9313-04; 368/9313-04 was closed (Section 1.2).
- Inspection Followup Item 313/9313-05; 368/9313-05 was closed (Section 1.3).
- Inspection Followup Item 313/9313-08; 368/9313-08 was closed (Section 1.4).
- Inspection Followup Item 313/9313-09; 368/9313-09 was closed (Section 1.5).
- Inspection Followup Item 313/9313-12; 368/9313-12 was reviewed but left open (Section 1.6).
- Inspection Followup Item 313/9411-01; 368/9411-01 was reviewed but left open (Section 1.7).
- Inspection Followup Item 313/9411-02; 368/9411-02 was closed (Section 1.8).
- Inspection Followup Item 313/9420-01 was reviewed but left open (Section 1.9).
- Inspection Followup Item 313/9420-03 was closed (Section 1.10).
- Violation 368/9420-04 was closed (Section 1.11).
- Inspection Followup Item 313/9420-05; 368/9420-05 was closed (Section 1.12).
- New Inspection Followup Item 313/9526-01; 368/9526-01 was opened (Section 1.3.1).

Attachment:

- Attachment - Persons Contacted and Exit Meeting

DETAILS

1 FOLLOWUP OF ENGINEERING ISSUES (92903)

1.1 (Closed) Inspection Followup Item 313/9313-01; 368/9313-01; Modifications to Restore Capability under Minimum Voltage Conditions

Background

A previous inspection had identified that the licensee's analysis method to determine actuator capability under degraded voltage conditions was not applicable to voltages less than 70 percent of rated motor terminal voltage. As a result of this concern, the licensee identified three motor-operated valves that required modifications to assure their capability under degraded voltage conditions.

Followup

The licensee performed a detailed reanalysis of the motor terminal voltages for Valves CV-7403, CV-7404, and 2CV-5086-2 at the actual time that valve operation would be required during design basis events. The revised analysis determined that the motor terminal voltage for each of the actuators would be greater than 70 percent. Based on the revised electrical calculations, the licensee considered the valves to have adequate capability under degraded voltage conditions. Therefore, the licensee did not modify any of the valves to increase the available voltage at the motor terminals. The inspectors reviewed the revised analysis and found them to be adequate to resolve the original concern.

1.2 (Closed) Inspection Followup Item 313/9313-04; 368/9313-04; Limitorque Maintenance Update 92-02

Background

In Maintenance Update 92-02, Limitorque reported that their previously published value for torque switch repeatability at a torque switch setting of 1 was potentially nonconservative. For this configuration, Limitorque recommended increasing repeatability margins from 5 to 10 percent and from 10 to 20 percent for actuators with torque switch trips at less than and greater than 50 foot-pounds of applied torque, respectively. At the time of the previous inspection, the licensee was reviewing the impact of this change, but had not revised the original repeatability values.

Followup

Instead of incorporating the repeatability values of Maintenance Update 92-02, the licensee decided to perform in-situ testing of 15 motor-operated valves with torque switches set at 1. This effort was undertaken in an attempt to demonstrate lower repeatability and, thus, preserve existing thrust margins.

The results of the testing program were documented and analyzed in Topical Report 95-R-0011-01, "MOV Program Topical Reports, Topical Report 4," dated July 1, 1995. Each motor-operated valve in the study was tested at least three times, with spring-pack deflection being measured at the point of torque switch trip. The repeatability was computed by taking two standard deviations and dividing by the mean. Repeatability measured by this method ranged from 0.92 to 5.5 percent.

The inspectors noted that the torque switch repeatability stated by Limitorque was based on measured actuator output torque. The inspectors questioned whether the licensee's measurement of spring-pack deflection by itself was sufficient to encompass the entire range of uncertainty expressed by the torque switch repeatability term in motor-operated valve capability calculations. This term is defined as the uncertainty in the magnitude of the torque delivered to the stem nut for a given torque switch setting.

The inspectors noted that measured spring pack deflection may not account for all sources of error in determining actuator output torque. Statistical variations in efficiency of the drive sleeve thrust bearings and other drive sleeve components, as well as changes in the effective moment arm at the worm-to-worm gear interface can affect the overall repeatability of the actuator output torque. In response to the inspectors' concerns, the licensee contacted Limitorque. According to the licensee, Limitorque stated that changes in torque output would be reflected by a corresponding change in spring-pack deflection and defended the licensee's method for determining torque switch repeatability.

The inspectors concluded that the licensee had adequately addressed the issue of torque switch repeatability for motor-operated valves with torque switches set at 1 by locally testing the affected valves. Test values were incorporated in the licensee's Generic Letter 89-10 program.

1.3 (Closed) Inspection Followup Item 313/9313-05; 368/9313-08: Revise Extrapolation Method for Motor-Operated Valve Design Basis Capability

Background

During a previous review of the licensee's analysis of diagnostic test data to determine the design basis capability of motor-operated valves, the inspectors had noted a nonconservative identification of closing thrust for low pressure injection Valve 2CV5057-2. Since the valve was tested at less than maximum design differential pressure, extrapolation of the measured closing thrust was required to determine the thrust required under design basis conditions. The inspectors noted that the licensee extrapolated the thrust at "flow cutoff" (the diagnostic event identified as Point C10 on the VOTES trace) rather than the maximum thrust observed to the point of seat contact (the diagnostic event identified as Point C11 on the VOTES trace). The inspectors observed that the licensee's method appeared to under-predict the thrust required under design basis conditions for Valve 2CV5057-2.

Followup

The inspectors reviewed licensee Procedure MES-04, "Guideline for Review of MOV Test Data," Revision 1. The inspectors found that the licensee changed their extrapolation method to use the greater of the Point C10 or C11 thrust to determine design basis capability. The inspector reviewed the revised methodology and found it adequate to resolve the original concern.

The licensee also modified Valve 2CV5057-2, which was a Target Rock rotating/rising stem globe valve, by replacing it with a different type of valve (Anchor Darling rising stem globe valve) and replacing the actuator with a larger model. The licensee planned to repeat the diagnostic testing of the valve under differential pressure conditions during the next outage to demonstrate design basis capability. The inspectors concluded that these actions were adequate to resolve the original concern.

1.3.1 Declutched Actuator Considered Operable

All Limitorque actuators for motor-operated valves are provided with a capability for emergency manual operation utilizing a handwheel rather than the electric motor. Limitorque refers to the action of uncoupling the motor and engaging the handwheel as "declutching." Declutching is accomplished by manually depressing the declutch lever at the motor operator. However, restoration for automatic motor operation is not similarly manually controlled by the declutch lever. Rather, restoration is accomplished by an internal mechanism automatically actuated by rotation of the motor shaft at the start of the electrical operation.

During their review of the previous open item, the inspectors noted that the licensee allowed a declutched motor-operated valve to remain in safety-related service without declaring the valve inoperable. To reduce valve seat leakage, the licensee had established procedural guidance to manually increase the valve sealing thrust. The licensee's procedure allowed an operator to manually declutch the motor of the motor-operated valve to engage the handwheel and then manually apply a measured torque to the handwheel. To demonstrate the ability of the actuator to automatically reclutch the motor and unseat the valve, the procedure required that the valve be electrically stroked open and closed following the initial manual operation. After the electrical stroke, the procedure again repeated the handwheel operation without subsequent electrical operation, thereby, leaving the actuator in a declutched condition.

The inspectors were concerned that the actuator would be left in a declutched condition while the valve was considered to be operable. In this condition, the actuator motor is disconnected from the actuator. Although the valve is designed to re-engage the motor at the next motor start, the inspectors were concerned that the reclutching mechanism may not be adequately reliable for safety-related service. Specifically, this feature of the motor-operated valve is not periodically tested or verified. A failure to reclutch the actuator would result in continuous motor operation without valve movement

until the motor overheated. The inspectors also noted that the licensee had not qualified the declutched actuator configuration during their Generic Letter 89-10 program. Furthermore, the inspectors noted that operational failures have been experienced at other plants caused by a failure of the valve to reclutch following inadvertent declutching. The actuator manufacturer (Limitorque) typically recommends electrical operation following every manual operation to ensure reclutching of the motor before the motor-operated valve is returned to service. The inspectors considered this recommendation to be typical of industry practice.

Although the licensee's procedure controlled the handwheel's torque to prevent excessive thrust, the inspectors were also concerned that the repeatability of the stem thrust resulting from handwheel operation had not been demonstrated during the licensee's Generic Letter 89-10 testing. Large variations in the thrust resulting from handwheel operation had been generally observed during NRC testing at the Idaho National Engineering Laboratory and testing conducted by the Electric Power Research Institute.

The inspectors requested additional technical justification from the licensee for allowing a motor-operated valve to be declutched while in safety-related service. During the inspection, the licensee contacted Limitorque regarding the adequacy of their procedure. According to the licensee, Limitorque concurred that the licensee's control of manual operation provided verification of the proper adjustment and functioning of the reclutching mechanism. Nonetheless, the inspectors considered the licensee's control to be inconsistent with their Generic Letter 89-10 program and contrary to industry practice.

According to the licensee, no motor-operated valves were currently in safety-related service in a declutched condition. The licensee acknowledged the inspectors' concerns and stated that they would re-evaluate their procedure for controlling manual operation after review of industry practice. The inspectors found the licensee's planned actions to be adequate. This item will be followed as an open item pending completion of this review (313/9526-01; 368/9526-01).

1.4 (Closed) Inspection Followup Item 313/9313-08; 368/9313-08: Future Disposition of Motor-Operated Valve CV-3812

Background

During the review of a dynamic diagnostic test trace of Valve CV-3812 (Loop 1 Service Water Supply Valve to VCC-2A and 2B) the inspectors noted that the point of flow cutoff (Point C10 on the VOTES trace) had been marked at the peak of a large cyclic load pattern. A middle amplitude placement of Point C10 resulted in a thrust requirement that exceeded the thrust measured at the as-left torque switch setpoint. The licensee defended the operability of Valve CV-3812 by stating that the assumed maximum expected differential

pressure of 123.5 psid was overly conservative and that the actual design differential pressure should be essentially 0 psid. The previous design review had considered an event that was beyond the design basis of the plant. The item was left open pending formalization of the new design basis review.

Followup

The inspectors reviewed Calculation V-1027-00, "Pressure Evaluation for Motor-Operated Valves CV-3812 and CV-3813," Revision 2. In this revision, the maximum expected differential pressure for Valve CV-3812 was reduced from 123.5 to 0 psid. The inspectors concluded that the licensee had acceptably justified the revised design basis conditions for Valve CV-3812. Given the new operating conditions, the inspectors concluded that Valve CV-3812 was capable of performing its design safety functions.

1.5 (Closed) Inspection Followup Item 313/9313-09; 368/9313-09: Load Sensitive Variation Under Differential Test Conditions

Background

The licensee's Generic Letter 89-10 program assumed that the same amount of thrust measured at torque switch trip under any dynamic conditions would be available during a design basis event. This appeared to be nonconservative, especially for tests conducted at differential pressures well less than the design basis condition. At these low differential pressures, the full magnitude of the valve's load sensitive behavior (rate-of-loading) may not have been expressed.

Followup

The licensee had revised the Generic Letter 89-10 program to assume that load sensitive behavior, as a characteristic of a motor-operated valve, increased linearly until the differential pressure across the valve reached 70 percent of the maximum expected differential pressure. Beyond this point, the licensee assumed no additional increase in load sensitive behavior.

As a further refinement to extrapolating load sensitive behavior, the licensee devised a method based on information presented in the "Electric Power Research Institute (EPRI) Performance Prediction Methodology Implementation Guide," EPRI TR-103244, Revision 0. In this method, the observed load sensitive behavior is increased linearly with differential pressure until 10,000 psi thread pressure is reached. After this point, no additional load sensitive behavior is assumed. The method also capped the maximum stem friction coefficient change from static to dynamic conditions at 0.046. The licensee had instituted the revised extrapolation procedure in its Unit 1 test

procedures and test evaluation packages. Unit 2 test procedures and test evaluation packages were scheduled to be updated to the new method during an approximately 3-month data evaluation period following a scheduled November 1995 startup from the current refueling outage. The current Unit 2 test evaluation packages were analyzed using the 70 percent method discussed above.

The inspectors reviewed the referenced EPRI document and several sample evaluations. The inspectors concluded that the licensee had developed an acceptable method to extrapolate load sensitive behavior for dynamic diagnostic tests conducted at less than the maximum differential pressure.

1.6 (Open) Inspection Followup Item 313/9313-12; 368/9313-12: Review of Pressure Locking and Thermal Binding Plan

Background

During the previous motor-operated valve inspection, the licensee had not formally addressed pressure locking and thermal binding within its Generic Letter 89-10 program. In response to emerging information, the licensee developed a three-phase program to address this issue. The first phase was to evaluate past actions in this area, the second phase was to evaluate valves within the Generic Letter 89-10 scope, and the third phase was to evaluate other power-operated gate valves.

Followup

Since the previous inspection, the NRC issued Generic Letter 95-07, "Pressure Locking and Thermal Binding of Safety-Related Power-Operated Gate Valves." At the time of this inspection, the licensee was in the process of performing a pressure locking and thermal binding evaluation pursuant to the new generic letter. The Unit 2 evaluation was nearly complete, whereas, the Unit 1 evaluation was not yet in draft form.

The inspectors reviewed Condition Report CR-2-95-0466, which documented an evaluation of gate valves in Unit 2 for susceptibility to pressure locking and thermal binding. A total of 17 valves were determined to be potentially susceptible to pressure locking or thermal binding. For valves potentially susceptible to pressure locking, a calculation using a method developed by the Grand Gulf Nuclear Station was performed to determine available margins.

The inspectors identified two concerns. First, it appeared that the licensee intended to start up from the current refueling outage with as many as six motor-operated valves potentially susceptible to pressure locking without performing modifications or instituting procedure changes to eliminate the vulnerability. The operability of these valves rested solely on the Grand Gulf Nuclear Station calculational method. The inspectors were concerned that this method had been validated by testing only one valve and, therefore, should only be the basis for short-term operability.

The second issue concerned the validity of using operating history to demonstrate a valve's lack of susceptibility to pressure locking or thermal binding. The inspectors were concerned that successfully stroking a valve many times under conditions identical to the assumed design pressure locking or thermal binding condition, does not preclude the possibility that increased loadings may have been overcome by an oversized motor-actuator such that valve weak-link stress levels or actuator limits may have been exceeded. This could introduce unnoticed, progressive damage to a motor-operated valve that could ultimately result in its failure to operate.

In response to the first concern, the licensee reviewed the calculated pressure locking thrust loadings and found that for five of the six valves, the opening thrust requirement calculated for the Generic Letter 89-10 design basis condition was greater than the calculated thrust needed to overcome pressure locking. The calculated pressure locking thrust for the one valve that did not meet this condition was only slightly greater than the calculated Generic Letter 89-10 thrust. In response to the second concern, the licensee stated that it will review the subject valves for the presence or lack of inherent stall protection (actuator capability at highest supply voltage and best friction factors being less than actuator and valve weak link allowable torque and thrust limits) to determine if these valves may be vulnerable to a progressive damage situation.

Pending completion of additional pressure locking and thermal binding evaluations, particularly those associated with Unit 1, and resolution of the concerns expressed above, the item was left open. The inspectors concluded that the licensee had properly addressed the immediate operability implications of the Unit 2 valves that were determined to be susceptible.

1.7 (Open) Inspection Followup Item 313/9411-01; 368/9411-01: Seismic Qualification of Main Feedwater Isolation Valves

Background

This followup item concerned the seismic analysis of the Main Feedwater Isolation Valves CV-2630 and CV-2680. The original analysis addressed only the vertical orientation of the valves, whereas the valves were actually installed in a horizonal orientation. When in the closed position, the licensee had determined that the yoke stresses substantially exceeded allowable design stress under combine design basis earthquake (DBE) and design basis accident (DBA) loading. This item was open pending completion of a licensee review of their licensing basis documents regarding combined DBE/DBA qualification.

Followup

The inspectors reviewed Engineering Report 94-R-0004-01, Revision 0, which documented the licensee's review of their licensing basis. The licensee concluded that there were no specific regulatory requirements for combined DBE/DBA of any safety-related motor-operated valves, although various commitments in the Safety Analysis Report did apply to valves within the reactor coolant pressure boundary.

The licensee determined that under combined DBE/DBA loading, the stress levels with the main feedwater isolation valves in their normally open position were acceptable and satisfied their commitments for seismic qualification. The licensee considered that combined DBE/DBA loading in the closed position was a design goal for the main feedwater isolation valves, but not a regulatory requirement or a commitment. The licensee planned to implement modifications or procedural changes in the future to enable the components to meet the licensee's design goal. The licensee's conclusion regarding the applicable regulatory design basis will be forwarded to the Office of Nuclear Reactor Regulation for review.

According to the licensee, the purchase order specifications had been misinterpreted by some vendors supplying seismically qualified motor-operated valves, resulting in an orientation-sensitive seismic qualification calculation being supplied by the vendor. The licensee's review concluded that the original analysis was conservatively bounding when compared to more detailed piping system response. The licensee found that, except for the main feedwater isolation valves, all motor-operated valves within the scope of their Generic Letter 89-10 program were acceptably qualified under combined DBE/DBA loading. The inspector found the licensee actions to be adequate. This item will remain open pending confirmation of the design basis of the valves.

1.8 (Closed) Inspection Followup Item 313/9411-02; 368/9411-02: Code Deviations Identified During Information Bulletin 79-14 Walkdowns

Background

Several minor deviations from ASME Code requirements were identified during the licensee's walkdown of as-built piping configurations for NRC Bulletin 79-14. This item was open pending licensee submittal of a schedule and resolution of the minor deviations.

Followup

The inspectors found that the as-built configuration deviations were identified within the scope of the licensee's ongoing isometric update project. Additional analysis and modifications to correct the deviations were planned consistent with their schedule submitted to the NRC on April 28, 1994.

Resolution of the remaining discrepancies is currently scheduled for completion by Refueling Outages 1R13 (Fall 1996) and 2R12 (Spring 1997). The inspectors concluded that the licensee's actions were adequate to track and resolve these deviations without further followup.

1.9 (Open) Inspection Followup Item 313/9420-01: Potential Single Failure Concern

Background

This issue involved a series of circumstances within the design basis of Unit 1, which could result in failure of the service water system to perform its safety function. Starting with an specific initial lineup of pumps and valves and power supply alignments permitted by the plant's operating procedures, a loss-of-coolant accident concurrent with the loss-of-offsite power and failure of the red train emergency diesel generator would require operator action within approximately 2 to 4 minutes to transfer Load Centers B55/B56 to the green bus. Otherwise, the service water system would fail to function as designed.

The inspectors were concerned that manual operator action was needed to enable automatic safety systems to function in this condition. Although not part of the licensee's licensing basis, American National Standard ANSI/ANS-58.8-1994, "Time Response Design Criteria for Nuclear Safety Related Operator Actions," states that credit should not be taken for operator actions within 20 minutes following a loss-of-coolant accident. The concern was lessened by the fact that the required operator action would be needed only following the obvious failure of a diesel generator, and that the action was prominently placed in the emergency operating procedures. The issue was referred to the Office of Nuclear Reactor Regulation for further review.

Followup

The inspectors discussed the status of this issue with the licensee. No further action had been taken by the licensee since the original inspection. This item will remain open pending completion of the Office of Nuclear Reactor Regulation assessment of this matter.

1.10 (Closed) Inspection Followup Item 313/9420-03; 368/9420-03: Licensee Evaluation of Service Water System Availability

Background

The licensee had performed an evaluation of the Unit 2 service water service water system as part of an industry validation and verification program in response to 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants." This assessment had indicated that the Unit 2 service water system had been very reliable during the period of January 1988 to June 1994. This item was opened to review the Unit 1 service water system assessment, which was in progress at the time.

Followup

The licensee had completed its assessment of the Unit 1 service water system performance. This evaluation had been truncated after initial reviews indicated that the operational performance of the Unit 1 service water system had been virtually equal to that of the Unit 2 service water system, and further efforts were, therefore, deemed to be of little use.

The inspectors reviewed this information and concurred that the licensee had satisfactorily assessed the performance history of the Unit 1 service water system. Over the review period, the service water pumps had successfully started 363 times in 364 attempts. The lone failure, which had been documented in Condition Report CR-1-89-409, had been caused by insufficient cooling to the valve packing and had resulted in fracture of the pump shaft. Corrective actions taken at the time have successfully prevented recurrence of this event over the past 6 years of operation. The inspectors concluded that the licensee had acceptably evaluated the operational performance of the Unit 1 service water system.

1.11 (Closed) Violation 313/9420-04; 368/9420-04: Emergency Cooling Pond Level

Background

The licensee had performed a calculation concluding that a minimum of 79.67 acre-feet of water was needed in the Unit 2 emergency cooling pond to ensure operation for 30 days following an accident. The calculation also addressed compensatory actions that would be necessary to ensure that this capacity of cooling water would be available. Specifically, the service water return would have to be shifted from the lake to the emergency cooling pond and the service water suction would not be shifted to the emergency cooling pond until, and if, the lake level dropped to a limiting level. The results of the calculation conflicted with the Unit 2 Technical Specifications and the Safety Analysis Report. The Technical Specifications required a minimum capacity of 70 acre-feet. The Safety Analysis Report stated that 63 acre-feet would be needed for a 30-day supply. A similar mismatch occurred with the calculation results and licensing basis documents for Unit 1. However, the licensee did not identify this issue as a design change or change to the plant's licensing basis. As a result changes to the Technical Specification and Safety Analysis Report were not made and a safety evaluation pursuant to 10 CFR 50.59 was not conducted.

Followup

The licensee acknowledged their failure to properly handle the administrative aspects of this issue. Safety evaluations and Technical Specification changes have been completed and reflect the new inventory limits and requirements for operators to perform compensatory actions. The licensee had prepared changes

to the safety analysis reports for inclusion in the next amendment submittals. To prevent similar oversights from occurring, the licensee revised Procedure 1000.131, 10 CFR 50.59 Program Review," to provide additional guidance on determining the necessity to revise licensing basis documents.

The inspectors reviewed the submittals and safety evaluations developed in response to this issue and discussed the issue with the licensee. The inspectors concluded that the licensee had acceptably corrected the identified discrepancy.

1.12 (Closed) Inspection Followup Item 313/9420-05; 368/9420-05: Completion of Modifications to Resolve Water Hammer

Background

After experiencing several water hammer events in the Unit 2 service water system, the licensee performed a hydraulic analysis of the system and developed a series of modifications designed to reduce the potential for, or severity of, specifically identified water hammer events within the system. The licensee made a commitment to the NRC to complete necessary modifications to resolve the water hammer problem for each unit. This item was opened to verify installation of the proposed changes.

Followup

The inspectors reviewed Design Change Packages 92-1019, Revision 0, and 89-2049, Revision 0, which documented the installation of various modifications to address water hammer problems in Units 1 and 2, respectively. The modifications provided for an air gap at the service water discharge, provisions to limit the refill rate of the reactor building coolers, and the addition of several vacuum breakers. Installations were complete in Spring 1995 for Unit 1 and Fall 1995 for Unit 2. The licensee expressed confidence that the modifications had fully addressed the problem and stated that no evidence of additional water hammer events had occurred after installation.

The inspectors concluded that the licensee had fulfilled its commitment to the NRC to install water hammer modifications to the Units 1 and 2 service water systems. Based on limited operational history, the modifications appeared to have been successful.

ATTACHMENT

1 PERSONS CONTACTED

1.1 Licensee Personnel

*S. Bennett, Licensing
*G. Hines, Design Engineer, Mechanical/Civil-Structural
*R. Lane, Director, Design Engineering
*J. McWilliams, Modifications
*D. Mims, Licensing Director
*T. Mitchell, Unit 2 SYE Manager
*W. Rogers, Supervisor, Engineering Support
*B. Rowlett, Senior Lead Engineer, Mechanical/Civil-Structural
*R. Scheide, Licensing
*B. Short, Licensing
*C. Snively, Senior Lead Engineer, SYE-1
*M. Stroud, Electrical/Interior Communications Design
*C. Turk, Manager, Mechanical/Civil-Structural
*L. Waldinger, General Manager, Operations
*T. Weir, Manager
*G. Woerner, Supervisor, Mechanical Engineering
*C. Zimmerman, Acting Unit 1 Plant Manager

In addition to the personnel listed above, the inspectors contacted other licensee personnel during this inspection period.

* Denotes personnel attending the exit meeting on November 3, 1995.

2 EXIT MEETING

An exit meeting was conducted on November 3, 1995. During this meeting, the inspectors reviewed the scope and findings of this 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.