UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
SAM NUNN ATLANTA FEDERAL CENTER
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December 5, 2002

EA-02-048

Duke Energy Corporation
ATTN: Mr. R. A. Jones
Site Vice President
Oconee Nuclear Station
7800 Rochester Highway
Seneca, SC 29672

SUBJECT: OCONEE NUCLEAR STATION - NRC SUPPLEMENTAL INSPECTION REPORT 50-269/02-14, 50-270/02-14, AND 50-287/02-14

Dear Mr. Jones:

On November 8, 2002, the NRC completed a supplemental inspection at your Oconee Nuclear Station. The enclosed report documents the inspection findings which were discussed on November 8, 2002, with Mr. David Baxter and other members of your staff. In addition, a public regulatory performance meeting is being planned for January 2003 to discuss the inspection findings.

This supplemental inspection was an examination of your problem identification, root cause evaluation, extent of condition determination, and corrective actions associated with a White finding identified in the barrier integrity cornerstone and a White performance indicator (PI) in the mitigating systems cornerstone. The White finding involved an inadequate abnormal procedure for ensuring containment closure upon a loss of reactor decay heat removal while Unit 1 was in reduced reactor coolant system inventory conditions during the Fall 2000 refueling outage. The White PI involved maintenance-induced unavailability of the 1B motor driven emergency feedwater pump. This supplemental inspection also included an NRC independent extent of condition review of issues related to the White finding and PI.

Based on the results of this inspection, the NRC determined that your corrective actions (both planned and already completed) are appropriate to resolve the deficiencies related to the White finding and PI. As such, the inspection objectives of Inspection Procedure 95002, “Inspection for one Degraded Cornerstone or any Three White Inputs in a Strategic Performance Area,” have been satisfied. Therefore, the White finding (including associated violation 50-269,270, 287/02-12-01) is considered closed, and the PI fault exposure hours may be reset per the guidance of NEI 99-02, Regulatory Assessment Performance Indicator Guideline, Revision 2.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system

(ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Loren Plisco, Director
Division of Reactor Projects

Docket Nos: 50-269, 50-270, 50-287
License Nos: DPR-38, DPR-47, DPR-55

Enclosure: NRC Supplemental Inspection Report 50-269/02-14, 50-270/02-14, and 50-287/02-14 w/Attachment - Supplemental Information

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U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos:	50-269, 50-270, 50-287
License Nos:	DPR-38, DPR-47, DPR-55
Report No:	50-269/02-14, 50-270/02-14, 50-287/02-14
Licensee:	Duke Energy Corporation
Facility:	Oconee Nuclear Station, Units 1, 2, and 3
Location:	7800 Rochester Highway Seneca, SC 29672
Dates:	November 4 - 8, 2002
Inspectors:	M. Scott, Senior Reactor Inspector G. Hutto, Resident Inspector - Robinson Nuclear Plant
Approved by:	Robert Haag, Chief Reactor Projects Branch 1 Division of Reactor Projects

Enclosure

SUMMARY OF FINDINGS

IR 05000269-02-14, 05000270-02-14, 05000287-02-14, Duke Energy Corporation, 11/4/2002 - 11/8/2002, Oconee Nuclear Station: Supplemental Inspection for degraded barrier integrity and mitigating systems cornerstones.

The inspection was conducted by a senior reactor inspector and a resident inspector. The inspection identified no significant findings. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July 2000.

Cornerstone: Barrier Integrity and Mitigating Systems

This supplemental inspection was performed by the NRC to assess the licensee's corrective actions associated with a White finding related to containment closure controls during reduced reactor coolant inventory conditions in Unit 1 and a White Performance Indicator (PI) related to unavailability of the 1B motor driven emergency feedwater (MDEFW) pump. The performance issue for the finding was previously characterized as having low to moderate risk significance (White) in NRC Final Significance Determination letter dated August 2, 2001. The Heat Removal System PI was characterized as performance requiring increased regulatory response (White) in the Mid Cycle Performance Review and Inspection Plan Letter dated August 26, 2002. During this supplemental inspection, which was performed in accordance with Inspection Procedure 95002, the inspectors determined that the licensee performed an overall adequate evaluation of the associated performance deficiencies.

The licensee's problem identification efforts for both the White finding and PI were found to be acceptable. Overall, the licensee's root cause evaluations and extent of condition review for both issues were considered adequate. Additionally, the NRC's independent extent of condition review for both the White finding and PI determined that the licensee's overall extent of condition was satisfactory.

Based on these inspection results, the White finding (including associated violation 50-269, 270, 287/02-12-01) is considered closed, and the PI fault exposure hours may be reset per the guidance of NEI 99-02, Regulatory Assessment Performance Indicator Guideline, Revision 2.

A. Inspector Identified Findings

No findings of significance were identified.

B. Licensee Identified Violations

None.

Report Details

01 Inspection Scope

This supplemental inspection was performed by the NRC to assess the licensee's evaluation and corrective actions associated with a White finding and a White PI. The White finding involved an inadequate abnormal procedure for ensuring containment closure upon a loss of reactor decay heat removal (DHR) while Unit 1 was in reduced reactor coolant system (RCS) inventory conditions during the Fall 2000 refueling outage. The White PI involved maintenance-induced unavailability of the 1B motor driven emergency feedwater (MDEFW) pump that led to the Heat Removal Safety System Unavailability PI crossing the Green-to-White threshold. The related performance issues were described in NRC Inspection Reports 50-269, 270, 287/00-07 and 50-269, 270, 287/01-05, and are related to the barrier integrity and mitigating systems cornerstones in the reactor safety strategic performance area. The inspection involved a review of the licensee's problem identification, root cause and extent of condition evaluation, corrective actions, and an NRC independent extent of condition review for both White issues.

The inspectors assessed the adequacy of the licensee's root cause evaluation by determining if the root causes and contributing causes were understood, and if the resulting corrective actions were sufficient to address those causes in order to prevent recurrence. This assessment included: a review of the licensee's Root Cause Failure Analysis Report, Problem Investigation Process reports (PIPs), associated corrective actions, and other related/referenced documents; interviews with key personnel on the licensee's root cause evaluation team, as well as from the licensee's design basis and operations procedural groups; and a comparison of the NRC's independent extent of condition determination with that of the licensee's. The inspectors' independent extent of condition review included a review of technical issues associated with the setting of containment closure during a loss of DHR event and the proper PI characterization of the problem with the 1B MDEFW pump motor.

02 Evaluation of Inspection Requirements

02.01 Problem Identification

a. Determination of who (i.e., licensee, self-revealing, or NRC) identified the issues and under what conditions

(1) Barrier Integrity Finding

During the Fall 2000 Unit 1 refueling outage, the NRC identified that inadequate controls existed to respond to loss of DHR events during reduced inventory operation of the RCS with fuel in the reactor. This would result in the failure to implement the commitments to Generic Letter (GL) 88-17, Loss of Decay Heat Removal, and Selected Licensee Commitment (SLC) 16.5.3 for assuring that containment closure would be achieved prior to the time at which core uncovery would occur from a loss of DHR. At that time, the inspectors determined that the operators would rely on a temporary aluminum cover installed in place of the inner emergency personnel access hatch door to meet

containment closure. The temporary aluminum hatch cover had not been designed for shutdown accident conditions. However, because it was considered by operators to be sufficient to meet containment closure requirements, the inspectors determined that the applicable enclosure in Abnormal Procedure (AP)/1,2,3/A/1700/26, Loss of Decay Heat Removal, which directs the closure of the outer emergency hatch, would not have been implemented following a loss of DHR. Accordingly, the lack of sufficient instructions to ensure containment closure per the immediate manual actions of the AP, was identified as a violation (VIO 50-269,270,287/02-12-01) of Technical Specification (TS) 5.4.1 in NRC's Final Significance Determination Letter dated August 2, 2001. The licensee issued PIP O-01-00093 to document the issue.

(2) Heat Removal System PI

On April 25, 2001, during the quarterly surveillance test of the 1B MDEFW pump, the outboard motor bearing temperature came into alarm at the 180 degrees F high alarm value. After the pump run was terminated, the temperature peaked at 192 degrees F. The licensee issued PIP O-01-01402 to document the condition and specify that a root cause determination was required. The root cause evaluation in PIP O-01-1402 determined that the motor's outboard sleeve bearing had been axially misaligned, causing the motor shaft to rub on the stationary bearing shoulder. The motor was set about 0.150 inches too close to the pump, which axially displaced the shaft into the outboard bearing shoulder. The licensee determined (in PIP resolution) that the pump would have fulfilled its function.

Following the April 2001 bearing problem, the NRC issued Inspection Report 50-269, 270,287/01-02 which contained a non-cited violation for the improper alignment of the 1B MDEFW pump, because instructions were not provided to perform axial alignment. This finding was assessed by the NRC's Significance Determination Process (SDP) and determined to be of very low safety significance (Green). However, the NRC continued to review the licensee's bases for concluding the 1B MDEFW pump could have fulfilled its function, and held several followup discussions/meetings with the licensee. The licensee's technical basis for concluding that the 1B MDEFW pump would have continued to function for its minimum mission time of seven hours with a degraded bearing, was based on a determination that the bearing high temperature was a self-arresting axial rubbing phenomenon that would eventually stop. After a thorough review of the licensee's bases and the facts surrounding the occurrence, the NRC concluded in Inspection Report 50-269,270,287/01-05 that the licensee's analysis did not provide an adequate basis to demonstrate that the 1B MDEFW pump was functional while in this degraded condition. Subsequently, in the third quarter of 2002, the licensee reported in their PI submittal that the 1B MDEFW pump was unavailable prior to the April 25, 2001, surveillance test. This resulted in the Heat Removal Safety System Unavailability PI crossing the Green-to-White threshold as of the first Quarter of 2001.

b. Determination of how long the issues existed, and prior opportunities for identification

(1) Barrier Integrity Finding

AP/1,2,3/A/1700/26, which provided the procedural logic to allow omission of closing the emergency personnel access hatch outer door based on a determination that

containment closure already existed, was issued in March 1996. A TS change to allow the use of a temporary hatch cover for the emergency air lock during core alteration or movement of irradiated fuel within the containment was implemented during March 1999. This TS change may have contributed to the operators' mind set that reliance on the temporary hatch cover was also appropriate during reduced RCS inventory conditions.

(2) Heat Removal System PI

The licensee's review of the work history associated with the 1B MDEFW pump/motor did not reveal any conclusive evidence as to when the misalignment occurred. Aside from preventive maintenance, the EFW pump/motor skids had limited work over the years since their installation in 1982. There was some relevant work on the 1B MDEFW pump/motor approximately two and ten years ago. Additional work, considered by the licensee to be minor in nature, was done in the December 2000 - January 2001 time frame. This work included an alignment check of the pump motor in radial and angular directions and greasing of the pump to motor coupling. These were recognized to have possibly contributed to the axial misalignment. However, with all things considered, the exact time of the misalignment was indeterminate. A review of the previous quarterly pump surveillance (January 31, 2001) did indicate that an anomalous temperature trend had occurred, but the alarm temperature value was not reached.

c. Determination of the plant-specific risk consequences (as applicable) and compliance concerns associated with the issues

(1) Barrier Integrity Finding

On November 27, 2000, Oconee Unit 1 entered a reduced inventory condition with a calculated time to boil of 18 minutes. The temporary aluminum hatch cover, which was installed in place of the inner emergency personnel hatch door, contained two four-inch diameter penetrations filled with temporary services and silicon RTV foam. In the event of a loss of DHR, it was determined that this cover would not prevent the release of fission products to the environment once fuel uncovery and core damage occurred (approximately five hours following the loss of DHR event).

The Large Early Release Frequency (LERF) risk metric was used to measure the risk impact of this finding. Consequently, NRC Inspection Manual Chapter 0609, Appendix H, Containment Integrity SDP was used to estimate a delta LERF (change in containment closure failure probability given the performance deficiency and the containment closure failure probability assumed for the base case). With an exposure time of six hours, the phase III plant specific risk analysis performed by the NRC yielded a delta LERF increase from the base case of 2.9E-7. This corresponded to an issue of low to moderate safety significance (White).

(2) Heat Removal System PI

On August 13, 2002, the licensee reported a White PI (as of the first Quarter of 2001) on Heat Removal Safety System Unavailability. As indicated in NRC Inspection Report 50-269, 270, 287/01-02, the actual risk associated with the performance deficiency of

mis-aligning the 1B MDEFW pump was determined to be of very low safety significance (Green).

d. Assessment

The licensee appropriately entered the White finding regarding inadequate procedures for establishing containment closure during loss of decay heat removal events into their corrective action program. Also, the licensee assigned the correct number of hours for the Heat Removal Safety System Unavailability PI and entered related problems into their corrective action program.

The inspectors determined that the licensee's problem identification efforts for both the White finding and PI were acceptable.

O2.02 Root Cause and Extent of Condition Evaluation

a. Evaluation of methods used to identify root causes and contributing causes

(1) Barrier Integrity Finding

The licensee did not perform a formal root cause investigation for the loss of DHR containment closure issue. However, the licensee did perform the problem evaluation that was contained in PIP O-01-00093. This attributed the apparent cause of the finding to a poorly worded procedure step whose intent was not adequately communicated to the users during training. This step would allow users (operators) to interpret the status of containment closure and omit the steps which would close the outer emergency personnel hatch door.

(2) Heat Removal System PI

The root cause determination method for the April 2001 occurrence (PIP O-01-1402) was acceptable. The determination contained all the elements required under the licensee's corrective action Nuclear System Directive (NSD)-212, Cause Analysis.

Following the April 2001 bearing temperature increase and subsequent bearing replacement, the 1B MDEFW pump motor outer bearing experienced another elevated temperature occurrence in September 2002, which was documented in PIP O-02-4859. The inspectors reviewed this occurrence to determine any similarities with the April 2001 misalignment problem. The licensee employed the same methodology and procedures in their root cause evaluation for this second occurrence of bearing temperature increase. As noted by the inspectors later in the report, the two misalignment issues that contributed to the elevated bearing temperatures appeared to be separate problems. The second occurrence is discussed in the following sections.

b. Level of detail of the root cause evaluation

(1) Barrier Integrity Finding

Although the licensee did not perform a root cause evaluation, the problem evaluation and determination of the apparent causes were conducted at a level of detail that was commensurate with the significance and complexity of the problem.

(2) Heat Removal System PI

Based on PIP O-01-1402, the licensee determined that the April 2001 occurrence resulted from incorrect bearing/motor shaft position in the axial direction, due to the lack of procedural guidance. A time line and a set of possible causes was established. Each possible cause was evaluated/eliminated until a conclusion was reached.

Per a review of recent available data and records by the inspector, and as addressed in the PIP's root cause, there was:

- An alignment check performed on the 1B MDEFW pump motor in December 2000 after the pump end suction pipe of the skid was modified to address foreign material problems with the pump's recirculation valve. The check looked at the angular and radial (offset) alignment and did not look at the pump to motor axial alignment. Due to the fact that the motor itself had not been moved, the licensee could not conclude that the work activity had caused the problem.

- The pump to motor coupling was greased per existing instructions in January 2001 subsequent to the aforementioned alignment and prior to the quarterly surveillance test on January 31, 2001. Based on the design of the motor-to-pump coupling, the addition of grease to the coupling can exert an outward (axial) force. The licensee could not conclude that the work activity had displaced the bearing enough to cause the problem.

Regarding a failure scenario, PIP O-01-1402 indicated that at some point in the past, the alignment between the pump and motor was incorrectly set; thereby, closing the available clearances in the coupling. The reason for this appears to be that the motor was "bolt bound" and could not be moved further from the pump without modifications to either the bolts or the holes in the motor feet to allow for further adjustment. The two work activities listed above could have been contributing factors in the reduction of motor bearing-to-shaft shoulder clearance.

PIP O-02-4859 indicates that after the 1B MDEFW pump quarterly surveillance test was performed on September 12, 2002, a review of the outboard bearing temperature data revealed anomalous temperature trends. The licensee formed an investigative team who recommended that additional test be performed on the pump and motor. The pump was operated for 14 to 15 hours, at approximately the required emergency steam generator injection flow and pressure. The bearing vibrations did trend up slightly, but remained below the inservice alert levels. Bearing temperature remained slightly elevated and unsteady, but below the alarm setpoint. Therefore, the 1B MDEFW pump could have performed its emergency safety function.

Root cause results for the September 2002 occurrence indicated that inadequate knowledge and procedures lead to a lack of axial restraint of the bearing. This root cause did not directly link this second occurrence to the April 2001 problem. An anti-rotation pin, which was not described in the pump technical manual or site procedures, was backed out of position; thereby, allowing the bearing to move toward the motor shaft shoulder. The pin was not described in the April 2001 work orders or procedurally accounted for during that bearing replacement. (The anti-rotation pin is further discussed below.) The root cause was well supported with information. Again per the licensee process, a time line and a set of possible causes was established. Each possible cause was evaluated/eliminated until a conclusion was reached.

c. Consideration of prior occurrences of the problem and knowledge of prior operating experience

(1) Barrier Integrity Finding

Although the licensee did not perform a root cause evaluation, the licensee performed searches of the Institute for Nuclear Power Operations (INPO) Nuclear Plant Events Database and the corporate Duke Operating Experience (OE) Database in an effort to identify operating experience related to containment closure expectations and requirements upon loss of DHR. The searches of these databases were performed over a time period from January 1988 to present with containment closure as the search criteria. Entries yielded by the searches were reviewed by the licensee and no events were identified that would have provided additional insights to their problem evaluation. The licensee did provide information from the event to other Duke plants via the Regulatory Compliance Managers BEST forum.

(2) Heat Removal System PI

OE information available from other sources was reviewed and explained in detail in both PIPs (O-01-1402 and O-02-4859) to the extent practicable. The site had reviewed corporate wide data bases and other nuclear system sources. It was revealed that searching of OE data was highly dependent upon user knowledge, keyword search word/phrase choice, the software used, and time spent searching.

As indicated in PIP O-02-4859, the licensee's Power Distribution Group had done motor work at Oconee until the early 1990s. A 1991 vendor bulletin relevant to the 1B MDEFW pump motor had been sent to the Power Distribution Group by the licensee's corporate office for action. They took action to provide training to personnel on the bearing anti-rotation pin as provided by the bulletin guidance. When site personnel took over the motor repair function, they were not made aware of the bulletin since the licensee's corporate office had made the decision not to reissue older information. In 1996, the licensee had determined that information gathered from that point forward would be placed in a computer data base accessible by all of their sites. Older information was accessible upon request. Both root causes had searched the licensee's data base, but did not locate this vendor bulletin since it had not been entered into the data base. The PIP contained corrective action to review this short coming.

The inspectors assessed the ability to retrieve OE utilizing site system engineers and the licensee's OE corporate manager. The search was on other than the licensee's data base. A half hour search using general vendor motor information and words such as "bearing over heat," "bearing, and " bearing failure," did not locate the above-mentioned bulletin.

d. Consideration of potential common causes and extent of condition of the problem.

(1) Barrier Integrity Finding

Although a root cause evaluation was not performed, the licensee performed an Engineering Level 2 assessment (PIP O-02-05963) that investigated and assessed containment closure controls with respect to the requirements set forth in GL 88-17 during reduced inventory conditions. As part of the assessment, a review was performed by the licensee of the containment controls, documentation, and engineering analyses associated with reduced inventory conditions.

The engineering assessment covered procedures and documents for control of containment penetrations during outages, control of the reactor building equipment hatch, control of personnel air locks, and control of steam generator (SG) penetrations and accesses. The licensee did not identify any further procedural deficiencies or weaknesses that would lead to the failure to implement GL 88-17 requirements for containment closure.

The licensee did identify several areas for improvement in Enclosure 4.3 of Operations Procedure (OP)/1,2,3/A/1502/009, Containment Closure Control. Currently, the procedure allows work on the SGs while inside containment closure is established, provided certain compensatory actions are in place to restore SG integrity. This could potentially allow a path from containment to the outside when containment closure was warranted. Work of this nature has not been performed in recent outages and the current work practice is not to perform work on the SGs if they are to be credited for containment closure purposes. A corrective action to delete this step in the procedure was generated. Also, OP/1,2,3/A/1502/009 requires approval by Primary Systems Engineering prior to using any temporary cover to be credited for containment closure. The licensee could find no guidance regarding the basis for boundary qualification (e.g., material, temperature rating, pressure rating, etc.). The licensee generated a corrective action to establish guidelines/processes for boundary qualification of temporary covers credited for containment closure (PIPs O-01-0093 and O-02-06244 apply).

(2) Heat Removal System PI

Common cause was considered in the PIPs for both occurrences. For the first instance of axial misalignment, to ensure that there was no other misalignments of MDEFW pumps (bearing and shaft shoulder rubbing), the licensee partially disassembled and checked the clearances for the remaining five pumps' bearings. The inspectors reviewed the inspection results and post inspection surveillance tests for anomalous temperature trends. The licensee also instituted closer examination of bearing temperature trend data.

For the second instance of misalignment, the licensee discovered a vendor bulletin that provided guidance on the anti-rotation pins and were checking each pump motor for proper pin placement. At the time of this inspection, the licensee was in process of inspecting the Unit 2 MDEFW pump motors. The inspectors reviewed the inspection results and observed the disassembled 2B MDEFW pump motor. Both Unit 2 MDEFW pump motors had pins in the proper location. The licensee had a schedule in place for inspecting the three remaining pumps (i.e., 1A, 3A, and 3B) by the end of March 2003. This was considered acceptable by the inspectors.

e. Assessment

The inspectors determined that the licensee's evaluation of the apparent cause for the inadequate controls for maintaining containment closure during reduced inventory and the engineering assessment of GL 88-17 compliance were adequate.

The inspectors determined that the licensee's root cause evaluations and extent of condition review for the White Heat Removal System PI were adequate.

02.03 Corrective Actions

a. Appropriateness of corrective actions

(1) Barrier Integrity Finding

The inspectors reviewed the corrective actions established by the licensee to address the containment closure deficiencies during reduced inventory conditions. These corrective actions included procedure changes to AP/1,2,3/A/1700/026 to provide steps in the body of the procedure to ensure that the emergency personnel hatch will be closed in all cases and to remove ambiguities for performing the enclosure for establishing reactor building containment closure in the event of loss of decay heat removal. Additional corrective actions include providing training to operations personnel on containment closure procedures and GL 88-17 requirements. The corrective actions established by the licensee address the identified apparent causes and are of a scope commensurate to the complexity and risk significance of the issue.

(2) Heat Removal System PI

In both PIPs O-01-1402 and O-02-4859, the licensee established corrective actions that were appropriate for the known facts and the problems encountered. The actions taken were commensurate with the risk and the importance of the actions. The procedures for coupling alignment were altered to reflect new alignment information. OE dissemination weaknesses were addressed by appropriate corrective actions.

b. Prioritization and establishment of schedule for implementing and completing the corrective actions

(1) Barrier Integrity Finding

The inspectors determined that the corrective actions were prioritized with consideration of risk and regulatory compliance. Initial corrective actions to implement procedure changes that require emergency hatch closure under all cases and changes to Selected Licensee Commitment (SLC) 16.5.3 that clarify the point that at least one reactor building emergency hatch must be closed to meet containment closure requirements, was implemented in March 2001. This was before any subsequent procedure usage. The inspectors noted that additional procedural enhancements and the development of operator training are scheduled to be completed by November 20, 2002.

(2) Heat Removal System PI

Appropriate priorities were established to complete repairs of the 1B MDEFW pump motor in April 2001. By June 2001, the licensee had verified that all other pumps motor internal clearances were satisfactory. For the anti-rotation pin installation issue, future pump inspections were appropriately scheduled for completion by March 2003.

c. Establishment of quantitative or qualitative measures of success for determining the effectiveness of the corrective actions to prevent recurrence

(1) Barrier Integrity Finding

The inspectors determined that the procedural changes to explicitly require the shutting of the emergency personnel hatch in the event of a loss of decay heat removal during reduced inventory conditions is the qualitative measure to prevent recurrence for this White issue. The basis for the White finding was that the procedure at the time allowed operators to make a subjective judgement on the status of containment closure. The procedure as changed gives unambiguous directions to establish containment closure and to shut the emergency personnel hatch without regards to the temporary aluminum cover.

(2) Heat Removal System PI

The inspectors determined that the licensee had taken actions to prevent recurrence via their repair and subsequent corrective actions (completed or scheduled). Once these corrective actions are all completed, reliability and operational ruggedness of the MDEFW pumps/motors should improve. The closer examination of bearing temperature trend data instituted by the licensee, will provide a measure of corrective action effectiveness.

d. Assessment

The inspectors found that the licensee's corrective actions for the containment closure White finding were appropriate. They address the apparent cause, were prioritized and scheduled with consideration of risk and regulatory significance, and were adequate to prevent recurrence. Accordingly, the White barrier integrity finding (and related violation 50-269, 270, 287/02-12-01) are closed.

The inspectors found that the licensee had performed appropriate corrective actions, and prioritized and scheduled the actions to prevent recurrence of the MDEFW pump motor alignment problems. Accordingly, the PI fault exposure hours may be reset per the guidance of NEI 99-02, Regulatory Assessment Performance Indicator Guideline, Revision 2.

02.04 Independent Assessment of Extent of Condition and Generic Implications

To assess the validity of the licensee's conclusions regarding extent of condition surrounding the White finding and PI, the inspectors independently sampled related licensee performance within key attributes of the barrier integrity and mitigating systems cornerstones. The areas selected for independent sampling are discussed below.

(1) Barrier Integrity Finding

The inspectors performed an independent assessment of the licensee's conclusions with respect to the extent of condition of the issues related to compliance to GL 88-17 and methods to establish the containment barrier during refueling outage activities. The inspectors reviewed various plant procedures for adequacy in establishing and maintaining containment integrity. These procedures included OP/1,2,3/A/1502/009, Containment Closure Control, AM/0/A/1400/002 B, Equipment Hatch - Reactor Building - Emergency Closing, AM/0/A/1400/032, Hatch - Emergency - Installation and Removal of Temporary Door Closure for Outage Services. The inspectors reviewed documentation validating the time maintenance personnel were able to install the equipment hatch in the event of a loss of decay heat removal to verify times were consistent with accident assumptions.

The inspectors also reviewed the licensee's procedures for establishing and maintaining reduced inventory and mid-loop conditions and verified that the prerequisites and precautions for entry into these conditions were consistent with GL 88-17 requirements for containment closure. The inspectors performed a walkdown of the Unit 2 containment during an ongoing refueling outage and observed the condition of the equipment, personnel air lock, emergency hatches, and a majority of the containment penetrations from inside containment. The inspectors looked for any conditions that would negatively impact the licensee's ability to establish containment closure. The inspectors also reviewed a sample of penetrations being controlled by the work control center for containment closure per OP/2/A/1502/009 to ensure that the appropriate closure requirements were implemented. The inspectors did not identify any further deficiencies with respect to containment barrier integrity as a result of this review.

(2) Heat Removal System PI

To assess the validity of the licensee's conclusions regarding the extent of condition of the issues, the inspectors utilized Inspection Procedure 62700, Maintenance Program Implementation, to assess: many points in the root cause process; the physical condition of the 2B MDEFW pump motor during its disassembly/inspection; procedures for pump/motor work and their changes; the 1B MDEFW pump outboard motor bearing associated with the September 2002 occurrence; motor performance data; the lubrication process for the pump-to-motor coupling; and a sample of the OE surrounding

the issues. The two misalignment issues with the 1B MDEFW pump motor appear to be separate problems. At the time of the inspection, the pump/motor surveillance data (i.e., vibration and bearing temperature profiles) indicated that the facility's MDEFW pump motors had no observable negative trends or problems. The resultant corrective action when completed should improve the reliability and operational availability of the pump/motor units. The inspectors did not identify any further deficiencies with respect to MDEFW pump maintenance or OE integration.

3.0 Management Meetings

The inspectors discussed the preliminary results of the inspection on November 8, 2002, with Mr. David Baxter, Engineering Manager, and other members of licensee management and staff. The licensee acknowledged the findings presented.

The inspectors asked the licensee whether any of the material examined during the inspection should be considered proprietary. No proprietary information was identified.

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Licensee

D. Baxter, Engineering Manager
D. Coyle, Operations Procedures Manager
W. Foster, Safety Assurance Manager
L. Nicholson, Regulatory Compliance Manager
J. Smith, Regulatory Compliance Technician

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

50-269,270,287/02-12-01	VIO	Inadequate Procedure Involving Containment Closure (Section 02.03d.)

Discussed

None

DOCUMENTS REVIEWED

General

Updated Final Safety Analysis Report
NEI 99-02, Regulatory Assessment Performance Indicator Guideline, Revision 2
NSD 703, Administrative Instructions for Technical Procedures, Rev. 22
NSD - 212, Cause Analysis, Rev. 12
NSD - 208, Problem Investigation Process, Rev. 22

Barrier Integrity Finding

NRC Inspection Report: Oconee Nuclear Station - NRC Integrated Inspection Report 50-269/00-07, 50-270/00-07, 50-287/00-07, dated January 29, 2001.

NRC Letter, Victor M. McCree, Deputy Director Division of Reactor Projects, to W.R. McCollum, Vice President Oconee Site: Preliminary White Finding (NRC Inspection Report 50-269/00-07, 50-270/00-07, 50-287/00-07 - Oconee Nuclear Station), EA-02-048, dated April 8, 2002

NRC Letter, Loren R. Plisco, Director Division of Reactor Projects, to W.R. McCullum, Vice President Oconee Site: Final Significance Determination For a White Finding and Notice of Violation (NRC Inspection Report 50-269/02-12, 50-270/02-12, 50-287/02-12 - Oconee Nuclear Station), EA02-048, dated August 2, 2002

Duke Letter, H. B. Tucker, Vice President, to NRC Document Control Desk: Response to Generic Letter 88-17, Loss of Decay Heat Removal, dated January 3, 1989

Duke Letter, W.R. McCollum, Vice President Oconee Site, to NRC Document Control Desk: License Amendment Request Regarding Containment Closure During Refueling Operations Request for Technical Specification Amendment 99-03, dated March 1, 1999

Duke Letter, W.R. McCollum, Vice President Oconee Site, to NRC Document Control Desk: Unsolicited Response to NRC Preliminary White Finding, dated July 11, 2002

Procedure AP/1/A/1700/026, Loss of Decay Heat Removal, Revision 11

Procedure AM/0/A/1400/002 B, Equipment Hatch - Reactor Building - Emergency Closure, Revision 0

Procedure AM/0/A/1400/032, Hatch - Emergency - Installation and Removal of Temporary Door Closure for Outage Services, Revision 0

Procedure OP/1/A/1103/011, Draining and Nitrogen Purging RCS, Revision 53

Procedure OP/1/A/1502/009, Containment Closure Control, Revision 20

Site Directives Manual S.D. 1.3.5, Shutdown Protection Plan, Revision 13

Nuclear Policy Manual, Nuclear System Directive: 403, Shutdown Risk Management (Modes 4,5,6, and No-Mode) per 10 CFR 50.65(a)(4), Revision 10

PIPs O-01-00093; O-02-05458; O-02-05522; O-02-05540; O-02-05776; O-02-05787; O-02-05963; O-02-06244; O-02-06299

<u>Heat Removal System PI</u>

NRC Letter, L. A. Reyes, Regional Administrator, to W.R. McCollum, Vice President Oconee Site: Assessment Followup - Oconee Nuclear Station, dated October 9, 2002

NRC Letter, L. A. Reyes, Regional Administrator, to W.R. McCullum, Vice President Oconee Site: Mid-Cycle Performance Review and Inspection Plan - Oconee Nuclear Station, dated August 26, 2002

Technical Manual OM-314-0216, Motor S.O. 72-F- 44015 and 72-F-44016, approved 11/22/83 [for MDEFW pumps 1A and 1B]

Technical Manual OM-314-0393, Motor S.O. 72-F- 44015 and 72-F-32561, 32562, approved 3/4/83 [for MDEFW pumps 2A, 2B, 3A]

Bingham Pump Company Drawing FD-220055, Revision 4

Engineering Support Document, Emergency Feedwater Pumps, Revision 3

Root Cause Failure Executive Summary Report, 1B Motor Driven Emergency Feedwater Pump Motor High Outboard Bearing Temperature Trend, dated 6/27/01 (PIP O-01-1402)

Root Cause Failure Analysis Report, 1B Motor Driven Emergency Feedwater Pump Motor Outboard Bearing Anomalous Temperature Trend, dated 11/01/02 (PIP O-02-4859)

Framatone Technical Document 74-1152414-09, 3/31/2000 [pages Volume 2, V-5, & VI-16]

Procedure MP/1/A/1300/027, Pump - Bingham - Motor Driven Emergency Feedwater - Unit 1 - Disassembly, Repair, and Assembly, Revision 18 [completed 12/27/2000]

Procedure MP/0/A/3009/021, Motor-A.C.-Horizontal-Disassembly, Repair, and Assembly, Revision 7 [bearing megger, completed 9/17/02]

Procedure TT/1/A/0600/024, 1B Motor Driven Emergency Feedwater Pump Test, Revision 0, [completed 10/22/02]

Work Orders - 98254949, task 27; 98181058, 98385108, 98385120, 98383826, 98383824 [motor clearance determination measurements]; 98540009; 98383185; 92001885 [history, TYPICAL]; and, 98533377, 98553387, 98553375, 98553376 [inspection schedule for anti-rotation pins on 1A, 1B, 3A, and 3B MDEFW pumps]

PIPs O-99-3895 and M-98-3983

Westinghouse Technical Bulletin, Large Motor Split Sleeve Bearing Anti-Rotation Pin, NSD-TB-91-02-R0, dated 01/14/91

Westinghouse Electric Corporation, Buffalo Division Drawing, Installation Instructions for Split Sleeve Bearing Motors - LLD Frame Series 5000, 5800, 6800, Number 6739A33, Revised 1/6/77

Lubrication Data Sheet for ON2FDWPU0005 [2B, TYPICAL], Sheet 5.12.10, revised 4/8/96 [pump to motor coupling grease]

Procedure MP/0/A/1840/040, Pumps - Motors - Miscellaneous Components - Lubrication - Oil Sampling - Oil Change, Revision 18

Procedure MP/0/A/1300/036, Pump Bingham - SSF - Auxiliary Service Water - Disassembly, Repair, and Assembly, Revision 10 [corrective action in PIP 01-1402]