



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**

**REGION II  
SAM NUNN ATLANTA FEDERAL CENTER  
61 FORSYTH STREET SW SUITE 23T85  
ATLANTA, GEORGIA 30303-8931  
April 19, 2001**

EA-01-056  
SDP/EA-00-137

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

**SUBJECT: OCONEE NUCLEAR STATION - NRC SUPPLEMENT INSPECTION REPORT  
50-269/01-06, 50-270/01-06, AND 50-287/01-06 AND NOTICE OF VIOLATION**

Dear Mr. McCollum:

On March 22, 2001, the NRC completed a supplemental inspection at your Oconee Nuclear Station. The enclosed report documents the inspection findings which were discussed on January 25, 2001, with Mr. M. Nazar and other members of your staff and discussed again with you and your staff on March 22, 2001.

This supplemental inspection was an examination of the root cause evaluation, extent of condition determination, and corrective actions associated with a White finding identified in the mitigating systems cornerstone. The White finding involved the reduced capability to provide reactor coolant makeup using the spent fuel pool as a suction source for a high pressure injection pump following certain tornadoes. This supplemental inspection also examined the corrective actions for a design control violation identified by the NRC that was associated with the White finding. The violation involved Duke Energy Corporation's (DEC) failure to consider correctly various design inputs in the calculation associated with the spent fuel pool as the suction source for the high pressure injection pump.

Based on the results of this inspection, the NRC determined that while DEC had reviewed this finding extensively, a root cause evaluation and extent of condition review were not performed for this White finding. Instead, DEC focused primarily on determining the Oconee licensing basis requirements for tornado mitigation. Corrective action was taken to modify the reactor coolant pump seals on Unit 1, thereby reducing the risk of a tornado induced loss of coolant accident due to a reactor coolant pump seal failure. This corrective action was considered adequate by the NRC. However, corrective actions to eliminate credit for the spent fuel pool as a suction source for a high pressure injection pump following certain tornadoes were determined to be contrary to the requirements of 10 CFR 50.59. This is identified as a cited violation in the enclosed Notice of Violation (Notice). This violation is being cited in accordance with Section VI.A.1.a. of the NRC Enforcement Policy because DEC did not restore compliance with regard to the 10 CFR 50.59 safety evaluation. No color was assigned to this issue because the Significance Determination Process did not apply.

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. The NRC will use your response, in part, to determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosures 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/NRC/ADMAS/index.html> (the Public Electronic Reading Room).

Sincerely,

**/RA Harold Christensen for:/**

Charles A. Casto, Director  
Division of Reactor Safety

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

Enclosures: 1. Notice of Violation  
2. NRC Supplemental Inspection Report 50-269,270,287/01-06

Attachment: List of Documents Reviewed

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**(\*) = SEE PREVIOUS PAGE FOR CONCURRENCE**

PUBLIC DOCUMENT (circle one): YES NO

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NAME	MThomas	MMaymi	COgle	RHaag	ABoland		
DATE	4/13/2001	4/17/2001	4/13/2001	4/16/2001	4/19/2001	4/ /2001	
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO

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## NOTICE OF VIOLATION

Duke Energy Corporation  
Oconee Nuclear Station  
Units 1, 2 and 3

Docket Nos. 50-269, 50-270, 50-287  
License Nos. DPR-38, DPR-47, DPR-55  
EA-01-056

During an NRC inspection conducted on January 22-26, 2001, and March 12-22, 2001, a violation of NRC requirements was identified. In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions - May 1, 2000," NUREG-1600, the violation is listed below:

10 CFR 50.59 (a)(1) (as revised January 1, 1999) states in part, that the licensee may make changes in the facility as described in the safety analysis report without prior Commission approval, provided the proposed change does not involve an unreviewed safety question (USQ). 10 CFR 50.59 (a)(2) states, in part, that a proposed change involves an USQ if the probability of occurrence or malfunction of equipment important to safety previously evaluated in the safety analysis report may be increased.

The Updated Final Safety Analysis Report (UFSAR) Section 3.2.2, System Quality Group Classification, states, in part, that a sufficient supply of primary side makeup water is assured during a tornado initiated loss of offsite power by several sources. Included in these sources is a high pressure injection (HPI) pump taking suction from the spent fuel pool (SFP).

UFSAR Section 3.2.2 further states that protection against a tornado is an Oconee design criterion, and that capability is provided to safely shut down all three units, in that, after a tornado, normal shutdown systems will remain available or alternate systems will be available to allow shutdown of the plant.

Contrary to the above, on August 28, 2000, the licensee completed a 10 CFR 50.59 safety evaluation to revise UFSAR Section 3.2.2 and delete the SFP as a suction source for the HPI pump after certain tornadoes, thereby increasing the probability of the malfunction of equipment important to safety. This resulted in an USQ for which the licensee did not have prior Commission approval.

This is a Severity Level IV violation (Supplement I).

Pursuant to the provisions of 10 CFR 2.201, Duke Energy Corporation is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555 with a copy to the Regional Administrator, Region II, and a copy to the NRC Resident Inspector at the Oconee Nuclear Station, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation" and should include for the violation: (1) the reason for the violation, or, if contested, the basis for disputing the violation, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved. Your response may reference or include previous docketed correspondence, if the correspondence adequately addresses the required response. If an adequate reply is not received within the

ENCLOSURE 1

time specified in this Notice, an order or a Demand for Information may be issued as to why the license should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

If you contest this enforcement action, you should also provide a copy of your response, with the basis for your denial, to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001.

Because your response will be made 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), to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction. ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/NRC/ADAMS/index.html> (the Public Electronic Reading Room). If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.790(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.

Dated at Atlanta, Georgia  
this 19<sup>th</sup> day of April 2001

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: 50-269/01-06, 50-270/01-06, 50-287/01-06

Licensee: Duke Energy Corporation

Facility: Oconee Nuclear Station, Units 1, 2, and 3

Location: 7800 Rochester Highway  
Seneca, SC 29672

Dates: January 22-26, and March 12-22, 2001

Inspector: M. Thomas, Senior Reactor Inspector

Accompanying Personnel: M. Maymi, Reactor Inspector Trainee

Approved by: C. Ogle, Chief  
Engineering Branch  
Division of Reactor Safety

ENCLOSURE 2

## SUMMARY OF FINDINGS

IR 05000269,270,287/01-06, on 01/22-26/2001 and 3/12-22/2001, Duke Energy Corporation, Oconee Nuclear Station, Units 1, 2, and 3. Supplemental Inspection.

### **Cornerstone: Mitigating Systems**

This supplemental inspection was performed in accordance with Inspection Procedure 95001 to assess the licensee's evaluation associated with the reduced capability to provide reactor coolant makeup using the spent fuel pool (SFP) as a suction source for a high pressure injection (HPI) pump following certain tornadoes. This issue was characterized previously as having low to moderate risk significance (White) in NRC Inspection Report 50-269,270,287/00-011 and the NRC's Final Significance Determination for a White Finding and Notice of Violation (dated November 9, 2000). The violation identified was against 10 CFR 50, Appendix B, Criterion III, Design Control, and involved errors in a design calculation which resulted in the licensee's failure to recognize the reduced capability to provide reactor coolant makeup.

Based on the age of the deficiency, Duke Energy Corporation (DEC) elected not to perform a root cause evaluation and extent of condition review for this White finding. DEC did, however, review this finding and some corrective actions were taken.

The reviews focused primarily on determining the Oconee licensing basis requirements for tornado mitigation instead of correcting the White finding condition.

The adequacy of the corrective actions was mixed. A significant modification which replaced the Unit 1 reactor coolant pump (RCP) seals was considered adequate by the inspectors. This corrective action served to reduce the risk of a tornado induced loss of coolant accident (LOCA) due to RCP seal failure on Unit 1. In addition, the inspectors noted that the errors which were the subject of the design control violation have been resolved and the licensee's Calculation Enhancement Project will provide corrective actions to address this type of calculational error.

Licensee corrective actions to eliminate credit for the SFP as a HPI pump suction source following certain tornadoes were determined to be inadequate. The corrective actions involved performing a 10 CFR 50.59 safety evaluation (dated August 28, 2000) to revise Section 3.2.2 of the Updated Final Safety Analysis Report (UFSAR), and other design basis documents, to eliminate credit for the SFP as a suction source for a HPI pump after certain tornadoes. However, the NRC determined that eliminating credit for the SFP as a HPI suction source was an unreviewed safety question (USQ) which required NRC review and approval prior to implementation. The HPI pump was credited to mitigate the loss of reactor coolant system (RCS) inventory by providing RCS makeup after certain tornadoes. Therefore, the 10 CFR 50.59 safety evaluation was inadequate, in that, it did not provide technical bases to support the conclusions that the change was not an USQ. This item was considered to be of very low risk significance since the flowpath was not deleted from service and plant procedures for using the flowpath were not changed. Based on the very low risk significance associated with this issue, this was identified as a cited Severity Level IV Violation.

As a result of this issue with the 10 CFR 50.59 safety evaluation, the White performance issue associated with the reduced capability to provide RCS makeup using the SFP as a suction source for a HPI pump following certain tornadoes will not be closed at this time. This issue will



be inspected in a followup inspection in accordance with Inspection Procedure 95001 at a later date.

The significance of most findings is indicated by their color (Green, White, Yellow, Red) using the Significance Determination Process (SDP) found in Inspection Manual Chapter 0609. Findings to which the SDP does not apply are indicated by "no color" or by the severity level of the applicable violation. The inspection identified one No Color finding, which involved a cited Severity Level IV violation. The violation involved the inadequate 10 CFR 50.59 safety evaluation associated with revising Section 3.2.2 of the UFSAR to eliminate credit for the SFP as a suction source for a HPI pump after certain tornadoes.

## Report Details

### 01 Inspection Scope

This supplemental inspection was performed by the NRC in accordance with Inspection Procedure 95001, "Inspection for One or Two White Inputs in a Strategic Performance Area." The inspection assessed the licensee's evaluation associated with the reduced capability to provide reactor coolant makeup using the spent fuel pool (SFP) as a suction source for a high pressure injection (HPI) pump following certain tornadoes. This issue was previously characterized as White in NRC Inspection Report (IR) 50-269,270,287/00-011 and the NRC's Final Significance Determination for a White Finding and Notice of Violation (dated November 9, 2000). This issue is related to the mitigating systems cornerstone in the reactor safety strategic performance area.

### 02 Evaluation of Inspection Requirements

#### 02.01 Problem Identification

- a. Determine that the evaluation identifies who (i.e. licensee, self-revealing, or NRC), and under what conditions the issue was identified.

The licensee's evaluation determined that the deficiencies in calculation OSC-3873, Hydraulic Model of the HPI System with Suction from Spent Fuel Pool, were identified by the licensee during the Self Initiated Technical Audit (SITA) SA-97-10(ON)(SITA) (HPI/LPI). This HPI/low pressure injection (LPI) SITA was conducted during the period November 10, 1997, through December 11, 1997. This SITA identified that calculation OSC-3873 was deficient and contained several non-conservative assumptions. This HPI/LPI SITA finding was documented in Problem Investigation Process Report (PIP) O-98-00148 and entered in the licensee's corrective action program.

The NRC performed an in-office follow up inspection on June 4, 2000, of Unresolved Item 50-269,270,287/00-04-01, Lack of Reasonable Assurance that a High Pressure Injection (HPI) Pump Could Operate for the Necessary Time Frame Using the Spent Fuel Pool (SFP) as the Suction Source Following a Tornado. This follow up inspection (documented in IR 50-269,270,287/00-11) resulted in the identification of a potential White finding. This IR also noted that the licensee identified the issue. PIP O-98-00148 documented that calculation OSC-3873 did not consider adequately design inputs such as atmospheric pressure, effects of spent fuel pool depletion, and instrument inaccuracy associated with alignment of a HPI pump to the SFP. As a result, there was no reasonable assurance that the HPI pump would have a sufficient supply of primary side makeup water, using the SFP as a suction source, following tornadoes of F3, F4, or F5 intensity.

- b. Determine that the evaluation documents how long the issue existed, and prior opportunities for identification.

The licensee documented that the issue existed since approximately 1988 when Abnormal Procedure AP/1,2,3/A/1700/11, Loss of Power, was revised to include instructions for aligning the SFP as the HPI suction source following a tornado. The

inspector noted that, although not proceduralized until 1988, the SFP to HPI pump alignment was credited in licensee analyses as early as 1986. Calculation OSC-2262, Tornado Protection Analysis, was originated in 1986. This calculation was performed in response to a NRC Request for Additional Information on EFW Tornado Protection dated May 30, 1986. The calculation's analysis description stated that the objective was to verify that adequate decay heat removal could be provided following a design basis tornado using only that equipment which was protected from tornado damage. The equipment listed included the manually operated steam line atmospheric dump valves (ADVs), the auxiliary service water (ASW) pump, and one HPI pump. The calculation further stated that one HPI pump may be powered from the ASW switchgear and aligned to take suction from the SFP in order to provide makeup to the RCS.

PIP O-98-00148, dated January 12, 1998, documented that the errors in calculation OSC-3873 existed since the origination of the calculation in 1990. This PIP also identified similar PIPs (O-95-00550, O-96-00864, and O-96-01041), which involved the lack of analysis related to the HPI system's role in a tornado event, as prior opportunities for identification.

PIP O-95-00550, dated May 17, 1995, identified that the capability to align a HPI pump to the SFP during a tornado had not been tested. Corrective actions included evaluating the possibility of testing the HPI pump alignment to the SFP, testing the ability to power the HPI pump from the ASW switchgear, and updating the HPI design basis document (DBD) as necessary. PIP O-96-01041, dated May 21, 1996, documented findings from fuel handling self-assessment, SA-96-17(ON)(SITA), where some engineering analyses were found to have errors and omissions. One of the engineering analyses mentioned in the PIP was related to the dynamics of the HPI tornado event not being fully analyzed. The corrective action recommended an analysis to support licensing commitments for tornado mitigation. This analysis would take into consideration commitments already made relating to the SFP. PIPs O-95-00550 and O-96-01041 were closed, in part, by corrective actions included in PIP O-96-00864 and/or PIP O-99-00115.

PIP O-96-00864, dated April 24, 1996, documented the licensee's failure to analyze the dynamics of the HPI tornado event. This finding was identified during the fuel handling self assessment SA-96-17(ON)(SITA). Corrective actions for this PIP included determining the licensing basis for mitigation of the tornado event postulated in calculation OSC-2262, and to provide a schedule and resources to resolve the issue. Another corrective action was to enhance OSC-2262 as necessary. The PIP was closed based on a 10 CFR 50.59 safety evaluation (dated July 30, 1998) which was performed to clarify the Oconee tornado licensing basis. Subsequent to this 10 CFR 50.59 safety evaluation, PIP O-99-00115, dated January 12, 1999, was initiated to perform additional licensing reviews and possible revision to this 10 CFR 50.59 safety evaluation. The corrective actions from PIP O-96-00864 were reopened and were being addressed in PIP O-99-00115.

- c. Determine that the evaluation documents the plant specific risk consequences (as applicable) and compliance concerns associated with the issue.

In response to IR 50-269,270,287/00-11, Duke Energy Corporation (DEC) requested a regulatory conference, which was conducted on September 7, 2000. During this

conference DEC presented their evaluation of the issue, risk assessments, and corrective measures to be taken.

During the regulatory conference, DEC presented an evaluation of plant specific risk consequences. The SFP to HPI pump flow path contribution to the tornado annual core damage frequency (CDF) was determined to have an approximate  $\Delta$ CDF value of  $3 \times 10^{-6}$  for Unit 1, and  $5 \times 10^{-7}$  for Units 2 and 3. These values were determined using the NRC-accepted Rhodes seal LOCA model. The risk insights for Units 2 and 3 were based on application of the Rhodes model to the Bingham reactor coolant pump (RCP) seal package installed in Units 2 and 3. The Unit 1 risk insight was based on application of the Rhodes model to the Westinghouse seal package installed in Unit 1. The risks associated with the issue were higher for Unit 1 and these were factored into the corrective actions. The licensee's assessment was consistent with the NRC's characterization of the issue as a White finding.

DEC presented their perspective of the compliance concerns associated with this issue during the regulatory conference. DEC concluded that there were no actual safety consequences and the potential safety consequences were low. Thus, the safety significance of the issue did not meet the criteria for NRC enforcement and no enforcement was necessary. The NRC's assessment of the potential safety consequences differed from that of the licensee. The NRC determined that the potential safety consequences were low to moderate. Also, the NRC differed from the licensee's perspective of the compliance concerns for this issue. The NRC identified a compliance issue that was cited in the NRC's Final Significance Determination for a White Finding and Notice of Violation (dated November 9, 2000). A violation of 10 CFR 50, Appendix B, Criterion III, Design Control (50-269,270,287/00-07-04) was cited for Oconee's failure to adequately consider design inputs to assure that the design bases were translated into specifications, drawings, procedures, and instructions for the HPI system using the SFP as a suction source following certain tornadoes. The violation was considered escalated enforcement because it was associated with a White finding.

#### 02.02 Root Cause and Extent of Condition Evaluation

- a. Determine that the problem was evaluated using a systematic method(s) to identify root cause(s) and contributing cause(s).

The licensee did not perform a root cause or extent of condition evaluation for the White finding nor the deficiencies identified in calculation OSC-3873. This was because the licensee considered the deficiencies (which occurred when the calculation was created in 1990) to be historical because they occurred more than two years ago. The licensee stated during the regulatory conference that processes were in place already to adequately address resolution of shortcomings in calculations (specifically, a Calculation Enhancement Project).

The licensee initiated the Calculation Enhancement Project in December 1998 as a result of other calculation deficiencies identified during the HPI/LPI SITA and previous NRC escalated enforcement (NRC Violation 50-269,270,287/98-268-01012 and Licensee Event Report 50-269/98-04). The scope of the project was to review critical design inputs and assumptions in safety-related risk significant calculations to confirm

the accuracy and adequacy of the inputs and assumptions. The licensee identified approximately 600 safety-related calculations that were determined to be within the scope of the Calculation Enhancement Project. The licensee also included a subset of non-safety-related calculations associated with tornado; heating ventilation and air conditioning; and seismic structures in this calculation project. The project is being performed in two phases. Phase 1 involves reviewing the calculations to identify deficiencies. Phase 2 involves revising any deficient calculations to meet current licensee standards. The project is scheduled to be completed in 2005. Ongoing calculation review categories that were within the scope of the enhancement project included emergency operating procedure (EOP) setpoint calculations, uncertainty calculations, and emergency feedwater (EFW) calculations. The inspector noted that calculations OSC-2262 and OSC-3873 were included in the population of calculations being reviewed under the Calculation Enhancement Project. In addition to the calculation review and enhancement project, Procedure EDM 101, Engineering Calculations/Analyses, was revised, and training was provided to the engineering staff in 1999 on engineering calculations. Followup training was provided to the engineering staff in 2000 on configuration management and calculations.

- b. Determine that the root cause evaluation was conducted to a level of detail commensurate with the significance of the problem.

Although the licensee did not perform a root cause evaluation, the Calculation Enhancement Project was being conducted to a level of detail that was commensurate with the significance of the problem.

- c. Determine that the root cause evaluation included a consideration of prior occurrences of the problem and knowledge of prior operating experience.

Although a root cause evaluation was not performed, the Calculation Enhancement Project included a consideration of prior occurrences of calculation errors and knowledge of prior operating experience.

- d. Determine that the root cause evaluation included consideration of potential common cause(s) and extent of condition of the problem.

Although a root cause evaluation and extent of condition evaluation were not performed, the Calculation Enhancement Project included consideration of potential common causes and extent of condition of the calculation errors.

### 02.03 Corrective Actions

- a. Determine that appropriate corrective action(s) are specified for each root and contributing cause or that there is an evaluation that no actions are necessary.

A root cause evaluation was not performed and contributing causes were not identified for this White finding. Nevertheless, DEC has reviewed this finding extensively. However, the reviews were primarily focused on determining what the Oconee licensing basis requirements were for tornado mitigation rather than correcting the deficiencies

associated with the White finding. The adequacy of the corrective actions taken by DEC was mixed.

The corrective action that the NRC determined to be appropriate included a significant modification, NSM ON-13066, which replaced the Unit 1 RCP seals. This corrective action reduced the risk of a tornado induced loss of coolant accident (LOCA) due to RCP seal failure.

Notwithstanding these actions, the licensee's corrective actions to eliminate credit for the SFP as a HPI pump suction source following certain tornadoes were not appropriate. This involved performing a 10 CFR 50.59 safety evaluation (dated August 28, 2000) to revise Section 3.2.2 of the Updated Final Safety Analysis Report (UFSAR), and other design basis documents, to eliminate credit for the SFP as a suction source for a HPI pump after certain tornadoes. Also, the licensee had drafted a revision to the Abnormal Procedure AP/1/A/1700/006, Natural Disaster. This draft revision would have eliminated the guidance from the abnormal procedure for aligning the SFP to HPI flow path. The licensee's justification for eliminating the SFP as a HPI pump suction source was that it was not within the Oconee design or licensing bases. Although a tornado induced RCP seal LOCA was outside the Oconee design basis, the NRC has previously determined and stated to the licensee in a letter dated November 9, 2000, that scenarios exist within the design basis which would require use of the SFP as a suction source for a HPI pump.

The inspector identified that eliminating credit for the SFP as a HPI suction source was an unreviewed safety question (USQ), as defined in 10 CFR 50.59. Removal of the SFP as a HPI pump suction source from UFSAR Section 3.2.2 and the proposal to remove it from Abnormal Procedure AP/1/A/1700/006 was an USQ because it increased the probability of malfunction of the HPI pump. This change reduced system and/or equipment redundancy and diversity. This change required NRC review and approval prior to implementation. The HPI pump was credited to mitigate the loss of reactor coolant system (RCS) inventory by providing RCS makeup after certain tornadoes. Therefore, the 10 CFR 50.59 safety evaluation was inadequate, in that, it did not provide the technical bases to support the conclusions that the change was not an USQ.

The inspector informed the licensee that, as a result of the inadequate 10 CFR 50.59 safety evaluation, the White finding will not be closed at this time. The inadequate safety evaluation will be identified as Violation 50-269,270,287/01-06-01, Inadequate 10 CFR 50.59 Safety Evaluation Associated With Revising UFSAR Section 3.2.2 to Remove the Spent Fuel Pool as a Suction Source for a High Pressure Injection Pump After Certain Tornadoes. The licensee initiated PIP O-01-00455 to track this issue. The inspector noted that, although the licensee had entered this issue in the corrective action program, no action was taken on the 10 CFR 50.59 safety evaluation. The inspector informed the licensee that, in accordance with Section VI.A.1.a. of the NRC Enforcement Policy, a Notice of Violation will be issued because the licensee had not restored compliance with regard to the 10 CFR 50.59 safety evaluation. This item was considered to be of very low risk significance since the flowpath was not deleted from service and changes to Abnormal Procedure AP/1/A/1700/006, Natural Disaster, had not been implemented yet.

The NRC determined that appropriate corrective actions were being taken via the Calculation Enhancement Project to address the type of calculation errors (NRC Violation 50-269,270,287/00-07-04) identified in calculation OSC-3873. As discussed in Section 02.02 of this IR, the Calculation Enhancement Project was implemented as a result of previous calculation errors that had been identified. The inspector verified that calculation OSC-3873 had been revised (September 2000) to address the deficiencies that were identified by the licensee and documented in PIP O-98-00148. Therefore, Violation 50-269,270,287/00-07-04 is closed.

- b. Determine that the corrective actions have been prioritized with consideration of the risk significance and regulatory compliance.

The inspector determined that the corrective actions were prioritized with consideration of risk and regulatory compliance. The licensee factored risk insights into the corrective actions and determined that the best use of their resources was to replace the Westinghouse seal package with the Bingham seal package on the Unit 1 RCPs. As previously stated in this report, this change reduced the risk of a tornado induced RCP seal LOCA. The licensee was also participating in the recently developed Bingham seal LOCA model. This seal LOCA model has been submitted to the NRC for review.

The inspector noted the licensee's consideration of risk in the prioritization of the calculations being reviewed for the Calculation Enhancement Project. The EOP setpoint calculations received the highest priority from the licensee.

The licensee's consideration of risk significance and regulatory compliance were not appropriate for prioritizing the corrective action to eliminate credit for the SFP to HPI pump flow path. The 10 CFR 50.59 safety evaluation to remove this flow path from UFSAR Section 3.2.2 was performed prior to implementation of the Unit 1 RCP seal package modification. As previously stated in Section 02.03.a. of this IR, this safety evaluation did not recognize that removing the SFP to HPI pump flow path from the UFSAR involved an USQ.

- c. Determine that a schedule has been established for implementing and completing the corrective actions.

The licensee had established a schedule and was tracking the completion status of the corrective actions for the White finding using PIP O-99-00115. The inspector noted that some of the corrective actions were in progress and PIP O-99-00115 was still open.

- d. Determine that quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to prevent recurrence.

The Unit 1 RCP seals were replaced through modification NSM ON-13066. Licensee measures to determine the effectiveness of this modification included post-modification testing (PMT) and operational performance. The NRC resident inspectors reviewed the PMT results of the Unit 1 RCP seals to verify the functional capability of the new seals. The resident inspectors also walked down the Unit 1 reactor building during RCS heatup to independently check for leaks from the new seals. The results of the resident inspectors' reviews are documented in IR 50-269,270,287/00-08.

The licensee established calculation effectiveness measures which include self-assessments and monthly report cards. The monthly report cards review PIPs to identify calculation errors and assess the errors to measure the effectiveness of the training provided to the engineering staff.

#### **4. OTHER ACTIVITIES**

##### 4OA6 Meetings

##### .1 Exit Meeting Summary

The inspector discussed the progress of the inspection with licensee representatives on a daily basis and presented the preliminary inspection results to Mr. M. Nazar, Site Engineering Manager, and other members of licensee management and staff on January 25, 2001. Subsequent to the preliminary exit, the licensee provided the inspector with additional information for review. This additional information was reviewed in-office by the inspector and a Region II senior reactor analyst (SRA). The inspection was completed on March 22, 2001. The inspector presented the inspection results to Mr. W. McCollum, Site Vice President, and other members of licensee management and staff on March 22, 2001. Proprietary information was reviewed during this inspection but is not included in this inspection report.

#### **PARTIAL LIST OF PERSONS CONTACTED**

##### Licensee

L. Azzarello, Design Basis Engineering Manager  
 E. Burchfield, Special Projects Engineering Supervisor  
 J. Forbes, Station Manager  
 W. Foster, Safety Assurance Manager  
 G. McAninch, Engineering Supervisor  
 W. McCollum, Site Vice President  
 M. Nazar, Site Engineering Manager  
 L. Nicholson, Regulatory Compliance Manager  
 J. Weast, Senior Specialist, Regulatory Compliance

##### NRC

D. Billings, Resident Inspector  
 C. Casto, Director, Division of Reactor Safety, Region II  
 E. Christnot, Resident Inspector  
 S. Freeman, Resident Inspector  
 C. Ogle, Chief, Engineering Branch, Division of Reactor Safety, Region II  
 L. Plisco, Director, Division of Reactor Projects, Region II  
 M. Shannon, Senior Resident Inspector



**ITEMS OPENED, CLOSED, AND DISCUSSED**Opened

50-269,270,287/01-06-01	VIO	Inadequate 10 CFR 50.59 Safety Evaluation Associated With Revising UFSAR Section 3.2.2 to Remove the Spent Fuel Pool as a Suction Source for a High Pressure Injection Pump After Certain Tornadoes (Section 02.03.a)
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Closed

50-269,270,287/00-07-04	VIO	Hydraulic Requirements Had Not Been Adequately Considered as Design Inputs for Calculation OSC-3873, Hydraulic Model of High Pressure Injection System with Suction from the Fuel Pool (Section 02.01.a)
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Discussed

None

## **LIST OF DOCUMENTS REVIEWED**

### **PROCEDURES**

AP/1/A/1700/006, Natural Disaster, Revision 7

EDM-101, Engineering Calculations/Analyses, Revision 10

NSD-208, Problem Investigation Process (PIP), Revision 22

### **CALCULATIONS**

OSC-2262, Tornado Protection Analysis, Revision 4

OSC-3873, Hydraulic Model of HPI System with Suction from the Spent Fuel Pool, Revision 4

### **OTHER DOCUMENTS**

Updated Final Safety Analysis Report Sections 3.1.2, 3.2.2, and 3.3.2

Letter from NRC to Duke Power Co. dated May 30, 1986, on the subject EFW Tornado Protection - Request for Additional Information

Letter from Duke Power Co. to NRC dated September 15, 1986, on the subject EFW Tornado Protection - Response to NRC's May 30, 1986 Request for Additional Information

Letter from NRC to Duke Power Co. dated July 28, 1989, on the subject Safety Evaluation Report on Effect of Tornado Missiles on Oconee Emergency Feedwater System

Letter from Duke Power Co. to NRC dated November 30, 1990, on the subject of Response to Generic Letter 88-20 (Individual Plant Examination) for Oconee Nuclear Station

NRC Memorandum from T. Bergman, NRR, to C. Carpenter, NRR, dated May 19, 1999, on the subject Summary of Meeting Held on May 11, 1999, With NEI to Discuss Public Comments on Draft Regulatory Guide, DG-1083, "Content of the Updated Final Safety Analysis Report in Accordance With 10 CFR 50.71(e)"

NRC Regulatory Guide 1.181, Content of the Updated Final Safety Analysis Report in Accordance With 10 CFR 50.71(e), September 1999

NRC Regulatory Guide 1.187, Guidance for Implementation of 10 CFR 50.59, Changes, Tests, and Experiments, November 2000

NEI 96-07, Guidelines for 10 CFR 50.59 Implementation, Revision 1, November 2000

NEI 98-03, Guidelines for Updating Final Safety Analysis Reports, Revision 1, June 1999

ATTACHMENT

10 CFR 50.59 USQ Evaluation, Revision to UFSAR Sections 3.1.2, 3.2.2, and 3.3.2.3 for Oconee's Tornado Licensing Basis, July 30, 1998

10 CFR 50.59 USQ Evaluation, NSM ON-13066 - Replace RCP Seals, December 20, 2000

Regulatory Audit SA-97-10(ON)(SITA)(HPI/LPI), January 26, 1998

**PROBLEM INVESTIGATION PROCESS (PIP) REPORTS**

O-95-00550, Capability to Align HPI Pump to SFP During a Tornado Has Not Been Tested

O-96-00864, Oconee Has not Analyzed the Dynamics of the HPI Tornado Event

O-96-01041, Errors and Omissions Were Noted in Some Engineering Analysis

O-98-00148, Calculation OSC-3873 Contained Several Non-Conservative Assumptions

O-99-00115, UFSAR Section 3.2.2 Statement Regarding Use of a HPI Pump

**PIP REPORT GENERATED DURING THIS INSPECTION**

O-01-00455, Inappropriate Use of the 50.59 Process