

May 7, 2004

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U. S. Nuclear Regulatory Commission
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Subject: 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
Reply to Notice of Violation – EA 04-018

Reference: Letter from Luis A. Reyes (NRC) to Ronald A. Jones (Duke),
“Notice of Violation and Proposed Imposition of Civil Penalty – \$60,000
(NRC Inspection Report No. 05000269/2004007,
05000270/2004007, and 05000287/2004007), dated April 8, 2004

Reference 1 transmitted a Notice of Violation and Proposed Imposition of Civil Penalty (EA 04-018). Pursuant to the provisions of 10 CFR 2.201, Duke Energy Corporation (Duke) has prepared a written response to the Notice of Violation as an enclosure to this letter. Duke does not contest the violation and will not be contesting the Imposition of Civil Penalty. Our statement concerning the method of payment is provided under separate cover.

The Unreviewed Safety Question (USQ) determination from the May 2001, 10 CFR 50.59 change did not meet regulatory requirements. However, based on the discussion outlined in the enclosed violation response, Duke believes that the change did not represent a safety-significant condition. A root cause investigation is in the review and approval phase of development. Preliminary evaluation results do not indicate a weak 10 CFR 50.59 program or a fundamental misunderstanding of the 10 CFR 50.59 process. Potential enhancements to the current 10 CFR 50.59 process have been identified and entered into Duke's corrective action program. The final results and any additional corrective actions from the root cause evaluation will be submitted to the NRC following the completion of the evaluation.

To date, several corrective actions to address this condition have been entered into the Duke corrective action program. Details related to these corrective actions are described in the violation response.

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Questions or requests for additional information may be directed to Stephen C. Newman, Oconee Regulatory Compliance Group, at (864) 885-4388.

A handwritten signature in black ink that reads "Bruce Hamilton for". The signature is written in a cursive, flowing style.

Ronald A. Jones
Site Vice President

Enclosure

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Enclosure

**Oconee Nuclear Station – Units 1, 2, and 3
Docket Nos. 50-269, 50-270, 50-287
Response to Notice of Violation
NRC Inspection Report No. 05000269/2004007, 05000270/2004007, and
05000287/2004007**

Restatement of Violation EA-04-018

During an NRC inspection completed on January 21, 2004, a violation of NRC requirements was identified. In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," NUREG-1600, the NRC proposes to impose a civil penalty pursuant to Section 234 of the Atomic Energy Act of 1954, as amended (Act), 42 U.S.C. 2282, and 10 CFR 2.205. The particular violation and associated civil penalty is set forth below:

10 CFR 50.59 (a)(1) (1999 edition) 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. 10 CFR 50.59 (a) (2) states, in part, that a proposed change involves an unreviewed safety question if the probability of the occurrence or the consequences of a malfunction of equipment important to safety previously evaluated in the safety analysis report may be increased or if the possibility of an accident or malfunction different from any previously evaluated accident or malfunction may be created.

Oconee Nuclear Station Updated Final Safety Analysis Report, Section 3.6.1.3, states that the analysis of effects resulting from postulated piping breaks outside containment is contained in Duke Power MDS Report No. OS-73.2 dated July 16, 1973 including supplement 2, dated March 12, 1974.

Duke Power MDS Report No. OS-73.2 and supplement 2 credited secondary side cooling within 15 minutes of a high energy line break (HELB) and reactor coolant system makeup from high pressure injection (HPI) within one hour of a HELB.

Contrary to the above, on May 17, 2001, the licensee made a change to the facility, as described in the Updated Final Safety Analysis Report, Section 3.6.1.3, and reference analyses that involved unreviewed safety questions without obtaining prior NRC approval. Specifically, the Duke Power MDS Report No. OS-73.2 and supplement calculation OSC-7299 were revised to increase the maximum initiation time of Emergency Feedwater following a HELB from 15 to 30 minutes and of HPI from one hour to eight hours. These changes resulted in an increase in the probability of occurrence or the consequences of a malfunction of equipment important to safety, and created the possibility of an accident or malfunction different from any previously evaluated.

This is a Severity Level III violation (Supplement I).
Civil Penalty - \$60,000.

Admission or Denial

Duke does not contest the violation.

Reasons for the Violation

The violation involves two areas associated with the change to the Oconee Updated Safety Analysis Report (UFSAR) related to actions taken following certain high energy line break events. These are (1) reliance on the boiler-condenser mode (BCM) of core cooling for an extended period of time (8 hours) until initiation of high pressure injection (HPI), and (2) increased cycling of the pressurizer safety valves (PSVs) during the period prior to initiation of emergency feedwater (EFW). The NRC considered that the UFSAR change created an unreviewed safety question (USQ) in these areas.

Duke is currently performing a Root Cause (RC) evaluation of the 10 CFR 50.59 related issues that resulted in the violation. Preliminary findings from this RC evaluation have revealed several causes that may have directly or indirectly contributed to the inadequate 10 CFR 50.59. These include:

- The 10 CFR 50.59 evaluation did not adequately address the impact of the change on the HELB licensing basis.
- Other than the evaluation preparer and reviewer, 10 CFR 50.59 processes in-place in May 2001 recommended, but did not mandate that anyone other than the evaluation preparer and reviewer evaluate cross-cutting complex changes associated with the 10 CFR 50.59 (i.e., it was left to the discretion of the reviewer to determine whether interdisciplinary reviews of the change were necessary).
- Other than a cursory check of the UFSAR change package elements, the UFSAR change process in-place in May 2001 did not require that the 10 CFR 50.59 receive additional reviews and approval prior to the UFSAR being changed.
- The May 2001, 10 CFR 50.59 change was prepared under the old 10 CFR 50.59 process. The old process at Duke required the individual to evaluate the technical aspects as well as licensing basis issues within the context of 10 CFR 50.59. This may have contributed to the evaluation appearing to be more of a technical "safety review" rather a focused review of the HELB licensing basis impacts associated with the change.
- The HELB accident analysis scenario description is located in Chapter 3.0 of the Oconee UFSAR ("Design of Structures, Components, Systems, and Equipment"). The process does not require that the chapter owner, who reviews and approves all changes to that particular UFSAR chapter, assist in the preparation, review, or approval the HELB accident analysis. Duke's Accident Analysis Section is responsible for the analysis.

Duke acknowledges that 10 CFR 50.59 documentation was inadequate for the complexity of the change being evaluated. Duke has evaluated this condition; however,

and concludes that there were no adverse safety issues associated with the change. Duke's rationale in support of this conclusion is discussed below.

Boiler Condenser Mode of Core Cooling

The NRC concluded that the use of BCM for an extended time and under the potential accident scenario of a HELB was a USQ because it created the possibility of an accident of a different type than any evaluated previously in the UFSAR. As Duke explained in the March 2, 2004, pre-decisional enforcement conference, the BCM mode of core cooling is an accepted and approved mode of heat transfer, which has been formally reviewed by the NRC as part of the Oconee Small Break Loss of Coolant Accident (SBLOCA) analysis.¹ In addition, the NRC has approved Duke's SBLOCA mass and energy release topical report which includes modeling the BCM cooling mode with RELAP5. Because the Oconee UFSAR does not limit the reactor coolant system modes of cooling in accident conditions, or the time period for which the specific cooling mode is relied upon for HELB events, Duke's original 10 CFR 50.59 evaluation for the change did not consider this mode of cooling for a HELB event that progressed similarly to a SBLOCA to be an accident of a different type than any evaluated previously in the Oconee UFSAR.

The NRC states, in its letter issuing the Notice of Violation (NOV), that the use of BCM may introduce reactivity concerns, which introduces the possibility of an accident of a different type than any evaluated previously in the UFSAR. Duke would like to note that this is contrary to the resolution of the related B&W Preliminary Safety Concern, which concluded that potential consequences of the restart of natural circulation following operation in the BCM mode of cooling were acceptable.² Duke had addressed the recommendations resulting from the B&W Preliminary Safety Concern at the Oconee Station, which involved interactions with the NRC through the B&W Owners' Group, at the time of performing the original 10 CFR 50.59 evaluation. Thus, Duke considered this issue resolved and therefore it was not addressed in either the HELB analysis or the 10 CFR 50.59 evaluation.

Additional PSV Cycling

The NRC concluded that the May 2001 change resulted in a USQ because additional cycling of the two PSVs could occur as a result of the extension of initiation of EFW from 15 minutes to 30 minutes following certain HELB events. The NRC concluded that the additional cycles represented an increase in the probability of malfunction of equipment from what was previously evaluated in the UFSAR. In the original 10 CFR 50.59 evaluation, Duke assumed that the PSVs were qualified to relieve both steam and water (see discussion below). Because the Oconee UFSAR did not specifically discuss the

¹ FANP topical report BAW-10164-P, (RELAP5 MOD2 B&W): NRC SERs dated: 4/18/1990 (Rev 1), 3/14/1995 (Revs 2 & 3), 4/9/2002 (Rev 4); FANP topical report BAW-10192PA, (LOCA): NRC SER dated 2/18/1997.

² "Evaluation of Potential Boron Dilution Following Small Break Loss-of-Coolant Accidents", Framatome Technologies, Inc, Report 47-5006624-00, submitted to U. S. NRC Document Control Desk by the B&WOG letter dated February 21, 2000.

number of cycles, Duke did not consider the increased PSV cycling in the 10 CFR 50.59 evaluation as an increase in the probability of malfunction of equipment.

The NRC states in its letter issuing the NOV that (1) "the EPRI test data for water conditions ... is not considered sufficient to demonstrate valve reliability under the revised HELB event" and (2) the PSV discharge events considered in the resolution to NUREG-0737 action item II.D.1 were those events considered to be applicable at the time, which were different from the HELB events discussed in the NOV where there is no prompt automatic safety system initiation (EFW or HPI) to maintain system pressure or provide core cooling during the period of PSV discharge.

As presented at the March 2, 2004, predecisional enforcement conference and based on input from the PSV manufacturer, Duke concluded that, with appropriate inlet configurations, the life cycle of the PSV on slightly subcooled water would be similar to the life cycle on saturated steam. This conclusion is based on Duke's review of the EPRI test data that showed that, regardless of the valve type, manufacturer, size, trim, media, etc., chatter occurred on the spring actuated valves ONLY when one or more of the following conditions existed:

- Inappropriate ring settings
- Long inlet
- Substantially subcooled conditions

For the Oconee HELB event, none of the aforementioned conditions existed. In the overall EPRI Test Program, there were seven (7) tests that exhibited significant valve chatter, two (2) of 78 steam tests and five (5) of 34 water tests. All of the seven (7) tests that exhibited significant valve chatter had one or more of the above conditions present. None of the remaining 105 EPRI tests experienced significant chatter.

If the above failed tests are eliminated as not applicable to Oconee's conditions, one would conclude that zero (0) of the remaining 105 tests exhibited significant chatter that could lead to valve failure. Twenty-nine (29) of these tests were water tests. Duke feels these findings are significant in that the representative sample of EPRI valves chosen to bound the entire industry population of spring actuated valves, exhibit predictable behavior and demonstrate sufficient valve reliability under Oconee's HELB event conditions.

The NRC also states in the NOV that when any component has an associated probability of failure per challenge, multiple challenges would result in a greater cumulative probability of failure. The NRC concludes that because of the increased reliance on the PSV to perform multiple cycles under both steam and liquid conditions, there is more than a minimal increase in the probability that the PSVs will not re-close. Duke agrees that each PSV cycle results in a slight increase in failure probability. However, it is also true that the number of additional cycles:

- did not exceed any design basis limit

- was a reasonably small increase and within the design capabilities of such valves (as originally determined by Duke and later validated by the manufacturer)
- was not considered a significant test parameter by EPRI during their PSV qualification testing
- has no precedent as a parameter for qualifying similar mechanical components to a set number of actuations

Also, Duke's historical rebuild / inspection frequency places these valves close to an "as-new" condition every 5 years or less, minimizing the effect of aging from any accumulated actuations/ degradations. As a future initiative, Duke is investigating working with the industry and the NRC to develop a better understanding of issues pertaining to the concepts of "More than a Minimal Increase in the Likelihood of Occurrence of a Malfunction of an SSC Important to Safety" with respect to 10 CFR 50.59.

Conclusion

Duke does not contest the violation (and proposed civil penalty). Although the final USQ determination from the May 2001 change did not meet 10 CFR 50.59 regulatory requirements, as discussed above, Duke believes that the change made did not represent a safety-significant condition.

Corrective Steps Taken and Results Achieved

1. A change to UFSAR Section 3.6.1.3 was implemented on April 29, 2004, to remove the change implemented as a result of the May 17, 2001, 10 CFR 50.59 evaluation.
2. Duke has performed an operability evaluation based on the Oconee UFSAR as it existed prior to the May 17, 2001, 10 CFR 50.59 revision to UFSAR section 3.6.1.3. This evaluation has been documented in Duke's corrective action program and shows that Oconee is operable but does not fully conform to the description given in UFSAR section 3.6.1.3.

Corrective Steps Taken (or That Will be Taken) To Avoid Further Violations

1. The violation is associated with an evaluation performed under the old 10 CFR 50.59 process. In transitioning to the new 10 CFR 50.59 rule, Duke has completed extensive training and retraining of qualified 10 CFR 50.59 evaluators. This new training involved higher-level objectives, i.e., testing of cognitive skills and the completion of an extensive computer-based training program, and increased classroom training necessary for successful qualification. This increased training and higher-level objectives better ensure that personnel are properly trained and qualified to perform in the 10 CFR 50.59 process. This

training was completed in mid-2001 for all currently qualified 10 CFR 50.59 evaluators.

2. A root cause investigation is in the review and approval phase of development. Preliminary evaluation results do not indicate a weak 10 CFR 50.59 program or a fundamental misunderstanding of the 10 CFR 50.59 process. Potential enhancements to the current 10 CFR 50.59 process have been identified and entered into Oconee corrective action program. These include:
 - a. Reviewing and implementing changes to the training program, as necessary, to reinforce evaluator understanding of the licensing basis.
 - b. Reviewing and revising, as necessary, the upper-tier Nuclear Site Directives (NSDs), which contain the requirements associated with the 10 CFR 50.59 and UFSAR change programs, to better ensure proper coordination between the NSDs
3. As an interim corrective action associated with corrective action No. 2 (above), by June 1, 2004, a process change will be implemented at Oconee that will require that future UFSAR change packages, which are not the result of a modification or an editorial change, receive additional reviews, including risk impact (as necessary), as determined by the Regulatory Compliance Group Manager. This action has been entered into Duke's corrective action program.
4. By July 1, 2004, Duke will complete the root cause investigation and extent of condition analysis associated with failing to determine that a USQ existed for this issue. Results from this investigation and analysis will be entered into Duke's corrective action program. Additionally, Duke will provide the final results of this investigation and analysis to the NRC.

Date of Full Compliance

Duke has performed an operability evaluation based on the UFSAR as it existed prior to the May 17, 2001, 10 CFR 50.59 revision to UFSAR section 3.6.1.3. This evaluation has been documented in Duke's corrective action program and shows that Oconee is operable with a non-conforming condition.

Duke will resolve the nonconforming condition in accordance with Appendix B, Criterion XVI; however, full compliance may require a plant modification, involve emergency operation procedure changes and/or the submittal of a license amendment request to the NRC. The corrective action program will outline steps necessary to achieve full compliance and may consider alternative approaches to address the specific HELB events and mitigation strategies. Final resolution of the non-conforming condition will be addressed under the ongoing HELB program reconstitution effort.

The High Energy Line Break (HELB) Reconstitution Effort is being performed to replace an outdated report originally completed in the 1973/1974 time frame. The original report

provided ONS/Duke's response to Atomic Energy Commission (AEC) requirements regarding protection against pipe ruptures outside containment. The reconstitution effort will update the report for the present day plant configuration and take into consideration significant technical and regulatory advances in pipe rupture postulation and protection requirements that have taken place since the original report was submitted. This project was self initiated based on assessments performed in 1998 that identified weaknesses in the overall ONS HELB design basis and protection functions.

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May 7, 2004

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Subject: Duke Energy Corporation
Oconee Nuclear Station, Units 1, 2, and 3
Docket Nos. 50-269, 50-270, 50-287
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Payment of Civil Penalty of \$60,000 – EA 04-018

- References: 1) Letter from Luis A. Reyes (NRC) to Ronald A. Jones (Duke), "Notice of Violation and Proposed Imposition of Civil Penalty - \$60,000 (NRC Inspection Report No. 05000269/2004007, 05000270/2004007, and 05000287/2004007), dated April 8, 2004
- 2) Duke Letter to Frank J. Congel, NRC, Reply to a Notice of Violation, EA-04-018, dated May 7, 2004

Reference 1 transmitted a Notice of Violation and Proposed Imposition of Civil Penalty (EA 04-018). Reference 2 provided the Duke Energy Corporation (Duke) response to Reference 1 for the Oconee Nuclear Station.

Pursuant to these referenced documents, an electronic transfer has been initiated via the ACH (Automated Clearinghouse) Network in the amount of \$60,000 payable to the U.S. Nuclear Regulatory Commission.

Questions or requests for additional information may be directed to Stephen C. Newman, Oconee Regulatory Compliance Group, at (864) 885-4388.



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