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SUBJECT: Responds to NRC 940211 ltr re violations noted in insp rept 50-269,-270,-287/93-25.Corrective actions:

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DUKE POWER

April 20, 1994

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Subject: Oconee Nuclear Site
Docket Nos. 50-269, -270, -287
Inspection Report 50-269, -270, -287/93-25

Dear Sir:

By letter dated February 11, 1994 the Service Water System Operational Performance Inspection report was issued by the NRC.

Within the report, the NRC identified four areas with weaknesses. Attached is Duke's response to these items.

If you have any questions concerning these responses, please contact Len Azzarello at (803) 885-4346.

Very truly yours,

J. W. Hampton

cc: Mr. S. D. Ebneter, Regional Administrator
U. S. Nuclear Regulatory Commission, Region II

Mr. L. A. Wiens, Project Manager
Office of Nuclear Reactor Regulation

Mr. P. E. Harmon
Senior Resident Inspector
Oconee Nuclear Site

Adequacy of Design Control Measures

Engineering calculations are performed and documented in accordance with EDM-101, "Engineering Calculations/ Analyses". EDM-101 is a Duke Power engineering procedure that ensures the work is performed with quality standards consistent with applicable requirements. EDM-101 has been written consistent with ANSI N45.2.11. The ultimate responsibility for ensuring the work is performed to the appropriate quality standards rests with the originator performing the engineering calculation, the checker performing the design verification, and the approver performing a review of the calculation. The checker has the option of (1) performing a step by step review of the data and design method used, (2) repeating the calculation independently employing either an identical technique, a different technique, or an approximate technique, as appropriate, or (3) qualification testing of the design under the applicable design conditions. The approver, as a minimum, reviews the appropriateness of the design inputs (including assumptions), design methods, and conformance with applicable codes and standards.

The audit team identified several engineering calculations which used what they believed to be unvalidated and/ or nonconservative assumptions. Two of the primary examples were the calculations performed on SSF ASW System flow distributions and the calculations supporting ECCW design and testing. These two examples will be addressed in more detail in future submittals on the proposed violations and are not intended to be an all inclusive list. However, in all cases, the conclusions of the calculations are valid and the individual purposes of the calculations are appropriately achieved. The degree to which an assumption is scrutinized during the verification and certification phase is in accordance with the impact it has on the conclusions. If the conclusions of a calculation are not particularly sensitive to a design input or assumption, then greater freedom is allowed and reasonable alternatives are sometimes accepted. These decisions are made on a case-by-case basis and do not represent a programmatic issue.

As stated earlier, the specifics of each example will be addressed in future correspondence on the proposed violations. Oconee is dedicated to the rigorous analysis of all design activities. Engineering judgement is used appropriately to determine the level of scrutiny given to all design inputs and assumptions. EDM-101 will be revised to clarify management expectations on the verification and validation of design inputs and assumptions. Refresher training on EDM-101 will be conducted to emphasize the importance of ensuring all important, controlling design inputs and assumptions are sufficiently validated and conservative. The requirement that, during the verification and certification process, checkers and approvers review the appropriateness of all design inputs and assumptions, will also be emphasized. However, case by case decisions on the appropriateness of a given assumption do not represent a programmatic weakness in the way engineering calculations are controlled.

The audit team identified several instances where system design and performance had not been properly translated into the abnormal procedures. Two of the primary examples

involved Low Pressure Service Water (LPSW) and Emergency Condenser Circulating Water (ECCW) response to a loss of Keowee lake (dam failure) event and Auxiliary Service Water (ASW) response to a tornado event. These two examples will be addressed in more detail in future submittals on the proposed violations and are not intended to be an all inclusive list. Nevertheless, there are instances where system design and performance have not been properly translated into procedural guidance. Oconee has already begun taking steps to address this issue.

Responsibility for both design basis and testing has recently been combined into the same systems engineering groups. As part of the expectations for the new groups, system engineers will have responsibility for ensuring all design basis functions are appropriately tested and translated into procedures for the Operations group. Design Basis Documents (DBDs) are being created to document all licensing and design basis commitments and functions. The engineering calculations/ analyses which support the design basis are now the responsibility of the appropriate system engineers. Oconee will review all required functions identified in the mechanical systems DBDs against both the existing calculational support for that function and the existing emergency operating procedures and the abnormal procedures. Oconee already performed this review preceding the Electrical Distribution System Functional Inspection (EDSFI) for electrical systems and identified where additional calculational support was needed. The NRC EDSFI audit team did not identify the need for any calculations in addition to what Oconee had already identified. If it is determined that the calculational support for a specific design function is inadequate, a Problem Investigation Process (PIP) report will be written so that the appropriate corrective action can be taken. Likewise, if it is determined that Operations procedural guidance does not contain the proper design input, a PIP will be written so that the appropriate corrective action can be taken.

Adequacy of Engineering Evaluations

Engineering evaluations are performed in accordance with EDM-101, "Engineering Calculations/ Analyses" and, if applicable, NSD-203, "Operability Evaluation Guidelines". EDM-101 is a Duke Power engineering procedure for performing and documenting engineering calculations and analyses that ensures the work is performed with quality standards consistent with applicable requirements. EDM-101 has been written consistent with ANSI N45.2.11. NSD-203 is a nuclear system directive which provides guidance for performing and documenting engineering operability evaluations. An operability evaluation involves the review of a number of different design criteria. The conclusion of any operability evaluation is based on analysis, test or partial test, operating experience, engineering judgement, or any combination of these. Engineering operability evaluations are documented in accordance with EDM-101 to ensure the same degree of quality, traceability and retrievability as other design inputs and calculations.

The audit team identified several engineering evaluations as not having addressed all applicable issues adequately. Two of the primary examples were the material suitability review for belzona and the LPSW pump NPSH evaluation. Another example involved potential cavitation and water hammer in the LPSW piping downstream of the RBCUs. In all three cases, engineering judgements were made on the basis of the conclusions, instead of the detailed analysis and testing the audit team believed should have been employed. In all cases, the conclusions are valid and have been appropriately supported. These three examples will be addressed in more detail in future submittals on the proposed violations and are not intended to be an all inclusive list. However, they are representative of the underlying issue. Duke Power's operability evaluation guidelines allow the use of engineering judgement as part of the evaluation process.

Judgements are made on a case-by-case basis and are based on sound engineering principles, operating experience, standard industry practices, and recognized subject matter expertise. Such was the case in the evaluation of LPSW pump NPSH mentioned earlier. While Oconee operating experience indicated that the LPSW pumps could operate with insufficient NPSH for a limited time, this experience was deemed insufficient upon which to base an operability evaluation. Therefore, the pump manufacturer, a recognized expert in the subject matter, was contacted and asked to evaluate the situation. The manufacturer's evaluation and conclusion was favorable and the LPSW pumps were judged operable. The use of judgement is a necessary, integral part of any engineering analysis and should not be viewed as a weakness. In addition, there is no connection between the examples cited in the report on when or how judgement was used, other than the use of judgement in lieu of actual test data. The examples cited in the report are not indicative of any programmatic weaknesses.

As stated earlier, the specifics of each example will be addressed in future correspondence on the proposed violations. Oconee is dedicated to the rigorous evaluation of all operability and other design issues. Engineering judgement is used appropriately to address certain

aspects of various issues. EDM-101 will be revised to clarify management expectations on the verification and validation of design inputs and assumptions. Refresher training on EDM-101 will be conducted to emphasize the importance of using judgement in a discretionary manner. The requirement that, during the verification and certification process, checkers and approvers review the appropriateness of any judgements, will be emphasized. However, the use of judgement does not represent a programmatic weakness in the way engineering evaluations are performed.

Adequacy of Testing Program

Oconee recognizes the importance of integrated system testing and the need to meet the intent of the present General Design Criteria (GDC) to ensure system functionality. Significant progress has been made over the last several years in developing and implementing integrated system testing. The Design Basis Documentation (DBD) process is helping to identify and facilitate the further development of additional integrated system testing.

Oconee was not originally designed with the capability to perform integrated system testing as required by the present GDCs or for IWV/IWP testing per ASME Section XI. The plant design predated Section XI; all testing was outlined in the Tech Specs. Neither the Tech Specs nor the FSAR require integrated system testing in all cases. Oconee has a number of shared systems which prevent integrated testing. Historically, testing has been component-based where it was considered that the sum of the components equals the system. A number of plant modifications have been performed over the years to improve the capability for in-service testing.

Oconee currently performs a number of full system tests. These include:

1. full flow core flood tank dump
2. full flow HPI/LPI system test
3. full flow emergency feedwater system test and functional startup test
4. full flow low pressure service water system test
5. condenser circulating water gravity/siphon flow test
6. emergency power switching logic loadshed test (J test)

Oconee has developed a system/component testing philosophy which is comprised of the following 7 elements:

1. Testing of all systems/components will be performed in accordance with Tech Specs, IWV/IWP, GL 89-04, GL 89-10, Appendix B, and all design basis test acceptance criteria to verify design basis or design intent.
2. All flow paths and circuitry required to mitigate all licensing basis accidents will be tested individually or as part of an integrated system test.
3. Integrated testing is preferred over component testing to ensure full system functionality.
4. If an integrated test is not possible because of plant design, limitations, risk to station equipment, impact to station operation, or the excessive cost in performing the test, the reason(s) for not performing a fully integrated test will be documented in the DBD.
5. At a minimum, component testing should be overlapped so that the net effect is a test of the full system.

6. Any maintenance or modification performed will require the completion of a post maintenance or post modification test which will verify the full design basis or design intent of the system or component disturbed.
7. All tests, whether component or system, shall have clear test acceptance criteria developed in advance. Discrepancies in test results shall be handled by the Problem Identification Program.

Oconee will continue to evaluate and improve its testing program. All required functions identified in the DBDs are currently being reviewed against existing test procedures to ensure the function is being appropriately verified. If an inadequacy is identified, a test procedure shall either be revised or created to verify the function. This effort, in combination with the 7 element testing philosophy, will ensure that all required functions are appropriately demonstrated. The Nuclear Generation Department at Duke Power has begun a comprehensive review of its testing programs in order to develop a system wide testing philosophy. Oconee is participating in this review and will adopt the department's philosophy, which may result in modifications to the 7 points discussed earlier.

Scope of Our Quality Assurance Program: Classification of Components Which Perform a Safety-Related Function

Section 3.1 of the Oconee FSAR states that the principal design criteria for Oconee was developed in consideration of the 70 General Design Criteria for Nuclear Power Plant Construction Permits, submitted by the AEC in a proposed rulemaking published for 10CFR Part 50 in July 1967. FSAR Section 3.1.1, "CRITERION 1 - QUALITY STANDARDS (Category A)", states that "those systems and components... which are essential to the prevention of accidents which could affect the public health and safety, or to mitigation of their consequences, shall be identified and then designed, fabricated and then erected to quality standards that reflect the importance of the safety function to be performed". Section 3.1.1 also states that "the integrity of systems, structures, and components essential to accident prevention and to mitigation of accident consequences has been included in the reactor design evaluations". It then lists those essential systems, structures and components, to which the Quality Assurance program applies, as:

1. reactor coolant system
2. reactor vessel internals
3. reactor building
4. engineered safeguards system
5. electric emergency power systems

The classification of systems, structures and components at Oconee meets this criterion.

In the early 1970's, a list was created which enumerated those items to which QA should be applied. This list used different criteria to define safety related than was used during the design and construction of Oconee. This list was responsive to the latest criteria (for that time), such as Regulatory Guide 1.26 and ANSI - N18.2, and therefore, did not correspond exactly with the original classifications.

In Duke's response to Generic Letter 83-28, the Safety-Related Structures, Systems, and Components Manual (presently known as the Quality Standards Manual) was referenced. This document identifies those systems, structures, and components which perform a safety related function. Any system, structure, or component (SSC) that performs a function in accordance with the QSM definition of safety related is identified in the document as "Performs Safety Function". In that this philosophy has expanded the list of SSCs which are functionally safety related, all the provisions of the Quality Assurance program (e.g., design, procurement, installation) have not been previously applied to some of the SSCs on the list. The primary function of the list is to provide maintenance and testing guidance. It was not the intent to backfit the safety classification to the design, procurement or installation work.

We recognize that the original listing of SSCs in the QSM did not include all SSCs which meet the 10 CFR Appendix B definition of "Performs Safety Function". For these cases, maintenance and testing procedures are currently being upgraded to be consistent with the Quality Assurance program. This effort to upgrade procedures will address the discrepancies identified by the audit team.