June 20, 2006

Mr. Bruce H. Hamilton
Vice President, Oconee Site
Duke Power Company LLC
7800 Rochester Highway
Seneca, SC 29672

SUBJECT: OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3 - REQUEST FOR RELIEF NO. 2006-ON-01, REVISION 1 (TAC NOS. MC9696, MC9697, AND MC9698)

Dear Mr. Hamilton:

By letter dated February 2, 2006, and supplemented March 15, 2006, you submitted relief request No. 2006-ON-01, requesting relief from certain American Society of Mechanical Engineers, *Boiler and Pressure Vessel Code,* inservice inspection (ISI) requirements at Oconee Nuclear Station, Units 1, 2, and 3. Specifically, you requested to use ultrasonic testing in lieu of radiography testing for selected repair and replacement activities. We have found the proposed alternative, No. 2006-ON-01, acceptable for the fourth 10-year ISI interval, and our evaluation and conclusions are contained in the enclosed safety evaluation.

On April 27, 2006, we granted verbal relief for Unit 3 on this relief request.

Sincerely,

/RA by L Raghavan for/

Evangelos C. Marinos, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-269, 50-270, and 50-287

Enclosure: Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE

OFFICE OF NULEAR REACTOR REGULATION

FOURTH 10-YEAR INSERVICE INSPECTION INTERVAL

REQUEST FOR RELIEF NO. 2006-ON-01, REVISION 1

DUKE POWER COMPANY LLC

OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3

DOCKET NOS. 50-269, 50-270, AND 50-287

1.0 INTRODUCTION

By letter dated February 2, 2006, and supplemented March 15, 2006, Duke Energy Corporation (the licensee's previous name) submitted relief request No. 2006-ON-01, requesting relief from certain American Society of Mechanical Engineers (ASME), *Boiler and Pressure Vessel Code* (Code), inservice inspection (ISI) requirements at Oconee Nuclear Station (Oconee), Units 1, 2, and 3. Specifically, the licensee requested to use ultrasonic testing (UT) in lieu of radiography testing (RT) for selected repair and replacement activities. Units 1, 2, and 3 are in their fourth 10-year ISI interval which began January 1, 2004, September 9, 2004, and January 2, 2005, respectively. The fourth ISI interval for Units 1, 2, and 3 will end July 15, 2013, September 9, 2014, and December 16, 2014, respectively.

On April 27, 2006, the NRC staff granted verbal relief for Unit 3 on this relief request.

2.0 REGULATORY EVALUATION

The ISI of the ASME Code Class 1, 2, and 3 components is to be performed in accordance with Section XI of the ASME Code and applicable edition and addenda as required by Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Section 50.55a(g), except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(I). Section 50.55a(3) states in part that alternatives to the requirements of paragraph (g) may be used, when authorized by the Nuclear Regulatory Commission (NRC), if the licensee demonstrates that: (I) the proposed alternatives would provide an acceptable level of quality and safety, or (ii) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the pre-service examination requirements, set forth in the ASME Code, Section XI, "Rules for

Inservice Inspection of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components.
The regulations require that inservice examination of components and system pressure tests conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) twelve months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The Code of Record for Oconee 1, 2, and 3 for the fourth 10-year ISI interval is the 1998 edition with 2000 addenda of Section XI. The components (including supports) may meet the requirements set forth in subsequent editions and addenda of the ASME Code incorporated by reference in 10 CFR 50.55a(b) subject to the limitations and modifications listed therein and subject to commission approval.

3.0 TECHNICAL EVALUATION OF REQUEST NO. 2006-ON-01

3.1 COMPONENTS FOR WHICH RELIEF IS REQUESTED

The components affected by this request for relief are pressurizer level and sample tap nozzles to their respective safe ends: welds 1PZR-WP63-1 through 1PZR-WP63-7, 2PZR-WP63-1 through 2PZR-WP63-7, and 3PZR-WP63-1 through 3PZR-WP63-7.

3.2 CODE REQUIREMENTS

The ISI Code of Record for Oconee 1, 2, and 3 for the fourth 10-year ISI interval is the 1998 edition with 2000 addenda of Section XI of the ASME Code, and the construction code for the repair is the 1983 edition with no addenda of Section III of the ASME Code.

NB-5222(a) requires that butt-welded joints be examined using a radiographic method and either liquid penetrant or magnetic particle method.

3.3 PROPOSED ALTERNATIVE

The proposed alternative method will meet the requirements of ASME Code, Section III, Code Case –659 (no revision), “Use of Ultrasonic Examination in Lieu of Radiography for Weld Examination, Section III, Division 1," with an exception for coverage.

3.4 LICENSEE’S BASIS FOR THE ALTERNATIVE

Based on the review of the configuration of the planned welds, the licensee has determined that an RT would require a minimum of 36 hours to take 34 film exposures of each weld. Even with the large number of film exposures per weld, unacceptable weld metal defects may not be detected. Since RT involves using a high-penetrating radioactive isotope, using a qualified UT method will eliminate the associated personnel safety risks and the normal anticipated exposure to the background radiation levels. Also, outage duration and costs will be reduced by allowing parallel path outage work to progress uninterrupted.

A qualified UT method meeting the requirements of ASME Code, Section III, Code Case N–659 would provide an adequate result compared to the RT method without the associated hardships. A surface dye-penetrant test (PT) required by Section III will also be performed, which will supplement UT coverage.

3.5 EVALUATION

The licensee is replacing the Class 1, Alloy 600 safe-ends with Class 1, Type 316, stainless steel (SST) safe-ends as a precautionary measure to minimize the potential of primary water stress corrosion cracking (PWSCC). The new SST safe-ends are welded to the cladded carbon steel pressurizer level and sample tap nozzles using Type 309 SST weld metal. The replacement safe-ends have an inside diameter (ID) less than the ID for a 1-inch National Pipe Standard pipe, which exempts the safe-end welds from pre-service and ISI IWB-2500 examinations.

The subject replacement welds are required by ASME Code, Section III, NB-5222(a) to receive RT and surface examinations. An RT examination of the conical to cylindrical weld region would need 34 file exposures per safe-end with no assurance that all of the flaws, if any, would be detected. The licensee could redesign the safe-end to reduce the number of film exposures per safe-end; however, a redesign would necessitate new drawings, stress calculations, mock-ups, and procedures, and would delay the removal of existing safe-ends manufactured from material that is highly susceptible to PWSCC. In lieu of RT, the licensee proposed using ASME Code Case N-659 with an exception to the coverage criterion. Code Case N-659 is not endorsed in Regulatory Guide (RG) 1.84, "Design, Fabrication, and Materials Code Case Acceptability, Section III."

UT and RT examinations are complementary but not directly comparable or equivalent. Depending on flaw type (i.e., volumetric or planar) and orientation, UT may be superior to RT or vice versa. RT is most effective in detecting volumetric-type flaws (i.e., slag and porosity), in detecting planar-type flaws with large openings (i.e., lack of fusion and cracks in stress areas), and in detecting planar flaws oriented in a plane parallel to the x-ray beam. RT is effective in all materials common to the nuclear industry and is effective in detecting the type of flaws generated during construction. Therefore, RT is a very good tool to detect workmanship-type (construction flaws) defects and ensures an acceptable level of weld quality. However, RT creates two-dimensional images for sizing, but has great difficulty in determining flaw depth.

In contrast, UT is very effective in detecting planar-type flaws in ferritic steels, and, to a lesser extent, wrought austenitic steels. UT is very effective in sizing planar flaws and planar flaws with ligaments. With flaw-specific training, UT is capable of detecting volumetric-type flaws, such as slag or porosity. The licensee will provide training and will demonstrate personnel skills and procedure capabilities on a mock-up containing construction-type flaws.

The required examination coverage is 100 percent of the volume of the entire weld, plus 0.5 T from each side of the weld, where T is the thickness of the weld. The licensee provided sketches showing coverage for the individual examination angles that ranged from 95.5 percent to 98.8 percent. The uninspectable volume is on the outside surface of the nozzle where a geometry change occurs in nozzle configuration. The surface above the uninspectable volume will receive a liquid (PT) examination that should detect surface breaking flaws in the uninspectable volume. Therefore, the UT and PT examinations will provide reasonable assurance of structural integrity of the subject welds.

The licensee has determined that an RT examination would require at least 36 hours to take 34 film exposures of each weld. Since the performance of RT examinations involves the use of highly penetrating radioactive isotopes, there exists a personal safety risk of inadvertent or

accidental exposure. The NRC staff agrees that this presents a hardship or unusual difficulty without a compensating increase in the level of quality or safety.

4.0 CONCLUSION

Based on the above evaluation, the NRC staff concludes that the licensee's proposed alternative (Relief Request No. 2006-ON-01) to use ASME Code Case N-659 with an exception for coverage provides reasonable assurance of structural integrity of the subject welds. Thus, compliance with ASME Code coverage requirements for RT examinations of the subject welds would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(ii), the NRC staff authorizes Relief Request No. 2006-ON-01 for the examination of the subject welds for the fourth 10-year ISI interval of Oconee 1, 2, and 3, or until Code Case N-659 is approved for general use by reference in RG 1.84. After that time, if the licensee wishes to continue to use Code Case N-659, the licensee must follow all conditions and limitations placed on the use of Code Case N-659, if any, that are specified in RG 1.84.

All other requirements of the ASME Code for which relief has not been specifically requested remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: D. Naujock

Date:

Oconee Nuclear Station, Units 1, 2, and 3

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