

July 26, 2004

Mr. Ronald A. Jones
Vice President, Oconee Site
Duke Energy Corporation
P.O. Box 1439
Seneca, South Carolina 29672

SUBJECT: REQUESTS FOR RELIEF NOS. 02-009 AND 02-010 FOR THE THIRD
10-YEAR INSERVICE INSPECTION INTERVAL - OCONEE NUCLEAR
STATION, UNIT 1 (TAC NO. MB7025)

Dear Mr. Jones:

By letter to the U.S. Nuclear Regulatory Commission (NRC) dated December 16, 2002, Duke Energy Corporation, the licensee for Oconee Nuclear Station (Oconee), Unit 1, submitted relief requests 02-009 and 02-010, from the requirements of the American Society of Mechanical Engineers *Boiler and Pressure Vessel Code*, Section XI, 1989 Edition, no addenda. In response to a request for additional information, the licensee resubmitted these relief requests in a letter dated April 30, 2004. These requests for relief are associated with repairs made to the Oconee, Unit 1, condenser circulating water (CCW) pump "1B" between March and June of 2000.

The NRC staff has completed its review of the subject requests for relief. As documented in the enclosed Safety Evaluation, the NRC staff concludes that compliance with the specified requirements would result in a significant hardship to the licensee without a compensating increase in the level of quality and safety. Therefore, the licensee's requests are acceptable pursuant to Title 10 of the *Code of Federal Regulations* Part 50, Section 50.55a(a)(3)(ii), for the third 10-year inservice inspection interval at Oconee, Unit 1.

Sincerely,

/RA/

Stephanie M. Coffin, Acting Chief, Section 1
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-269

Enclosure: As stated

cc w/encl: See next page

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The NRC staff has completed its review of the subject requests for relief. As documented in the enclosed Safety Evaluation, the NRC staff concludes that compliance with the specified requirements would result in a significant hardship to the licensee without a compensating increase in the level of quality and safety. Therefore, the licensee's requests are acceptable pursuant to Title 10 of the *Code of Federal Regulations* Part 50, Section 50.55a(a)(3)(ii), for the third 10-year inservice inspection interval at Oconee, Unit 1.

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUEST ASSOCIATED WITH REPAIRS MADE TO

CONDENSER CIRCULATING WATER PUMP

OCONEE NUCLEAR STATION, UNIT 1

DUKE ENERGY CORPORATION

DOCKET NUMBER 50-269

1.0 INTRODUCTION

By letter to the U.S. Nuclear Regulatory Commission (NRC) dated December 16, 2002, Duke Energy Corporation, the licensee for Oconee Nuclear Station (Oconee), Unit 1, submitted relief requests 02-009 and 02-010, from the requirements of the American Society of Mechanical Engineers *Boiler and Pressure Vessel Code*, Section XI, 1989 Edition, no addenda. In response to a request for additional information (RAI), the licensee resubmitted these relief requests in a letter dated April 30, 2004. These requests for relief are associated with repairs made to the Oconee, Unit 1, condenser circulating water (CCW) pump "1B" between March and June of 2000.

2.0 REGULATORY EVALUATION

Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a(g), specifies that inservice inspection (ISI) of nuclear power plant components shall be performed in accordance with the requirements of ASME Code, Section XI, except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). The regulation at 10 CFR 50.55a(a)(3) states that alternatives to the requirements of paragraph (g) may be used, when authorized by the Commission if, (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.

The licensee sought relief from the requirements of USA Standard (USAS) Code for Pressure Piping USAS B31.1.0, 1967. The Oconee CCW pumps were not originally designed, procured, or constructed to any code or quality assurance (QA) standard. The pumps were upgraded from non-QA to QA-1 (pressure boundary only) as a part of the Oconee Service Water Project in 1998. As part of the upgrade, the licensee committed to maintain the pumps as QA-1 equipment for all future maintenance. The CCW system construction code was USAS B31.1.0, 1967. This system construction code was selected as the construction code to be used for this repair-replacement activity since no original component construction code exists.

ENCLOSURE

3.0 TECHNICAL EVALUATION

3.1 System/Components for Which Relief is Requested

Oconee CCW pump "1B" (Equipment Number ON1CCWPU0002, ISI Class C)

3.2 Code Requirements From Which Relief is Requested

The Code of Record for the third ISI interval is ASME Code, Section XI, 1989 Edition, no addenda.

3.3 Request for Relief No. 02-009

3.3.1 Code Requirements

The 1B CCW pump was not originally built to any construction code. When it was reclassified to QA-1 by the licensee, it was placed within the scope of ASME Code, Section XI, which provides requirements for repair and replacement activities. The effective code for the Oconee Repair-Replacement Program is ASME Code, Section XI, 1989 Edition, no addenda. Subparagraph IWA-4120 (a) states, "Repairs shall be performed in accordance with the Owner's Design Specification and the original construction code of the component or system." The CCW system construction code was USAS B31.1.0, 1967. This system construction code was selected as the construction code to be used for this repair-replacement activity since no original component construction code exists.

USAS B31.1.0, 1967 Code, Subsection 127.5.1 states, "Qualification of the welding procedures to be used, and of the performance of welders and welding operators, is required, and shall comply with the requirements of ASME Boiler and Pressure Vessel Code (Section IX) except as modified by this Par. 127.5."

Paragraph 127.5 then has several modifications. The modification relevant to this submittal is Section 127.5.4, paragraph (a), which states, "Test joints for both procedure qualification and performance qualification shall be made as groove welds in pipe in one or more of the specified basic qualification test positions."

3.3.2 Applicable Code Requirements from which Relief is Requested

The vendor's welders were qualified to ASME Code, Section IX requirements, but were qualified on plate rather than pipe, which does not meet the requirements of USAS B31.1.0, 1967 Code, Section 127.5.4, paragraph (a). Therefore, the submittal requests relief from the requirement of USAS B31.1.0, 1967 Code, Section 127.5.4, paragraph (a), that welders must specifically qualify on pipe in order to perform the listed welds.

3.3.3 Basis for Relief

The majority of the pump is located below lake level, requiring pump removal for inspections and repairs other than those which could be performed by underwater divers. The size of this pump, the equipment required to lift the pump out of the intake structure, the number of welds affected, and the number of hours to remove the previous weld repairs, re-certify the welders to

this specific standard, remake the weld repairs, and perform nondestructive examination (NDE) would result in a significant hardship.

The vendor's welders were qualified to ASME Code, Section IX. The qualification test was groove welding on plate in the 1G (flat) position. Table QW-461.9 of ASME Code, Section IX, provides the position and diameter limitations for performance qualification. According to this table, qualification using groove welding on plate in the flat position also qualifies the welder for groove welding on pipe over 24 inches, outside diameter (OD), in the flat position and fillet welding on plate and pipe in the flat position. ASME Code, Section IX, recognizes that welding on large diameter piping is similar to welding on plate. All the welds repaired were groove welds on the CCW pump diameter, which varies from approximately 65 inches to approximately 96 inches, or fillet welds. Therefore, due to the large diameter of the CCW pumps, the welder qualification meets ASME Code, Section IX.

There are additional items that also support the reasonable assurance of structural integrity:

- The welder qualification requirements of ASME Code, Section IX, were met.
- NDE was performed on all weld repairs. This included visual examinations of all weld repairs and magnetic particle examinations on some specific welds. This supports the acceptable quality of the current welds.
- The Oconee CCW pumps were not originally designed, procured, or constructed to any code or QA standard. The licensee and Sulzer Pumps worked together to develop an "as-found inspection guide" for the refurbishment of the Oconee CCW pumps. No weld inspections were required by ASME Code as a part of this inspection. However, weld inspections were included in the guide based on good maintenance practices. The type of as-found weld inspection to be performed on each part was identified (visual inspection or magnetic particle inspection) in this inspection guide. The same inspection method that identified a weld defect was used to verify acceptable defect removal, weld repair preparation, and final weld repair. The licensee and Sulzer Pumps also worked together to define an acceptance criteria for defect identification and defect removal/repair that met the USAS B31.1.0, 1967 Code, intent. Weld inspections were performed using a structured process with inspection criteria clearly identified. This process included:
 - Qualified personnel performed the inspections. Personnel performing visual inspections were qualified to American National Standards Institute/American Welding Society-Quality Control-1 (ANSI/AWS-QC-1), "Standard for AWS Certification of Welding Inspectors." Personnel performing magnetic particle inspection were qualified to American Society for Nondestructive Testing-Technical Council-1A (ASNT-TC-1A), Level II.
 - Weld inspection procedures were used to perform the inspections.
 - Specific criteria were developed to identify defects.

- Acceptance criteria for defect removal, weld repair preparation, and final weld repair inspection were also identified and controlled per procedure.
- The pump was pressure tested with air to 13.5 psig (pounds per square inch gauge) after installation. The pump passed this inspection with no leaks noted. It was tested again using this same method approximately 4 months later to 14.5 psig with no leaks noted. The normal operating pressure for the CCW pumps is 12.47 psig (28.8 feet head @ 177,000 gpm (gallons per minute)). The shut-off head for the CCW pumps is 27.3 psig (63 feet head).
- The pump has operated successfully for over 3 years since the refurbishment work was performed.
- Technical Specification (TS) 3.7.8 requires verification of the siphon header every 18 months. Verification is via a flow test of the header in the siphon mode per Surveillance Requirement (SR) 3.7.8.9. This test has been completed successfully three times since the pump was refurbished.

As a result, rework simply to conform with minor differences in the qualifications does not appear to provide a compensating increase in quality or safety. Therefore, complying with the requirements of the USAS B31.1.0, 1967 Code, would result in hardship or unusual difficulty without a compensating increase in quality or safety pursuant to 10 CFR 50.55a(a)(3)(ii).

3.4 Request for Relief No. 02-010

3.4.1 Code Requirements

The 1B CCW pump was not originally built to any construction code. When it was reclassified to QA-1 by the licensee, it was placed within the scope of ASME Code, Section XI, which provides requirements for repair and replacement activities. The effective code for the Oconee Repair-Replacement Program is ASME, Section XI, 1989 Edition, no addenda.

Subparagraph IWA-4120 (a) states, "Repairs shall be performed in accordance with the Owner's Design Specification and the original construction code of the component or system." The CCW system construction code was USAS B31.1.0, 1967. This system construction code was selected as the construction code to be used for this repair-replacement activity since no original component construction code exists.

USAS B31.1.0, 1967 Code, Subsection 127.5.1, states, "Qualification of the welding procedures to be used, and of the performance of welders and welding operators, is required, and shall comply with the requirements of ASME Boiler and Pressure Vessel Code (Section IX) except as modified by this Par. 127.5."

Paragraph 127.5 then has several modifications. The modification relevant to this submittal is Section 127.5.4, paragraph (c), which states, in part, "Qualifications in Position 1G qualifies for welds in that position only."

3.4.2 Applicable Code Requirements from which Relief is Requested

Vendor welders were qualified to weld in the 1G (flat) position. Welders were witnessed performing welds out of the welder's qualified position on the 3D CCW pump (welds were witnessed being performed in the horizontal rather than flat position). These were removed and rewelded. Based on a review of the pump parts, some fillet weld repairs on the 1B CCW pump could not have been positioned to perform the repair in a true flat position due to the geometry of the part. Based on this, it is concluded that some fillet welds were performed out of position. Relief from the requirements of USAS B31.1.0, 1967 Code, Section 127.5.4, paragraph (c), is requested by this submittal.

3.4.3 Basis for Relief

The majority of the pump is located below lake level, requiring pump removal for inspections and repairs other than those that could be performed by underwater divers. The size of this pump, the equipment required to lift the pump out of the intake structure and the number of hours to remove the previous weld repairs, remake the weld repairs, and perform NDE would result in a significant hardship.

Out-of-position welding was not actually witnessed by the Authorized Nuclear Inservice Inspector (ANII) or the licensee on the 1B CCW pump refurbishment. However, experience on the 3D CCW pump refurbishment and examination of the 1B CCW pump parts indicate that some of the 1B CCW pump parts requiring fillet welds were welded out of position. Since the licensee cannot verify which welds were actually made out of position, the licensee is conservatively considering all fillet weld repairs as being made out of position (horizontal rather than flat). Although this is a technical non-compliance with the welder qualification, welding in this position is allowed by the USAS B31.1.0, 1967 Code, and there is no indication that the welds themselves are defective. Considering that the pumps were originally designed and fabricated without QA or code requirements, the conservative decision in 1998 to apply QA and code requirements to the pumps for future pump maintenance assures that the quality and safety of the pumps always exceeds the original requirements.

There are additional items that also support the reasonable assurance of structural integrity:

- NDE was performed on all weld repairs. This included visual examinations of all weld repairs and magnetic particle examinations on some specific welds. This supports the acceptable quality of the current welds.
- The Oconee CCW pumps were not originally designed, procured, or constructed to any code or QA standard. The licensee and Sulzer Pumps worked together to develop an "as-found inspection guide" for the refurbishment of the Oconee CCW pumps. No weld inspections were required by ASME Code as a part of this inspection. However, weld inspections were included in the guide based on good maintenance practices. The type of as found weld inspection to be performed on each part was identified (visual inspection or magnetic particle inspection) in this inspection guide. The same inspection method that identified a weld defect was used to verify acceptable defect removal, weld repair preparation, and final weld repair. The licensee and Sulzer Pumps also worked together to define acceptance criteria for defect identification and defect

removal/repair that met the USAS B31.1.0, 1967 Code, intent. Weld inspections were performed using a structured process with inspection criteria clearly identified. This process included:

- Qualified personnel performed the inspections. Personnel performing visual inspections were qualified to ANSI/AWS-QC-1, "Standard for AWS Certification of Welding Inspectors." Personnel performing magnetic particle inspection were qualified to ASNT-TC-1A, Level II.
 - Weld inspection procedures were used to perform the inspections.
 - Specific criteria were developed to identify defects.
 - Acceptance criteria for defect removal, weld repair preparation, and final weld repair inspection were also identified and controlled per procedure.
-
- The majority of the fillet welds are attachment welds connecting pump bearing supports or diffuser vanes to the pressure-retaining boundary component rather than welds that directly comprise the pressure-retaining boundary.
 - The pump was pressure tested with air to 13.5 psig after installation. The pump passed this inspection with no leaks noted. Approximately 4 months later, it was tested again using this same method to 14.5 psig with no leaks noted. The normal operating pressure for the CCW pumps is 12.47 psig (28.8 feet-head @ 177,000 gpm). The shut-off head for the CCW pumps is 27.3 psig (63 feet-head).
 - The pump has operated successfully for over 3 years since the refurbishment work was performed.
 - TS 3.7.8 requires verification of the siphon header every 18 months. Verification is via a flow test of the header in the siphon mode per SR 3.7.8.9. This test has been completed successfully three times since the pump was refurbished.

As a result, rework simply to conform with minor differences in the qualifications does not appear to provide a compensating increase in quality or safety. Therefore, complying with the USAS B31.1.0, 1967 Code, requirement would result in hardship or unusual difficulty without a compensating increase in quality or safety pursuant to 10 CFR 50.55a(a)(3)(ii).

3.5 Staff Evaluation

By letter to the NRC dated December 16, 2002, the licensee submitted the subject relief requests. In response to an RAI, the licensee resubmitted these relief requests in a letter dated April 30, 2004. The licensee requested that the NRC approve requests for relief associated with repairs made to the Unit 1 1B CCW Pump between March and June of 2000. The reliefs were requested pursuant to 10 CFR 50.55a(a)(3)(ii), wherein the licensee sought relief from the requirements of the USAS B31.1.0, 1967 Code.

The 1B CCW pump was not originally built to any construction code. When it was reclassified to QA-1 by the licensee, it was also placed within the scope of ASME Code, Section IX, which provides requirements for repair and replacement activities. The effective code for the Oconee Repair-Replacement Program is ASME Code, Section XI, 1989 Edition, no addenda. Subparagraph IWA-4120 (a) states, "Repairs shall be performed in accordance with the Owner's Design Specification and the original construction code of the component or system." The CCW system construction code was USAS B31.1.0, 1967. This system construction code was selected as the construction code to be used for this repair-replacement activity since no original component construction code exists.

3.5.1 Request for Relief No. 02-009

USAS B31.1.0, 1967 Code, Subsection 127.5.1, states, "Qualification of the welding procedures to be used, and of the performance of welders and welding operators, is required, and shall comply with the requirements of ASME Boiler and Pressure Vessel Code (Section IX) except as modified by this Par. 127.5." Section 127.5.4, paragraph (a), states, "Test joints for both procedure qualification and performance qualification shall be made as groove welds in pipe in one or more of the specified basic qualification test positions." The vendor's welders were qualified to ASME Code, Section IX requirements, but were qualified on plate rather than pipe, which does not meet the requirements of the USAS B31.1.0, 1967 Code, Section 127.5.4, paragraph (a). Therefore, the submittal requests relief from the requirement of USAS B31.1.0, 1967 Code, Section 127.5.4, paragraph (a), that welders must specifically qualify on pipe in order to perform the listed welds.

The vendor's welders were qualified to ASME Code, Section IX. The qualification test was groove welding on plate in the 1G (flat) position. Table QW-461.9 of ASME Code, Section IX, provides the position and diameter limitations for performance qualification. According to this table, qualification using groove welding on plate in the flat position also qualifies the welder for groove welding on pipe over 24 inches OD in the flat position and fillet welding on plate and pipe in the flat position. ASME Code, Section IX, recognizes that for large diameter piping, the welding is similar to welding on plate. All the welds repaired were groove welds on the CCW pump diameter, which varies from approximately 65 inches to approximately 96 inches, or fillet welds. Therefore, due to the large diameter of the CCW pumps, the welder qualification meets Section IX requirements. Since the welder qualification requirements of ASME Code, Section IX, were met, it can be assumed that the qualifications are acceptable to ASME Code, Sections III and XI, which would have much more stringent quality requirements than the USAS B31.1.0, 1967 Code. In addition, NDE was performed on all weld repairs. This included visual examinations of all weld repairs and magnetic particle examinations on some specific welds. In addition, the pump was pressure tested with air to 13.5 psig after installation. The pump passed this inspection with no leaks noted. It was tested again using this same method approximately 4 months later to 14.5 psig with no leaks noted. These pressures are greater than the normal operating pressure for the CCW pumps. This supports the acceptable quality of the current welds.

The majority of the pump is located below lake level, requiring pump removal for inspections and repairs other than those which could be performed by underwater divers. The size of this pump, the equipment required to lift the pump out of the intake structure, the number of welds affected, and the number of hours to remove the previous weld repairs, re-certify the welders to this specific standard, remake the weld repairs, and perform NDE would result in a significant

hardship. Therefore, compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

3.5.2 Request for Relief No. 02-010

USAS B31.1.0, 1967 Code, Section 127.5.4, paragraph (c), states, in part, "Qualifications in Position 1G qualifies for welds in that position only." Vendor welders were qualified to weld in the 1G (flat) groove position, which also qualifies the 1F (flat) fillet position. Welders were witnessed performing welds out of the welder's qualified position on the 3D CCW pump (welds were witnessed being performed in the horizontal rather than flat position). These were removed and rewelded. Based on a review of the pump parts, some fillet weld repairs on the 1B pump could not have been positioned to perform the repair in a true flat position due to the geometry of the part. Based on this, it is concluded that some fillet welds were performed out of position on the 1B CCW pump. Relief from the requirements of USAS B31.1.0, 1967 Code, Section 127.5.4, paragraph (c), is requested by this submittal.

Out of position welding was not actually witnessed by the ANII or the licensee on the 1B CCW pump refurbishment. However, experience on the 3D CCW pump refurbishment and examination of the 1B CCW pump parts indicate that some of the 1B CCW pump parts requiring fillet welds were welded out of position. Since the licensee cannot verify which welds were actually made out of position, the licensee is conservatively considering all fillet weld repairs as being made out of position (horizontal rather than flat). Although this is a technical non-compliance with the welder qualification, welding in this position is allowed by the USAS B31.1.0, 1967 Code, and there is no indication that the welds themselves are defective.

NDE was performed on all weld repairs. This included visual examinations of all weld repairs and magnetic particle examinations on some specific welds. In addition, the pump was pressure tested with air to 13.5 psig after installation. The pump passed this inspection with no leaks noted. It was tested again using this same method approximately 4 months later to 14.5 psig with no leaks noted. These pressures are greater than the normal operating pressure for the CCW pumps. These examinations and tests support the licensee's contention that there is no indication that the welds themselves are defective and have an acceptable level of quality and, combined with the hardship stated above, the NRC staff has concluded that compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

4.0 CONCLUSION

The NRC staff has reviewed the licensee's submittal and concludes that lifting the pump out of the intake structure, removing the previous weld repairs, re-certifying the welders to this specific standard, remaking the weld repairs, and performing NDE would result in a significant hardship to the licensee without a compensating increase in the level of quality and safety. Therefore, relief requests 02-009 and 02-010 are authorized pursuant to 10 CFR 50.55a(a)(3)(ii) for the repairs made to the 1B CCW pump between March and June of 2000 at Oconee, Unit 1.

All other requirements of the ASME Code, Section III and XI, for which relief has not been specifically requested and approved remain applicable, including third party review by the ANII.

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Date: July 26, 2004

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