



W. R. McCollum, Jr.  
Vice President

**Duke Power**

Oconee Nuclear Site  
7800 Rochester Highway  
Seneca, SC 29672  
(864) 885-3107 OFFICE  
(864) 885-3564 FAX

May 7, 2001

U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, D.C. 20555-0001

SUBJECT: Oconee Nuclear Station - Unit 2  
Docket No. 50-270  
Request to use an Alternative to ASME Boiler and  
Pressure Vessel Code, Section XI in accordance with  
10 CFR 50.55a(a) (3) (ii)

Pursuant to 10 CFR 50.55a(a) (3) (ii), Duke Energy Corporation (Duke) requests the use of alternatives to the requirements of the ASME Boiler and Pressure Vessel Code, Section XI, Subsections IWA-4500(e) (2) and IWA-4533, 1992 Edition with no addenda for Oconee Unit 2.

Approval of this request would allow the use of alternatives to the examination requirements of IWA-4500(e) (2) and IWA-4533 following repair of Class A Reactor Vessel head components. It has been evaluated and determined that compliance with the requirements of IWA-4500(e) (2) and IWA-4533 would result in hardship and unusual difficulty without a compensating increase in the level of quality and safety. Entry into Mode 2 operation following completion of repairs is currently scheduled for May 26, 2001.

A detailed description of this proposed alternative, including a background discussion and justification, is included as Attachment A to this letter.

Attachment A to this request contains information proprietary to Framatome ANP (FRA-ANP). Brackets enclose proprietary information "[ ]". An affidavit from FRA-ANP is included as Attachment B. This affidavit establishes the basis on which the NRC, pursuant to 10 CFR 2.790 may withhold the information from public disclosure. Attachment C provides a non-proprietary version of this request.

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Questions regarding this request may be directed to Robert Douglas at (864) 885-3073.

Very truly yours,



William R. McCollum

Attachments:

- A - Request for Alternative, Serial Number 01-06  
(Proprietary)
- B - Affidavit of R.W. Ganthner
- C - Request for Alternative, Serial Number 01-06 (Non-Proprietary)

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cc w/att:

L. A. Reyes, Regional Administrator  
U.S. Nuclear Regulatory Commission, Region II  
Atlanta Federal Center  
61 Forsyth St., SW, Suite 23T85  
Atlanta, GA 30303

D. E. Labarge, Senior Project Manager (ONS)  
Office of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
Mail Stop O-8 H12  
Washington, D.C. 20555-0001

cc (w/o att):

M. E. Shannon,  
NRC Senior Resident Inspector  
Oconee Nuclear Station

Mr. Virgil Autrey  
Division of Radioactive Waste Management  
Bureau of Land and Waste Management  
SC Dept. of Health & Environmental Control  
2600 Bull St.  
Columbia, SC 29201

**EXHIBITS A& B**

**EXHIBIT A**

Request for Alternate No. 01-06, Duke Energy Company, Oconee Nuclear Station, Unit 2.

**EXHIBIT B**

The above listed document contains information, which is considered Proprietary in accordance with Criteria b, c, d, e, and f of the attached affidavit.

**ATTACHMENT B**

DUKE ENERGY CORPORATION  
RELIEF REQUEST 01-06

**AFFIDAVIT OF**

**R. W. Ganthner**

AFFIDAVIT OF RAYMOND W. GANTHNER

- A. My name is Raymond W. Ganthner. I am Vice-President of Engineering & Licensing for Framatome ANP, Inc. (FRA-ANP), and as such, I am authorized to execute this Affidavit.
- B. I am familiar with the criteria applied by FRA-ANP to determine whether certain information of FRA-ANP is proprietary and I am familiar with the procedures established within FRA-ANP to ensure the proper application of these criteria.
- C. In determining whether an FRA-ANP document is to be classified as proprietary information, an initial determination is made by the Unit Manager, who is responsible for originating the document, as to whether it falls within the criteria set forth in Paragraph D hereof. If the information falls within any one of these criteria, it is classified as proprietary by the originating Unit Manager. This initial determination is reviewed by the cognizant Section Manager. If the document is designated as proprietary, it is reviewed again by me to assure that the regulatory requirements of 10 CFR Section 2.790 are met.
- D. The following information is provided to demonstrate that the provisions of 10 CFR Section 2.790 of the Commission's regulations have been considered:
- (i) The information has been held in confidence by FRA-ANP. Copies of the document are clearly identified as proprietary. In addition, whenever FRA-ANP transmits the information to a customer, customer's agent, potential customer or regulatory agency, the transmittal requests the recipient to hold the information as proprietary. Also, in order to strictly limit any potential or actual customer's use of proprietary information, the substance of the following provision is included in all agreements entered into by FRA-ANP, and an equivalent version of the proprietary provision is included in all of FRA-ANP's proposals:

AFFIDAVIT OF RAYMOND W. GANTHNER (Cont'd.)

"Any proprietary information concerning Company's or its Supplier's products or manufacturing processes which is so designated by Company or its Suppliers and disclosed to Purchaser incident to the performance of such contract shall remain the property of Company or its Suppliers and is disclosed in confidence, and Purchaser shall not publish or otherwise disclose it to others without the written approval of Company, and no rights, implied or otherwise, are granted to produce or have produced any products or to practice or cause to be practiced any manufacturing processes covered thereby.

Notwithstanding the above, Purchaser may provide the NRC or any other regulatory agency with any such proprietary information as the NRC or such other agency may require; provided, however, that Purchaser shall first give Company written notice of such proposed disclosure and Company shall have the right to amend such proprietary information so as to make it non-proprietary. In the event that Company cannot amend such proprietary information, Purchaser shall prior to disclosing such information, use its best efforts to obtain a commitment from NRC or such other agency to have such information withheld from public inspection.

Company shall be given the right to participate in pursuit of such confidential treatment."

AFFIDAVIT OF RAYMOND W. GANTHNER (Cont'd.)

- (ii) The following criteria are customarily applied by FRA-ANP in a rational decision process to determine whether the information should be classified as proprietary. Information may be classified as proprietary if one or more of the following criteria are met:
- a. Information reveals cost or price information, commercial strategies, production capabilities, or budget levels of FRA-ANP, its customers or suppliers.
  - b. The information reveals data or material concerning FRA-ANP research or development plans or programs of present or potential competitive advantage to FRA-ANP.
  - c. The use of the information by a competitor would decrease his expenditures, in time or resources, in designing, producing or marketing a similar product.
  - d. The information consists of test data or other similar data concerning a process, method or component, the application of which results in a competitive advantage to FRA-ANP.
  - e. The information reveals special aspects of a process, method, component or the like, the exclusive use of which results in a competitive advantage to FRA-ANP.
  - f. The information contains ideas for which patent protection may be sought.

AFFIDAVIT OF RAYMOND W. GANTHNER (Cont'd.)

The document(s) listed on Exhibit "A", which is attached hereto and made a part hereof, has been evaluated in accordance with normal FRA-ANP procedures with respect to classification and has been found to contain information which falls within one or more of the criteria enumerated above. Exhibit "B", which is attached hereto and made a part hereof, specifically identifies the criteria applicable to the document(s) listed in Exhibit "A".

- (iii) The document(s) listed in Exhibit "A", which has been made available to the United States Nuclear Regulatory Commission was made available in confidence with a request that the document(s) and the information contained therein be withheld from public disclosure.
- (iv) The information is not available in the open literature and to the best of our knowledge is not known by General Electric, Westinghouse-CE, or other current or potential domestic or foreign competitors of FRA-ANP.
- (v) Specific information with regard to whether public disclosure of the information is likely to cause harm to the competitive position of FRA-ANP, taking into account the value of the information to FRA-ANP; the amount of effort or money expended by FRA-ANP developing the information; and the ease or difficulty with which the information could be properly duplicated by others is given in Exhibit "B".

E. I have personally reviewed the document(s) listed on Exhibit "A" and have found that it is considered proprietary by FRA-ANP because it contains information which falls within one or more of the criteria enumerated in Paragraph D, and it is information which is customarily held in confidence and protected as proprietary information by FRA-ANP. This report

AFFIDAVIT OF RAYMOND W. GANTHNER (Cont'd.)

comprises information utilized by FRA-ANP in its business which affords FRA-ANP an opportunity to obtain a competitive advantage over those who may wish to know or use the information contained in the document(s).



RAYMOND W. GANTHNER

State of Virginia)

) SS. Lynchburg

City of Lynchburg)

Raymond W. Ganthner, being duly sworn, on his oath deposes and says that he is the person who subscribed his name to the foregoing statement, and that the matters and facts set forth in the statement are true.



RAYMOND W. GANTHNER

Subscribed and sworn before me  
this 4<sup>th</sup> day of May 2001.



Brenda C. Maddox

Notary Public in and for the City  
of Lynchburg, State of Virginia.

*It was commissioned a Notary  
public as Brenda C. Cardona.*

My Commission Expires July 31, 2003

DUKE ENERGY CORPORATION  
Oconee Nuclear Station, Unit 2

Request for Alternative to the Requirements of the  
ASME Boiler and Pressure Vessel Code, Section XI

**Applicable Code Edition and Addenda**

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) will 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 ISI Code of record for Oconee Nuclear Station, Unit 2, third 10-year interval is the 1989 Edition of the ASME Code. 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 NRC approval. The codes of record for the repairs described within this request are the 1989 Section III and 1992 Section XI codes.

**Description of Code Requirements for Which an Alternative is Requested**

There are two sections of the referenced code for which alternatives are requested:

1. IWA-4500(e)(2) defines the band to be inspected following a temper-bead repair as the area of 1-1/2 times the component thickness or 5 inches, whichever is less.
2. Paragraph IWA-4533 specifies that "The weld repair as well as the preheated band shall be examined by the liquid penetrant method after the completed weld has been at ambient temperature for at least 48 hours. The repaired region shall be examined by the radiographic method and, if practical, by the ultrasonic method," following repair of dissimilar materials using the temper bead process in accordance with IWA-4530.

Alternatives to the post repair inspection areas described in IWA-4500(e)(2), the radiographic examination requirements, and the examination hold period requirements of IWA-4533 are requested.

**Description of Proposed Alternatives**

In lieu of the requirements of IWA-4500(e)(2) and IWA-4533, the following alternatives are proposed:

1. Alternate Examination Area: Due to the unique geometry of the Control Rod Drive Mechanism (CRDM) inside Reactor Vessel (RV) head repairs, it is not practical to inspect the band area defined by IWA-4500(e)(2). [

[

]

2. Alternate Volumetric Examination: Due to the thickness of the Unit 2 RV head and the complex geometry of the RV head in the area of the CRDM nozzles, examination of the repair regions by the radiographic method stipulated by IWA-4533 is not practical. It is proposed that examination by the ultrasonic method be substituted for the radiographic method.

3. [

[

- [ ]
4. Alternate to Post Weld Holding Period Before NDE: IWA-4533 stipulates that surface and volumetric inspections be performed after the completed weld has been at ambient temperature for at least 48 hours. It is proposed that the 48-hour hold be eliminated and that the volumetric and surface inspections be performed after the welds are completed and conditions have reached near ambient temperatures.

**Background Information**

Normal inspections of the Unit 2 RV head during a refueling outage discovered small amounts of boron emanating from the CRDM nozzle interface with the outside radius of the RV head. Boron deposits were discovered at this interface for CRDM nozzles Nos. 4, 6, 18, and 30<sup>1</sup>. This pressure boundary degradation was reported to the NRC on April 28, 2001 in accordance with 10CFR50.72(b)(3)(ii).

Non-destructive examinations utilizing eddy current and ultrasonic methods are planned for the nozzle base metal of the nozzles described above. Liquid penetrant inspections are planned for each J groove partial penetration weld connecting these CRDM nozzles to the inside radius of the RV head. Liquid penetrant inspections are also planned for portions of the outside diameter of the CRDM nozzles that project below the RV head. These inspections will help identify the probable leak path.

Experience gained from the repairs to the Unit 1 and Unit 3 CRDM nozzles indicated that more remote automated repair methods were needed to reduce radiation dose to repair personnel. [ ]

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<sup>1</sup> Should the relief requested herein be needed for other CRDM nozzles, a letter supplementing this request will identify these nozzles.

[ ]

**Justification for Alternates**

**(1) Justification for Using Alternate Examination Area**

The configuration of the new pressure boundary welds limits the ability to examine the band area defined by IWA-4500(e)(2). IWA-4500(e)(2), defines a band around the weld repair of at least 1-1/2 times the component thickness or 5 inches, whichever is less, that shall be preheated and maintained at a minimum temperature, based on the welding process to be utilized. For the repairs described herein, the GTAW process will be utilized. Due to the thickness of the RV head, the 5-inch minimum is utilized for definition of the band area.

[ ]

]

**(2) Justification for Using Alternate Volumetric Examination**

The geometry of the RV head and the orientation of the inner bore of the CRDM nozzles make effective radiographic examination impractical. The thickness of the RV head limits the sensitivity of the detection of defects in the new pressure boundary weld. It is proposed that examinations by the ultrasonic method be used in lieu of examinations by the radiographic method.

UT examinations will be performed in accordance with the requirements of the 1989 ASME Code, Section III, subsection NB. The acceptance standards of Paragraph NB-5330 will be applied for the UT examinations.

The UT examination procedures and techniques are based upon industry practice for the examination of austenitic weld materials. The UT examinations consist of a combination of 2.25 Mhz 0 degree dual focused longitudinal wave, 45 degree and 70 degree dual focused refracted longitudinal wave search units. Single 45 degree and 60 degree shear wave search units may also be employed. The 0 degree longitudinal wave is performed to detect any lack of bond areas between the weld and original parent materials, inter-bead lack of fusion, and any laminar type cracking within the base material of the examination volume. The 45, 60, and 70 degree search units are used to detect welding defects such as cracks or lack of fusion between weld beads.

The initial calibration of the examination system provides a demonstration of the procedure, equipment, and examiner capabilities to detect and resolve the 3/32-inch diameter calibration reflectors located in the calibration block.

These ultrasonic methods provide assurance that unacceptable flaws in the Reactor Vessel Head material in the vicinity of the new pressure boundary welds can be detected.

**(3) Justification for Alternate Examination of Tapered Portion of New Pressure Boundary Weld**

The tapered portion of the weld cannot be inspected for axial (transverse flaws) with the manual and remote UT probes to be used for the examination. 70% of the weld surface will be inspected by the UT method. PT will examine the tapered portion of the weld after final grinding of the weld. The UT probes cannot inspect the HAZ of the low alloy RV head beside the tapered portion of the weld. The UT probes will inspect 83% of the low alloy steel HAZ.

Remote enhanced video will be used during the welding operation to insure welding quality. The weld consumables to be used in the new pressure boundary weld consist of bare wire with no hygroscopic flux. The video equipment has the resolution capability to resolve a 1/2 mil diameter color contrast wire. The UT inspection that can be performed along with the supplemental PT inspection and the weld quality provisions described above will provide an acceptable level of quality and safety.

**(4) Justification for Alternate to Post Weld Holding Period Before NDE**

IWA-4533 specifies that the weld region shall undergo volumetric examination after the weld repair area has been at ambient temperature for a minimum of 48 hours. The 48-hour hold is specified to assure that no delayed cold cracking in the ferritic steel HAZ has occurred. The weld consumables to be used in the new pressure boundary weld consist of bare wire with no hygroscopic flux. The welding will be performed at 300 degrees F, as required by IWA-4500 (e)(2).

As noted before, the repairs described herein will be made to the 1992 ASME Section XI Code. However, the latest code, the 1998 Edition through 2000 Addenda has deleted the 48-hour hold period requirement. In summary, the proposed elimination of the 48-hour period prior to performing NDE is based on the use of bare wire with no hygroscopic flux with the 300 degree F preheat such that delayed hydrogen induced cracking is eliminated and the recent change in the code that eliminates the 48-hour hold period. These items, as well as the weld quality provisions described above, assure an acceptable level of quality and safety.

**The Quality and Safety Provided by the Proposed Alternative**

There are two purposes to the examinations required by IWA 4500(e)(2) and IWA 4533:

1. [ ]
2. Performance of temper bead repairs could result in under-bead hydrogen induced cracking. The second purpose of the examination is to verify that no under-bead cracking has occurred. The use of bare wire with no hygroscopic flux with the 300 degrees F preheat will reduce the potential for hydrogen induced cracking. However, the ultrasonic inspections planned are perfectly suited for the examination of the weld to head interface, through the weld thickness, to detect the possible presence of under-bead cracks.

The NDE inspection methods described herein will provide an acceptable level of quality and safety compared to the code requirements. The use of bare wire consumables with no hygroscopic flux and the 300 degrees F preheat will limit the potential for initiating cracks in the RV head base material. The above described UT methods can detect cracks that may form in 83% of the RV head base material adjacent to the new weld. The UT and PT methods described will assure the weld quality meets ASME Section III subsection NB-5000 requirements. These inspections, along with the remote GTAW process, will insure that the welds will perform as designed and thus provide an acceptable level of quality and safety.

**Justification for Granting Relief**

[ ]  
[ ] The proposed examination areas will provide adequate evidence that the new pressure boundary welds and low alloy steel RV head meet the requirements of the ASME codes.

DEC believes that compliance with the post-repair examination methods required by IWA-4533 present a hardship or unusual difficulty without a compensating increase in the level of quality and safety. [ ]

[ ] Moreover, the results of a RT would be questionable because of density changes between the base and weld metal and residual radiation from the base metal would render the film image inconclusive. Therefore, compliance with the Code RT requirement would create unusual difficulties and hardship. The proposed alternatives provide an acceptable level of quality and safety.

DEC believes that alternative for elimination of the 48-hour hold period meets the NRC's criteria for a hardship case per 10 CFR 50.55(a), (a)(3)(ii).

Section IWA-4500(e)(2) requires a post-weld 48-hour hold period prior to performing the NDE required by Section XI. The need to repair the subject CRDM nozzles was identified during the current refueling outage. Therefore, these repairs were not part of the outage schedule or the ALARA dose estimate planning. Compliance with the requirement for a post-weld 48-hour hold period prior to performing the NDE required by IWA-4500(e)(2) results in the addition of over 2-1/2 days to the refueling outage schedule. The additional time and delay of plant startup will constitute unusual hardships and burdens that are not necessary considering that the NDE that could be performed in a shorter time period following the repair and would provide an acceptable level of assurance of the quality and safety of the weld repairs. Any weld defects or cracking would be identified by the NDE performed with less than the 48-hour hold time. Duke's proposed approach will provide assurance of the structural integrity of the CRDM nozzles as demonstrated by a Section III analysis of the new weld configuration, in addition to the above described (1) low hydrogen producing welding process, (2) weld quality measures, and NDE procedures and processes.

As previously described: (1) the purpose of the 48-hour hold period is to assure that no undetected delayed hydrogen induced cold cracking in the ferritic steel HAZ has occurred; and (2) the welding processes used avoid delayed cold cracking. In recognition that the 48-hour hold period is an unnecessary burden and hardship for temper bead weld repairs using the GTAW welding process with 300°F preheat, the latest edition of the ASME Code, Section XI (i.e., the 1998 Edition with 2000 Addenda) has deleted the 48-hour hold period requirement of IWA-4500(e)(2).

The purposes of the 48-hour hold period are obviated by the shielded GTAW welding process with 300°F preheat. Accordingly, compliance with this requirement would not provide a compensating increase in the level of quality and safety. DEC concludes that the quality and safety of the repair is not increased by the 48-hour hold period and, therefore, that the additional 2-1/2 day outage extension is an unnecessary hardship without a compensating increase in the level of quality and safety.

DEC believes the alternatives for inspection of the tapered portion of the weld are justified. The UT of the full thickness portion of the weld, along with the partial UT and the PT of the tapered portion provide assurance that cracks, should they form, could be detected. In addition, weld quality will be verified by video monitoring during the welding process.

Due to the previous repairs to the Oconee Unit 1 thermocouple nozzles and CRDM nozzle 21, the Unit 3 CRDM nozzles, the Unit 2 CRDM repairs described herein, and Primary Water Stress Corrosion Cracking concerns throughout the nuclear industry, Duke is planning to replace the Oconee Units 1, 2 and 3 RV heads. Orders for the new RV heads have been placed. The RV heads are to be replaced between 2003 and 2006.

**Duration of the Proposed Alternative**

The proposed alternatives are only applicable to the examinations to be made after repair to the subject Oconee Unit 2 RV head CRDM nozzles.

**Implementation Schedule**

This Request for Alternate is associated with the ongoing repair of the Unit 2 RV head CRDM nozzles. Entry into Mode 2 operation is currently scheduled for May 26, 2001.

Originated By: Timothy D. Brown      5/7/01  
Timothy D. Brown      Date

Reviewed By: L. J. Azzarello      5/7/01  
Leonard J. Azzarello      Date



**Figure 1: Oconee Unit 2 New CRDM Pressure Boundary Welds**