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A Duke Energy Company

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May 8, 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 (DEC) requests the use of alternatives to portions of the requirements of the ASME Boiler and Pressure Vessel Code, Section XI, Subsections IWA-4500(e)(2), IWA-4532.2(d), and IWA-4500(d)(1)(b), 1992 Edition with no addenda for Oconee Unit 2.

Approval of this request would allow the use of alternatives to the welding process requirements of the above ASME code sections for the repair of Class A Reactor Vessel head components. It has been evaluated and determined that the alternatives described herein provide an acceptable 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.

A001

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

Very truly yours,

William R. McCollum,
Oconee Site Vice President

Attachments:

A - Request for Alternative, Serial Number 01-07 (Proprietary)
B - Affidavit of R.W. Ganthner
C - Request for Alternative, Serial Number 01-07 (Non-Proprietary)

cc w/att:

L. A. Reyes, Regional Administrator
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cc (w/o att):

M. E. Shannon,
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ATTACHMENT B

DUKE ENERGY CORPORATION
RELIEF REQUEST 01-07

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:

"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."

(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.

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

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 8th day of May 2001.

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

My Commission Expires 2/29/04

EXHIBITS A & B

EXHIBIT A

Request for Alternate No. 01-07, 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.

DUKE ENERGY CORPORATION
Oconee Nuclear Station, Unit 2

Request for Alternate 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

Alternatives are requested to portions of subsections IWA-4500(e)(2), 4532.2(d), and 4500(d)(1)(b):

1. [ ]

2. IWA-4532.2(d) specifies that the weld area shall be maintained at a temperature of 450-550 degrees F for a minimum holding time of 4 hours when welding to P3 materials.

3. IWA-4500(d)(1)(b) specifies that the welding parameters used in the actual weld shall be equivalent to those parameters in the Procedure Qualification Report (PQR).

Alternatives are requested to the requirements: (1) of [ ], (2) to the post-weld heat soak temperature as specified in IWA-4532.2(d), and (3) to the requirement that the actual welding parameters be equivalent to the PQR parameters, as specified in IWA-4500(d)(1)(b).

Description of Proposed Alternatives

In lieu of the requirements of IWA-4500(e)(2), IWA-4532.2(d), and IWA-4500(d)(1)(b), the following alternatives are proposed:

1. [ ]

2. IWA-4532.2(d): The temperature of the post-weld heat soak will be maintained at the preheat temperature of 300 degrees F for four hours instead of heating to 450 to 550 degrees F and holding for four hours as specified for welding to P3 materials.

3. IWA-4500(d)(1)(b): The PQR was qualified with the post-weld heat soak heat temperature of between 450 to 550 degrees F for a period of two hours. A post-weld heat soak temperature of 300 degrees F for a period of four hours will be used for the actual weld to be applied to the repair areas.

Background Information

Normal inspections of the Unit 2 RV closure head during a refueling outage discovered small amounts of boron emanating from the CRDM nozzle interface with the outside radius of the closure RV head. Boron deposits were discovered at this interface for CRDM nozzles Nos. 4, 6, 18, and 30[1]. 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 also 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. [

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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. [

[1] Should the relief requested herein be needed for other CRDM nozzles, a letter supplementing this request will identify these nozzles.

[

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Justification for Alternates

(1) Justification for Alternate to Controlling Interpass Temperature

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(2) Justification for Alternate Post-Weld Heat Soak Temperature

The 450-550 degrees F post-weld heat soak requirement of IWA-4532.2(d) is to assure that no delayed cold cracking in the ferritic steel HAZ occurs. The weld consumables to be used will consist of bare wire with no hygroscopic flux. The preheat temperature of 300 degrees F will be maintained during the post-weld soak for four hours. The combination of the low moisture absorbing weld process and maintaining the post-weld soak temperature at 300 degrees F for four hours will eliminate the possibility of hydrogen induced cracking.

Industry experience has found that delayed hydrogen cracking requires a hydrogen concentration above about 5ml/100g of deposited weld metal, and a weld and Heat Affected Zone (HAZ) with low ductility/toughness. Delayed hydrogen cracking tends to occur in carbon and alloy steel welds produced by processes which use a flux, e.g. shielded metal arc welding (SMAW), submerged arc welding (SAW), and flux cored arc welding (FCAW). The flux in these processes can pick up moisture that breaks down during welding to produce atomic hydrogen. The atomic hydrogen is partially absorbed by the weld metal and HAZ. Absorption of hydrogen, in sufficient quantity in low ductility material, may cause delayed hydrogen cracking. The GTAW process uses Argon gas as the shielding medium, a non hygroscopic flux.

Moisture contaminated shielding gas or high humidity environments may introduce hydrogen into GTAW welds. The Electric Power Research Institute (EPRI) performed tests where argon shielding gas was bubbled through a cylinder of water and then mixed with welding grade argon having a dew point of -70 degrees F to produce gas mixtures with dew points from -60 degrees F to +60 degrees F. At +60 degrees F dew point (an unrealistically high dew point), the measured hydrogen concentration in test welds was 4.6 ml/100g of weld metal (Reference 1). This value falls in the extra low hydrogen range specified by American Welding Society (AWS). The EPRI study also measured the hydrogen content of bare filler material and found it to be less than 1 ml/100g of weld metal.

The EPRI work further showed that a 450 degrees F post-weld heat soak would reduce the already low hydrogen content to infinitesimally small values. Work by Coe and Moreton (Reference 2) determined that it takes only 0.3 hours at 450 degrees F to remove 95% of any hydrogen present. At 300 degrees F, the diffusivity rate measurements showed that only 0.7 hours is required to remove 95% of any hydrogen that is present. The proposed alternative will hold the post-weld heat soak at 300 degrees F for four hours.

The National Board Inspection Code does not require the post-weld heat soak when using electrodes with a supplemental hydrogen designation of H8 (8ml/100g). These applications are for SMAW on P4 and P5A materials. These combinations have

the potential for hydrogen contamination and hardening of the base metal that will exceed the potential of GTAW for P1 and P3 material. Moreover, the 1998 with 2000 addenda ASME Code has eliminated the requirement for the post-weld soak for GTAW temper-bead welds.

(4) Justification for Alternate to the PQR Post-Weld Heat Soak Temperature vs. Actual Weld Post-Weld Heat Soak Temperature

The PQR was performed in accordance with Code Case N-432, Revision 0, "Repair Welding Using Automatic or Machine Gas Tungsten-Arc Welding (GTAW) Temper Bead Technique, Section XI, Division 1," prior to the incorporation of machine welding into Section XI. Code Case N-432 revision 0 requires a post-weld heat soak temperature of between 450 and 550 degrees F for a period of two hours. The post-weld heat soak was intended to eliminate any hydrogen that may have been absorbed into the weld or low alloy steel by the welding process. As discussed in (2) above, reducing the post-weld heat soak temperature to 300 degrees F for four hours will be as effective as the code requirement in removing hydrogen. As such, DEC believes that the disagreement between the PQR and the actual weld process is of minimal technical consequence. The welding as described will provide an acceptable level of quality and safety.

The Quality and Safety Provided by the Proposed Alternative

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The code required post-weld soak temperature insures that hydrogen that could be absorbed in the welding process would be eliminated. The use of bare wire consumables, no hygroscopic flux, and the alternate post-weld soak temperature

will preclude hydrogen accumulation during the welding process. The current National Board Inspection Code, and the ASME Code, in the 1998 Edition with 2000 addenda, eliminated the post-weld heat soak requirements. The reduced post-weld heat soak temperature will not affect the quality and safety of the new pressure boundary weld.

The code requirement that the actual weld has similar weld parameters as the PQR is to insure that the actual weld has the same quality as the weld qualified in the PQR. In this case, the change in the post-weld heat soak temperature from that used in the PQR is of minimal technical consequence to the final weld quality. All other weld parameters will be satisfied in the final weld. It was demonstrated above that the change in the post-weld soak temperature would not increase the potential for hydrogen induced cracking. Thus, this change in the parameter will not change the quality and safety of the welding process.

In summary, the above discussed items support that the new pressure boundary welds will have an acceptable level of quality and safety. This conclusion is based on the (1) use of low moisture absorbing welding processes with the alternate post soak temperature, (2) hydrogen diffusivity studies conducted by Coe and Moreton, (3) the current National Board Inspection Code and ASME Code requirements for GTAW temper-bead welds.

Justification for Granting Relief

[

] The repair plans for Unit 2 seek to reduce exposures by instituting semi-automated remote processes. These new and innovative plans require exemption from several code welding processes requirements as noted herein. The use of the above described semi-automated repair process is dependent on approval of this request. In the event this

request is not approved, the total radiation exposure to perform the repairs using manual processes would increase from an estimated 21 REM (using semi-automated processes) to approximately 125 REM for the manual repair processes as used on Unit 3. The manual CRDM nozzle repairs completed on Unit 3 resulted in whole body exposures of 282 REM. DEC believes the alternatives described will provide an acceptable level of quality and safety when compared to the code requirements to directly monitor weld interpass temperature.

DEC believes that compliance with portions of IWA-4532.2(d) constitutes a hardship per 10 CFR 50.55 (a), (a)(3)(ii). Industry studies have shown that reduction of the post-weld heat soak temperature to 300 degrees F does not affect the quality and safety of the weld. Current National Board Inspection and ASME Codes have eliminated the post-weld heat soak. Rejection of this request would result in a delay of the outage of approximately 1-1/2 days and a 5% increase in the radiation dose planned for the CRDM nozzle repair evolution. DEC believes the alternative described will provide an acceptable level of quality and safety when compared to the code requirements for the post-weld heat soak temperature.

DEC believes that compliance with portions of IWA-4500 (d)(1)(b) constitutes a hardship per 10 CFR 50.55 (a), (a)(3)(ii). Qualification of the welding process with the alternate post-weld soak temperature of 300 degrees F will delay the current refueling outage by approximately six weeks. As noted herein, the requirement to use a post-weld soak temperature of 450 degrees F does not increase the level of quality and safety compared to the 300 degrees F post-weld soak temperature. Industry studies have shown that using lower post soak temperatures provide acceptable results. Therefore, the difference between the post-weld soak temperature of the PQR and the actual welding post soak temperature are of minimal technical consequence and will not affect the quality and safety of the new pressure boundary welds.

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, DEC 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 repairs of 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.

References

1. Electric Power Research Institute (EPRI), Document TR103354, "Temperbead Welding Repair of Low Alloy Pressure Vessel Steels; Guidelines," December 1993, Chapter 2, "Diffusion of Hydrogen in Low Alloy Steel," D. Gandy & S. Findland

2. Journal of Iron and Steel Institute, April 1966, "Diffusion of Hydrogen in Low Alloy Steel," pages 366-370, F.R. Coe and B.A. Moreton

Originated By: Timothy D. Brown — Timothy D. Brown — 5-8-01 — Date

Reviewed By: L. J. Azzarello — Leonard J. Azzarello — 5/8/01 — Date

Figure 1: Oconee Unit 2 New CRDM Pressure Boundary Welds