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U. S. Nuclear Regulatory Commission  
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Subject: Arkansas Nuclear One - Unit 1  
Docket No. 50-313  
License No. DPR-51  
Request for Authorization to Use Alloy 690 Welding Filler Material per  
Code Cases 2142-1 and 2143-1

Gentlemen:

Pursuant to 10 CFR 50.55a(a)(3)(i), Entergy Operations, Incorporated (EOI) requests approval from the NRC to use Alloy 690 equivalent welding filler material along with the associated ASME Boiler and Pressure Vessel Code, Section IX Code Cases 2142-1 and 2143-1. These code cases would be applied as an alternative when performing welding repairs under ASME Boiler and Pressure Vessel Code, Section XI, 1992 Edition for Arkansas Nuclear One, Unit 1 (ANO-1).

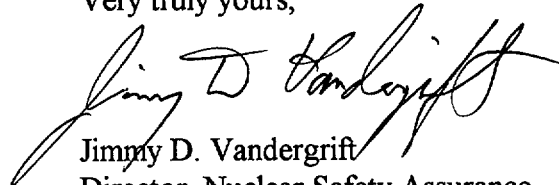
This request is to allow the application of Alloy 690 equivalent weld filler materials (UNS N06052 and UNS W86152) for the Control Rod Drive Mechanism (CRDM) nozzles. Industry studies show that Alloy 690 weld filler materials possess a high resistance to primary water stress corrosion when compared to the materials allowed by the referenced code. EOI has evaluated the use of the alternative material and determined that because of its superior corrosion resistant properties, the alternative material will provide an acceptable level of quality and safety. A description of this proposed alternative, including a background discussion and justification, is included as an attachment to this letter.

The subject relief request was discussed with members of NRC Project Management and Materials and Chemical Engineering Branches during a call on March 26, 2001. NRC verbal acceptance for use of the Alloy 690 equivalent materials was provided.

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Since this alternative provides relief from the ASME Code, there are no commitments associated with this request. Please contact Steve Bennett at 501-858-4626 regarding further information on this request.

Very truly yours,



Jimmy D. Vandergrift  
Director, Nuclear Safety Assurance

JDV/sab  
Attachment

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**ENTERGY OPERATIONS INC.  
ARKANSAS NUCLEAR ONE, UNIT 1  
2ND TEN YEAR INTERVAL  
REQUEST NO. ANO1-ISI-001**

**I. Component / Examination Identification**

Component: Reactor Pressure Vessel Control Rod Drive Mechanism (CRDM) Nozzles

Code Class: ASME Class 1

Description: Use of Code Cases 2142-1 and 2143-1

References: 10CFR50.55a(a)(3)(I)  
ASME Section XI, 1992 Edition  
ASME Section III, 1965 Edition, Summer 1967 Addenda  
ASME Section IX  
Code Cases 2142-1 and 2143-1

**II. Requirements**

A potential *primary water stress corrosion crack (PWSCC)* was identified in CRDM nozzle #56 during the boric acid visual inspection of the CRDM nozzles. As a follow-up action, CRDM nozzle #56 was examined using the liquid penetrant, eddy current, and ultrasonic methods. The CRDM J-weld was also examined by the liquid penetrant method. Based upon the results of the nondestructive examinations, weld repairs of the CRDM J-weld and nozzle are required.

According to IWA-4170 of ASME Section XI, repairs are performed in accordance with the owners design specification and the original construction code of the component or system. If repair welding cannot be performed in accordance with the construction code or ASME Section III requirements, then repair welding (i.e. temper bead welding) can be performed in accordance with the applicable requirements in ASME Section XI.

ASME Sections III and XI require qualification of Welding Procedure Specifications (WPSs) and welders (welding operators) in accordance with ASME Section IX. This means that each welding filler metal that is proposed for production welding must also be qualified. To reduce the quantity of welding procedure and welder performance qualifications, ASME Section IX assigns F-Numbers to classes of welding filler metals with similar chemical and mechanical properties and weldability. Accordingly, if a WPS or welder was originally qualified to perform production welding with a specific F-Number filler metal, then the WPS or welder is

also qualified to perform production welding with all other filler metals within the specified F-Number classification. F-Number classifications are defined in QW-432 of ASME Section IX.

The WPSs that will be utilized to perform repair welding of CRDM nozzles have been qualified to use F-Number 43 filler metals. F-Number 43 filler metals are nickel alloy filler metals. Alloy 690 type filler metals (UNS N06052 and NW86152) have been proposed for all weld repairs on the CRDM nozzles because of their resistance to PWSCC. However, although the UNS N06052 and NW86152 filler metals are nickel alloys, they are not classified as F-Number 43 filler metals in the editions and addenda of ASME Section IX to which the WPSs were originally qualified.

### **III. PROPOSED ALTERNATIVE**

Pursuant to 10 CFR 50.55a(a)(3)(i), Entergy Operations, Incorporated (EOI) requests approval from the NRC to use Alloy 690 equivalent welding filler material, UNS N06052 and NW86152, in accordance with the ASME Boiler and Pressure Vessel Code, Section IX Code Cases 2142-1 and 2143-1 for Arkansas Nuclear One, Unit 1 (ANO-1).

### **IV. BASIS FOR PROPOSED ALTERNATIVE**

This request is to allow use of Alloy 690 weld filler metals, UNS N06052 and W86152, in accordance with ASME Section IX Code Cases 2142-1 and 2143-1. Code Cases 2142-1 and 2143-1 establish chemical and material properties and a basis for classification of the filler metals. According to the code cases, UNS N06052 and UNS W86152 welding filler metals can be considered as F-Number 43 filler metals for welding procedure and welder performance qualification.

Industry studies show that Alloy 690 weld filler metals possess a high resistance to primary water corrosion. EOI has also evaluated the use of the alternative filler metals and determined that because of its superior corrosion resistant properties, the alternative material will provide an acceptable level of quality and safety when compared to Alloy 600 type weld filler metals, UNS N06082 (ERNiCr-3) and W86182 (ENiCrFe-3).

In a letter to the NRC dated September 9, 1998 (2CAN099804), EOI requested authorization to use the Alloy 690 equivalent filler metals in the construction of the replacement steam generators to be installed at ANO-2. NRC approved the request by letter dated March 26, 1999 (2CNA039903). Similarly, in letter dated January 8, 2001 the NRC authorized the use of Alloy 690 equivalent filler metals in the repair of a CRDM nozzle and thermocouple nozzles on Oconee Unit 1 reactor pressure vessel.

It should also be noted that UNS N06052 and W86152 welding filler metals were incorporated into the 1999 Addenda of the 1998 Editions of ASME Section II, Part C and ASME Section IX. In ASME Section II, Part C, UNS N06052 filler metal now exists in

SFA-5.14 as ERNiCrFe-7; UNS W86152 now exists in SFA-5.11 as ENiCrFe-7. QW-432 of ASME Section IX now identifies ERNiCrFe-7 and ENiCrFe-7 as F-Number 43 filler metal. Therefore, both of these filler metals have been included into the ASME Code.

## **V. CONCLUSION**

The use of Alloy 690 equivalent welding filler metals, UNS N06052 and W86152, provide superior resistance to PWSCC over that provided by Alloy 600 filler metals. Furthermore, UNS N06052 (ERNiCrFe-7) and W86152 (ENiCrFe-7) have been incorporated into the 1998 Edition, 1999 Addenda of ASME Sections II and IX. As such, they have been classified as F-Number 43 filler metals in QW-432 of ASME Section IX. Therefore, use of Alloy 690 equivalent welding filler metals in accordance with Code Cases 2142-1 and 2143-1 provide an acceptable level of quality and safety when performing weld repairs on the CRDM nozzles.