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NG-97-0078

Office of Nuclear Reactor Regulation  
U. S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Mail Station P1-37  
Washington, DC 20555-0001

Subject: Duane Arnold Energy Center  
Docket No: 50-331  
Op. License No: DPR-49  
Clarification and Justification Concerning Inservice Inspection  
Alternative Examination Requests NDE-020 and NDE-R011

References: 1) NG-96-0809, from J. Franz (IES) to W. Russell (NRC) dated  
April 26, 1996, Third 10-Year Interval Inservice Inspection Plan  
2) NG-96-2088, from K.E. Peveler (IES) to Office of Nuclear  
Reactor Regulation (NRC) dated October 3, 1996, Inservice  
Inspection Relief Requests  
3) NG-96-2574 from K.E. Peveler to Office of Nuclear Reactor  
Regulation (NRC) dated November 26, 1996, Additional  
Information on Inservice Inspection Relief Requests NDE-020 and  
NDE-R011

File: A-100, A-286

Dear Sirs:

Reference 1 transmitted the Duane Arnold Energy Center (DAEC) Third 10-Year Interval Inservice Inspection (ISI) Plan, along with several relief requests requiring NRC approval. Included was Second-10 Year interval relief request NDE-020. Reference 2 transmitted a revision to relief request NDE-020, and Third 10-Year Interval relief request NDE-R011. During a conference call on November 18, 1996, the Staff requested additional information regarding relief requests NDE-020 and NDE-R011. The requested information was provided in reference 3. In another telephone call on December 6, 1996, the Staff requested further clarification. The requested further clarification and justification for relief requests NDE-020 and NDE-R011 is provided in attachment 1 to this letter. Relief Requests NDE-R011 and NDE-020 were changed to Alternative Examination Requests to meet the intent of 10CFR50.55a(3)(i).

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For Alternative Examination Request NDE-R011 we have added Examination Category B-D, Item Numbers B3.90 and B3.100, as well as additional justification. For Alternative Examination Request NDE-020 we have added Examination Category B-A, Item Numbers B1.20, B1.30, B1.40 and Examination Category B-D, Item Numbers B3.90 and B3.100, as well as additional justification.

Should you have any questions regarding this matter, please contact this office.

Sincerely,



Kenneth E. Peveler  
Manager, Regulatory Performance

Attachments: (1) Clarification and Justification for Alternative Examination Requests  
NDE-R011 and NDE-R020  
(2) Alternative Examination Number: NDE-R011  
(3) IES Utilities Inc. Duane Arnold Energy Center 2nd 10-Year Interval  
Alternative Examination Number: NDE-020

cc: D. Barta  
L. Root  
G. Kelly (NRC-NRR)  
D. Weaver (NRC-NRR)  
A. B. Beach (Region III)  
NRC Resident Office  
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### **Clarification and Justification for Alternative Examination Requests NDE-R011 and NDE-R020**

The Reactor Pressure Vessel (RPV) and Nozzle-to-Vessel Welds were examined in accordance with GE (General Electric) procedure "UT-DAC-702VO", which was demonstrated at the EPRI (Electrical Power Research Institute) NDE (Nondestructive Examination) Center under the PDI (Performance Demonstration Initiative) Program. The procedure was qualified in detection and sizing in accordance with ASME Section XI, Appendix VIII, Supplement 6. In addition, the procedure was also successful in the detection of under clad flaws (ASME Section XI, Appendix VIII, Supplement 4, 0.52" X 1.1" (single side exam) and 0.27" X 1.1" (double side exam)).

The examinations performed met all of the requirements specified in Regulatory Guide 1.150, (Ultrasonic Testing of Reactor Vessel Welds During Preservice and Inservice Examinations), including transducer beam profiles. All other ASME Section XI requirements were met. A demonstration witnessed by the ANII (Authorized Nuclear Inservice Inspector) was performed which showed that a dynamic calibration on the existing calibration blocks with the side-drilled holes to a depth of 1.5" was acceptable.

A review of the "edge effect" using theoretical and empirical approaches has been completed. A discussion of each approach follows:

#### **Theoretical**

A comparison of the responses from a 60° shear wave signal from the DAEC Calibration Block with 1.5" side-drilled holes to an ASME Calibration Block with 3" side-drilled holes was completed using AutoCad. The comparison showed that the sensitivity for the 1.5" holes was more than the 3" holes thus proving that the "edge effect" did not reduce the examination sensitivity.

#### **Empirical**

To support the theoretical approach, data was collected from an ASME Calibration Block with 3" side-drilled holes. The data was taken on the block starting 0.25" from the edge of the block and at 0.25" increments along the length of the holes. Angles of 0°, 45°, and 60° were used. The results were compared with the angles used during the DAEC Vessel Examination. This concluded that the sensitivity used in the examination using the DAEC calibration block was higher than that which would have been used when calibrating on an ASME Calibration Block.

Enclosed is the General Electric Report, GERIS 2000 AND MANUAL EXAM SENSITIVITY FOR RPV WELD EXAMINATIONS AT DUANE ARNOLD ENERGY CENTER, GENE 955-009-0197, which provides the details of the comparisons stated above.

### **CONCLUSION**

The GERIS 2000 and manual RPV weld examinations at the DAEC were slightly more sensitive when calibrated on blocks containing 1.5" deep side-drilled holes than they would have been using an ASME standard configuration block.

There was no detectable effect due to transducer placement near the edge of the block (edge effect) for angle beam examinations at the DAEC. Calibration sensitivity using 1.5" deep side-drilled holes with the search unit placed at approximately .75" from the edge of the block was slightly higher, from 1.7dB (45°) to 5.0dB (60°), than calibrations using 3" deep holes with the search unit placed at 1.5" from the edge.

There was an apparent edge effect on straight beam calibrations using 3" deep holes with the search unit about 1.25" from the edge. There appears to be a side lobe reinforcement of the amplitude from the 1/4T, 1/2T, and 3/4T holes. The effect is on the order of 6dB. When this effect is considered, the calibration sensitivity using 1.5" deep side-drilled holes with the search unit placed at approximately .75" from the block edge was about 14dB higher than calibrations using 3" deep holes with the search unit placed 1.5" from the edge.

RPV weld examinations at the DAEC met the sensitivity requirements of ASME Section XI, 1989 Edition with no Addenda and earlier Editions. The examinations were performed in accordance with USNRC Regulatory Guide 1.150 requirements.