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September 30, 1996
NG-96-1807

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
Response to NRC Request for Additional Information on Third 10-
Year Interval Inservice Inspection Program Plan and Associated
Requests for Relief

References: 1) NG-96-0809, from J. Franz (IES) to W. Russell (NRC) dated
April 26, 1996, Third 10-Year Interval Inservice Inspection Program
Plan
2) Letter from G. Kelly (NRC) to L. Liu (IES), dated July 30, 1996,
Request for Additional Information on Third 10-Year Interval
Inservice Inspection Program Plan and Associated Requests for
Relief

File: A-100, A-286

Dear Sirs:

The Duane Arnold Energy Center (DAEC) will begin its third 10-year inspection interval on November 1, 1996. Reference 1 transmitted the DAEC Third 10-Year Interval Inservice Inspection (ISI) Program Plan for NRC approval. The plan and several relief requests were the subject of a conference call with the Staff on July 9, 1996.

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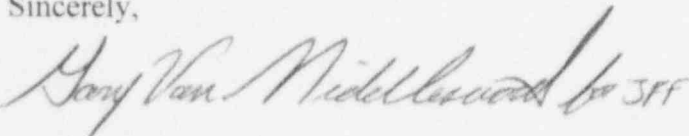
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The Staff issued a request for additional information (RAI) on July 30, 1996. This RAI (Reference 2) was the subject of another conference call between the NRC Staff and IES personnel on August 23, 1996. We have provided the information requested in the RAI in Attachment 1.

As discussed with the Staff, we intend to use this plan to perform inservice inspections during refueling outage (RFO) 14, currently scheduled to begin on October 10, 1996. The third 10-year interval relief requests which require approval prior to this outage are NDE-R022, NDE-R024, NDE-R025, and NDE-R026 (Attachment 2). Previously submitted relief requests NDE-R022 and NDE-R024 were revised; new relief requests NDE-R025 and NDE-R026 were developed based on our discussions with the Staff. We request approval of these relief requests and the Third 10-Year Interval ISI Plan by October 10, 1996.

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

Sincerely,

A handwritten signature in cursive script, appearing to read "John F. Franz". To the right of the signature, the letters "JFF" are handwritten.

John F. Franz
Vice President, Nuclear

Attachments: 1) IES Response To NRC Request For Additional Information on the
Duane Arnold Energy Center Third 10-Year Interval Inservice Inspection
Program Plan
2) Relief Requests

JFF/CJR/cjr
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cc: C. Rushworth
L. Liu
G. Kelly (NRC-NRR)
A. B. Beach (Region III)
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**IES RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION
ON THE DUANE ARNOLD ENERGY CENTER
THIRD 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM PLAN**

NRC REQUEST 1:

Address the degree of compliance with augmented examinations that have been established by the NRC when added assurance of structural reliability is deemed necessary. Examples of documents that address augmented examinations are:

- (a) Branch Technical Position MEB 3-1, High Energy Fluid Systems, Protection Against Postulated Piping Failures in Fluid Systems Outside Containment;
- (b) Regulatory Guide 1.150, Ultrasonic Testing of Reactor Vessel Welds During Preservice and Inservice Examinations;
- (c) NUREG-0619, BWR Feedwater Nozzle and CRD Return Line Nozzle Cracking;
- (d) NUREG-803, Integrity of BWR Scram System Piping; and
- (e) Generic Letter 88-01, NRC Position on IGSCC in BWR Austenitic Stainless Steel Piping (ref. NUREG-0313).

Discuss these and any other augmented examinations that may have been incorporated in the Duane Arnold Energy Center, Third 10-Year Interval Inservice Inspection Program Plan, Revision 0.

IES RESPONSE:

The DAEC does not include any augmented requirements under the ISI Program. These are handled under separate correspondence with the NRC and implemented under plant specific procedures. The current augmented requirements will not change with the start of the third 10-year interval. Brief summaries of the augmented programs addressed in NRC Request 1 are provided below.

- (a) Branch Technical Position MEB 3-1 "High Energy Fluid Systems, Protection Against Postulated Piping Failures in Fluid Systems Outside Containment"

Branch Technical Position MEB 3-1 has been utilized at the DAEC under Generic Letter 87-11, "Relaxation in Arbitrary Intermediate Pipe Rupture Requirements." The Reactor Water Cleanup (RWCU) return, High Pressure Coolant Injection (HPCI), and Reactor Core Isolation Cooling (RCIC) steam piping was re-analyzed to Generic Letter 87-11. This was done in order to resolve Equipment Qualification (EQ)

concerns. This resulted in 10 welds falling under this augmented program. All of these welds are scheduled to be examined in Refueling Outage (RFO) 14.

- (b) Regulatory Guide 1.150 "Ultrasonic Testing of Reactor Vessel Welds During Preservice and Inservice Examinations"

The DAEC contracts outside contractors to perform the ultrasonic examinations of the DAEC vessel. All contractor's procedures for vessel examinations are reviewed against the requirements of the regulatory guide.

- (c) NUREG-0619, "BWR Feedwater Nozzle and Control Rod Drive Return Line Nozzle Cracking"

IES is committed to perform various examinations in accordance with NUREG-0619. This NUREG requires ultrasonic (UT) examination of the feedwater nozzle and visual inspection of the feedwater sparger every two refueling cycles, and liquid-penetrant (PT) examination of feedwater nozzles every four cycles. NUREG-0619 requires UT examination of the control rod drive return line (CRDRL) pipe every cycle and PT examination of the CRDRL nozzles every four cycles.

These NUREG inspection requirements were based on the technology in use at the time. Section 4.3.1 of NUREG-0619 states that confidence in UT capabilities available at that time was unacceptably low. The NUREG states, "Should future developments and the results of inservice UT examinations demonstrate that UT techniques can detect small nozzle thermal fatigue cracks with acceptable reliability and consistency, these techniques could then form the basis for modification of the inspection criteria."

Since the issuance of NUREG-0619, improvements in the area of UT, both manual and automated, have occurred. Automatic UT techniques, such as the GERIS and Smart 2000 Systems, are capable of detecting and sizing small (0.25 inch deep) fatigue cracks. The Boiling Water Reactor Owners' Group (BWROG) has proposed an alternative for the periodic inspections contained in NUREG-0619. By letter dated October 30, 1995, the BWROG transmitted GE-NE-523-A71-0594, "Alternate BWR Feedwater Nozzle Inspection Requirements" to the NRC. This proposal seeks to eliminate PT examinations, to lengthen the time interval between routine UT examinations, and to reduce the nozzle area being examined by UT.

The NRC Staff is currently in the process of reviewing the BWROG submittal. We have discussed the status of this review with the Staff. Based on discussions with the Staff, we understand that changes to individual plant commitments may be made in accordance with the Nuclear Energy Institute (NEI) "Guideline for Managing NRC Commitments," Revision 2. We intend to modify our existing NUREG-0619 commitments via this process.

(d) NUREG 0803 "Integrity of BWR Scram System Piping"

The DAEC has included the applicable portion of the Control Rod Drive (CRD) Scram Discharge Volume (SDV) piping as ASME Section XI, Class 2 in the ISI Program. The SDV piping and supports will be examined in accordance with the DAEC Third Ten-Year Interval ISI Program.

(e) Generic Letter (GL) 88-01 "NRC Position on IGSCC in BWR Austenitic Stainless Steel Piping"

The DAEC performs augmented examinations in accordance with the positions outlined in GL 88-01. As discussed in an NRC Safety Evaluation (SE) dated January 24, 1995 and supplemented by a letter dated May 7, 1996, we have implemented an acceptable hydrogen water chemistry program. We therefore inspect the recirculation piping for intergranular stress corrosion cracking at a reduced frequency in accordance with the NRC SE.

In addition, other augmented examinations are implemented at the DAEC including those addressing several applicable General Electric Service Information Letters (SILs) and Rapid Information Communication Service Information Letters (RICSILs). These are implemented under plant specific procedures.

NRC REQUEST 2:

Paragraph 10 CFR 50.55a(b)(2)(iv) requires that certain ASME Code Class 2 piping welds in the Residual Heat Removal (RHR), Emergency Core Cooling (ECC), and Containment Heat Removal (CHR) systems be examined. Portions of these systems are critical to the safe shutdown of the plant and should not be completely excluded from inservice volumetric examinations based on piping wall thickness. In consideration of the safety significance of the subject systems, discuss any plans or schedules for examination of a sample of these welds to assure the continued integrity of thin-wall piping. The staff has previously determined that a 7.5% augmented volumetric sample of thin-wall welds constitutes an acceptable resolution at similar plants.

IES RESPONSE:

Technical Approach and Position (TAP-I006) identifies the selection process for Class 2 welds at the DAEC. All the welds within the ISI boundaries and not exempted by IWC-2200 were counted in the total population. Welds were selected based on a prorated approach. Of those welds selected, 180 welds are included which are greater than 4 inches in diameter and less than 0.375 inches in thickness. There is only one system in which all the welds are exempted by IWC-2500-1; this is the Reactor Core Isolation Cooling (RCIC) System. This

system contains 14 welds, all of which are exempted from examination. The DAEC accident analysis does not take credit for the RCIC System as an ECC System.

Note (2) of IWC-2500-1, Category C-F-2 states "The welds selected for examination shall include 7.5%, but not less than 28 welds, of all carbon and low alloy steel welds not exempted by IWC-1220. (Some welds not exempted by IWC-1220 are not required to be nondestructively examined per Examination Category C-F-2. These welds, however, shall be included in the total weld count to which the 7.5% sampling rate is applied.)" Thus these 180 welds are not required to be examined, only to be included in the total weld count.

As stated in NRC Request 2, paragraph 10 CFR 50.55a(b)(2)(iv) states that appropriate Code Class 2 welds in RHR, ECC, and CHR systems must be examined. When applying editions and addenda up to the 1983 Edition through the S83 Addenda, the extent of examination for these systems must be determined by the 1974 Edition with S75 Addenda of ASME Section XI. This is not applicable to the DAEC Third Ten-Year Interval ISI Program Plan as the DAEC is implementing the 1989 Edition of ASME Section XI.

NRC REQUEST 3:

Provide the staff with the status of the augmented reactor pressure vessel examinations required by the Code of Federal Regulations, 10 CFR 50.55a(g)(6)(ii)(A), issued September 8, 1992, and provide a technical discussion describing how the regulation was/will be implemented for these welds at Duane Arnold Energy Center. Include in the discussion a description of the approach and any specialized techniques or equipment that was/will be used to complete the required augmented examination. It is noted that the licensee performed accessibility studies during three outages to determine the percentage of reactor pressure vessel weld coverage that is obtainable.

IES RESPONSE:

IES intends to perform reactor pressure vessel examinations as required by 10 CFR 50.55a and the ASME Code. We are currently discussing the specific details of the examinations with the Staff.

NRC REQUEST 4:

In the review of the Inservice Inspection (ISI) program, Sections 10 and 15, we noted that certain "Inservice Inspection Technical Approach and Positions" are not in strict compliance with the Code and, in some cases, present alternatives to Code requirements. The basis for use of proposed alternatives and the implementation of these alternatives to Code requirements must be authorized by the Director of the Office of Nuclear Reactor Regulation (NRR). Verify that IES Utilities Inc., positions comply with the Code and do not constitute alternatives requiring relief. The following examples from the "Inservice Inspection

Technical Approach and Positions" appear to be alternatives to Code requirements that require relief by NRR:

NRC REQUEST 4 (a):

"Technical Approach and Position Number: TAP-I002". This position addresses the preparation of inservice inspection summary reports. We noted that the licensee's position on the submittal of NIS-2 forms is that they will be submitted only to document repairs/replacements resulting from inservice inspection activities. All Code Class 1, 2, and 3 components and supports are subject to inservice inspection; however, not all are scheduled for examination. Some repairs and replacements are performed during a refueling outage as a result of ISI activities. However, other plant activities may result in repairs or replacements of Code Class 1, 2, and 3 components not scheduled for examination during an outage or between refueling outages. Per IWA-6220(c), all repairs and replacements of Code Class 1, 2, and 3 components and supports performed since the preceding summary report shall be reported in the subsequent inservice inspection report. As a result, "Technical Approach and Position Number: TAP-I002" is considered to be a deviation from the Code reporting requirement.

IES RESPONSE:

Technical Approach and Position, TAP-I002 will be deleted. All NIS-2s prepared will be included in each inservice inspection summary report.

NRC REQUEST 4 (b):

"Technical Approach and Position Number: TAP-I004" states that the present weld identification method will continue to be used. IWA-2600, "Weld Reference System", presents the Code requirement for establishment of a weld reference system when performing surface and volumetric examinations. Describe Duane Arnold Energy Center's current weld identification system and discuss how the present system provides an acceptable level of assurance for reproducibility of examinations. The technical discussion should describe the methodology used by the licensee to assure proper identification of each weld and the ability to locate welds scheduled for examination.

IES RESPONSE:

The DAEC has issued a set of "ISI Isometrics" which identifies all welds within the ISI Program which may be subjected to examination. These isometrics are based on plant field fabrication drawings. The DAEC has an internal procedure which establishes a weld reference system and meets Appendix III, Supplement 1. This procedure requires each weld examined under the ISI Program to be identified by a system of reference points. The system shall permit identification of each weld, location of each weld center line, and designation of regular intervals along the length of the weld. This system will be applied to all welds

examined during the third ten-year interval. A copy of the procedure is included as an addendum to this attachment.

NRC REQUEST 4 (c):

"Technical Approach and Position Number: TAP-I007" appears to be an implementation of Code Case N-509, Alternate Rules for the Selection and Examination of Class 1, 2, and 3 Integrally Welded Attachments. Since this Code Case has not yet been approved for generic use in Regulatory Guide 1.147, the licensee should discuss how the alternatives of the subject Code case provide an acceptable level of quality and safety.

IES RESPONSE:

Technical Approach and Position TAP-I007 identifies how the DAEC will implement Code Case N-509. The bases for Code Case N-509 as presented by the ASME Section XI Committee are as follows:

Category B-H

- No inservice failures have occurred in the industry over the last 20 years;
- Present Code requirements end at 20 years of operation. By the end of 1992, 22 operating plants of the 111 in this country will no longer be required to examine these welds; and
- Cost/benefit to the industry equals the estimated expenditure to date in dollars and exposure (\$508,843, 187,830 REM).

Category B-K-1

- No inservice failures have occurred in the industry over the last 20 years;
- Present Code requirements end at 20 years of operation. By the end of 1992, 22 operating plants of the 111 in this country will no longer be required to examine these welds;
- A potential for failures exists due to operational transients;
- Stress analysis and design reviews have been completed for Class 1 system components;
- Integrally welded attachment thicknesses have very little impact on potential failures;
- Surface or volumetric examination methods are not required to identify broken welds;
- Leak-before-break is a rational approach to take regarding potential stress-induced cracks at integrally welded attachments of pressure boundary components. Leakage tests are required by the Code;
- Class 1 integrally welded attachments are not located in severely corrosive environments; and
- Cost/benefit to the industry equals the estimated expenditure to date in dollars and exposure (\$3,063,867, 537,906 REM).

Category C-C

- There are only an estimated 13 cases of integrally welded attachment failures in the industry in the last 20 years;
- Only 1 case of an integrally welded attachment failure resulted in pressure boundary component leakage. This was not found by ISI of the attachment weld, the failure was caused by poor design and found by observed leakage;
- The primary cause of failures is operational transients/water hammers;
- Surface examination methods are not required to identify broken welds;
- Leak-before-break is a rational approach to take regarding potential stress-induced cracks at integrally welded attachments of pressure boundary components. Leakage tests are required by the Code;
- Class 2 integrally welded attachments are not generally located in severely corrosive environments; and
- Cost/benefit to the industry equals the estimated expenditure to date in dollars and exposure (\$3,674,023, 146,208 REM).

Category D-A

- No inservice failures have occurred in the industry over the last 20 years;
- A potential for failures exists due to operational transients;
- Class 3 integrally welded attachments on systems such as service water are located in highly corrosive environments;
- General visual examinations (VT-3) may not be detailed enough for acceptable corrosion determinations;
- 100% examinations of Class 3 integrally welded attachments are not warranted due to a lack of identified failures; and
- Reductions in examinations will provide a significant cost/benefit to the industry based on the estimated expenditure to date in dollars and exposure (\$2,286,897, 79,329 REM).

The DAEC believes that the above bases provides an acceptable level of quality and safety in implementing the requirements of Code Case N-509.

NRC REQUEST 4 (d):

"Technical Approach and Position Number: TAP-I009" appears to deviate from Code requirements. The licensee has taken the position that when relevant flaws are found during pump and valve internal examinations, additional examinations will be performed on other, similar, components only if those components are scheduled for disassembly during the same outage. When relevant conditions are found, the Code requires that additional examinations be performed during the same outage to establish that generic degradation is not occurring. Therefore, it may be necessary to disassemble other components to satisfy this requirement, thereby providing reasonable assurance of operational readiness.

IES RESPONSE:

Technical Approach and Position TAP-I009 will be deleted.

NRC REQUEST 4 (e):

In "Technical Approach and Position Number: TAP-P001", the licensee notes that the VT-2 visual examinations will be performed at less than hydrostatic or operational pressure. This appears to be a deviation from the Code. The licensee should provide the basis for performing the pressure test at less than operating pressure and describe how an acceptable level of quality and safety is achieved.

IES RESPONSE:

Technical Approach and Position TAP-P001 was approved as Relief Request NDE-009 in the Second Ten-Year Interval. This would be applied during non-refueling outages when disassembly and reassembly of a limited number of joints are involved. TAP-P001 has been revised to clarify when it will be used and is included in Attachment 2.

NRC REQUEST 4 (f):

For "Technical Approach and Positions" that are implementing Code Case N-498-1, Alternative Rules for 10-Year Systems Hydrostatic Testing for Class 1, 2, and 3 Systems, the licensee is proposing to implement alternatives to Code requirements. Therefore, relief is required.

IES RESPONSE:

Relief Request PR-003 provides the alternative examinations in implementing Code Case N-498-1.

NRC REQUEST 5:

For Request for Relief NDE-R001, the licensee has proposed to perform the Code-required reactor pressure vessel examinations to the extent practical. (a) Are the examination volume percentages presented in the "Reactor Vessel Weld Limited Examination Table" actual coverages achieved and are they based on examinations from both the inside and outside of the reactor pressure vessel? (The licensee stated in Relief Request NDE-R024 that all vessel weld examinations were deferred to RFO14). (b) Is it the intent to apply this request for relief to the augmented reactor pressure vessel examination also? (c) Describe how the coverages obtained/obtainable provide an acceptable level of quality and safety.

IES RESPONSE:

Request for Relief NDE-R001 is hereby withdrawn. The following is provided for information.

- (a) The examination volume percentages are based on extensive accessibility studies that have been performed at the DAEC. The percentages are for the OD examination only. The vessel weld examinations for the third period of the second ten year interval were deferred. The first and second period examinations were completed.
- (b) It is the DAEC's intent to apply these percentages to the augmented vessel examination. When the examinations are completed, the percentages will be revised as needed.
- (c) The DAEC is a member of the BWRVIP and endorses BWRVIP-05, "BWR RPV Shell Weld Inspection Recommendations." This document, currently under review by the NRC, addresses the safety concerns and implication of performing examinations on only 50% of the axial welds and 0% of the circumferential welds.

NRC REQUEST 6:

In Request for Relief NDE-R002, the licensee addressed examination of integral attachment welds. Considering that the licensee is proposing alternatives similar to Code Case N-509, which requires only a 10% sample of integral attachment welds, and that the licensee has scheduled this sample, the need for this relief request is not clear. Describe the intent of Request for Relief NDE-R002.

IES RESPONSE:

Request for Relief NDE-R002 is hereby withdrawn.

NRC REQUEST 7:

In Request for Relief NDE-003, the licensee has requested relief from integral attachment examinations due to the burden of accessing 100% of the integral attachment welds. Because the licensee is examining only a 10% sample, can other integral attachments be selected to alleviate the need for relief? Provide a basis for the subject request. It should be noted that when implementing Code Case N-509, the total number of integral attachments requiring examinations is substantially reduced. Therefore, 100% coverage of examination areas should be obtained where practical.

IES RESPONSE:

Request for Relief NDE-R003 is hereby withdrawn.

NRC REQUEST 8:

In Request for Relief NDE-R004, it is unclear what the licensee is requesting relief from. Identify the requirement from which relief is requested. It is noted that the licensee is adopting Code Case N-432, Repair Welding Using Automatic or Machine Gas Tungsten-Arc Welding (GTAW) Temperbead Technique. Repairs made with a qualified temper bead weld procedure following excavation of flaws would not require post-weld heat treatment.

IES RESPONSE:

Request for Relief NDE-R004 was previously approved during the Second Ten-Year Interval as RR-001, Rev 2. This relief approved a non-code repair of the "D" outboard main steam isolation valve. The relief was approved on the condition that 2 radiographs would be performed on the valve within the next 4 outages (RFO 13, 14, 15, or 16). This relief request is included in the third 10-year interval plan for completeness, since the radiographs have not yet been completed.

NRC REQUEST 9:

In Request for Relief NDE-R005, the licensee addressed examination of RHR Heat Exchanger integral attachment weld HEA-CC-08 (1 through 4). Considering that the licensee selected the subject integral attachment welds for examination and is performing a limited examination on them, provide justification for examining only one of the set (1 through 4) of integral attachment welds. It is noted that for the second interval, the licensee proposed to examine the accessible portions of each of the four integral attachment welds.

IES RESPONSE:

Request for Relief NDE-R005 is hereby withdrawn.

NRC REQUEST 10:

Regarding Requests for Relief NDE-009 and NDE-010, in examination information submitted for the second interval¹ the examiner noted that the examination was performed at a gain level below the Code-required scanning sensitivity in order to maintain a 10-30% average ID noise level. (a) Considering that in the second interval the subject volumetric examinations were performed at a scanning sensitivity below that required by the Code, and that the proposed examinations to the extent practical for the third interval may provide marginal information with regard to the integrity of these welds, state the basis for believing

¹ Examination information submitted for the second interval included Ultrasonic Report No. 195039, Data Sheet Nos. DM-073 and DM-074, and Report No. 195043, Data Sheet No. DM-051. Relief Requests NDE-016 and NDE-017 addressed these examinations for the second interval.

that the limited examinations, using the reduced scanning level, provide an acceptable level of quality and safety. (b) In addition, it appears that the material characteristics of the calibration standard are not closely matched to those of the materials being examined. Discuss the use of calibration standards for the subject welds and the scanning sensitivities utilized for the subject examinations. (c) Are there other examinations that have been or will be performed at scanning sensitivities below the Code-required scanning levels?

IES RESPONSE:

The examiner's note on data sheets DM-051, DM-052, DM-073, and DM-074, is not a reference to Code requirements. Rather, it is a reference to a procedural "recommendation" that scanning be performed at a gain level of +14dB (5X) above reference level where possible. Where this results in excessive noise level, a reduction is allowed. The reduction is permissible to either a 10% to 30% average inner diameter (ID) noise level or the Code minimum of +6dB above reference level. To go below the Code requirement requires analysis and justification from a Level III prior to performing the examination.

Data sheet DM-051 was scanned at 47.0dB for axial scans and 57.0dB for circumferential scans. Calibration sheet CM-052 (the calibration record for data sheet DM-051) shows calibration gain to be 40.6dB for axial scans and 50.0dB for circumferential scans. Axial scans were performed at +6.4dB and circumferential scans were performed at +7.0dB above the reference level. Both exceed the Code requirement of +6dB (2X) scanning gain level.

Data sheet DM-052 is a supplemental 60° refracted longitudinal (RL) wave examination performed to achieve maximum possible coverage. The examination was performed at 78.8dB scanning gain. Calibration sheet CM-053 (the calibration record for data sheet DM-052) shows calibration gain to be 78.8dB. This is permissible by procedure. The Code does not address scanning level for supplemental examinations.

Data sheet DM-073 was scanned at 56.0dB for axial scans and 63.0dB for circumferential scans. Calibration sheet CM-074 (the calibration record for data sheet DM-073) shows calibration gain to be 49.0dB for axial scans and 56.2dB for circumferential scans.

Axial scans were performed at +7dB and circumferential scans were performed at +6.8dB above reference level. Both meet or exceed the Code requirement of +6dB (2X) scanning gain level.

Data sheet DM-074 is a supplemental 60° RL wave examination performed to achieve maximum possible coverage. The examination was performed at 77.4dB scanning gain. Calibration sheet CM-075 (the calibration record for data sheet DM-074) shows calibration gain to be 77.4dB. This is permissible by procedure. The Code does not address scanning level for supplemental examinations.

- (a) As shown in the above discussion, there were no examinations performed at scanning sensitivities below that required by the Code. The proposed examinations provide reasonable assurance of integrity for the subject welds. The level of quality and safety is equivalent to other Code examinations. The bases for relief in NDE-R009 and NDE-R010 are still valid.
- (b) The calibration standards used for the subject examinations meet Code requirements for material and product form, therefore they are matched to the materials being examined. The Code does not address similar ultrasonic characteristics, such as attenuation. This is the reason for the ID noise level scanning sensitivity. Monitoring the noise level at the ID surface assures that the sound beam is actually penetrating the material being examined. It is necessary to cap the ID noise level at an average 30% full screen height (FSH) to prevent masking small indications. The provisions in the UT procedure used for these examinations are designed to provide adequate gain without the masking effect.
- (c) Of DAEC welds with an examination history, none are known to have been scanned at less than the minimum Code required gain level.

NRC REQUEST 11:

In Request for Relief NDE-R016, the licensee has requested relief from the Code-required successive examination requirements of IWB-2430 and IWC-2430 for flaws that are believed to have fabrication origins. Code Interpretation XI-1-83-04 states that the requirements of IWC-2430 would apply regardless of whether the flaws are considered fabrication- or service-induced. (a) Provide justification for the current position on performing additional examinations. (b) Provide a list of components at Duane Arnold Energy Center having flaws requiring successive examination and the disposition of such flaws.

IES RESPONSE:

Request for Relief NDE-R016 is hereby withdrawn.

NRC REQUEST 12:

In Request for Relief NDE-R019, the licensee has requested relief from pipe clamp or restraint removal to perform the Code-required NDE because of the burden associated with such removal. The licensee's request appears to be generic in nature. When implementing Code Case N-509, the licensee is only required to examine 10% of integral attachment welds. Because of this reduction in examination areas, the staff believes that integral attachment welds scheduled for examination should be examined in their entirety. Provide a basis for the subject request for relief, considering the overall reduction in examinations required and how performing the limited examinations provides the same level of quality and safety.

IES RESPONSE:

Request for Relief NDE-R019 is hereby withdrawn.

NRC REQUEST 13:

In Request for Relief NDE-R022, the licensee has addressed examination of the reactor pressure vessel shell-to flange weld. We note that the table presenting the history and proposed future examinations for Weld VCB-C005 for the third interval includes only 70% of the weld length. (a) Explain the deviation from the Code examination requirements. (b) If the licensee is going to have a specialized tool for examinations during RFO14, describe the burden of complying with the Code requirement to complete the second 10-year interval shell-to-flange examinations and satisfy the first period coverage requirement for the shell-to-flange weld. (c) Included in the "Basis for Relief" is a discussion about feedwater nozzle examinations. Discuss how the feedwater examinations support the subject request for relief.

It should be noted that "Note 4" of Examination Category B-A is typically applied to examinations performed on pressurized water reactors where there are fewer nozzles than in boiling water reactors. In addition, deferral of nozzle examinations is permissible only if examinations are performed from the inside surface of the vessel. Because boiling water reactor owners normally perform nozzle examinations each period from the outside surface of the reactor pressure vessel, and the shell-to-flange weld examinations from the seal surface are performed manually, the minimum percentages of examinations should be completed each period.

IES RESPONSE:

This relief request has been revised to include 100% of the subject weld during the Third Ten-Year Interval. The revised relief request is included in Attachment 2.

- (a) Thirty percent ($252^{\circ} - 0^{\circ}$) of VCB-C005 will be examined in RFO 14 to complete the second ten-year interval requirements. To meet Code requirements (Note 4 of Table IWB-2500-1, Category B-A) for the third ten-year interval, an additional 50% of the weld would need to be examined in RFO 14. The relief request has been revised to examine 30% ($252^{\circ} - 0^{\circ}$) to be credited to the second ten-year interval and an additional 30% ($0^{\circ} - 108^{\circ}$) to be credited to the third ten-year interval, for a total of 60% to be examined in RFO 14. The following table shows the past and proposed future examinations of VCB-C005:

	<u>1st Interval</u>	<u>2nd Interval</u>	<u>3rd Interval</u>	<u>4th Interval</u>
Period 1	$108^{\circ} - 252^{\circ}$	$0^{\circ} - 108^{\circ}$	$0^{\circ} - 108^{\circ}$ *	$0^{\circ} - 108^{\circ}$
Period 2	$0^{\circ} - 108^{\circ}$	$108^{\circ} - 252^{\circ}$		
Period 3	$252^{\circ} - 0^{\circ}$	$252^{\circ} - 0^{\circ}$ *	$108^{\circ} - 0^{\circ}$	$108^{\circ} - 0^{\circ}$

*to be examined in RFO 14

Because only 30% of VCB-C005 is being examined in the first period of the third ten year interval, relief from Note 4 (50%) is being requested.

- (b) Complying with the Code requirement to complete the second 10-year interval shell-to-flange examinations and satisfy the first period coverage requirement for the shell-to-flange weld is excessively burdensome. As discussed in the relief request, the performance of the additional Code required examinations has a small potential of increasing plant safety margins and a very disproportionate impact on expenditures of plant manpower and radiation exposure.
- (c) The specialized automated equipment needed to perform the ultrasonic examination of the feedwater nozzles per NUREG 0619 will be utilized to perform the examination of VCB-C005.

NRC REQUEST 14:

In Request for Relief NDE-R024, the licensee proposes to implement Code Case N-535. This Code Case provides the flexibility to complete examinations required for an interval and start the examinations for the subsequent interval during an interval transition outage. (Note: This Code Case does not address the rescheduling of examination areas.) Based on the review of this request for relief, it appears that the licensee has deferred all of the reactor vessel weld examinations to RFO14 and rescheduled examination of the nozzle-to-safe ends. (a) Provide a basis for the implementation of Code Case N-535 and verify that the successive examination requirements (IWB-2420 and IWC-2420) are being satisfied. (b) In addition, provide a list of components for which the interval between examinations will exceed 10 years.

IES RESPONSE:

The second 10-year interval, third period reactor vessel weld examinations are the only examinations that were deferred to RFO 14. Relief Request NDE-R024 has been revised to incorporate changes to Relief Request NDE-R022. Revised Relief Request NDE-R024 is included in Attachment 2.

- (a) The feedwater nozzles are scheduled to be ultrasonically examined per NUREG 0619 during RFO 14. The augmented reactor vessel weld examination is also scheduled for RFO 14. In order to perform these examinations, several nozzle bioshield doors and windows are required to be removed. To save manpower and exposure, some of the nozzle-to-vessel welds have been scheduled to be examined with the associated inner radius and nozzle-to-safeend welds. Relief Request NDE-R025 has been developed to address this. This relief request is included in Attachment 2.

Relief Request NDE-R025 includes a table which compares the second ten-year and third ten-year interval examinations. A total of 11 of the 34 nozzles will be examined in the third period of the third ten-year interval which were examined in a prior period during the second ten-year interval. A total of 3 of the 34 nozzles have been moved forward during the third ten-year interval. The nozzles that will be examined during RFO 14 correspond to the nozzle windows that are required to be opened for the vessel weld examination. Although there are 11 nozzles that will be examined in a later period than that in the second ten-year interval, the nozzles that are examined in RFO 14 are selected to encompass all the associated systems and gives a representative sample, thus indicating if there is a generic problem. If there was a generic problem with a particular system or type of nozzle, per IWB-2430 (additional examinations), the other nozzles of that type would require examination during the current outage. The DAEC believes that this provides reasonable assurance that the reactor pressure vessel nozzle and inner radius section examinations meet the intent of the code. This also supports the DAEC's effort in reducing exposure in accordance with 10 CFR 20.1101 by not requiring nozzle windows to be opened more than once during an interval. 10 CFR 20.1101 mandates licensees to use, to the extent practicable, procedures and engineering controls based on sound radiation protection principles to achieve occupational doses and doses to the public that are as low as reasonably achievable (ALARA).

- (b) This information is provided in NDE-R025.

NRC REQUEST 15:

Section 18, Class 1, Section XI, Summary Table A, Examination Category B-G-2 has 145 as the total number of components. The Code states that examinations are limited to components selected for examination under Examination Categories B-B, B-J, B-L-2, and B-M-2. The licensee has scheduled 9 of 145 components for examination. This number appears to be low. Provide a basis for this number.

IES RESPONSE:

The following is a summary of the total number of components under Category B-G-2.

- There are three locations on the reactor vessel top head that are under Item B7.10. These are scheduled, one each period (total 3).
- There are five locations on piping that are under Item B7.50. One location is disassembled each outage (equaling two per period) to facilitate removal of the drywell head. Thus there are two scheduled per period (total 6). The remaining are not scheduled because of Note 2 under Table IWB-2500-1, Category B-G-2.

- There are two locations on pumps (one of two pumps) that are under Item B7.60. These are not scheduled because of Note 2 under Table IWB-2500-1, Category B-G-2.
- There are 46 locations on valves that are under Item B7.70. These are not scheduled because of Note 2 under Table IWB-2500-1, Category B-G-2.
- There are eighty-nine locations on control rod drives which are not scheduled because the location and number that will be examined each outage are not known.

The total that can be scheduled at this time is therefore 9.

The DAEC believes that performing VT-1 examinations of bolting in place does not provide an effective evaluation of the bolting. An examination conducted while the bolting is still in place under tension does not provide access to the thread engagement area of the bolting and in most cases the section of bolting which is under tension is not accessible. To remove insulation and examine bolting in place under tension does not conform to the DAEC's effort in meeting the ALARA goals per 10 CFR.

The DAEC interprets Note 2 under Table IWB-2500-1, Category B-G-2 to mean that the piping, pumps, and valves under B-J, B-L-2, and B-M-2, respectively, that are examined during disassembly is when the bolting under B-G-2 is required to be examined. Thus, the B-G-2 bolting will be examined when the component is disassembled and/or examined.

NRC REQUEST 16:

Section 18, Class 1, Section XI, Summary Table A, Examination Category B-J has 720 as the total number of components. The Code requires that 25% of Class 1 piping welds be examined. Twenty-five percent of 720 is 180. The licensee's table indicates that 133 areas are scheduled for examination. Please explain the discrepancy.

IES RESPONSE:

The selection used at the DAEC is shown in TAP-I005. A comparison of Category B-J in Section 18 and the table in TAP-I005 shows that the number of components are the same for each Item Number (i.e., 442 for Item B9.11). The table "Weld Selection Table for Category B-J Pressure Retaining Welds in Piping" shows the selection made for each system within the Class 1 boundaries. For TAP-I005 Note 3 which states "All dissimilar metal piping welds between combinations of: carbon or low alloy steels to high alloy steels, carbon or low alloy steels to high nickel alloys, and high alloy steels to high nickel alloys," Category B-F may be included in the number of welds examined under Category B-J. This is supported by Interpretation XI-1-83-33 which allows the use of Category B-F weld selection to satisfy selection and examination requirements of Category B-J. The table shows a total of 128 welds being examined. Section 18 shows a total of 133 welds being examined. The additional welds exceed that required by the Code. When adding the Category B-F welds

(32) requiring examination, the total is 165 total weld examinations. It is important to note that Section 18 also includes the total number of longitudinal welds within the ISI Program, however none of these are scheduled because the DAEC has implemented Code Case N-524 as addressed in Relief Request NDE-R012. There are 100 longitudinal welds in Section 18 under Item B9.12. Subtracting from the total number of 720 welds results in 620 welds requiring examination. The number of welds scheduled for examination (165) exceeds the number of welds required to be examined (25% of 620, which is 155).

NRC REQUEST 17:

It is noted in Section 18, Class 1, Section XI, Summary Table A that Examination Category B-D welds are being examined in the first and third period only. (a) Were nozzle examinations performed in the second period of the second interval? Deferral of nozzle inner radius section examinations is not permissible. (b) How is the licensee satisfying the Code requirements for the nozzle inner radii? Deferral of nozzle examinations is allowed for the reactor pressure vessel examinations only if examinations are conducted from the inside of the component and the nozzle weld is examined by straight beam ultrasonic methods from the nozzle bore, with the remaining examinations to be conducted from the shell inside diameter; these examinations may be performed at or near the end of each inspection interval. (c) Provide a basis for performing no Examination Category B-D examinations in the second period.

IES RESPONSE:

Relief Request NDE-R025 has been developed to address this concern. This relief request is included in Attachment 2. In order to reduce the number of times a nozzle bioshield door is opened during the ten-year interval (which reduces the manpower and exposure), the nozzle inner radius examinations are being scheduled with the nozzle-to-vessel weld examinations. Relief Request NDE-R025 lists the nozzle and the period in which the examination was completed for each interval.

NRC REQUEST 18:

In Section 3, the licensee has referenced Code Case N-307-1, Revised Ultrasonic Examination Volume for Class 1 Bolting, Table IWB-2500-1, Examination Category B-G-1, When the Examinations Are Conducted From the Center-Drilled Hole, and Code Case N-457, Qualification Specimen Notch Location for Ultrasonic Examination of Bolts and Studs, for bolting examinations. Verify that the requirements of Appendix VI will be satisfied.

IES RESPONSE:

As shown in Section 18, the examination of the reactor pressure vessel studs will not occur until at least RFO 15. The DAEC plans to purchase a spare reactor pressure vessel stud to meet the requirements of Appendix VI, paragraph VI-2430. The procedures utilized will be

qualified in accordance with paragraph VI-2440. The personnel will be qualified in accordance with VI-2200.

NRC REQUEST 19:

Verify that there are no relief requests in addition to those submitted. If additional relief requests are required, the licensee should submit them for staff review.

IES RESPONSE:

The additional relief requests are attached for review.