

March 26, 2003

Mr. Mark A. Peifer
Site Vice President
Duane Arnold Energy Center
Nuclear Management Company, LLC
3277 DAEC Road
Palo, IA 52324-0351

SUBJECT: DUANE ARNOLD ENERGY CENTER - THIRD 10-YEAR INTERVAL
INSERVICE INSPECTION PROGRAM RELIEF REQUEST NOS. NDE-R028,
REVISION 2, AND NDE-R044 (TAC NOS. MB4801 AND MB4802)

Dear Mr. Peifer:

By letter dated March 29, 2002, Nuclear Management Company, LLC (licensee), submitted Relief Request Nos. NDE-R028, Revision 2, and NDE-R044, for the third 10-year interval of the inservice inspection (ISI) program at Duane Arnold Energy Center (facility). These two relief requests seek relief in the form of limited examination coverage from the non-destructive examination (NDE) requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI requirements. Specifically, pursuant to 10 CFR 50.55a(g)(6)(i), Relief Request NDE-R028, Revision 2, proposes relief from performing essentially 100 percent of the weld length for certain specified nozzle-to-vessel welds. Pursuant to 10 CFR 50.55a(a)(3)(i), Relief Request NDE-R044 proposes relief from performing essentially 100 percent of the weld length for Recirculation System Weld RCB-J030.

The enclosed is the Nuclear Regulatory Commission (NRC) staff's Safety Evaluation for these two relief requests. For Relief Request NDE-R028, Revision 2, the NRC staff concludes that redesigning the specified weldments to obtain full coverage is not practical, and that the testing performed provides adequate assurance of the continued structural integrity of these welds. Therefore, the relief requested in NDE-R028, Revision 2, is granted pursuant to 10 CFR 50.55a(g)(6)(i), for the third ISI interval. For Relief Request NDE-R044, the NRC staff concludes that compliance with examination coverage as specified in the ASME Code for weld RCB-J030 is impractical. Therefore, the relief requested in NDE-R044 is granted pursuant to 10 CFR 50.55a(g)(6)(i), for the third ISI interval. These reliefs are authorized by law and will not endanger life or property or the common defense and security, and are otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed upon the facility.

Peifer, M. A.

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Your letter dated March 29, 2002, also included two other relief requests (NDE-R001, Revision 1, and NDE-R045). These will be addressed by separate correspondence.

If you have questions regarding the enclosure, please contact Darl Hood by phone at (301) 415-3049 or email (dsh@nrc.gov).

Sincerely,

/RA/

L. Raghavan, Chief, Section 1
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-331

Enclosure: Safety Evaluation

cc w/encl: See next page

Peifer, M. A.

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATING TO RELIEF REQUESTS NOS. NDE-RO28, REVISION 2, AND NDE-R044
FOR THE THIRD 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM
NUCLEAR MANAGEMENT COMPANY, LLC
DUANE ARNOLD ENERGY CENTER
DOCKET NO. 50-331

1.0 INTRODUCTION

Inservice inspection (ISI) of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Class 1, 2, and 3 components is to be performed in accordance with Section XI of the ASME Code and applicable edition and addenda as required by Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50.55a(g), except where specific relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). Section 50.55a(a)(3) of 10 CFR states that alternatives to the requirements of paragraph (g) may be used, when authorized by the Nuclear Regulatory Commission (NRC), if the applicant demonstrates that (i) the proposed alternatives would provide an acceptable level of quality and safety or (ii) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the preservice 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 regulations require that inservice examination of components and system pressure tests conducted during the first 10-year interval, and subsequent intervals, comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The ISI code of record for the third 10-year ISI interval of Duane Arnold Energy Center (DAEC) is the 1989 Edition of the ASME Code.

By letter dated March 29, 2002, Nuclear Management Company, LLC (the licensee), requested relief for DAEC's third 10-year ISI interval under Relief Request Nos. NDE-R001, Revision 1, NDE-028, Revision 2, NDE-R044, and NDE-R045. The requested reliefs are from the volumetric examination coverage requirements for examination categories B-A, B-D, B-J, and C-F-2 welds. This Safety Evaluation addresses only NDE-R028, Revision 2 and NDE-R044. The two remaining relief requests (NDE-R001, Revision 1, and NDE-R045) will be addressed by separate correspondence.

2.0 RELIEF REQUEST NO. NDE-R028, REVISION 2: VOLUMETRIC EXAMINATION LIMITATIONS FOR CODE CATEGORY B-D WELDS

2.1 ASME Code Requirements From Which Relief is Requested

The 1989 Edition of ASME Code, Section XI, Table IWB-2500-1, Code Category B-D, Item B3.90, requires a volumetric examination which includes 100 percent of the weld length, once during the 10-year interval. The examination volume is defined in ASME Code, Section XI, Figure IWB-2500-7(b). ASME Code Case N-460 permits a reduction in ASME Class 1 weld examination coverage provided the coverage reduction is less than 10 percent. The licensee has adopted Code Case N-460 in DAEC's ISI Program Plan as permitted by Regulatory Guide (RG) 1.147, Revision 12. The licensee is requesting relief from performing volumetric examination on essentially 100 percent of the weld length for five nozzle-to-vessel welds (identified in Section 2.3 below).

2.2 Licensee's Proposed Alternative

The licensee states that for future examinations, it will perform volumetric examinations from the vessel side of the nozzle-to-vessel welds and that, because of the design, no other alternative examination techniques are currently available to increase the examination volume.

2.3 Licensee's Basis for Relief

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee has determined that conformance to the volumetric coverage requirements for the welds listed below is impractical for DAEC. These welds were fabricated in a manner that prevented 100 percent examination. Specifically, the licensee states:

Due to the design of these welds it is not feasible to effectively perform a volumetric examination of 100% of the volume as described in IWB-2500-7(b). The nozzle-to-vessel welds are accessible from the vessel side, but examination cannot be performed from the nozzle side because of the forging curvature. In addition to component configuration certain nozzle-to-vessel weld examinations are further limited by reactor pressure vessel (RPV) design obstructions (such as RPV appurtenances)...

In its submittal, the licensee states (see Relief Request NDE-R001, Revision 1) that the reactor vessel (and hence its welds) was designed and installed to ASME Code, Section III, 1965 Edition, 1967 Addenda. The licensee explains that the design parameters for inspectability that would allow for 100 percent coverage for inservice examinations were not

requirements at that time and were not necessarily factored into the design. The welds for which limited examination volume was achieved and the reasons for the limitations are listed below:

Weld	Category	Item	Limitation	Coverage
HSB-D001	B-D	B3.90	One-sided examination	70.90%
RRF-D001	B-D	B3.90	One-sided examination	73.36%
VIA-D001	B-D	B3.90	One-sided examination	86.20%
VIC-D001	B-D	B3.90	One-sided examination	86.20%
VIF-D001	B-D	B3.90	One-sided examination	86.20%

2.4 NRC Staff Evaluation

By letter dated March 7, 2001, and pursuant to 10 CFR 50.55a(g)(6)(i), the NRC staff previously issued Revision 1 to Relief Request NDE-R028, granting relief from the coverage requirements for certain nozzle-to-vessel welds. Relief Request NDE-R028, Revision 2, adds five more ASME Code Category B-D, Item Number B3.90 welds with the same limitation. The licensee states that, because of the design, no other alternative examination techniques are currently available to increase the examination volume.

The 1989 Edition of ASME Code Section XI, Figure IWB-2500-7(b), defines the volume for ASME Code Category B-D welds that require ultrasonic scanning to obtain 100 percent coverage. The NRC staff's review of the submitted nondestructive testing data reports indicate that all of the examinations had limited access due to the design configuration and curvature; thereby limiting 100 percent scanning of the required volume. In addition, the data sheets provided by the licensee show that curvature of the nozzle prevented completing a two-sided examination and the required coverage cannot be obtained with a one-sided examination. Finally, there is no requirement to perform the examination from the inside bore-clad side of the nozzle and access would be extremely difficult from the inside of the vessel annulus.

The NRC staff finds that achieving greater coverage would require the welds to be redesigned or portions of the RPV support structure to be removed to allow 100 percent coverage. These measures would involve an extensive expenditure in component replacement, welding, preservice examination, and radiological dose accumulation to the extent that the effort would be impractical.

On the basis of its review of the data submitted for the subject welds, the NRC staff notes that there were no recordable indications identified with the amount of coverage obtained. The data reports also indicate that the licensee compared the results with the testing results from the previous interval and noted no change. The NRC staff concludes, from the information provided by the licensee, that reasonable assurance exists that any pattern of degradation would have been identified with the coverage obtained, and it is, therefore, acceptable.

2.5 Conclusion

On the basis of the above discussion, the NRC staff considers it impractical to redesign the subject welds in order to obtain the ASME Code required volumetric coverage, and that the testing performed provides adequate assurance of the continued structural integrity of the welds. Therefore, Relief Request NDE-R028, Revision 2, is granted pursuant to 10 CFR 50.55a(g)(6)(i) for DAEC's third ISI interval. This grant of relief is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

3.0 RELIEF REQUEST NO. NDE-R044: VOLUMETRIC EXAMINATION LIMITATIONS FOR WELD RCB-J030

3.1 ASME Code Requirements From Which Relief is Requested

The 1989 Edition of the ASME Code, Section XI, Table IWB-2500-1, Code Category B-J, Item B9.11, requires a volumetric examination and surface examination which includes 100 percent of the weld length, once during the ten-year interval. ASME Code Case N-460 permits a reduction in ASME Class 1 weld examination coverage provided the coverage reduction is less than 10 percent. The licensee has adopted Code Case N-460 in DAEC's ISI Program Plan as permitted by RG 1.147, Revision 12. The licensee is requesting relief from performing volumetric examination on essentially 100 percent of the weld length for Recirculation System Weld RCB-J030.

3.2 Licensee's Proposed Alternative

Pursuant to 10 CFR 50.55a(a)(3)(i), the licensee states that in the future, it will examine the weld to the maximum extent practical within the limitations of the examination technique or design of the component. If any reportable indications should be found in the accessible portion of the weld, an engineering evaluation would be performed to determine if the inaccessible portion of the weld might be affected. Furthermore, the licensee stated that inaccessible portions of the weld will continue to be subject to system pressure test requirements under ASME Code, Section XI, IWB-5000, which would require a visual (VT-2) examination.

3.3 Licensee's Basis for Relief

The licensee identifies the subject weld as being for a branch connection onto the 22" Recirculation piping located off the Recirculation Pump suction piping, and states that the configuration limits the examination to one side. The licensee used supplemental ultrasonic angles of 60° refracted longitudinal and 35° shear wave to obtain 38 percent of the required coverage for this configuration.

The licensee states that using radiography of the subject weld as an alternate form of testing would require draining of the recirculation system and that personnel exposure would increase by a factor of 1.7, for a total of 1.02 Rem for the remaining 62 percent coverage. The licensee

states that the benefit of examining the additional 62 percent weld volume has only a small potential of increasing plant safety margins, with a disproportional impact upon expenditures of manpower and radiation exposure.

3.4 NRC Staff Evaluation

The 1989 Edition of the ASME Code, Section XI, Table IWB-2500-1, Code Category B-J, Item B9.11, requires a volumetric examination and surface examination which includes 100 percent of the weld length, once during the ten-year interval. The examination volume is defined in Figure IWB-2500-8.

The licensee indicates that draining the recirculation system to obtain the remaining 62 percent coverage would increase radiation exposure by a factor of 1.7 and would be disproportionate to the amount of manpower expenditure and dose accumulation. While the NRC staff does not agree that draining the recirculation system to obtain ASME Code coverage by radiography would necessarily be disproportionate with regard to dose and manpower, the NRC staff finds that draining the recirculation system is a major outage evolution. In addition, removing a portion of the system from service reduces the safety margin by removing part of an emergency core cooling system flowpath from service.

The data reports for the subject weld show that there were no recordable indications noted on the 38 percent coverage obtained. Furthermore, the data reports indicated that the licensee compared previous interval testing results with this interval's results and observed no changes.

3.5 Conclusion

On the basis of its review of the information provided by the licensee, the NRC staff concludes that reasonable assurance exists that no pattern of degradation has developed in the area where coverage was obtained, and that if one were to develop, it would be identified with the amount of coverage obtained. The NRC staff also concludes that the licensee's alternative to perform analysis when appropriate, along with the continued performance of surface and pressure testing, provides reasonable assurance of structural integrity.

On the basis of the above discussion and the information described in Relief Request NDE-R044, the NRC staff concludes that compliance with the ASME Code required examination coverage for weld RCB-J030, is impractical for DAEC's third 10-year ISI interval. Therefore, Relief Request NDE-R044 is granted pursuant to 10 CFR 50.55a(g)(6)(i) for the third 10-year Inservice Inspection interval. This grant of relief is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

Principal Contributor: T. Steingass

Date: March 26, 2003