January 27, 2000

Mr. Douglas R. Gipson
Senior Vice President
Nuclear Generation
Detroit Edison Company
6400 North Dixie Highway
Newport, MI 48166

SUBJECT: FERMI 2 - RELIEF REQUESTS FOR THE FIRST 10-YEAR INTERVAL INSERVICE INSPECTION (ISI) NONDESTRUCTIVE EXAMINATION (NDE) PROGRAM (TAC NOS. MA5530, MA5531, MA5532, MA5533)

Dear Mr. Gipson:

By four letters dated May 14, 1999, the Detroit Edison Company (the licensee) requested relief from certain ISI requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI, for the Fermi 2 plant. The five requests for relief are related to inspections under the ISI NDE program for the first 10-year interval.

The staff, with technical assistance from its contractor, the Idaho National Engineering and Environmental Laboratory, has completed its review of the five requests for relief. For requests for relief RR-A21, Revision 1, and RR-A22, Revision 1, the licensee's proposed revised alternatives to the Code requirements provide an acceptable level of quality and safety. Pursuant to 10 CFR 50.55a(a)(3)(i), the licensee's proposed alternatives remain authorized as originally evaluated in a safety evaluation dated August 25, 1998. For requests for relief RR-A1, RR-A6, Revision 1, and RR-A23, the staff concludes that the Code requirements are impractical and the examinations that have been performed provide reasonable assurance of structural integrity of the subject welds. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i). A copy of the staff's safety evaluation, which includes the associated contractor's technical letter report, is enclosed.

Sincerely,

/RA

Claudia M. Craig, Chief, Section 1
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-341

Enclosure: Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REQUESTS FOR RELIEF FOR THE FIRST 10-YEAR INTERVAL INSERVICE

INSPECTION NONDESTRUCTIVE EXAMINATION PROGRAM

DETROIT EDISON COMPANY

FERMI 2

DOCKET NO. 50-341

1.0 INTRODUCTION

The inservice inspection (ISI) of the American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 components shall be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel (B&PV) Code and applicable addenda as required by 10 CFR 50.55a(g), except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(6)(g)(i). The regulation at 10 CFR 50.55a(a)(3) states, in part, that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if (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 pre-service examination requirements, set forth in 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. For Fermi 2, the applicable edition of Section XI of the ASME Code for the first 10-year ISI interval is the 1980 edition through winter 1981 addenda.

By four letters dated May 14, 1999, the Detroit Edison Company (the licensee) requested relief from certain ISI requirements of the ASME Code. The licensee proposed alternatives contained in requests for relief Nos. RR-A21, Revision 1, and RR-A22, Revision 1. The licensee proposed relief from ASME Code ISI requirements that it considered impractical in requests for relief Nos. RR-A1, RR-A6, Revision 1, and RR-A23.

2.0 EVALUATION

The information provided by the licensee in support of the requests for relief from Code requirements has been evaluated and the basis for disposition is documented below. The NRC's contractor, the Idaho National Engineering and Environmental Laboratory (INEEL), provided its evaluation of the subject requests for relief in the attached technical letter report (TLR). Based on the results of its review, the NRC staff adopts the contractor's conclusions and recommendations.

Request for Relief No. RR-A1 (Revision 1)

ASME Code, Section XI, Examination Category B-A, Item B1.21 and B1.22 requires 100 percent volumetric examination of the accessible length of all circumferential and meridional head welds, as defined by Figure IWB-2500-3. Item B1.30 requires 100 percent volumetric examination of the circumferential shell-to-flange welds, as defined by Figure IWB-2500-4.

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required 100 percent volumetric examination coverage for the welds listed in Section 2.1 of INEEL's TLR.

Complete examination coverage of the subject B1.21 and B1.22 welds is restricted by physical obstructions, including control rod drives, vessel support skirt attachments, and top head lifting lugs. Examination Category B-A, Item B1.30, requires 100 percent volumetric examination of the reactor pressure vessel (RPV) shell-to-flange weld. Complete examination coverage is restricted by the flange geometry (flange radius and stud holes interfere with scanning from the flange surface). The staff determined that the Code-required 100 percent volumetric examinations are impractical for the subject welds. To perform the Code-required examinations of the subject welds, the RPV would require design modifications and would impose a significant burden on the licensee.

The licensee has examined these welds to the extent practical; examination volumes achieved range from 0 to 73.6 percent of each weld. In addition, other RPV shell welds have been examined to the extent required by the Code. Therefore, based upon the volumetric coverage obtained on the accessible portion of the subject welds, volumetric examinations on other RPV welds, and VT-2 visual examinations that are performed in conjunction with the pressure testing each refueling outage, these examinations provide reasonable assurance of the structural integrity of the subject welds. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i).

Request for Relief No. RR-A6 (Revision 1)

ASME Code, Section XI, Examination Category B-D, Full Penetration Welds of Nozzles in Vessels, Items B3.90 and B3.100, require 100 percent volumetric examination of nozzle-to-reactor-vessel welds and nozzle inside radius sections, as defined by Figure IWB-2500-7.

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required 100 percent volumetric examination of the reactor vessel nozzle welds for the welds listed in Section 2.2 of INEEL's TLR.

Complete examination is restricted by the proximity to other nozzles, the outside blend radius of nozzles, and the vessel taper at the bottom head to lower shell course weld. These limitations make the 100 percent volumetric examination impractical. To gain access for examination, the RPV nozzles would require design modifications. Imposition of this requirement would create a significant burden on the licensee.

The licensee has examined a significant portion of these welds, obtaining 61-69 percent coverage for each of the nozzle-to-vessel welds and 89 percent coverage for the subject nozzle inside radius section. These coverages provide reasonable assurance of structural integrity of the subject welds. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i).

Request for Relief No. RR-A21 (Revision 1)

ASME Code, Section XI, Examination Category B-K-1, Item B10.10, Integrally Welded Attachments to Piping, requires 100 percent surface or volumetric examination, as applicable, of the integrally welded attachments for Class 1 piping, as defined by Figure IWB-2500-13, -14, or -15.

Pursuant to 10 CFR 50.55a(a)(3)(i), the licensee proposed an alternative to the Code-required examination of integrally welded attachments in the table listed in Section 2.3 of INEEL's TLR.

Request for Relief RR-A21 was previously evaluated and authorized in an NRC safety evaluation dated August 25, 1998. In Revision 1, it is noted that four lug weld sets received better than expected coverage and were deleted from the request for relief table. Additionally, eight lug sets not identified previously as having limitations were added to the request for relief table. The addition of these lugs does not affect the technical content of the request since the coverage and nature of the limitations are similar. Therefore, the NRC staff determined that the licensee's proposed alternative of the previous safety evaluation dated August 25, 1998, has not changed and provides reasonable quality and safety. The NRC staff concludes that the licensee's proposed alternative is authorized, pursuant to 10 CFR 50.55a(a)(3)(i).

Request for Relief No. RR-A22 (Revision 1)

ASME Code, Section XI, Examination C-C, Item C3.20, Integrally Welded Attachments to Piping, requires 100 percent surface examination, as defined by Figure IWC-2500-5, for integrally welded attachments to piping, where the base metal thickness is 3/4-inch or greater.

Pursuant to 10 CFR 50.55a(a)(3)(i), the licensee proposed an alternative to the Code-required examination of integrally welded attachments in the table listed in Section 2.4 of INEEL's TLR.

Request for Relief RR-A22 was previously evaluated and granted in the safety evaluation dated August 25, 1998. In Revision 1, it is noted that two lug weld sets received better than expected coverage and were deleted from the request for relief table. Additionally, one lug set not identified previously as having limitations was added to the request for relief table. However, the addition of this lug set does not affect the technical content of the request since the coverage and nature of the limitation is similar. Therefore, the conclusions of the previous evaluation have not changed and relief should remain authorized, pursuant to 10 CFR 50.55a(a)(3)(i).

Request for Relief No. RR-A23

ASME Code, Section XI, Examination Category B-J, Item 9.11, Pressure Retaining Welds in Piping, requires surface and volumetric examination for circumferential welds in piping NPS 4 or larger, as defined by Figure IWB-2500-8.

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required volumetric examinations in the table listed in Section 2.5 of INEEL's TLR.

Complete volumetric or surface examinations cannot be performed due to (1) component configurations (tee configuration, tee-to-valve configuration, sweepolet-to-valve configuration) or (2) interference from pump insulation support rings and brackets. The Code volumetric or surface examination requirements for the subject welds are impractical. To meet the Code requirements, the subject welds and/or adjoining components would require significant redesign and modifications. Imposition of this requirement would place a significant burden on the licensee.

The licensee has completed 50-76 percent and >90 percent of the Code-required volumetric and surface examinations, respectively, of three of the subject welds. The remaining weld included in this request received a 100-percent volumetric examination and was limited to 86 percent of the Code-required surface examination only. Furthermore, the subject welds are part of a larger population (156 welds) of Examination Category B-J circumferential welds that were examined during the interval. The staff determined that the volumetric and surface examinations of the subject welds completed and the examinations performed on the remaining population of circumferential B-J welds provide reasonable assurance of structural integrity of the subject welds. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i).

3.0 CONCLUSION

The NRC staff concludes that for requests for relief RR-A21, Revision 1, and RR-A22, Revision 1, the licensee's proposed alternatives to the Code requirements provide an acceptable level of quality and safety. Pursuant to 10 CFR 50.55a(a)(3)(i), the licensee's proposed alternatives remain authorized as originally evaluated in the August 25, 1998, safety evaluation.

For requests for relief RR-A1, RR-A6, Revision 1, and RR-A23, the staff concludes that the Code requirements are impractical and the examinations that have been performed provide reasonable assurance of structural integrity of the subject welds. Relief is granted pursuant to 10 CFR 50.55a(g)(6)(i).

Attachment: Technical Letter Report

Principal Contributor: T. McLellan

Date: January 27, 2000

TECHNICAL LETTER REPORT
ON THE FIRST 10-YEAR INTERVAL INSERVICE INSPECTION
REQUESTS FOR RELIEF
FOR
DETROIT EDISON
FERMI 2
DOCKET NUMBER: 50-341

1. INTRODUCTION

By letters dated May 14, 1999, the licensee, Detroit Edison, submitted requests for relief from the requirements of the ASME Code, Section XI, for the Fermi 2 first 10-year inservice inspection (ISI) interval. The Idaho National Engineering and Environmental Laboratory (INEEL) staff's evaluation of the subject requests for relief is in the following section.

2. EVALUATION

The information provided by Detroit Edison in support of the requests for relief from Code requirements has been evaluated and the bases for disposition are documented below. The Code of record for the Fermi 2, first 10-year ISI interval, which began January 1988, is the 1980 Edition through Winter 1981 Addenda of Section XI of the ASME Boiler and Pressure Vessel Code.

2.1 Request for Relief No. RR-A1(Revision 1), Examination Category B-A, Item B1.21, Circumferential Head Welds, Item B1.22, Meridional Head Welds, and Item B1.30, Shell to Flange Welds

Code Requirement: Examination Category B-A, Item B1.21 and B1.22 requires 100% volumetric examination of the accessible length of all circumferential and meridional head welds, as defined by Figure IWB-2500-3. Item B1.30 requires 100% volumetric examination of the circumferential shell-to-flange welds, as defined by Figure IWB-2500-4.

Licensee's Code Relief Request: In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required 100% volumetric examination coverage for the welds listed below.

ATTACHMENT

WELD	ITEM	DESCRIPTION	COVERAGE	LIMITATION
5-306	B1.21	Head Circ. Weld	0%	Bottom Head CRD Penetrations and Skirt Attachment Weld (Dollar Plate)
1-319A	B1.22	Head Merid. Weld	73.6%	Top Head Lifting Lugs
1-319C	B1.22	Head Merid. Weld	70%	Top Head Lifting Lugs
1-319E	B1.22	Head Merid. Weld	72%	Top Head Lifting Lugs
1-319G	B1.22	Head Merid. Weld	71.3%	Top Head Lifting Lugs
2-306A	B1.22	Head Merid. Weld	0%	Bottom Head CRD Penetrations and Skirt Attachment Weld
2-306A	B1.22	Head Merid. Weld	0%	Bottom Head CRD Penetrations and Skirt Attachment Weld
2-306B	B1.22	Head Merid. Weld	0%	Bottom Head CRD Penetrations and Skirt Attachment Weld
2-306C	B1.22	Head Merid. Weld	0%	Bottom Head CRD Penetrations and Skirt Attachment Weld
2-306D	B1.22	Head Merid. Weld	0%	Bottom Head CRD Penetrations and Skirt Attachment Weld
2-306E	B1.22	Head Merid. Weld	0%	Bottom Head CRD Penetrations and Skirt Attachment Weld
2-306F	B1.22	Head Merid. Weld	0%	Bottom Head CRD Penetrations and Skirt Attachment Weld
2-306G	B1.22	Head Merid. Weld	0%	Bottom Head CRD Penetrations and Skirt Attachment Weld
13-308	B1.30	Shell to Flange	54%	RPV Flange Configuration (coverage augmented by scan from flange seal surface)

Licensee's Basis for Requesting Relief (as stated):

"Pursuant to 10 CFR 50.55a(g)(5)(iii) Detroit Edison is requesting relief from ASME Section XI requirements to examine essentially 100% of accessible Category B-A weld lengths because within the limits of RPV design it is impractical to do so. Detroit Edison believes that the alternatives specified provide an acceptable level of quality and safety.

"Relief Request RR-A1 documented limitations based on both the installed ultrasonic examination system, which used pole tracks for scanning, and part geometry. During RF02 Fermi implemented the use of an automated examination system that uses a magnetic wheel scanning device which maximizes coverage to the extent possible using current technology. Limitations to automated scanning of RPV shell welds due to the examination system have been eliminated. Current limitations are based only on RPV

configuration or interference from other components as described in the 'Alternatives' section below.

"Reactor Vessel Ultrasonic Examination techniques meet the requirements of ASME Section XI; ASME Section V, Article 4; and Regulatory Guide 1.150. Detroit Edison believes that the alternative examinations proposed satisfy the intent of the ASME Code within the limits of accessibility for examination inherent to the BWR design. Table 1 identifies the welds with limitations and the cause of the limitation (see also attached figures)[1]. The extent of examination is reported in accordance with ASME Section V.

"Welds 1-319A, 1-319C, 1-319E, & 1-319G

"The four listed top head weld exams are fully complete for most of the weld length. They are limited because of a lifting lug positioned on each weld. Because of the physical access limitations it is impractical to examine the full volume of these welds for their entire length.

"...For the weld volume that is partially scanned, the ultrasonic examination covers the most critical area at the inside surface of the head. The areas of highest stress on the outside surface in the area of the limitation receive a surface examination per Category B-H.

"Inaccessible Bottom Head Welds

"Welds 5-306 and 2-306A through 2-306G

"The access restrictions caused by the CRD penetrations and RPV support skirt make it impractical to perform a meaningful ultrasonic examination of these welds with current technology.

"...Reasonable assurance of structural integrity is maintained because the welds received volumetric and surface NDE to verify that no deleterious material or processing defects were present at the time of fabrication. The welds are physically located at the bottom of the reactor vessel, below the withdrawn control rod blades. There is also more than 170 inches of water from the bottom of the active fuel height to the weld location. This physical arrangement reduces the neutron fluence and the coincident material degrading impacts significantly, when compared to RPV beltline welds that are inspectable. The same CRD penetrations that prevent the examination of the welds would also serve to prevent rapid propagation of a large defect by providing a crack arrest point.

"Weld 13-308

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[1] Enclosures, tables, figures, and attachments furnished with the licensee's submittal are not included in this report.

"The RPV shell to flange weld exam is limited due to vessel flange configuration which makes it impractical to examine the full volume of the weld. The Code allowed alternative exam of ASME Section V, Article 4, T441.5.1 (Longitudinal exam from the flange) was performed during RF06 but this exam was also limited because of the RPV stud holes. Even with this Code allowed alternative, it is not possible to obtain full volume coverage even when scanning is performed from both sides of the weld for 360 degrees.

Licensee's Proposed Alternative Examination (as stated):

"**Welds 1-319A, 1-319C, 1-319E, & 1-319G**

"The Fermi proposed alternative for the ASME Code exam performance is partial examination for these welds.

"Welds 5-306 and 2-306A through 2-306G

"For the inaccessible RPV bottom head welds, the proposed alternatives include a combination ASME Section XI Code required leakage inspections and monitoring of drywell leakage during operation.

"Weld 13-308

"The Fermi proposed alternative is a partial exam from the shell side combined with the longitudinal wave exam from the flange surface. As shown in figure 3, the proposed alternative partial exam performed from the shell side provides significant coverage of the ID surface where flaws would be most likely to originate. A significant portion of full weld volume is also covered by the longitudinal exam from the flange surface.

Evaluation: Examination Category B-A, item numbers B1.21, and B1.22 require 100% volumetric examination of the accessible length of all RPV circumferential and meridional head welds. Complete examination coverage of the subject B1.21 and B1.22 welds is restricted by physical obstructions including control rod drives, vessel support skirt attachments and top head lifting lugs. Examination Category B-A, item number B1.30 requires 100% volumetric examination of the RPV flange-to-shell weld. Complete examination coverage is restricted by the flange geometry (flange radius and stud holes interfere with scanning from the flange surface). These conditions make 100% volumetric examination impractical for the subject weld. To gain additional access for examination of the subject welds, the RPV would require design modifications. Imposition of this requirement would impose a significant burden on the licensee.

The licensee has examined these welds to the extent practical; examination volumes achieved range from 0-73.6% of each weld. The subject welds are outside of the highly irradiated core belt-line region of the RPV. In addition, other RPV shell welds have been examined to the extent required by the Code. Therefore, based upon the volumetric coverage obtained on the accessible portion of the subject welds, volumetric examinations on other RPV welds, and VT-2 visual examinations that are performed in conjunction with the pressure testing each refueling outage, it is concluded that existing patterns of degradation, if present, would have been detected and reasonable assurance of the structural integrity of the subject welds has been

provided. Therefore, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

2.2 Request for Relief No. RR-A6 (Revision 1), Examination Category B-D, Full Penetration Welds of Nozzles in Vessels

Code Requirement: Examination Category B-D, Items B3.90 and B3.100, require 100% volumetric examination of nozzle-to-reactor vessel welds and nozzle inside radius sections, as defined by Figure IWB-2500-7.

Licensee's Code Relief Request: In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required 100% volumetric examination of the reactor vessel nozzle welds listed below.

WELD	ITEM	DESCRIPTION	COVERAGE	LIMITATION
8-316A-D	B3.90	Nozzle Weld	69.1%	Nozzle Blend Radius
4-316A, D	B3.90	Nozzle Weld	60%	Nozzle Blend Radius and Instrumentation Nozzles
4-316B, C, E, F	B3.90	Nozzle Weld	64.1%	Nozzle Blend Radius
14-316A, B	B3.90	Nozzle Weld	68.9%	Nozzle Blend Radius
15-315	B3.90	Nozzle Weld	68%	Nozzle Blend Radius
13-314A-K	B3.90	Nozzle Weld	66.7%	Nozzle Blend Radius
5-314A, B	B3.90	Nozzle Weld	65.6%	Nozzle Blend Radius and Bottom Head to Shell Taper
19-314A, B	B3.90	Nozzle Weld	63.1%	Nozzle Blend Radius and Bottom Head to Shell Taper
2-318	B3.90	Nozzle Weld	61.4%	Nozzle Blend Radius
4-318A, B	B3.90	Nozzle Weld	62%	Nozzle Blend Radius
19-314A, B	B3.100	Nozzle Weld Inner Radius	80.2%	Bottom Head to Shell Taper

Licensee's Basis for Requesting Relief (as stated):

"Pursuant to 10 CFR 50.55a(g)(5)(iii) Detroit Edison is requesting relief from ASME Section XI requirements to examine essentially 100% of accessible Category B-D nozzle welds, because within the limits of design and accessibility it is impractical to do so.

"Relief Request RR-A6 only documented ultrasonic examination limitations based on interference caused by proximity to other nozzles. Other limitations have been identified during the performance of examinations during the first interval.

"The primary limitation to full ASME Code volumetric coverage is nozzle configuration. The nozzle type used in the Fermi 2 reactor is a flanged nozzle as shown in Figure 1. This type of nozzle provides the best access for inspection of the nozzle types permitted in the ASME Code as shown in the Figures of IWB-2500-7. The Code required volume ($t_s/2$) extends into the nozzle outside blend radius. The curve of the radius section hinders the ability of transducers to maintain contact with the nozzle and also changes the effective beam angle. This limitation results in a typical maximum composite coverage of all Code required scans (0{Longitudinal}, 45, and 60 {Parallel & Transverse} degree) between 60% and 70% depending on nozzle diameter and thickness. The maximum obtainable coverage is achieved by the 60 degree transverse (T) scan. Essentially all of the weld and heat affected zones are covered by this angle beam scan for the entire weld circumference on most nozzles. Typical scan limitations are shown in Figures 2A through 2C. The estimated volumetric coverage obtained is reported in Table 1.

"Another limitation to full ASME Code volumetric coverage is the vessel taper at the bottom head to lower shell course weld. This geometric condition prevents full coverage of the bottom side of the two jet pump instrumentation nozzles and the two recirculation suction nozzles. Composite coverage for these welds remains above 60%. This limitation also impacts the nozzle inner radius coverage for the two core spray nozzles as reported in Table 1.

"The limitation originally described in RR-A6 of this relief request indicated a limitation of 46 degrees or 12.8% of the full circumference for 2 of 6 feedwater nozzles based on automated examination equipment accessibility. The examinations were performed manually and the limitation was less than originally described and accepted (see Figure 3). A part of the scan path was able to be performed for the full circumference. Additionally, Fermi examines these feedwater nozzles as specified in NUREG 0619 to detect cracking in the nozzle inner radius and bore areas where cracks have previously been detected in other BWRs. These exams were fully completed and no service related flaws have been detected.

"All nozzle forgings received ultrasonic examination during manufacture and the nozzle to shell welds were subject to radiographic examination during fabrication of the reactor pressure vessel. All of the nozzle welds requiring volumetric examination by ASME Section XI have been completed during the first ten-year inspection interval and no service related defects have been detected. The nozzle inner radius ultrasonic examination techniques used at Fermi performed scanning from the blend radius; however, since this technique was designed to detect internal surface defects no credit has been taken for those exams.

Licensee's Proposed Alternative Examination (as stated):

"Perform examination of the ASME Code volume to the extent practical."

Evaluation: The Code requires 100% volumetric examination of the subject RPV nozzle-to-vessel welds and inside radius sections. However, complete examination

is restricted by the proximity to other nozzles, outside blend radius of nozzles and the vessel taper at the bottom head to lower shell course weld. These limitations make the 100% volumetric examination impractical. To gain access for examination, the RPV nozzles would require design modifications. Imposition of this requirement would create an undue burden on the licensee.

The licensee has examined a significant portion of these welds, obtaining 61-69% coverage for each of the nozzle-to-vessel welds and 89% coverage for the subject nozzle inside radius section. Based on the coverages obtained it is concluded that any existing patterns of degradation would have been detected by the examinations that were completed and reasonable assurance of the structural integrity has been provided.

Based on the impracticality of meeting the Code coverage requirements for the subject nozzle-to-vessel welds and inside radius sections, and the reasonable assurance provided by the examinations that were completed on these and other Class 1 nozzles, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

2.3 Request for Relief No. RR-A21 (Revision 1), Examination Category B-K-1, Item B10.10, Integrally Welded Attachments to Piping

Code Requirement: Examination Category B-K-1, Item B10.10 requires 100% surface or volumetric examination, as applicable, of the integrally welded attachments for Class 1 piping as defined by Figure IWB-2500-13, -14, or -15.

Licensee's Proposed Alternative: In accordance with 10 CFR 50.55a(a)(3)(i), the licensee proposed an alternative to the Code-required examination of integrally welded attachments in the table listed below.

WELD	ITEM	COVERAGE	LIMITATION
FW-PS-2-D2-AA1-AA4	B10.10	70%	Clamp at spring B21-5355-HDI
FW-RD-2-A2-AL1-AL4	B10.10	68%	Clamp at spring B31-5357-HA2
SW-RS-2-B2-W6A-W9A	B10.10	68%	Clamp at spring B31-5359-HB1
PSFW-E11-2298-833A-F	B10.10	69% per lug	Clamp at rigid support E11-2298-G04
PSFW-E11-2299-781A-D	B10.10	50% per lug	Clamp at rigid spring E11-2299-G01
SW-E11-2327-2WD-2WJ	B10.10	90% per lug	Clamp at restraint E11-2327-G03
SW-E21-3052-2WN-2WR	B10.10	88% per lug	Clamp at restraint E21-3052-G02
PSFW-E21-3052-803A-D	B10.10	84% per lug	Clamp at spring E21-3052-G04
SW-E21-3053-2WN-2WR	B10.10	86% per lug	Clamp at spring E21-3053-G02
SW-E21-3052-2WS-2WV	B10.10	0% per lug	Clamp at spring E21-3052-G09

SW-E21-3053-2WS-2WV	B10.10	69% per lug	Inaccessible for MT due to lug retainers at spring E21-3053-G10
SW-E21-3053-795A-795D	B10.10	88% per lug	Clamp at spring E21-3053-G08
SW-N21-2336-12WC-12WH	B10.10	86% per lug	Clamp limitation
SW-N21-2336-12WJ-12WP	B10.10	66% per lug	Clamp limitation
SW-N21-2336-19WB-19WE	B10.10	0% per lug	Inaccessible for MT due to lug retainers at N21-3537-G29
SW-N21-2336-9WB-9WE	B10.10	90% per lug	Clamp at snubber N21-3536-G29
SW-N21-2336-2WC-9WP	B10.10	90% per lug	Clamp at spring N21-3537-G26

The licensee stated:

"Detroit Edison proposes that in addition to the surface examination of the exposed portion of lug welds and required base metal volume, that a supplemental visual examination to the extent practical by the examiner be performed. Additionally, leakage inspections were performed at the completion of each refueling outage per Category B-P.

"Based on the coverage achievable, physical limitations, comparison of Fermi ISI Program scope as compared to current Code requirements, and low empirical probability of weld failure, Detroit Edison considers the proposed alternative examination to provide an acceptable level of quality and safety."

Licensee's Basis for Proposed Alternative (as stated):

"Pursuant to 10 CFR 50.55a(a)(3)(i) Detroit Edison is requesting relief from ASME Section XI requirements to perform complete (>90% coverage) surface examination of all integrally welded piping attachments that have a base metal design thickness of 5/8" or greater.

"The proposed alternative is partial nondestructive examination supplemented by visual examination. Technical justification for the adequacy of the alternative is substantiated by changes in the ASME Code.

"The relief request also identifies burdens associated with engineering resource impacts, clamp removal and location restoration which would represent a burden to existing resources. Identification of these burdens are provided only in support of the need for an alternative. The engineering impacts mentioned are incurred in diverting limited engineering resources away from other tasks.

"The structural integrity of the piping pressure boundary including welded attachments was originally demonstrated during construction by meeting the requirements of ASME Section III. Design, fabrication, installation, inspection and examination satisfied the appropriate Code requirements. Construction examinations used techniques similar to those used for inservice examinations (surface NDE methods). During the Fermi Preservice Inspection volumetric examinations were also performed. The construction and preservice

examinations were usually completed prior to installation of the support members. Therefore, the extent of accessibility was not specifically known until the first inservice examination is completed. Integral attachment locations remaining to be examined were compared to locations similar in design and any expected limitations are listed in the table.

"The pressure boundary passed the required preservice hydrostatic test and all subsequent pressure tests through the fifth refueling and inspection outage (RF05).

"Complete examinations meeting the coverage requirements of ASME Code Section XI were performed on welds of similar configurations which utilized the same weld techniques, procedures and materials. The welds with complete examinations are spread throughout the Class 1 systems and subject to similar operating and environmental conditions as the partially examined welds. No service related discontinuities have been discovered on welds fully examined or those partially examined. Additionally, there is no industry history of ASME Class 1 service induced attachment weld failures. It is reasonable to expect that the unexamined portions are also acceptable.

"The absence of significant integral attachment weld problems is further evidenced by ASME Code Case N-509 which allows a reduced sample size of only 10% of all integral attachments. This Code Case has been approved at other nuclear facilities (e.g., Duane Arnold) and was incorporated into the 1995 Addenda of ASME Section XI. Detroit Edison has not requested to implement this Code Case, which would reduce the inspection population to approximately 10 locations, during our first inspection interval. We are only requesting partial relief of coverage on specific locations included in the 29 locations where examinations can be performed.

"The average surface coverage of the incomplete examinations completed and listed in Table 1 is approximately 68%. To obtain complete Code coverage at each location, the component support would have to be disassembled and the pipe clamp assembly removed. Temporary line support would have to be evaluated by engineering and installed as necessary. The additional engineering resources, time, field personnel, and radiation exposure required to attain full coverage is not consistent with the minimal risk associated with these items, as reflected by plant and industry experience as well as current Code requirements.

"Radiation exposure for a best case location assuming a conservative effective (averaged) dose rate of 5mr/hr and a minimum of 16 manhours to remove and reinstall the clamp assembly and inspect the location would result in at least 80mr additional exposure per location (approximately 1.7R minimum accumulated dose). Note that this assumption uses an effective averaged dose rate, and actual dose on a pipe and is often much higher. Removal of the clamps could actually increase the possibility of damaging other components such as nozzles and penetrations due to additional line stress. Additionally, the time for disassembly and reassembly does not assume mechanical difficulties

such as temporary line support, seized bolts, and removal and reinstallation of welded lug retainers from the clamps, that will greatly increase the time and dose impacts.

Evaluation: Request for Relief RR-A21 was previously evaluated and granted in an NRC SER dated August 25, 1998. In Revision 1, it is noted that four lug weld sets received better than expected coverage and were deleted from the request for relief table. Additionally, eight lug sets not identified previously as having limitations were added to the request for relief table. However, the addition of these lugs does not affect the technical content of the request since the coverage and nature of the limitations are similar. Therefore, the conclusions of the previous evaluation have not changed and relief should remain authorized, pursuant to 10 CFR 50.55a(a)(3)(i).

2.4 Request for Relief No. RR-A22 (Revision 1), Examination C-C, Item C3.20, Integrally Welded Attachments to Piping

Code Requirement: Examination Category C-C, Item 3.20, requires 100% surface examination, as defined by Figure IWC-2500-5, for integrally welded attachments to piping, where the base metal thickness is 3/4-inch or greater.

Licensee's Proposed Alternative: In accordance with 10 CFR 50.55a(a)(3)(i), the licensee proposed an alternative to the Code-required examination of integrally welded attachments in the table listed below.

WELD	ITEM	COVERAGE	LIMITATION
PSFW-E11-3146-606A-L	C3.20	83% per lug	Clamp at restraint E11-3146-G24
PSFW-E11-3146-952A-L	C3.20	100% per lug for lugs B, E, H, K, 50% for others	Clamp at restraint E11-3146-G36
SW-E11-3158-583A-583F	C3.20	87% per lug lugs B & E	Lugs A, C, D, & F inaccessible due to lug retainers on restraint E11-3158-G52
SW-E11-3158-7WC-7WH	C3.20	85% per lug	Clamp at spring E11-3158-G51
PSFW-E41-3162-583A-F	C3.20	90%	Clamp at snubber E41-3162-G20
PSFW-E41-3172-592A-D	C3.20	90%	Clamp at snubber E41-3172-G19
PSFW-E41-3172-625A-625D	C3.20	87% per lug expected	Lug retainers at E41-3172-G14
PSFW-E11-33177-718B	C3.20	75% of pad weld length	Proximity of pipe to wall

The licensee stated:

> "Detroit Edison proposes that in addition to the surface examination of the exposed portion of lug welds and required base metal volume, that a supplemental visual examination to the extent practical by the examiner be performed. Additionally, leakage inspections were performed each inspection period per Category C-H.
>
> "Based on the coverage achieved, physical limitations, comparison of Fermi ISI Program scope as compared to current Code requirements, and low empirical probability of weld failure, Detroit Edison considers the proposed alternative examination to provide an acceptable level of quality and safety.

Licensee's Basis for Proposed Alternative (as stated):

"Pursuant to 10 CFR 50.55a(a)(3)(i) Detroit Edison is requesting relief from ASME Section XI requirements to perform complete (>90% coverage) surface examination of all integrally welded piping attachments that have a base metal design thickness of 3/4" or greater.

"The proposed alternative for Fermi is partial nondestructive examination supplemented by visual examination. Technical justification for the adequacy of the alternative is substantiated by changes in the ASME Code.

"This relief request also identifies burdens associated with engineering resource impacts, clamp removal, location restoration which would represent a burden to existing resources. Identification of these burdens are provided only in support of the need for an alternative. The engineering impacts mentioned are incurred in diverting limited engineering resources away from other tasks.

"The structural integrity of the piping pressure boundary including welded attachments was originally demonstrated during construction by meeting the requirements of ASME Section III. Design, fabrication, installation, inspection and examination satisfied the appropriate Code requirements. Construction examinations used techniques similar to those used for inservice examinations (surface NDE methods). During the Fermi Preservice Inspection, volumetric examinations were also performed. The construction and preservice examinations were usually completed prior to installation of the support members. Therefore, the extent of accessibility was not specifically known until the first inservice examination is completed. Integral attachment locations remaining to be examined were compared to locations similar in design and any expected limitations are listed in the table.

"The pressure boundary passed the required preservice hydrostatic test and all subsequent pressure tests through the fifth refueling and inspection outage (RF05).

"Complete examinations meeting the coverage requirements of ASME Code Section XI are performed on welds of similar configurations which utilized the same weld techniques, procedures and materials. The welds with complete examinations are subject to similar operating and environmental conditions as the partially examined welds. No service related discontinuities have been discovered on welds fully examined or those partially examined. Additionally, there is no industry history of ASME Class 2 service induced attachment weld failures. It is reasonable to expect that the unexamined portions are also acceptable.

"The absence of significant integral attachment weld problems is further evidenced by ASME Code Case N-509 which allows a reduced sample size of only 10% of all integral attachments. This Code Case has been approved at other nuclear facilities (e.g., Duane Arnold) and was incorporated into the 1995 Addenda of ASME Section XI. Fermi has not requested to implement this Code Case, which would reduce the inspection population to approximately 19

locations, during the first inspection interval. We are asking for partial relief of coverage on specific locations included in the 39 locations where examinations can be performed.

"The average surface coverage for the incomplete examinations completed and listed in Table 1 is approximately 80%. To obtain complete Code coverage at each location, the component support would have to be disassembled and the pipe clamp assembly removed. Temporary line support would have to be evaluated by engineering and installed as necessary. The additional engineering resources, time, field personnel, and radiation exposure required to attain full coverage is not consistent with the minimal risk associated with these items, as reflected by plant and industry experience as well as current Code requirements.

"Radiation exposure for a best case location assuming a conservative effective (averaged) dose rate of 5mr/hr and a minimum of 16 manhours to remove and reinstall the clamp assembly and inspect the location would result in at least 80mr additional exposure per location (approximately 640mr minimum accumulated dose). Note that this assumption uses an effective averaged dose rate, and actual dose on a pipe and is often much higher. Removal of the clamps could actually increase the possibility of damaging other components such as nozzles and penetrations due to additional line stress. Additionally, the time for disassembly and reassembly does not assume mechanical difficulties such as temporary line support, seized bolts, and removal and reinstallation of welded lug retainers from the clamps, that will greatly increase the time and dose impacts."

Evaluation: Request for Relief RR-A22 was previously evaluated and granted in an NRC SER dated August 25, 1998. In Revision 1, it is noted that two lug weld sets received better than expected coverage and were deleted from the request for relief table. Additionally, one lug set not identified previously as having limitations and was added to the request for relief table. However, the addition of this lug set does not affect the technical content of the request since the coverage and nature of the limitation is similar. Therefore, the conclusions of the previous evaluation have not changed and relief should remain authorized, pursuant to 10 CFR 50.55a(a)(3)(i).

2.5 Request for Relief No. RR-A23, Examination Category B-J, Item 9.11, Pressure Retaining Welds in Piping

Code Requirement: Examination Category B-J, Item No. B9.11 requires surface and volumetric examination as defined by Figure IWB-2500-8 for circumferential welds in piping NPS 4 or larger.

Licensee's Code Relief Request: In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required volumetric examinations of the following welds:

WELD	ITEM	DESCRIPTION	COVERAGE	LIMITATION
FW-RS-2-A5	B9.11	Reactor Circulation	86% PT >90% UT	Pump Insulation, Support Ring & Brackets.
FW E11-2299-0W1	B9.11	RHR Pipe	>50% UT 100% PT	Tee Configuration Limits UT Only
FW-N21-2336-0W1	B9.11	Feedwater	76% UT 100% MT	Tee to Valve Configuration
FW-N21-2336-1W03	B9.11	Feedwater	50% UT 100% MT	Sweepolet to Valve Configuration

Licensee's Basis for Requesting Relief (as stated):

"During the course of inservice examination, 4 of 156 Category B-J circumferential welds have been encountered that are impractical to fully examine in accordance with ASME Section XI (>90% of length and volume). Pursuant to 10 CFR 50.55a(g)(5)(iii), Detroit Edison is requesting relief from ASME Section XI requirements to perform complete examinations of listed piping welds, as described above.

"Fermi proposes to examine these welds to the extent practical within the limits of design and accessibility. Reasonable assurance of piping system structural integrity is provided by the Fermi ISI NDE Program as detailed in this relief request. Detroit Edison considers the proposed alternative examination to provide an acceptable level of quality and safety.

"The adjacent weld, which is also a moderate stress weld, is fully examined. Inspections completed through the sixth refueling outage (RF06 have detected no reportable service induced defects in any carbon steel piping welds subject to ISI.

FW-RS-2-A5

"This stainless steel weld is a low stress random selection. The weld was given an IGSCC mitigation treatment (Induction Heat Stress Improvement) as defined in NUREG 0313 Rev. 2, prior to service. Fermi has also implemented an augmented inspection program in accordance with Generic Letter 88-01. The combined Code and GL-88-01 selections result in greater than 50% of all Reactor Recirculation System welds being inspected each interval. The inspection sample set is sufficiently large to provide for reliable detection of

representative degradation. There is no decrease in the ability to detect system degradation as a result of this limitation. Redesigning or removing the obstructions to marginally increase coverage of this weld is impractical. It would also substantially increase man-hours and radiation dose without a compensating increase in plant safety. Detroit Edison believes this alternative provides an acceptable level of quality and safety."

FW E11-2299-0W1

"This stainless steel tee-to-pipe weld is a high stress weld selection. The weld was radiographed during construction and satisfied Section III acceptance criteria. There are also six other high stress locations in the RHR system that were fully examined. The surface of the weld is fully accessible for liquid penetrant examination. Ultrasonic examination is limited to effective scanning from the pipe side only because of reducing-tee configuration. The ultrasonic examination covers all of the base material on the pipe side of the weld and the weld root area. Because the examination covers the weld root area, which is also the thinnest section of this pipe-to-tee weld zone, there is adequate assurance that IGSCC or fatigue or cracking could be detected. Altering the weld design to increase exam coverage would be impractical. Additionally, two adjacent welds on both sides of this weld are fully examined. Fermi has also implemented and augmented inspection program in accordance with Generic Letter 88-01. The combined Code and Generic Letter 88-01 selections result in greater than 50% of all susceptible welds being inspected each interval. The inspection sample set is sufficiently large to provide for reliable detection of representative degradation. There is no decrease in the ability to detect system degradation as a result of this limitation.

"Radiographic examination was considered as an alternative but has the following limitations. The radiation emitted from the pipe would negatively impact the sensitivity of the examination. Performance of the examination would take approximately one shift to complete and prevent other outage activities from be(ing) performed during the radiography evolution. Radiographic examination of the weld would require draining of the recirculation loop piping and a portion of RHR. This would require plugging jet-pumps and recirc suction lines inside the vessel. RHR Shutdown cooling would not be available to remove decay heat. For these reasons radiography is not a feasible alternative for the ultrasonic examination.

"Because of the acceptable initial condition, pressure test history and continued performance, the capability to complete the surface exam and greater than 50 percent of the exam volume including the root area, it is reasonable to conclude there is no significant impact on the level of plant quality and safety by the reduction in volumetric coverage of this weld. Detroit Edison believes this alternative provides an acceptable level of quality and safety.

FW-N21-2336-0W1

"This carbon steel tee-to-pipe weld is a moderate stress weld selection category as defined in the Fermi UFSAR. The moderate stress category results in an

inspection sample of 28% of all Category B9.11 circumferential welds. The increased inspection sample is comprised of welds with the highest probability of failure and results in added assurance of system integrity. This is a more conservative approach to selecting welds than a supplemental random selection to bring the examination sample to 25%, as specified in the Code. The inspection sample set exceeds ASME Code requirements and is sufficiently large to provide for reliable detection of system degradation.

"The weld was radiographed during construction and satisfied Section III acceptance criteria. The valve body and weld ends were also radiographed in accordance with NB 2570. The surface of the weld is fully accessible for magnetic particle examination. Ultrasonic examination is limited because of tee-to-valve configuration. The ultrasonic examination does cover the weld and the weld root area in at least one direction base material on the valve side is not fully covered in two directions. Altering the weld design to marginally increase coverage is impractical.

"Because of the acceptable initial condition, pressure test history and continued performance, the capability to complete the surface exam and approximately 75% of the exam volume including the root area, it is reasonable to conclude there is no significant impact on the level of plant quality and safety by the reduction in volumetric coverage of this weld. Because the inspection sample population exceeds ASME Code requirements, there is no decrease in the ability to detect system degradation as a result of this limitation. Detroit Edison believes this alternative provides an acceptable level of quality and safety.

FW-N21-2336-1W03

"This carbon steel reducer-to-valve weld is a high stress weld selection. The weld was radiographed during construction and satisfied Section III acceptance criteria. The valve body and weld ends were also radiographed in accordance with NB 2570. There are also eleven other high stress locations (includes terminal ends) in the Feedwater System that will be fully examined. The surface of the weld is fully accessible for magnetic particle examination. Ultrasonic examination is limited to effective scanning from the crown of the weld. The ultrasonic examination covers most of the base material on both sides of the weld in one direction. The entire weld and root was scanned in he circumferential direction. Additionally, the high stress weld directly adjacent to this weld was fully examined.

"There are over 50 high stress carbon steel weld selections spread among the systems subject to inservice inspection. The Fermi Class 1 inspection population for all systems exceeds ASME Code requirements by 15 welds because moderate stress welds are included in the selection basis. The welds that were selected are the most probable locations for stress related failure. The selection methodology used was more stringent than required by Code. Because of the selection methodology and sample size there is no reduction in capability to detect system degradation as compared to Code requirements. Through the sixth refueling outage (RF06) there were no service induced

defects detected. Industry experience does not indicate cracking of carbon steel butt welds to be a problem. All of these reasons indicate that it is impractical to alter the weld design to increase exam coverage for this weld.

Radiographic examination was considered as an alternative but is undesirable for the following reasons. Draining the feedwater line to perform the examination would make reactor water clean up unavailable and would negatively impact reactor vessel clarity potentially affecting refueling and inspection activities. It would also prevent drywell and steam tunnel outage activities from be(ing) performed during radiography evolution adding critical path time to the outage schedule. The benefit of increasing the coverage of this weld by radiographic examination has only a small potential of increasing plant safety margin and a disproportionate impact on other plant activities. Because of these impacts and since the Fermi inspection program exceeds ASME Code requirements for the sampling program this alternative is not considered to be practical.

Because of the acceptable initial condition, pressure test history and continued performance, the capability to complete the surface exam and approximately 50 percent of the Code exam volume, it is reasonable to conclude there is no significant impact on the level of plant quality and safety by the reduction in volumetric coverage of this weld. Detroit Edison believes this alternative provides an acceptable level of quality and safety.

Licensee's Proposed Alternative Examination (as stated):

"Partial examination of each weld to the greatest extent possible using appropriate surface and ultrasonic examination methods. Additionally, leakage inspections performed at the completion of each refueling outage per Category B-P..."

Evaluation: The Code requires 100% volumetric and surface examination of the subject welds. Complete volumetric or surface examinations cannot be performed due to component configurations (tee configuration, tee to valve configuration, sweepolet-to-valve configuration), and interference from pump insulation, and support rings and brackets. Therefore, the Code volumetric or surface examination requirements for the subject welds are impractical. To meet the Code requirements, the subject welds and/or adjoining components would require significant re-design and modifications. Imposition of this requirement would place a considerable burden on the licensee.

The licensee has completed 50-76% and >90% of the Code-required volumetric and surface examinations, respectively, of three of the subject welds. The remaining weld included in this request received 100% volumetric and was limited to 86% of the Code-required surface examination only. Furthermore, the subject welds are part of a larger population (156 welds) of Examination Category B-J circumferential welds that were examined during the interval. Based upon the volumetric and surface examinations of the subject welds completed and the examinations performed on the remaining population of circumferential B-J welds, it is concluded that patterns of

degradation, if present, would have been detected. Consequently, reasonable assurance of the structural integrity of the subject welds has been provided. Therefore, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

3. CONCLUSION

The INEEL staff has reviewed the licensee's submittals and concludes that for Requests for Relief RR-A21, Revision 1 and RR-A22, Revision 1, the licensee's proposed alternatives to the Code requirements continue to provide an acceptable level of quality and safety. Therefore, it is recommended that these proposed alternatives remain authorized pursuant to 10 CFR 50.55a(a)(3)(i), as originally evaluated in an SER dated August 25, 1998. For Requests for Relief RR-A1, RR-A6, Revision 1, and RR-A23 it is concluded that the Code requirements are impractical for the subject welds. Therefore, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).