

July 27, 2001

Mr. Charles H. Cruse
Vice President - Nuclear Energy
Calvert Cliffs Nuclear Power Plant, Inc.
Calvert Cliffs Nuclear Power Plant
1650 Calvert Cliffs Parkway
Lusby, MD 20657-4702

SUBJECT: EVALUATION OF REQUEST FOR INSERVICE INSPECTION (ISI) RELIEF NO.
ISI-6 FOR CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NOS. 1 AND 2
(TAC NOS. MA9404 AND MA9405)

Dear Mr. Cruse:

By letter dated June 30, 2000, Calvert Cliffs Nuclear Power Plant, Inc. (the licensee) submitted a relief request for the second 10-year interval inservice inspection (ISI) program for Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2. Relief request ISI-6 requested relief from the requirement that essentially 100 percent of weld length be examined when augmented volumetric examination of the weld is required. The proposed alternative applies to those welds where it is impractical to perform a complete examination due to the limitations of design, geometry, and materials of construction.

The NRC staff has reviewed the requests against the requirements of Section XI of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) pursuant to paragraph 50.55a of Part 50 to Title 10 of the Code of Federal Regulations. The basis for the staff's conclusions are contained in the enclosed safety evaluation.

The staff has concluded that, for Request for Relief No. ISI-6 (Part A), 10 CFR 50.55a(g)(6)(ii)(A) Augmented Examination of the Reactor Vessel, the licensee has maximized examination coverage to the extent practical, and that the licensee's proposed alternative for the augmented reactor pressure vessel examinations is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) based on the alternative providing an acceptable level of quality and safety.

For Request for Relief No. ISI-6 (Parts B through H) the staff concludes that the licensee was unable to obtain the volumetric code coverage of 100 percent of the subject welds. The examinations were limited due to the configuration/geometry of the subject welds. For the licensee to achieve the examination requirements it would require modifications to the plant which would be a significant burden on the licensee. Therefore, the Code examinations are impractical. The licensee obtained 31 percent through 88 percent volumetric examination coverage which is sufficient to detect any existing patterns of degradation. In addition, the subject welds are subject to the pressure testing requirements of ASME Code, Section XI. The licensee's proposed alternatives provide reasonable assurance of structural integrity of the subject welds. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i). The staff has determined that granting relief pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law and

C. Cruse

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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.

Sincerely,

/RA/

Richard P. Correia, Acting Chief, Section 1
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-317 and 50-318

Enclosure: Safety Evaluation

cc w/encl: See next page

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/RA/

Richard P. Correia, Acting Chief, Section 1
Project Directorate I
Division of Licensing Project Management
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Docket Nos. 50-317 and 50-318

Enclosure: Safety Evaluation

cc w/encl: See next page

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*input provided by safety evaluation dated 7/3/01 incorporated with no significant changes.

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Calvert Cliffs Nuclear Power Plant
Unit Nos. 1 and 2

President
Calvert County Board of
Commissioners
175 Main Street
Prince Frederick, MD 20678

James Petro, Esquire
Counsel
Constellation Power Source
111 Market Street
Baltimore, MD 21202

Jay E. Silberg, Esquire
Shaw, Pittman, Potts, and Trowbridge
2300 N Street, NW
Washington, DC 20037

Director
NRM
Calvert Cliffs Nuclear Power Plant
1650 Calvert Cliffs Parkway
Lusby, MD 20657-4702

Resident Inspector
U.S. Nuclear Regulatory
Commission
P.O. Box 287
St. Leonard, MD 20685

Mr. Richard I. McLean, Manager
Nuclear Programs
Power Plant Research Program
Maryland Dept. of Natural Resources
Tawes State Office Building, B3
Annapolis, MD 21401

Regional Administrator, Region I
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406

Mr. Joseph H. Walter, Chief Engineer
Public Service Commission of
Maryland
Engineering Division
6 St. Paul Centre
Baltimore, MD 21202-6806

Kristen A. Burger, Esquire
Maryland People's Counsel
6 St. Paul Centre
Suite 2102
Baltimore, MD 21202-1631

Patricia T. Birnie, Esquire
Co-Director
Maryland Safe Energy Coalition
P.O. Box 33111
Baltimore, MD 21218

Mr. Loren F. Donatell
NRC Technical Training Center
5700 Brainerd Road
Chattanooga, TN 37411-4017

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SECOND 10-YEAR INTERVAL INSERVICE INSPECTION

REQUEST FOR RELIEF NO. ISI-6

CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NOS. 1 AND 2

CALVERT CLIFFS NUCLEAR POWER PLANT, INC.

DOCKET NUMBERS 50-317 AND 50-318

1.0 INTRODUCTION

Inservice inspection (ISI) of the American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 components is to be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code (ASME 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(g)(6)(i). 10 CFR 50.55a(a)(3) states that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if the licensee 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 pre-service examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection (ISI) 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) twelve months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The Code of record for the Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2 second 10-year ISI interval is the 1983 Edition through Summer 1983 Addenda of the ASME Code.

2.0 EVALUATION

The NRC staff has reviewed the information concerning second 10-year ISI program Request for Relief No. ISI-6 for Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2, in the licensee's letter dated June 30, 2000, and the additional information provided by letter dated June 4, 2001.

2.1 Request for Relief No. ISI-6 (Part A)¹, 10 CFR 50.55a(g)(ii)(A) Augmented Examination of the Reactor Vessel

Regulatory Requirement:

10 CFR 50.55a(g)(6)(ii)(A), "Augmented Examination of Reactor Vessel", requires the examination of essentially 100% of reactor vessel shell welds specified in Item B1.10 (includes items B1.11 and B1.12) of Examination Category B-A of the 1989 Edition of Section XI. Essentially 100% is defined as more than 90% in Paragraph 10 CFR 50.55a(g)(6)(ii)(A)(5), and mandates that licensees which determine that they are unable to satisfy the augmented requirements propose an alternative to the examination requirements that would provide an acceptable level of quality and safety.

Licensee's Relief Request: (as stated)

In addition to ASME Section XI Inservice Inspection requirements, all licensees must implement, once during the lifetime of the facility, an augmented volumetric examination of the RPV [reactor pressure vessel] welds in accordance with 10 CFR 50.55a(g)(6)(ii)(A), specified in Code Item B1.10 of Examination Category B-A of the 1989 Edition of the ASME Code, Section XI. Examination Category B-A, Items B1.11 and B1.12 require volumetric examination of essentially 100 percent of the RPV circumferential and longitudinal shell welds, as defined by Figures IWB-2500-1 and -2, respectively. Essentially, 100 percent is defined by 10 CFR 50.55a(g)(6)(ii)(A)(2), as greater than 90 percent of the examination volume of each weld.

The examinations required by 10 CFR 50.55a(g)(6)(ii)(A) were completed on both Units 1 and 2 in 1998 and 1999, respectively.

At Calvert Cliffs Nuclear Power Plant (CCNPP) Unit 1, the augmented examination coverage requirements could not be met for one weld (Summary No. 001100, Comp ID 10-203) which was listed in Table 1² of Reference (a). The examination coverage for this weld was limited due to physical restrictions to scanning caused by the core barrel support lugs and the reactor vessel flow skirt. If the required coverage can not be met, 10 CFR 50.55a(g)(6)(ii)(A)(5) requires an alternative to the examination requirements be proposed. To meet the coverage requirements for the subject weld from the inside surface would require design modifications to increase access to the inside diameter surface. Physical modification of the RPV to achieve coverage requirements is not practical.

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

¹ For ease of evaluation the staff has divided Request for Relief No. ISI-6 in to parts A-H.

² The licensee's Table 1 for Category B-A welds is duplicated in Request for Relief ISI-6 (Part B).

Examination of the one weld from the outside diameter to increase the percent coverage was evaluated. The evaluation concluded that while supplemental outside examination could increase the total coverage, this examination was considered impractical due to the associated radiation exposure, estimated to be at least 4 Rem(R). The dose estimate includes all of the necessary support activities in addition to the actual examination. However we were able to examine a considerable portion (76 percent) of the subject weld despite the difficult configuration. Therefore, we propose acceptance of the weld examination, as completed, as an alternative allowed under 10 CFR 50.55a(g)(6)(ii)(A)(5).

The examination of the RPV welds provides an acceptable level of quality and safety. We obtained a very high cumulative coverage of all CCNPP Unit 1 RPV shell welds (Items B1.11 and B1.12) of greater than 96 percent. For CCNPP Unit 2, the requirements of 10 CFR 50.55a(g)(6)(ii)(A)(2) were met.

Licensee's Proposed Alternative Examination:

The licensee proposes acceptance of the weld examination, as completed, as an alternative allowed under 10 CFR 50.55a(g)(6)(ii)(A)(5).

Evaluation:

For compliance with the augmented reactor vessel examination requirements, the licensee must volumetrically examine essentially 100 percent (> 90 percent) of the Reactor Pressure Vessel Lower Head Weld. However, the required examination was limited due to physical restrictions to scanning caused by the core support lugs and flow skirt weld. To perform the required examination from the inside surface would require design modifications to increase access to the inside diameter surface. In addition, the licensee considered a supplementary examination from the outside diameter to increase the total coverage and it was determined to be a hardship due to the associated radiation exposure that was estimated to be at least 4 Rem. Increasing examination coverage from either the internal or external surfaces of the vessel is not feasible because of the burden associated with modifying the internal area and the high radiation levels determined from examining the external surfaces of the vessel. The additional examination coverage would not be significant compared with the percentage already examined. Therefore, essentially 100 percent coverage of the subject lower head weld is not achievable. To obtain complete volumetric coverage, design modifications would be required. To require the licensee to modify the subject areas to perform the examinations would be a burden on the licensee without a compensating increase in quality and safety.

The volumetric examination of the subject Item B1.11 Reactor Pressure Vessel Lower Head Weld was performed to the extent practical from the inside surface using mechanized inspection equipment. The examination performed on this weld and the complete examination of the Items B.1.11 and B1.12 welds result in an overall coverage of greater than 96 percent of the Reactor Pressure Vessel Welds. The staff determined that the 76 percent examination coverage obtained for this weld is sufficient to detect any existing patterns of degradation.

The staff concludes that the licensee has maximized examination coverage to the extent practical for this weld, and that the licensee's proposed alternative for the augmented reactor pressure vessel examinations is authorized pursuant to 10 CFR 50.55a(a)(3)(ii).

2.2 Request for Relief No. ISI-6 (Part B), Examination Category B-A, Pressure Retaining Welds in Reactor Vessels

Code Requirement:

Examination Category B-A, Items B1.11, B1.22 and B1.30 require 100percent volumetric examination of the Reactor Pressure Vessel Circumferential Shell Welds, Meridional Head Welds, and Shell-to-Flange Welds, as defined by Figures IWB-2500-1, -3, and -4, respectively. Item B1.40 requires 100percent volumetric and surface examination of Reactor Pressure Vessel Head-to-Flange Welds, as defined by Figure IWB-2500-5.

Licensee's Code Relief Request:

In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required 100percent volumetric examination of the welds listed below in Table 1.

Table 1

Unit	Component ID	Description	Category Item No.	Exam Coverage	Limitation
1	10-203	RPV Lower Shell to Lower Head	B-A B1.11	76%	Volumetric coverage limited due to proximity of core support lugs and flow skirt to weld.
1	1-204A	RPV Lower Head Meridional Weld (30 degrees)	B-A B1.22	52%	Volumetric coverage limited due to proximity of flow skirt to weld.
1	7-203	RPV Upper Shell to Flange	B-A B1.30	71%	Volumetric coverage limited due to inside surface taper.
1	6-209A	RPV Closure Head to Flange	B-A B1.40	65%	Volumetric coverage limited due to reactor vessel head shroud supports.
2	1-204A	RPV Lower Head Meridional Weld (30 degrees)	B-A B1.22	50%	Volumetric coverage limited due to proximity of flow skirt on the vessel ID.
2	7-203	RPV Upper Shell to Flange	B-A B1.30	84%	Volumetric coverage limited due to inside surface taper.
2	6-209A	RPV Closure Head to Flange	B-A B1.40	65%	Volumetric coverage limited due to reactor vessel head shroud supports.

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

Title 10 CFR 50.55a(g)(4) requires that pressurized water reactor (PWR) facilities meet the requirements of ASME Section XI in effect for the facility to the extent practical within the limitations of design, geometry, and material of construction. During the volumetric ultrasonic examination of the components listed in Tables 1 and 2³, CCNPP was unable to obtain the volumetric code coverage of "essentially 100% of the weld." The items listed in Tables 1 and 2 represent the welds credited for the Unit Nos. 1 and 2 Inservice Inspection Long-Term Plans, respectively where 90% or less volumetric examination coverage was obtained as required by Code Case N-460. Tables 1 and 2 provide the Long-Term Plan Summary Number, Component ID, Component Description, ASME Code Category, ASME Item Number, Percent Volumetric Examination Coverage Achieved, and the Reason for the examination limitation for the welds which require relief.

The examinations of the ASME Category B-A, 'Pressure Retaining Welds In Reactor Vessel' listed in Tables 1 and 2 were all limited by the geometry/configuration of the inside surface of the reactor pressure vessel (RPV) and RPV head shroud support lugs.

To achieve the requirements of "essentially 100% coverage" would require modifications to the plant which would not be practical and would most likely be detrimental to the components.

The proposed alternative provides an acceptable level of quality and safety because the welds listed in Tables 1 and 2 represent a small portion of the welds examined during the second ten-year inservice inspection interval at CCNPP and they were all subject to the pressure testing requirements of ASME Section XI.

Licensee's Proposed Alternative Examination (as stated):

Calvert Cliffs Nuclear Power Plant (CCNPP) proposes to examine the welds in Tables 1 and 2 to the maximum extent practical taking into consideration the limitations of design, geometry, and materials of construction which are characteristic of a plant of our vintage.

Evaluation:

The Code requires 100 percent volumetric examination of the Reactor Pressure Vessel Circumferential Shell Welds, Meridional Head Welds, and Shell-to-Flange Welds and 100percent volumetric and surface examination of Reactor Pressure Vessel Head-to-Flange Welds. The licensee was unable to obtain the volumetric code coverage of essentially 100 percent of the welds listed in Table 1 above. The examinations were all limited by the geometry/configuration of the inside surface of the RPV and RPV head shroud support lugs. To achieve the examination requirements would require modifications to the plant which would be a significant burden on the licensee. Therefore, the Code examinations are impractical.

³ The licensee's Tables 1 and 2 for Category B-A welds are duplicated in Table 1 of this relief request.

The licensee obtained 50 percent through 84 percent volumetric examination coverage which is sufficient to detect any existing patterns of degradation. In addition, the subject welds are subject to the pressure testing requirements of ASME Code, Section XI. The licensee's proposed alternative provides reasonable assurance of structural integrity of the subject welds. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i).

2.3 Request for Relief No. ISI-6 (Part C), Examination Category B-B, Pressure Retaining Welds In Vessels Other Than Reactor Vessels

Code Requirement:

Examination Category B-B, Items B2.12, B2.31, B2.32 and B2.40 require 100 percent volumetric examination of Pressurizer Longitudinal Welds, Steam Generator Circumferential, Meridional, and Tubesheet-to-Head Welds, as defined by Figures IWB-2500-2, -3, -6 respectively.

Licensee's Code Relief Request:

In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required 100 percent volumetric examination of the welds listed below in Table 2.

Table 2

Unit	Component ID	Description	Category Item No.	Exam Coverage	Limitation
1	11-4-102	SG 11 Lower Extension Ring to Lower Head	B-B B2.31	76%	Volumetric coverage limited due to weld geometry
1	11-1-111A	SG 11 Lower Head Meridional Weld (66 degrees)	B-B B2.32	88%	Volumetric coverage limited due to weld geometry and interference from the outlet nozzle.
1	11-4-104	SG 11 Tubesheet to Lower Extension Ring	B-B B2.40	81%	Volumetric coverage limited due to weld geometry
2	2-401D	Pressurizer Lower Shell Weld (0 degrees)	B-B B2.12	58%	Volumetric coverage limited due to permanent insulation support.
2	21-1-111A	SG 21 Meridional Weld (66 degrees)	B-B B2.32	88%	Volumetric coverage limited due to proximity of flow skirt to weld.

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

Title 10 CFR 50.55a(g)(4) requires that pressurized water reactor (PWR) facilities meet the requirements of ASME Section XI in effect for the facility to the extent practical within the limitations of design, geometry, and material of construction. During the

volumetric ultrasonic examination of the components listed in Tables 1 and 2⁴, CCNPP was unable to obtain the volumetric code coverage of “essentially 100% of the weld.” The items listed in Tables 1 and 2 represent the welds credited for the Unit Nos. 1 and 2 Inservice Inspection Long-Term Plans, respectively where 90% or less volumetric examination coverage was obtained as required by Code Case N-460. Tables 1 and 2 provide the Long-Term Plan Summary Number, Component ID, Component Description, ASME Code Category, ASME Item Number, Percent Volumetric Examination Coverage Achieved, and the Reason for the examination limitation for the welds which require relief.

The examinations of the ASME Category B-B, “Pressure Retaining Welds In Vessels other than Reactor Vessels” listed in Tables 1 and 2 were limited due to the vessel nozzle configurations and permanent obstructions on the steam generators and the pressurizers.

To achieve the requirements of “essentially 100% coverage” would require modifications to the plant which would not be practical and would most likely be detrimental to the components.

The proposed alternative provides an acceptable level of quality and safety because the welds listed in Tables 1 and 2 represent a small portion of the welds examined during the second ten-year inservice inspection interval at CCNPP and they were all subject to the pressure testing requirements of ASME Section XI.

Licensee’s Proposed Alternative Examination (as stated):

Calvert Cliffs Nuclear Power Plant (CCNPP) proposes to examine the welds in Tables 1 and 2 to the maximum extent practical taking into consideration the limitations of design, geometry, and materials of construction which are characteristic of a plant of our vintage.

Evaluation:

The Code requires 100 percent volumetric examination of Pressurizer Longitudinal Welds, Steam Generator Circumferential, Meridional, and Tubesheet-to-Head Welds. The licensee was unable to obtain the volumetric code coverage of 100 percent of the weld. The examinations of the ASME Category B-B, “Pressure Retaining Welds In Vessels other than Reactor Vessels” listed in Table 2 were limited due to the vessel nozzle configurations and permanent obstructions on the steam generators and the pressurizer. To achieve the examination requirements would require modifications to the plant which would be a significant burden on the licensee. Therefore, the Code examinations are impractical.

The licensee obtained 58 percent through 88 percent volumetric examination coverage which is sufficient to detect any existing patterns of degradation. In addition, the subject welds are subject to the pressure testing requirements of ASME Section XI. The licensee’s proposed

⁴ The licensee’s Tables 1 and 2 for Category B-B welds are duplicated in Table 2 of this relief request.

alternative provides reasonable assurance of structural integrity of the subject welds. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i).

2.4 Request for Relief No. ISI-6 (Part D), Examination Category B-D, Full Penetration Welds of Nozzles in Vessels

Code Requirement:

Examination Category B-D, Items B3.90, B3.110, and B3.130 require 100 percent volumetric examination of Nozzle-to-Vessel Welds in Reactor Pressure Vessels, Pressurizers, and Steam Generators respectively 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 percent volumetric examination of the welds listed below.

Table 3

Unit	Component ID	Description	Category Item No.	Exam Coverage	Limitation
1	10-205A	RPV Outlet Nozzle (0 degrees)	B-D B3.90	63%	Volumetric Examination limited due to nozzle integral extension geometry.
1	10-205B	RPV Outlet Nozzle (180 degrees)	B-D B3.90	63%	Volumetric Examination limited due to nozzle integral extension geometry.
1	4-404	Pressurizer Surge Line Nozzles	B-D B3.110	71%	Volumetric Examination limited due to permanent attachment and one sided exam from vessel side.
1	4-405	Pressurizer Spray Nozzle to Upper Head	B-D B3.110	66%	Volumetric Examination limited due to nozzle configuration/geometry and thermal sleeve.
1	16-405A	Pressurizer Safety & Relief Valve Nozzle to Upper Head	B-D B3.110	77%	Volumetric Examination limited due to nozzle geometry.
1	16-405B	Pressurizer Safety & Relief Valve Nozzle to Upper Head	B-D B3.110	79%	Volumetric Examination limited due permanent attachment and one sided exam from vessel side.
1	11-5-111A	SG 11 Loop 11A Outlet Nozzle to Shell	B-D B3.130	84%	Volumetric Examination limited due to nozzle configuration/geometry and support skirt attachment to shell.

Unit	Component ID	Description	Category Item No.	Exam Coverage	Limitation
1	11-5-111B	SG 11 Loop 11B Outlet Nozzle to Shell	B-D B3.130	80%	Volumetric Examination limited due to nozzle configuration/geometry and support skirt attachment to shell.
1	11-5-111C	SG 11 Loop 11 Inlet Nozzle to Shell	B-D B3.130	77%	Volumetric Examination limited due to nozzle configuration/geometry and support skirt attachment to shell.
1	12-5-111A	SG 12 Loop 12A Outlet Nozzle to Shell	B-D B3.130	84%	Volumetric Examination limited due to nozzle configuration/geometry and support skirt attachment to shell.
1	12-5-111B	SG 12 Loop 12B Outlet Nozzle to Shell	B-D B3.130	80%	Volumetric Examination limited due to nozzle configuration/geometry and support skirt attachment to shell.
1	12-5-111C	SG 12 Loop 12 Inlet Nozzle to Shell	B-D B3.130	77%	Volumetric Examination limited due to nozzle configuration/geometry and support skirt attachment to shell.
2	10-205A	RPV Outlet Nozzle (0 degrees)	B-D B3.90	62%	Volumetric Examination limited due to nozzle integral extension geometry.
2	10-205B	RPV Outlet Nozzle (180 degrees)	B-D B3.90	62%	Volumetric Examination limited due to nozzle integral extension geometry.
2	4-404	Pressurizer Surge Line Nozzles	B-D B3.110	71%	Volumetric Examination limited due to permanent attachment and one sided exam from vessel side.
2	4-405	Pressurizer Spray Nozzle to Upper Head	B-D B3.110	66.4%	Volumetric Examination limited due to nozzle configuration/geometry and thermal sleeve.
2	16-405B	Pressurizer Safety & Relief Nozzle to Upper Head	B-D B3.110	41.9%	Volumetric Examination limited due configuration/geometry
2	21-5-111A	SG 21 Loop 21A Outlet Nozzle to Shell	B-D B3.130	84%	Volumetric Examination limited due to nozzle configuration/geometry and support skirt attachment to shell.
2	21-5-111B	SG 21 Loop 21B Outlet Nozzle to Shell	B-D B3.130	80%	Volumetric Examination limited due to nozzle configuration/geometry and support skirt attachment to shell.

Unit	Component ID	Description	Category Item No.	Exam Coverage	Limitation
2	21-5-111C	SG 21 Loop 21 Inlet Nozzle to Shell	B-D B3.130	77%	Volumetric Examination limited due to nozzle configuration/geometry and support skirt attachment to shell.
2	22-5-111A	SG 22 Loop 22A Outlet Nozzle to Shell	B-D B3.130	84%	Volumetric Examination limited due to nozzle configuration/geometry and support skirt attachment to shell.
2	22-5-111B	SG 22 Loop 22B Outlet Nozzle to Shell	B-D B3.130	80%	Volumetric Examination limited due to nozzle configuration/geometry and support skirt attachment to shell.
2	22-5-111C	SG 22 Loop 22 Inlet Nozzle to Shell	B-D B3.130	77%	Volumetric Examination limited due to nozzle configuration/geometry and support skirt attachment to shell.

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

Title 10 CFR 50.55a(g)(4) requires that pressurized water reactor (PWR) facilities meet the requirements of ASME Section XI in effect for the facility to the extent practical within the limitations of design, geometry, and material of construction. During the volumetric ultrasonic examination of the components listed in Tables 1 and 2⁵, CCNPP was unable to obtain the volumetric code coverage of “essentially 100% of the weld.” The items listed in Tables 1 and 2 represent the welds credited for the Unit Nos. 1 and 2 Inservice Inspection Long-Term Plans, respectively where 90% or less volumetric examination coverage was obtained as required by Code Case N-460. Tables 1 and 2 provide the Long-Term Plan Summary Number, Component ID, Component Description, ASME Code Category, ASME Item Number, Percent Volumetric Examination Coverage Achieved, and the Reason for the examination limitation for the welds which require relief.

The examinations of the ASME Category B-D, “Full Penetration Welds of Nozzles in Vessels” listed in Tables 1 and 2 were limited due to the nozzle geometry/configurations and support attachments.

To achieve the requirements of “essentially 100% coverage” would require modifications to the plant which would not be practical and would most likely be detrimental to the components.

The proposed alternative provides an acceptable level of quality and safety because the welds listed in Tables 1 and 2 represent a small portion of the welds examined during

⁵ The licensee’s Tables 1 and 2 for Category B-D welds are duplicated in Table 3 of this relief request.

the second ten-year inservice inspection interval at CCNPP and they were all subject to the pressure testing requirements of ASME Section XI.

Licensee's Proposed Alternative Examination (as stated):

Calvert Cliffs Nuclear Power Plant (CCNPP) proposes to examine the welds in Tables 1 and 2 to the maximum extent practical taking into consideration the limitations of design, geometry, and materials of construction which are characteristic of a plant of our vintage.

Evaluation:

The Code requires 100 percent volumetric examination of Nozzle-to-Vessel Welds in Reactor Pressure Vessels, Pressurizers, and Steam Generators.

The licensee was unable to obtain the volumetric code coverage of 100 percent of the subject welds. The examinations of the ASME Category B-D, Full Penetration Welds of Nozzles in Vessels listed were limited due to the nozzle geometry/configurations and support attachments. To achieve the examination requirements it would require modifications to the plant which would be a significant burden on the licensee. Therefore, the Code examinations are impractical.

The licensee obtained 41.9 percent through 84 percent volumetric examination coverage which is sufficient to detect any existing patterns of degradation. In addition, the subject welds are subject to the pressure testing requirements of ASME Section XI. The licensee's proposed alternative provides reasonable assurance of structural integrity of the subject welds. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i).

2.5 Request for Relief No. ISI-6 (Part E), Examination Category B-F, Pressure Retaining Dissimilar Metal Welds

Code Requirement:

Examination Category B-F, Items B5.40, and B5.130 require 100 percent volumetric and surface examinations of pressurizer nozzle-to-safe end welds and dissimilar metal butt welds as defined by Figure IWB-2500-8.

Licensee's Code Relief Request:

In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required 100 percent volumetric examination of the welds listed below.

Table 4

Unit	Component ID	Description	Category Item No.	Exam Coverage	Limitation
1	4-PS-1003-6	Safe End to Nozzle	B-F B5.40	63%	Volumetric Examination limited due to nozzle configuration/geometry and thermal sleeve
1	30-RC-11A-7	Elbow to Safe End	B-F B5.130	45%	Volumetric Examination limited due to weld geometry.
1	30-RC-12B-7	Elbow to Safe End	B-F B5.130	64%	Volumetric Examination limited due to weld geometry.
2	4-PS-1003-8	Safe End to Nozzle	B-F B5.40	75%	Volumetric Examination limited due to nozzle configuration/geometry and thermal sleeve
2	30-RC-21A-7	Elbow to Safe End	B-F B5.130	73%	Volumetric Examination limited due to geometry.
2	30-RC-21A-10	Safe End to Pipe	B-F B5.130	75.4%	Volumetric Examination limited due to configuration/geometry.
2	30-RC-21B-10	Safe End to Pipe	B-F B5.130	81.1%	Volumetric Examination limited due to configuration/geometry.

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

Title 10 CFR 50.55a(g)(4) requires that pressurized water reactor (PWR) facilities meet the requirements of ASME Section XI in effect for the facility to the extent practical within the limitations of design, geometry, and material of construction. During the volumetric ultrasonic examination of the components listed in Tables 1 and 2⁶, CCNPP was unable to obtain the volumetric code coverage of "essentially 100% of the weld." The items listed in Tables 1 and 2 represent the welds credited for the Unit Nos. 1 and 2 Inservice Inspection Long-Term Plans, respectively where 90% or less volumetric examination coverage was obtained as required by Code Case N-460. Tables 1 and 2 provide the Long-Term Plan Summary Number, Component ID, Component Description, ASME Code Category, ASME Item Number, Percent Volumetric Examination Coverage Achieved, and the Reason for the examination limitation for the welds which require relief.

The examinations of the ASME Category B-F, "Pressure Retaining Dissimilar Metal Welds" listed in Tables 1 and 2 were limited due to geometry and materials present in these welds. These welds are typically limited to examination from one side due to the acoustic attenuation characteristics of the cast stainless steel components involved.

⁶ The licensee's Tables 1 and 2 for Category B-F welds are duplicated in Table 4 of this relief request.

To achieve the requirements of “essentially 100% coverage” would require modifications to the plant which would not be practical and would most likely be detrimental to the components.

The proposed alternative provides an acceptable level of quality and safety because the welds listed in Tables 1 and 2 represent a small portion of the welds examined during the second ten-year inservice inspection interval at CCNPP and they were all subject to the pressure testing requirements of ASME Section XI.

Licensee’s Proposed Alternative Examination (as stated):

Calvert Cliffs Nuclear Power Plant (CCNPP) proposes to examine the welds in Tables 1 and 2 to the maximum extent practical taking into consideration the limitations of design, geometry, and materials of construction which are characteristic of a plant of our vintage.

Evaluation:

The Code requires 100 percent volumetric and surface examinations of pressurizer nozzle-to-Safe end welds and dissimilar metal butt welds. The licensee was unable to obtain the volumetric code coverage of 100percent of the subject welds. The examinations of the ASME Category B-F, Pressure Retaining Dissimilar Metal Welds were limited due to geometry and materials present in these welds. These welds are typically limited to examination from one side due to the acoustic attenuation characteristics of the cast stainless steel components involved.

To achieve the examination requirements would require modifications to the plant which would be a significant burden on the licensee. Therefore, the Code examinations are impractical. The licensee obtained 45 percent through 81.1 percent volumetric examination coverage which is sufficient to detect any existing patterns of degradation. In addition, the subject welds are subject to the pressure testing requirements of ASME Section XI. The licensee’s proposed alternative provides reasonable assurance of structural integrity of the subject welds. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i).

2.6 Request for Relief No. ISI-6 (Part F), Examination Category B-J, Pressure Retaining Welds in Piping

Code Requirement:

Examination Category B-J, Items B9.11, and B9.31 requires 100 percent volumetric and surface examination of Circumferential and Branch Connections Pipe Welds of Nominal Pipe size ≥ 4 in. respectively as defined by Figures IWB-2500-8, -9, -10 and -11.

Licensee’s Code Relief Request:

In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required 100 percent volumetric examination of the welds listed below.

Table 5

Unit	Component ID	Description	Category Item No.	Exam Coverage	Limitation
1	30-RC-11A-8	Safe End to Pump	B-J B9.11	41%	Volumetric Examination limited due to geometry and material of the Reactor Coolant Pump.
1	30-RC-11A-9	Pump to Safe End	B-J B9.11	50%	Volumetric Examination limited due to geometry and material of the Reactor Coolant Pump.
1	30-RC-12B-1	Nozzle to Transition Piece	B-J B9.11	46%	Volumetric Examination limited due to nozzle transition configuration/geometry.
1	12-PSL-2	Safe End to Pipe	B-J B9.11	83%	Volumetric Examination limited due to weld geometry.
1	14-SC-1005-1	Reducer to Pipe	B-J B9.11	50%	Volumetric Examination limited due to weld geometry.
1	14-SC-1005-25	Pipe to Elbow	B-J B9.11	68%	Volumetric Examination limited due to weld geometry.
1	12-SI-1012-2	Valve 1-SI-245 to Pipe	B-J B9.11	75%	Volumetric Examination limited due to weld geometry and valve material.
1	6-SI-1002-27	Valve 1-SI-128 to Pipe	B-J B9.11	87%	Volumetric Examination limited due to weld geometry.
1	4-PS-1003M-7	Pipe to Tee	B-J B9.11	88%	Volumetric Examination limited due to tee geometry.
1	4-PS-1003-2	Tee to Elbow	B-J B9.11	89%	Volumetric Examination limited due to tee geometry.
1	4-SR-1001-5	Pipe to Elbow	B-J B9.11	50%	Volumetric Examination limited due to weld geometry.
1	42-RC-12-2/12-SC-1004	Branch Connection	B-J B9.31	50%	Volumetric Examination limited due to nozzle configuration/ geometry.
1	12-SI-1009-4/6-SI-1001	Branch Connection	B-J B9.31	34%	Volumetric Examination limited due to geometry of 6 inch branch connection allows exam from 12 inch pipe side only.
2	30-RC-21A-8	Safe End to Pump	B-J B9.11	29%	Volumetric Examination limited due to geometry.
2	30-RC-21B-1	Nozzle to Transition Piece	B-J B9.11	63.6%	Volumetric Examination limited due to nozzle configuration/geometry and proximity adjacent weld.

Unit	Component ID	Description	Category Item No.	Exam Coverage	Limitation
2	30-RC-21B-8	Safe End to Pump	B-J B9.11	41%	Volumetric Examination limited due to weld geometry and material.
2	30-RC-22A-9	Pump to Safe End	B-J B9.11	55%	Volumetric Examination limited due to weld geometry and material.
2	30-RC-22B-8	Safe End to Pump	B-J B9.11	41%	Volumetric Examination limited due to weld geometry and material.
2	12-SC-2004-5	Valve 2-MOV-652 to Elbow	B-J B9.11	59%	Volumetric Examination limited due to valve configuration/geometry.
2	12-SI-2009-3	Pipe to Valve 2-MOV-614	B-J B9.11	46%	Volumetric Examination limited due to valve configuration/geometry.
2	12-SI-2009-10	Valve 2-SI-217 to Elbow	B-J B9.11	84.2%	Volumetric Examination limited due to configuration/geometry.
2	12-SI-2012-7	Pipe to Valve 2-SI-247	B-J B9.11	80%	Volumetric Examination limited due to valve configuration/geometry.
2	6-SI-2004C-1	Valve 2-SI-148 to Pipe	B-J B9.11	31%	Volumetric Examination limited due to valve configuration/geometry.
2	4-PS-2003-3	Pipe to Tee	B-J B9.11	67%	Volumetric Examination limited due to tee configuration/geometry.
2	4-SR-2005-2	Pressurizer Safety and Relief Safe End to Elbow	B-J B9.11	63%	Volumetric Examination limited due to safe end configuration/geometry.
2	12-SI-2009-4/6-SI-2001	Branch Connection	B-J B9.31	50%	Volumetric Examination limited due to configuration/geometry.
2	12-SI-2011-4/6-SI-2003	Branch Connection	B-J B9.31	50%	Volumetric Examination limited due to configuration/geometry.
2	12-SI-2012-4/6-SI-2004C	Branch Connection	B-J B9.31	31%	Volumetric Examination limited due to branch configuration/geometry.
2	42-RC-22-2/12-SC-2004	Branch Connection	B-J B9.31	35.1%	Volumetric Examination limited due to configuration/geometry

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

Title 10 CFR 50.55a(g)(4) requires that pressurized water reactor (PWR) facilities meet the requirements of ASME Section XI in effect for the facility to the extent practical

within the limitations of design, geometry, and material of construction. During the volumetric ultrasonic examination of the components listed in Tables 1 and 2⁷, CCNPP was unable to obtain the volumetric code coverage of “essentially 100% of the weld.” The items listed in Tables 1 and 2 represent the welds credited for the Unit Nos. 1 and 2 Inservice Inspection Long-Term Plans, respectively where 90% or less volumetric examination coverage was obtained as required by Code Case N-460. Tables 1 and 2 provide the Long-Term Plan Summary Number, Component ID, Component Description, ASME Code Category, ASME Item Number, Percent Volumetric Examination Coverage Achieved, and the Reason for the examination limitation for the welds which require relief.

The Examinations of the ASME Category B-J, “Pressure Retaining Welds in Piping” listed in Tables 1 and 2 were limited due to combinations of the welds geometry and materials of construction.

To achieve the requirements of “essentially 100% coverage” would require modifications to the plant which would not be practical and would most likely be detrimental to the components.

The proposed alternative provides an acceptable level of quality and safety because the welds listed in Tables 1 and 2 represent a small portion of the welds examined during the second ten-year inservice inspection interval at CCNPP and they were all subject to the pressure testing requirements of ASME Section XI.

Licensee’s Proposed Alternative Examination (as stated):

Calvert Cliffs Nuclear Power Plant (CCNPP) proposes to examine the welds in Tables 1 and 2 to the maximum extent practical taking into consideration the limitations of design, geometry, and materials of construction which are characteristic of a plant of our vintage.

Evaluation:

The Code requires 100 percent volumetric and surface examination of Circumferential and Branch Connections Pipe Welds of Nominal Pipe size ≥ 4 in.

The licensee was unable to obtain the volumetric code coverage of 100 percent of the subject welds. The examinations of the ASME Category B-J, Pressure Retaining Welds were limited due to combinations of the welds geometry and materials of construction. To achieve the examination requirements it would require modifications to the plant which would be a significant burden on the licensee. Therefore, the Code examinations are impractical.

The licensee obtained 31 percent through 89 percent volumetric examination coverage which is sufficient to detect any existing patterns of degradation. In addition, the subject welds are subject to the pressure testing requirements of ASME Section XI. The licensee’s proposed

⁷ The licensee’s Tables 1 and 2 for Category B-J welds are duplicated in Table 5 of this relief request.

alternative provides reasonable assurance of structural integrity of the subject welds. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i).

2.7 Request for Relief No. ISI-6 (Part G), Examination Category C-A, Pressure Retaining Welds in Pressure Vessels

Code Requirement:

Examination Category C-A, Items C1.10, and C1.30 requires 100 percent volumetric examination of Shell Circumferential and Tubesheet-to-Shell Welds of Pressure Vessels respectively as defined by Figures IWC-2500-1, and -2.

Licensee's Code Relief Request:

In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required 100 percent volumetric examination of the welds listed below.

Table 6

Unit	Component ID	Description	Category Item No.	Exam Coverage	Limitation
1	SCHE-11-1	11 Shutdown Cooling Heat Exchanger Flange to Channel Barrel	C-A C1.10	77%	Volumetric Examination limited due to flange geometry preventing examination from one side of weld only.
1	SCHE-12-2	Tube Sheet to Channel Cover	C-A C1.10	65%	Volumetric Examination limited due to tubesheet geometry.
1	RHE-9	Regenerative Heat Exchanger Shell to Tee	C-A C1.10	72%	Volumetric Examination limited due to tee geometry.
1	RHE-16	Regenerative Heat Exchanger Tee to Shell	C-A C1.10	82%	Volumetric Examination limited due to tee geometry.
1	SG-12-8	SG 12 Extension Ring to Tube Sheet	C-A C1.30	66%	Volumetric Examination limited due to weld geometry and permanent obstruction at outside surface.
2	RHE-10	Regenerative Heat Exchanger Shell to Tee	C-A C1.10	72%	Volumetric Examination limited due to tee geometry.

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

Title 10 CFR 50.55a(g)(4) requires that pressurized water reactor (PWR) facilities meet the requirements of ASME Section XI in effect for the facility to the extent practical within the limitations of design, geometry, and material of construction. During the

volumetric ultrasonic examination of the components listed in Tables 1 and 2⁸, CCNPP was unable to obtain the volumetric code coverage of “essentially 100% of the weld.” The items listed in Tables 1 and 2 represent the welds credited for the Unit Nos. 1 and 2 Inservice Inspection Long-Term Plans, respectively where 90% or less volumetric examination coverage was obtained as required by Code Case N-460. Tables 1 and 2 provide the Long-Term Plan Summary Number, Component ID, Component Description, ASME Code Category, ASME Item Number, Percent Volumetric Examination Coverage Achieved, and the Reason for the examination limitation for the welds which require relief.

The Examinations of the ASME Category C-A, “Pressure Retaining Welds in Pressure Vessels” listed in Tables 1 and 2 were limited due to the vessel configuration or permanent obstructions on the outside surface.

To achieve the requirements of “essentially 100% coverage” would require modifications to the plant which would not be practical and would most likely be detrimental to the components.

The proposed alternative provides an acceptable level of quality and safety because the welds listed in Tables 1 and 2 represent a small portion of the welds examined during the second ten-year inservice inspection interval at CCNPP and they were all subject to the pressure testing requirements of ASME Section XI.

Licensee’s Proposed Alternative Examination (as stated):

Calvert Cliffs Nuclear Power Plant (CCNPP) proposes to examine the welds in Tables 1 and 2 to the maximum extent practical taking into consideration the limitations of design, geometry, and materials of construction which are characteristic of a plant of our vintage.

Evaluation:

The Code requires 100 percent volumetric examination of Shell Circumferential and Tubesheet-to-Shell Welds of Pressure Vessels. The licensee was unable to obtain the volumetric code coverage of 100 percent of the subject welds. The examinations of the ASME Category C-A, Pressure Retaining Welds in Pressure Vessels were limited due to the vessel configuration or permanent obstructions on the outside surface. To achieve the examination requirements would require modifications to the plant which would be a significant burden on the licensee. Therefore, the Code examinations are impractical.

The licensee obtained 65 percent through 82 percent volumetric examination coverage which is sufficient to detect any existing patterns of degradation. In addition, the subject welds are subject to the pressure testing requirements of ASME Section XI. The licensee’s proposed alternative provides reasonable assurance of structural integrity of the subject welds. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i).

⁸ The licensee’s Tables 1 and 2 for Category C-A welds are duplicated in Table 6 of this relief request.

2.8 Request for Relief No. ISI-6 (Part H), Examination Category C-B, Pressure Retaining Nozzle Welds in Pressure Vessels

Code Requirement:

Examination Category C-B, Items C2.21 requires 100 percent volumetric examination of Nozzle-to-Shell Welds of Pressure Vessels as defined by Figures IWC-2500-4(a) or (b).

Licensee’s Code Relief Request:

In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required 100 percent volumetric examination of the welds listed below.

Table 7

Unit	Component ID	Description	Category Item No.	Exam Coverage	Limitation
1	SCHE-12-N2	Outlet Nozzle to Shell	C-B C2.21	52%	Volumetric Examination limited due to nozzle geometry preventing examination from one side of weld.
2	SG-22-MS	SG 22 Vessel to Main Steam Nozzle	C-B C2.21	77.8%	Volumetric Examination limited due to nozzle configuration/geometry.
2	SG-22-FW	SG 22 Feedwater Nozzle to Vessel	C-B C2.21	76.2%	Volumetric Examination limited due to nozzle configuration/geometry.
2	SCHE-21-N1	Shutdown Cooling Heat Exchanger Inlet Nozzle	C-B C2.21	44%	Volumetric Examination limited due to nozzle geometry preventing examination from one side of weld.
2	RHE-25	Regenerative Heat Exchanger Pipe to Reducer	C-B C2.21	84%	Volumetric Examination limited due to configuration/geometry.

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

Title 10 CFR 50.55a(g)(4) requires that pressurized water reactor (PWR) facilities meet the requirements of ASME Section XI in effect for the facility to the extent practical within the limitations of design, geometry, and material of construction. During the volumetric ultrasonic examination of the components listed in Tables 1 and 2⁹, CCNPP was unable to obtain the volumetric code coverage of “essentially 100% of the weld.”

⁹ The licensee’s Tables 1 and 2 for Category C-B welds are duplicated in Table 7 of this relief request.

The items listed in Tables 1 and 2 represent the welds credited for the Unit Nos. 1 and 2 Inservice Inspection Long-Term Plans, respectively where 90% or less volumetric examination coverage was obtained as required by Code Case N-460. Tables 1 and 2 provide the Long-Term Plan Summary Number, Component ID, Component Description, ASME Code Category, ASME Item Number, Percent Volumetric Examination Coverage Achieved, and the Reason for the examination limitation for the welds which require relief.

The Examinations of the ASME Category C-B, "Pressure Retaining Nozzle Welds in Vessels" listed in Tables 1 and 2 were limited due to the configuration/geometry of the nozzle welds.

To achieve the requirements of "essentially 100% coverage" would require modifications to the plant which would not be practical and would most likely be detrimental to the components.

The proposed alternative provides an acceptable level of quality and safety because the welds listed in Tables 1 and 2 represent a small portion of the welds examined during the second ten-year inservice inspection interval at CCNPP and they were all subject to the pressure testing requirements of ASME Section XI.

Licensee's Proposed Alternative Examination (as stated):

Calvert Cliffs Nuclear Power Plant (CCNPP) proposes to examine the welds in Tables 1 and 2 to the maximum extent practical taking into consideration the limitations of design, geometry, and materials of construction which are characteristic of a plant of our vintage.

Evaluation

The Code requires 100 percent volumetric examination of Nozzle-to-Shell Welds of Pressure Vessels. The licensee was unable to obtain the volumetric code coverage of 100 percent of the subject welds. The examinations of the ASME Category C-B, Pressure Retaining Nozzle Welds in Vessels were limited due to the configuration/geometry of the nozzle welds. To achieve the examination requirements would require modifications to the plant which would be a significant burden on the licensee. Therefore, the Code examinations are impractical.

The licensee obtained 44 percent through 84 percent volumetric examination coverage which is sufficient to detect any existing patterns of degradation. In addition, the subject welds are subject to the pressure testing requirements of ASME Section XI. The licensee's proposed alternative provides 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

For Request for Relief No. ISI-6 (Part A), 10 CFR 50.55a(g)(6)(ii)(A) Augmented Examination of the Reactor Vessel, the staff concludes that the licensee has maximized examination coverage to the extent practical, and that the licensee's proposed alternative for the augmented reactor pressure vessel examinations is authorized pursuant to 10 CFR 50.55a(a)(3)(ii).

For Request for Relief No. ISI-6 (Parts B through H) the staff concludes that the licensee was unable to obtain the volumetric code coverage of 100percent of the subject welds. The examinations were limited due to the configuration/geometry of the subject welds. For the licensee to achieve the examination requirements it would require modifications to the plant which would be a significant burden on the licensee. Therefore, the Code examinations are impractical. The licensee obtained 31percent through 88percent volumetric examination coverage which is sufficient to detect any existing patterns of degradation. In addition, the subject welds are subject to the pressure testing requirements of ASME Section XI. The licensee's proposed alternatives provide reasonable assurance of structural integrity of the subject welds. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i). The staff has determined that granting relief pursuant to 10 CFR 50.55a(g)(6)(i) 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 Reviewer: T. McLellan

Date: July 27, 2001