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TECHNICAL EVALUATION REPORT
DONALD C. COOK NUCLEAR PLANT UNITS 1 AND 2
INSERVICE INSPECTION PROGRAM

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INTRODUCTION

The revision to 10 CFR 50.55a, published in February 1976, required that Inservice Inspection (ISI) Programs be updated to meet the requirements (to the extent practical) of the Edition and Addenda of Section XI of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code* incorporated in the Regulation by reference in paragraph (b). This updating of the programs was required to be done every 40 months to reflect the new requirements of the later editions of Section XI.

As specified in the February 1976 revision, for plants with Operating Licenses issued prior to March 1, 1976, the regulations became effective after September 1, 1976, at the start of the next regular 40-month inspection period. The initial inservice examinations conducted during the first 40-month period were to comply with the requirements in editions of Section XI and addenda in effect no more than six months prior to the date of start of facility commercial operation.

The Regulation recognized that the requirements of the later editions and addenda of the Section XI might not be practical to implement at facilities because of limitations of design, geometry, and materials of construction of components and systems. It therefore permitted determinations of impractical examination or testing requirements to be evaluated. Relief from these requirements could be granted provided health and safety of the public were not endangered giving due consideration to the burden placed on the licensee if the requirements were imposed. This report provides evaluations of the various requests for relief by the licensee, Indiana and Michigan Electric Company (IMEC), of the Donald C. Cook Nuclear Plant Units 1 and 2. It deals only with inservice examinations of components and with system pressure tests. Inservice tests of pumps and valves (IST programs) are being evaluated separately.

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* Hereinafter referred to as Section XI or Code.

The revision to 10 CFR 50.55a, effective November 1, 1979, modified the time interval for updating ISI programs and incorporated by reference a later edition and addenda of Section XI. The updating intervals were extended from 40 months to 120 months to be consistent with intervals as defined in Section XI.

For plants with Operating Licenses issued prior to March 1, 1976, the provisions of the November 1, 1979, revision are effective after September 1, 1976, at the start of the next one-third of the 120-month interval. During the one-third of an interval and throughout the remainder of the interval, inservice examinations shall comply with the latest edition and addenda of Section XI, incorporated by reference in the Regulation, on the date 12 months prior to the start of that one-third of an interval. For Cook Unit 1, the ISI program and the relief requests evaluated in this report cover the second and third 40-month periods of the first interval (December 23, 1978, to August 23, 1985), and for Cook Unit 2, the report covers the entire first 10-year interval (July 1, 1978, to July 1, 1988). These programs were based upon the 1974 Edition of Section XI of the ASME Boiler and Pressure Vessel Code with Addenda through the Summer of 1975.

The November 1979 revision of the Regulation also provides that ISI programs may meet the requirements of subsequent Code editions and addenda, incorporated by reference in Paragraph (b) and subject to Nuclear Regulatory Commission (NRC) approval. Portions of such editions or addenda may be used, provided that all related requirements of the respective editions or addenda are met. These instances are addressed on a case-by-case basis in the body of this report.

Finally, Section XI of the Code provides for certain components and systems to be exempted from its requirements. In some instances, the exemptions are not acceptable to NRC or are only acceptable with restrictions. As appropriate, these instances are also discussed in this report.

References (1) to (12) listed at the end of this report pertain to information transmittals on the Inservice Inspection (ISI) Program between the licensee and the NRC.

By letters of June 29, 1976,[1] and November 24, 1976,[3] the Commission provided general ISI guidance for Unit 1. The licensee responded to the initial guidance on August 2, 1976,[2] and submitted its ISI program for Cook Unit 1 on September 22, 1978,[4] A resubmittal of the Unit 1 program was made on September 11, 1979.[5] The licensee submitted its ISI program for Unit 2 on November 18, 1977,[7] with a revised program submittal on August 25, 1978.[8] A request for additional information on the ISI programs for both units was made by the Commission on April 5, 1982,[9] and the licensee responded on July 2, 1982.[10] A revised ISI program for both Units 1 and 2 was submitted on September 2, 1982.[11] On September 23, 1982,[12] the licensee informally transmitted further information for his ISI program.

From these submittals, a total of 15 requests for relief from Code requirements or for updating to a later code were identified. These requests are evaluated in the following sections of this report.

I. CLASS 1 COMPONENTS

A. Reactor Vessel

1. Circumferential Seal Weld (Dollar Plate Weld) in Closure Head, Category B-B, Item B1.2

Code Requirement

The volumetric examinations performed during each inspection interval shall cover at least 10% of the length of each longitudinal shell weld and meridional head weld and 5% of the length of each circumferential shell weld and head weld. The areas shall include the longitudinal and circumferential welds in the vessel shell and meridional and circumferential welds in vessel heads. This includes weld metal and base metal for one plate thickness beyond the edge of the weld. Examinations may be performed at or near the end of each inspection interval.

Code Relief Request

The licensee requests relief from volumetric examination of the dollar plate weld in the reactor pressure vessel closure head. The weld is identified as LTP Ref. No. 001300, Weld No. 1-C-02 for Unit 1, and LTP Ref. No. 001100, Weld No. 2-CMC-02 for Unit 2.

Proposed Alternative Examination

None.

Licensee's Basis for Requesting Relief

For Unit 1, relief is requested from performing the Code examination from both sides of the dollar plate weld. This weld can only receive UT coverage from one side of the weld and on the weld. No examination from dollar plate side of the weld can be done due to interference of the permanently mounted ventilation shroud and control rod drive housing.

For Unit 2, relief is requested from performing 100% volumetric Code examination of the reactor vessel closure head dollar plate weld. The weld is inaccessible for examination due to its location within the maze of reactor vessel control rod drive housings.

Evaluation

The designs of the closure head and control rod drive penetrations prevent full volumetric examination of the closure head circumferential seal weld; however, a UT examination can be done from one side and on the weld surface. This examination should be done.

For Unit 2, the licensee's statement does not indicate whether it is possible to examine the weld from one side and on the weld surface as could be done for Unit 1. If this portion of the examination can be made, it should be done.

To maintain the extent of examination for both units, an augmented inservice inspection program of both volumetric and visual examination should be required. The volumetric examination of other (accessible) Category B-B welds should be increased to achieve an examination sample whose total weld length is equal to that required for this Category B-B weld for which relief was requested. The priority in selecting the welds for additional examination should be as follows:

(1) other welds in the closure head, and

(2) other Category B-B welds.

In addition, visual examination for gross leakage should be required during each system pressure test in accordance with IWB-1220(c).

Conclusions and Recommendations

Based on the above evaluation, it is concluded that for the dollar plate welds discussed above, the Code requirements are impractical. It is further concluded that the alternative examination discussed above will provide necessary added assurance of structural reliability. Therefore, the following is recommended:

Relief should be granted from volumetric examination of the identified welds for the 10-year inspection interval, provided that:

(a) The accessible portion of each dollar head weld, i.e., one side and over the weld surface, is examined for 5% of the length.

(b) The examination of the accessible Category B-B welds is increased to achieve an examination sample whose total weld length includes that required for the dollar plate weld for which relief was requested.

(c) A general visual examination per IWB-1220(c) is made during each system pressure test for evidence of leakage in the area of the closure head.

References

Reference 11.

2. Closure Head Flange Weld, Category B-C, Item B1.3 (Unit 2 only)

Code Requirement

The volumetric examination performed each inspection interval shall cumulatively cover 100% of each circumferential weld.

Code Relief Request

Relief is requested from performing 4% of the volumetric Code examination on this reactor vessel closure head flange weld (LTP Ref Number 001900, Weld Number 2-CHC-01).

Proposed Alternative Examination

None.

Licensee's Basis for Requesting Relief

Four percent of the weld cannot be UT examined due to physical interference from the head's three lifting lugs.

Evaluation

Ninety-six percent of the length of the weld can be examined according to Code. This is adequate, provided the visual examination for leakage is made during each pressure test in accordance with IWB-1220(c).

Conclusions and Recommendations

Based on the above evaluation, it is concluded that for the closure head flange weld discussed above, the Code requirements are impractical. It is further concluded that the alternative examination discussed above will provide necessary added assurance of structural reliability. Therefore, the following is recommended:

Relief from volumetrically examining the 4% of the closure head flange weld, inaccessible because of the lifting lugs, should be granted, provided the visual examination per IWB-1220(c) is made.

References

Reference 11.

B. Pressurizer

1. Nozzle-to-Vessel Welds and Nozzle-to-Vessel Radiused Section, Category B-D, Item B2.2 (Unit 2 only)

Code Requirement

A volumetric examination of each nozzle shall cover 100% of the volume as shown in Figure IWB-2500D. All nozzles shall be examined during each inspection interval.

Code Relief Request

Relief is requested from performing a complete Code volumetric examination on the pressurizer surge line nozzle-to-vessel head weld (LTP Ref Number 006950, Weld Number 2-RC-26).

Proposed Alternative Examination

None.

Licensee's Basis for Requesting Relief

The code requires volumetric examination from both sides of the nozzle-to-vessel head weld and on the weld. Relief is requested from performing the examination on the weld and from one side. It is not possible to conduct this U.T. examination on the weld surface and from the nozzle side due to nozzle blend radius interference which prevents contact of the U.T. search unit. This weld is examined from the vessel side for its full length.

Evaluation

The nozzle blend radius prevents proper contact of the transducer on the nozzle side of the weld and on the weld crown. The weld can be examined from the one accessible side as is allowed in more recent versions of the Code (Article III-4420, 1977 Code, Summer 1978 Addenda). This article provides for the angle beam UT of welds from one side, using a full V-path. Relief from the applicable Code requirements can be justified if the newer approved procedure is followed. Since this procedure may not adequately examine the volume of the nozzle base material and inside radiused section, the UT examination should be supplemented by a surface examination. These examinations, and a visual examination for leakage during hydrostatic testing should provide adequate information about the nozzle's integrity.

Conclusions and Recommendations

Based on the above evaluation, it is concluded that for the weld discussed above, the Code requirements are impractical. It is further concluded that the alternative examination discussed above will provide necessary added assurance of structural reliability. Therefore, the following is recommended:

(a) The volumetric examination from the accessible side of the weld should be conducted as discussed by the licensee, using a full-V path to maximize the volume examined.

(b) The limited volumetric examination should be supplemented by a surface examination of the weld and base material.

(c) General visual examination for evidence of leakage should be made during each pressure test in accordance with IWB-1220(c).

References

References 11 and 12.

2. Integrally Welded Vessel Supports, Category B-H, Item B2.8 (Unit 2 only)

Code Requirement

A volumetric examination shall be made of the weld to the vessel and base metal beneath the weld zone and support attachment member for a distance of two support thicknesses. In the case of vessel support skirts, the examination performed during each inspection interval shall cover, at least, 10% of the circumference of the weld to the vessel.

Code Relief Request

Relief is requested from performing a UT examination from the lower head side of the pressurizer support skirt integral weld configuration (LTP Ref Number 008505, Weld Number 2-PRZ-20).

Proposed Alternative Examination

None.

Licensee's Basis for Requesting Relief

The code requires volumetric examination from both sides and on the weld surface of the pressurizer support skirt weld. Relief is requested from performing a UT examination from the lower head side because of the weld configuration. It is not possible to UT from the lower head side due to the curvature of the head and the offset of the support skirt. The weld is examined for its full length on the weld and from the support skirt side.

Evaluation

The angle made by the pressurizer support skirt and lower head is too small to allow UT transducer access to the support skirt weld from the head side (inside). Access is also restricted for performing a surface examination. The licensee has committed to performing a UT examination of the weld along its whole length from the accessible side. A remote visual examination from the inaccessible side should also be made per IWA-2210(b) along with the UT examination for signs of material degradation of the inaccessible weld and vessel surfaces.

Conclusions and Recommendations

Based on the above evaluation, it is concluded that for the weld discussed above, the Code requirements are impractical. It is further concluded that the alternative examinations

discussed above will provide necessary added assurance of structural reliability. Therefore, the following is recommended:

(a) Relief should be granted from the Code requirement to examine the weld from the inside of the support skirt.

(b) The weld and all base material should be examined over 100% of the weld's length as follows:

(1) from the outside diameter by volumetric examination;

(2) from the inside diameter by remote visual means according to IWA-2210(b).

References

References 11 and 12.

C. Heat Exchangers and Steam Generator

No relief requests.

D. Piping Pressure Boundary

1. Circumferential and Longitudinal Pipe Welds, Category B-J, Item B4.5 (Unit 1 only)

Code Requirement

The volumetric examinations performed during each inspection interval shall cover all of the area of 25% of the circumferential joints, including the adjoining 1-ft sections of longitudinal joints. Examinations in each interval shall cover a different 25% until all welds have been examined.

Code Relief Request

Relief is requested from volumetric examination of welds where limitations occur due to piping system or weld geometry. Specific welds requiring relief are as follows:

Isometric Piping Drawing Number	LTP Ref No.	Weld No.
	Reactor Coolant	
1-RC-14	053000	015
	Chemical and Volume Control	
1-CS-92	127100	23F

Proposed Alternative Examination

None.

Licensee's Basis for Requesting Relief

Reactor Coolant System: Relief is requested from performing 18% of the volumetric Code examination from the pipe side due to close proximity of welded pipe lug. No UT examination is possible on the reducer side of the weld due to the steep taper of the reducer.

Chemical and Volume Control: Relief is requested from performing 17% of the volumetric Code examination of this pipe to valve weld from the side due to the close proximity of welded lugs. No UT examination can be done from the valve side due to the steep taper of the valve body.

Evaluation

Imposition of Code examination requirements on these welds is not practical due to the inaccessibility of portions of their lengths. However, the number of inaccessible welds is sufficiently small and random, compared with the total number of welds in Category B-J (or in any of the above affected systems), that none of these welds needs to be (nor is scheduled to be) included in the 25% sample to be examined during this inspection interval.

For subsequent inspection intervals, the licensee has the option of updating to subsequent Code versions or of staying with the 1974 Edition, Summer 1975 Addenda, pursuant to 10 CFR 50.55a (b)(2)(ii). Updating would allow the licensee to examine the same 25% sample, if the provisions of the 1977 Edition, Summer 1978 Addenda, continue to prevail (see Footnote (2) of Category B-J in Table IWB-2500-1). By adopting 10 CFR 50.55a(b)(2)(ii) the Commission was offering an option whereby "operating facilities with ongoing inservice inspection programs would have continuity in the extent and frequency of examinations for pipe welds" (see 44 FR 57913).

Based on these considerations, relief from these requirements is not required at this time for these welds. It is preferable to defer a decision until the next inspection interval, after the licensee has reevaluated which of the above options he wishes to exercise.

Conclusions and Recommendations

Based on the above evaluation, it is concluded that for these welds, relief from the impractical Code requirements is not needed. Therefore, it is recommended that relief from volumetric examination not be granted for this inspection interval.

References

Reference 11.

2. Branch Pipe Connection Welds Exceeding 6-Inch Diameter, Category B-J, Item B4.6 (Unit 2 only)

Code Requirement

The volumetric examination performed during each inspection interval shall cover all of the area of 25% of the branch-pipe connection joints.

Code Relief Request

Relief is requested from performing the Code examination on the weld surface of this branch connection weld (Isometric Piping Drawing No. 2-RC-17, LTP Ref Number 015800, Weld Number 08N).

Proposed Alternative Examination

Surface examination will supplement the UT examination.

Licensee's Basis for Requesting Relief

No UT examination can be done on the weld surface due to the curvature of the weld surface and the radius of the weld. This geometry precludes adequate UT search unit contact when the UT pitch catch technique is used on this highly attenuative stainless steel material. UT examination is conducted from the pipe side of the weld for its full length.

Evaluation

It may be possible to make a full V-path ultrasonic examination of the weld from the pipe side. This examination complies with the more recent 1977 Code, Summer 1978 Addenda, Article III-4420. The required angle beam calibration is given in Article III-3230.

The 1977 Edition of Section XI has been referenced in 10 CFR 50.55a and inservice examinations may meet the requirements of this edition in lieu of those from previous editions with the following provisions:

(a) Commission approval is required to update to the more recent edition (pursuant to 10 CFR 50.55a(g)(4)(iv)).

(b) When applying the 1977 Edition, all the addenda through Summer 1978 Addenda must be used.

(c) Any requirement of the more recent edition which is related to the one(s) under consideration must also be met.

If a full volumetric examination cannot be made from one side, it could be supplemented by a surface examination. This surface examination should meet the intent of Figure IWB-2500-10 of the Summer 1978 Addenda of the 1977 Edition. (Although Item B9.31 of this code version calls for volumetric examination, no examination volume is shown on this figure).

Conclusions and Recommendations

Based on the above evaluation, it is concluded that for the welds discussed above, the code requirements are impractical. It is further concluded that the alternative examination discussed above will provide necessary added assurance of structural reliability. Therefore, the following is recommended:

Pursuant to 10 CFR 50.55a(g)(4)(iv), approval should be granted to update to the requirements of the Summer 1978 Addenda to examine Item B4.6 welds using the techniques in Appendix III, specifically Articles III-3230 and III-4420, with the following provision:

If a full volumetric examination cannot be made from one side of the weld, a surface examination to Figure IWB-2500-10 of the Summer 1978 Addenda should also be done.

References

Reference 11.

3. Integrally Welded Supports, Category B-K-1, Item B4.9

Code Requirement

The volumetric examination of weld areas shall include essentially 100% of the integrally welded external support attachment weld volumes. This includes the welds to the pressure retaining boundary and the base metal beneath the weld zone and along the support attachment member for a distance of two support thicknesses.

Code Relief Request

Relief is requested from performing 100% of the volumetric examination. Specific welds requiring relief are listed as follows:

Isometric Piping Drawing Number	LTP Ref No.	Weld No.
UNIT 1:	Reactor Coolant	
1-RC-10	040600	24F-HL-1[a**]
1-RC-10	040700	24F-HL-2[a]
1-RC-10	040800	24F-HL-3[a]
1-RC-10	040900	24F-HL-4[a]
1-RC-501	059900	03S-RL-4[b]
1-RC-505	066300	27S-PR-1[b]
1-RC-506*	068600	135-PS[c]
1-RC-509	081200	29S-RL-1[b]
1-RC-509	081300	29S-RL-2[b]
1-RC-509	081400	29S-RL-3[b]
1-RC-511	086600	15F-PS-2[d]
	Safety Injection	
1-SI-549	124900	51S[d]
1-SI-21	089600	27S-HL-1[e]
1-SI-25	095400	23S-HL-3[f]
1-SI-25	095500	23S-HL-4[f]

*The licensee had listed this weld as Category B-J, Item B4.8, but it appears to be more properly Category B-K-1, Item B4.9.

**a to f are keys to alternative examinations and licensee's bases.

Isometric Piping Drawing Number	LTP Ref No.	Weld No.
UNIT 2:	Reactor Coolant	
2-RC-32	047400	PR1-PL-2[b]
2-RC-32	047500	PR1-PL-2[b]
2-RC-32	047600	PR1-PL-2[b]
2-TV-34	054800	PR1-PL-1[b]
2-TV-34	054900	PR1-PL-2[b]
2-TV-34	055000	PR1-PL-3[b]
	Safety Injection	
2-SI-56	088000	PR1-PL-1[b]
2-SI-56	088050	PR1-PL-2[b]
	Chemical and Volume Control	
2-CS-119	130000	PR1-PL-1[b]
2-CS-119	134300	PR1-PL-1[b]

Proposed Alternative Examination

Various alternatives are proposed depending upon the weld and are listed as follows:

(a,b) Surface examination will be done to supplemement the limited UT.

(c,d) Surface examination will be done in lieu of volumetric examination.

(e,f) None.

Licensee's Basis for Requesting Relief

Various statements are given depending upon the weld and are listed as follows:

(a) Relief is requested from performing the 100% volumetric Code examinations on these pipe lugs. These welds cannot be UT examined from the weld surface due to the small size of the fillet weld surface. Eighty percent of the weld was UT examined from pipe side.

(b) Relief is requested from performing the volumetric Code examination on the weld surface of this pipe lug weld due to the small size of the fillet weld. UT was done from pipe side.

(c) Relief is requested from performing 100% volumetric Code examination of this pipe support weld. This support consists of a 1-1/2 in. pipe support which is attached to a 2-in. line by a fillet weld. The small size of the fillet weld and component size prevents adequate UT search unit contact.

(d) Relief is requested from performing 100% volumetric Code examination of this pipe support weld. No UT examination can be made on this fillet weld due to the small size.

(e) Relief is requested from performing 10% of the volumetric Code examination of this pipe lug weld from the side due to the close proximity of a welded pipe support.

(f) Relief is requested from 22% of the volumetric Code examination of these two pipe lug welds. The welds are located in a floor penetration with additional interference from an adjacent pipe restraint.

Evaluation

(a-d):

The geometry of fillet welds for piping supports generally cannot be examined to the extent required by Section XI by ultrasonic examination. Ultrasonic examination of the base metal would detect piping flaws in the heat-affected zone but would provide little or no information on weld penetration. Any penetration flaws would most likely generate at the surface and be detectable by surface examination. A surface examination supplementing the UT (where a partial UT can be made) or substituting for the UT examination (where the UT examination is not practical) is adequate.

(e,f):

Only a small portion of the fillet weld will not be volumetrically examined because it is inaccessible. The 78% or 90% of the fillet weld that is examined will provide adequate information on these structural support components.

Conclusions and Recommendations

Based on the above evaluation, it is concluded that for the welds discussed above, the code requirements are impractical. It is further concluded that the alternative examination discussed above will provide necessary added assurance of structural reliability. Therefore, the following is recommended:

(a,b) Relief from the 100% volumetric examination should be granted provided the alternative surface examination is performed to supplement the limited UT examination.

(c,d) Relief from the volumetric examination should be granted provided the alternative surface examination is performed.

(e,f) Relief from volumetrically examining the 10% or 22% inaccessible portion of the weld should be granted provided the accessible portion of each weld is examined according to code.

References

Reference 11.

E. Pump Pressure Boundary

1. Integrally Welded Supports (Reactor Coolant Pumps), Category B-K-1, Item B5.4

Code Requirement

The volumetric examination of the integrally welded support attachment shall include welds to the pressure retaining boundary and the base metal beneath the weld zone and along the support attachment member for a distance of two support thicknesses. The examinations performed during each inspection interval shall cover 25% of the integrally welded supports.

Code Relief Request

Relief is requested from performing 100% volumetric Code examination of the following reactor coolant pump support lug welds:

	LTP Ref No.	Weld No.
UNIT 1:		
	148200	Lug 2
	149000	Lug 2
	149700	Lug 1
UNIT 2:		
	153300	3
	153800	2
	154500	1

Proposed Alternative Examination

A surface examination will be performed on all accessible areas in lieu of volumetric examination.

Licensee's Basis for Requesting Relief

UT examination cannot be performed on the heavy walled cast stainless steel due to the steel's highly attenuative properties. Surface examination will be performed on all accessible areas in lieu of volumetric examination. Five percent of these welds cannot be surface examined due to support component and structural beam interference.

Evaluation

The reactor coolant pump supports are fabricated from castings of austenitic steel. The material properties of cast austenitic steel attenuate ultrasound to the extent that ultrasonic examination is not possible. The materials of construction make the examination requirements of Section XI

impractical. Any penetration flaws would most likely generate at the surface and be detectable by surface examination. The surface examination proposed by the licensee on the accessible portion of the weld (95%) will be adequate.

Conclusions and Recommendations

Based on the above evaluation, it is concluded that for the welds discussed above, the Code requirements are impractical. It is further concluded that the alternative examination discussed above will provide necessary added assurance of structural reliability. Therefore, the following is recommended:

Code relief from the volumetric examination should be granted provided the proposed alternative surface examination on the accessible portion of the weld is performed.

References

Reference 11.

2. Reactor Coolant Pump, Pump Casing Welds, Category B-L-1 Item B5.6

Code Requirement

Volumetric examination shall cover the weld metal and the base metal for one wall thickness beyond the edge of the weld. The examinations performed during each inspection interval shall include 100% of the pressure-retaining welds in at least one pump in each group of pumps performing similar functions in system (e.g., recirculating coolant pumps). The examinations may be performed at or near the end of the inspection interval.

Code Relief Request

Relief is requested from making a radiographic examination of the base metal for one wall thickness beyond the edge of the weld (LTP Ref No. 148400, Weld No. 1-RCP for Unit 1, and LTP Ref No. 153400, Weld No. 1-RCP for Unit 2).

Proposed Alternative Examination

The licensee proposes to examine the base metal for 1/2 in. on either side of the weld using the miniature linear accelerator (MINAC).

Licensee's Basis for Requesting Relief

Relief is requested from performing radiographic examination of the reactor coolant pump circumferential weld in accordance with the 1974 Edition through the Summer 1975 Addenda (74S75) of the code. It is proposed that the 1977 Edition through the Summer 79 Addenda (77S79) apply in this case.

The 74S75 Edition requires that the weld and one wall thickness on each side of the weld receive examination while the 77S79 Edition restricts the examination volume to the weld and 1/2 inch either side of the weld. Due to the nature of performing radiographic examinations utilizing the MINAC, the requirements set forth in the later code are more realistic and yet do not encroach on the quality of the examination results. The radiographic requirements in the 77S79 clarify the requirements for the performance of radiographic examination and establish tolerances for density variations between density readings. This will increase the quality of the radiograph results and minimize radiation exposure.

Evaluation

The examination required by the 1974 Code is not practical. No utility has done an inservice inspection of the reactor coolant

pump casing welds in accordance with the requirements of the 1974 Edition, Summer 1975 Addenda, of Section XI. Several licensees have, however, made successful volumetric examinations by taking multiple shots of the weld and 1/2-in. on each side using the MINAC. The MINAC examination complies with the 1977 Edition, Summer 1978 Addenda, which allows the examination of only 1/2 in. on each side of the weld. The licensee can update to the Summer 1978 Addenda, instead of Summer 1979, to perform the desired examination.

The 1977 Edition of Section XI has been referenced in 10 CFR 50.55a and inservice examinations may meet the requirements of this edition in lieu of those from previous editions with the following provisions:

(a) Commission approval is required to update to the more recent edition (pursuant to 10 CFR 50.55a(g)(4)(iv));

(b) When applying the 1977 Edition, all of the addenda through Summer 1978 Addenda must be used;

(c) Any requirement of the more recent edition which is related to the one(s) under consideration must also be met.

Recommendations

Pursuant to 10 CFR 50.55a(g)(4)(iv), approval to update to the 1977 Edition, Summer 1978 Addenda, should be granted. This would require only 1/2-inch of base metal on each side of the weld to be examined and makes application of the MINAC technique feasible.

References

Reference 11.

F. Valve Pressure Boundary

No relief requests.

II. CLASS 2 COMPONENTS (Units 1 and 2)

A. Pressure Vessels

No relief requests.

B. Piping

1. Containment Penetrations, Main Steam and Feedwater Piping, Category C-G, Item C2.1

Code Requirement

A volumetric examination shall be performed of 50% of the following welds:

> Circumferential butt welds in piping within 3 pipe diameters of the centerline of rigid pipe anchors, or anchors at the penetration of the primary reactor containment, or at rigidly anchored components.

These examinations shall be divided among the number of components of the same size and geometry in each of the multiple streams of a system which perform the same (or redundant) functions, such that the total examinations completed over the system's service lifetime will be equivalent to having performed 100% of the required examinations in one of the multiple streams of the system. Systems or portions of systems with a single stream shall be examined such that 100% of the required examinations of the components will be completed over the system's service lifetime.

If the number of areas subject to examination in a specific category is less than the number of streams, at least one such area shall be examined.

Code Relief Request

Relief is requested from making the volumetric examination in the main steam and in the feedwater systems of each unit selected from the following welds:

	Isometric Piping Drawing Number	System Function	Weld No.	Component No.
UNIT 1:	1-MS-1	Main Steam from	12F	CPN-2*
	1-MS-6	Steam Generator	12	CPN-3
	1-MS-10	to Stop Valves	11	CPN-4
	1-MS-14		11F	CPN-5
	1-FW-11	Feedwater from	01	CPN-9
	1-FW-13	Isolation Check	01	CPN-8
	1-FW-16	Valves to Steam	01	CPN-7
	1-FW-18	Generator	01F	CPN-10

*Containment penetration

	Isometric Piping Drawing Number	System Function	Weld No.	Component No.
UNIT 2:	2-MS-89	Main Steam from	13F	CPN-2
	2-MS-91	Steam Generator	11F	CPN-3
	2-MS-93	to Stop Valves	11	CPN-4
	2-MS-95		11	CPN-5
	2-FW-74	Feedwater from	16	CPN-8
	2-FW-75	Isolation Check	16	CPN-9
	2-FW-76	Valves to Steam	16	CPN-10
	2-FW-77	Generator	15	CPN-7

Proposed Alternative Examination

None.

Licensee's Basis for Requesting Relief

The weld is totally enclosed within the sleeve.

Evaluation

The identified welds are completely inaccessible for volumetric or surface examination because the welds are located inside a containment penetration. Each of these containment penetration assemblies, due to design, leaves one pressure retaining piping weld inaccessible for examination by either surface or volumetric means. The welds can only be examined by inspecting for evidence of leakage during system hydrostatic tests.

The initial design of the assemblies did not provide for accessibility for inservice examinations. If it is assumed, though, that the workmanship and quality assurance of the welding as well as the preservice examinations were adequate, then an examination of the first pressure boundary weld outside the containment should reflect service induced failures for that particular piping section. In the main steam system, this weld is inaccessible because it is covered by a pipe whip restraint as described in II.B.2 of this report. Thus, the first accessible pressure boundary weld outside the containment on one process pipe of each of the two types for which relief is requested could be volumetrically examined, where practical, over 100% of its length during each inspection interval. Such an examination would maintain sample size.

While these containment penetration welds cannot be viewed directly, the licensee could conduct visual examinations for evidence of leakage in the vicinity of these welds when the hydrostatic pressure tests are made.

Conclusions and Recommendations

Based on the above evaluation, it is concluded that for the welds discussed above, the Code requirements are impractical. It is further concluded that the alternative examination discussed above will provide necessary added assurance of structural reliability. Therefore, the following is recommended:

Relief should be granted from the volumetric examination of the identified welds with the following provisions:

(a) The first accessible pressure boundary weld outside the containment on one feedwater and one main steam process pipe on each unit should be volumetrically examined, where practical, over 100% of its length during each inspection interval.

(b) Visual examinations should be performed on all the above listed containment penetration assemblies when leakage and hydrostatic tests are conducted in accordance with IWA-5000.

References

References 11 and 12.

2. Covered Welds, Main Steam Piping, Category C-G, Item C2.1

Code Requirement

A volumetric examination shall be performed of 50% of the following welds:

Circumferential butt welds in piping within 3 pipe diameters of the centerline of rigid pipe anchors, or anchors at the penetration of the primary reactor containment, or at rigidly anchored components.

These examinations shall be divided among the number of components of the same size and geometry in each of the multiple streams of a system which perform the same (or redundant) functions, such that the total examinations completed over the system's service lifetime will be equivalent to having performed 100% of the required examinations in one of the multiple streams of the system. Systems or portions of systems with a single stream shall be examined such that 100% of the required examinations of the components will be completed over the system's service lifetime.

If the number of areas subject to examination in a specific category is less than the number of streams, at least one such area shall be examined.

Code Relief Request

Relief is requested from making the volumetric examination of one weld in the main steam system of each unit selected from the following welds:

	Isometric Piping Drawing Number	System Function	Weld No.	Component No.
UNIT 1:	1-MS-1	Main Steam from	10F	CPN-2*
	1-MS-6	Steam Generator	10F	CPN-3
	1-MS-10	to Stop Valves	9F	CPN-4
	1-MS-14		9F	CPN-5
UNIT 2:	2-MS-89	Main Steam from	11F	CPN-2
	2-MS-91	Steam Generator	9F	CPN-3
	2-MS-93	to Stop Valves	9F	CPN-4
	2-MS-95		9F	CPN-5

Proposed Alternative Examination

None.

*Containment penetration

Licensee's Basis for Requesting Relief

The weld is inaccessible. A large pipe whip restraint surrounds the weld and adjacent area. Volumetric examination is impractical by UT as the weld cannot be reached for positioning and handling transducer, and by RT as exposure has to be made through restraint. Surface examination is impractical as the weld is not readily accessible for application and removal of penetrant. Removal of the pipe whip restraint would require torch cutting 2400- and 2700-lb sections that are supported from above.

Evaluation

The identified welds are the first outside the containment, connecting the process pipe to the outer end of the containment penetration assembly. They are inaccessible for volumetric or surface examination for the reasons given by the licensee. The initial design of these welds did not provide for accessibility for inservice examinations. If it is assumed, though, that the workmanship and quality assurance of the welding as well as the preservice examinations were adequate, then an examination of the first accessible pipe weld outside the containment should reflect service-induced failures for that particular piping section, although stress conditions may be different. Thus, an adjacent weld on one main steam line in each unit could be volumetrically examined, where practical, over 100% of its length during each inspection interval. Such an examination would maintain sample size, provided the welds selected are in different lines from those selected to meet the recommendations for main steam lines discussed in II.B.1 of this report.

While these containment penetration welds cannot be viewed directly, the licensee could conduct visual examinations for evidence of leakage in the vicinity of these welds when the hydrostatic pressure tests are made.

Conclusions and Recommendations

Based on the above evaluation, it is concluded that for the welds discussed above, the Code requirements are impractical. It is further concluded that the alternative examination discussed above will provide necessary added assurance of structural reliability. Therefore, the following is recommended:

Relief should be granted from the volumetric examination of the identified welds with the following provisions:

(a) An adjacent weld in one main steam line in each unit should be volumetrically examined, where practical, over 100% of its length during each inspection interval.

(b) The visual examinations should be performed on all the covered welds when leakage and hydrostatic tests are conducted in accordance with IWA-5000.

References

References 11 and 12.

3. Main Steam Safety Valve Header and Feedwater Branch Connections, Category C-G, Item C2.3

Code Requirement

A volumetric examination shall be performed of 50% of branch connection weld joints.

These examinations shall be divided among the number of components of the same size and geometry in each of the multiple streams of a system which perform the same (or redundant) functions, such that the total examinations completed over the system's service lifetime will be equivalent to having performed 100% of the required examinations in one of the multiple streams of the system. Systems or portions of systems with a single stream shall be examined such that 100% of the required examinations of the components will be completed over the system's service lifetime.

Code Relief Request

Relief is requested from making the volumetric examination on two branch connection-to-pipe welds covered by saddle, selected from the following welds:

Isometric Piping Drawing Number	System Function	Weld No.
UNIT 1:		
1-MS-11	Main Steam from	25, 31, 34, 37, 40, 41
1-MS-15	Steam Generator	26, 29, 32, 35, 38, 41
1-MS-2	to Stop Valves	28, 31, 34, 37, 40, 25
1-MS-7		27, 30, 33, 36, 39, 40
1-FW-10	Auxiliary Feed	44
1-FW-12	Pumps Discharge	39
1-FW-15	to Steam Generator	39
1-FW-17		44
UNIT 2:		
2-MS-90	Main Steam from	15F,16F,17F,18F,14F,13F
2-MS-92	Steam Generator	19F,18F,17F,16F,15F,14F
2-MS-94	to Stop Valves	20F,19F,18F,17F,16F,15F
2-MS-96		18F,17F,15F,14F,13F,16F
2-FW-70	Feedwater	41
2-FW-71		30
2-FW-72		35
2-FW-73		39

Proposed Alternative Examination

Surface examination of (1) branch connection-to-saddle and (2) saddle-to-pipe welds is proposed.

Licensee's Basis for Requesting Relief

The weld is inaccessble. Configuration cannot be volumetrically examined for meaningful results.

Evaluation

The sketch accompanying the licensee's basis for requesting relief shows a Branch Connection Fabrication detail with three welds: (1) "branch connection to pipe" weld, (2) "branch connection to saddle" weld, and (3) "saddle to pipe" weld. The "branch connection to pipe" weld is the pressure retaining weld and is covered by the saddle, making it inaccessible for any inspection. The "branch connection to saddle" and "saddle to pipe" welds are not pressure retaining welds; however, any branch connection leak would have to leak through one of these two welds and they are accessible for surface examination. Because they are fillet welds, they are not amenable to volumetric examination. The surface examination should be done as proposed by the licensee.

The selection of two branch connections in each unit fulfills the above sample size requirements, provided actual selection is based on the procedure outlined in Subparagraph IWC-2411(c) of the 1974 Edition, Summer 1975 Addenda.

In addition, the licensee should conduct visual examinations for evidence of leakage in the vicinity of all these welds covered by saddles when the hydrostatic pressure tests are made.

Conclusions and Recommendations

Based on the above evaluation, it is concluded that for these welds, the Code requirements are impractical. It is further concluded that the alternative examinations discussed in the evaluation above will provide necessary added assurance of structural reliability. Therefore, the following is recommended:

Relief should be granted from the volumetric examination for the identified branch connection to pipe welds covered with saddle, with the following provisions:

(a) Surface examination of the branch connection-to-saddle and saddle-to-pipe welds should be made for two such branch connections in each unit during each interval.

(b) Visual examination should be performed on the branch and saddle area of all such branch connections when leakage and hydrostatic tests are conducted in accordance with IWA-5000.

References

Reference 11.

4. Containment Spray Piping (Flow Diagram No. 5144), Category C-G

Code Requirement

A volumetric examination shall be performed of 50% of the following welds:

(a) Circumferential butt welds at structural discontinuities,

(b) Circumferential butt welds within 3 pipe diameters of rigid pipe anchors, or anchors at the penetration of the primary reactor containment, or at rigidly anchored components,

(c) Longitudinal weld joints in pipe fittings,

(d) Branch connection weld joints, and

(e) Pump casing and valve body weld joints.

Code Relief Request

Relief is requested from making the volumetric examination on welds in this system (all welds on Isometric Piping Drawing Nos. 1-CTS-1 through -6 for Unit 1, and on Drawing Nos. 2-CTS-10 through -15 for Unit 2).

Proposed Alternative Examination

Visual examination is proposed for piping welds.

Licensee's Basis for Requesting Relief

Due to NRC criteria, Standard Review Plan, MEB 3-1, paragraph B.2.e, footnote 6, (page 3.6.2-14): System qualifies as a moderate-energy fluid system, since the time that it operates as a high-energy fluid system is about 2% of the time that it operates as a moderate-energy fluid system.

Evaluation

10 CFR 50.55a(b)(2)(iv)(A), as adopted in 44 FR 57912, states the following:

(iv) Pressure-retaining welds in ASME Code Class 2, piping (applies to Tables IWC-2520 or IWC-2520-L, Category C-F). (A) Appropriate Code Class 2 pipe welds in Residual Heat Removal Systems, Emergency Core Cooling Systems and Containment Heat Removal Systems, shall be examined. The extent of examination for these systems shall be determined by the requirements of paragraph IWC-1220, Table IWC-2520, Categories C-F and C-G, and paragraph IWC-2411 in the 1974 Edition, Summer 1975 Addenda, of Section XI of the ASME Code.

Therefore, the regulations do not permit granting relief for all the welds in the Containment Spray System.

Recommendation

The request to grant relief for the Containment Spray System should be denied because it violates 10 CFR 50.55a (b)(2)(iv)(A).

References

Reference 11.

5. Emergency Core Cooling Piping (Flow Diagram No. 5143), Category C-G

Except for the system involved, this relief request is identical to the one for the Containment Spray System (see II.B.4 of this report). Therefore, the following is recommended:

The request to grant relief for the Emergency Core Cooling System should be denied because it violates 10 CFR 50.55a (b)(2)(iv)(A).

References

Reference 11.

6. CVCS - Reactor Letdown and Charging (Flow Diagram No. 5129), Category C-G

Code Requirement

A volumetric examination shall be performed of 50% of the following welds:

(a) Circumferential butt welds at structural discontinuities,

(b) Circumferential butt welds within 3 pipe diameters of rigid pipe anchors, or anchors at the penetration of the primary reactor containment, or at rigidly anchored components,

(c) Longitudinal weld joints in pipe fittings,

(d) Branch connection weld joints, and

(e) Pump casing and valve body weld joints.

Code Relief Request

Relief is requested from making the volumetric examination on welds in this system as follows:

Drawing No.	System Function	Sizes (in.)
UNIT 1: All welds in		
1-CS-33	Chemical and volume control from volume control tank to charg pump	6 & 8
1-CS-35		6 & 8
UNIT 2: All welds in		
2-CS-79	Refueling water storage tank to centrifugal charg pump	6 & 8
2-CS-80	Supply header to centrifugal charg pump "E"	6
2-CS-81	Supply header to centrifugal charg pump "W"	6

Proposed Alternative Examination

Visual examination is proposed for all piping.

Licensee's Basis for Requesting Relief

Due to NRC criteria, Standard Review Plan, MEB 3-1, paragraph B.2.e, footnote 6, (pg 3.6.2-14): System qualifies as a moderate-energy fluid system, since the time that it operates as a high-energy fluid system is about 2% of the time that it operates as a moderate-energy fluid system.

Evaluation

These portions of the reactor letdown and charging piping in the chemical and volume control system comply with IWC-1220(b) of the 1977 Edition, Summer 1978 Addenda, of Section XI. That subparagraph exempts components of systems or portions of systems that are not required to operate above a pressure of 275 psig or a temperature of 200°F from the requirements of IWC-2500.

The 1977 Edition, Summer 1978 Addenda, has been referenced in 10 CFR 50.55a and inservice examinations may meet the requirements of this edition in lieu of those from previous editions with the following provisions:

(a) Commission approval is required to update to the more recent edition (pursuant to 10 CFR 50.55a(g)(4)(iv));

(b) When applying the 1977 Edition, all of the addenda through Summer 1978 Addenda must be used;

(c) Any requirement of the more recent edition which is related to the one(s) under consideration must also be met.

Recommendation

Pursuant to 10 CFR 50.55a(g)(4)(iv), approval should be granted to update to the requirements of the 1977 Edition, Summer 1978 Addenda, for paragraph IWC-1220(b). This exempts the reactor letdown and charging piping from the requirements of IWC-2500.

References

Reference 11.

C. Pump

No relief requests.

D. Valves

No relief requests.

III. CLASS 3 COMPONENTS

No relief requests.

IV. PRESSURE TESTS

No relief requests.

V. GENERAL

No relief requests.

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2. J. Tillinghast (IMEC) to B. Rusche (NRC), Donald C. Cook Nuclear Plant, August 2, 1976.

3. D. L. Zieman (NRC) to J. Tillinghast (IMEC), D. C. Cook Unit No. 1, License No.DPR-58, November 24, 1976.

4. J. Tillinghast (IMEC) to H. R. Denton (NRC), Donald C. Cook Nuclear Plant Unit No. 1, Docket No. 50-315, License No. DPR-58, Inservice Inspection Program for Welds, Pumps and Valves, September 22, 1978.

5. R. S. Hunter (IMEC) to H. R. Denton (NRC), Donald C. Cook Nuclear Plant Unit 1, Docket No. 50-315, License No. DPR-58, ISI Program Resubmittal, September 11, 1979.

6. J. Tillinghast (IMEC) to E. G. Case (NRC), Donald C. Cook Nuclear Plant Unit No. 2, Docket No. 50-316, CPPR No. 61, September 29, 1977.

7. J. Tillinghast (IMEC) to E. G. Case (NRC), Donald C. Cook Nuclear Plant Unit No. 2, Docket No. 50-316, CPPR No. 61, November 18, 1977.

8. J. Tillinghast (IMEC) to H. R. Denton (NRC), Donald C.Cook Nuclear Plant Unit No. 2, Docket No. 50-316, License No. DPR-74, August 25, 1978.

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10. R. S. Hunter (IMEC) to H. R. Denton (NRC), Donald C. Cook Nuclear Plants Units No. 1 and 2, Docket Nos. 50-315 and 50-316, License Nos. DPR-58 and DPR-74, Inservice Inspection Program, July 2, 1982.

11. R. S. Hunter (IMEC) to H. R. Denton (NRC), Donald C. Cook Nuclear Plant Units 1 and 2, Docket Nos. 50-315 and 50-316, License Nos. DPR-58 and DPR-74, Inservice Inspection Program - Class 1 and 2 Welds, September 2, 1982.

12. J. I. Castresana (IMEC) to G. A. Freund (SAI), Informal transmittal, September 23, 1982.