



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
OF THE SECOND TEN YEAR INTERVAL INSERVICE INSPECTION PROGRAM PLAN

REQUESTS FOR RELIEF

FOR

CENTERIOR ENERGY

DAVIS-BESSE NUCLEAR POWER STATION

DOCKET NO. 50-346

1.0 INTRODUCTION

The Technical Specifications for Davis-Besse Nuclear Power Station state that the inservice inspection of the American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 components shall be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel 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). Section 50.55a(a)(3) states that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if (i) the proposed alternatives would provide an acceptable level of quality and safety or (ii) compliance with the specified requirements would result in hardship or unusual difficulties without a compensating increase in the level of quality and safety.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that inservice examination of components and system pressure tests conducted during the first ten-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 applicable edition of Section XI of the ASME Code for the Davis-Besse Nuclear Power Station second 10-year inservice inspection (ISI) interval is the 1986 Edition. The components (including supports) may meet the requirements set forth in subsequent editions and addenda of the ASME Code incorporated by reference in 10 CFR 50.55a(b) subject to the limitations and modifications listed therein and subject to Commission approval.

ENCLOSURE 1

Pursuant to 10 CFR 50.55a(g)(5), if the licensee determines that conformance with an examination requirement of Section XI of the ASME Code is not practical for its facility, information shall be submitted to the Commission in support of that determination and a request made for relief from the ASME Code requirement. After evaluation of the determination, pursuant to 10 CFR 50.55a(g)(6)(i), the Commission may grant relief and may impose alternative requirements that are determined to be authorized by law, will not endanger life, property, or the common defense and security, and are otherwise in the public interest, giving due consideration to the burden upon the licensee that could result if the requirements were imposed. In a letter dated August 14, 1995, Centerior Energy, submitted to the NRC its Second Ten-Year Interval Inservice Inspection Program Plan Requests for Relief Nos. RR-A10, RR-A11, RR-A12, and RR-B7 for Davis Besse Nuclear Power Station. The licensee provided additional information in its letters dated January 26, 1996, and March 5, 1996.

2.0 EVALUATION AND CONCLUSIONS

The staff, with technical assistance from its contractor, the Idaho National Engineering Laboratory (INEL), has evaluated the information provided by the licensee in support of its Second Ten-Year Interval Inservice Inspection Program Plan, Requests for Relief Nos. RR-A10, RR-A11, RR-A12, and RR-B7 for Davis Besse Nuclear Power Station. The licensee provided additional information in its letters dated January 26, 1996, and March 5, 1996.

Based on the information submitted, the staff adopts the contractor's conclusions and recommendations presented in the Technical Letter Report attached. The staff has concluded that for Requests for Relief RR-A10, RR-B7, and for the nozzle-to-vessel welds (Items B3.110 and B3.130) contained in Request for Relief RR-A11 the requirements of the Code are impractical and the proposed testing provides reasonable assurance of operational readiness. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i). Such relief is authorized by law and will not endanger life, property, or the common defense and security, and is otherwise in the public interest. The relief has been granted giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

The staff has concluded that the licensee's proposed alternative to determine additional examinations by using IWB-2430 or IWC-2430 of the 1989 Edition, 1991 Addenda of the ASME Code, Section XI contained in Request for Relief RR-A12 will provide an acceptable level of quality and safety, because the licensee's proposed alternative will allow additional examinations to be concentrated on susceptible components. Therefore, the licensee's proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(i).

The inside radius sections (Items B3.120 and B3.140) originally contained in Request for Relief RR-A11 have been withdrawn by the licensee in its letter dated March 5, 1996.

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Date: April 12, 1996

TECHNICAL EVALUATION LETTER REPORT
ON THE SECOND 10-YEAR INTERVAL INSERVICE INSPECTION
REQUESTS FOR RELIEF
FOR
CENTERIOR ENERGY
DAVIS-BESSE NUCLEAR POWER STATION
DOCKET NUMBER: 50-346

1.0 INTRODUCTION

By letter dated August 14, 1995, the licensee, Centerior Energy, submitted Requests for Relief RR-A10, RR-A11, RR-A12, and RR-B7 for the Davis-Besse Nuclear Power Station. As a result of a December 20, 1995, conference call, the licensee provided clarification regarding Requests for Relief RR-A10, RR-A11 and RR-B7 in a letter dated January 26, 1996. Upon further discussions with the Nuclear Regulatory Commission (NRC) staff, the licensee withdrew the portions of Request for Relief RR-A11 regarding the inside radius sections (Items B3.120 and B3.140) by its letter dated March 5, 1996. The Idaho National Engineering Laboratory (INEL) staff has evaluated the information provided by the licensee in support of these requests for relief in the following section.

2.0 EVALUATION

The Code of record for the Davis-Besse Nuclear Power Station second 10-year inservice inspection (ISI) interval is the 1986 Edition of Section XI of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code. The information provided by the licensee in support of the requests for relief has been evaluated and the bases for disposition are documented below.

A. Request for Relief RR-A10, Examination Category B-J, Item B9.31, Class 1 Branch Connection Welds

Code Requirement: Table IWB-2500-1, Examination Category B-J, Item B9.31, requires 100% surface and volumetric examination, as defined by Figures IWB-2500-9, -10, and -11, of 25% of the population of branch

connection welds that are 4-inch nominal pipe size (NPS) or larger. For branch connection welds less than 4-inch NPS, Item B9.22 requires 100% surface examination as defined by the same figure:

Licensee's Code Relief Request: The licensee requests relief from performing the volumetric examination to the extent required by the Code for the reactor coolant piping branch connection welds listed in Table RR-A10 below.

TABLE RR-A10			
Weld ID	Description	Diameter	Volumetric Coverage
DHA	Decay Heat Nozzle Branch Connection	12 inch	75%
SNA	Surge Line Nozzle Branch Connection	10 inch	75%
DN1 DN2 DN3 DN4	Drain Line Nozzle Branch Connection	2.5 inch	75%
IN1 IN2 IN3 IN4	High Pressure Injection Nozzle Branch Connection	2.5 inch	75%

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

"The volumetric examination of the identified welds is limited by the component geometry such that the reduction in coverage is greater than 10 percent. The surface examination is not limited.

"The branch connection weld configuration is similar to Figure IWB-2500-9. Article III-4000 requires a total of four scans for complete examination coverage.

"Scan 1 - A circumferential scan clockwise around the nozzle for reflectors transverse to the weld.

"Scan 2 - A circumferential scan counter-clockwise around the nozzle for reflectors transverse to the weld.

"Scan 3 - An axial scan from the pipe surface around the nozzle for reflectors parallel to the weld.

"Scan 4 - An axial scan from the nozzle surface around the nozzle for reflectors parallel to the weld.

"The Reactor Coolant Piping is clad which limits the examination path to a one-half vee sound path.

"Each branch connection weld can be completely (100 percent) examined circumferentially in both directions. It can also be examined completely (100 percent) in the axial direction from the pipe surface. However, no reliable scan can be performed from the nozzle side due to the nozzle radius interfering with the examination scan. The Reactor Coolant Piping cladding also limits the ability to "bounce" the ultrasonic beam from the pipe side of the weld to obtain coverage in the fourth beam direction. Therefore, only 3 of the 4 required beam directions can be obtained. This results in 75 percent of the examination coverage.

"The examination volume is examined in at least one direction to detect reflectors in both the parallel and transverse directions to the weld. This should detect any defects which may exist.

"Additional welds exist for this examination category item, but are in less critical locations or are subject to less severe service conditions. However, these welds are similar in configuration and would also require relief if they were selected for examination during the present 10-year interval."

The licensee provided additional information in a letter dated January 26, 1996, as stated below.

"The eight 2.5 inch branch connection welds included in this relief request are four High Pressure Injection (HPI) nozzles and four Reactor Coolant System (RCS) Drain Line nozzles. Toledo Edison recognizes that these nozzles could be classified under Code Item B9.32 and subjected to a surface examination only. Since the nozzle assemblies are 8.75 inches in diameter at their connections to the RCS piping, failure of these welds would result in a significant breach of the RCS. Therefore, TE conservatively classified these welds under Code Item B9.31, NPS 4 or larger, thereby subjecting these welds to both volumetric and surface examinations. Since TE committed to examine these welds under Code Item B9.31, they are included in this Relief Request."

Licensee's Proposed Alternative Examination (as stated):

"Each weld will be examined in the circumferential direction in accordance with ASME Code requirements. Each weld will be examined in

the axial direction from the pipe surface only. The surface examination will be performed as required by the ASME Code."

Evaluation: The Code requires 100% volumetric and surface examination for Class 1 branch connection welds 4-inch NPS and larger. For branch connection welds less than 4-inch NPS, only a surface examination is required. The licensee has requested relief from performing 100% volumetric examination of the ten branch connection welds contained in this request. However, eight of these welds are less than 4-inch NPS, for which the Code only requires a surface examination. As stated by the licensee, the nozzle assemblies for these eight welds are actually 8.75 inches in diameter and failure would result in a significant breach of the reactor coolant system (RCS). Although the subject Drain Line and High Pressure Injection (HPI) nozzle welds are part of 2.5-inch lines, the actual connection to the RCS is greater than 4 inches. Therefore, the INEL staff concurs with the licensee's position and believes that these welds have been properly classified as Code Item B9.31 welds.

As stated above, relief is requested from performing the volumetric examinations to the extent required by the Code for the branch connection welds listed in Table RR-A10. To meet the Code requirements, the subject welds must be examined in four directions, including two axial directions, or from one side using extended beam paths to obtain two-directional coverage. For the branch connection welds contained in this request, nozzle geometry precludes axial scanning from the nozzle side of the weld, and extending the beam path to obtain two-directional coverage from one side is not possible due to cladding on the inside surface of the pipe. These conditions make the Code coverage requirements impractical for the subject welds. To meet the Code requirements, these branch connections would require design modifications to allow access for examination. Imposition of this requirement would create a significant burden on the licensee.

In addition to the Code-required surface examination, the licensee can volumetrically examine a significant portion (75%) of each weld.

Consequently, any significant patterns of degradation should be detected, and reasonable assurance of the structural integrity of the subject branch connection welds will be provided by the surface examination and limited volumetric examination.

Considering the impracticality of the Code coverage requirements for the subject welds and the significant percentage of examination coverage obtained, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

B. Request for Relief RR-A11, Examination Category B-D, Items B3.110 and B3.130, Pressurizer and Steam Generator Nozzle-to-Vessel Welds

Note: In a letter dated March 5, 1996, the licensee withdrew the portions of this request regarding the nozzle inside radius sections (Items B3.120 and B3.140). These items have been deleted from the evaluation.

Code Requirement: Table IWB-2500-1, Examination Category B-D, Items B3.110 and B3.130, require 100% volumetric examination as defined by Figure IWB-2500-7 for all pressurizer and steam generator nozzle-to-vessel welds.

Licensee's Code Relief Request: The licensee requested relief from performing the volumetric examinations to the extent required by the Code for the welds listed in Table RR-A11 below.

TABLE RR-A11			
Item No./System	No. of Welds	Weld/Area	Coverage
B3.110/Pressurizer	1	Spray nozzle-to-upper head	72%
	3	Relief nozzle-to-upper head	60%
	1	Surge line nozzle-to-lower head	69%

TABLE RR-A11			
Item No./System	No. of Welds	Weld/Area	Coverage
B3.130/Steam Generator	4	Outlet nozzle-to-lower head	75%
	2	Inlet nozzle-to-upper head	72%

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

"The volumetric examination of the identified welds and inside radii is limited by the nozzle configurations and the inability to 'bounce' the ultrasonic beam from the vessel's inside cladded surface. This reduces the examination coverage more than 10 percent.

"Article 4, Section V of the ASME Code, 1986 Edition requires the weld and adjacent base metal to be examined using nominal angles of 45 and 60 degrees, (deviation is permitted if geometry limits the coverage, however, separation of angles must be at least 10 degrees) and a straight beam. Four basic scan directions are required for the angle beams. Two perpendicular to the weld axis (axial scan) from opposite directions and two parallel to the weld axis (circumferential scan) from opposite directions. These requirements apply for each of the angle beams used (i.e., 45 and 60 degrees). Each of the 45 and 60 degree angle beams is required to pass through all of the weld volume in the four basic scan directions. However, the adjacent base metal scanning requirements allow the two beam angles to pass through in only one direction each for the axial and circumferential scans.

As a result of the December 20, 1995, conference call, the licensee provided additional information in a letter dated January 26, 1996. In response to a question regarding coverage of the nozzle-to-vessel welds, the licensee confirmed that in all cases axial and circumferential scans had been performed in two opposing directions to the extent practical.

Licensee's Proposed Alternative Examination: No alternative to the Code requirements was proposed. The licensee performed the Code-required examinations to the extent practical.

Evaluation: The Code requires a 100% volumetric examination of all Class 1 nozzle-to-vessel welds. For the subject nozzle-to vessel welds, axial scanning is limited to one side due to nozzle configuration, and

using an extended beam path to increase coverage is not feasible due to cladding on the inside surface. Therefore, the Code requirement is impractical for these nozzle-to-vessel welds. To meet the examination coverage requirement, the affected components would have to be modified to allow access for examination. Imposition of the Code coverage requirement on the licensee would create a considerable burden.

The Code-required volumetric examinations have been performed to the extent practical and a considerable portion ($\geq 60\%$) of each nozzle-to-vessel weld has been examined. Therefore, significant patterns of degradation would have been detected and reasonable assurance of structural integrity has been provided. Based on the impracticality of the Code coverage requirements for these welds and the percentage of the Code-required volumetric examinations that has been completed, it is recommended that relief be granted, pursuant to 10 CFR 50.55a(g)(6)(i), for the Item B3.110 and B3.130 nozzle-to-vessel welds.

C. Request for Relief RR-B7, Examination Category C-G, Item C6.10, High Pressure Injection (HPI) Nozzle-to-Pump Casing Welds

Code Requirement: Table IWC-2500-1, Examination Category C-G, Item C6.10, requires a 100% surface examination, as defined by Figure IWC-2500-8, for Class 2 pump casing welds.

Licensee's Code Relief Request: The licensee requested relief from performing the surface examination to the extent required by the Code for the 6-inch suction and the 4-inch discharge nozzle-to-casing welds on the HPI pump.

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

"The surface examination of the identified welds is limited by the component geometry such that the reduction in coverage is greater than 10 percent.

"An integrally welded attachment is welded at the point where the suction and discharge nozzles attach to the High Pressure Injection Pump Casing.

"The circumference of the discharge nozzle to casing weld is approximately 21 inches. The attachment covers up approximately 4.75 inches of the discharge nozzle to casing weld. Therefore, only 77 percent of the examination area is available for examination.

"The circumference of the suction nozzle to casing weld is approximately 14 inches. The attachment covers up approximately 4.75 inches of the discharge nozzle to casing weld. Therefore, only 66 percent of the examination area is available for examination.

"The discharge and suction nozzle welds on both High Pressure Injection Pumps are of similar design. Therefore, no other welds are available for examination."

Licensee's Proposed Alternative Examination (as stated):

"No alternative examination is proposed. The available surface area of the High Pressure Injection Pump discharge and suction nozzle to casing welds will be surface examined to the maximum extent possible."

Evaluation: The Code requires a 100% surface examination for Class 2 pump casing welds. However, complete examination of the subject HPI pump welds is prevented by integrally welded attachments that partially cover the welds and obstruct access for complete examination. Therefore, the Code requirement is impractical for these welds. To meet the Code requirement, the HPI pumps or associated integrally welded attachments would require design modifications to allow access for examination, which would cause a considerable burden on the licensee.

In lieu of the Code requirement, the licensee will examine the welds to the extent practical, which amounts to 77% of the discharge nozzle weld and 66% of the suction nozzle weld. This represents a substantial portion of the Code-required area and should detect any significant patterns of degradation that could occur. Considering the impracticality

of meeting the Code-coverage requirements, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i). The examinations that can be completed will provide reasonable assurance of structural integrity for the subject welds.

D. Request for Relief RR-A12, IWB-2430 and IWC-2430, Additional Examinations for Class 1 and 2 Components

Code Requirement: Section XI, Paragraphs IWB-2430 and IWC-2430 require additional examinations during the current outage when examinations reveal indications that exceed the acceptance standards of Tables IWB-3410-1 and IWC-3400, respectively. The additional examinations shall include the remaining welds, areas, or parts included in the inspection item listing and scheduled for this and the subsequent period.

Licensee's Code Relief Request: The licensee requested relief to use IWB-2430 and IWC-2430 of the 1991 Addenda of the 1989 Edition of ASME Section XI.

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

"Approval to use IWB-2430 and IWC-2430 of the 1989 Edition, 1991 Addenda of ASME Section XI is requested.

"The 1986 Edition of ASME Section XI is very prescriptive in determining the number of additional examinations required when indications exceeding the acceptance standards are found. The root cause or the service conditions to which the component was subjected is not considered when determining the additional examinations. This could result in examining components which do not have the same failure mechanisms as the component which contained the unacceptable indication. Examination time, cost, and radiation exposure would increase without an increase in public health or safety.

"The 1989 Edition, 1991 Addenda of ASME Section XI uses the material and service conditions of the component when determining the need for additional examinations, thereby eliminating the need to perform examinations on components which are not subjected to similar service conditions or are not of similar materials."

Licensee's Proposed Alternative Examination (as stated):

"Additional examinations will be determined using IWB-2430 or IWC-2430 of the 1989 Edition, 1991 Addenda of ASME Section XI."

Evaluation: Additional examinations are required by the Code when examinations performed in accordance with Tables IWB-2500-1 or IWC-2500-1 reveal indications that exceed Code acceptance standards. In accordance with the 1986 Code, the additional examinations are to include the remaining welds, areas, or parts that are included in the Code inspection item number, and scheduled for the current and subsequent period. In lieu of the additional examination requirements of the 1986 Code, the licensee proposed to use the additional examination requirements found in the 1991 Addenda. In accordance with the 1991 Addenda, additional examinations are to be selected from welds, areas, or parts of similar material and service as the original component.

The additional examinations required by the Code of record blanket all components within the inspection item without consideration of the cause of the unacceptable flaw. This approach requires examination of unrelated components that may not be susceptible to the flaw-causing condition. The licensee's proposed alternative, to use the requirements of the 1991 Addenda, allows some latitude so that engineering judgement can be applied in determining where additional examinations are needed. Thus, generic problems can be identified and examinations concentrated on susceptible components. Although the proposed alternative may result in a reduced number of additional examinations, the examinations that are performed will be more effective because they will concentrate on components subject to conditions that caused the original flaw. In addition, the alternative has potential ALARA benefits without compromising plant safety.

Based on the evaluation above, it is concluded that the proposed alternative will provide an acceptable level of quality and safety because the licensee's proposed alternative will allow additional examinations to be concentrated on susceptible components. Therefore, it

is recommended that the licensee's proposed alternative be authorized pursuant to 10 CFR 50.55a(a)(3)(i).

3.0 CONCLUSION

The INEL staff has reviewed the licensee's submittal and concludes that the requirements of the Code are impractical and that relief should be granted pursuant to 10 CFR 50.55a(g)(6)(i) for Requests for Relief RR-A10, RR-B7, and for the nozzle-to-vessel welds (Items B3.110 and B3.130) contained in Request for Relief RR-A11. Such relief is authorized by law and will not endanger life, property, or the common defense and security, and is otherwise in the public interest. The relief has been granted giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

For Request for Relief RR-A12, it is concluded that the licensee's proposed alternative will provide an acceptable level of quality and safety. Therefore, it is recommended that the licensee's proposed alternative be authorized pursuant to 10 CFR 50.55a(a)(3)(i).

The inside radius sections (Items B3.120 and B3.140) originally contained in Request for Relief RR-A11 have been withdrawn by the licensee in its letter dated March 5, 1996.