UNITED STATES
NUCLEAR REGULATORY COMMISSION
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SECOND 10-YEAR INTERVAL INSERVICE INSPECTION REQUESTS FOR RELIEF

SOUTHERN NUCLEAR OPERATING COMPANY, INC.

JOSEPH M. FARLEY NUCLEAR PLANT, UNIT 1

DOCKET NO. 50-348

1.0 INTRODUCTION

The Technical Specifications (TS) for Joseph M. Farley Nuclear Plant, Unit 1 (Farley), state that the inservice inspection (ISI) of the American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 components shall be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code (ASME Code) and applicable addenda as required by Title 10 of the Code of Federal Regulations (10 CFR) Section 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 difficulty without a compensating increase in the level of quality and safety.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions, and the preservice examination requirements set forth in the ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that inservice examination of components and system pressure tests conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The applicable edition of Section XI of the ASME Code for the Farley, Unit 1, second 10-year ISI interval is the 1983 Edition through Summer 1983 Addenda.

Pursuant to 10 CFR 50.55a(g)(5)(i), if the licensee determines that conformance with an examination requirement of Section XI of the ASME Code is not practical for its facility,

Enclosure 1

information shall be submitted to the Commission in support of that determination and a request made for relief.

2.0 EVALUATION

By letter dated March 4, 1998, and supplemented by letter dated August 28, 1998, Southern Nuclear Operating Company, Inc. (SNC), submitted its second 10-year ISI program plan requests for relief for Farley, Unit 1.

The staff, with technical assistance from its contractor, the Idaho National Engineering and Environmental Laboratory (INEEL), has evaluated the information provided by SNC in support of its second 10-year ISI interval Requests for Relief Nos. RR-13, RR-48, RR-49, RR-50, RR-51, RR-52, RR-53, RR-54, and RR-55, for Farley, Unit 1. Based on the results of its review, the staff adopts the contractor's conclusions and recommendations presented in the Technical Letter Report (TER) (Enclosure 2) with the exception of RR-48. In a conference call on August 21, 1998, with the NRC, INEEL, and SNC personnel, RR-48 was discussed. SNC decided to withdraw this relief request and provided a letter dated August 28, 1998, documenting this decision.

Request for Relief, No. RR-13: The ASME Code, Section XI, IWB-2500-1, Examination Category B-J, Item B9.31, requires both 100 percent volumetric and surface examination of the Class 1 branch pipe connection welds nominal pipe size 4 inches and greater as defined by Figures IWB-2500-9, -10, and -11. Pursuant to 10 CFR 50.55a(g)(6)(i), relief is requested from examining 100 percent of the Code-required volume of pressure retaining branch connections located on centrifugally cast stainless steel, Class 1, main loop piping. Specifically, these welds are:

ALA1-4100-20BC	Cold Leg Loop #1, 6" Safety Injection Line Branch Connection
ALA1-4100-22BC	Cold Leg Loop #1, 12" Accumulator Discharge Line Branch Connection
ALA1-4200-15BC	Hot Leg Loop #2, 14" Pressurizer Surge Line Branch Connection
ALA1-4300-16BC	Hot Leg Loop #3, 12" RHR Line Branch Connection

SNC included a sketch in the request for relief displaying the branch connections geometric configurations. The configuration of the branch connections is such that the Code-required 100 percent volumetric coverage cannot be achieved, and therefore the Code coverage requirements are impractical for the subject welds. In order to examine the welds in accordance with the requirements of the Code, the branch connection piping and portions of the main loop piping would have to be redesigned, fabricated, and installed. This would place a considerable burden on SNC. SNC stated that Welds 4100-20BC, 4200-15BC, and 4300-16BC received a 20 percent composite examination coverage, and that Weld ALA1-4100-22BC received an 80 percent composite examination coverage. SNC proposed no alternative

examinations; however, performance of the Code-required surface examinations in conjunction with volumetric examination of other Class 1 branch connection welds provides reasonable assurance of structural integrity of the subject welds. The staff has determined that there is reasonable assurance of the structural integrity of the welds and that relief is granted pursuant to 10 CFR 50.55a(g)(6)(i).

Request for Relief, No. RR-48: This relief request was withdrawn by SNC's letter dated August 28, 1998. It should be noted that INEEL's TER denied RR-48 as requested in SNC's original submittal dated March 4, 1998. During a conference call with the NRC, SNC, and INEEL, this denial was discussed at which time SNC made the decision to withdraw this relief request. Therefore, by letter dated August 28, 1998, the request was withdrawn.

Request for Relief, No. RR-49, Revision 1: The ASME Code, Section XI, Table IWB-2500-1, Examination Category B-D Item B3.90 requires a volumetric examination of reactor pressure vessel (RPV) nozzle-to-vessel welds as defined by Figures IWB-2500-7(a) and (b). The examination volume includes 100 percent of the weld length. Additionally, Section XI, Paragraph IWA-2232(a) requires that ultrasonic examination of vessel welds greater than 2 inches in thickness be conducted in accordance with ASME Code, Section V, Article 4. Article 4 requires two-directional coverage wherever feasible.

Pursuant to 10 CFR 50.55a(g)(6)(i), SNC requested relief from the Code coverage requirements for the reactor pressure vessel nozzle-to-vessel welds listed below.

Inlet Nozzles	Outlet Nozzles
ALA1-1100-18	ALA1-1100-17
ALA1-1100-20	ALA1-1100-19
ALA1-1100-22	ALA1-1100-21

The Code requires 100 percent volumetric examination for the subject nozzle-to-vessel welds. Complete examination coverage was not possible due to nozzle configuration, including nozzle curvature and the protruding inner radius portion of the outlet nozzles. Therefore, the volumetric examination is impractical to perform to the extent required by the Code. To meet the Code requirements, the nozzle-to-vessel welds would require design modification. Imposition of this requirement would create a considerable burden on SNC.

SNC can complete a significant portion (84.5 percent composite coverage of the inlet nozzles and 76.5 percent composite coverage of the outlet nozzles) of the Code-required volumetric examinations. Therefore, existing patterns of degradation would have been detected. This provides reasonable assurance of the structural integrity of the subject nozzle-to-vessel welds. Therefore, the staff has determined that relief is granted pursuant to 10 CFR 50.55a(g)(6)(i).

Request for Relief, No. RR-50: The ASME Code, Section XI, Table IWB-2500-1, Examination Category B-A, Item B1.30, requires a 100 percent volumetric examination of the RPV shell-to-flange weld, as defined by Figure IWB-2500-4.

Pursuant to 10 CFR 50.55a(g)(6)(i), SNC requested relief from volumetric examination of the RPV shell-to-flange Weld ALA1-1100-1 to the extent required by the Code.

The Code requires that the subject RPV shell-to-flange weld be 100 percent volumetrically examined during the inspection interval. Due to the extreme flange taper, the ability to scan for indications transverse to the shell-to-flange weld was limited. Based on the review of this request for relief, it has been determined that it is impractical to examine the subject weld to the extent required by the Code. To obtain the complete coverage required by the Code, refabrication of the RPV flange assembly or redesign of Farley-specific automated inspection equipment by the nondestructive examination (NDE) vendors would be necessary. Imposition of this requirement would cause a considerable burden on SNC.

SNC has committed to continue work with the NDE vendor to evaluate techniques and equipment that will optimize coverage of this weld to the extent practical. SNC calculated that the composite coverage achieved was 65 percent of the required examination volume. Based upon the percent of volumetric coverage obtained, the staff determined that a pattern of degradation, if present, would have been detected. Therefore, coverage that SNC obtained provides reasonable assurance of structural integrity of the subject components and relief is granted pursuant to 10 CFR 50.55a(g)(6)(i).

Request for Relief, No. RR-51: The ASME Code, Section XI, IWB-2500-1, Examination Category B-P, Item Numbers B15.51 and B15.71, requires the system hydrostatic test to include all Class 1 components within the system boundary.

Pursuant to 10 CFR 50.55a(a)(3)(ii), SNC proposed to perform the Class 1 System Hydrostatic Test with the vent and drain valves in the closed position. SNC stated:

> The [reactor coolant system] RCS vent and drain connections will be visually examined with the isolation valves in the normally closed position each refueling outage for leakage and evidence of past leakage during the ASME XI Class 1 System Leakage Test (IWB-5221).
>
> The RCS vent and drain connections will also be visually examined with the isolation valves in the normally closed position during the 10-year ISI pressure test (IWB-5222 and Code Case N-498-1). This examination will be performed with the RCS at nominal operating pressure and at near operating temperature after satisfying the required 4-hour hold time.

The Code requires that a system hydrostatic test be performed once per interval to include all Class 1 components within the RCS system boundary. SNC has proposed an alternative to the hydrostatic test requirements for the subject line segments. The line segments, as stated by SNC, includes two manually operated valves separated by a short pipe nipple, which is connected to the RCS via another short pipe nipple and a half coupling. The line configuration, as previously outlined, provides double isolation of the RCS system. Under normal plant operating conditions, the subject line segments would see RCS temperatures and pressures only if leaking occurs from the inboard valve. In order for SNC to perform the Code-required test, it would be necessary to manually open the inboard valves to pressurize the line segments. Pressurization by this method would defeat the RCS double isolation and may cause safety concerns for the personnel performing the examination duties. Typical line/valve configurations are in close proximity to the primary and secondary RCS piping. Manual

actuation (opening and closing) of these valves in close proximity to the RCS main loop piping, is estimated to expose plant personnel to 1.2 man-rem per test. Therefore, the Code requirement to perform the system hydrostatic test on these line segments presents a hardship on SNC. SNC's proposed alternative will be to visually examine the isolation valves, in the normally closed position each refueling outage, for leaks and evidence of past leakage during the system leakage test. Also, the RCS vent and drain connections will be visually examined with the isolation valves in the normally closed position during the 10-year ISI pressure test.

Based on the evaluation, it has been determined that the Code requirement to perform the system hydrostatic test on the subject line segments at Farley Unit 1 is difficult to achieve. Imposition of the Code requirement on SNC would cause a significant burden that would not be compensated by an increase in quality and safety. SNC's proposed alternative provides reasonable assurance that the structural integrity of the subject line segments will be maintained. Therefore, the staff has determined that SNC's proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(ii).

Request for Relief, No. RR-52: The ASME Code, Section XI, IWB-2500-1, Examination Category C-A, Item Number C1.20 requires a volumetric examination of the Volume Control Tank (VCT) head-to-shell weld. The examination coverage shall include essentially 100 percent of the weld length. Pursuant to 10 CFR 50.55a(g)(6)(i), SNC requested relief from the volumetric examination of the VCT bottom head-to-shell weld to the extent required by the Code.

The Code requires 100 percent volumetric examination of the subject bottom head-to-shell weld. Complete examination coverage was not possible due to the four component supports attached near the subject weld. Therefore, the volumetric examination is impractical to perform to the extent required by the Code. To meet the Code requirements, the VCT supports would have to be redesigned, refabricated, and reinstalled. Imposition of this requirement would create a considerable burden on SNC.

SNC has completed a significant portion of the Code required volumetric examination (80 percent). Therefore, existing patterns of degradation would have been detected. The staff has determined that the inspections performed by SNC provides reasonable assurance of structural integrity of the subject weld. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i).

Request for Relief, No. RR-53: The ASME Code, Section XI, IWB-2500-1, Examination Category C-A, Item Numbers C1.20 requires a volumetric examination of the Excess Letdown Heat Exchanger head-to-weld neck flange. The examination coverage shall include essentially 100 percent of the weld length. Pursuant to 10 CFR 50.55a(g)(6)(i), SNC requested relief from the volumetric examination of the Excess Letdown Heat Exchanger head-to-weld neck flange (Weld No. 1) to the extent required by the Code.

The Code requires 100 percent volumetric examination of the subject head-to-weld neck flange Weld No. 1. Complete examination coverage was not possible due to the geometric configuration of the component; specifically, the taper on the weld neck flange severely limits ultrasonic coverage from the flange side. Therefore, the volumetric examination is impractical

to perform to the extent required by the Code. To meet the Code requirements, the Excess Letdown Heat Exchanger would have to be refabricated and reinstalled. Imposition of this requirement would create a considerable burden on SNC.

SNC has completed 49 percent of the Code-required volumetric examination. Based on the volume that was examined, the staff determined that a pattern of degradation, if present, would have been detected. Thus, the examinations provided provides reasonable assurance of continued inservice structural integrity of the subject components. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i).

Request for Relief, No. RR-54: The ASME Code, Section XI, IWB-2500-1, Examination Category C-A, Item Number C1.10 requires a volumetric examination of the Residual Heat Removal (RHR) Heat Exchanger shell-to-weld neck flange. The examination coverage shall include essentially 100 percent of the weld length. Pursuant to 10 CFR 50.55a(g)(6)(i), SNC requested relief from the volumetric examination of the RHR Heat Exchanger shell-to-weld neck flange (Weld No. 1) to the extent required by the Code.

The Code requires 100 percent volumetric examination of the subject shell-to-weld neck flange Weld No. 1. Complete examination coverage was not possible due to the geometric configuration of the component; specifically, the taper on the weld neck flange severely limits ultrasonic coverage from the flange side. Therefore, the volumetric examination is impractical to perform to the extent required by the Code. To meet the Code requirements, the heat exchanger would have to be refabricated and reinstalled. Imposition of this requirement on SNC would create a considerable burden on SNC.

SNC has completed a significant portion of the Code-required volumetric examination (80 percent). Based on the volume that was examined, it is reasonable to conclude that a pattern of degradation, if present, would have been detected. Thus, the examinations performed by SNC provides reasonable assurance of continued inservice structural integrity of the subject components. Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), relief is granted.

Request for Relief, No. RR-55: The ASME Code, Section XI, Table IWB-2500-1, Examination Category B-G-1, Item B6.10, requires a surface examination of the Reactor Vessel Closure Head Nuts each 10-year interval. Pursuant to 10 CFR 50.55a(a)(3)(i), SNC proposed an alternative to the Code-required surface examination on Reactor Vessel Closure Head Nuts, NUT-1 through NUT-58. SNC stated:

> A VT-1 examination was performed on the interior surface of the nuts.

The Code requires 100 percent surface examination of the reactor pressure vessel closure head nuts. Complete examination coverage was not possible due to the difficulty in obtaining two-directional magnetic particle coverage of the interior surface. This difficulty arose because the magnetic yoke could not physically fit inside the nuts. SNC has completed a significant portion of the Code-required surface examination (75 percent), and a visual examination was performed on the interior surface of the closure head nuts. Based on the coverage that was achieved using the magnetic particle method and the additional visual examination performed on the interior surface, the staff has determined that a pattern of degradation, if present, would

have been detected. Thus, the staff has determined that the examinations performed provide an acceptable level of quality and safety. Therefore, SNC's proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(i).

3.0 CONCLUSION

The staff has reviewed SNC's submittals and concludes that, for Request for Relief No. RR-55, SNC's proposed alternative to the Code requirements provides an acceptable level of quality and safety. Therefore, SNC's proposed alternative contained in Request for relief No. RR-55 is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for the second 10-year ISI interval. For Request for Relief No. RR-51, the staff concludes that the Code requirements would result in a hardship without a compensating increase in the level of quality and safety. Therefore, SNC's proposed alternative contained in Request for Relief No. RR-51 is authorized pursuant to 10 CFR 50.55a(3)(ii) for the second 10-year ISI interval.

For Requests for Relief Nos. RR-13, -49, -50, -52, -53, and -54, the staff concludes that the Code requirements are impractical to perform and the requested relief provides reasonable assurance of structural integrity. Therefore, SNC's Requests for Relief Nos. RR-13, -49, -50, -52, -53, and -54 are granted pursuant to 10 CFR 50.55a(g)(6)(i).

Request for Relief RR-48, was withdrawn by SNC's letter dated August 28, 1998.

Principal Contributor: T. McLellan

Date: October 1, 1998

TECHNICAL LETTER REPORT
ON THE SECOND 10-YEAR INTERVAL INSERVICE INSPECTION
REQUEST FOR RELIEF NOS. RR-13, AND RR-48 THROUGH RR-55
FOR
SOUTHERN NUCLEAR OPERATING COMPANY
JOSEPH M. FARLEY NUCLEAR PLANT, UNIT 1
DOCKET NUMBER: 50-348

1. INTRODUCTION

By letter dated March 4, 1998, the licensee, Southern Nuclear Operating Company, submitted Requests for Relief Nos. RR-13, and RR-48 through RR-55, seeking relief from the requirements of the ASME Code, Section XI, for the Joseph M. Farley Nuclear Plant, Unit 1. These requests for relief are for the second 10-year inservice inspection (ISI) interval. The Idaho National Engineering and Environmental Laboratory (INEEL) staff's evaluation of the subject requests for relief are in the following section.

2. EVALUATION

The information provided by Southern Nuclear Operating Company in support of the requests for relief from Code requirements has been evaluated and the bases for disposition are documented below. The Code of record for the Joseph M. Farley Nuclear Plant, Unit 1, second 10-year ISI interval, which began December 1, 1987, is the 1983 Edition through Summer 1983 Addenda of Section XI of the ASME Boiler and Pressure Vessel Code.

A. Request for Relief, No. RR-13, Examination Category B-J, Item B9.31, Branch Pipe Connection Welds NPS 4 or Larger

Code Requirement: Section XI, IWB-2500-1, Examination Category B-J, Item B9.31 requires both 100% volumetric and surface examination of the Class 1 branch pipe connection welds nominal pipe size 4 inches and greater as defined by figures IWB-2500-9, -10, and -11.

Licensee's Code Relief Request: Pursuant to 10 CFR 50.55a(g)(6)(i), relief is requested from examining 100% of the Code-required volume of pressure retaining branch connections located on centrifugally cast stainless steel, Class 1, main loop piping. Specifically these welds are:

ALA1-4100-20BC	Cold Leg Loop #1, 6" Safety Injection Line Branch Connection
ALA1-4100-22BC	Cold Leg Loop #1, 12" Accumulator Discharge Line Branch Connection

ALA1-4200-15BC Hot Leg Loop #2, 14" Pressurizer Surge Line Branch Connection

ALA1-4300-16BC Hot Leg Loop #3, 12" RHR Line Branch Connection

Licensee's Proposed Alternative: None. The Code-required ultrasonic examinations were performed to the extent practical.

Licensee's Basis for Proposed Alternative (as stated)[1]:
"Composite coverage in this relief request was calculated by Southern Nuclear Operating (SNC) using the average coverage of four scans: (1) pipe side coverage for reflectors oriented parallel to the weld seam, (2) branch connection side coverage for reflectors oriented parallel to the weld seam, (3) clockwise coverage on the weld crown for reflectors oriented transverse to the weld seam, and (4) counter-clockwise coverage on the weld crown for reflectors oriented transverse to the weld seam.

"Welds 4100-20BC, 4200-15BC, and 4300-16BC have configurations such that 2.4" to 3.9" thick stainless steel branch connections are "set-in" to the centrifugally cast stainless steel main loop piping and then welded. (See "set-in" sketch on Attachment 9-1). Coverage is described below.

"Pipe Side Coverage for Parallel Reflectors - Due to the severe attenuation properties of the cast stainless steel material used in the main loop piping, meaningful data from the main run of pipe was only obtainable utilizing a ½ node examination, 45° refracted longitudinal (RL) wave technique. Coverage was determined to be 80% of the weld volume from the pipe side (one-beam direction).

1. "Branch Connection Coverage for Parallel Reflectors - Scans were not performed from the branch connections side due to very limited coverage; therefore, coverage is 0%. The basis for this determination is detailed below.

   "Scanning from the branch connection side would require bouncing a shear wave through metal paths (from the transducer to the examination volume) of 7" to 11" of stainless steel which would significantly attenuate the ultrasonic energy reaching the branch connection/weld interface. Significant attenuation would have then been obtained at the weld interface and the shear wave would not have effectively penetrated into the cast stainless material. (See Attachments 13-2 and 13-3). Additional composite coverage would have been 4% to 7% if the scanning had been performed.

1Figures and attachments furnished with the licensee's submittal are not included in this report.

"Obtaining this minimal Coverage would require fabrication of three new F-304 stainless steel calibration blocks of non-standard diameter and thickness (approximately 10.1" OD by 2.4" thick, 17.6" OD by 3.6" thick, and 19.4" OD by 3.9" thick).

2. "Clockwise Coverage on Weld Crown for Transverse Reflectors - Scanning clockwise on the weld crown for transverse reflectors in the weld root provided little, if any, meaningful coverage due to the curvature of the weld. While scanning was performed on the weld crown during the second interval, coverage plots indicated that the root of the weld was not effectively reached and coverage is determined to be 0%. (See Attachments 13-2 and 13-3.)

3. "Counter-Clockwise Coverage on Weld Crown for Transverse Reflectors - Scanning counter-clockwise on the weld crown for transverse reflectors in the weld root provided little, if any, meaningful coverage due to the curvature of the weld. While scanning was performed on the weld crown during the second interval, coverage plots indicated that the root of the weld was not effectively reached and coverage was determined to be 0%. (See Attachments 13-2 and 13-3.)

4. "Composite Coverage - Using the method described above, the second interval composite coverage was calculated to be 20%. SNC concludes that second interval examinations for this configuration are performed to the maximum extent practical. Performance of additional examinations (from the branch connection side) of very limited coverage, reduced effectiveness, and with the necessity of fabricating non-standard calibration blocks is considered to be a burden, with little compensating increase in the level of safety or quality.

"Weld ALA1-4100-22BC has a configuration such that the SA-351, CF8A cast stainless steel "sweepolet" was welded into the cast stainless steel piping. (See "sweepolet" sketch on Attachment 13-1). Coverage is described below.

A. "Pipe Side Coverage for Parallel Reflectors - 100% of the weld volume was examined from the pipe side using the ½ node, 45° refracted longitudinal (RL) wave technique described above (one-beam direction).

B. "Branch Connection Side Coverage for Parallel Reflectors - Coverage from the branch connection side (second-beam direction) was 50%. Limitations were due to the combination of cast material and curved configuration.

C. "Clockwise Coverage on Weld Crown for Transverse Reflectors - Approximately 100% of the required code coverage was obtained for this weld configuration.

D. "Counter-Clockwise Coverage on Weld Crown for Transverse Reflectors - Approximately 100% of the required code coverage was obtained for this weld configuration.

E. "Composite coverage - Composite coverage for the second interval was calculated to be 87.5%. SNC concludes that examinations for this configuration were performed to the maximum extent practical."

Justification: "The geometric configuration of the branch connections prevented ultrasonic or radiographic examination of the welds to the extent required. Primary cracking mechanisms for these welds is considered by the nuclear industry to be stress-corrosion cracking, thermal fatigue cracking, or mechanically induced fatigue cracking. Each is discussed below.

"Stress Corrosion Cracking - In a low oxygen, PWR primary system water environment there has never been any evidence of stress-corrosion cracking in 304 stainless steel.

"Thermal Fatigue Cracking - Thermal fatigue cracking previously occurred in an FNP primary system branch line; with the cracking initiated by thermal stresses related to stratification. This cracking was located away from the subject branch connection welds. With the subject welds located on the main run of piping, there should be sufficient turbulence and mixing present such that thermal stresses sufficient to initiate cracking in the welds would not be present.

"Mechanically Induced Fatigue Cracking - Fatigue cracking initiated by mechanical means such as vibration was accounted for in the design of the branch connections. However, in the event that unusual vibration remained undetected and subsequently produced cracking, the cracking would most likely have initiated on the outside of the weld and been detected with the required surface examination.

"Overall the potential for cracking in these branch connection welds is low. The low potential for cracking in these welds in conjunction with the partial volumetric examination and complete surface examination performed during the second interval should provide reasonable assurance of the continued structural integrity of these welds. Compliance with Code coverage requirements would require that the branch connection configurations and portions of the main loop piping be redesigned, fabricated, and installed which would be extremely expensive. Denial of this relief request would cause an excessive burden upon Southern Nuclear Company because refabrication of the branch connections to perform the Code-required examinations is impractical; therefore, approval of this relief request should be granted pursuant to 10 CFR 50.55a(g)(6)(i)."

Evaluation: The licensee included a sketch in the request for relief displaying the branch connections geometric configurations. The configuration of the branch connections is such that the Code-required 100% volumetric coverage cannot be

achieved, and therefore the Code coverage requirements are impractical for the subject welds. In order to examine the welds in accordance with the requirements of the Code, the branch connection piping and portions of the main loop piping would have to be redesigned, fabricated, and installed. This would place a considerable burden on the licensee. The licensee stated that Welds 4100-20BC, 4200-15BC, and 4300-16BC received a 20% composite examination coverage, and that Weld ALA1-4100-22BC received a 80% composite examination coverage. The licensee proposed no alternative examinations, however, performance of the Code-required surface examinations in conjunction with volumetric examination of other Class 1 branch connection welds will provide reasonable assurance that any generic degradation will be detected.

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

B. Request for Relief, No. RR-48, Examination Category C-A, Item C1.30, and Category F-B, Item F2.10, Regenerative Heat Exchanger Welds and Component Supports

Code Requirement: Section XI, IWC-1220, "Components Exempt from Examination," contains the exemption criteria for Class 2 components. The following components (or parts of components) are exempted from the volumetric and surface examination requirements of IWC-2500:

(a) components of systems or portions of systems that during normal plant operating conditions are not required to operate or perform a system function but remain flooded under static conditions at a pressure of at least 80% of the pressure that the component or system will be subjected to when required to operate;

(b) components of systems or portions of systems, other than Residual Heat Removal Systems and Emergency Core Cooling Systems, that are not required to operate above a pressure of 275 psig or above a temperature of 200° F;

(c) component connections (including nozzles in vessels and pumps), piping and associated valves, and vessels and their attachments that are 4 in. nominal pipe size and smaller.

Licensee's Proposed Alternative: In accordance with 10 CFR 50.55a(a)(3)(i), the licensee proposed to apply the exemption criteria found in the 1989 Addenda of ASME Section XI; specifically, to exempt the Regenerative Heat Exchanger welds and component supports from the examination requirements of IWC-2500.

Licensee's Basis for the Proposed Alternative (as stated): "Exemption criteria have been added to the 1989 Addenda of ASME Section XI (and subsequent editions/addenda) to allow the exemption of vessels, pumps, valves, and their

connections in piping NPS 4 and smaller (excluding high pressure safety injection). The December 3, 1997, amendment to 10 CFR 50.55a proposed the adoption of the 1995 Edition of ASME Section XI with Addenda through 1996 (which contains this exemption criteria). Additionally, this exemption criteria is contained in Code Case N-408-2, Alternative Rules for Examination of Class 2 Piping, which has received NRC approval for use in Regulatory Guide 1.147. Therefore, the NRC has specifically recognized the use of this exemption criteria.

"The intent of the change to the exemption criteria is to allow exemption of a component connected to exempt piping, provided that failure of the component would not produce a leak greater than the flow through the exempt piping. For the Regenerative Heat Exchanger, the inlet and outlet piping for the shell side is 3" NPS. Therefore, a crack or defect in the Regenerative Heat Exchanger shell would not produce a leak greater than that which would be produced by the loss of inlet or outlet piping. Similarly, a crack or defect in the Regenerative Heat Exchanger tubing (which has no volumetric or surface examination requirements due to the size of the individual tubes) would not produce a leak greater than that which would be produced by the loss of inlet or outlet piping. To produce a leak greater than that produced by the loss of a 4" NPS line would require failure of the shell and failure of multiple heat exchanger tubes, which is not considered a credible inservice failure. Therefore, the intent of the exemption is maintained.

"Additionally, use of this exemption would eliminate unnecessary examinations located in high dose rate areas. Previous dose rate surveys for the Unit 1 Regenerative Heat Exchanger examinations indicate a contact dose rate of approximately 2800 mrem/hr.

Justification: "Use of the later Code edition/addenda exemption criteria to exempt the above specified components should have no adverse affects on the existing level of safety and quality, and relief should be granted pursuant to the requirements of 10 CFR 50.55a(a)(3)(i). Denial of this relief request would require continued personnel radiation exposure to perform examinations not deemed necessary by later Code editions or by the NRC though approval of Code Case N-408-2."

Evaluation: The licensee has requested to use the exemption criteria of IWC-1222 of the 1989 Addenda in lieu of the exemption requirements of the Code of record. In accordance with the 1983 Code, piping NPS 4 and smaller is exempt from examination, but connected components are not. In the 1989 Addenda of Section XI, IWC-1222 was revised to exempt vessels, pumps and valves, and their connections in piping NPS 4 and smaller, with the following note. "*In piping* is defined as having a cumulative inlet and a cumulative outlet pipe cross-sectional area neither of which exceeds the nominal OD cross-sectional area of the designated size." In other words, a component connected to exempt piping is exempt if, upon failure, it would not produce a leak greater than the volume flowing through the exempt piping. This exemption is also contained in Code Case N-408-2, *Alternative Rules for Examination of Class 2 Piping, Section XI,*

Division 1, Which has been approved for general use in Revision 11 of Regulatory Guide 1.147, *Inservice Inspection Code Case Acceptability – ASME Section XI, Division 1*. However, the exemption criteria as written in the 1989 Addenda for the subject component does not distinguish between tube side and shell side piping of heat exchangers. In the licensee's response to the NRC request for additional information for the Unit 1 third ten-year interval inservice inspection program and the Unit 2 inservice inspection program update, dated April 6, 1998, the licensee stated that the Regenerative Heat Exchanger has 3" NPS inlet and outlet lines on the shell side, and 3" NPS inlet and outlet lines on the tube side. Because the subject component contains two 3" inlet and two 3" outlets, the cumulative inlet and cumulative outlet pipe cross-sectional area exceeds the nominal cross-sectional area of the designated size (4"). Therefore, the INEEL staff believes that the Regenerative Heat Exchanger does not fall within the exemption criteria as described in IWC-1222 in the 1989 Addenda of ASME XI, and that it should be examined to the requirements specified in IWC-2500.

Based on the above evaluation, it is concluded that the subject Regenerative Heat Exchanger does not meet the requirements for the exemption criteria as specified in the 1989 Addenda. Therefore the proposed alternative to use the exemption criteria of the 1989 Addenda, or the use of Code Case N-408-2 does not apply to the subject Regenerative Heat Exchanger weld and component supports. Therefore it is recommended that the licensee's proposed alternative not be authorized.

C. Request for Relief, No. RR-49, Revision 1, Examination Category B-D, Item B3.90, Reactor Pressure Vessel (RPV) Nozzle-to-Vessel Welds

Code Requirement: Section XI, Table IWB-2500-1, Examination Category B-D Item B3.90 requires a volumetric examination of reactor pressure vessel (RPV) nozzle-to-vessel welds as defined by Figures IWB-2500-7(a) and (b). The examination volume includes 100% of the weld length. Additionally, Section XI, Paragraph IWA-2232(a) requires that ultrasonic examination of vessel welds greater than 2 inches in thickness be conducted in accordance with ASME Code, Section V, Article 4, requires two-directional coverage wherever feasible.

Licensee's Code Relief Request: Pursuant to 10 CFR 50.55a(g)(6)(i), relief is requested from the Code coverage requirements for the reactor pressure vessel nozzle-to-vessel welds listed below.

Inlet Nozzles	Outlet Nozzles
ALA1-1100-18	ALA1-1100-17
ALA1-1100-20	ALA1-1100-19
ALA1-1100-22	ALA1-1100-21

Licensee's Proposed Alternative (as stated):

"Ultrasonic examination of these welds was performed to the maximum extent practical from the nozzle bore and from the RPV ID surface. No other examination will be conducted."

Licensee's Basis for Requesting Relief (as stated):
"Examination coverage and the basis for limitations for each type of nozzle are listed below:

"Inlet Nozzles-The required examination volume and associated weld configuration for the inlet nozzles is shown in Section XI, Figure IWB-2500-7(a), except that the inner radius is a smooth contour, not a protrusion as shown in the figure. Coverage and limitations for this configuration are:

1. Reflectors Parallel to the Inlet Nozzle-To-Vessel Weld - Ultrasonic examinations were performed from the nozzle bore using 0-degree, 10-degree longitudinal, 30-degree longitudinal, and 50-degree longitudinal scans, as allowed by T-441.4.2. Coverage from this direction was 99%.

2. Reflectors Transverse to the Inlet Nozzle-To-Vessel Weld - Ultrasonic examinations were performed on the ID of the vessel wall and accessible portions of the adjoining nozzle using 0-, 45-, and 60-degree angle beam scans, directed clockwise and counter-clockwise. Scanning could not be performed on the Curved portion of the nozzle inner radius. Coverage from this direction was 70%. (Note: A supplemental 70-degree angle beam scan was used to investigate the ID surface as required by Regulatory Guide 1.150, Revision 1).

3. Composite Coverage - Composite coverage is calculated as 84.5% based on the average of the two coverages listed above.

"Outlet Nozzles - The required examination volume and associated weld configuration (barrel type nozzle with a protruding inner radius) for the outlet nozzles is shown in Section XI, Figure IWB-2500-7(a). Coverage and limitations for this configuration are listed below.

1. Reflectors Parallel to the Outlet Nozzle-To-Vessel Weld - Ultrasonic examinations were performed from the nozzle bore using 0-degree, 10-degree longitudinal, 30-degree longitudinal, and 50-degree longitudinal scans, as allowed by T-441.4.2. Coverage from this direction was 100%.

2. Reflectors Transverse to the Outlet Nozzle-To-Vessel Weld - Ultrasonic examinations were performed on the ID of the vessel wall using 0-, 45-, and 60-degree angle beam scans, directed clockwise and counter-clockwise. The protruding inner radius prevented scanning on the nozzle. Coverage from this direction was 53%. (Note: A supplemental 70-degree angle beam scan was used to investigate the ID surface as required by Regulatory Guide 1.150, Revision 1).

3. Composite Coverage - Composite coverage was calculated as 76.5% based on the average of the two coverages listed above.

Justification: "Various techniques were evaluated including the use of additional angles; however, it was concluded that the techniques described above permitted the maximum practical coverage to be obtained. Compliance with Code coverage requirements would necessitate refabrication of the RPV nozzles, which would be extremely expensive. The examinations performed during the second interval provided reasonable assurance that inservice flaws exceeding acceptance standards have not developed in the subject welds. Denial of this relief request would cause an excessive burden upon Southern Nuclear Operating Company because refabrication of the nozzles to perform the Code required examinations is impractical; therefore, approval of this relief request should be granted pursuant to 10 CFR 50.55a(g)(6)(i).

Evaluation: The Code requires 100% volumetric examination for the subject nozzle-to-vessel welds. Complete examination coverage was not possible due to nozzle configuration including nozzle curvature and the protruding inner radius portion of the outlet nozzles. Therefore, the volumetric examination is impractical to perform to the extent required by the Code. To meet the Code requirements, the nozzle-to-vessel welds would require design modification. Imposition of this requirement would create a considerable burden on the licensee.

The licensee can complete a significant portion (84.5% composite coverage of the inlet nozzles and 76.5% composite coverage of the outlet nozzles) of the Code-required volumetric examinations. Therefore, existing patterns of degradation would have been detected providing reasonable assurance of the structural integrity of the subject nozzle-to-vessel welds. Therefore, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

D. Request for Relief, No. RR-50, Examination Category B-A, Item B1.30, Reactor Pressure Vessel (RPV) Shell to Flange Weld

Code Requirement: Section XI, Table IWB-2500-1, Examination Category B-A, Item B1.30, requires a 100% volumetric examination of the reactor pressure vessel (RPV) shell-to-flange weld as defined by Figure IWB-2500-4.

Licensee's Code Relief Request: Pursuant to 10 CFR 50.55a(g)(6)(i), relief is requested from volumetric examination of the RPV shell-to-flange Weld ALA1-1100-1 to the extent required by the Code.

Licensee's Proposed Alternative (as stated):
"The supplemental 70-degree beam used to investigate the ID surface provided increased coverage for reflectors oriented perpendicular to the weld. No additional examinations are planned for the second interval; however, for the third interval

Southern Nuclear Operating Company will work with the NDE vendor to evaluate techniques and equipment such that optimized coverage of this weld is obtained, to the extent practical."

Licensee's Basis for Requesting Relief (as stated):
"Examination coverage and the basis for the limitations are listed below. (Attachment 50-1 shows the Farley shell-to-flange configuration)[2].

a. Reflectors Parallel to the Shell-to-Flange Weld - As allowed by T-441.4.2, ultrasonic examinations will be performed from the flange seal surface with the sound beam striking the examination volume at near-normal incidence to the weld fusion line using 0-, 6-, 12-, and 16-degree beams. Essentially 100% coverage was obtained during these examinations; therefore, Code requirements for reflectors oriented parallel to the weld were met as allowed by T-441.5.1. (Note: Automated 45- and 60-degree examinations were attempted from the RPV ID during the conduct of the ten-year RPV examinations as part of standard Westinghouse practices; however, interference between the sled holding the transducer and the sharp ID taper prevented meaningful examinations. Supplemental 70-degree examinations for Regulatory Guide 1.150, Revision 1, issues were also performed, during the ten-year examinations, to the extent practical.).

b. Reflectors Transverse to the Shell-to-Flange Weld - Standard Westinghouse automated examinations using a sled in contact with the RPV ID were performed on this weld from the using 45- and 60-degree transducers oriented to detect indications transverse to the weld; however, interference between the sled holding the transducers and the sharp ID taper limited the examinations. The examinations were performed in both the clockwise and counter-clockwise directions with the lower 30% of the examination volume being scanned. A supplemental 70-degree beam was used to investigate the ID surface as required by Regulatory Guide 1.150, Revision 1, with a coverage equal to 47% of the examination volume.

Discussions with Westinghouse examination personnel indicated that the flange configuration at Farley has a severe taper when compared to many other reactor pressure vessels they examine; therefore, the limited coverage was appropriate for the Westinghouse standard examinations that were performed. Reviews indicated that 45- and 60-degree coverage for reflectors transverse to the weld could theoretically have been increased (from 30% to approximately 47%) by removing the examination sled from the RPV and manually repositioning individual transducers; however, this was not a standard practice performed during the conduct of RPV examinations.

2Figures and attachments furnished with the licensee's submittal are not included in this report.

c. Composite Coverage - Based on the average of the two scans listed above, composite coverage was calculated as 65%."

Justification: "Examinations conducted during the first interval were performed using a combination of manual examinations from the flange surface and automated "immersion" technique examinations from the RPV ID. During the "Immersion" technique examinations, the physical flange geometry had much less effect on coverage than it did with the "contact" technique currently used by NDE vendors, since with an "immersion" technique the transducers are not in contact with the ID surface. Since NDE vendors have changed to contact techniques, total compliance with second interval Code requirements would necessitate either refabrication of the RPV flange or for the NDE vendors to change equipment and techniques. Refabrication of the RPV to install a new flange or requiring an NDE vendor to obtain/develop specialized automated inspection equipment for Farley would be very expensive.

"Examinations performed during the first interval on this weld gave reasonable assurance that neither circumferentially oriented or axially oriented flaws exceeding acceptance standards were present. For the second interval, Code examination of the weld from the flange surface provided continued assurance that circumferential cracking exceeding acceptance standards have not developed. From a technical standpoint, circumferential cracking is considered to be the more limiting case with service-induced axially oriented cracking considered a very unlikely scenario for this weld. Therefore, while not meeting the specified Code coverage requirements (for axially oriented flaws), the Code examination performed from the flange surface in conjunction with the limited automated 45-, 60-, and 70-degree examinations provided reasonable assurance that the structural integrity of the weld is being maintained.

"Denial of this relief request would cause an excessive burden upon Southern Nuclear Operating Company because refabrication of the RPV flange to perform the Code required examinations is impractical; therefore, approval of this relief request should be granted pursuant to 10 CFR 50.55a(g)(6)(i)."

Evaluation: The code requires that the subject reactor pressure vessel shell-to-flange weld be 100% volumetrically examined during the inspection interval. Due to the extreme flange taper the ability to scan for indications transverse to the shell-to-flange weld was limited. Based on the review of this request for relief, it has been determined that it is impractical to examine the subject weld to the extent required by the Code. To obtain the complete coverage required by the Code, refabrication of the RPV flange assembly, or redesign of Farley-specific automated inspection equipment by the NDE vendors would be necessary. Imposition of this requirement would cause a considerable burden on the licensee.

The licensee has committed to continue work with the NDE vendor to evaluate techniques and equipment that will optimize coverage of this weld to the extent practical. The licensee calculated that the composite coverage achieved was 65%

of the required examination volume. Based upon the percent of volumetric coverage obtained, it is reasonable to conclude that a pattern of degradation, if present, would have been detected. As a result, reasonable assurance of continued structural integrity has been provided. Therefore, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

E. Request for Relief, No. RR-51, Examination Category B-P, Items B15.51 and B15.71, Pressure Retaining Components

Code Requirement: ASME Section XI, IWB-2500-1, Examination Category B-P, Items B15.51 and B15.71 requires the system hydrostatic test to include all Class 1 components within the system boundary.

Licensee's Proposed Alternative: Pursuant to 10 CFR 50.55a(a)(3)(ii), the licensee proposed to perform the Class 1 System Hydrostatic Test with the vent and drain valves in the closed position. The licensee stated:

> "The RCS vent and drain connections will be visually examined with the isolation valves in the normally closed position each refueling outage for leakage and evidence of past leakage during the ASME XI Class 1 System Leakage Test (IWB-5221).
>
> "The RCS vent and drain connections will also be visually examined with the isolation valves in the normally-closed position during the 10-year ISI pressure test (IWB-5222 and Code Case N-498-1). This examination will be performed with the RCS at nominal operating pressure and at near operating temperature after satisfying the required 4-hour hold time."

Licensee's Basis for Proposed Alternative (as stated):
"These connections are equipped with manual valves which provide for double isolation of the reactor coolant system (RCS) pressure boundary. These valves are generally maintained closed during all modes of operation and the piping outboard of the first isolation valve is, therefore, not normally pressurized. The proposed alternative provides an acceptable level of safety and quality based on the following.

1. "ASME Section XI Code, paragraph IWA-4400, provides the requirements for hydrostatic pressure testing of piping and components after repairs by welding to the pressure boundary. IWA-4400(b)(5) excludes component connections, piping, and associated valves that are 1-inch nominal pipe size and smaller from the hydrostatic pressure test requirement after welded repairs. Therefore, requiring a hydrostatic test and visual examination of these $\leq$1 inch diameter RCS vent/drain connections once each 10-year interval is unwarranted considering that a repair weld on the same connections is exempted by the ASME XI Code."

2. "The non-isolable portion of the RCS vent and drain connections will be pressurized and visually examined as required. Only the isolable portion of the vent and drain connections is not pressurized."

3. "A typical vent/drain connection includes two manual valves separated by a short pipe nipple which is connected to the RCS via another short pipe nipple and a half coupling. All connections are typically socket-welded and the welds received a surface examination after installation. The piping and valves are nominally heavy wall (Schedule 160 pipe and 6000-lb. valve bodies). The vents and drains are not subjected to high stresses or cyclic loads, and the design ratings are significantly greater than RCS operating or design pressure."

4. "The Technical Specifications (TS) require RCS leakage monitoring during normal operation. Should any of the TS limits be exceeded, then appropriate corrective actions, which may include shutting the plant down, are required to identify the source of the leakage and restore the RCS boundary integrity."

"Additionally, SNC believes that there are also potential personnel safety and ALARA issues associated with pressurizing these connections. These issues are as follows:

1. "ASME Code Case N-498-1 is currently used at FNP to perform this test. Pressure testing these connections to the outboard valve requires the inboard isolation valves to be opened and subjects the valves and piping to RCS nominal operating pressure and near operating temperature. Opening the inboard valve at these conditions is contradictory to the requirement for double isolation of the RCS and thus creates the possibility for safety concerns for personnel performing visual examination of the connections."

2. "Performing the test with the inboard valves open requires several man-hours to position the valves for the test and then to restore them after the test is complete. All of these valves are located in close proximity of the RCS main loop piping thus requiring personnel entry into high radiation areas within the containment. Based on previous outage data it is estimated that dose associated with valve alignment and realignment would be approximately 1.2 man-Rem per test."

3. "Since this test would be performed near the end of an outage, when all RCS work has been completed, the time required to open and then close these vent/drain valves could impact the outage schedule."

Justification: "Requiring a hydrostatic test and visual examination of these ≤ 1-inch diameter RCS vent/drain connections once each 10-year interval is unwarranted considering that a repair weld on the same connections is exempted by the ASME XI Code. The added radiation exposure and potential for outage impact associated with opening the valves is not considered justifiable, since the proposed alternative

visual examinations (in conjunction with the TS monitoring requirements for RCS leakage) should provide assurance that the RCS pressure boundary, associated with these connections, is being maintained at an acceptable level of quality and safety. Denial of this relief request results in the potential for outage schedule impacts and radiation exposure without a compensating increase in the level of quality and safety; therefore, the proposed alternative should be granted pursuant to the requirements of 10 CFR 50.55a(a)(3)(ii)."

Evaluation: The Code requires that a system hydrostatic test be performed once per interval to include all Class 1 components within the RCS system boundary. The licensee has proposed an alternative to the hydrostatic test requirements for the subject line segments. The line segments, as stated by the licensee, includes two manual operated valves separated by a short pipe nipple which is connected to the RCS via another short pipe nipple and half coupling. The line configuration as outlined provides double isolation of the RCS system. Under normal plant operating conditions the subject line segments would see RCS temperatures and pressures only if leakby occurs from the inboard valve. In order for the licensee to perform the Code required test, it would be necessary to manually open the inboard valves to pressurize the line segments. Pressurization by this method would defeat the RCS double isolation and may cause safety concerns for the personnel performing the examination duties. Typical line/valve configurations are in close proximity to the primary and secondary RCS piping. Manual actuation (opening and closing) of these valves in close proximity to the RCS main loop piping, is estimated to expose plant personnel to 1.2 man-Rem per test. Therefore the Code requirement to perform the system hydrostatic test on these line segments presents a hardship on the licensee. The licensee's proposed alternative will be to visually examine the isolation valves, in the normally closed position each refueling outage, for leaks and evidence of past leakage during the system leakage test. Also the RCS vent and drain connections will be visually examined with the isolation valves in the normally closed position during the 10-year ISI pressure test. The licensee's proposed alternative will provide reasonable assurance that structural integrity is maintained on the subject line segments.

Based on the evaluation it has been determined that the Code requirement to perform the system hydrostatic test on the subject line segments at Farley Unit 1 is difficult to achieve. Imposition of the Code requirement on Southern Nuclear Operating Company would cause a significant burden that would not be compensated by an increase in quality and safety. The licensee's proposed alternative will provide reasonable assurance that the subject line segments structural integrity will be maintained. Therefore, it is recommended that the licensee's proposed alternative be authorized pursuant to 10 CFR 50.55a(a)(3)(ii).

F. Request for Relief, No. RR-52, Examination Category C-A, Item C1.20, Pressure Retaining Weld in Volume Control Tank

Code Requirement: ASME Section XI, IWB-2500-1, Examination Category C-A, Item Number C1.20, requires a volumetric examination of the Volume Control Tank

head-to-shell weld. The examination coverage shall include essentially 100% of the weld length.

Licensee's Code Relief Request: Pursuant to 10 CFR 50.55a(g)(6)(i), the licensee requested relief from the volumetric examination of the Volume Control Tank bottom head-to-shell weld to the extent required by the Code.

Licensee's Proposed Alternative (as stated):
"None. Code required ultrasonic examinations were performed to the extent practical."

Licensee's Basis for Requesting Relief (as stated):
"The design of this tank (see Attachment 52-1) includes four legs welded near the subject weld which prevented complete ultrasonic or radiographic examination of the weld. Coverage was calculated to be 80%.

Justification "The interference resulting from the presence of the four legs prevented ultrasonic or radiographic examination of the weld to the extent required. In order to have examined the weld in accordance with the requirements, the tank would have had to been redesigned, fabricated, and installed which would be expensive. The examinations performed during the second interval provided reasonable assurance that inservice flaws exceeding acceptance standards have not developed in the subject welds. Denial of this relief request would cause and excessive burden upon Southern Nuclear Operating Company (SNC) because refabrication of the tank to perform the Code required examinations is impractical; therefore, approval of this relief request should be granted pursuant to 10 CFR 50.55a(g)(6)(i)."

Evaluation: The Code requires 100% volumetric examination of the subject bottom head-to-shell weld. Complete examination coverage was not possible due to the four component supports attached near the subject weld. Therefore, the volumetric examination is impractical to perform to the extent required by the Code. To meet the Code requirements, the Volume Control tank supports would have to be redesigned, refabricated, and reinstalled. Imposition of this requirement would create a considerable burden on the licensee.

The licensee has completed a significant portion of the Code required volumetric examination (80%). Therefore, existing patterns of degradation would have been detected and reasonable assurance of the structural integrity of the subject weld was provided. Therefore, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

G. Request for Relief, No. RR-53, Examination Category C-A, Item C1.20, Pressure Retaining Weld in the Excess Letdown Heat Exchanger

Code Requirement: ASME Section XI, IWB-2500-1, Examination Category C-A, Item Number C1.20 requires a volumetric examination of the Excess Letdown Heat

Exchanger head-to-weld neck flange. The examination coverage shall include essentially 100% of the weld length.

Licensee's Code Relief Request: Pursuant to 10 CFR 50.55a(g)(6)(i), the licensee requested relief from the volumetric examination of the Excess Letdown Heat Exchanger head-to-weld neck flange (Weld No. 1) to the extent required by the Code.

Licensee's Proposed Alternative (as stated):
"None. Code restricted ultrasonic examinations were performed to the extent practical."

Licensee's Basis for Requesting Relief (as stated):
"The taper on the weld neck flange severely limited the conduct of ultrasonic examinations from the flange side. Ultrasonic examinations from the head were limited by the presence of the inlet nozzle, the outlet nozzle, and two vent/drain lines. Ultrasonic examination coverage was calculated to be 49%. Performance of radiographic examinations was not feasible due to the presence of the head divider plate. (See Attachment 53-1.)[3]"

Justification: "The geometric configuration prevented ultrasonic examination of the weld to the extent required. In order to have examined the weld in accordance with the requirements, the heat exchanger would have had to been redesigned, fabricated, and installed which would be expensive. The examinations performed during the second interval provided reasonable assurance that inservice flaws exceeding acceptance standards have not developed in the subject welds. Denial of this request would cause an excessive burden upon Southern Nuclear Operating Company (SNC) because refabrication of the heat exchanger to perform the Code required examinations is impractical; therefore, approval of this request should be granted pursuant to 10 CFR 50.55a(g)(6)(i).

Evaluation: The Code requires 100% volumetric examination of the subject head-to-weld neck flange Weld No. 1. Complete examination coverage was not possible due to the geometric configuration of the component, specifically the taper on the weld neck flange severely limits ultrasonic coverage from the flange side. Therefore, the volumetric examination is impractical to perform to the extent required by the Code. To meet the Code requirements, the Excess Letdown Heat Exchanger would have to be refabricated, and reinstalled. Imposition of this requirement would create a considerable burden on the licensee.

The licensee has completed 49% of the Code-required volumetric examination. Based on the volume that was examined, it is reasonable to conclude that a pattern of degradation, if present, would have been detected. Thus, reasonable assurance

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3Figures and attachments furnished with the licensee's submittal are not included in this report.

of continued inservice structural integrity has been provided. Therefore, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

H. Request for Relief, No. RR-54, Examination Category C-A, Item C1.10, Pressure Retaining Weld in the Residual Heat Removal Heat Exchanger

Code Requirement: ASME Section XI, IWB-2500-1, Examination Category C-A, Item Number C1.10 requires a volumetric examination of the Residual Heat Removal Heat Exchanger shell-to-weld neck flange. The examination coverage shall include essentially 100% of the weld length.

Licensee's Code Relief Request: Pursuant to 10 CFR 50.55a(g)(6)(i), the licensee requested relief from the volumetric examination of the Residual Heat Removal Heat Exchanger shell-to-weld neck flange (Weld No. 1) to the extent required by the Code.

Licensee's Proposed Alternative (as stated):
"None. Code required ultrasonic examinations were performed to the extent practical."

Licensee's Basis for Requesting Relief (as stated):
"The taper on the weld neck flange severely limited the conduct of ultrasonic examinations from the flange side. Ultrasonic examinations from the bottom head were limited by the presence of a nozzle reinforcement collar welded around the inlet and outlet nozzles. Ultrasonic examination coverage was calculated to be 80%. Performance of radiographic examinations was not feasible due to presence of the bottom head divider plate. (See Attachment 54-1.)[4]"

Justification: "The geometric configuration prevented ultrasonic examination of the weld to the extent required. In order to have examined the weld in accordance with the requirements, the heat exchanger would have had to been redesigned, fabricated, and installed which would be expensive. The examinations performed during the second interval provided reasonable assurance that inservice flaws exceeding standards have not developed in the subject welds. Denial of this relief request would cause an excessive burden upon Southern Nuclear Operating Company because refabrication of the heat exchanger to perform the Code required examinations is impractical; therefore, approval of this relief request should be granted pursuant to 10 CFR 50.55a(g)(6)(i)."

Evaluation: The Code requires 100% volumetric examination of the subject shell-to-weld neck flange Weld No. 1. Complete examination coverage was not possible due the geometric configuration of the component, specifically the taper on the weld neck flange severely limits ultrasonic coverage from the flange side. Therefore, the volumetric examination is impractical to perform to the extent

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4Figures and attachments furnished with the licensee's submittal are not included in this report.

required by the Code. To meet the Code requirements, the heat exchanger would have to be refabricated, and reinstalled. Imposition of this requirement on the licensee would create a considerable burden on the licensee.

The licensee has completed a significant portion of the Code-required volumetric examination (80%). Based on the volume that was examined, it is reasonable to conclude that a pattern of degradation, if present, would have been detected. Thus reasonable assurance of continued inservice structural integrity has been provided. Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), it is recommended that relief be granted.

I. Request for Relief, No. RR-55, Examination Category B-G-1, Item B6.10, Reactor Pressure Vessel Closure Head Nuts

Code Requirement: Section XI, Table IWB-2500-1, Examination Category B-G-1, Item B6.10, requires a surface examination of the Reactor Vessel Closure Head Nuts each 10-year interval.

Licensee's Proposed Alternative: Pursuant to 10 CFR 50.55a(a)(3)(i), the licensee proposed an alternative to the Code-required surface examination on Reactor Vessel Closure Head Nuts, NUT-1 through NUT-58. The licensee stated:
"A VT-1 examination was performed on the interior surface of the nuts"

Licensee's Basis for Proposed Alternative (as stated):
"MT examination of the 'exterior' surface of the closure head nuts was performed using two examinations approximately perpendicular to each other. Coverage of the 'exterior' surface was 100%. For the 'interior' surface, the first examination was performed with the lines of magnetic flux normal to the threads; however, the second examination could not be performed 'approximately perpendicular' to the first examination, since a MT yoke would not physically fit inside the nuts. (The lines of magnetic flux for the second examination were only +20 degrees to -20 degrees from those of the first examination). Coverage of the 'interior' surface was, therefore, 50% and composite examination coverage was calculated to be 75%.

Justification: "The 1989 Addenda and subsequent editions of ASME Section XI changed the examination requirements of RPV closure head nuts from a surface examination to a visual examination, VT-1. The proposed December 3, 1997, amendment to 10 CFR 50.55a issued by the NRC proposed the adoption of the 1995 Edition of ASME Section XI with Addenda through 1996. As a result, the NRC has recognized that VT-1 examinations of RPV closure head nuts provides an acceptable alternative to the 1989 Code required surface examinations. Public health and safety will not be endangered; therefore, this relief request should be granted pursuant to the requirements of 10 CFR 50.55a(a)(3)(i)."

Evaluation: The Code requires 100% surface examination of the reactor pressure vessel closure head nuts. Complete examination coverage was not possible due to the difficulty in obtaining a two directional magnetic particle coverage of the interior surface. This difficulty arose because the magnetic yoke could not physically fit inside the nuts. The licensee has completed a significant portion of the Code required surface examination (75%), and a visual examination was performed on the interior surface of the closure head nuts. Based on the coverage that was achieved using the magnetic particle method and the additional visual examination performed on the interior surface, it is reasonable to conclude that a pattern of degradation, if present, would have been detected. Thus, the INEEL staff believes that the examinations performed 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).

3.0 CONCLUSION

The INEEL staff has reviewed the licensee's submittal and concluded that for Request for Relief RR-55, the licensee's proposed alternative to the Code requirements provides an acceptable level of quality and safety. Therefore, it is recommended that the proposed alternative be authorized pursuant to 10 CFR 50.55a(a)(3)(i). For Request for Relief RR-51, it is concluded that the Code requirements would result in a hardship without a compensating increase in the level of quality and safety. Therefore, it is recommended that the proposed alternative be authorized pursuant to 10 CFR 50.55a(3)(ii). For Requests for Relief RR-13, -49, -50, -52, -53, and -54, it is concluded that the Code requirements are impractical to perform. Therefore, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i). For Request for Relief RR-48 it is concluded that the proposed alternative does not provide an acceptable level of quality and safety. Therefore, it is recommended that the proposed alternative not be authorized.