Serial: HNP-10-097
10 CFR 50.55a

Progress Energy

SEP 2 4 2010

U.S. Nuclear Regulatory Commission
ATTENTION: Document Control Desk
Washington, DC 20555

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT NO. 1
DOCKET NO. 50-400/RENEWED LICENSE NO. NPF-63
RELIEF REQUEST FROM ASME BOILER AND PRESSURE VESSEL CODE, SECTION XI REQUIREMENTS FOR THE SERVICE WATER SYSTEM

Ladies and Gentlemen:

In accordance with the Code of Federal Regulations, Title 10, Part 50.55a, "Codes and Standards," paragraph (g)(5)(iii), the Harris Nuclear Plant (HNP) of Carolina Power and Light Company, doing business as Progress Energy Carolinas, Inc., submits the following request for relief from the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," 2001 Edition with addenda through 2003.

Approval is requested for deferral of code repair of a flaw in an ASME Code Class 3 piping supply line in the HNP Service Water (SW) system. Slight moisture accumulation on "A" Train Emergency Service Water (ESW) supply pipe 3SW1-114SA-1 indicates a leak point at the interface of a sockolet and sockolet-to-pipe weld. The flaw is located in a section of piping that cannot be isolated to complete a code repair within the time period permitted by the applicable Technical Specifications (TS) Limiting Condition for Operation (LCO).

Code repair of the identified flaw at this time is impractical since a plant shutdown would be required. Evaluation of the flaw in accordance with the fracture mechanics methodology provided in GL 90-05 has determined that the structural integrity of the SW piping is not adversely affected by this flaw. Therefore, HNP requests NRC approval to defer implementation of code repairs to no later than the next scheduled refueling outage, as permitted by GL 90-05.

The attached relief request addresses the present condition of the weld and implementation of the compensatory actions taken per GL 90-05. Operability and functionality of the system have been maintained and HNP has concluded that deferring repair of the flaw will not affect the health and safety of the public. Since compliance with the specified Code requirements would result in unnecessary hardship without a compensating increase in the level of quality and safety, HNP requests approval of this relief request pursuant to 10 CFR 50.55a(g)(5)(iii).

Progress Energy Carolinas, Inc.
Harris Nuclear Plant
P. O. Box 165
New Hill, NC 27562

A047
NRR

Enclosure 1 contains proposed HNP relief request I3R-08.
Enclosure 2 contains the Regulatory Commitments associated with this request.

Please refer any questions regarding this submittal me at (919) 362-3137.

Sincerely,

John R. Caves

J.R. Caves
Supervisor – Licensing/Regulatory Programs
Harris Nuclear Plant

JRC/kab

Enclosures: 1. 10 CFR 50.55a Request: I3R-08
2. List of Regulatory Commitments

cc: Mr. J. D. Austin, NRC Sr. Resident Inspector, HNP
Ms. M. G. Vaaler, NRC Project Manager, HNP
Mr. L. A. Reyes, NRC Regional Administrator, Region II

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT NO. 1
DOCKET NO. 50-400/RENEWED LICENSE NO. NPF-63
10 CFR 50.55a REQUEST: I3R-08
Revision 0

Request for Relief for Temporary Non-Code Repair of Service Water Return Piping Line in Accordance with 10 CFR 50.55a(g)(5)(iii)

1.0 ASME CODE COMPONENT AFFECTED

(a) Description:

Interface of a sockolet and sockolet-to-pipe weld on line 3SW1-114SA-1, a 1-inch carbon steel supply line to root valve 1SW-62 and a downstream pressure transmitter connection point off of the "A" Train Emergency Service Water (ESW) return piping from the "A" Component Cooling Water Heat Exchanger (CCW HX).

(b) Function:

The ESW system provides cooling water to remove heat from essential plant heat loads associated with reactor auxiliary components for dissipation in the plant ultimate heat sink during emergency operation. The Operability of the ESW System ensures that sufficient cooling capacity is available for continued operation of safety-related equipment during normal and accident conditions. Line 3SW1-114SA-1 must maintain its structural integrity so that minimum flow can be maintained on all "A" ESW loads.

(c) Class: ASME Section III, Class 3

(d) Description of the flaw:

A through-wall pinhole leak was found on the carbon steel sockolet and sockolet-to-pipe weld interface on pressure transmitter connection line 3SW1-114SA-1 off the "A" Train ESW return piping to the "A" CCW HX. Only slight moisture accumulation can be seen at the leak point with no measurable leak rate. The "A" ESW header is supplied by Normal Service Water (NSW) with an operating temperature of 100° F and operating pressure of approximately 80 psig.

The 1-inch piping and downstream valve were most recently replaced during RFO-13 (April 2006); however, the sockolet itself was not replaced during that outage. Non-destructive (NDE) ultrasonic testing (UT) was conducted on the affected area. The thickness data was reviewed by HNP's Mechanical/Civil Design group. The data shows that the areas surrounding the pinhole are near nominal thickness values. The thickness values of the sockolet vary, but were all recorded to be greater than 0.200 inches. The thickness readings of the 1-inch piping adjacent to the sockolet were recorded near nominal values. No areas of generalized thinning were identified.

(e) Flaw Detection:

The flaw was identified on August 8, 2010, during operator rounds. The plant was in Mode 1 at 100 percent power.

2.0 APPLICABLE CODE EDITION AND ADDENDA

ASME Boiler and Pressure Vessel Code, Section XI, 2001 Edition with addenda through 2003.

3.0 APPLICABLE CODE REQUIREMENT

Per NRC Inspection Manual Part 9900 Technical Guidance, "Operability Determinations & Functionality Assessments for Resolution of Degraded or Nonconforming Conditions Adverse to Quality or Safety," Section C.12, "If a leak is discovered in a Class 1, 2, or 3 component while conducting an in-service inspection, maintenance activity, or during facility operation, any corrective measures to repair or replace the leaking component must be performed in accordance with IWA-4000 of Section XI."

Article IWA-4000 (Repair/Replacement Activities) provides the requirements for performing repair/replacement activities on components and their supports. This is used whenever a flaw is discovered that does not meet the ASME requirements.

Per IWA-4110 of IWA-4000 (Scope):

(a) The requirements of this Article apply regardless of the reason for the repair/replacement activity or the method that detected the condition requiring the repair/replacement activity.

(b) This Article provides requirements for repair/replacement activities associated with pressure retaining components and their supports, including appurtenances, subassemblies, parts of a component, core support structures, metal containments and their integral attachments, and metallic portions of Class CC containments and their integral attachments. Repair/replacement activities include welding, brazing, defect removal, metal removal by thermal means, rerating, and removing, adding, and

modifying items or systems. These requirements are applicable to procurement, design, installation, examination, and pressure testing of items within the scope of this Division.

HNP is requesting relief from these Article IWA-4000 requirements to defer the code repair of the identified through-wall flaw until the next refueling outage, RFO-16 (November 2010), provided the conditions of Generic Letter (GL) 90-05, "Guidance for Performing Temporary Non-Code Repair of ASME Code Class 1, 2, and 3 Piping," are met.

4.0 IMPRACTICALITY OF COMPLIANCE

Per GL 90-05, an ASME Code repair is required for Code Class 1, 2, and 3 piping unless specific written relief is granted by the NRC. Relief is appropriate when performing the repair at the time of discovery is determined to be impractical.

In accordance with this GL, impracticality is defined to exist if:

- The flaw detected during plant operation is in a section of Class 3 piping that cannot be isolated to complete a code repair within the time period permitted by the limiting condition of operation of the affected system as specified in the plant Technical Specifications, and
- Performance of code repair necessitates a plant shutdown.

The identified flaw is a pinhole leak on the sockolet fitting at the interface of a sockolet and sockolet-to-pipe weld on 3SW1-114SA-1, the supply line to root valve 1SW-62 and a downstream pressure transmitter connection point. This 1-inch connection line is off of the "A" Train ESW return piping to the "A" CCW HX. The HNP Technical Specifications (TS) Limiting Condition for Operation (LCO) associated with the ESW System is:

3.7.4 At least two independent emergency service water loops shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION: With only one emergency service water loop OPERABLE, restore at least two loops to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

Repair of the defect requires header depressurization. The section of piping containing the flaw cannot be isolated from the system without a plant shutdown. Freeze sealing of the line is an alternative method to temporarily isolate the line; however it is unlikely that this method can be executed to allow completion of the repair within the 72-hour LCO time window. Since there is little confidence that the affected section of piping can be isolated for the completion of a code repair within the time period permitted by the above TS, impracticality exists in accordance with the above GL 90-05 definition.

5.0 BURDEN CAUSED BY COMPLIANCE

In order to comply with ASME Code requirements and the applicable LCO, the plant would need to be shut down to perform the repair. As noted in GL 90-05, "The rather frequent instances of small leaks in some Class 3 systems, such as service water systems, could lead to an excessive number of plant start-up and shutdown cycles with undue and unnecessary stress on facility systems and components if the facilities were to perform a code repair when the leakage is identified."

6.0 PROPOSED ALTERNATIVE AND BASIS FOR USE

In accordance with the guidelines of GL 90-05, HNP is proposing to defer repair of the identified flaw, leaving the piping "as-is", until the next outage exceeding 30 days, which is expected to be the next refueling outage, RFO-16, scheduled to begin in October 2010. To ensure that the acceptance criteria of GL 90-05 continue to be met, HNP has implemented compensatory actions to detect changes in the condition of the identified defect.

6.1 SCOPE

An indication of a through-wall leak was found on a sockolet fitting at the interface between a sockolet and socket weld on 3SW1-114SA-1, the supply line to root valve 1SW-62 and a downstream pressure transmitter connection point. This 1-inch line is off of the "A" Train ESW return piping to the "A" CCW HX. The flaw on this carbon steel, ASME Code Class 3 piping was discovered on August 8, 2010, during normal plant operations and is believed to have originated on the inner diameter (ID) of the affected piping.

6.2 SPECIFIC CONSIDERATIONS

The following considerations have been made to assure the structural integrity of the affected piping:

Consequences of Flooding. A walkdown of line 3SW1-114SA-1 with the "A" CCW HX in-service and NSW supplying "A" ESW revealed little to no vibration present on the line that could be felt by touch. This line extends horizontally from 24-inch line 3SW24-67SA-1. The 1-inch line is less than 1 foot in length and is therefore quite rigid. The 24-inch line is supported by a large structural support approximately 6 feet above the 1-inch line. Based on this, vibration induced fatigue cracking of the line, and consequential flooding of the area, is not a concern.

Consequences of Spraying Water on Other Equipment. With only slight moisture accumulation at the leak point and no quantifiable leak rate (less than 1 drop per minute), the leak is not affecting any other equipment important to safety in the immediate area. If the leakage rate were to increase, housekeeping devices could be installed to shield adjacent equipment.

Significant of Loss of Flow. The current loss of flow from the ESW system is negligible compared to the total system flow. The leak rate is less than 1 drop per minute under normal operating conditions of 100°F and 80 psig, with NSW supplying the "A" ESW header. ESW system flow is typically 13,000 to 18,000 gpm.

Design Loading Evaluation. A stress analysis (Attachment 2) was performed by HNP Mechanical/Civil Engineering that evaluated whether the UT thickness data for the affected area impacted the design load stresses, including deadweight pressure, thermal expansion and seismic loads of the affected piping. This analysis concluded that because the current pipe thickness of the affected area was at least 90 percent of the nominal pipe thickness, there is a negligible effect on the calculated stresses for the pipe and no impact on the integrity of the piping system.

Integrity of the Temporary Non-code Repair. A code repair will be completed no later than the next refueling outage, RFO-16, scheduled to begin in October 2010. RFO-16 and the subsequent repair of this flaw, will begin within 90 days of the discovery of this leak, eliminating the need to schedule additional UT measurements of the affected area every three months.

Qualitative Assessments to Monitor Degradation. A compensatory action has been initiated for Operations to perform a qualitative assessment via walkdown inspections of the leakage from the flaw to be completed at least weekly, meeting the GL 90-05 requirements.

Engineering Evaluation. UT data shows the areas surrounding the pinhole are near nominal thickness values. The thickness of the actual sockolet varies, although all measurements were greater than 0.200 inches. The 1-inch pipe adjacent to the sockolet was recorded with thicknesses near nominal values. No general area thinning was identified. HNP Engineering Evaluation has determined that this is likely an isolated occurrence with no remedial measures required.

6.3 CAUSE OF LEAK

The pinhole is on a sockolet fitting at the interface of the sockolet and sockolet-to-pipe weld. While the 1-inch piping and downstream valve were replaced during RFO-13 (April 2006), the sockolet itself was not replaced. NDE (UT) measurements were taken for the affected area of pipe. The thickness data was reviewed by HNP's Mechanical/Civil Design Engineering group. The data shows that the areas surrounding the pinhole are near nominal thickness. The thickness values of the sockolet vary, but were all greater than 0.200 inches. The thickness readings for the 1-inch piping adjacent to the sockolet were recorded near nominal thickness. No areas of generalized thinning were identified.

Although the exact cause of the weld defect cannot be determined, it could be a result of impurities, work practices, or workmanship. Welds and their surrounding heat affected zones are particularly susceptible to local corrosion attack. Sufficient selective attack in these regions results in oxide removal, thereby enhancing local corrosion rate and the potential for formation of a crevice. Once a crevice forms and becomes wetted by service water its passive film starts to break down and the surrounding region begins to corrode in a mechanism similar to pitting corrosion. This type of corrosion tends to remain localized and not propagate rapidly into adjoining regions. Because of the leak location, it is believed that a crevice formed on the ID of the weld area due to localized corrosion. With no areas of generalized thinning identified, this flaw has been determined to be an isolated occurrence.

6.4 STRUCTURAL INTEGRITY OF LINES

NDE (UT) measurements were taken on the affected area by a qualified HNP Quality Control (QC) inspector on August 9, 2010, and reviewed by HNP Mechanical/Civil Design Engineering.

The UT data (Attachment 1) shows that the pipe thickness in the area surrounding the pinhole is near nominal thickness. The thickness of the actual sockolet varies, however all measurements were recorded greater than 0.200 inches. Near nominal thickness values were recorded for the UT readings on the 1-inch pipe and the 24-inch pipe adjacent to the sockolet, with no general area thinning identified.

A Flaw Evaluation (Section 6.5), performed in accordance with the GL 90-05 "Through-Wall Flaw Approach," demonstrates that the piping connection containing the pinhole leak is structurally adequate.

A walkdown of line 3SW1-114SA-1 with the "A" Component Cooling Water Heat Exchanger in service and NSW supplying "A" ESW revealed little to no vibration present on the line (i.e. could not be felt by touch). The line extends horizontally from 24-inch line 3SW24-67SA-1. This 1-inch line is less than one foot in length and is therefore quite rigid. Additionally, the 24-inch line is supported by a large structural support located approximately 6 feet above the 1-inch line. Therefore, vibration induced fatigue wear of the line is not a concern.

Based on the above evaluation, this leak does not represent an operability concern for the structural integrity of the 1-inch supply line 3SW1-114SA-1 for all modes of operation. Besides monitoring, no remedial measures are required to ensure integrity is maintained. Further analysis to consider the impact of a complete line break is unwarranted. Furthermore, the identified pinhole leak does not prevent the ESW system from performing its safety function to provide cooling water and remove heat from essential plant heat loads associated with reactor auxiliary components during emergency operation.

6.5 FLAW EVALUATION

Per GL 90-05, "through-wall" flaw evaluation criteria were used to evaluate the pinhole leak in ESW line 3SW1-114SA-1. The GL 90-05 criteria are applicable since this line is ASME Section III, Class 3 piping per the HNP Engineering Database (EDB). For conservatism purposes, analyses assumes the through-wall flaw length "2a" to be in the circumferential direction and the stress "s" is assumed to be bending stress.

The pipe properties for line 3SW1-114SA-1, (1-inch, schedule 80, ASTM A106 Grade B pipe) per EDB, NAVCO Piping Datalog & ASME are:

Outside Diameter: $D_o = 1.315$ in

Nominal Pipe Thickness: $t_{nom} = 0.179$ in

Measured Pipe Thickness: $t = 0.179$ in (which is greater than t_{min})

Design Temperature: $T=140°F$

Design Pressure: $p = 150$ psig

Allowable Stress: $S = 15000$ psi

Allowable Stress Intensity Factor: $K < 35\ ksi(in)^{0.5}$

Minimum Required Wall Thickness, t_{min}, for hoop stress per ASME Section III is:

$$t_{min} = \frac{p\,D_o}{2(S+0.4p)} = 0.007 \text{ in}$$

"Through –Wall" Flaw Evaluation

The following through-wall flaw evaluation is performed in accordance with GL 90-05, Enclosure 1, Section C.3.a. The stress intensity factor for through-wall flaw (including safety factor of 1.4) is:

Stress Intensity Factor: $K = 1.4\,(s)(F)(3.1416{*}a)^{0.5}$, where:

Combined Bending Stresses: $s = M_A + M_{BE} = 1617$ psi (per Stress Evaluation)

Moment Stress$_{(\text{Deadweight \& Pressure})}$: $M_A = 757$ psi

Moment Stress$_{(\text{DBE Seismic})}$: $M_{DBE} = 860$ psi

Geometry Factor: $F = 1 + (A)(c)^{1.5} + (B)(c)^{2.5} + (C)(c)^{3.5} = 3.736$

$A = -3.26543 + 1.52784r - 0.072698r^2 + 0.0016011r^3 = 627.031$

$B = 11.36322 - 3.91412r + 0.18619\,r^2 - 0.004099r^3 = -1.601 \times 10^3$

$C = -3.18609 + 3.84763\,r - 0.18304r^2 + 0.00403r^3 = 1.583 \times 10^3$

$$c = \frac{a}{(3.1416)(R)} = 0.028$$

R = mean pipe radius = $\frac{D_o - t_{nom}}{2} = 0.568$ in.

$$r = \frac{R}{t_{min}} = 86.733\ in$$

Flaw Length, $2a$ = the diameter of the pinhole = 0.100 in
$a = 0.050$ in

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Flaw Length, 2a, was conservatively assumed to be 0.100 inches. A flaw of this dimension would have a visible, steady leakage rate. With no visible leakage rate and only moisture accumulation as indication of this through-wall flaw, a flaw length of 0.100 inches is acceptable. Since "2a" is less than 3 inches and less than 15 percent of the pipe circumference, this "Through-Wall Flaw" approach is acceptable in assessing the structural integrity of the flaw.

$$K = 1.4\,(s)(F)(3.1416*a)^{0.5} = 3352\ \text{psi(in)}^{0.5}$$
$$= 3.352\ \text{ksi(in)}^{0.5}$$

Since the evaluated stress intensity factor of 3.352 ksi$(in)^{0.5}$ is less than the allowable stress intensity factor of 35 ksi$(in)^{0.5}$ for carbon steel, this flaw meets the GL 90-05 criteria for proposal of a temporary non-code repair of the Class 3 piping.

6.6 AUGMENTED INSPECTIONS

Since the flaw has been evaluated and found acceptable by the GL 90-05 "Through-Wall Flaw" approach, augmented UT inspections of the five most susceptible (and accessible) locations were performed to assess the overall degradation of the affected system, per GL 90-05 requirements for moderate energy systems. The locations selected for the augmented inspection were in the heat affected zones of welds near five root valves on 1-inch, carbon steel ASME Class Code 3 service water piping with design temperature and pressure equal to that of the flaw under evaluation. As shown in Table 1 below, none of the measured thicknesses, t_{min}, were less than the ASME code required minimum thickness of 0.007 inches. The average wall thickness for each location was near nominal thickness. No significant thinning was identified at any location, indicating that the flaw is most likely an isolated failure and that system wide degradation is not present.

Table 1. Augmented UT Inspection Data

Valve ID	$t_{nominal}$	t_{min}	$t_{average}$
1SW-1058	0.179	0.148	0.179
1SW-1056	0.179	0.159	0.174
1SW-1057	0.179	0.162	0.176
1SW-1065	0.179	0.175	0.182
1SW-1067	0.179	0.171	0.177

6.7 CONCLUSION

The flaw evaluation performed for the pinhole flaw demonstrates that the piping, including the weld joining the pipe to the sockolet for line 3SW1-114SA-1, is structurally adequate in accordance with the guidance provided in GL 90-05. The flaw was evaluated using the through-wall flaw fracture mechanics methodology provided by NRC Generic Letter 90-05, which is a conservative approach to evaluating the stability of the flaw.

Since the flaw in line 3SW1-114SA-1 satisfies the criteria presented in GL 90-05, it is acceptable to propose a temporary non-code repair of this code Class 3 piping.

Therefore, HNP is requesting NRC approval per 10 CFR 50.55a(g)(5)(iii) to defer ASME Section XI IWA-4000 repair/replacement requirements for the identified flaw in accordance with the guidance provided in GL 90-05.

7.0 DURATION OF PROPOSED ALTERNATIVE

Repair of the defect will be deferred until the next refueling outage, RFO-16, provided the condition continues to meet the acceptance criteria of Generic Letter 90-05. HNP is currently monitoring the leak location. RFO-16 is scheduled to begin in October 2010.

8.0 PRECEDENT

Similar requests for relief were approved for:

Harris Nuclear Plant, October 30, 2009, ML093010584

South Texas Project Unit 2, November 30, 2007, ML073120446

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Attachment 1. Inspection Finding for Flaw on Line 3SW1-114SA-1

QA UT-8 Rev 7

Progress Energy NGG

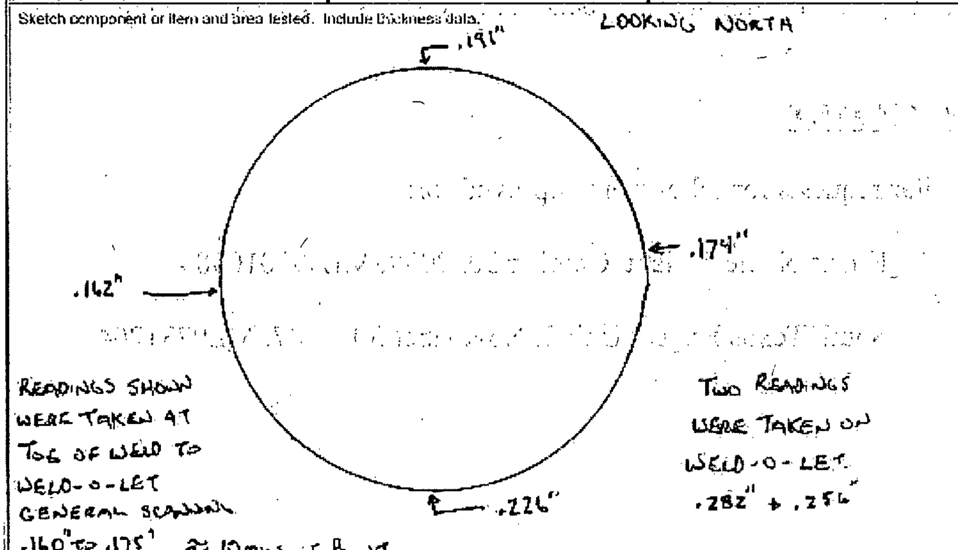
NDE Report # N/A
Page 1 of 1

DIGITAL ULTRASONIC THICKNESS NDE REPORT

Plant: ☐ BNP ☐ CR3 ☒ HNP ☐ RNP WO: 44555O-01 Unit ☒ 1 ☐ 2 ☐ 3 Date: 08/08/10

Component / Item Tested: LINE # 3SW1-114SA-1	NDE Procedure: No.: 427 Rev.: 7 TR: N/A
Component Material: ☒ C/S SA-106 (Type) ☐ S/S N/A (Type) ☐ Other (Specify): N/A	Expected Nominal / Range: 0.179"
Thickness Gauge: Mfg.: PANAMETRICS Model: 36DL+ S/N: 992124311 Software Rev. No. 2.07/1.2	Couplant: Brand ULTRA GEL Batch No. 04125 0
Calibration / Reference Std.: ☐ Test Item Mic./Caliper No.: N/A ☒ Step Block S/N: 95-7870 ☒ C/S ☐ S/S ☐ Other (Describe Below)	Primary Cal. Thickness: 0.100 To 0.300 Cal. Check Thickness: 0.100 To 0.300
Transducer: Mfg.: PANAMETRICS Model: D793 S/N: 545912 Diameter: ¼" Freq.: 10 MHz ☐ Single ☒ Dual	
Component Conditions: High Temp: ☐ Yes ☒ No Coated / Painted: ☐ Yes ☒ No — Inst. Receiver Gain Setting Auto dB Technique: ☒ Single-Echo ☐ Thru-Coat ☒ Multiple-Echo	Other Test Conditions: N/A

Sketch component or item and area tested. Include thickness data.



Inspector	Certification Level	Date
[signature]	LEVEL I LTD AMTR	08/08/10
Inspector	Certification Level	Date
Reviewed By (If Required) [signature]	Title	Date 8-9-10

NGGM-PM-0011 APPENDIX A

Attachment 2. Stress Evaluation for Line 3SW1-114SA-1

Prepared by: Daryl Hughes 8/9/10
Verified by: Aaron Borodotsky 8/9/10

Stress evaluation:

The pin hole leak is in socket weld of the 1" pipe, 3SW1-114SA-1, to the coupling on the header pipe, 3SW24-67SA-1, near the outlet of the "A" CCW Heat Exchanger. The 1" pipe is associated with valve 1SW-62 (Ebasco tag number 3SW-V56SA-1), reference drawings 5-G-0047 & 5-S-0547 and stress calculation 8050-4. Since the flaw is in the weld a 90-05 evaluation will be performed.

The 1" pipe is a short cantilever that transitions to tubing. The 1" pipe is not modeled in the stress analysis. However, from page 55 of calculation 8050-4, the seismic accelerations at node 1784 (represents the location of the 1" pipe to the header pipe) are:

Gx = 0.863 Gy =0.770 Gz =0.831

Pipe 3SW1-114SA-1 is 1", schedule 80, material ASTM A-106 per EDB. The design pressure and temperature are 150 psig and 140 degF, respectively. The pipe properties per NAVCO Piping Datalog, Edition 11 are:

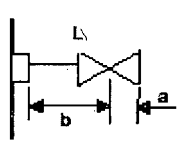
OD =1.315"
Wall thickness =0.179"
Pipe weight including water = 2.48 lb/ft = 0.207 lb/in
Moment of Inertia = 0.105 in^4
Section Modulus of 1" OD pipe = 0.160 in^3
Cantilever length, L = 7" as-built measurement
SIF= 2.1

1. Calculate Bending moment at the socket let connection, reference AISC:
   M due to pipe weight= $wL^2/2$ = = 0.207 x $(7)^2/2$ = 5.1 in-lb
   M due to valve weight = P x b = 16 x 4.5" = 72 in-lb

   Total Bending Moment due to 1g = 5.1 + 72 = 77.1 in-lb
   Bending stress due to DW = 77.1/0.160 = 482 psi

2. Calculate Pressure stress = pd/4t = 150 psi x 1.315 /(4 x0.179) = 275 psi

3. Calculate pipe frequency based on deflection, reference AISC:



a = 2.5" Valve Wt. = 16 #
b = 4.5"
L = 7"

Attachment 2 (Continued)

$\Delta = (w L^4 / 8EI) + Pb^2 / 6EI\ (3L - b)$
$\Delta = \{[0.270\ (7)^4 / 8(29 \times 10^6)0.105]\} + [16\ (4.5)^2 / 6(29 \times 10^6)0.105](3 \times 7 - 4.5)$
$\Delta = 0.00028"$

$f = (1 / 2\pi) \times (386.4 / \Delta)^{1/2}$
$f = (1 / 2\pi) \times (386.4 / 0.00028)^{1/2}$
$f = 187$ HZ

Since 1" pipe is rigid, use accelerations at node 1748 from 8050-4, page 55 to determine bending stress in the 1" pipe.

Gx = 0.863g (North) Gy = 0.770g Gz = 0.831g

4. Calculate DBE Stress (Emergency condition):

Pipe is running north/south. Gx does not need to be included. The resultant acceleration for bending stress is:
$Gr = (0.770^2 + 0.831^2)^{1/2} = 1.133g$

DBE bending Stress = (77.1 x 0.75 x 2.1 / 0.160) x 1.133 = 860 psi

5. Total stress = Pressure + DW + DBE = 275 + 482 + 860 = 1617 psi

The thickness of the pipe at 0, 90, 180 and 270 degrees are 0.191", 0.174", 0.226" and 0.162", respectively using UT measurements technique. A general scan of the pipe showed thicknesses ranging from 0.160" to 0.175". The wall thickness, in general, is 90% or greater than nominal. Therefore, no increase in stress is necessary. The stress value above is used in the attached GL 90-05 calculations.

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LIST OF REGULATORY COMMITMENTS

The following table identifies the actions in this document to which the Harris Nuclear Plant has committed. Statements in this submittal with the exception of those in the table below are provided for information purposes and are not considered commitments.

Item	Commitment	Completion Date
1	Replace temporary non-code repair of defect in weld on line 3SW1-114SA-1 with a permanent repair. Temporary non-code repair consists of deferral of code repair until the next scheduled outage exceeding 30 days, RFO-16, provided the condition continues to meet the acceptance criteria of Generic Letter 90-05.	RFO-16 (November 2010)
2	Perform weekly inspections of location to detect changes in size or leakage of weld until code repair is performed. The structural integrity and the monitoring frequency will be re-evaluated if significant changes are found in the condition of the weld area during this monitoring.	RFO-16 (November 2010)