Progress Energy

Serial: HNP-05-128
10 CFR 50.55a

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

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT NO. 1
DOCKET NO. 50-400/LICENSE NO. NPF-63
RELIEF REQUEST FROM INSERVICE INSPECTION PROGRAM NO. 2R1-015
ALTERNATIVE TO ASME CODE SECTION XI, IWA-4000 REQUIREMENTS

Ladies and Gentlemen:

In accordance with the Code of Federal Regulations, Title 10, Part 50.55a, "Codes and Standards," paragraph (a)(3)(i), the Harris Nuclear Plant (HNP) of Carolina Power and Light Company (CP&L) doing business as Progress Energy Carolinas, Inc., requests relief from the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," requirements for the pressure testing of piping and valves within the Class 1 pressure boundary. HNP proposes a system leakage test to the normal operating pressure boundary rather than a hydrostatic test to the full Class 1 pressure boundary.

HNP has concluded that the proposed alternative provides an acceptable level of quality and safety, and that 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(a)(3)(ii).

Attachment 1 provides the proposed HNP relief request (2R1-015).

HNP requests approval of this relief request by March 8, 2006 to support planning activities associated with Refueling Outage (RFO) 13 scheduled for the spring of 2006.

This document contains no new Regulatory Commitments.

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

A047

Please refer any questions regarding this submittal to Mr. Dave Corlett at (919) 362-3137.

Sincerely,

C.S. Kamilaris

C.S. Kamilaris
Manager, Site Support Services

CSK/khv

c:

Mr. R. A. Musser, NRC Sr. Resident Inspector
Mr. C. P. Patel, NRC Project Manager
Dr. W. D. Travers, NRC Regional Administrator

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## ASME Code Component(s) Affected

| | |
|---|---|
| Code Class: | 1 |
| References: | IWB-2500, Code Case N-498-4 |
| Examination Category: | B-P |
| Item Number: | B15.51, B15.71 |
| Description: | Piping and valves within the Class 1 pressure boundary. It includes Reactor Coolant, Charging, Safety Injection, and Residual Heat Removal Systems. |
| Component: | Process piping, drains, vent, test, and fill lines within the Class 1 pressure boundary. |

## Applicable Code Edition and Addenda

ASME Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," Code 1989 Edition, no Addenda.

## Applicable Code Requirement

Table IWB-2500-1, Examination Category B-P, Note 2 states, "The pressure retaining boundary during system hydrostatic test shall include all Class 1 components within the system boundary." Also, Code Case N-498-4 (Alternative Requirements for 10-Year System Hydrostatic Testing for Class 1, 2, and 3 Systems) reply paragraph (a)(2) states, "The boundary subject to test pressurization during the system leakage test shall extend to all Class 1 pressure retaining components within the system boundary."

Note: HNP intends to use Code Case N-498-4 to satisfy the 10-Year System Hydrostatic Testing of Class 1, 2, and 3 components. Code Case N-498-4 is approved for use in Regulatory Guide 1.147 with conditions.

Relief is requested from ASME Section XI (Table IWB-2500-1, Examination Category B-P, Note 2) and Code Case N-498-4, regarding extension of the pressure retaining boundary during system pressure tests conducted at or near the end of each inspection interval to Class 1 pressure retaining components within the system boundary.

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**Reason and Justification for Requesting Relief:**

Relief is requested in accordance with 10 CFR 50.55a(a)(3)(ii) on the basis that hardship and unusual difficulty exist without a compensating increase in the level of quality and safety, regarding extension of the pressure retaining boundary during system pressure test to all Class 1 pressure retaining components within the system boundary.

Table 1 identifies the Class 1 pressure retaining components that are associated with the requested relief.

The Class 1 drains, vent, test, and fill lines are equipped with isolation valves, which provide double isolation of the Reactor Coolant Pressure Boundary (RCPB). These valves are generally maintained in the closed position during normal plant operation. The piping outboard of the first isolation valve is not normally pressurized. Under normal operating conditions, the piping and connections are subjected to reactor coolant system pressure and temperature only if leakage through the inboard valves occurs. To perform the ASME Code required pressure test, it would be necessary to manually open the inboard valves to pressurize the piping and connections. Pressurization by this method defeats the double isolation and reduces the margin of personnel safety for those performing the test. Furthermore, performing the test with the inboard isolation valves open requires several man-hours to position the valves for the test and restore the valves to their closed positions once the test is completed. These valves are located in close proximity to the RCS loop piping and thus would require personnel entry into high radiation areas within the containment and a consequent increase in radiation exposure. 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 close these valves would impact the outage schedule. Thus, compliance with this specific Code requirement results in unnecessary hardship pursuant to 10CFR50.55a(a)(3)(ii) without a compensating increase in the level of quality and safety.

Also, HNP design of Class 1 process piping requires substantial effort to extend the Class 1 system boundary where check valves or non-redundant components serve as the first system isolation from the reactor coolant system. Such configurations may require check valve disassembly or other temporary configurations to achieve test pressures at upstream piping and valves. Since the Class 1 system pressure testing is performed in Mode 3, these temporary configurations could conflict with Technical Specification requirements. Establishing and restoring such temporary configurations could also result in an unwarranted increase in worker radiation exposure.

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Based on the above, extension of the pressure-retaining boundary during system leakage tests to Class 1 pressure retaining components within the system boundary represents a hardship and unusual difficulty that does not provide a compensating increase in the level of quality and safety.

The following is specific information pertaining to the various pipe segments for which relief has been requested.

Small Size Class 1 Vent, Drain, Test, and Fill Lines

Relief is requested from fully pressurizing piping between the first and second isolation device on small size vent, drain, test, and fill lines. There are twenty-six vent, drain, test and fill lines in the Reactor Coolant System (RCS) ranging in size from 0.5 inch to two inches. The configurations are two small isolation valves in series. The piping segments provide the design-required double isolation barrier for the reactor coolant pressure boundary. The Code-required leakage test would be performed in MODE 3 at the normal operating pressure of 2235 psig and at a nominal temperature of about 557°F.

Leakage testing of these piping segments at nominal operating pressure in MODE 3 would require the opening of the inboard isolation valve at the normal operating RCS temperature and pressure conditions. In so doing, the design requirement for two primary coolant pressure boundary isolation devices would be violated. Additionally, opening these valves introduces the potential risk for spills and personnel contamination.

These piping segments are VT-2 inspected through the entire length as part of the Class 1 system inspection at the conclusion of each refueling outage. The leakage test will not specifically pressurize past the first isolation valve for this inspection. No external or visible leakage will be allowed for a test to be successful. Since this type of test will assure that the combined first and second isolation devices are effective in maintaining the reactor coolant pressure boundary at normal operating temperature and pressure, the increase in safety achieved from the Code-required leakage test is not commensurate with the hardship of performing such testing.

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Larger Size Class 1 Piping Segments

*12 Inch Residual Heat Removal Motor Operated Valves*

This piping segment consists of two 86-foot run of piping between Residual Heat Removal (RHR) inlet valves 1RH-39 & 40, and 1RH-1 & 2. These valves are interlocked at a required setpoint of <363 psig to avoid over-pressurization of the RHR system. The interlock prevents manual opening of the valves from the Control Room with RCS pressure above the setpoint.

The piping segment is VT-2 inspected through the entire length as part of the Class 1 system inspection at the conclusion of each refueling outage. The proposed system pressure test will not specifically pressurize past the first isolation valve for this inspection. It is possible that the piping becomes pressurized due to minor leakage past the first isolation valve. No external or visible leakage will be allowed for the test to be successful. This test will provide assurance that the combined first and second isolation valves are effective in maintaining the reactor coolant pressure boundary at normal operating temperature and pressure.

*Safety Injection Loops Low Head Check Valves 1SI-250, 252, & 254, and Upstream Piping*

These three piping segments each consist of a 26-28 foot run of piping along with a short 1.00 inch connection. These lines are for injecting low head Emergency Core Cooling System (ECCS) water from the accumulators and the low head safety injection system (i.e., RHR system in ECCS configuration). The primary isolation and secondary isolation devices for the 12 inch lines are check valves oriented to flow into the RCS. The piping segments provide the design-required double isolation barrier for the reactor coolant pressure boundary.

Leakage testing in MODE 3 would require a pressure source be connected at each segment location. In so doing, the design requirement for two primary coolant pressure boundary isolation devices would be violated. For test locations located overhead and away from normal personnel access areas, ladders or scaffolding would have to be installed to provide access to the piping segment and to open the valve. This process would lead to the occupational dose associated with leakage testing these lines.

These lines are located in areas involving occupational radiation exposure, and leakage testing of these lines would increase occupational radiation dose.

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The leakage test will not specifically pressurize past the first isolation valve for this inspection. It is possible that the piping becomes pressurized due to minor leakage past the first isolation valve. Otherwise, the pressure in the segment will be at least at the operating pressure of the cold leg accumulators, which are pressurized to between 585 and 665 psig. No external or visible leakage will be allowed for the test to be successful. Since this test will assure that the combined first and second isolation devices are effective in maintaining the reactor coolant pressure boundary at normal operating temperature and pressure, the increase in safety achieved from the Code-required leakage test is not commensurate with the hardship of performing such testing.

*Safety Injection Loops High Head Check Valves 1SI-81, 82, 83, 136, 137 & 138, and Upstream Piping*

These six piping segments each consist of a 2-inch and 6-inch piping span between two check valves oriented toward the RCS. These lines are for injecting high head ECCS water into the hot and cold legs after an accident. The primary and secondary isolation devices are check valves oriented to flow into the RCS. The piping segments provide the design-required double isolation barrier for the reactor coolant pressure boundary. Leakage testing of these piping segments at nominal operating pressure in MODE 3 would require a modification to allow pressurizing to the normal operating RCS temperature and pressure conditions.

The leakage tests will not specifically pressurize past the first isolation valve for this inspection. It is possible that the piping becomes pressurized due to minor leakage past the first isolation valve. No external or visible leakage will be allowed for the test to be successful. This test will assure that the combined first and second isolation valves are effective in maintaining the reactor coolant pressure boundary at normal operating temperature and pressure.

**Proposed Alternate Examination(s)**

The Class 1 system boundary during leakage tests will be maintained in a normal, operational alignment with items identified within Table 1 constituting exceptions to the Code-required boundary. The VT-2 visual examination will extend to the Class 1 pressure boundary.

Items within Table 1 will be visually examined for evidence of leakage during system leakage testing without being pressurized.

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**Implementation Schedule**

This Relief Request is applicable to the HNP Second 10-year Inservice Inspection Interval.

**Precedents**

Similar request for relief was approved for H. B. Robinson Plant Unit No. 2 (TAC No. MB2773), and Pilgrim Nuclear Power Station (TAC No. MC1472). Similar request for relief was submitted for approval for Indian Point Unit No. 2 (Docket No. 50-247), FitzPatrick Nuclear Power Plant (Docket No. 50-333), and Indian Point Units No. 2 & 3 (Docket No. 50-247 and 50-286).

Note that ASME Code has recently approved Code Case N-731, Alternative Class 1 System Leakage Test Pressure Requirements. The code case allows "for portions of Class 1 safety injection systems that are continuously pressurized during an operating cycle, the pressure associated with a statically-pressurized passive safety injection system of a pressurized water reactor may be used."

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Table 1: Relief Request Number 2R1-015
Affected Class 1 Pressure Retaining Components – Examination Category B-P

| Affected Line or Component | Pipe Diameter (in.) | Pipe Schedule | Approx Length (ft.) | Drawing No. | Boundary Exception(s) |
|---|---|---|---|---|---|
| Loop Drain Line Isolation Valve | 2 | SCH 160, A-376 TP304 | ≤ 1 ft. | 2165-S-1300<br>2165-G-800<br>2165-G-129 | Valve 1RC-7 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1RC-8 |
| Loop Drain Line Isolation Valve | 2 | SCH 160, A-376 TP304 | ≤ 1 ft. | 2165-S-1300<br>2165-G-800<br>2165-G-129 | Valve 1RC-16 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1RC-17 |
| Loop Drain Line Isolation Valve | 2 | SCH 160, A-376 TP304 | ≤ 1 ft. | 2165-S-1300<br>2165-G-800<br>2165-G-129 | Valve 1RC-28 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1RC-29 |
| Pressurizer PORV Vent Line on Primary Sample Path off Pressurizer | 0.75 | SCH 160, A-376 TP304 | 0.5 ft. | 2165-S-1301<br>2165-G-801<br>2165-G-148 | Valve 1RC-110 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1RC-111 |
| Instrument Vent Line on Pressurizer Level Instrument Loop 1LT-459 | 0.5 | SCH 160, A-376 TP304 | 0.5 ft. | 2165-S-1301<br>2165-G-801<br>2165-G-147 | Valve 1RC-984 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1RC-985 |
| Instrument Vent Line on Pressurizer Level Instrument Loop 1LT-460 | 0.5 | SCH 160, A-376 TP304 | 0.5 ft. | 2165-S-1301<br>2165-G-801<br>2165-G-147 | Valve 1RC-986 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1RC-987 |
| Instrument Vent Line on Pressurizer Level Instrument Loop 1LT-461 | 0.5 | SCH 160, A-376 TP304 | 0.5 ft. | 2165-S-1301<br>2165-G-801<br>2165-G-147 | Valve 1RC-988 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1RC-989 |
| CVCS Pressurizer Spray Downstream CV and Test Connection Isolation Valve | 2 | SCH 160, A-376 TP304 | ≤ 1 ft. | 2165-S-1303<br>2165-G-803<br>2165-G-137<br>2165-G-139 | Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1CS-491 and 1CS-488 |
| | 1 | | 1.5 ft. | | Valve 1CS-489 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1CS-490 |

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TABLE 1: RELIEF REQUEST NUMBER 2R1-015
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| Affected Line or Component | Pipe Diameter (in.) | Pipe Schedule | Approx Length (ft.) | Drawing No. | Boundary Exception(s) |
|---|---|---|---|---|---|
| Norm Charging Line Upstream CV and Test Connection Isolation Valve | 2 | SCH 160, A-376 TP304 | ≤ 1 ft. | 2165-S-1303<br>2165-G-803<br>2165-G-137<br>2165-G-139 | Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1CS-500 and 1CS-497 |
| | 1 | | 1.5 ft. | | Valve 1CS-498 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1CS-499 |
| Alt Charging Line Upstream CV and Test Connection Isolation Valve | 2 | SCH 160, A-376 TP304 | ≤ 1 ft. | 2165-S-1303<br>2165-G-803<br>2165-G-137<br>2165-G-139 | Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1CS-486 and 1CS-483 |
| | 1 | | 1.5 ft. | | Valve 1CS-484 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1CS-485 |
| Excess Letdown Upstream Isolation Valve | 1 | SCH 160, A-376 TP304 | 1.5 ft. | 2165-S-1303<br>2165-G-803<br>2165-G-138 | Valve 1CS-460 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1CS-461 |
| Between Accumulator 1A-SA Discharge CV and SI to RCS Loop "A" CV | 12 | SCH 140, A-376 TP316 | 26 | 2165-S-1309<br>2165-G-809<br>2165-G-154<br>2165-G-155 | Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1SI-249 and 1SI-250 |
| | 1 | SCH 160, A-376 TP304 | 2 | | Valve 1SI-273 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-274 |
| Between Accumulator 1B-SB Discharge CV and SI to RCS Loop "B" CV | 12 | SCH 140, A-376 TP316 | 28 | 2165-S-1309<br>2165-G-809<br>2165-G-154<br>2165-G-155 | Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1SI-251 and 1SI-252 |
| | 1 | SCH 160, A-376 TP304 | 2 | | Valve 1SI-275 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-276 |

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**TABLE 1: RELIEF REQUEST NUMBER 2R1-015**
**AFFECTED CLASS 1 PRESSURE RETAINING COMPONENTS – EXAMINATION CATEGORY B-P**

| Affected Line or Component | Pipe Diameter (in.) | Pipe Schedule | Approx Length (ft.) | Drawing No. | Boundary Exception(s) |
|---|---|---|---|---|---|
| Between Accumulator 1C-SA Discharge CV and SI to RCS Loop "C" CV | 12 | SCH 140, A-376 TP316 | 26 | 2165-S-1309<br>2165-G-809<br>2165-G-154<br>2165-G-155 | Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1SI-253 and 1SI-254 |
| | 1 | SCH 160, A-376 TP304 | 2 | | Valve 1SI-277 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-278 |
| RCS Loop to RHR Pump "B" Isolation and Drain Line | 12 | SCH 140S, A-376 TP316 | 86 | 2165-S-1324<br>2165-G-824<br>2165-G-155 | Valves 1RH-39 and 1RH-40 remain closed to avoid over-pressurization of the RHR system |
| | 1 | SCH 160, A-376 TP304 | 2 | | Valve 1RH-41 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1RH-42 |
| RCS Loop to RHR Pump "A" Isolation and Drain Line | 12 | SCH 140S, A-376 TP316 | 86 | 2165-S-1324<br>2165-G-824<br>2165-G-155 | Valves 1RH-1 and 1RH-2 remain closed to avoid over-pressurization of the RHR system |
| | 1 | SCH 160, A-376 TP304 | 2 | | Valve 1RH-3 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1RH-4 |
| RCS Cold Leg Loop 1 SIS, Boron injection, and CVCS paths. | 6 | SCH 160, A-376 TP304 | 38 | 2165-S-1310<br>2165-G-810<br>2165-S-1308<br>2165-G-808<br>2165-G-154<br>2165-G-155<br>2165-G-156 | Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1SI-81, 1SI-356, 1SI-8, and 1SI-72 |
| | 2 | | 68 | | |
| | 2 | | 3 | | |
| | 1 | | 1.5 | | Valve 1SI-27 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-28 |
| | 1 | | 1.5 | | Valve 1SI-79 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-80 |

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| Affected Line or Component | Pipe Diameter (in.) | Pipe Schedule | Approx Length (ft.) | Drawing No. | Boundary Exception(s) |
|---|---|---|---|---|---|
| Class 1 piping from Residual Heat Exchanger to RCS Cold Leg Loop 2. | 6 | SCH 160, A-376 TP304 | 33 | 2165-S-1310<br>2165-G-810<br>2165-S-1308<br>2165-G-808<br>2165-G-154<br>2165-G-155<br>2165-G-156 | Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1SI-82, 1SI-357, 1SI-9, and 1SI-73 |
| | 2 | | 83 | | |
| | 2 | | 7 | | |
| | 1 | | 1.5 | | Valve 1SI-33 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-34 |
| | 1 | | 1.5 | | Valve 1SI-75 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-76 |
| Class 1 piping from Residual Heat Exchanger to RCS Cold Leg Loop 3. | 6 | SCH 160, A-376 TP304 | 25.5 | 2165-S-1310<br>2165-G-810<br>2165-S-1308<br>2165-G-808<br>2165-G-154<br>2165-G-155<br>2165-G-156 | Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1SI-83, 1SI-358, 1SI-10, and 1SI-74 |
| | 2 | | 49.5 | | |
| | 2 | | 1.5 | | |
| | 1 | | 1.5 | | Valve 1SI-39 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-40 |
| | 1 | | 1.5 | | Valve 1SI-77 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-78 |
| Class 1 piping from Residual Heat Exchanger to RCS Hot Leg Loop 1. | 6 | SCH 160, A-376 TP304 | 43 | 2165-S-1308<br>2165-G-808<br>2165-G-154<br>2165-G-156 | Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1SI-136, 1SI-134, 1SI-104, and 1SI-127 |
| | 2 | | 2.5 | | |
| | 2 | | 2.5 | | |
| | 1 | | 1.5 | | Valve 1SI-376 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-377 |

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| Affected Line or Component | Pipe Diameter (in.) | Pipe Schedule | Approx Length (ft.) | Drawing No. | Boundary Exception(s) |
|---|---|---|---|---|---|
| Class 1 piping from Residual Heat Exchanger to RCS Hot Leg Loop 2. | 6 | SCH 160, A-376 TP304 | 44.5 | 2165-S-1308<br>2165-G-808<br>2165-G-154<br>2165-G-156 | Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1SI-137, 1SI-135, 1SI-105, and 1SI-128 |
| | 2 | | 2.5 | | |
| | 2 | | 2.5 | | |
| | 1 | | 1.5 | | Valve 1SI-132 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-133 |
| Class 1 piping from Residual Heat Exchanger to RCS Hot Leg Loop 3. | 6 | SCH 160, A-376 TP304 | 1 | 2165-S-1308<br>2165-G-808<br>2165-G-154<br>2165-G-156 | Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves 1SI-138, 1SI-106, and 1SI-129 |
| | 2 | | 42.5 | | |
| | 2 | | 1 | | |
| | 2 | | 1 | | |
| | 1 | | 1.5 | | Valve 1SI-130 remains closed to avoid pressurizing downstream Class 1 pipe and valve 1SI-131 |