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Dale E. James
Manager, Licensing
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2CAN070807

July 31, 2008

U. S. Nuclear Regulatory Commission
Attn.: Document Control Desk
Washington, DC 20555-0001

SUBJECT: Request for Alternative ANO2-PT-001
Visual Examination of Extended Reactor Coolant Pressure Boundary Piping During System Leakage Tests
Arkansas Nuclear One, Unit 2
Docket No. 50-368
License No. NPF-6

REFERENCE:

1. Entergy Letter to NRC dated April 24, 2006, "Request for Alternative ANO1-PT-001 Visual Examination of Extended Reactor Coolant Pressure Boundary Piping during System Leakage Tests" (CNRO-2006-00022)

2. Entergy Letter to NRC dated October 16, 2006 "Request for Alternative ANO1-PT-001 Response to a Request for Additional Information" (CNRO-2006-00048)

3. NRC Letter to Entergy dated January 31, 2007, "Arkansas Nuclear One, Unit 1 – Request for Alternative ANO1-PT-001, Relief from System Hydrostatic Test Requirements for the Extended Reactor Coolant Pressure Boundary Piping" (TAC No. MD1394) (1CNA010705)

Dear Sir or Madam:

Pursuant to 10 CFR 50.55a(a)(3)(ii), Entergy Operations, Inc. (Entergy) proposes an alternative to the requirements of ASME Section XI IWB-5222(b) for Arkansas Nuclear One, Unit 2 (ANO-2). ASME Section XI IWB-5222(b) requires, "The pressure retaining boundary during the system leakage test conducted at or near the end of each inspection interval shall extend to all Class 1 pressure retaining components within the system."

The proposed alternative is to visually examine the extended reactor coolant pressure boundary (RCPB) piping between the first and second normally closed isolation valves during the Class 2 system leakage test conducted each inspection interval. The proposed alternative provides adequate assurance of the pipe's leak tightness. Request for Alternative ANO2-PT-001 is provided in attachment to this letter.

Entergy submitted a similar request for ANO, Unit 1 in Reference 1 and provided supplemental information in Reference 2. The NRC approved that request via Reference 3.

This letter contains no new commitments.

Entergy requests approval of the proposed request for alternative by September 1, 2009, in order to support the fall 2009 refueling outage. Although this request is neither exigent nor emergency, your prompt review is requested.

If you have any questions or require additional information, please contact me.

Sincerely,

DEJ/rwc

Attachment: Request for Alternative ANO2-PT-001

cc: Mr. Elmo E. Collins
Regional Administrator
U. S. Nuclear Regulatory Commission
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Arlington, TX 76011-4125

NRC Senior Resident Inspector
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Attn: Mr. Alan B. Wang
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Mr. Bernard R. Bevill
Director Division of Radiation
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ATTACHMENT TO

2CAN070807

REQUEST FOR ALTERNATIVE
ANO2-PT-001

REQUEST FOR ALTERNATIVE
ANO2-PT-001

I. COMPONENTS

Components/Numbers: Reactor Coolant Pressure Boundary

1. High Pressure Safety Injection Header (HPSI) No. 1 piping between check valves 2SI-27A and 2SI-28A
2. HPSI Header No. 2 piping between check valves 2SI-27B and 2SI-28B
3. Safety Injection Loop “A” piping between check valves 2SI-13A, 2SI-14A, 2SI-15A and 2SI-16A
4. Safety Injection Loop “B” piping between check valves 2SI-13B, 2SI-14B, 2SI-15B and 2SI-16B
5. Safety Injection Loop “C” piping between check valves 2SI-13C, 2SI-14C, 2SI-15C and 2SI-16C
6. Safety Injection Loop “D” piping between check valves 2SI-13D, 2SI-14D, 2SI-15D and 2SI-16D
7. Safety Injection piping between valves 2CV-5084-1, 2CV-5086-2 and 2SI-19
8. Low Temperature Overpressure Protection (LTOP) vent piping between valves 2CV-4730-1 and 2CV-4731-2
9. LTOP vent piping between valves 2CV-4740-2, 2CV-4741-1 and 2CV-4698-1
10. Auxiliary Pressurizer Spray piping between valves 2CVC-28A AND 2CV-4824-2

Code Classes:	ASME Code Class 1
References:	ASME Section XI 2001 Edition with 2003 Addenda, IWB-5222(b)
Examination Category:	B-P
Item Number(s):	B15.10
Description:	System Pressure Test Boundary
Unit / Inspection Interval Applicability:	Arkansas Nuclear One, Unit 2 / Third (3rd) 10-year interval, 2R20 Refueling Outage

II. CODE REQUIREMENT(S)

The current code of record governing pressure testing for Arkansas Nuclear One, Unit 2 (ANO-2), is the 2001 Edition with 2003 Addenda. ASME Section XI IWB-5222(b) requires, "The pressure retaining boundary during the system leakage test conducted at or near the end of each inspection interval shall extend to all Class 1 pressure retaining components within the system."

III. PROPOSED ALTERNATIVE EXAMINATIONS

Pursuant to 10 CFR 50.55a(a)(3)(ii), Entergy requests authorization to visually examine the extended reactor coolant pressure boundary (RCPB) between the first and second normally closed isolation valves that experience Class 2 pressure during the Class 2 system leakage test conducted each inspection period of the inspection interval for the components identified in Section I, above. The third 10-year interval for ANO-2 ends on March 25, 2010.

Section IV, below, provides the basis for applying this proposed alternative to each identified line.

IV. BASIS FOR ALTERNATIVE

Performing leakage test of the Class 1 boundary beyond the inboard isolation valves at or near the end of each inspection interval requires conditions that place the plant in abnormal configurations or requires off-normal activities in order to pressurize the subject piping. These challenges include abnormal line-ups, installing jumpers around valve operation interlocks, installing and removing piping jumpers around valves, removing valve internals, and installing plugs. Associated with each challenge come additional burdens prior to plant restart, such as:

- High radiation exposure
- Erecting and removing scaffolding
- Multiple disassembly and reassembly of valves and control circuitry
- Welding

These off-normal configurations and challenges have a potential to adversely impact normal plant start-up because of the critical path time and effort required to ensure system configuration is restored and tested.

The piping subject to this request is outboard of the first isolation valve and is designed to RCPB conditions. However, its operation during normal conditions is not subject to RCPB conditions but to Class 2 system conditions of high pressure safety injection (HPSI), shutdown cooling, safety injection, low temperature overpressure protection (LTOP) relief isolation or auxiliary spray. While this piping is extremely difficult to test with the Class 1 leakage test, it is easily aligned to the Class 2 system and can be tested at Class 2 conditions each inspection period. Although Class 2 pressure is lower than Class 1, it is

representative of conditions for which the subject piping is exposed during both normal and accident conditions. Additionally, if the inboard valve leaked (thereby pressurizing the subject piping) and a through-wall flaw did exist that could only be detected at the higher pressure; the flaw would be discovered during the Class 1 leakage test, which is performed during each refueling outage with the inboard valve closed.

Following is a description of the piping subject to this request and the burdens associated with performing the Class 1 test currently required by ASME Section XI.

A. HPSI Header No. 1 between Check Valves 2SI-27A and 2SI-28A

The HPSI Header No. 1 piping and valves associated with this proposed alternative are shown in Figure 1.

The Class 2 function of the piping upstream of valve 2SI-28A is to provide a pathway for post-accident hot leg injection to the reactor coolant system in the event of a loss of coolant accident (LOCA). This portion of the piping between valves 2SI-28A and 2SI-27A is typically pressurized to approximately 634 psig during normal plant operation.

There are no branch connections located between these valves and a valve stem locking device is installed on valve 2SI-29A (downstream boundary isolation), locking the valve in the open position. Therefore performing a ten-year Class 1 system leakage test of extended RCPB piping of HPSI Header No. 1 between check valves 2SI-27A and 2SI-28A involves the following actions:

1. Erect scaffolding to access the valves;
2. Remove stem locking device from valve 2SI-29A;
3. Manually close valve 2SI-29A;
4. Perform the system leakage test with applied external pressure source;
5. Reinstall stem locking device on valve 2SI-29A; and
6. Remove the scaffolding

Entergy estimates the identified actions will take workers approximately 56 man-hours to complete, resulting in a radiological exposure of approximately 0.144 person-rem.

Risks associated with this activity are damage to permanent plant equipment and seat leakage at isolation valves causing delays and extending pressure test, increasing person-rem.

B. HPSI Header No. 2 between Check Valves 2SI-27B and 2SI-28B

The HPSI Header No. 2 piping and valves associated with this proposed alternative are shown in Figure 2.

The Class 2 function of the piping upstream of valve 2SI-28B is to provide a pathway for post-accident hot leg injection to the reactor coolant system in the event of a LOCA. This portion of the piping between valves 2SI-28B and 2SI-27B is typically pressurized to approximately 634 psig during normal plant operation.

Performing a ten-year Class 1 system leakage test of extended RCPB piping of HPSI Header No. 2 between check valves 2SI-27B and 2SI-28B involves the same actions identified in Section IV.A, above, applied to this header piping and components.

Entergy estimates the identified actions will take workers approximately 56 man-hours to complete, resulting in a radiological exposure of approximately 0.144 person-rem.

Risks associated with this activity are damage to permanent plant equipment and seat leakage at isolation valves causing delays and extending pressure test, increasing person-rem.

C. <u>Safety Injection piping between check valves 2SI-13A, 2SI-14A, 2SI-15A, and 2SI-16A</u>

The Safety Injection piping and valves associated with this proposed alternative are shown in Figure 3.

There is a shared Class 2 function between these check valves. 2SI-13A provides a flow path for high pressure safety injection to the Reactor Coolant System (RCS) and for post-accident recirculation cooling. 2SI-14A provides a flow path for low pressure safety injection to the RCS and for shutdown cooling. 2SI-15A provides a flow path for safety injection to RCS Cold Leg “A” and for shutdown and recirculation cooling. 2SI-16A provides a flow path for safety injection to RCS Cold Leg “A” from Safety Injection Tank 2T-2A. This portion of the piping between valves 2SI-13A, 2SI-14A, 2SI-15A, and 2SI-16A is typically pressurized between 600 psig and 624 psig during normal plant operation.

Performing a ten-year Class 1 system leakage test of extended RCPB piping of Safety Injection between check valves 2SI-13A, 2SI-14A, 2SI-15A, and 2SI-16A involves the following actions

1. Erect scaffolding to access the valves;
2. Disassemble the appropriate 2SI-15 valve and install a hydro plug;
3. Temporarily reassemble the valve;
4. Perform the system leakage test with applied external pressure source;
5. Disassemble the valve and remove the hydro plug;
6. Reassemble the valve; and
7. Remove the scaffolding

Entergy estimates the identified actions will take workers approximately 288 man-hours to complete resulting in a radiological exposure of approximately 6.990 person-rem.

Risks associated with this activity are damage to permanent plant equipment during the course of multiple disassembly/reassembly evolutions and seat leakage on upstream valves causing delays and extending pressure test, increasing person-rem.

D. Safety Injection piping between check valves 2SI-13B, 2SI-14B, 2SI-15B, and 2SI-16B

The Safety Injection piping and valves associated with this proposed alternative are shown in Figure 4.

There is a shared Class 2 function between these check valves which involves the same safety function as identified in Section IV.C above, applied to this Loop piping and components to RCS Cold Leg "B". 2SI-16B provides a flow path for safety injection to RCS Cold Leg "B" from Safety Injection Tank 2T-2B. This portion of the piping between valves 2SI-13B, 2SI-14B, 2SI-15B, and 2SI-16B is typically pressurized between 600 psig and 624 psig during normal plant operation.

Performing a ten-year Class 1 system leakage test of extended RCPB piping of Safety Injection between check valves 2SI-13B, 2SI-14B, 2SI-15B, and 2SI-16B involves the same actions identified in Section IV.C, above, applied to this Loop piping and components.

Entergy estimates the identified actions will take workers approximately 288 man-hours to complete resulting in a radiological exposure of approximately 6.900 person-rem.

Risks associated with this activity are damage to permanent plant equipment during the course of multiple disassembly/reassembly evolutions and seat leakage on upstream valves causing delays and extending pressure test, increasing person-rem.

E. Safety Injection piping between check valves 2SI-13C, 2SI-14C, 2SI-15C, and 2SI-16C

The Safety Injection piping and valves associated with this proposed alternative are shown in Figure 5.

There is a shared Class 2 function between these check valves which involves the same safety function as identified in Section IV.C above, applied to this Loop piping and components to RCS Cold Leg "C". 2SI-16C provides a flow path for safety injection to RCS Cold Leg "C" from Safety Injection Tank 2T-2C. This portion of the piping between valves 2SI-13C, 2SI-14C, 2SI-15C, and 2SI-16C is typically pressurized between 600 psig and 624 psig during normal plant operation.

Performing a ten-year Class 1 system leakage test of extended RCPB piping of Safety Injection between check valves 2SI-13C, 2SI-14C, 2SI-15C, and 2SI-16C involves the same actions identified in Section IV.C, above, applied to this Loop piping and components.

Entergy estimates the identified actions will take workers approximately 288 man-hours to complete resulting in a radiological exposure of approximately 4.100 person-rem.

Risks associated with this activity are damage to permanent plant equipment during the course of multiple disassembly/reassembly evolutions and seat leakage on upstream valves causing delays and extending pressure test, increasing person-rem.

F. Safety Injection piping between check valves 2SI-13D, 2SI-14D, 2SI-15D, and 2SI-16D

The Safety Injection piping and valves associated with this proposed alternative are shown in Figure 6.

There is a shared Class 2 function between these check valves which involves the same safety function as identified in Section IV.C above, applied to this Loop piping and components to RCS Cold Leg "D". 2SI-16D provides a flow path for safety injection to RCS Cold Leg "D" from Safety Injection Tank 2T-2D. This portion of the piping between valves 2SI-13D, 2SI-14D, 2SI-15D, and 2SI-16D is typically pressurized between 600 psig and 624 psig during normal plant operation.

Performing a ten-year Class 1 system leakage test of extended RCPB piping of Safety Injection between check valves 2SI-13D, 2SI-14D, 2SI-15D, and 2SI-16D involves the same actions identified in Section IV.C, above, applied to this Loop piping and components.

Entergy estimates the identified actions will take workers approximately 288 man-hours to complete resulting in a radiological exposure of approximately 4.120 person-rem.

Risks associated with this activity are damage to permanent plant equipment during the course of multiple disassembly/reassembly evolutions and seat leakage on upstream valves causing delays and extending pressure test, increasing person-rem.

G. Shutdown Cooling piping between valves 2CV-5084-1, 2CV-5086-2, and 2SI-19

The Shutdown Cooling piping and valves associated with this proposed alternative are shown in Figure 7.

The Class 2 function of the piping upstream of valve 2CV-5084-1 is to provide a suction flow path for the low pressure safety injection pumps during shutdown cooling operation. This portion of the piping between valves 2CV-5084-1, 2CV-5086-2, and 2SI-19 is typically pressurized to approximately 275 psia during shutdown cooling operation.

Performing a ten-year Class 1 system leakage test of extended RCPB piping of shutdown cooling between valves 2CV-5084-1, 2CV-5086-2, and 2SI-19 involves the following actions:

1. Remove safety relief valve;
2. Install fabricated adaptor;
3. Perform the system leakage test with applied external pressure source; and
4. Reinstall safety relief valve

Entergy estimates the identified actions will take workers approximately 36 man-hours to complete resulting in a radiological exposure of approximately 0.100 person-rem.

Risks associated with this activity are damage to permanent plant equipment and seat leakage at isolation valves causing delays and extending pressure, test increasing person-rem.

H. LTOP piping between valves 2CV-4730-1 and 2CV-4731-2

The LTOP piping and valves associated with this proposed alternative are shown in Figure 8.

The Class 2 function of the piping downstream of valve 2CV-4730-1 is to maintain RCS integrity during normal power operation. It has a safety function to enable LTOP safety valve 2PSV-4732 to provide over-pressure protection during conditions of low temperature operation. This portion of the piping between valves 2CV-4730-1 and 2CV-4731-2 is normally not pressurized during normal plant operation. During plant cool down from Mode 4 to Mode 5, this portion of piping is placed in service when RCS pressure is < 400 psia.

Likewise, during plant heatup, this portion of piping remains in service until RCS temperature is between 270 °F to 280 °F and, prior to 400 psia RCS pressure, this portion of piping is isolated.

Performing a ten-year Class 1 system leakage test of extended RCPB piping of LTOP valves 2CV-4730-1 and 2CV-4731-2 involves the same actions identified in Section IV.G, above, applied to this piping and components.

Entergy estimates the identified actions will take workers approximately 36 man-hours to complete resulting in a radiological exposure of approximately 0.360 person-rem.

Risks associated with this activity are damage to permanent plant equipment and seat leakage at isolation valves causing delays and extending pressure test, increasing person-rem.

I. LTOP piping between valves 2CV-4740-2, 2CV-4741-1, and 2CV-4698-1

The LTOP piping and valves associated with this proposed alternative are shown in Figure 9.

The Class 2 function of the piping downstream of valve 2CV-4740-2 is to maintain RCS integrity during normal power operation. It has a safety function to enable LTOP safety valve 2PSV-4742 to provide over-pressure protection during conditions of low temperature operation. In addition, it has an active safety function to provide an alternate cooling flow path for safety injection when the reactor coolant system is isolated and no other heat sink is available. This portion of the piping between valves 2CV-4740-2, 2CV-4741-1, and 2CV-4698-1 is normally not pressurized during normal plant operation. During plant cooldown from Mode 4 to Mode 5, this portion of piping is put into service when RCS pressure is < 400 psia. Likewise, during plant heatup, this portion of piping remains in service until RCS temperature is between 270 °F to 280 °F and, prior to 400 psia RCS pressure, this portion of piping is isolated.

Performing a ten-year Class 1 system leakage test of extended RCPB piping of LTOP valves 2CV-4740-2, 2CV-4741-1, and 2CV-4698-1 involves the same actions identified in Section IV.G, above, applied to this piping and components.

Entergy estimates the identified actions will take workers approximately 36 man-hours to complete resulting in a radiological exposure of approximately 0.360 person-rem.

Risks associated with this activity are damage to permanent plant equipment and seat leakage at isolation valves causing delays and extending pressure test, increasing person-rem.

J. <u>Pressurizer Auxiliary Spray piping between valves 2CVC-28A and 2CV-4824-2</u>

The Pressurizer Auxiliary Spray piping and valves associated with this proposed alternative are shown in Figure 10.

The Class 2 function of the piping upstream of valve 2CVC-28A is to provide a flow path for auxiliary spray to the pressurizer for de-pressurization and pressure control when RCPs are not in operation and for core flush in the event of a cold leg break. 2CV-4824-2 has a passive closed safety function to prevent diversion of borated water to the pressurizer during emergency boration. This portion of the piping between valves 2CVC-28A and 2CV-4824-2 is pressurized to approximately 275 psia during shutdown cooling operation.

Performing a ten-year Class 1 system leakage test of extended RCPB piping of Pressurizer Auxiliary Spray between check valves 2CVC-28A and 2CV-4824-2 involves the following actions

1. Disassemble valve and install a hydro plug;
2. Temporarily reassemble the valve;
3. Perform the system leakage test with applied external pressure source;
4. Disassemble the valve and remove the hydro plug; and
5. Reassemble the valve

Entergy estimates the identified actions will take workers approximately 48 man-hours to complete resulting in a radiological exposure of approximately 0.400 person-rem.

Risks associated with this activity are damage to permanent plant equipment during the course of multiple disassembly/reassembly evolutions and seat leakage on upstream valves causing delays and extending pressure test, increasing person-rem.

V. CONCLUSION

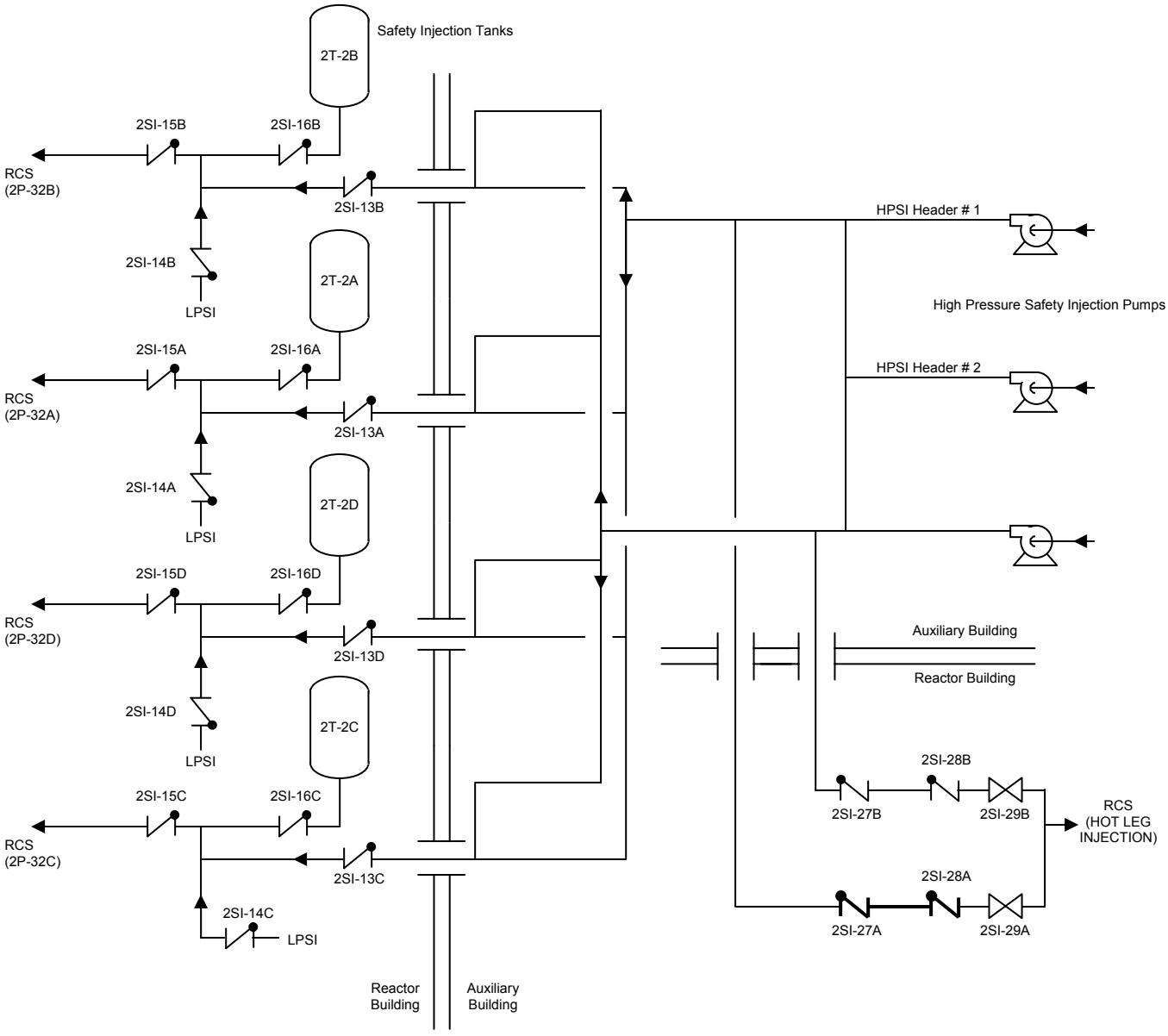
10 CFR 50.55a(a)(3) states:

> "Proposed alternatives to the requirements of paragraphs (c), (d), (e), (f), (g) and (h) of this section or portions thereof may be used when authorized by the Director of the Office of Nuclear Reactor Regulation. The applicant shall demonstrate that:
>
> (i) The proposed alternatives would provide an acceptable level of quality and safety, or
>
> (ii) Compliance with the specified requirements of this section would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety."

As discussed in Section III above, to perform a Class 1 system leakage test of the subject piping will result in undue burden without a compensating increase in quality and safety. The proposed alternative to visually examine the extended RCPB between the first and second normally closed isolation valves that experience Class 2 pressure during the Class 2 system leakage test conducted each inspection period of the inspection interval provides adequate assurance of the pipe's leak tightness. Therefore, Entergy requests authorization to perform the requested alternative to the Code requirement pursuant to 10 CFR 50.55a(a)(3)(ii).

FIGURE 1

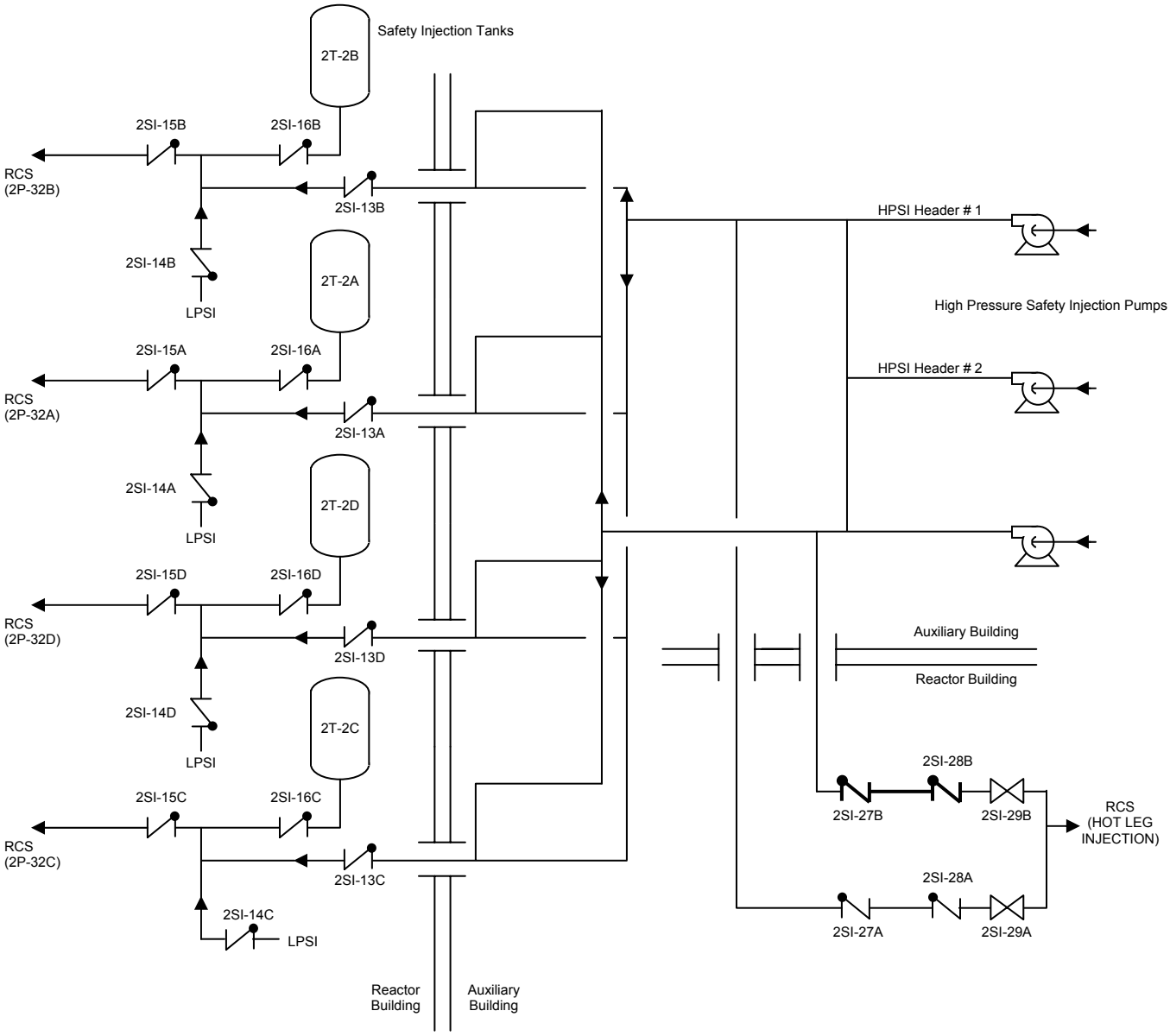
High Pressure Safety Injection Header No. 1



NOTE: Test boundary shown in bold

FIGURE 2

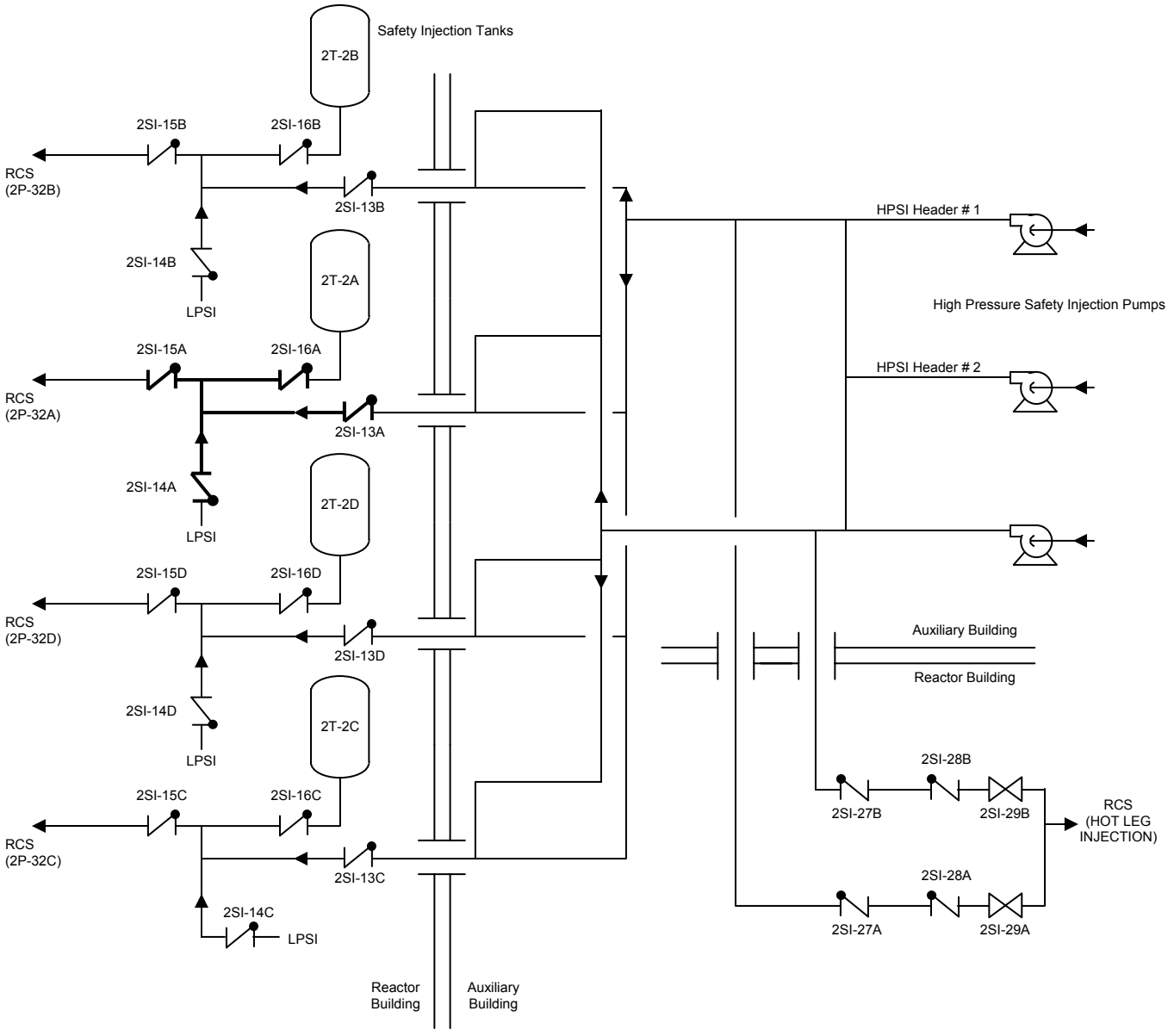
High Pressure Safety Injection Header No. 2



NOTE: Test boundary shown in bold

FIGURE 3

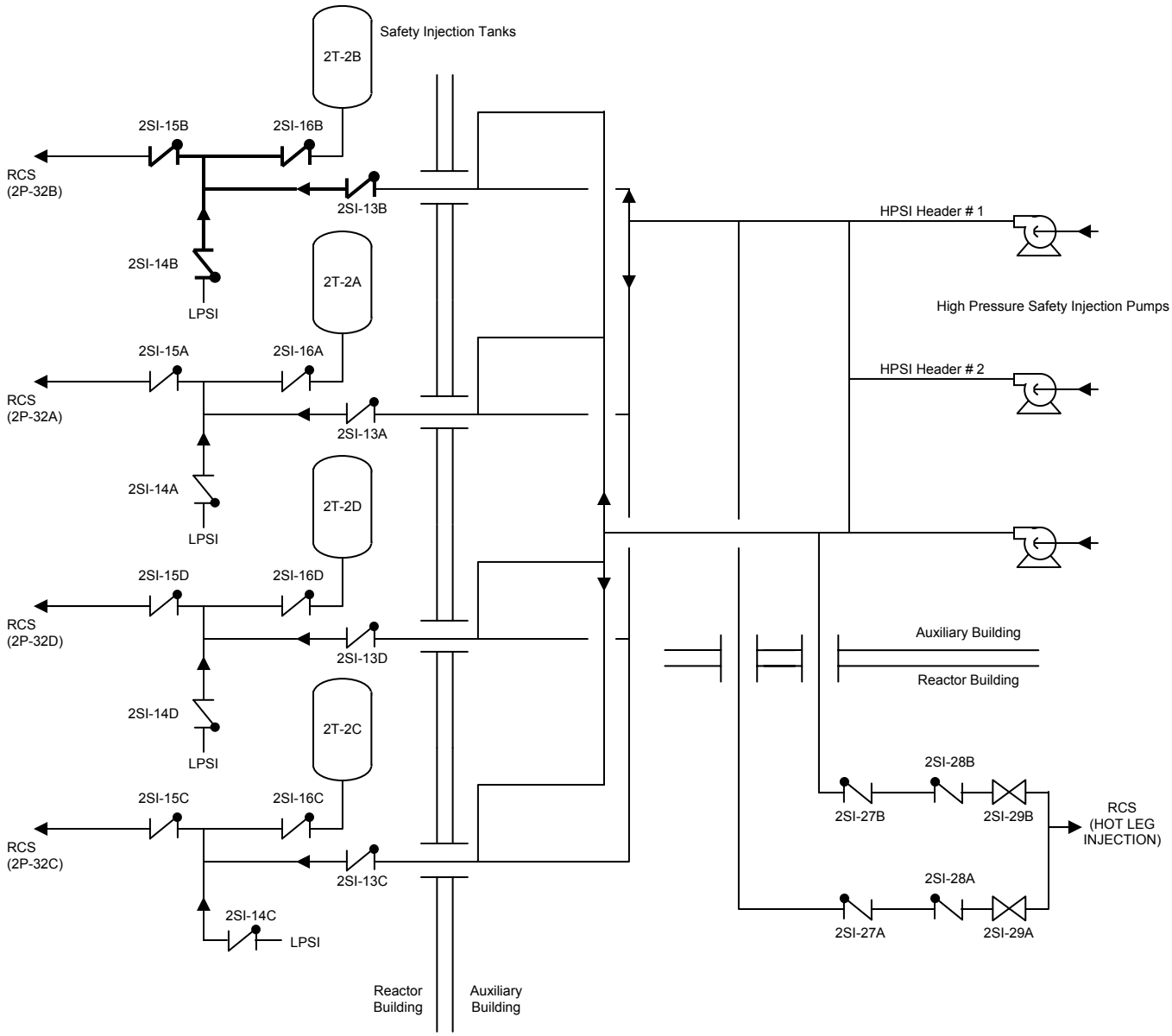
Safety Injection Loop "A"



NOTE: Test boundary shown in bold

FIGURE 4

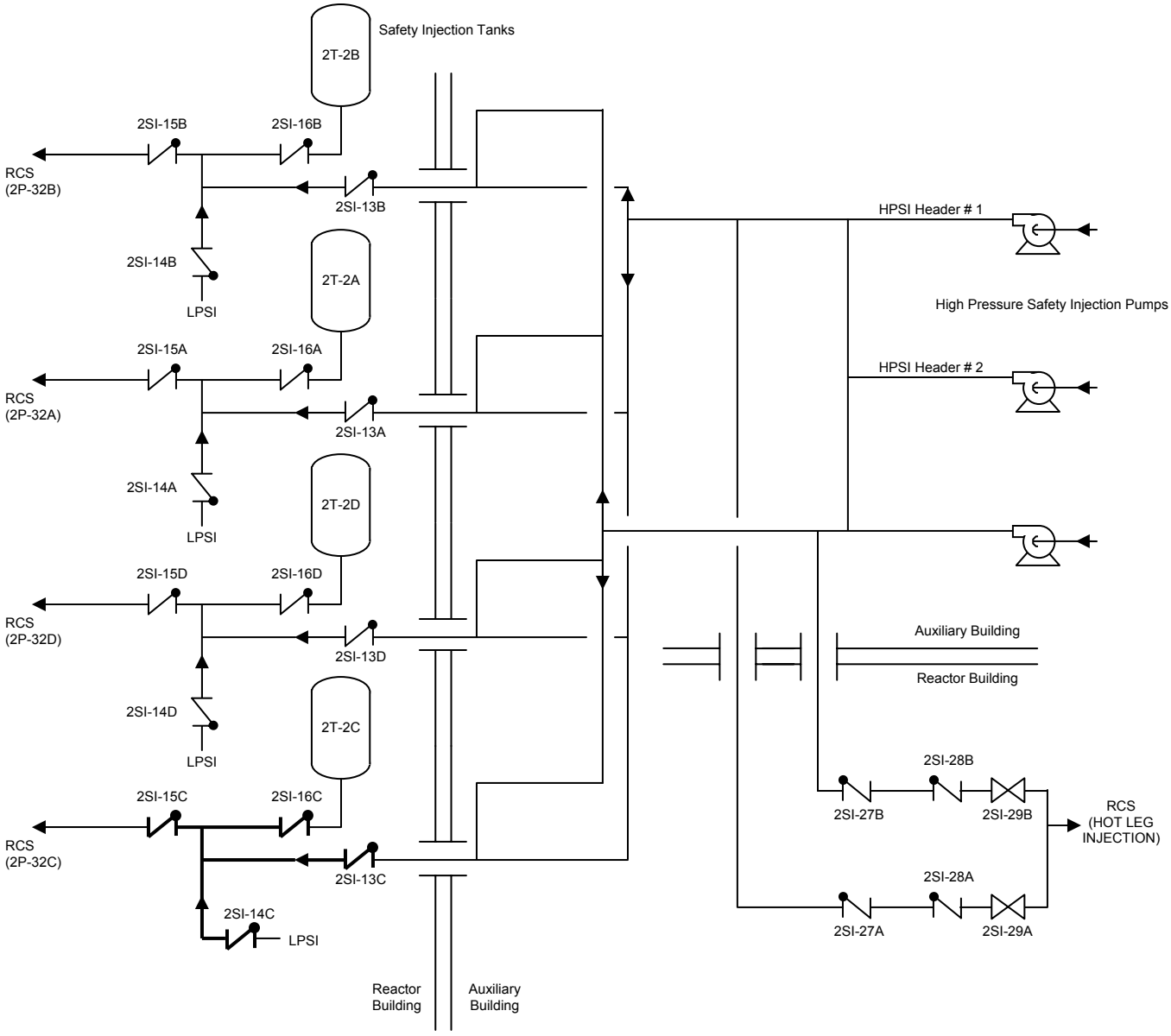
Safety Injection Loop "B"



NOTE: Test boundary shown in bold

FIGURE 5

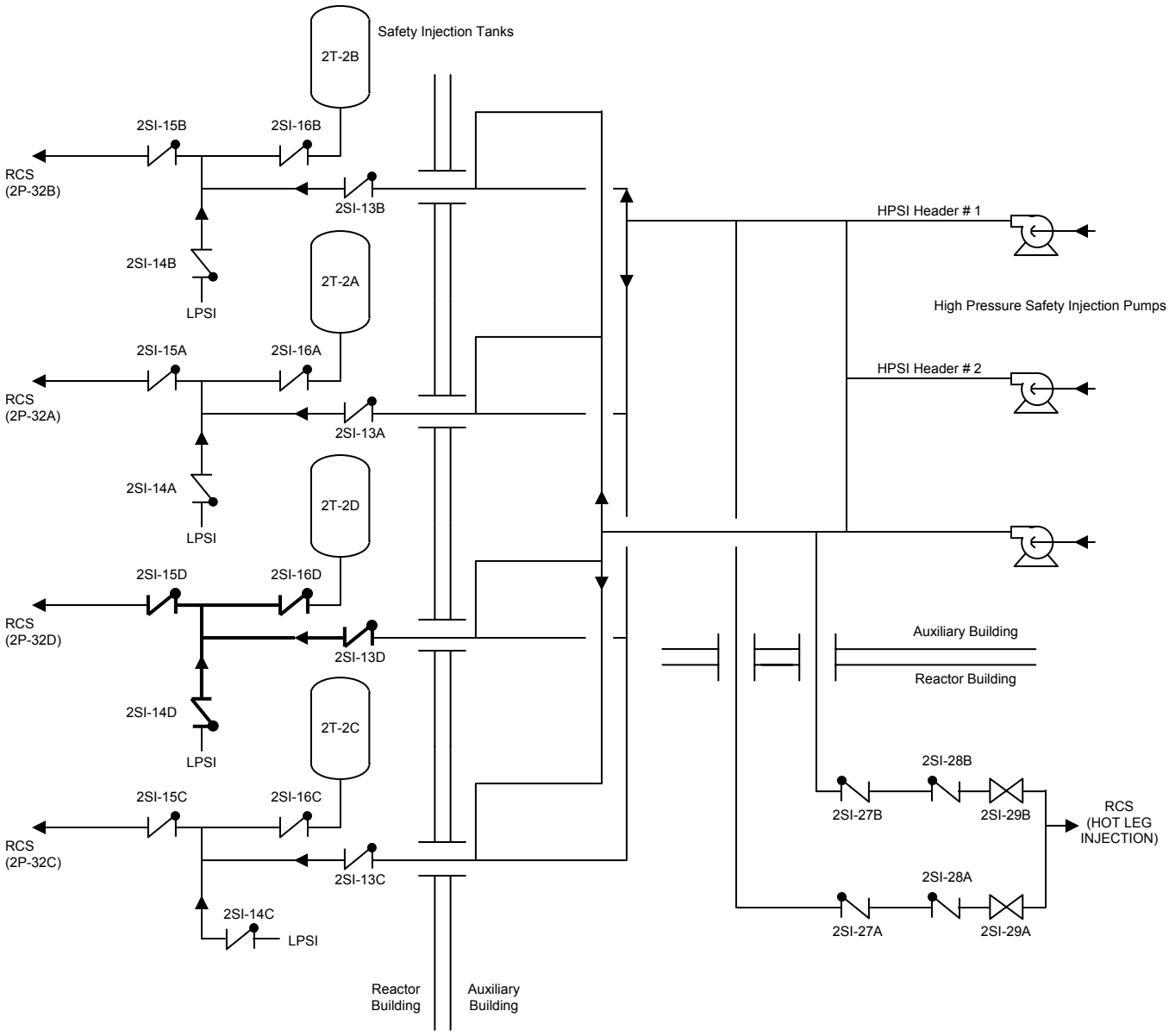
Safety Injection Loop "C"



NOTE: Test boundary shown in bold

FIGURE 6

Safety Injection Loop "D"



NOTE: Test boundary shown in bold

FIGURE 7

Shutdown Cooling

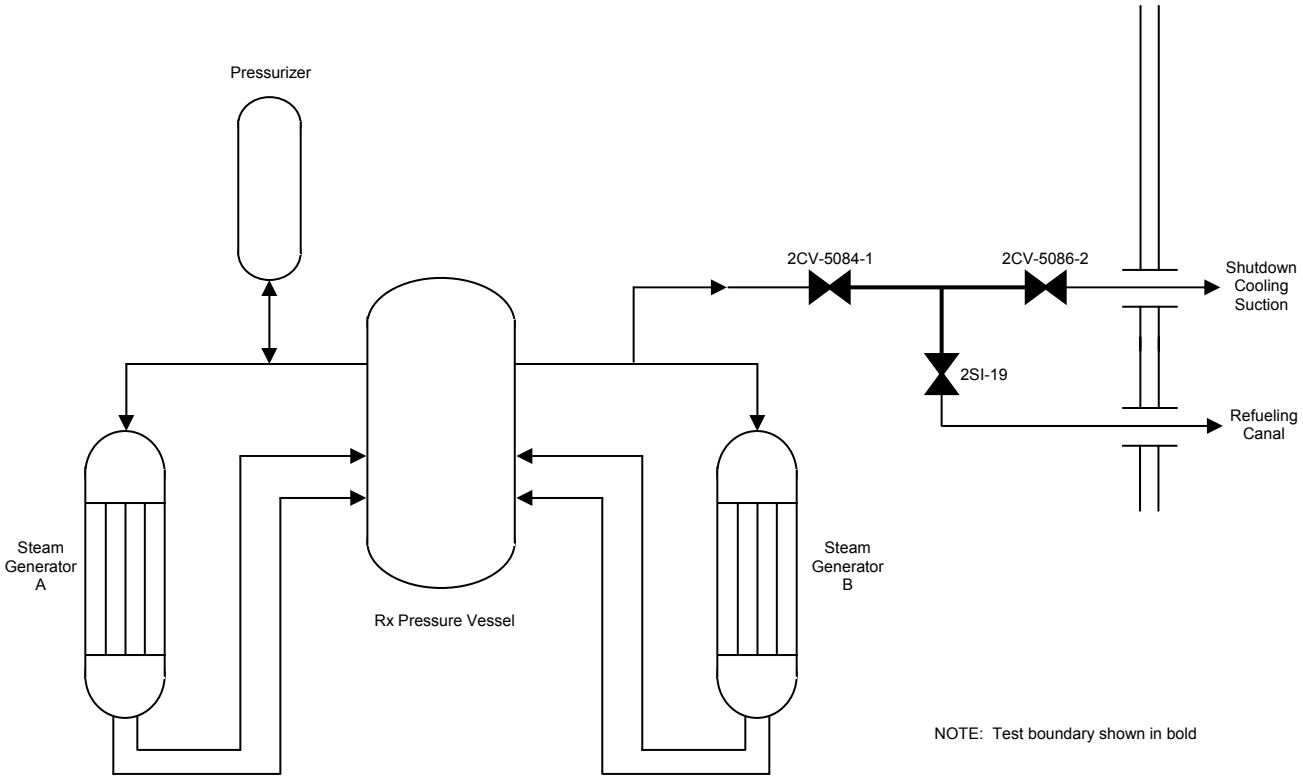


FIGURE 8

Low Temperature Overpressure Protection

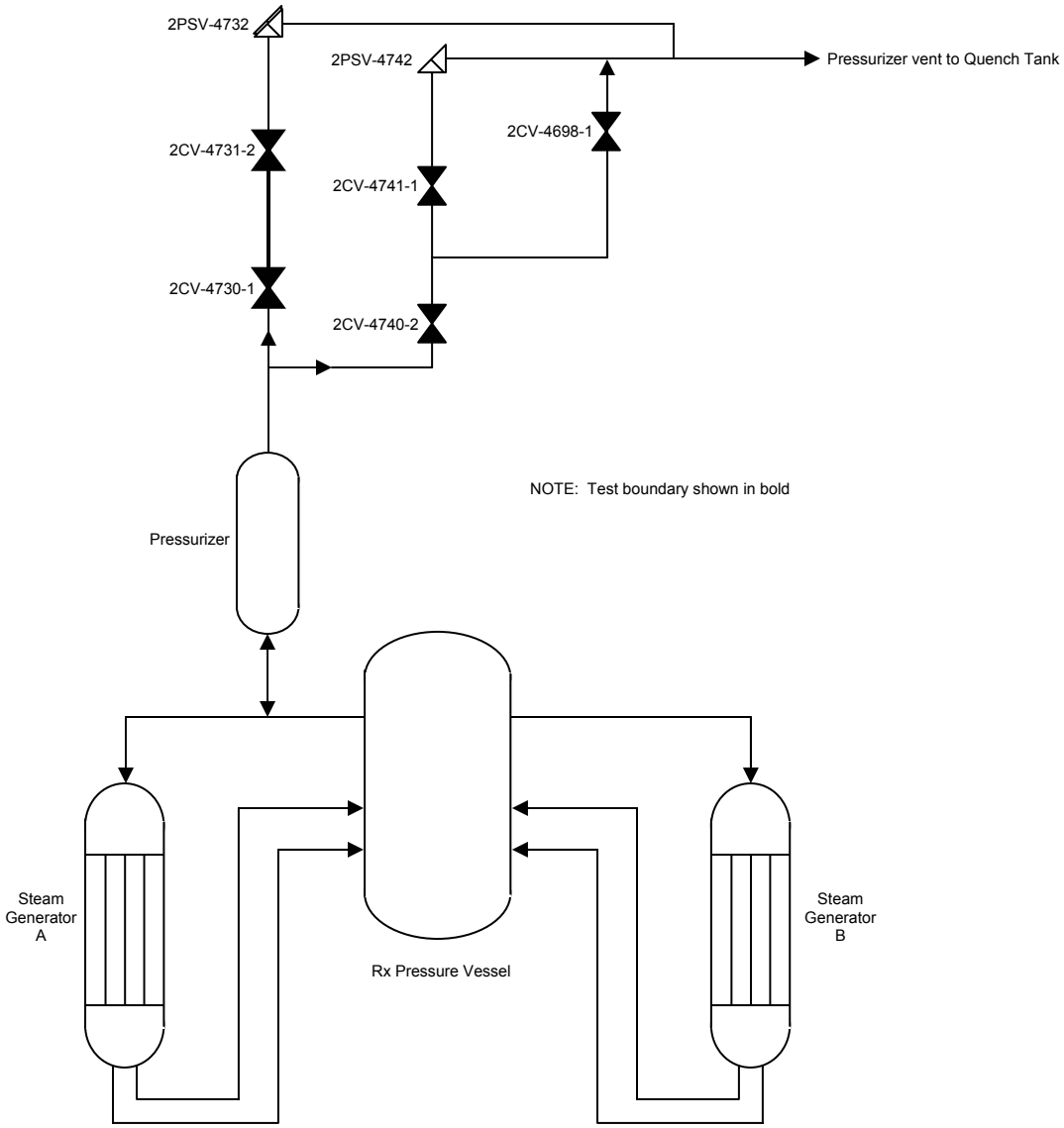


FIGURE 9

Low Temperature Overpressure Protection

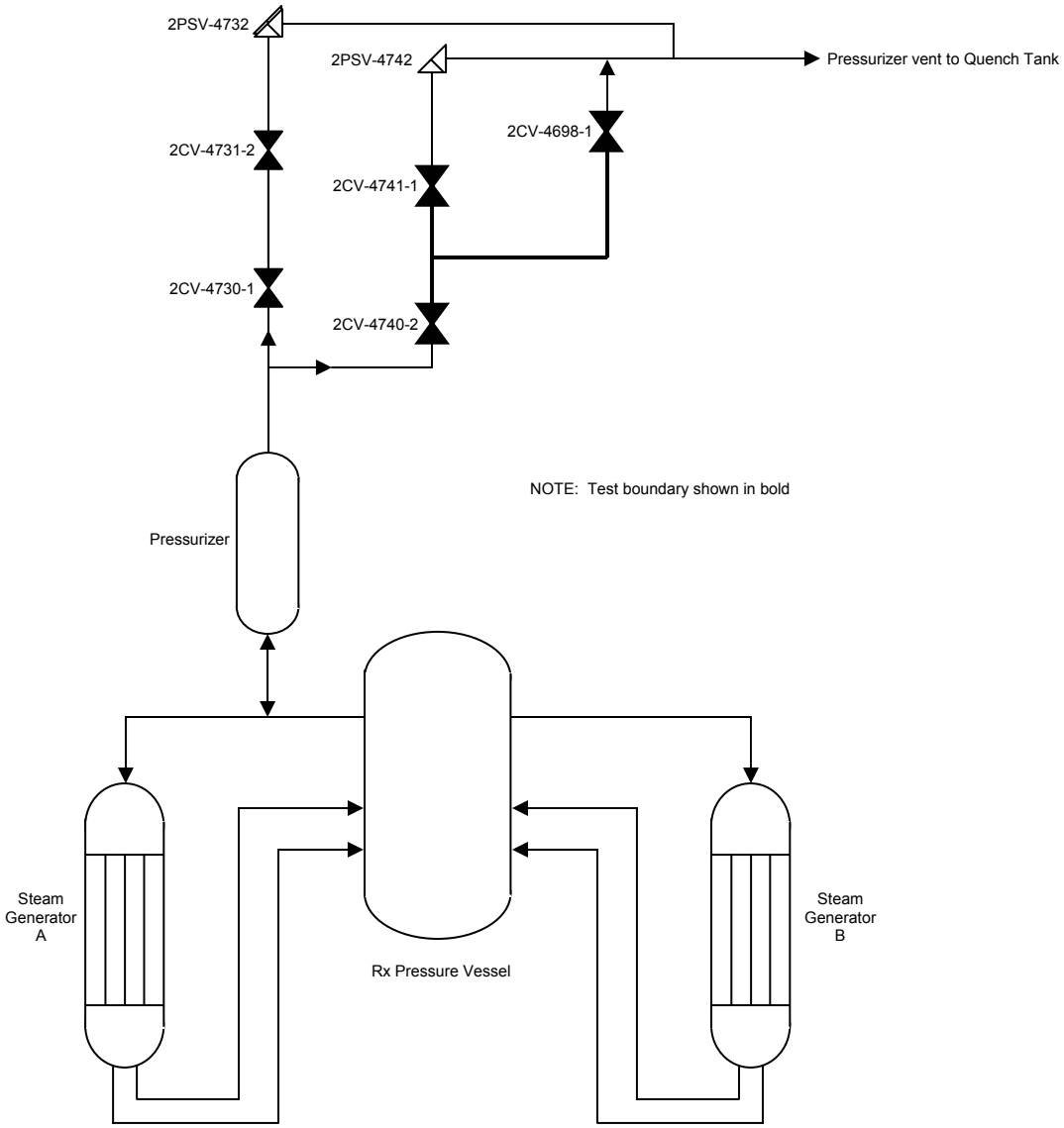


FIGURE 10

Auxiliary Pressurizer Spray