LILCO
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SHOREHAM NUCLEAR POWER STATION
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Direct Dial Number

October 26, 1982 SNRC-776

Mr. Ronald C. Haynes
Office of Inspection & Enforcement,
Region 1
U.S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, PA 19406

SHOREHAM NUCLEAR POWER STATION - UNIT 1
DOCKET NO. 50-322

Dear Mr. Haynes:

Recent NRC inspection items have related to the location of containment isolation valves (CIVs) and their distance from the containment penetration. General Design Criteria (GDC) 55, 56 and 57 require that CIVs located outside containment be located "as close as practical" to containment. Selected valves have been previously discussed as part of NRC inspection items and resolved via letter SNRC-560, dated 4/23/81 (Mr. E. J. Brunner from Mr. M. S. Pollock).

The "as close as practical" criteria differs from the design ability to locate the CIV as close as possible to the containment wall in that the practical location must reflect consideration of the numerous compromises required in the layout of plant equipment, (i.e., accessibility for surveillance and maintenance, and location of suitable support locations) and the often conflicting requirements of other design codes.

To address the "as close as possible" alternative, LILCO has investigated the location of all CIVs with respect to the distance from the containment. This survey determined the actual valve distance from the containment and the justification for its locations. During the survey review, a distance of ten feet from containment was assumed as reasonable and requiring no further discussion.

At the request of the I&E onsite inspector, a discussion of the location of selected CIVs representing valves considered to be typical of the worst-case locations, has been generated. The list of selected penetrations and associated valves is enclosed as Attachment 1. In addition, Attachment 2 presents the details and justification for these locations; and Attachment 3 lists in tabular form the location criteria for all CIVs.

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In Attachment 3, since numerous considerations exist which affect the valves location, we have provided selected location "codes" to justify the location of the valves over the minimum distance of 10 ft. A distance of ten feet was assumed as reasonable and requiring no further discussion.

Some of the competing criteria which often necessitate compromise are as follows:

1. Design Codes - Relief valves should be located as close as practical to the component of concern in order to provide maximum overpressure protection. When system design requires the relief valve to discharge into the primary containment, relatively long runs of tail pipe may be necessary due to basic equipment arrangements. Piping codes preclude the option of adding any further isolation valves in the RV tail pipe.

2. Maintainability - Maintainability is a very important design criterion which in some cases requires locating CIVs away from the penetration to provide access. Locating an important component like a CIV in an area which has poor access could compromise valve maintenance and actually degrade containment isolation capability.

3. Valve Support - Some CIVs have large actuators and must be well located to provide adequate seismic support. Pipe flexibility between the rigid valve support and the rigid penetration is sometimes needed in order to keep design stress in the connecting pipe to acceptable levels. It is in the better interest of containment isolation to provide a suitable length of pipe with low stress levels than to provide a short section of pipe with high stress levels.

4. Piping Geometry - In several cases multiple pipe branches tee into a common manifold prior to penetrating the containment. Because of system function, individual CIVs are required on the branches rather than a single CIV on the manifold. This arrangement minimizes both the parallel piping which would be required, and the number of containment penetrations required, thereby improving overall containment integrity. In this case, however, the basic geometry of the fittings combined with design provisions for weld inspections dictated by Section XI of the ASME Code make compliance with the distance criterion difficult

if not impossible. On the whole, containment integrity is better served by having fewer penetrations whose CIVs cannot meet the distance criterion rather than having more penetrations whose CIVs can meet the distance criterion.

5. <u>Minimizing Pipe Length</u> - Good piping design practice calls for minimizing the length of piping runs. For high energy lines, a short run length decreases the likelihood of a Pipe Break Outside Containment (PBOC). For radioactive lines, a short run length minimizes exposure to personnel during operation and maintenance, and to equipment during and following an accident. In several manifold cases, extensive extra lengths of piping would be required to locate a CIV closer to the penetration, in conflict with this design practice.

To summarize, our evaluation of this matter indicates that the criteria of 10CFR50 have been adequately fulfilled. Although the distance from the containment in some cases may appear excessive, the location meets the intent of the "as close as practical" rule when considering all the valve location requirements based on maintenance, inservice inspection and testing accessibility and the ability to provide adequate seismic support for the valve and associated piping.

Very truly yours,

J. L. Smith

J. L. Smith
RCW/mp

cc: H. R. Denton
J. Higgins
All Parties
E. J. Weinkam

ATTACHMENT 1

Selected Penetrations and Valves for Discussion

Penetration	Valve(s)
X24 (A through H)	P42*MOV-232 through 240
X43/XS-5	E11*RV-152B; RV-157B E11*MOV-055B; MOV-056B
X10B	E11*RV-155 E41*MOV-036
X8B	1E11*MOV-040B
J-2	T48*SOV-134 Check Valve
X36	C41*EV-010A&B
B-3	T48*SOV-128A&B
F-11	Two check valves
B-7	P50*MOV-103A
XS-16	D11*MOV-033B

ATTACHMENT 2

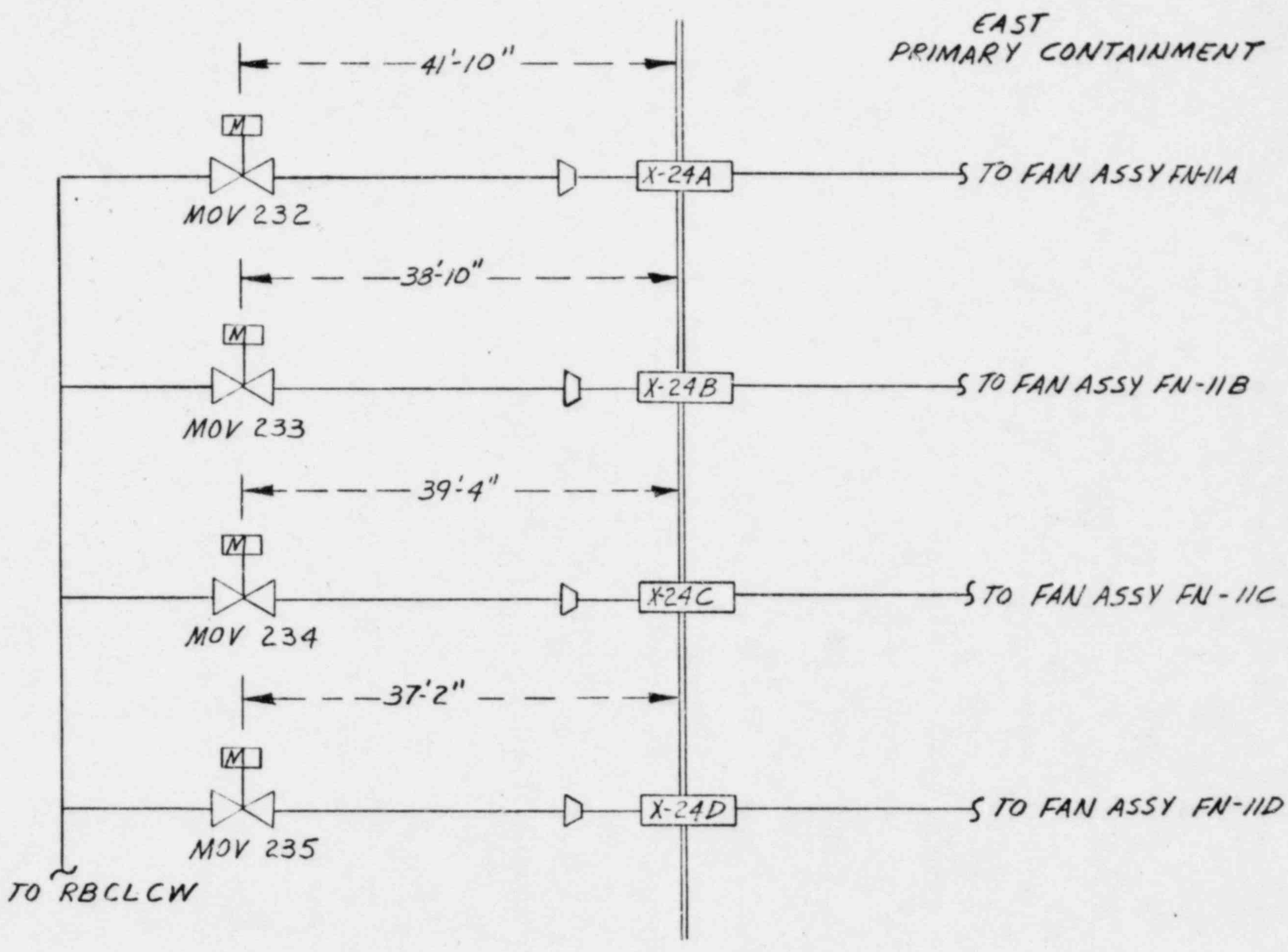
Penetration	Valves	Size	Distance
X-24 A, B, C & D	1P42*MOV-232	3"	41'10"
	-233	3"	38'10"
	-234	3"	39'4"
	-235	3"	37'2"

The original design for these valves was for a 2" valve. As part of a major modification to improve drywell cooling, they were upgraded to 3" valves, and at that time consideration was given to moving the valves closer to the penetration. The present location was determined to be "as close as practical" based on giving priority to much larger diameter high pressure valves located in the vicinity of the penetration. These valves are physically approximately 25 feet from the containment penetration. The distance indicated above reflects the actual "piping run" distance, which was arranged to accommodate larger valves of other systems (16"1E11*MOV-040A and 24" 1E11*MOV-037A) which were already installed, and an existing aisle.

These valves could be physically moved a few feet closer, but this would not be practical, and the reduction in accessibility would hamper maintenance required by the valve testing program and would also restrict accessibility to other components in the area.

PENETRATION X-24A, B, C, D

COOLING WATER TO DRYWELL COOLERS



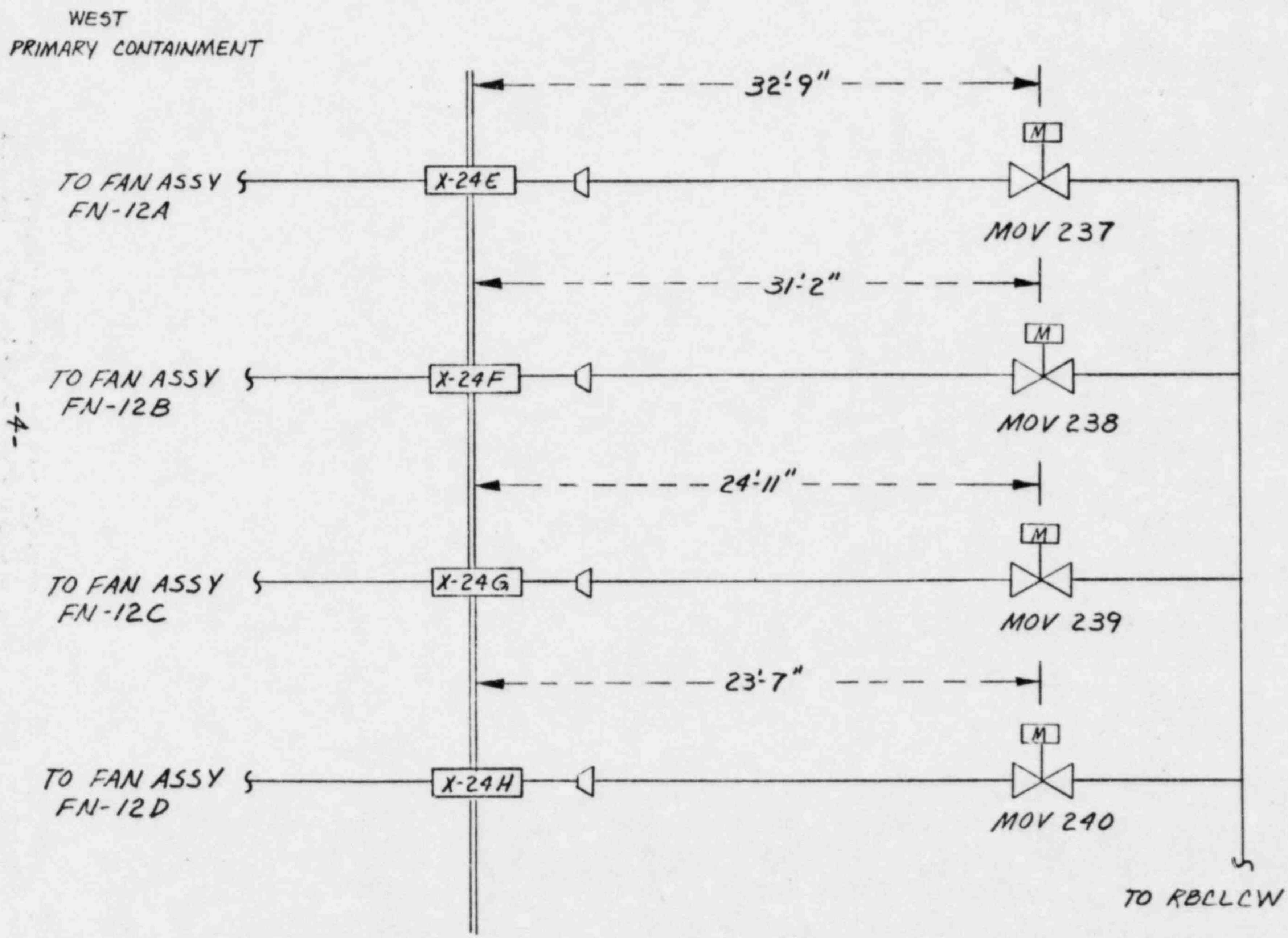
Penetration	Valves	Size	Distance
X-24 E, F, G & H	1P42*MOV-237	3"	32'9"
	-238	3"	31'2"
	-239	3"	24'11"
	-240	3"	23'7"

These valves are identical to the 4 valves discussed with penetration X-24 A, B, C & D, except that these are located on the east side of the containment.

These valves are physically about 15 feet from the containment penetrations. The distance above reflects the actual "piping run" distance which accommodates other high pressure valves in the immediate area. The locations allow for maintenance on the Motor Operators of these valves.

At the time of the drywell cooling modification, these valves were moved slightly closer to the containment by removing a platform and by optimizing other piping configurations. Notice that the distances on the east side are approximately 10' closer than those on the west side. Maintainability in a congested area was not compromised by this relocation.

PENETRATION X-24E, F, G, H
COOLING WATERS TO DRYWELL COOLERS



Penetration	Valves	Size	Distance
X-43/XS-5	1E11*RV-152B	4"	227'-3"
	.E11*RV-157B	1"	12'-6"
	1E11*MOV-055B	2"	16'-3"
	-056B	2"	11'-10"

Refer to FSAR 6.2.4.3.3 under "General Evaluation" for general compliance against Criterion 56. Specific compliance for penetration (XS-5) is given under "Influent Lines to Suppression Chamber", and for penetration (X-43) is given under "Effluent Lines from Suppression Chamber."

GDC 56 requires that lines penetrating containment and connecting to the primary containment atmosphere have two isolation valves, one inside containment and the other outside. This criterion does not reflect consideration of the BWR suppression pool which provides isolation from the suppression chamber air space by a water seal.

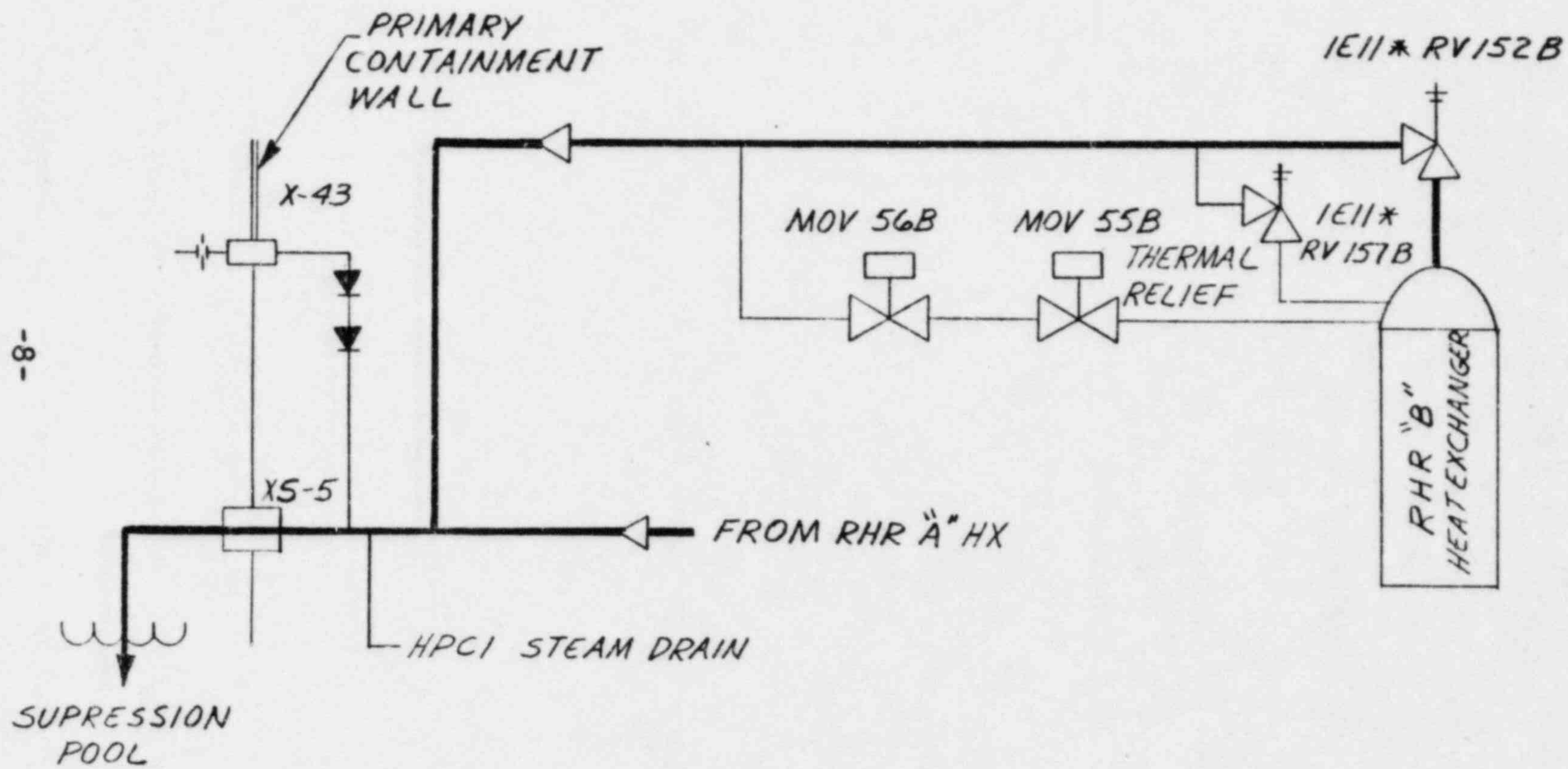
The HPCI steam supply to RHR heat exchanger relief valves and the RHR heat exchanger relief valves common discharge line (XS-5) penetrates the primary containment and discharges at a point located below the suppression pool water surface, thus providing a water seal and isolation from the suppression chamber air space. No valves are included in these lines, in accordance with ASME Section III - Division 1, Subsection NC-7153, which requires that no stop valve or other device be placed relative to a pressure relief device so that it could reduce overpressure protection. GDC 56 is satisfied on the basis given above, and that the relief valves common discharge line including relief valves is isolated from the suppression chamber air space by a water seal (suppression pool) in the primary containment. Also, the relief valves are normally closed, and other piping, equipment, and valves located outside of the relief valve form a closed system (all branch lines are procedurally maintained closed) which is pressurized after a LOCA such that any leakage past relief valves would be into primary containment. Subsidiary lines (RHR heat exchange vent lines) which use the common discharge line as a header are provided with two normally closed, remote manually actuated, motor-operated isolation valves. Compliance with ASME Section III-Division 1, Subsection NC-7151 dictates that the relief valve be located as close as practicable to the major source of transient pressure. The original design for the piping for the RHR Heat Exchanger Relief valves had the discharge running to the RHR pump test return line. This arrangement was changed so that the RHR Heat Exchanger Relief valves utilized a separate penetration which is XS-5. The long length of piping from 1E11*RV-152B to XS-5 is justified because it is considered more practical than utilizing a second set of vacuum breakers and a second penetra- tion. The competing criteria in this case were to minimize the [illegible] penetrations or to have the isolation valve closer to the containment.

Fewer penetrations provide a more conservative design and this criteria was judged to be governing. In fact there are no spare penetrations available for this service.

The section of piping penetrating the containment wall, from the penetration to the Containment Isolation Valve, represents an extension of containment. This piping is the containment pressure boundary and maintains containment integrity after an accident. The "as close as practical" guideline is satisfied when a CIV is located near an existing line, and the critical distance becomes the distance to the containment pressure boundary (i.e., existing line) not the distance to the actual containment penetration. Since the 8" discharge line from the RHR relief valve to XS-5 is considered part of the containment pressure boundary, the location of E11*RV157B and MOV056B and 055B are considered as close as practical to the 8" line with respect to other design considerations such as maintainability, ASME Code requirement location of relief valves with respect to the device they are relieving, and the fact that all of these valves are mounted on the same piece of equipment. It is therefore concluded that the referenced valves are located "as close as practical" in accordance with total system design requirements.

PENETRATION X-43 AND XS-5

RHR HEAT EXCHANGER RELIEF VALVE AND VENT



Penetration	Valves	Size	Distance
X-10B	1E41*MOV-036	4"	81'-5"
	1E11*RV-155	2"	62'-5"
	1E11MOV-040B	16"	84'-0"

Refer to FSAR 6.2.4.3.3 under "General Evaluation" for general compliance against Criterion 56 and under "Influent Lines to Suppression Chamber" for penetration (X-10B) for additional specific compliance.

CIV 1E11*MOV-040B is discussed separately under penetration (X-8B).

Relief valve 1E11*RV-155 is a thermal relief for the piping run from the RHR heat exchangers (in the steam condensing mode) to the RCIC suction. Relief valves are located as close as practical to the equipment being protected (refer to previous discussion). The valve is physically located at el. 33'2", which is dictated by the elevation of penetration X-10B (29'0"). This arrangement allows the relief discharge line to slope continuously down to the containment to avoid liquid "collection pockets" which are not permitted by the ASME Code.

When verifying the "as close as practical to the containment" location of this relief valve, it was assumed that the relief valve could be located anywhere along the piping run from the RHR exchanger condensate outlet and the RCIC suction, given that the elevation was required to be at least 33'. The present location was confirmed to be "as close a possible" to penetration X-10B due to overhead obstructions above closer locations and the criteria that the relief valve be a close as practical to the equipment it is protecting.

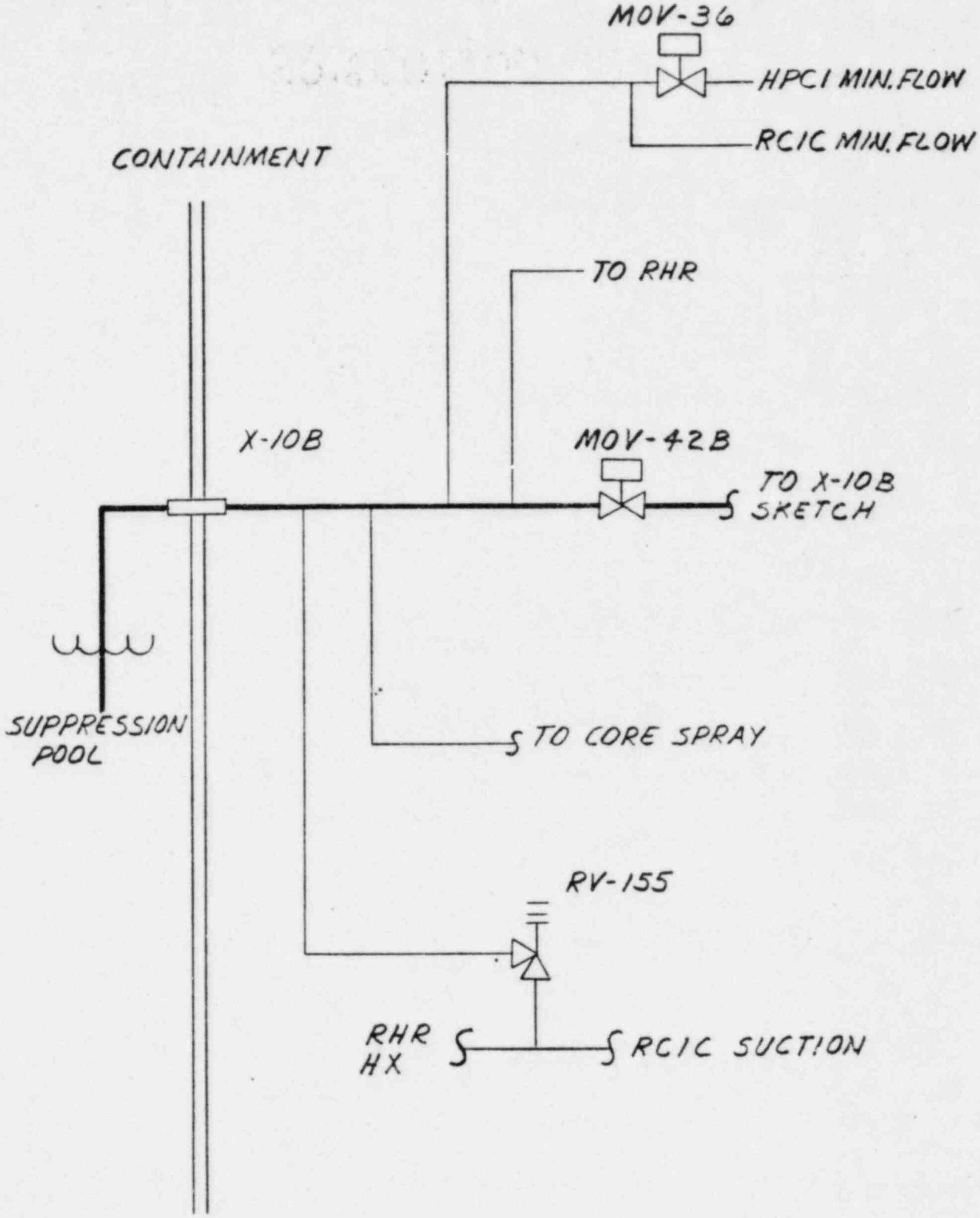
Containment isolation valve 1E41*MOV036 serves as a minimum flow valve for the HPCI system. This valve conforms to the requirements of GDC 56 as discussed in FSAR Section 6.2.4.3.3. Since the piping ultimately discharges below water level, the post LOCA water seal minimizes the isolation valves function when considered in conjunction with the closed Code Class 2 boundary beyond the valve. The normally closed position combined with the previous criteria minimizes the need for containment isolation.

For these reasons, the controlling criteria for locating the valve becomes system process requirements. This fact is evident by the valves location of only a few feet from the main HPCI piping run. HPCI is a high pressure system which could operate during plant accident or transient conditions. The valve opens when the system is initially started and recloses when flow is delivered to the vessel. Locating the valve close to the main system piping run minimizes the system boundary pressurized while operating, and reduces the total extent of high pressure piping in the secondary containment.

The valve is located "as close as practical" in accordance with total system design requirements.

PENETRATION X-10B

HPCI MINIMUM FLOW LINE, RHR RELIEF VALVE DISCHARGE LINE



Penetration	Valve	Size	Distance
X-8B	1E11*MOV-040B	16"	51-1"

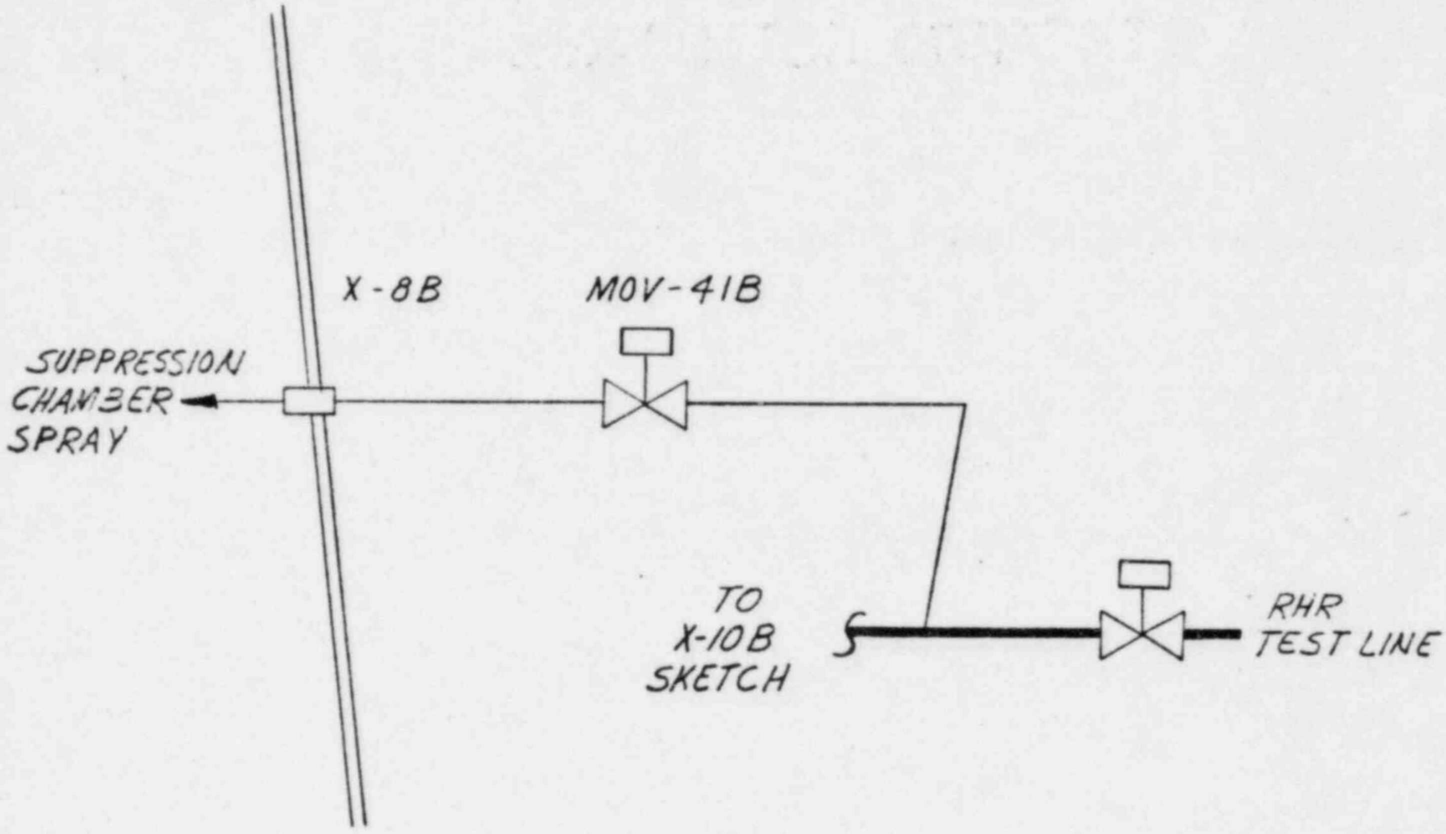
Refer to FSAR 6.2.4.3.3 under "General Evaluation" for general compliance against Criterion 56, and under "Influent Lines to Suppression Chamber" for penetration (X-8).

The outboard CIV MOV-040B is located outboard of MOV-042B from penetration (X-10B), and outboard of MOV-041B from penetration (X-8B). The distances are 84'0" and 51'1", respectively. The line through penetration (X-10B) discharges at a point below the suppression pool water surface. In this case both MOV-042B and the suppression pool water seal provide isolation.

In the case of the flow path through penetration X-8B and MOV-041B, and the flow path through penetration (X-10B) and MOV-042B, CIV MOV-040B represents the second isolation valve. The "as close as practical" criteria is satisfied by the first isolation valve from containment. Since both the first and second isolation valves are outside containment they are accessible for inservice inspection during plant operation.

CIV (MOV-040B) is used during the test mode and is normally closed. In addition, the piping, equipment, and valves located outside CIV MOV-040B form a closed system (all branch lines are procedurally maintained closed) which is pressurized after a LOCA such that any potential leakage past the isolation valves would be into containment. The location of MOV-040B is dictated by its safety function, which is to serve as the block valve which branches off the LPCI injection line. As such, it is essential to be located as close to the LPCI injection line as practical. This valve also serves as outermost CIV when in the suppression chamber spray and suppression pool cooling modes of operation.

PENETRATION X-8B
RHR TEST LINE



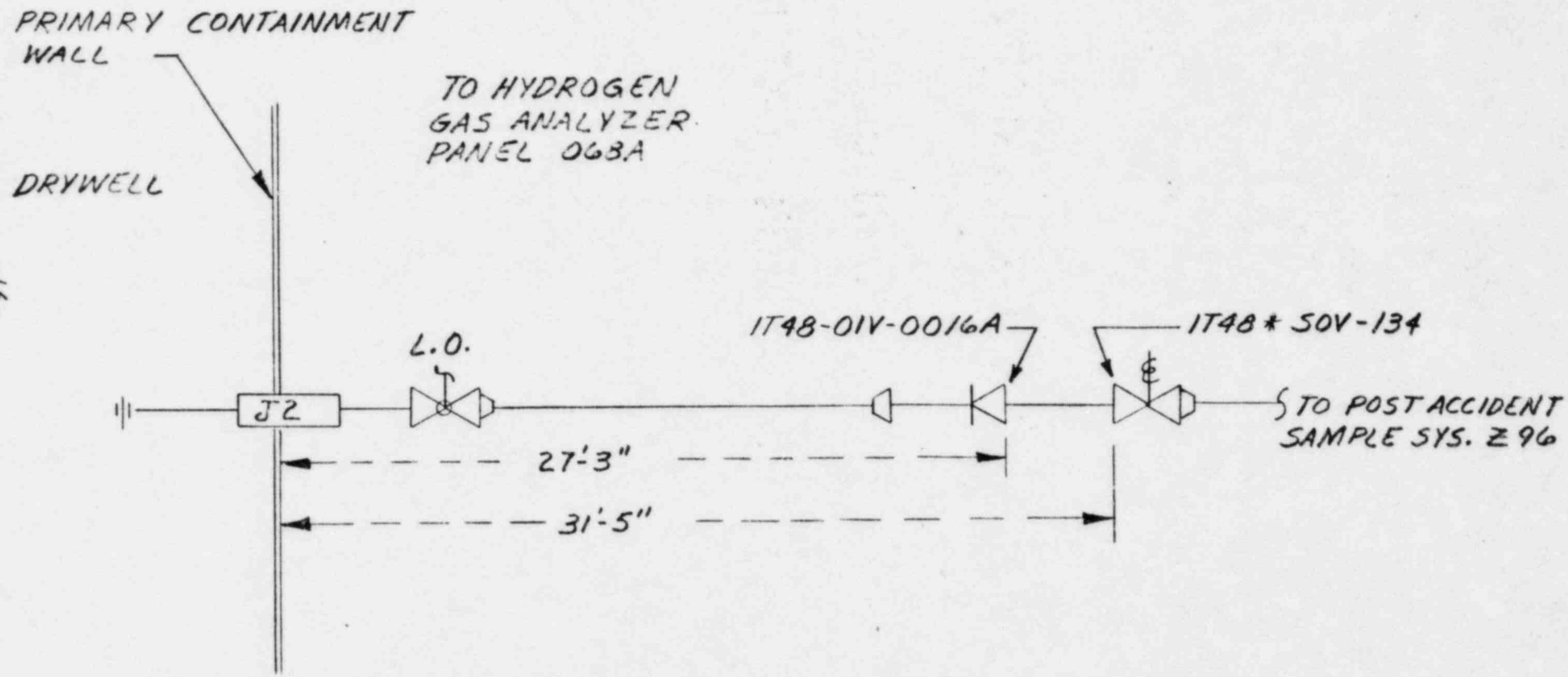
Penetration	Valves	Size	Distance
J-2	OIV-0016A (Simple Check Valve)	3/4"	27'3"
	IT48*SOV-134	3/4"	31'5"

Specific compliance against Criterion 56 is given in FSAR 6.2.4.3.3 under "Influent Lines to Drywell".

This penetration contains the redundant PASS primary containment atmosphere sample return line. Each has two normally closed valves, a solenoid operated isolation valve and check valve, both located outside of the primary containment.

As described, this line connects into an existing line to the hydrogen gas analyzer, 1T48*PNL-068A, which is required to be open at all times to perform its intended function. This existing line forms an extension of the containment boundary. This arrangement satisfies GDC 56 since the isolation valves are located as close as practical to the containment boundary (i.e., instrument line). The critical distance for valves OIV-0016A and IT48*SOV-134, is its distance from the existing pipe, not its distance from penetrations. These distances are 7'-8" and 11'-10" respectively.

PENETRATION J-2
POST ACCIDENT SYSTEM



Penetration	Valves	Size	Distance
X-36	1C41*EV-010A&B	1½"	67'-10"

Refer to FSAR 6.2.4.3.2 under "Influent Lines to Drywell" for specific compliance of these CIV's against Criterion 55.

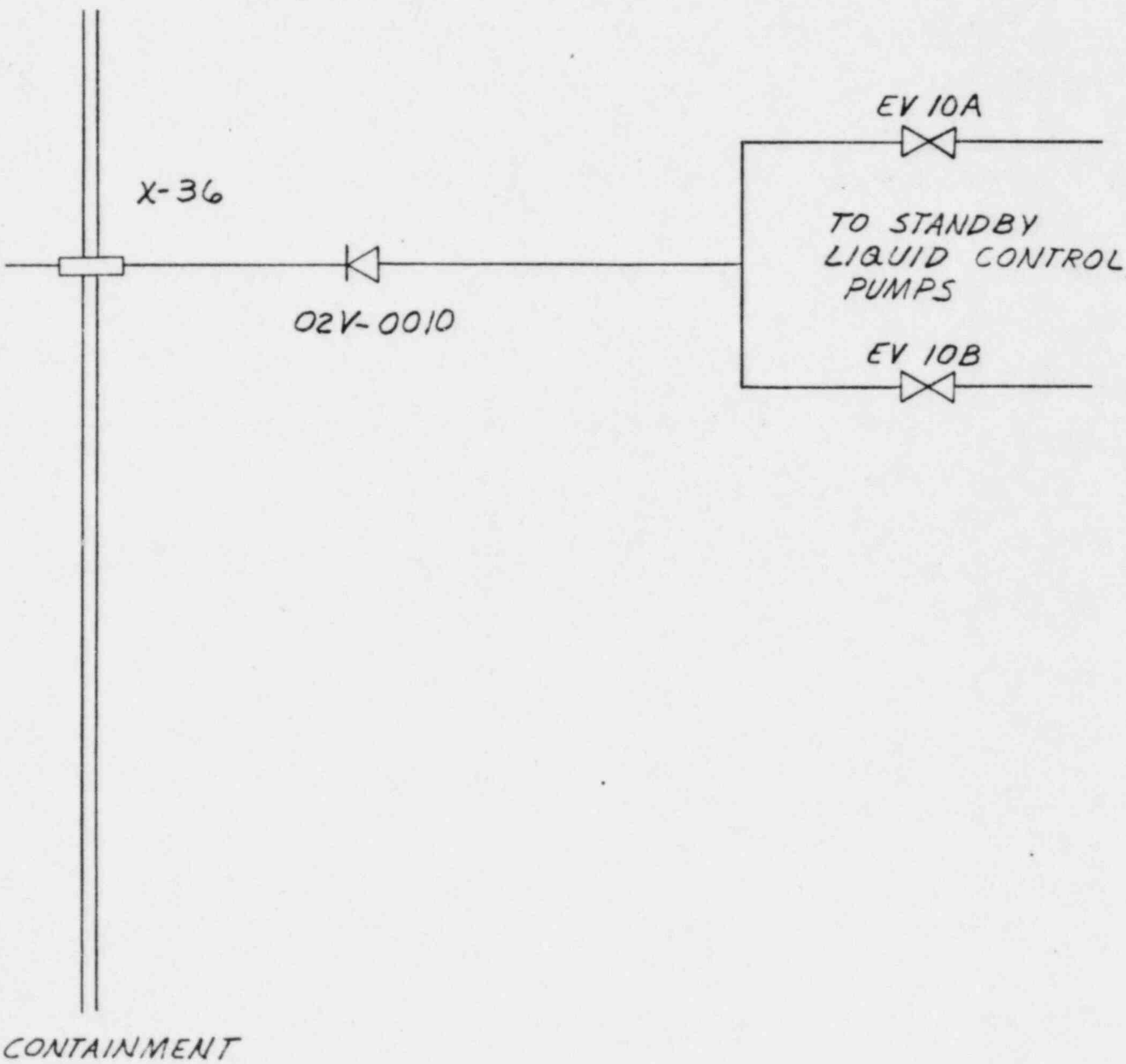
The standby liquid control line penetrates the primary containment through penetration X-36 and discharges directly into the RPV. This line is equipped with a simple check valve inside the primary containment and a simple check valve located outside as close as practical (less than 10 feet) to the primary containment. Additionally, redundant remote manual normally closed explosive valves are provided outside the primary containment. This alternate arrangement for containment isolation from GDC 55 was taken on the basis that it is imperative that the line be capable of opening should injection of the liquid poison become necessary. An automatic valve has been omitted to preclude the possibility of failure of the valve to open. As a means of providing assurance for reliable timely actuation, redundant explosive valves (normally closed) are used upstream of the outboard check valve. This arrangement ensures reliability of operation as well as isolation if required.

The piping between the primary containment and the explosive valves is constructed to ASME III, Code Class 1 requirements which is a higher level of assurance than the primary containment itself which is constructed to ASME III, Code Class 2.

Penetration X-36, Continued

In addition, these valves are located in an accessible location for the maintenance required.

PENETRATION X-36
STANDBY LIQUID CONTROL SYSTEM

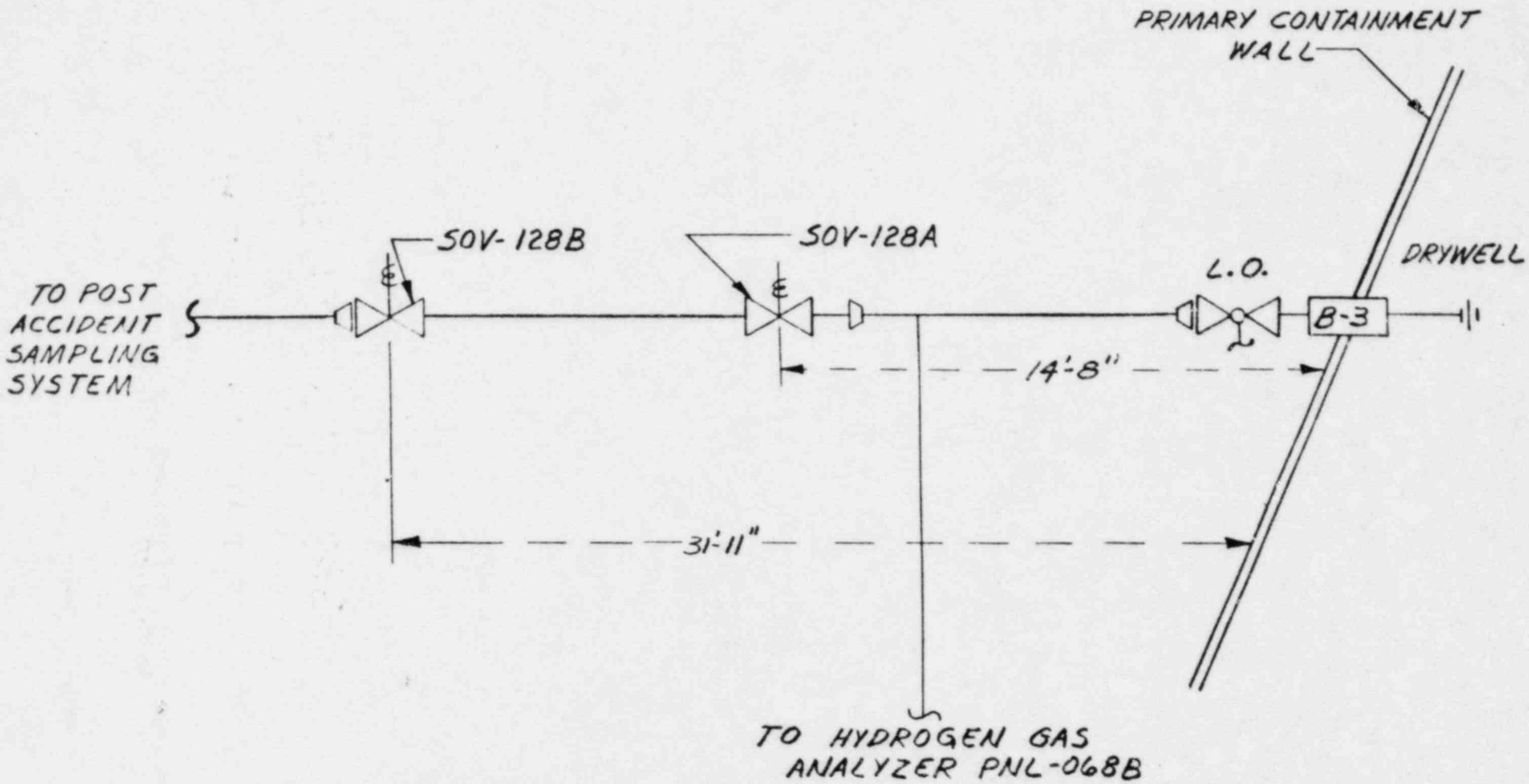


Penetration	Valves	Size	Distance
B-3	IT48*SOV-128A	3/4"	14'8"
	IT48*SOV-128B	3/4"	31'11"

Specific compliance against Criterion 56 is given in FSAR 6.2.4.3.3 under "Effluent Lines from Drywell".

The rationale for the location of these valves is identical to described for penetration J-2.

PENETRATION B-3
POST ACCIDENT SAMPLING



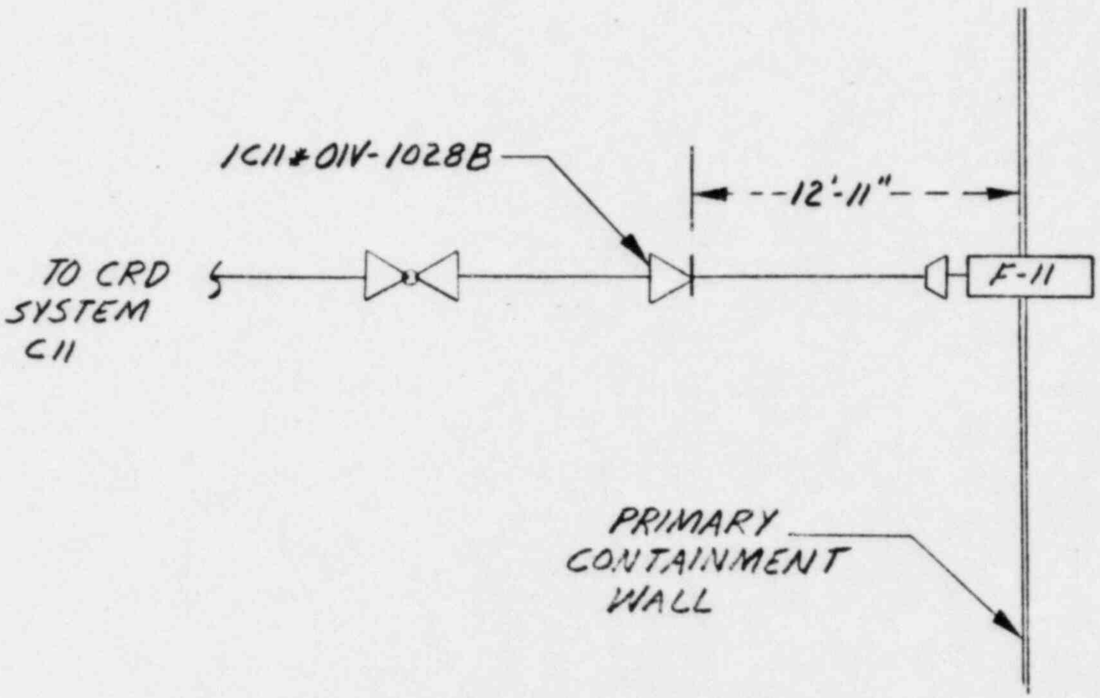
Penetration	Valves	Size	Distance
F-11	1C11*OIV-1028B	3/4"	12'11"

Refer to FSAR 6.2.4.3.2 under "General Evaluation" for general compliance against Criterion 55, and under "Influent Lines to Drywell" for additional specific compliance.

The consequences of failing this line have been evaluated and are acceptable. The recirculation pump seal injection line is 3/4" ASME Section III - Code Class 2 from the recirculation pump through the second check valve (located outside and as close as practical to the primary containment). From this second check valve to the CRD connection, the line is ANSI B31.1.0. Should this line be postulated to fail and either one of the check valves is assumed not to close (single active failure), the flow rate through the broken line has been calculated to be substantially less than that permitted for a broken instrument line. The two check valves in series, one located inside and the other outside the primary con- tainment, provide sufficient isolation capability for postulated failure of this line. On this basis, and the general evaluation referenced above, the intent of GDC 55 is satisfied.

PENETRATION F-11

RECIRCULATING PUMP SEAL INJECTION



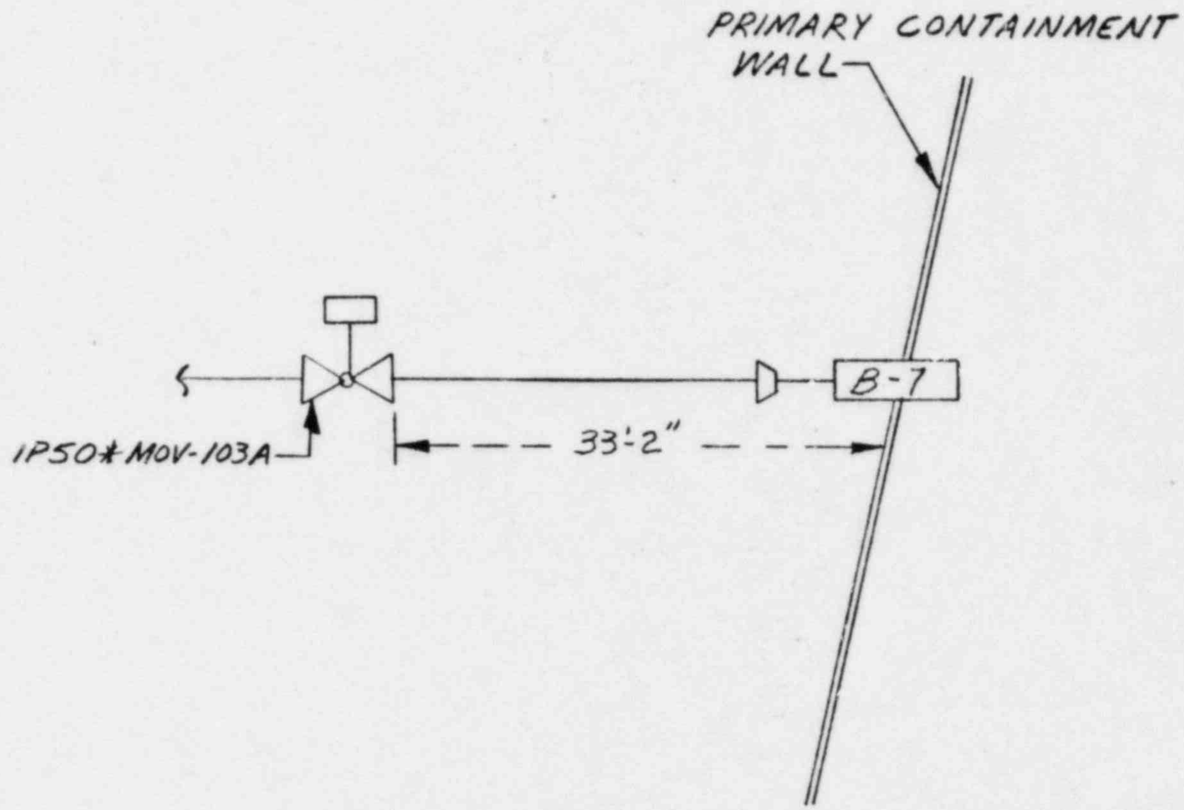
Penetration	Valves	Size	Distance
B-7	1P50*MOV-103A	$1\frac{1}{2}$"	33'2"

Refer to FSAR 6.2.4.3.3 under "General Evaluation" and under "Influent Lines to Drywell" for specific compliance to GDC 56.

CIV MOV-103A was originally designed to be located 28 feet from containment. Although the valve diameter may be considered as small bore, the addition of a motor operator causes a significant increase in the clearance and support requirements. As a result of the design requirements of the seismic support system and necessity for proximity to a maintenance inspection, and testing platform, the CIV was relocated to its present location.

Based on maintenance, inservice inspection and testing accessibility and the ability to provide adequate seismic support for the above valves and associated piping, the present location is "as close as practical" to the containment.

PENETRATION B-7
INSTRUMENT AIR TO DRYWELL



Penetration	Valves	Size	Distance
XS-16	1D11*MOV-032B	1"	17'10"
	1D11*MOV-033B	1"	15'-10"

These valves are designed to isolate after a postulated accident at which time the piping and primary containment will be subjected to elevated temperatures resulting in expansion stresses.

The actual piping distance of these valves from the penetration is necessary to provide the required flexibility loops necessary to ensure integrity of the small piping during the postulated and coincident seismic event.

The physical distance of 1D11*MOV-033B from the penetration is, 4'-8", MOV-032B is slightly farther.

PENETRATION XS-16

DRYWELL RADIATION MONITORING SUPPLY / RETURN

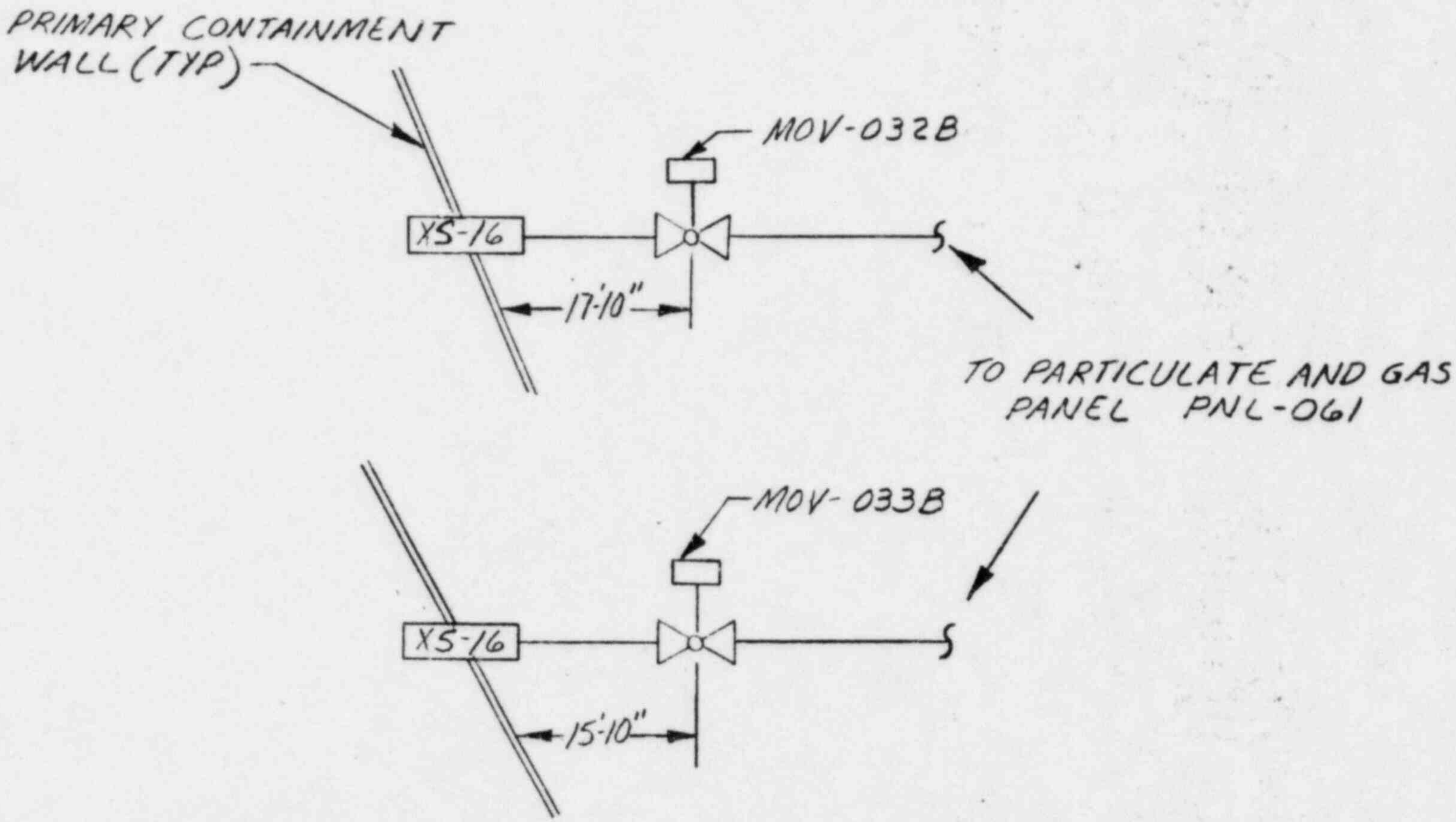


TABLE 1.0

CONTAINMENT ISOLATION VALVES
LOCATION CRITERIA

Penetration Number	Description	Valve Numbers	Size (in)	Distance from Containment	Location Criteria (note 1)	Remarks
X-1A, B, C,D	Main Steam Lines	1B21*AOVO82A	24	CODE "A"	CODE "A"	
		1B21*AOVO82B	24	CODE "A"	CODE "A"	
		1B21*AOVO82C	24	CODE "A"	CODE "A"	
		1B21*AOVO82D	24	CODE "A"	CODE "A"	
	Main Steam Drain Lines (Before seat on outboard)	1B21*MOVO61	2	CODE "A", "H"	CODE "A"	
		1B21*MOVO62	2	CODE "A", "H"	CODE "A"	
		1B21*MOVO63	2	CODE "A", "H"	CODE "A"	
		1B21*MOVO64	2	CODE "A", "H"	CODE "A"	
	Main Steam Leakage Control	1E32*MOVO21A	1 1/2	CODE "A", "H"	CODE "A"	
		1E32*MOVO21B	1 1/2	17'-7", "H"	CODE "B"	
		1E32*MOVO21C	1 1/2	CODE "A", "H"	CODE "A"	
		1E32*MOVO21D	1 1/2	CODE "A", "H"	CODE "A"	
X-2A,B	Feedwater	1B21*AOVO36A	18	CODE "A"	CODE "A"	
		1B21*AOVO36B	18	CODE "A"	CODE "A"	
X-3	Main Steam Drain Line	1B21*MOVO32	3	CODE "A"	CODE "A"	
X-4	Reactor Water Cleanup System from the Reactor Vessel	1G33*MOVO34	6	CODE "A"	CODE "A"	
X-5	Residual Heat Removal System - Shutdown Cooling from Reactor Vessel	1E11*MOVO48	20	CODE "A"	CODE "A"	
		1E11*RV163	1	CODE "A"	CODE "A"	
X-6A,B	Residual Heat Removal Injection Line to Recirc System	1E11*MOVO37A	24	CODE"A"	CODE "A"	PREDICATED BY LOC. OF L/B CHK VALVE
		1E11*MOVO37B	24	CODE "A"	CODE "A"	PREDICATED BY LOC. OF L/B CHK VALVE
X-7A,B	Residual Heat Removal	1E11*MOVO39A	10	CODE "A"	CODE "A"	
		1E11*MOVO39B	10	CODE "A"	CODE "A"	
	System-Drywell Spray	1E11*MOVO38A	10	CODE "A"	CODE "A"	
		1E11*MOVO38B	10	CODE "A"	CODE "A"	
X-8A,B	Residual Heat Removal System-Suppression Chamber Spray	1E11*MOVO41A	6	17'-1"	CODE "D"	
		1E11*MOVO41B	6	17'-1"	CODE "D"	
	Residual Heat	1E11*MOVO40A	16	41'-6"	CODE "C"	

ATTACHMENT 3

Penetration Number	Description	Valve Numbers	Size (in)	Distance from Containment	Location Criteria (note 1)	Remarks
	Removal Return to Suppression Pool	1E11*MOV040B	16	51'-1"	CODE "B"	
		1E11*MOV042A	16	24'-0"	CODE "B"	
		1E11*MOV042B	16	27'-9"	CODE "B"	
X-9A,B,C,D	Residual Heat Removal System-Pump Suction	1E11*MOV031A	20	CODE "A"	CODE "A"	
		1E11*MOV031B	20	CODE "A"	CODE "A"	
		1E11*MOV031C	20	CODE "A"	CODE "A"	
		1E11*MOV031D	20	CODE "A"	CODE "A"	
X-10A	Residual Heat Removal Return to Suppression	1E11*MOV042A	16	CODE "A"	CODE "A"	
	Pool Suppression Pool Cleanup Return	1G41*MOV033A	6	21'-6"	CODE "D"	
		1G41*MOV033B	6	19'-3"	CODE "D"	
	Residual Heat Removal Steam Condensing Discharge-Residual	1E11*MOV044A	4	29'-5"	CODE "B"	
	Heat Removal System-Minimum Flow	1E11*MOV045A	4	29'-5"	CODE "B"	
	Core Spray Test Line	1E21*MOV035A	10	43'-1"	CODE "D"	
	Core Spray Minimum Flow	1E21*MOV034A	3	24'-9"	CODE "D"	
	Suppression Pool Pump Back	1E11-01V-0047 (Simple Check Valve)	3	14'-11","H"	CODE "D"	
		1G11*MOV0639	3	26'-10","H"	CODE "D"	
	Post-Accident Sampling System Sample Return	Simple Check Valve	3/4	CODE "A","H"	CODE "A"	
		1E11*SOV-168	3/4	CODE "A","H"	CODE "A"	
X-10B	Residual Heat Removal Test Return to Suppression Pool	1E11*MOV042B	16	11'-1"	CODE "B"	
	Reactor Core Isolation Cooling-Minimum Flow	1E51*MOV036	2	68'-10","H"	CODE "G"	PREDICATED BY LOC. OF L/B BRANCH-OFF
	High Pressure Coolant Injection-Minimum Flow	1E41*MOV036	4	81'-5","H"	CODE "E"	
	Residual Heat Removal System-Steam Condensing Discharge	1E11*MOV044B	4	26'-1","H"	CODE "C&D"	
	Residual Heat Removal System-Minimum Flow	1E11*MOV045B	4	23'-9","H"	CODE "C&D"	
	Core Spray Test Line	1E21*MOV035B	10	42'-9","H"	CODE "D"	

TABLE 1.0 (CONT'D)

Penetration Number	Description	Valve Numbers	Size (in)	Distance from Containment	Location Criteria (note 1)	Remarks
	Core Spray Minimum Flow	1E21*MOV034B	3	26'-4","H"	CODE "D"	
	Relief Valve Discharge - Residual Heat Removal Supply to Reactor Core Injection Cooling Suction.	1E11*RV155	2	62'-5","H"	CODE "E"	LOCATION AS CLOSE AS POSSIBLE TO PRES. VESSEL (RHR HX)
	Post Accident Sample Return	1E11*SOV169 1E11-01V-0048	3/4 later	20'-9","H" later	CODE "D" later	
X-11	Residual Heat Removal System Head Spray Line to Reactor Vessel	1E11*MOV053 1E11*RV164	4 1	CODE "A" CODE "A"	CODE "A" CODE "A"	
X-12	High Pressure Coolant Steam Inlet Line	1E41*MOV042 1E41*MOV048	10 1	CODE "A","H" 17'-11"	CODE "A" CODE "B&C"	
X-13	High Pressure Coolant Injection-Turbine Exhaust	1E41*MOV044 1E41*18V-0021 1E41*18V-0022 (Simple Check Valves)	18 18 18	CODE "A" 12'-5" CODE "A"	CODE "A" CODE "B" CODE "A"	
X-14	Spare					
X-15	High Pressure Coolant Injection-Pump Suction	1E41*MOV032	16	CODE "A"	CODE "A"	
X-16	Reactor Core Isolation Cooling-Turbine Steam Inlet	1E51*MOV042 1E51*MOV048	3 1	CODE "A" CODE "A"	CODE "A" CODE "A"	
X-17	Reactor Core Isolation Cooling-Turbine Exhaust	1E51*MOV045 1E51*08V-0020 1E51*08V-0021 (Simple Check Valves)	8 8 8	CODE "A" CODE "A" CODE "A"	CODE "A" CODE "A" CODE "A"	
X-18	Reactor Core Isolation Cooling-Vacuum	1E51*MOV046 1E51*02V-0025	2	CODE "A"	CODE "A"	

Penetration Number	Description	Valve Numbers	Size (in)	Distance from Containment	Location Criteria (note 1)	Remarks
	Pump Discharge	(Simple Check Valve)	2	14'-7"	CODE "D"	
X-19	Reactor Core Isolation Cooling-Pump Suction	1E51*MOV032	6	CODE "A"	CODE "A"	
X-20A,B	Core Spray Pump Discharge to Reactor Vessel	1E21*MOV033A	10	CODE "A"	CODE "A"	
		1E21*MOV033B	10	CODE "A"	CODE "A"	
X-21A,B	Core Spray Pump Suction	1E21*MOV031A	14	CODE "A"	CODE "A"	
		1E21*MOV031B	14	CODE "A"	CODE "A"	
X-22A,B	Reactor Building Closed Loop	1P42*MOV035	4	13'-10"	CODE "B"	
	Cooling Water to Recirc Pump and Motor Coolers	1P42*MOV047	4	CODE "A"	CODE "B"	
X-23A,B	Reactor Building Closed Loop	1P42*MOV036	4	13'-8"	CODE "B"	
	Cooling Water to Recirc Pump and Motor Coolers	1P42*MOV048	4	11'-2"	CODE "B"	
X-24A to H	Reactor Building Closed Loop	1P42*MOV232	3	41'-10"	CODE "B"	
		1P42*MOV233	3	38'-10"	CODE "B"	
		1P42*MOV234	3	39'-4"	CODE "B"	
		1P42*MOV235	3	37'-2""	CODE "B"	
		1P42*MOV237	3	32'-9"	CODE "B"	
		1P42*MOV238	3	31'-2"	CODE "B"	
		1P42*MOV239	3	24'-11"	CODE "B"	
	Cooling Water to Drywell Coolers	1P42*MOV240	3	23'-7"	CODE "B"	
X-25A,B	Reactor Building Closed Loop	1P42*MOV231	4	14'-5"	CODE "B"	
		1P42*MOV236	4	CODE "A"	CODE "A"	
X-26	Purge Air to Drywell	1T46*AOV038B	18	CODE "A"	CODE "A"	
X-27	Purge Air from Drywell	1T46*AOV039B	18	CODE "A"	CODE "A"	

Penetration Number	Description	Valve Numbers	Size (in)	Distance from Containment	Location Criteria (note 1)	Remarks
X-28	Purge Air to Suppression Chamber	1T46*AOV038D	18	CODE "A"	CODE "A"	
		1T46*AOV038C	18	CODE "A"	CODE "A"	
	Suppression Chamber Inerting	1T24*AOV004A	1	CODE "A"	CODE "A"	
		1T24*AOV004B	1	CODE "A"	CODE "A"	
X-29	Purge Air from Suppression Chamber	1T46*AOV039D	18	CODE "A"	CODE "A"	
		1T46*AOV039C	18	CODE "A"	CODE "A"	
	Vacuum Breaker Test Line - Suppression Chamber	1T46*AOV079A	6	16'-1"	CODE "B"	
		1T46*AOV079B	6	18'-5"	CODE "B"	
X-30	Sample Coolant from Reactor Vessel	1B31*AOV082	3/4	CODE "A"	CODE "A"	
X-31	Equipment Drains from Drywell	1G11*MOV248	3	CODE "A"	CODE "A"	
		1G11*MOV249	3	CODE "A"	CODE "A"	
X-32	Floor Drains from Drywell	1G11*MOV246	3	CODE "A"	CODE "A"	
		1G11*MOV247	3	CODE "A"	CODE "A"	
X-33	Spare					
X-34	Spare					
X-35	Spare					
X-36	Standby Liquid Control System	1C41*02V-0010	1 1/2"	CODE "A"	CODE "A"	
		(Simple Check Valve)				
		1C41*EV010A	1 1/2"	67'-10","H"	CODE "B"&"D"	
		1C41*EV010B	1 1/2"	67'-10","H"	CODE "B"&"D"	
X-37A,B,C,D	Transversing in-Core Probe	1C51*SOV801A	3/8"	CODE "A"	CODE "A"	
		1C51*SOV801B	3/8"	CODE "A"	CODE "A"	
		1C51*SOV801C	3/8"	CODE "A"	CODE "A"	
		1C51*SOV801D	3/8"	CODE "A"	CODE "A"	
	Drive Guide Tubes	1C51*EV801A	3/8"	CODE "A"	CODE "A"	
		1C51*EV801B	3/8"	CODE "A"	CODE "A"	
		1C51*EV801C	3/8"	CODE "A"	CODE "A"	
		1C51*EV801D	3/8"	CODE "A"	CODE "A"	
X-38	TIP N_2 Purge	1C51*SOV-028	later	later	later	
		Simple Check Valve	later	later	later	
X-39A,B	Instrument Air to Suppression Chamber	1P50*01V-0811	1	CODE "A"	CODE "A"	
		1P50*01V-0821	1	CODE "A"	CODE "A"	

Penetration Number	Description	Valve Numbers	Size (in)	Distance from Containment	Location Criteria (note 1)	Remarks
		(Simple Check Valves)	1			
		1P50*MOV104	1	CODE "A"	CODE "A"	
		1P50*MOV106	1	CODE "A","H"	CODE "A"	
X-40	Spare					
X-41	High Pressure Coolant Injection Vacuum Breaker	1E41*MOV049	2	CODE "A"	CODE "A"	
X-42	Reactor Core Isolation Cooling Vacuum Breaker	1E51*MOV049	1 1/2	CODE "A"	CODE "A"	
X-43, XS-5	High Pressure Coolant Injection	1E11*01V-3144	1	CODE "A","H"	CODE "A"	
	-Steam Line Drain	1E11*01V-3145 (Simple Check Valve)	1	CODE "A","H"	CODE "A"	
	-Steam Supply to Residual	1E11*RV152A	4	51'-3"	CODE "E"	RVs Preferably Located Near Source
	Heat Removal Heat Exchanger	1E11*RV152B	4	227'-3"	CODE "E"	
	Residual Heat Removal System					
	-Heat Exchanger Relief	1E11*RV157A	1	CODE "A","H"	CODE "A"	
		1E11*RV157B	1	12'-6","H"	CODE "B","C"&"E"	
	-Heat Exchanger Vent	1E11*MOV055A	2	19'-4","H"	CODE "B"	
		1E11*MOV056A	2	16'-11","H"	CODE "B"	
		1E11*MOV055B	2	16'-3","H"	CODE "C"	
		1E11*MOV056B	2	11'-10","H"	CODE "B"	
X-44	Primary Containment Atmosphere	1T48*MOV033A	6	CODE "A"	CODE "A"	
	Control-Suppression Chamber Supply	1T48*MOV038A	4	CODE "A"	CODE "A"	
	Drywell Floor Seal Pressurization	1T23*MOV031A	1/2	CODE "A"	CODE "A"	
X-45	Primary Containment Atmosphere	1T48*MOV033B	6	CODE "A"	CODE "A"	
	Control-Suppression Chamber Supply	1T48*MOV038B	4	CODE "A"	CODE "A"	
	Drywell Floor Seal Pressurization	1T23*MOV031B	1/2	CODE "A"	CODE "A"	
X-46	Primary Containment Atmosphere					

Penetration Number	Description	Valve Numbers	Size (in)	Distance from Containment	Location Criteria (note 1)	Remarks
	Control-Drywell Supply	1T48*MOV035A	4	CODE "A"	CODE "A"	
		1T24*AOV001B	4	17'-4"	CODE "D"	
	Drywell Inerting	1T24*AOV001A	4	15'-0"	CODE "D"	
X-47	Primary Containment Atmosphere Control Drywell Supply	1T48*MOV035B	4	CODE "A"	CODE "A"	
XS-1	Spare					
XS-2	Spare					
XS-3	Spare					
XS-4	Spare					
XS-5	See X-43					
XS-6	Suppression Pool Cleanup/Pumpdown	1G41*MOV034A	10	CODE "A"	CODE "A"	
		1G41*MOV034B	10	28'-4"	CODE "D"	
XS-7	Primary Containment Atmosphere Control-Suppression Chamber Room	1T48*MOV034B	6	CODE "A"	CODE "A"	
		1T48*MOV040B	6	CODE "A"	CODE "A"	
XS-8	Primary Containment Atmosphere	1T48*MOV034A	6	CODE "A"	CODE "A"	
	Control-Suppression Chamber Return	1T48*MOV040A	4	CODE "A"	CODE "A"	
XS-9	Spare					
XS-10	Spare					
XS-11	Spare					
XS-12	Spare					
XS-13	Spare					
XS-14	Spare					
XS-15	Spare					
XS-16A,B,&C	Drywell Service Air	1P50*02V-0603 (Simple Check Valve)	1 1/2	CODE "A"	CODE "A"	
		1P50*02V-0601 (Manual Valve)	1 1/2	CODE "A"	CODE "A"	
	Drywall Rad. Monit.-Supply	1D11*MOV032B	1	17'-10"	CODE "H"	Distance >10' is required for reduced pipe stress

Penetration Number	Description	Valve Numbers	Size (in)	Distance from Containment	Location Criteria (note 1)	Remarks
						stress
	Drywell Rad. Monit.- Return	1D11*MOVO33B	1	15'-10"	CODE "H"	Distant > 10' is required for reduced pipe stress
XS-17	Spare					
XS-18	Spare					
XS-19	Spare					
XS-20	Primary Containment Atmosphere Control-Drywell Return	1T48*MOVO37A	6	CODE "A"	CODE "A"	
XS-21	Primary Containment Atmosphere Control-Drywell Return	1T48*MOVO37B	6	CODE "A"	CODE "A"	
XS-22	Vacuum Breaker Test Line-Drywell	1T48*AOVO78B	6	11'-9"	CODE "B"	
XS-23	Spare (Reserved for Reactor Vessel Inspection)					
XS-24	Spare					
XS-25	Spare (Moved to XS-16)					
XS-26	Spare					
XS-27	Spare (Moved to XS-16)					
XS-28	Spare					
XS-29	Spare					
XS-30	Post-Accident Sampling System	(Simple Check Valve - No. later)	3/4	later - location incomplete at time of survey		
	Primary Containment Atmosphere Sample Return	1T48*SOV131	3/4			

Penetration Number	Description	Valve Numbers	Size (in)	Distance from Containment	Location Criteria (note 1)	Remarks
B-3	Post-Accident Sampling System Drywell Atmosphere Sample	1T48*SOV128A 1T48*SOV128B	3/4 3/4	14'-8" 31'-11"	CODE "G" CODE "G"	S/B VALVE ONLY ISOLATES AFTER BRANCH
B-7	Instrument Air to Drywell	1P50*MOV103A	1 1/2	33'-2"	CODE "B&D"	
C-2	Post-Accident Sampling System Reactor Sample	1B31*SOV313A 1B31*SOV313B	3/4 3/4	CODE "A" 16'-10"	CODE "A" CODE "E"	
D-5	Instrument Air to Drywell	1P50*MOV103B	1 1/2	25'-8"	CODE "D"	
F-10	Recirc. Pump Seal Injection	1C11*01V-1028A (Simple Check Valves)	3/4"	CODE "A"	CODE "A"	
F-11	Recirc. Pump Seal Injection	1C11*01V-1028B (Simple Check Valves)	3/4"	12'-11"	CODE "B"	
J-2	Post-Accident Sample System -	Simple Check Valve	3/4	27'-3"	CODE "G"	S/B VALVE ONLY ISOLATES AFTER BRANCH
	Atmosphere Sample Return	1T48*SOV134	3/4	31'-5"	CODE "G"	S/B VALVE ONLY ISOLATES AFTER BRANCH
J-10	Post-Accident Sampling System - Drywell Atmosphere Sample	1T48*SOV126A 1T48*SOV126B	3/4 (NOT IN-STALLED) 1/2	23'-11" 28'-7"	CODE "G" CODE "G" CODE "G"	S/B VALVE ONLY ISO-LATES AFTER BRANCH
Suppression Chamber Hatch (Azimuth 137 7)	Post-Accident Sampling System - Suppression Chamber Atmosphere Sample	1T48*SOV129A 1T48*SOV129B	3/4 3/4	10'-9" 30'-2"	CODE "G" CODE "G"	
Suppression Chamber Hatch .(Azimuth 317 17)	Post-Accident Sampling System - Suppression Chamber Atmosphere Sample Lines	1T48*SOV127A 1T48*SOV127B	3/4 3/4	15'-0" 22'-4"	CODE "G" CODE "G"	

NOTES:

(1) Valve location from the containment penetration shall be acceptable based upon the following criteria; distance from the containment is measured from the run piping weld at the penetration to the first weld at the isolation valve or to the valve flange face.

Location Code	Justification
A	Distance is 10' or less-no further action needed.
B	Distance greater than 10' required to utilize practical valve or pipe support locations.
C	Distance greater than 10' required due to piping geometry, e.g. may be fitting bound due to interconnecting lines or redundant parallel piping runs would be required.
D	Distance greater than 10' required for valve maintainability or accessibility or access or maintainability of other piping and/or equipment.
E	Distance greater than 10' Location from containment penetration conflicts with other code or system requirements.
F	Valve serves as isolation valve for more than one penetration; location is a compromise
G	Location acceptable on other bases - see remarks.
H	Location distance from containment pressure boundary.