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VARGA,S.A. Light Water Reactors Branch 4

SUBJECT: Forwards responses to 781103 First Round containment sys branch questions.Responses will be formally submitted as amend to FSAR.

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Docket No. 50-397

January 23, 1979
G02-79-18

Director, Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Mr. S. A. Varga, Chief
Branch No. 4
Division of Project Management

Subject: WPPSS NUCLEAR PROJECT NO. 2
RESPONSES TO FIRST ROUND
CONTAINMENT SYSTEMS BRANCH QUESTIONS

Reference: Letter, S. A. Varga (NRC) to N. Strand (WPPSS), "First Round Questions on the WNP-2 OL Application - CSB", dated November 3, 1978.

Dear Mr. Varga:

Attached please find sixty (60) copies of responses to the referenced questions. The few open items from the question set are being carried forward and will be submitted at the earliest possible date. These responses will be formally submitted in the FSAR in an amendment within the next three months.

Very truly yours,

D. L. Renberger

D. L. RENBERGER
Assistant Director
Technology

DLR:OKE:sg

cc: I. Littman, WPPSS, NY w/o responses
JJ Verderber, B&R " "
JJ Byrnes, B&R " "
RC Root, B&R, Site " "
HR Canter, B&R " "
D. Roe, BPA " "
FA Maclean, GE San Jose " "
E. Chang, GE San Jose w/5
J. Ellwanger, B&R "
NS Reynolds,
Debevoise & Liberman w/1
WNP-2 Files w/1

B001
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STATE OF WASHINGTON)
) ss
COUNTY OF BENTON   )

D. L. RENBERGER, Being first duly sworn, deposes and says: That he is the Assistant Director, Technology, for the WASHINGTON PUBLIC POWER SUPPLY SYSTEM, the applicant herein; that he is authorized to submit the foregoing on behalf of said applicant; that he has read the foregoing and knows the contents thereof; and believes the same to be true to the best of his knowledge.

DATED January 23, 1979

DL Renberger
D. L. RENBERGER

On this day personally appeared before me D. L. RENBERGER to me known to be the individual who executed the foregoing instrument and acknowledged that he signed the same as his free act and deed for the uses and purposes therein mentioned.

GIVEN under my hand and seal this 23 day of January, 1979.

Notary Public in and for the State of Washington
Residing at Kennewick

Q 22.031

Provide a detailed calculation of the friction loss coefficient for the entire vent system. Indicate whether the results of the 4T (temporary tall test tank facility) portion of the ongoing generic Mark II test program have been used to confirm the calculation vent loss coefficient. Additionally, indicate the margin applied to the calculated friction loss coefficient to account for any differences between the WNP-2 vent design and that of the 4T test facility.

Response:

No known studies have been performed to experimentally determine 4T test downcomer vent loss coefficients. However in their Pool Swell Analytical Model (PSAM)/4T test data comparisons (References 1 and 2), General Electric used downcomer vent loss coefficients of 2.51 and 3.50 for the 4T test 20" downcomers and 24" downcomers, respectively. These values were used as input to the General Electric PSAM and were calculated using information from Reference 3.

The WNP-2 downcomer friction loss coefficient (fL/D) that is used in pool swell studies is equal to 1.9 (see Table 3.8-1). Use of a value of 1.9 vs a 4T value ensures conservatism in WNP-2 pool swell studies in that lower values of fL/D maximizes pool swell velocity (see Figure 4-24 of Reference 4).

References:

1) NEDE-21544-P, Dec. 1976, "Mark II Pressure Suppression Containment System; An Analytical Model of Pool Swell Phenomena".

2) Response to NRC Question 20.71 transmitted via letter MFN-275-78 to Mr. J. F. Stolz, Chief, Light Water Reactor Branch No. 1, USNRC, from Mr. L. J. Sobon, Manager BWR Containment Licensing, General Electric Co. on "Responses to NRC Request for Additional Information" (Round 3 Questions), dated June 30, 1978.

3) AEC-TR-6630, Handbook of Hydraulic Resistance-Coefficients of Local Resistance and of Friction, I.E. Idel'chik, 1960.

4) NED 21061 Rev. 3, Mark II Containment Dynamic Forcing Functions Information Report, June 1978.

Q. 22.032

Provide the following information regarding the vacuum breaker systems between the wetwell and the drywell and between the reactor building and the wetwell:

a. Describe the preoperational and inservice tests that will be performed to verify that the setpoints of the vacuum breakers are at the appropriate pressure levels and meet the required opening times:

RESPONSE:

Preoperational and inservice testing of the vacuum breaker system is performed to verify that the valves open at the appropriate pressure levels. For the single and double disk check valves, testing will be accomplished using a torque wrench applied to the disk pivot shaft and determining the opening pressure by correlation with the measured torque required to open the valve. Correlation curves are provided by the valve manufacturer. The response time for opening of the single and double disk check valves is not measured during preoperational and inservice testing. Two of the double disk valves were tested by the manufacturer for compliance with the specification requirement that the valves be fully opened within 1 second at 0.5 psi differential pressure.

b. Provide the sensitivity limits and hysteresis characteristics of the electrical switches. Provide the results of your analyses of the maximum opening between the valve disc and the seat when the position indicator system indicates that the wetwell vacuum breaker valve is closed.

RESPONSE:

The switches used for position indication of the wetwell-drywell and reactor building-wetwell vacuum breakers are a contact-probe type. These contact probes are very sensitive and have zero hysteresis. Accuracy within 0.010" is possible.

Valve closed indication is taken directly from the valve face. Four probes are located 90^{o} apart, straddling the valve vertical centerline. Due to the accuracy of the switches (0.010"), the location of the four probes, and based on the geometry of the vacuum breaker, the maximum opening between the valve disc and the seal when the position indicator system indicates a closed valve is 0.012".

c. Provide a schematic of the vacuum breaker assembly. Provide your analysis of the minimum flow area and the total loss coefficient for one vacuum breaker assembly.

RESPONSE:

The attached Figures (2-1 and 2-2) from the manufacturer's instruction manual illustrate the configuration of the double disk vacuum breaker assembly, and the seal detail. FSAR Reference 3.8-8, which was provided to the NRC, also provides illustrations and details of the vacuum breaker system and the Anderson, Greenwood & Co. vacuum breaker valves.

The minimum flow area of the vacuum breaker valves is 295.6 square inches based on the 19.4 inch diameter inlet orifice. Capacity certification tests were performed on 3 wetwell-drywell and 3 reactor building-wetwell vacuum breaker valves. Using the flow data from these tests, resistance coefficients (K) were determined as follows:

Wetwell-DryWell valves - 4.73 at 0.360 psid

Reactor Building-Wetwell valves - 1.65 at 0.289 psid

These values of K include valve entrance effects and are based on the connecting piping internal area of 424.6 square inches.

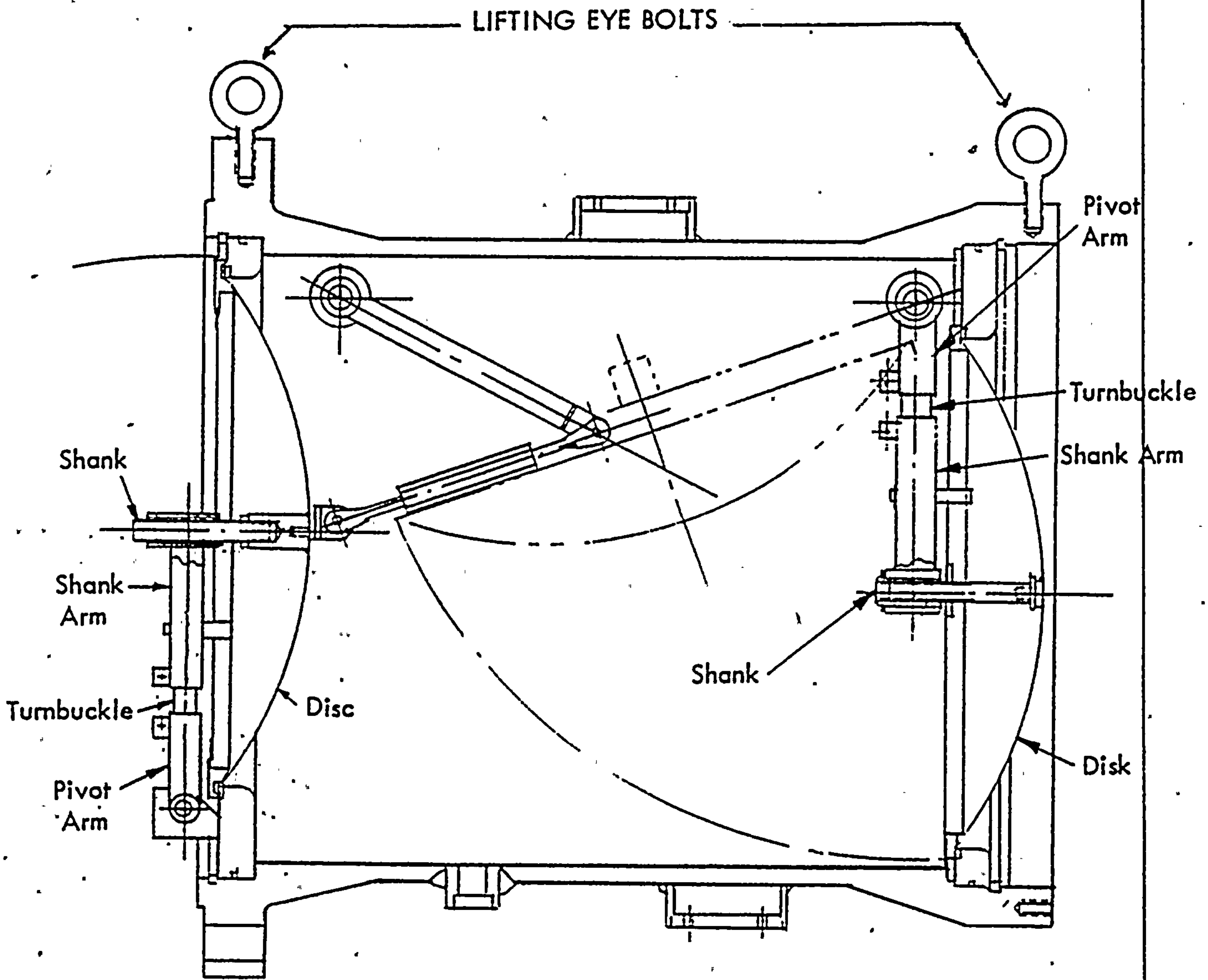

FIGURE 2-1. VALVE CROSS SECTION
(DUAL DISC)

2-4. VALVE SEAL. A circular seal around the perimeter of the valve orifice provides a superior seal when the valve is in the closed position. The details of this seal are shown in Figure 2-2. Use the small sketch labeled COMPLETE VALVE for orientation, then refer to the CV1-L seal detail. The valve disk assembly (cross hatched) is the movable part. All other parts are fixed. A circular moat encircles the valve orifice. Over this moat the valve seal diaphragm material is stretched and held in place by two concentric retainer rings. The valve seals when the seal lip on the valve disk assembly touches this diaphragm. The inner of the two seal retainer rings serves to limit the penetration of the lip into the seal from 0.010 to about 0.020 inches and also serves as a secondary metal-to-metal seal. The primary seal between the lip and diaphragm is pressure boosted. Pressure from the high pressure, or downstream side is fed into the moat under the seal diaphragm. This causes a zero pressure difference across the seal at point A and a full pressure difference across the seal diaphragm at point B.

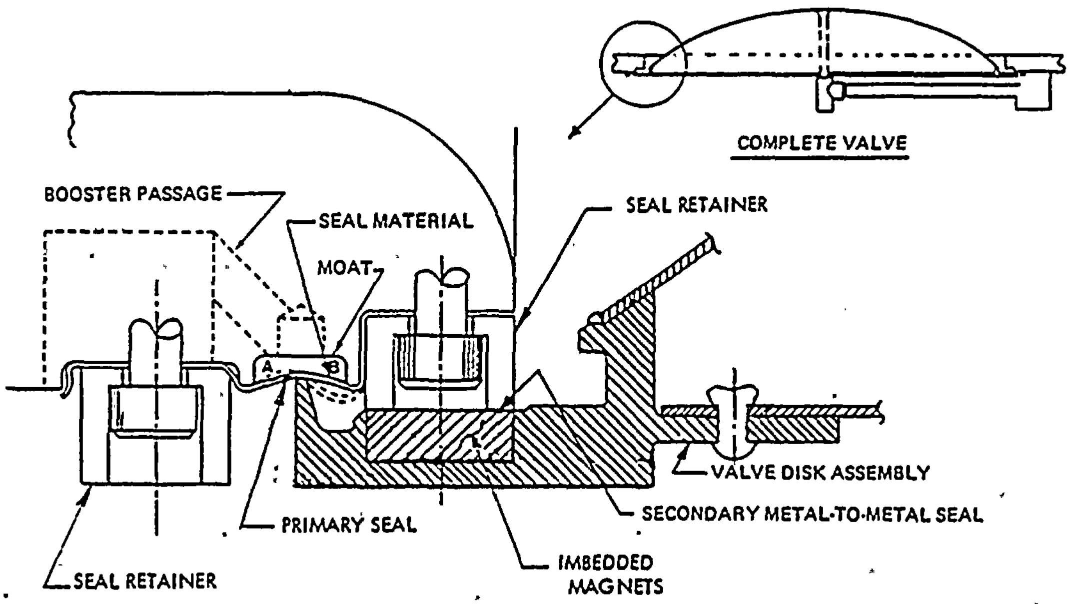

FIGURE 2-2. CV1-L VALVE, SEAL DETAIL

Q. 022.033

You state in Section 6.2.1.1.8.2 of the FSAR that operation of the containment purge system will be limited to one percent of the reactor operating time. We find this approach acceptable provided you:

a.. Expand your definition of reactor operating time to include the three operational modes of startup, hot standby, and hot shutdown.

b. Demonstrate that the purge system isolation valves can be closed when subjected to the environmental conditions, including pressure, that occur following a postulated loss-of-coolant accident.

c. Combine the time to purge the suppression chamber with the time to purge the drywell in the proposed one percent restriction on the operating time of the containment purge system.

Response:

a. Refer to response to question 022.019.

b. Refer to response to question 022.019.

c. Purge system operation, addressed in paragraph 6.2.1.1.8.2, includes purging the drywell and suppression chamber.

Q. 22.034

Identify all access openings to the secondary containment and discuss the administrative controls that will be exercised over them. Discuss the instrumentation to be provided to monitor the status of the openings. Indicate whether position indicators will provide readout information to the plant operator and whether alarms will be annunciated in the main control room.

RESPONSE:

All access openings to the secondary containment are administratively controlled. Details related to this administration and the indications provided are presented in the WNP-2 Security Plan, transmitted under separate cover to the NRC.

Q 22.035

Provide the following information related to potential bypass leakage paths:

a. For each air or water seal, perform an analysis of the fluid inventory which will be available to maintain the seal for 30 days following a postulated loss of coolant accident and demonstrate that this fluid inventory will be sufficient. Describe the testing program and the specific details of your proposed technical specifications which will verify the assumptions used in the analysis. Provide the basis for the valve fluid leakage used in your analysis.

b. For each of these paths where water seals eliminate the potential for bypass leakage, provide a sketch showing the location of the water seals relative to the system isolation valves.

c. Explain why the combustible gas control system is omitted from Table 6.2-13 of the FSAR as a potential leakage path. Demonstrate that this system meets each of the provisions of Branch Technical Position CSB 6-3, Section B-9, for a closed system.

Response

a. Potential bypass leakage paths around the secondary containment are discussed in 6.2.3, Secondary Containment Functional Design. As discussed in 6.2.3.2, the two 24 inch reactor feedwater (RFW) lines are the only lines for which a water or air seal is assumed which prevents secondary containment bypass leakage. An analysis was performed which showed that a vertical water seal greater than thirty feet will remain between the isolation valves and the containment atmosphere. As discussed in 6.2.3.3 and 6.2.6.3, the isolation valves on the lines which were identified as potential bypass leakage paths around the secondary containment, will be tested to ensure that the

individual leakage rates are below the limits set by ASME Code Section XI, Table IWV3420-1. The limit allowed by Table IWV3420-1 was the value assumed in calculating the water lost from the water seal through the RFW isolation valves.

b. Figure 6.2-25 shows the RFW line routing. The water seal will not drop below the horizontal run of piping on the 543 foot elevation.

c. The containment atmosphere control (CAC) system is a closed system outside the primary containment. Suction and discharge are to the primary containment. All piping remains within the secondary containment. Any leakage from the CAC system will be processed by the standby gas treatment system prior to release to the environment. The CAC system is described in detail in 6.2.5 and shown in Figure 3.2-17.

The CAC system meets all the criteria stipulated in BTP CSB 6-3 paragraph B.9. The CAC system does not directly communicate with the environment, is designed to Code Group B standards, meets Seismic I design requirements, is designed to the primary containment pressure and temperature design conditions, is designed against the consequences of any breach in the reactor coolant pressure boundary (pipe whip, etc.), and will be open to the primary containment atmosphere during the intergrated leak rate test. In addition, the CAC system can be isolated from the primary containment by two, redundant isolation valves. There is no reason to consider the CAC system as a secondary containment bypass leakage path.

Q. 022.036

It is our position that safety-related equipment located in the drywell should be exposed for 6 hours to a saturated steam environment at 340°F and a pressure equal to the drywell design pressure during the qualification testing. (Refer to Item 022.021 transmitted on September 18, 1978).

RESPONSE:

Safety related equipment in the drywell for WNP-2 was procured before 1974 and was specified and qualified to a saturated steam environment for 3 hours at 340°F and 6 additional hours at 320°F at 45 psig (drywell design pressure). These environmental conditions formed the design basis for WNP-2 in the drywell and were consistent with IEEE standard 323-1974 (Table A2), "Test Conditions for Boiling Water Reactors" when it was published.

Q. 22.037

Discuss in detail the design provisions incorporated for periodic inspection and operability testing of the individual components of the containment heat removal systems, including the pumps, valves, duct pressure-relieving devices and spray nozzles.

RESPONSE:

The containment heat removal system is an operating mode of the residual heat removal (RHR) system shown in Figure 3.2-6. Operation of the RHR system for containment heat removal is discussed in 6.2.2.

All power operated valves can be exercised without affecting reactor operation. All RHR check valves in the primary containment, RHR-V-41A, B and C and RHR-V-50A and B, can be remotely exercised by means of a pneumatic actuator (see Note 3 of Table 6.2-16).* The check valve on the discharge of each RHR pump will be exercised when the RHR pump is operated. All relief valves can be removed and bench tested when the RHR system is not required.

The RHR pumps have a full flow test line back to the suppression pool which allows testing of the pumps without affecting reactor operation. Sufficient instrumentation is available to verify proper flow, NPSH, and discharge pressure. The pumps are in an accessible area outside the primary containment where, if necessary, they can be locally monitored.

The spray nozzles on the containment spray headers are passive components. Each drywell spray header contains 150 spray nozzles. Each spray nozzle consists of a nozzle body and seven removable spray caps. Each spray cap has an internal vane. Since the spray nozzles are passive components with no moving parts, testing is limited to a qualitive air flow test during preoperational testing.

The RHR heat exchangers are periodically used for cooling down the reactor pressure vessel after shutdown in preparation for maintenance and refueling. This verifies operability of the RHR heat exchangers.

There are no duct pressure relieving devices, or anything similar, on the RHR system.

In addition, the RHR system is built to Code Group B (ASME III-2) standards and is subject to the applicable inservice inspections discussed in 6.6.

*A revised Table 6.2-16 is submitted with question 22.044.

Q. 22.038

Provide a detailed analysis of the available net positive suction head for the pumps in the reactor heat removal systems that are used as part of the containment heat removal system. This analysis should demonstrate compliance with the guidance contained in Regulatory Guide 1.1, "NPSH for Emergency Core Cooling and Containment Heat Removal System Pumps." Indicate the required net positive suction head.

RESPONSE:

The net positive suction head (NPSH) for all emergency core cooling system (ECCS) pumps was calculated in accordance with Regulatory Guide 1.1.

NPSH = Wetwell air space pressure + static pressure - friction losses - vapor pressure

Static head equals minimum suppression pool water level, 466 feet, minus centerline of RHR pump suction nozzles, 421 feet. Static head equals 45 feet.

Friction losses for suction piping is approximately 3 feet for all the RHR pumps. The suction strainer is assumed to be 50% plugged.

Vapor pressure at the peak suppression pool temperature of 220°F is 2.5 psig (6 feet).

In accordance with Regulatory Guide 1.1, "no increase in containment pressure from that present prior to postulated loss-of-coolant accidents" is assumed. Therefore, the wetwell air space pressure is assumed to be 0 psig, even though maximum suppression pool temperature is 220°F. This is conservative but not realistic since the suppression pool will be at saturation pressure any time the suppression pool water exceeds 212°F.

Based on the above, the NPSH available is 36 feet.* The NPSH required by the pump manufacturers as documented by pump performance curves is 11 feet at 7450 gpm rated flow. See figures 6.3-10a, b, c for pump performance curves.

*Page 6.2-19 will be revised per the attached draft.

for accident protection including support structures are designed in accordance with Seismic Category I criteria (see Chapter 3). The available NPSH was calculated in accordance with Regulatory Guide 1.1, and is ~~14~~ 36'. The pump characteristics for the LPCI pumps are shown in Figures 6.3-10a, b, and c.

The LPCI system incorporates a relief valve on each of the pump discharge lines which protects the components and piping from inadvertent overpressure conditions. These valves are set to relieve pressure at 500 psig with a capacity of 25 gpm. The common suction relief valve on loop "A" and "B" is set at 220 psig with a capacity of 25 gpm. The suction valve on loop "C" is set at 125 psig with a capacity of 10 gpm.

Provisions are included in the LPCI system to permit testing of the system. These provisions are:

a. All active LPCI components are designed to be testable during normal plant operation and/or during plant shutdown as discussed in 6.3.1.1.2m.

b. A discharge test line is provided for the three pumps to route suppression pool water back to the suppression pool without entering the reactor pressure vessel.

c. A suction test line, supplying reactor grade water, is provided to test loop "C" discharge into the reactor pressure vessel during normal plant shutdown.

d. Instrumentation is provided to indicate system performance during normal and test operations.

e. All check valves and motor-operated valves are capable of operation for test purposes.

f. Shutdown lines taking suction from the recirculation system are provided for loops "A" and "B" to provide for shutdown cooling and to test pump discharge into the reactor pressure vessel after normal plant shutdown.

g. All relief valves are removable for bench-testing during plant shutdown.

Q 22.039

Describe the analysis performed to establish the size of the suction screens in the reactor heat removal system. Provide a drawing showing the suction screen assembly.

RESPONSE:

The screen size for the suction strainers on the residual heat removal system is based on the more restrictive of the criteria set by the pump manufacturer or the spray nozzle orifice opening.

The pump manufacturer imposed a maximum particle size of three thirty-seconds (3/32) of an inch based on the size of the smallest orifice/flow path in the pump mechanical seal. This is significantly more restrictive than the requirement imposed by the spray nozzles which have an orifice opening of seventeen sixty-fourths (17/64) of an inch. Accordingly, the strainers will be specified to prevent the passage of particles three thrity-seconds of an inch or greater.

The suction strainers are presently being procured. A drawinq will be supplied at a later date.

Q 22.040

Provide a full scale drawing for Figures 3.2-2, 3.2-3, and 3.2-6 of the FSAR.

RESPONSE:

Enclosed are seven copies each of the requested full scale drawings, (mailed separately)

Q. 22.041

Table 6.2-16 of the FSAR does not identify the specific criterion of the General Design Criteria that applies to the isolation provisions for a number of systems. Accordingly, provide the specific criterion for the following systems. RCIC pump minimum flow bypass (X-65) RCIC turbine exhaust to suppression pool (X-4), RCIC turbine exhaust vacuum breaker line (X-116), RCIC vacuum pump discharge to suppression pool (X-64), RCIC pump suction from suppression pool (X-33), LPCS line (X-63), HPCS pump suction (X-30), LPCS pump suction (X-34), HPCS line (X-49), drywell spray (X-11A, B), suppression pool spray, (X-25, A, B), RHR lines (X-47, 26, 117, 35, 32, 36, 116, 48, RFW to reactor (17-A, B), Suppression pool clean up (X-100, 101, drywell equipment and floor drain (X-23, 24), containment ventilation ((X-53), 66, 119, 3, 96, 99, 105, 98, 103, 104, 97, 108, 67. Refer back to item 022.014 transmitted to you in our letter dated September 18, 1978, for our position on Note 2 of Table 6.3-16.

RESPONSE:

The General Design Criteria for all penetrations including the above are included in revised Table 6.2-16 submitted in response to question 22.027.*

*A revised Table 6.2-16 is also submitted with question 22.044.

Q. 022.042

Table 6.2-16 indicates that the isolation provisions for the recirculation pump seal (x-43, A, B), CIA for MSIV and MS relief valves (x-56), CIA and nitrogen backup to the ADS valves (x-89, A, B, 91) conform to the requirements of Criterion 57 of the General Design Criterion (GDC). It is our position that the isolation provisions for these specific lines should meet the requirements of Criterion 56. However, a single isolation valve outside containment is acceptable as discussed in Section 6.2.4 (II.3e) of the Standard Review Plan (SRP). Revise Table 6.2-12 to reflect our position and indicate if the other acceptable alternatives for meeting the requirements of the GDC as specified in the SRP could be applied to any of these lines.

RESPONSE:

The General Design Criteria for the above penetrations has been changed from 57 to 56. Table 6.2-16* has been revised to indicate this (see the response to question 22.027). Containment isolation is provided by a check valve and a motor operated gate valve (see also the response to question 22.043 for the justification for locating the check valve outside containment).

* A revised Table 6.2-16 is also included with question 22.044.

Q 22.043

Tables 6.2-13, 6.2-16, and 7.3-13 of the FSAR indicate that a check valve outside the containment is considered as a containment isolation valve for the minimum flow at the pumps in the reactor heat removal system (X-47, 48), vacuum relief from secondary containment (X-66, 67, 119) and a process sample line (X-69D). Provide justification for this design approach.

Response

Tables 6.2-13, and 7.3-13 have been deleted. See question 22.027 for revised Table 6.2-16.

There are check valves inboard of the isolation valves on the minimum flow line from the RHR pumps (X-47, X-48). These valves are built to the same standards as the isolation valves and will, if necessary, isolate the minimum flow line from the primary containment; however, these check valves are not considered containment isolation valves. Please see revised Table 6.2-16.

There are no check valves on the process sample line (X-69D). The notation, C.V., which was previously used was not intended to designate check valve. Revised Table 6.2-16 now clearly designates the valve types for the isolation valves on penetration X-69D.

Both isolation valves on the reactor building to wetwell vacuum relief lines (X-66, X-67, and X-119) are located outside the wetwell to improve valve operability (see Note 17 of revised Table 6.2-16). The reactor building to wetwell vacuum relief system is required to prevent excessive negative pressures in the primary containment under certain postulated conditions (see 6.2.1.1.4). The disc in the check valve is maintained in the close position during normal operation by means of a spring actuated lever arm and magnets embedded in the periphery of the disc. The magnetic and spring forces are overcome, and the disc starts to open, when the pressure differential across the valve exceeds 0.2 psid. The check valves have position indication lights which can alert the operators to the fact that a check valve is not fully closed. The operator can then remotely shut the valve by means of a pneumatic operator. The operating switch is spring-return to neutral. The air supply to these valves is Quality Class I.

Revised Table 6.2-16 now lists check valves outside containment for CIA to the inboard MSIV's and MS relief valves (X-56) and CIA and nitrogen backup to the ADS valves (X-89A and B). These check valves are in all three cases inboard of motor operated, isolation globe valves. The check valves are located outside of the primary containment to improve valve operability as discussed in Note 17 of Table 6.2-16.

Q 22.44

Revise Table 6.2-16 of the FSAR to identify the leakage detection provisions for those systems that rely on remote-manual isolation. This revision should demonstrate conformance with the guidance contained in Standard Review Plan 6.2.4. Containment Isolation Systems, which states that provisions should be made to allow the operator in the main control room to know when to isolate systems that require remote manual isolation. While you have responded to a similar question in Amendment No. 1 to the FSAR (Item 022.011d), Table 6.2-16 should nevertheless be expanded.

Response:

See revised Table 6.2-16. Reference is made in the "Isolation Signal" column to the note in the table which discusses isolation signals generated by the individual system process control signals or remote-manual closure based on information available to the operator in the main control room.

TABLE 6.2-16

PRIMARY CONTAINMENT ISOLATION

LINE DESCRIPTION	Penetration No.	FSAR Figure No.'s	GDC	Code Gp.(12)	Valve No.	Valve Type	Location	Power to Open (5)	Power to Close (5)	Isolation Signal (9)	Back Up	Normal Position (10)	Shutdown Position	Post LOCA	Failure Position (6)	Valve Size (14)	Closure Time(7)(11)	Distance to Penetration	Leads to ESF System	Process Fluid	Leakage Barrier (13)	Termination Zone (13)	Potential (13) Bypass Leakage (SCFH)	Notes
MS Line A	18A	3.2-2 3.2-25 6.2-31j	55	A	MS-V-22A	AO Globe	I	Air	Air/ Spr	B,C, G,D, P,H	RM	O	O/C	C	C	26	3-10	–	No	S	Valves	T.B.	No	1, 15
					MS-V-28A	AO Globe	O	Air	Air/ Spr	B,C, G,D, P,H	RM	O	O/C	C	C	26	3-10	4	No	S	Valves	T.B.	No	1, 15
					MS-V-67A	MO Gate	O	AC	AC	B,C, G,D, P,H	RM	O	C	C	AS-IS	1-	Std	5	No	S	Valves	T.B.	No	15
					MSLC-V-3A	MO Gate	O	AC	AC	30	RM	C	C	O	AS-IS	1-1/2	Std	10	Yes	S	Valves	R.B.	No	
MS Line B	18B	3.2-2 3.2-25 6.2-31j	55	A	MS-V-22B	AO Globe	I	Air	Air/ Spr	B,C, G,D, P,H	RM	O	O/C	C	C	26	3-10	–	No	S	Valves	T.B.	No	1, 15
					MS-V-28B	AO Globe	O	Air	Air/ Spr	B,C, G,D, P,H	RM	O	O/C	C	C	26	3-10	4	No	S	Valves	T.B.	No	1, 15
					MS-V-67B	MO Gate	O	AC	AC	B,C, G,D, P,H	RM	O	C	C	AS-IS	1-1/2	Std	5	No	S	Valves	T.B.	No	15
					MSLC-V-3B	MO Gate	O	AC	AC	30	RM	C	C	O	AS-IS	1-1/2	Std	10	Yes	S	Valves	R.B.	No	
MS Line C	18C	3.2-2 3.2-25 6.2-31j	55	A	MS-V-22C	AO Globe	I	Air	Air/ Spr	B,C, G,D, P,H	RM	O	O/C	C	C	26	3-10	–	No	S	Valves	T.B.	No	1, 15
					MS-V-28C	AO Globe	O	Air	Air/ Spr	B,C, G,D, P,H	RM	O	O/C	C	C	26	3-10	4	No	S	Valves	T.B.	No	1, 15
					MS-V-67C	MO Gate	O	AC	AC	B,C, G,D, P,H	RM	O	C	C	AS-IS	1-1/2	Std	5	No	S	Valves	T.B.	No	15
					MSLC-V-3C	MO Gate	O	AC	AC	30	RM	C	C	O	AS-IS	1-1/2	Std	10	Yes	S	Valves	R.B.	No	

TABLE 6.2-16 (Continued)

LINE DESCRIPTION	Penetration No.	FSAR Figure No.'s	GDC	Code Gp.(12)	Valve No.	Valve Type	Location	Power to Open (5)	Power to Close (5)	Isolation Signal (9)	Back Up	Normal Position (10)	Shutdown Position	Post LOCA	Failure Position (6)	Valve Size (14)	Closure Time(7)(11)	Distance to Penetration	Leads to ESF System	Process Fluid	Leakage Barrier (13)	Termination Zone (13)	Potential (13) Bypass Leakage (SCFH)	Notes
MS Line D	18D	3.2-2 3.2-25 6.2-31j	55	A	MS-V-22D	AO Globe	I	Air	Air/ Spr	B,C, G,D, P,H	RM	O	O/C	C	C	26	3-10	-	No	S	Valves	T.B.	No	1, 15
					MS-V-28D	AO Globe	O	Air	Air/ Spr	B,C, G,D, P,H	RM	O	O/C	C	C	26	3-10	4	No	S	Valves	T.B.	No	1, 15
					MS-V-67D	MO Gate	O	AC	AC	B,C, G,D, P,H	RM	O	C	C	AS-IS	1-1/2	Std	5	No	S	Valves	T.B.	No	15
					MSLC-V-3D	MO Gate	O	AC	AC	30	RM	C	C	O	AS-IS	1-1/2	Std	10	Yes	S	Valves	R.B.	No	
MS Line Drain	22	3.2-2 6.2-31f	55	A	MS-V-16	MO Gate	I	AC	AC	B,C, G,D, P,H	RM	O	C	C	AS-IS	3	Std	-	No	S	Valves	T.B.	.19	
					MS-V-19	MO Gate	O	DC	DC	B,C, G,D, P,H	RM	O	C	C	AS-IS	3	Std	6	No	S				

DRAFT UNTIL WPPSS REVIEW

LINE DESCRIPTION

RFW Line A	17A	3.2-2 6.2-31b	55	A	RFW-V-10A	Check	I	Process	Process	–	–	0	O/C	O/C	–	24	–	–	No	W	Valves	T.B. 1.5	16
					RFW-V-32A	PC Check	0	Process	Pro/Spr	–	–	0	O/C	O/C	–	24	–	2	No	W			
					RFW-V-65A	MO Gate	0	AC	AC	31	Manual	0	O/C	O/C	AS-IS	24	STD	8	No	W			
					RHCU-V-40	MO Gate	0	AC	AC	~~47~~ 45		0	0	C	AS-IS	6	STD	24	No	W			
RFW Line B	17B	3.2-2 6.2-31b	55	A	RFW-V-10B	Check	~~1~~ I	Process	Process	–	–	0	O/C	O/C	–	24	–	–	No	W	Valves	T.B. 1.5	16
					RFW-V-32B	PC Check	0	Process	Pro/ Spr	–	–	0	O/C	O/C		24		2	No	W			
					RFW-V-65B	MO Gate	0	AC	AC	31	Manual	0	O/C	O/C	AS-IS	24	STD	8	No	W			
					RHCU-V-40	MO Gate	0	AC	AC	~~47~~ 45		0	0	C	AS-IS	6	STD	24	No	W			
RHC Hydraulic Lines		3.2-3	57	B																			
Cylinder	76f				HY-V-17A	SO Globe	0	AC	Spring	B,F	RM	0	0	C	C	3/4	<5	5	No	H	Valves	RB	No 28
Cylinder	76b				HY-V-18A	SO Globe	0	AC	Spring	B,F	RM	0	0	C	C	3/4	<5	5					
Shuttle	76e				HY-V-19A	SO Globe	0	AC	Spring	B,F	RM	0	0	C	C	1/2	<5	5					
Drain	76c				HY-V-20A	SO Globe	0	AC	Spring	B,F	RM	0	0	C	C	1/2	<5	5					
Cylinder	77f				HY-V-17B	SO Globe	0	AC	Spring	B,F	RM	0	0	C	C	3/4	<5	5	No	H	Valves	RB	No 28
Cylinder	77b				HY-V-18B	SO Globe	0	AC	Spring	B,F	RM	0	0	C	C	3/4	<5	5					
Shuttle	77e				HY-V-19B	SO Globe	0	AC	Spring	B,F	RM	0	0	C	C	1/2	<5	5					
Drain	77c				HY-V-20B	SO Globe	0	AC	Spring	B,F	RM	0	0	C	C	1/2	<5	5					

TABLE 6.2-16 (Continued)

DRAFT UNTIL WPPSS REVIEW

LINE DESCRIPTION

HPCS to Reactor	6	3.2-7 6.2-31L	55	A	HPCS-V-5	Check	I	Process	Process	–	–	C	C	O/C	–	12	–	–	Yes	W	Valves	R.B.	No	3, 24
					HPCS-V-4	MO Gate	O	AC	AC	46	Manual	C	C	O/C	AS-IS	12	17	9						
LPCS to Reactor	8	3.2-7 6.2-31L	55	A	LPCS-V-6	Check	I	Process	Process	–	–	C	C	O/C	–	12	–	–	Yes	W	Valves	R.B.	No	3, 24
					LPCS-V-5	MO Gate	O	AC	AC	46	Manual	C	C	O/C	AS-IS	12	27	22						
HPCS pump suction from suppression pool	31	3.2-7 6.2-31n	56	B	HPCS-V-15	MO GATE	O	AC	AC	46	Manual	C	C	O/C	AS-IS	18	18	3	Yes	W	Valves	R.B.	No	18, 24
LPCS pump suction	34	3.2-7 6.2-31n	56	B	LPCS-V-1	MO Gate	O	AC	AC	46	Manual	O	O	O/C	AS-IS	24	Std	2	Yes	W	Valves	R.B.	No	18, 24
HPCS test line	49	3.2-7 6.2-31f	56	B	HPCS-V-23	MO Globe	O	AC	AC	F,X3	RM	C	C	C	AS-IS	12	Std	6	Yes	W	Valves	R.B.	No	18
HPCS pump min. flow					HPCS-V-12	MO Gate	O	AC	AC	38	RM	C	C	C	AS-IS	4	4	53						
HPCS suction relief					HPCS-RV-14	Relief	O	PP	Spring	–	–	C	C	C	–	1	–	65						19
HPCS discharge relief					HPCS-RV-35	Relief	O	PP	Spring	–	–	C	C	C	–	2	–	70						19
LPCS test line	63	3.2-7 6.2-31f	56	B	LPCS-V-12	MO Globe	O	AC	AC	F,X3	RM	C	C	C	AS-IS	12	Std	4	Yes	W	Valves	R.B.	No	18
LPCS pump min. flow					LPCS-V-11	MO Globe	O	AC	AC	38	RM	C	C	O/C	AS-IS	3	Std	87						
LPCS suction relief					LPCS-RV-31	Relief	O	PP	Spring	–	–	C	C	C	–	1	–	25						19
LPCS discharge relief					LPCS-RV-18	Relief	O	PP	Spring	–	–	C	C	C	–	2	–	50						19
SLC to Reactor	13	3.2-5 6.2-31m	55	A	SLC-V-7	Check	I	Process	Process	–	–	C	C	C	–	1-1/2	–	–	No	W	Valves	R.B.	No	
					SLC-V-6	Check	O	Process	Process	–	–	C	C	C	–	1-1/2	–	6						
					SLC-V-4A	Explo-sive	O	AC		–	–	C	C	C	–	1-1/2	–	136						21
					SLC-V-4B	Explo-sive	O	AC		–	–	C	C	C	–	1-1/2	–	136						21

LINE DESCRIPTION																								
DW Service Line	92	9.2-4 6.2-31l	56	B	DW-V-157	Gate	I	Manual	Manual	-	-	LC	LC	LC	-	2	-		No	W	Valves	S.B.	.13
					DW-V-156	Gate	O	Manual	Manual	-	-	LC	LC	LC	-	2	-	5					
RHR Condensing Mode Steam Supply	21	3.2-8 6.2-31e	55	A	RCIC-V-63	MO Gate	I	AC	AC	K	RM	O	O/C	O/C	AS-IS	10	16	-	Yes	S	Valves	R.B.	No
					RCIC-V-76	MO Globe	I	AC	AC	K	RM	C	C	C	AS-IS	1	5	-					
					RCIC-V-64	MO Gate	O	DC	DC	X	RM	C	C/O	C	AS-IS	10	16	2					
RCIC Turbine Steam Supply	45	3.2-8 6.2-31e	55	A	RCIC-V-63	MO Gate	I	AC	AC	K	RM	O	O/C	O/C	AS-IS	10	16	-	No	S	Valves	R.B.	No
					RCIC-V-76	MO Globe	I	AC	AC	K	RM	C	C	C	AS-IS	1	5	-					
					RCIC-V-8	MO Gate	O	DC	DC	~~K~~ X	RM	O	O/C	O/C	AS-IS	4	Std	2					
RCIC Pump Minimum Flow	65	3.2-8 6.2-31h	56	B	RCIC-V-19	MO Globe	O	DC	DC	~~32,~~ 33	RM	C	C	C	AS-IS	2	5	7	No	W	Valves	R.B.	No 22
RCIC Turbine Exhaust	4	3.2-8 6.2-31n	56	B	RCIC-V-68	MO Gate	O	DC	DC	~~32,~~ 35	Manual	O	O	O/C	AS-IS	10	Std	10	No	S	Valves	R.B.	No 22
RCIC Turbine Exhaust Vacuum Breaker	116	3.2-8 6.2-31l	56	B	RCIC-V-110	MO Gate	O	DC	DC	X1	RM	O	O	O/C	AS-IS	2	Std	9	No	A	Valves	R.B.	No 17
					RCIC-V-113	MO Gate	O	DC	DC	X1	RM	O	O	O/C	AS-IS	2	Std	5					
RCIC Vacuum Pump Discharge	64	3.2-8 6.2-31q	56	B	RCIC-V-69	MO Gate	O	DC	DC	~~32,~~ 36	Manual	O	O	O/C	AS-IS	1-1/2	Std	4	No	W	Valves	R.B.	No 22
RCIC Pump Suction from Suppression Pool	33	3.2-8 6.2-31n	56	B	RCIC-V-31	MO Gate	O	DC	DC	32	Manual	C	C	O/C	AS-IS	8	Std	2	No	W	Valves	R.B.	No 23
RPV Head Spray	2	3.2-8 6.2-31e	55	A	RCIC-V-66	Check	I	Process	Process	-	-	C	O	O/C	-	6	-	-	No	W	Valves	R.B.	No 3
					RCIC-V-13	MO Gate	O	DC	DC	~~32,~~ 34	RM	C	O/C	O/C	AS-IS	6	15	2	No	W	Valves	R.B.	No
					RHR-V-23	MO Globe	O	DC	DC	A,U,H,X2	RM	C	O/C	C	AS-IS	6	Std	7	Yes	W	Valves	R.B.	No

TABLE 6.2-16 (Continued)

DRAFT UNTIL WPPSS REVIEW

LINE DESCRIPTION																								
Drywell Spray Loop A	11A	3.2-6 6.2-31g	56	B	RHR-V-16A	MO Gate	O	AC	AC	46	Manual	C	C	O/C	AS-IS	16	10	26	Yes	W	Valves	R.B.	No	17, 24
					RHR-V-17A	MO Gate	O	AC	AC	46	Manual	C	C	O/C	AS-IS	16	10	24						
Drywell Spray Loop B	11B	3.2-6 6.2-31g	56	B	RHR-V-16B	MO Gate	O	AC	AC	46	Manual	C	C	O/C	AS-IS	16	10	12	Yes	W	Valves	R.B.	No	17, 24
					RHR-V-17B	MO Gate	O	AC	AC	46	Manual	C	C	O/C	AS-IS	16	10	2						
LPCI Loop A	12A	3.2-6 6.2-31L	55	A	RHR-V-41A	Check	I	Process	Process	-	-	C	C	O/C	-	14	-	-	Yes	W	Valves	R.B.	No	3, 24
					RHR-V-42A	MO Gate	O	AC	AC	46	Manual	C	C	O/C	AS-IS	14	12	21						
LPCI Loop B	12B	3.2-6 6.2-31L	55	A	RHR-V-41B	Check	I	Process	Process	-	-	C	C	O/C	-	14	-	-	Yes	W	Valves	R.B.	No	3, 24
					RHR-V-42B	MO Gate	O	AC	AC	46	Manual	C	C	O/C	AS-IS	14	12	20						
LPCI Loop C	12C	3.2-6 6.2-31L	55	A	RHR-V-41C	Check	I	Process	Process	-	-	C	C	O/C	-	14	-	-	Yes	W	Valves	R.B.	No	3, 24
					RHR-V-42C	MO Gate	O	AC	AC	46	Manual	C	C	O/C	AS-IS	14	12	20						
Shutdown Cooling Return Loop A	19A	3.2-6 6.2-31m	55	A	RHR-V-50A	Check	I	Process	Process	-	-	C	O	C	-	12	-	-	Yes	W	Valves	R.B.	No	3
					RHR-V-123A	MO Gate	I	AC	AC	F,A, U,H, X2	RM	C	O/C	C	AS-IS	1		-						
					RHR-V-53A	MO Globe	O	AC	AC	H,A, U,X2	RM	C	O	C	AS-IS	12	40	5						
Shutdown Cooling Return Loop B	19B	3.2-6 6.2-31m	55	A	RHR-V-50B	Check	I	Process	Process	-	-	C	O	C	-	12	-	-	Yes	W	Valves	R.B.	No	3
					RHR-V-123B	MO Gate	I	AC	AC	F,A, U,M, X2	RM	C	O/C	C	AS-IS	1		-						
					RHR-V-53B	MO Globe	O	AC	AC	H,A, U,X2	RM	C	O	C	AS-IS	12	40	2						
Shutdown Cooling Suction	20	3.2-6 6.2-31k	55	A	RHR-V-9	MO Gate	I	AC	AC	A,U, H,X2	RM	C	O	C	AS-IS	20	40	-	Yes	W	Valves	R.B.	No	
					RHR-V-8	MO Gate	O	AC	AC	A,U, H,X2	RM	C	O	C	AS-IS	20	40	14						

TABLE 6.2-16 (Continued)

LINE DESCRIPTION

RHR Loop A:	47	3.2-6	56	B																				
pump test line		6.2-31p			RHR-V-24A	MO Globe	O	AC	AC	F,X3	RM	C	C	O/C	AS-IS	18	Std	12	Yes	W	Valves	R.B.	No	2, 18, 24
discharge header relief					RHR-RV-25A	Relief	O	PP	Spring	–	–	C	C	C	–	2	–	33	Yes	W	Valves	R.B.	No	18 19
heat exch. steam relief					RHR-RV-55A	Relief	O	PP	Spring	–	–	C	C	C	–	10	–	22	Yes	S	Valves	R.B.	No	18 19
heat exch. condensate					RHR-V-11A	MO Gate	O	AC	AC	F,X3	RM	C	O/C	C	AS-IS	4	–	18	Yes	W	Valves	R.B.	No	18
heat exch. condensate relief					RHR-RV-36	Relief	O	PP	Spring	–	–	C	C	C	–	8	–	20	Yes	W	Valves	R.B.	No	18 20
pump minimum flow					RHR-FCV-64A	MO Globe	O	AC	AC	38	RM	O	C	O/C	AS-IS	3	8	22	Yes	W	Valves	R.B.	No	18
heat exch. thermal relief					RHR-RV-1A	Relief	O	PP	Spring	–	–	C	C	C	–	1-1/2	–	188	Yes	W	Valves	R.B.	No	18 19
heat exch. vent					RHR-V-73A	MO Globe	O	AC	AC	39	Manual	C	O/C	C	AS-IS	2	Std	175	Yes	A	Valves	R.B.	No	18
FDR system inter-tie					RHR-V-121	Gate	O	Manual	Manual	–	–	LC	LC	LC	–	3	–	6	No	W	Valves	R.B.	No	
CAC system Loop A drain					RHR-V-134A	MO Gate	O	AC	AC	~~15~~ 37	Manual	C	C	O/C	AS-IS	2	Std	44	Yes	W	Valves	R.B.	No	18
RHR Loop B	48	3.2-6	56	B																				
pump test line		6.2-31p			RHR-V-24B	MO Globe	O	AC	AC	F,X3	RM	C	C	O/C	AS-IS	18	Std	12	Yes	W	Valves	R.B.	No	2, 18, 24
discharge header relief					RHR-RV-25B	Relief	O	PP	Spring	–	–	C	C	C	–	2	–	30	Yes	W	Valves	R.B.	No	18 19
heat exch. steam relief					RHR-RV-55B	Relief	O	PP	Spring	–	–	C	C	C	–	10	–	20	Yes	S	Valves	R.B.	No	18 19
pump A&B suction relief					RHR-RV-5	Relief	O	PP	Spring	–	–	C	C	C	–	2	–	20	Yes	W	Valves	R.B.	No	18 19
heat exch. condensate					RHR-V-11B	MO Gate	O	AC	AC	F,X3	RM	C	O/C	C	AS-IS	4	Std	15	Yes	W	Valves	R.B.	No	18
pump minimum flow					RHR-FCV-64B	MO Globe	O	AC	AC	38	RM	O	C	O/C	AS-IS	3	8	22	Yes	W	Valves	R.B.	No	18
flush line relief					RHR-RV-30	Relief	O	PP	Spring	–	–	C	C	C	–	2	–	34	Yes	W	Valves	R.B.	No	18 19
heat exch. thermal relief					RHR-RV-1B	Relief	O	PP	Spring	–	–	C	C	C	–	1-1/2	–	189	Yes	W	Valves	R.B.	No	18 19
heat exch. vent					RHR-V-73B	MO Globe	O	AC	AC	39	Manual	C	O/C	C	AS-IS	2	Std	190	Yes	A	Valves	R.B.	No	18
CAC system Loop B drain					RHR-V-134B	MO Gate	O	AC	AC	~~15~~ 37	Manual	C	C	O/C	AS-IS	2	Std	44	Yes	W	Valves	R.B.	No	18

TABLE 6.2-16 (Continued)

DRAFT UNTIL WPPSS REVIEW

LINE DESCRIPTION																							
CAC Division 1 discharge to drywell	96	3.2-17 6.2-31g	56	B	CAC-V-2	MO Gate	O	DC	DC	37	Manual	C	C	O/C	AS-IS	4	Std	4	Yes	A	Valves	R.B.	No 17
					CAC-FCV-2A	EHO Globe	O	AC	AC	37	Manual	C	C	O/C	C	2-1/2	Std	6					
CAC Division 2 suction from drywell	97	3.2-17 6.2-31g	56	B	CAC-V-15	MO Gate	O	DC	DC	37	Manual	C	C	O/C	AS-IS	4	Std	2	Yes	A,S	Valves	R.B.	No 17
					CAC-FCV-1B	EHO Globe	O	AC	AC	37	Manual	C	C	O/C	C	2-1/2	Std	4					
CAC Division 2 discharge to drywell	98	3.2-17 6.2-31g	56	B	CAC-V-11	MO Gate	O	DC	DC	37	Manual	C	C	O/C	AS-IS	4	Std	8	Yes	A	Valves	R.B.	No 17
					CAC-FCV-2B	EHO Globe	O	AC	AC	37	Manual	C	C	O/C	C	2-1/2	Std	10					
CAC Division 1 suction from drywell	99	3.2-17 6.2-31g	56	B	CAC-V-6	MO Gate	O	DC	DC	37	Manual	C	C	O/C	AS-IS	4	Std	4	Yes	A,S	Valves	R.B.	No 17
					CAC-FCV-1A	EHO Globe	O	AC	AC	37	Manual	C	C	O/C	C	2-1/2	Std	7					
CAC Division 1 discharge to wetwell	102	3.2-17 6.2-31g	56	B	CAC-V-4	MO Gate	O	DC	DC	37	Manual	C	C	O/C	AS-IS	4	Std	3	Yes	A	Valves	R.B.	No 17
					CAC-FCV-4A	EHO Globe	O	AC	AC	37	Manual	C	C	O/C	C	2-1/2	Std	5					
CAC Division 2 discharge to wetwell	103	3.2-17 6.2-31g	56	B	CAC-V-13	MO Gate	O	DC	DC	37	Manual	C	C	O/C	AS-IS	4	Std	7	Yes	A	Valves	R.B.	No 17
					CAC-FCV-4B	EHO Globe	O	AC	AC	37	Manual	C	C	O/C	C	2-1/2	Std	9					
CAC Division 2 suction from wetwell	104	3.2-17 6.2-31g	56	B	CAC-V-17	MO Gate	O	DC	DC	37	Manual	C	C	O/C	AS-IS	4	Std	5	Yes	A,S	Valves	R.B.	No 17
					CAC-FCV-3B	EHO Globe	O	AC	AC	37	Manual	C	C	O/C	C	2-1/2	Std	7					
CAC Division 1 suction from wetwell	105	3.2-17 6.2-31g	56	B	CAC-V-8	MO Gate	O	DC	DC	37	Manual	C	C	O/C	AS-IS	4	Std	2	Yes	A,S	Valves	R.B.	No 17
					CAC-FCV-3A	EHO Globe	O	AC	AC	37	Manual	C	C	O/C	C	2-1/2	Std	6					

TABLE 6.2-16 (Continued)

DRAFT UNTIL WPPSS REVIEW

LINE DESCRIPTION																								
RHR Loop A Suppression Pool Suction	35	3.2-6 6.2-31n	56	B	RHR-V-4A	MO Gate	O	AC	AC	46	Manual	O	O/C	O	AS-IS	24	Std	2	Yes	W	Valves	R.B.	No	18
RHR Loop B Suppression Pool Suction	32	3.2-6 6.2-31n	56	B	RHR-V-4B	MO Gate	O	AC	AC	46	Manual	O	O/C	O	AS-IS	24	Std	2	Yes	W	Valves	R.B.	No	18
RHR Loop C Suppression Pool Suction	36	3.2-6 6.2-31n	56	B	RHR-V-4C	MO Gate	O	AC	AC	46	Manual	O	O	O	AS-IS	24	Std	2	Yes	W	Valves	R.B.	No	18
RHR Loop A:	117	3.2-6 6.2-31d	56	B																				
heat exch. steam relief					RHR-RV-95A	Relief	O	PP	Spring	-	-	C	C	C	-	10	-	24	Yes	S	Valves	R.B.	No	18 19
condensate pot drain					RHR-V-124A	MO Gate	O	AC	AC	39	Manual	C	C	C	AS-IS	1-1/2	Std	11	Yes	W	Valves	R.B.	No	18
condensate pot drain					RHR-V-124B	MO Gate	O	AC	AC	39	Manual	C	C	C	AS-IS	1-1/2	Std	12	Yes	W	Valves	R.B.	No	18
RHR Loop B:	118	3.2-6 6.2-31d	56	B																				
heat exch. steam relief					RHR-RV-95B	Relief	O	PP	Spring	-	-	C	C	C	-	10	-	21	Yes	S	Valves	R.B.	No	18 19
condensate pot drain					RHR-V-125A	MO Gate	O	AC	AC	39	Manual	C	C	C	AS-IS	1-1/2	Std	17	Yes	W	Valves	R.B.	No	18
condensate pot drain					RHR-V-125B	MO Gate	O	AC	AC	39	Manual	C	C	C	AS-IS	1-1/2	Std	14	Yes	W	Valves	R.B.	No	18
RHR Loop C:	26	3.2-6 6.2-31f	56	B																				
pump test line					RHR-V-21	MO Globe	O	AC	AC	F,X3	RM	C	C	C	AS-IS	18	Std	34	Yes	W	Valves	R.B.	No	18
discharge header relief					RHR-RV-25C	Relief	O	PP	Spring	-	-	C	C	C	-	2	-	30	Yes	W	Valves	R.B.	No	18 19
pump C suction relief					RHR-RV-88C	Relief	O	PP	Spring	-	-	C	C	C	-	1	-	37	Yes	W	Valves	R.B.	No	18 19
pump minimum flow					RHR-V-64C	MO Globe	O	AC	AC	38	RM	O	C	O/C	AS-IS	3	8	30	Yes	W	Valves	R.B.	No	18
Suppression Pool Spray Loop A	25A	3.2-6 6.2-31h	56	B	RHR-V-27A	MO Gate	O	AC	AC	F,X3	RM	C	C	O/C	AS-IS	6	10	5	Yes	W	Valves	R.B.	No	2, 18, 24
Suppression Pool Spray Loop B	25B	3.2-6 6.2-31h	56	B	RHR-V-27B	MO Gate	O	AC	AC	F,X3	RM	C	C	O/C	AS-IS	6	10	6	Yes	W	Valves	R.B.	No	2, 18, 24

TABLE 6.2-16 (Continued)

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LINE DESCRIPTION

RB to Wetwell Vacuum Breakers	119	3.2-15 6.2-31q	56	B	CSP-V-9	AO Butfy	O	Spring	Air	40	RM	C	C	C	O	24	4	1	Yes	A	Valves	R.B.	No	17
					CSP-V-10	PC Check	O	Process	Process	–	RM	C	C	C	–	24	–	4	Yes	A	Valves	R.B.	No	26
RB to Wetwell Vacuum Breakers & Wetwell Ventil-ation Supply	66	3.2-15 6.2-31b 6.2-31q	56	B	CSP-V-5	AO Butfy	O	Spring	Air	40	RM	C	C	C	O	24	4	7	Yes	A	Valves	R.B.	No	17
					CSP-V-7	PC Check	O	Process	Process	–	RM	C	C	C	–	24	–	10	Yes	A	Valves	R.B.	No	26
					CSP-V-4	AO Butfy	O	Air	Spring	F,B,Z	RM	C	C	C	C	24	4	14	No	A	Valves	R.B.	No	
					CSP-V-3	AO Butfy	O	Air	Spring	F,B,Z	RM	C	C	C	C	24	4	17	No	A	Valves	R.B.	No	
RB to Wetwell Vacuum Breakers & Wetwell Ventil-ation Exhaust	67	3.2-15 6.2-31j 6.2-31q	56	B	CSP-V-6	AO Butfy	O	Spring	Air	40	RM	C	C	C	O	24	4	9	Yes	A	Valves	R.B.	No	17
					CSP-V-8	PC Check	O	Process	Process	–	RM	C	C	C	–	24	–	16	Yes	A	Valves	R.B.	No	26
					CEP-V-4A	AO Butfy	O	Air	Spring	F,B,Z	RM	C	C	C	C	24	4	10	No	A	Valves	R.B.	No	
					CEP-V-3A	AO Butfy	O	Air	Spring	F,B,Z	RM	C	C	C	C	24	4	12	No	A	Valves	R.B.	No	
					CEP-V-4B	AO Gate	O	Air	Spring	F,B,Z	RM	C	C	C	C	2	1	10	No	A	Valves	R.B.	No,	
					CEP-V-3B	AO Gate	O	Air	Spring	F,B,Z	RM	C	C	C	C	2	1	12	No	A	Valves	R.B.	No	
Drywell Ventil-ation Supply	53	3.2-15 6.2-31b	56	B	CSP-V-2	AO Butfy	O	Air	Spring	F,B,Z	RM	C	C	C	C	30	4	1	No	A	Valves	R.B.	No	17
					CSP-V-1	AO Butfy	O	Air	Spring	F,B,Z	RM	C	C	C	C	30	4	4	No	A	Valves	R.B.	No	
Drywell Ventil-ation Exhaust	3	3.2-15 6.2-31j	56	B	CEP-V-1A	AO Butfy	O	Air	Spring	F,B,Z	RM	C	C	C	C	30	4	12	No	A	Valves	R.B.	No	17
					CEP-V-2A	AO Butfy	O	Air	Spring	F,B,Z	RM	C	C	C	C	30	4	8	No	A	Valves	R.B.	No	
					CEP-V-1B	AO Gate	O	Air	Spring	F,B,Z	RM	C	C	C	C	2	1	12	No	A	Valves	R.B.	No	
					CEP-V-2B	AO Gate	O	Air	Spring	F,B,Z	RM	C	C	C	C	2	1	8	No	A	Valves	R.B.	No	

TABLE 6.2-16 (Continued)

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LINE DESCRIPTION

RCC Inlet Header	5	3.2-14 6.2-31c	56	B	RCC-V-104	MO Gate	O	AC	AC	1/5AT	-	O	O		AS-IS	10	Std	5	No	W	Valves	R.B.	No 17
					RCC-V-5	MO Gate	O	AC	AC	1/5AT	-	O	O		AS-IS	10	Std	3					
RCC Outlet Header	46	3.2-14 6.2-31o	56	B	RCC-V-21	MO Gate	O	AC	AC	1/5AT	-	O	O		AS-IS	10	Std	3	No	W	Valves	R.B.	No
					RCC-V-40	MO Gate	I	AC	AC	1/5AT	-	O	O		AS-IS	10	Std	-					
Suppression Pool Cleanup Suction	100	3.2-12 6.2-31i	56	B	FPC-V-153	MO Gate	O	AC	AC	F,B	RM	C	C	C	AS-IS	6	Std	2	No	W	Valves	R.B.	No 17
					FPC-V-154	MO Gate	O	AC	AC	F,B	RM	C	C	C	AS-IS	6	Std	7					
Suppression Pool Cleanup Return	101	3.2-12 6.2-31o	56	B	FPC-V-156	MO Gate	O	AC	AC	F,B	RM	C	C	C	AS-IS	6	Std	3	No	W	Valves	RB	No 17
					FPC-V-149	Globe	O	Manual	Manual	-	-	LC	LC	LC	-	6	-	41					
RWCU From Reactor	14	3.2-11 6.2-31k	55	A	RWCU-V-1	MO Gate	I	AC	AC	A,J, ~~H,U,~~ X2 — E,Y,W	RM	O	O	C	AS-IS	6	Std	-	No	W	Valves	RB	No
					RWCU-V-4	MO Gate	O	DC	DC	A,J, ~~H,U, X2~~ — E,Y,W	RM	O	O	C	AS-IS	6	Std	4					
RRC Pump A seal Water	43A	3.2-3 6.2-31c	56	B	RRC-V-13A	Check	I	Process	Process	-	-	O	O	C	-	3/4	Std	-	No	W	Valves	R.B.	No
					RRC-V-16A	MO Gate	O	AC	AC	AT 1/5	-	O	O	C	AS-IS	3/4	Std	2					
RRC Pump B seal water	43B	3.2-3 6.2-31c	56	B	RRC-V-13B	Check	I	Process	Process	-	-	O	O	C	-	3/4	Std	-	No	W	Valves	R.B.	No
					RRC-V-16B	MO Gate	O	AC	AC	AT 1/5	-	O	O	C	AS-IS	3/4	Std	2					
RRC Sample Line	69d	3.2-3 6.2-31d	55	A	RRC-V-19	SO Globe	I	AC	Spring	B,C, D,P	RM	C	C	C	C	3/4	<5	-	No	W	Valves	T.B.	.05
					RRC-V-20	AO Globe	O	Air	Spring	B,C, D,P	RM	C	C	C	C	3/4	Std						

TABLE 6.2-16 (Continued)

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LINE DESCRIPTION																								
Drywell Equipment Drain	23	3.2-9 6.2-31k	56	B	EDR-V-19	AO Gate	O	Air	Spring	F,B	RM	O	O	C	C	3	Std	2	No	W	Valves	R.B.	No	17
					EDR-V-20	AO Gate	O	Air	Spring	F,B	RM	O	O	C	C	3	Std	4						
Drywell Floor Drain	24	3.2-10 6.2-31k	56	B	FDR-V-3	AO Gate	O	Air	Spring	F,B	RM	O	O	C	C	3	Std	2	No	W	Valves	R.B.	No	17
					FDR-V-4	AO Gate	O	Air	Spring	F,B	RM	O	O	C	C	3	Std	3						
Decontamination Soltn. Supply Header	94	3.2-10	NA	B	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	Blanked Close	R.B.	No	
Decontamination Soltn. Return Header	95	3.2-10	NA	B	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	Blanked Close	R.B.	No	
CIA for Safety Relief Valve Accumulators	56	3.2-21 6.2-31c	56	B	CIA-V-21 CIA-V-20	Check NO Globe	O O	Process AC	Process AC	- 41	- Manual	C O	C O	C O	- AS-IS	3/4 3/4	- Std	3 10	No	A	Valves	R.B.	No	17
CIA Line A for ADS Accumulators	89B	3.2-21 6.2-31c	56	B	CIA-V-31A CIA-V-30A	Check NO Globe	O O	Process AC	Process AC	- 42	- Manual	C O	C O	C O	- AS-IS	1/2 1/2	- Std	5 15	No	A	Valves	R.B.	No	17
CIA Line B for ADS Accumulators	91	3.2-21 6.2-31c	56	B	CIA-V-31B CIA-V-30B	Check NO Globe	O O	Process AC	Process AC	- 42	- Manual	C O	C O	C O	- AS-IS	1/2 1/2	- Std	2 15	No	A	Valves	R.B.	No	17
CRD Insert Lines (185 separate lines)	9	3.2-4	56	B						See Note 4														
CRD Withdrawal lines (185 separate lines)	10	3.2-4	56	B						See Note 4														

TABLE 6.2-16 (Continued)

DRAFT UNTIL WPPSS REVIEW

LINE DESCRIPTION

Air line for testing RHR-V-50A	42d	6.2-31r 3.2-6	56	B	PI-VX-42d	Globe	O	Manual	Manual	–	–	LC	LC	LC	–	1	–	<7	No	A	Valves	R.B.	No	25
					PI-VX-216	Globe	O	Manual	Manual	–	–	LC	LC	LC	–	1	–	<7						
Air line for testing RHR-V-50B	69c	6.2-31r 3.2-6	56	B	PI-VX-69c	Globe	O	Manual	Manual	–	–	LC	LC	LC	–	1	–	<7	No	A	Valves	R.B.	No	25
					PI-VX-221	Globe	O	Manual	Manual	–	–	LC	LC	LC	–	1	–	<7						
Air line for testing RHR-V-41A	61f	6.2-31r 3.2-6	56	B	PI-VX-61f	Globe	O	Manual	Manual	–	–	LC	LC	LC	–	1	–	<7	No	A	Valves	R.B.	No	25
					PI-VX-219	Globe	O	Manual	Manual	–	–	LC	LC	LC	–	1	–	<7						
Air line for testing RHR-V-41B	54Bf	6.2-31r 3.2-6	56	B	PI-VX-54Bf	Globe	O	Manual	Manual	–	–	LC	LC	LC	–	1	–	<7	No	A	Valves	R.B.	No	25
					PI-VX-218	Globe	O	Manual	Manual	–	–	LC	LC	LC	–	1	–	<7						
Air line for testing RHR-V-41C	62f	6.2-31r 3.2-6	56	B	PI-VX-62f	Globe	O	Manual	Manual	–	–	LC	LC	LC	–	1	–	<7	No	A	Valves	R.B.	No	25
					PI-VX-220	Globe	O	Manual	Manual	–	–	LC	LC	LC	–	1	–	<7						
Air line for testing LPCS-V-6	78d	6.2-31r 3.2-7	56	B	PI-VX-78d	Globe	O	Manual	Manual	–	–	LC	LC	LC	–	1	–	<7	No	A	Valves	R.B.	No	25
					PI-VX-222	Globe	O	Manual	Manual	–	–	LC	LC	LC	–	1	–	<7						
Air line for testing HPCS-V-5	78e	6.2-31r 3.2-7	56	B	PI-VX-78e	Globe	O	Manual	Manual	–	–	LC	LC	LC	–	1	–	<7	No	A	valves	R.B.	No	25
					PI-VX-223	Globe	O	Manual	Manual	–	–	LC	LC	LC	–	1	–	<7						
Air line for testing RCIC-V-66	54Aa	6.2-31r 3.2-8	56	B	PI-VX-54Aa	Globe	O	Manual	Manual	–	–	LC	LC	LC	–	1	–	<7	No	A	Valves	R.B.	No	25
					PI-VX-217	Globe	O	Manual	Manual	–	–	LC	LC	LC	–	1	–	<7						
Air line for testing WW-DW vacuum relief valves	82e	6.2-31r 9.3-1	56	B	CAS-V-453	SO Globe	O	AC	Spring	44	–	C	C	C	C	1	<5	5	No	A	Valves	R.B.	No	25
					CAS-CVX-82e	Check	O	Process	Process	–	–	C	C	C	–	1	–	7						
Air line for maintenance	93	9.3-1 6.2-31t	56	B	–	Pipe Cap	I	–	–	–	–	C	C	C	–	2	–	–	No	A	Cap & Valve	S.B.	No	
					SA-V-109	Gate	O	Manual	Manual	–	–	LC	LC	LC	–	2	–	1						
Tip lines	27a-e		54	–	C51J004	SO Ball	O	AC	AC	B, F	RM	C	C	C	C	3/8	<5	2	No	A	Valves	R.B.	No	29
					C51J004	Shear	O	–	Explosive	43	–	O	O	O	O	3/8	–	2						

TABLE 6.2-16 (Continued)

DRAFT UNTIL WPPSS REVIEW

LINE DESCRIPTION																								
Radiation Monitor (S-SR-20) Supply line	85b	6.2-31a 3.2-15	56	B	PI-VX-250	SO Gate	0	AC	Spring	47-45		0	0	C	C	1	<5	-	No	A	Valves	R.B.	No	25
					PI-VX-251	SO Gate	0	AC	Spring	47-45		0	0	C	C	1	<5	-						
Radiation Monitor (S-SR-20) Return line	72f	6.2-31a 3.2-15	56	B	PI-VX-253	SO Gate	0	AC	Spring	47-1/5		0	0	C	C	1	<5	-	No	A	Valves	R.B.	No	25
					PI-CVX-72f	Check	0	Process	Process	-	-	0	0	C	-	1	-	-						
Radiation Monitor (S-SR-21) Supply line	73a	6.2-31a 3.2-15	56	B	PI-VX-256	SO Gate	0	AC	Spring	47-1/5		0	0	C	C	1	<5	-	No	A	Valves	R.B.	No	25
					PI-VX-257	SO Gate	0	AC	Spring	47-1/5		0	0	C	C	1	<5	-						
Radiation Monitor (S-SR-21) Return line	29f c	6.2-31a 3.2-15	56	B	PI-VX-259	SO Gate	0	AC	Spring	47-1/5		0	0	C	C	1	<5	-	No	A	Valves	R.B.	No	25
					PI-CVX-29c	Check	0	Process	Process	-	-	0	0	C	-	1	-	-						
All Instrument lines from reactor	--		55	A	-	EF Check	0	Spring	EF	-	-	0	0	0	-	3/4 & 1	-	-		-	Valves	R.B.	No	27
						Globe	0	Manual	Manual	-	-	0	0	0	-	3/4 & 1	-	-						
All Instrument lines from primary containment	-		56	B	-	EF Check	0	Spring	EF	-	-	0	0	0	-	1 & 1-1/2	-	-		-	Valves	R.B.	No	27
						Globe	0	Manual	Manual	-	-	0	0	0	-	1 & 1-1/2	-	-						
Instrument lines (Hydrogen monitors) return to containment	-	3.2-15	56	B	-	Check	0	Process	Process	-	-	C	C	0	-	1	-	-	Yes	A, S	Valves	R.B.	No	27
						Globe	0	Manual	Manual	-	-	0	0	0	-	1	-	-						

TABLE 6.2-16

PRIMARY CONTAINMENT AND REACTOR VESSEL ISOLATION SIGNAL CODES FOR TABLE 6.2-16**

Signal	Description
A*	Reactor vessel low water level (Trip 3) - (A scram occurs at this level also. This is the higher of the three low water level signals).
B*	Reactor vessel low water level (Trip 2)
C*	High radiation - Main steam
D*	Line break - Main steamline (steamline high space temperature or high steam flow).
F*	High drywell pressure (core standby cooling systems are started).
J*	Line break in cleanup system - high space temperature.
K*	Line break in RCIC system line to turbine (high RCIC pipe space temperature, high steam flow, or low steam line pressure).
M*	Line break in RHR shutdown piping (hi suction flow)
P*	Low main steamline pressure at inlet turbine (RUN mode only).

* These are the isolation functions of the primary containment and reactor vessel isolation system; other functions are given for information only.

** See notes 30 through 46 for isolation signals generated by the individual system process control signals or for remote-manual closure based on information available to the operators. These notes are referenced in the "isolation signal" column.

TABLE 6.2-16 (Continued)

Signal	Description
S	Low drywell pressure
U*	High reactor vessel pressure
W	High temperature at outlet of cleanup system non-regenerative heat exchanger
Y	Standby liquid control system actuated
Z*	Reactor building ventilation exhaust plenum high radiation
RM	Remote manual switch located in main control room
G*	Low condenser vacuum
H*	Turbine Building high temperature
T*	High leakage flow
X*	"K" plus RHR/RCIC equipment area high temperature
X1*	High drywell pressure and low reactor pressure
X2*	RHR equipment area high temperature
X3*	Reactor vessel low water level (Trip 1)
E*	REACTOR WATER CLEAN-UP SYSTEM HIGH DIFFERENTIAL FLOW

* These are the isolation functions of the primary containment and reactor vessel isolation system; other functions are given for information only.

TABLE 6.2-16 (Continued)

ABBREVIATIONS/LEGEND

Valve Type		
	AO	air operated
	MO	motor operated
	PC	positive closing
	EHO	electro-hydraulic operated
	SO	solenoid operated
Location		
	I	inside containment
	O	outside containment
Power to Open/Close		
	AC	AC electrical power
	DC	DC electrical Power
	Process, pro	process flow
	PP	process fluid overpressurization
	spr	spring
Normal Position		
	O	open
	C	close
Process fluid		
	W	water
	A	air
	S	steam
	H	hydraulic fluid
Termination Zone		
	TB	turbine building
	RB	reactor building
	Rad W	radwaste building
	SB	service building

TABLE 6.2-16 (Continued)

NOTES FOR TABLE

Type C testing is discussed in Figure 6.2-31 which shows the isolation valve arrangement. Unless otherwise noted (see notes 4, 27, 28,29) all valves listed in Table 6.2-16 are type C tested.

1. Main steam isolation valves require that both solenoid pilots be de-energized to close valves. Accumulator air pressure plus spring set act together to close valves when both pilots are de-energized. Voltage failure at only one pilot does not cause valve closure. The valves are designed to fully close in less than 10 seconds.

2. Suppression cooling valves have interlocks that allow them to be manually reopened after automatic closure. This setup permits suppression pool spray, for high drywell pressure conditions, and/or suppression water cooling. When automatic signals are not present, these valves may be opened for test or operating convenience.

3. Testable check valves are designed for remote opening with zero differential pressure across the valve seat. The valves will close on reverse flow even though the test switches may be positioned for open. The valves open when pump pressure exceeds reactor pressure even though the test switch may be positioned for close.

4. The isolation provisions for the CRD lines are commensurate with the essential requirement that the control rods are inserted on a scram. Isolation of the hydraulic lines is provided by check valves 115 and 138 and solenoid valves 120, 122, and 123 on the hydraulic control units (HCU) and by air operated valves F010, F011 on the scram discharge header (see Figures 4.6-5a and b). The HCU's and scram discharge headers as well as the hydraulic lines themselves are Seismic I, and are qualified to the appropriate accident environment. The failure and scram position of all power operated valves are compatible with system isolation and, at the same time, rod insertion on a scram. Addition of power operated isolation valves on the hydraulic lines themselves could prevent control rod insertion. Manual isolation valves 101 and 102 allow for further isolation if it becomes necessary. The hydraulic lines are small and terminate in the reactor building which is served by the standby gas treatment system. The hydraulic lines and their manual isolation valves in the scram discharge header and its air operated valves are code group B.

TABLE 6.2-16 (Continued)

The hydraulic control unit (HCU) is a General Electric factory-assembled engineered module of valves, tubing, piping, and stored water which controls a single control rod drive by the application of precisely timed sequences of pressures and flows to accomplish slow insertion or withdrawal of the control rods for power control, and rapid insertion for reactor scram.

Although the hydraulic control unit, as a unit, is field installed and connected to process piping, many of its internal parts differ markedly from process piping components because of the more complex functions they must provide.

Thus, although the codes and standards invoked by Groups A, B, C, and D pressure integrity quality levels clearly apply at all levels to the interfaces between the HCU and the connecting conventional piping components (e.g., pipe nipples, fittings, simple hand valves, etc.), it is considered that they do not apply to the specialty parts (e.g., solenoid valves, pneumatic components, and instruments).

The design and construction specifications for the HCU do invoke such codes and standards as can be reasonably applied to individual parts in developing required quality levels, but these codes and standards are supplemented with additional requirements for these parts and for the remaining parts and details. For example, 1) all welds are penetrant tested (PT), 2) all socket welds are inspected for gaps between pipe and socket bottom, 3) all welding is performed by qualified welders, and 4) all work is done per written procedures. Quality Group D is generally applicable because the codes and standards invoked by that group contain clauses which permit the use of manufacturer's standards and proven design techniques which are not explicitly defined within the codes of Quality Group A, B, or C. This is supplemented by the QC techniques.

The CRD lines will be included in the type A test leakage since the reactor pressure vessel and the nonseismic portions of the CRD system are vented during the performance of the type A test. The CRD insert and withdraw lines are compatible with the criteria intended by 10CFR50, Appendix J, for type C testing, since the acceptance criterion for type C testing allows demonstration of fluid leakage rates by associated bases.

TABLE 6.2-16 (Continued)

5. Alternating current motor-operated valves required for isolation functions are powered from the AC standby power buses. Direct current operated isolation valves are powered from station batteries.

6. All motor-operated isolation valves remain in the last position upon failure of valve power. All air-operated valves close on motive air failure or in the safest position.

7. The standard minimum closing rate is 12 inches of nominal valve diameter per minute for gate valves and 4 inches of valve stem travel per minute for globe valves. For example, a 12 inch gate valve will close in one minute.

8. Reactor building ventilation exhaust plenum high radiation signal (Z) is generated by two trip units; this requires one unit at high trip or both units at down scale (instrument failure) trip, in order to initiate isolation.

9. Primary Containment and Reactor Vessel Isolation Signals (PCRVIS) are indicated by letters. Isolation signals generated by the individual system process control signals or for remote manual closure based on information available to the operator are discussed in the referenced notes in the "isolation signal" column.

10. Normal status position of valve (open or closed) is the position during normal power operation of the reactor (see Normal Position column).

11. The specified closure rates are as required for containment isolation only. Reported times are in seconds.

12. All isolation valves are Seismic I.

13. Used to evaluate primary containment leakage which may bypass the secondary containment emergency filtration system. See 6.2.3.2.

14. Reported sizes are the valve nominal diameters in inches. Size indicated is containment side of relief valve when relief valve size is not equal on both sides.

TABLE 6.2-16 (Continued)

15. Leakage control system provided, see 6.7

16. Bypass leakage of secondary containment is not considered during design basis LOCA, see 6.2.3.2.

17. Valve operability will be improved because the environmental conditions are better outside the primary containment from the standpoint of humidity, radiation, pressure and temperature transients, and post-LOCA pipe whip and jet impingement.

18. These lines connect to systems outside of the containment which meet the requirements for a closed system as set by NRC SRP 6.2.4, Section II, paragraph 3e. These systems are considered an extension of the primary containment. Any leakage out of these systems will be processed by the standby gas treatment system.

19. Relief valve setpoint greater than 77.5 psig (1.5 times containment design pressure).

20. Relief valve setpoint is 75 psig.

21. Cannot be reshut after opening without disassembly.

22. See 6.2.4.3.2.2.1.2

23. See 6.2.4.3.2.2.2

24. Due to redundancy within the emergency core cooling systems, some subsystems may be secured during the long term cooling period. In addition RHR loops A and B have several discharge paths (LPCI, Drywell Spray, Suppression Chamber Spray, Suppression Pool Cooling) which the operator may select during the 30 day post-LOCA period.

25. Applicable portion of the flow diagrams 3.2-6, -7, -8, ~~and~~ -15, to be updated to reflect the configurations shown on Figures 6.2-31r and -31s. and 9.3.1

26. The disc on the check valve is maintained in the close position during normal operation by means of a spring actuated lever arm and magnets embedded in the periphery of the disc. The magnetic and spring forces maintain the disc shut until the differential force to open the valve exceeds 0.2 psid. The check valves have position

TABLE 6.2-16 (Continued)

indication lights which can alert the operators to the fact that the check valve is not fully closed. The operator can then remotely shut the valve by means of a pneumatic operator. The operating switch is spring-return to neutral so the vacuum breaker function will not be impaired. The air supply to these valves is Quality Class I.

27. Instrument lines that penetrate primary containment conform to Regulatory Guide 1.11. The lines that connect to the reactor pressure boundary include a restricting orifice inside containment, are Seismic Category I and terminate in instruments that are Seismic Category I. The instrument lines also include manual isolation valves and excess flow check valves or equivalent (see hydrogen monitor return lines). These penetrations will not be type C tested since the integrity of the lines are continuously demonstrated during plant operations where subject to reactor operating pressure. In addition, all lines are subject to the type A test pressure on a regular interval. Leaktight integrity is also verified with completion of functional and calibration surveillance activities as well as by visual inspection during daily operator patrols as applicable.

28. Penetrations X-76 and X-77 contain lines for the hydraulic control of the reactor recirculation flow control valve. These lines contain corrosive hydraulic fluid used to position the reactor recirculation flow control valve.

    These lines inside of the containment are Seismic Category I and Quality Group B. They are provided with failed closed automatic isolation valves outside the containment which receive an automatic isolation signal on high drywell pressure.

    These lines meet the requirement of General Design Criterion 57 and therefore require only single automatic isolation valves outside of the containment. These lines also meet the requirement of Standard Review Plan 6.2.4. They are designed to Seismic Category I, Code Group B and the following criteria:

TABLE 6.2-16 (Continued)

do not communicate with either the reactor coolant system or the containment atmosphere,

b. are protected against missiles and pipe whip,

c. are designed to withstand temperatures at least equal to the containment design temperature,

d. are designed to withstand the external pressure from the containment structural acceptance test, and

e. are designed to withstand the loss-of-coolant accident transient and environment.

Even if the failed closed valve were to not shut there will be no leakage of containment atmosphere through the hydraulic control lines since the piping inside the primary containment remains intact. There are no active component failures which would compromise the integrity of the closed system inside the primary containment. Integrity of the closed system inside the primary containment is, essentially, constantly monitored since the system is under a constant operating pressure of 1800 psig. Any leakage through this system would be noticed because operation would be erratic and because of indications provided on the hydraulic control unit. In addition, in order to perform type C tests on these lines, the system would have to be disabled and drained of the corrosive hydraulic fluid. This is considered to be detrimental to the proper operation of the system in that possible damage could occur in establishing the test condition or restoring the system to normal.

These lines and associated isolation valves should therefore be considered to be exempt from type C testing.

29. Since the traversing incore probe (TIP) system lines do not communicate freely with the containment atmosphere or the reactor coolant, General Design Criteria 55 and 56 are not directly applicable to this specific class of lines. The basis to which these lines are designed is more closely described by General Design Criterion 54, which states in effect that isolation capability of a system should be commensurate with the safety importance of that isolation. Furthermore, even though the failure of the TIP system lines presents no safety consideration, the TIP system has redundant isolation capabilities.

TABLE 6.2-16 (Continued)

The safety features have been reviewed by the NRC for BWR/4 (Duane Arnold), BWR/5 (Nine Mile Point) and BWR/6 (GESSAR), and it was concluded that the design of the containment isolation system meets the objectives and intent of the General Design Criteria.

Isolation is accomplished by a seismically qualified solenoid-operated ball valve, which is normally closed. To ensure isolation capability, an explosive shear valve is installed in each line. Upon receipt of a signal (manually initiated by the operator), this explosive valve will shear the TIP cable and seal the guide tube.

When the TIP system cable is inserted, the ball valve of the selected tube opens automatically so that the probe and cable may advance. A maximum of five valves may be opened at any one time to conduct calibration, and any one guide tube is used, at most, a few hours per year.

If closure of the line is required during calibration, a signal causes a cable to be retracted and the ball valve to close automatically after completion of cable withdrawal. If a TIP cable fails to withdraw or a ball valve fails to close, the explosive shear valve is actuated. The ball valve position is indicated in the control room.

The WNP-2 TIP system design specifications require that the maximum leakage rate of the ball and shear valves shall be in accordance with the Manufacturer's Standardization Society (Hydrostatic Testing of Valves). The ball valves are 100% leak tested to the following criteria by the manufacturer:

Pressure	0 - 62 psig
Temperature	340^{o}F
Leak Rate	10^{-3}cm^{3}/sec

A statistically chosen sample of the shear valves is tested by the manufacturer to the following criteria:

Pressure	0 - 125 psig
Temperature	340^{o}F
Leak Rate	10^{-3}cm^{3}/sec STP

TABLE 6.2-16 (Continued)

The shear valves have explosive squibs and require testing to destruction. They cannot therefore be 100% tested.

As stated above, the penetration is automatically closed following use. During normal operation the penetration will be open approximately eight hours per month to obtain TIP information. If a failure occurred such as not being able to withdraw the TIP cable, the shear valve could be closed to isolate the penetrations. Installation requirements are that the guide tube/penetration flange/ball and shear valve composite assemble not leak at a rate greater than 10^{-4} std cc/sec at 80 psig. Further leak testing of the shear valves is not recommended since destructive testing would be required.

Leak testing of the ball valves also is not recommended since the guide tube terminates in a sealed indexer housing which is kept under a positive pressure by a nitrogen or air purge. The purge make-up will be indicative of the system leakage. Note that the TIP ball valve is normally closed and thus is a part of the leakage barrier being monitored. Consequently, the personnel exposure required to conduct type C tests from inside the containment is not warranted.

30. System is initiated after a LOCA. Isolation valves will auto close on the following high leakage conditions:

    a. 5 PSI between main steam isolation valves, 60 seconds after system initiation

    b. High flow from main steam line to low pressure manifold, 150 seconds after system initiation

    c. Inboard main steam isolation valve opened, after system initiation

31. PCRVIS is not desirable since the feedwater system, although not an ESF system, could be a significant source of make-up after a LOCA which is not concurrent with a seismic event.

    Feedwater check valves on either side of the containment provide immediate leak isolation, if required. The feedwater block valves can, however, be remote-manually closed if there is no indication of feedwater flow (see 6.2.4.3.2.1.1.1).

TABLE 6.2-16 (Continued)

32. The RCIC system ~~could be used~~ will be operating at most only during the first several hours after a LOCA. The RCIC system ~~would~~ will be initiated by low water level (B signal) and subsequently will be automatically tripped by one of the turbine shutdown signals listed below. The operator upon receiving indication that the RCIC system is no longer operable should complete isolation of the system by remote-manually shutting the isolation valves which have not been automatically shut. Also the operator will isolate the RCIC system on a high level alarm in the appropriate Reactor Building sump. Automatic shutdown of the RCIC turbine occurs upon receipt of any one of the following signals:

a. turbine overspeed

b. high water level in the RPV

c. low RCIC pump suction pressure

d. high turbine exhaust pressure

e. closure of steam supply valves

Automatic closure of steam supply valves to the turbine occurs upon receipt of any one of the following signals:

a. high flow in steam supply line

b. high area temperature

c. low reactor pressure of 50 psig

d. high pressure between turbine exhaust diaphragms

The low reactor pressure signal of 50 psig is expected to occur almost immediately after a design basis LOCA and within several hours for a small LOCA. Leakage from this system, e.g., packing gland, pump seals, is expected to be negligible because of the small leakage rates expected and because of the short operating time (see reply to Question 212.003 for an estimate of maximum leakage rates expected and the radiological consequences).

TABLE 6.2-16 (Continued)

33. The RCIC minimum flow valve is open only between the time of system initiation and the time at which the system flow to the RPV exceeds 40 GPM. The valve is shut at all other times. RCIC-V-19 auto closes ~~on a~~ when the ... turbine throttle valve closes following a turbine trip (see Note 32~~, above~~). Should a leak occur when the valve is open, it will be detected by a high level alarm in the appropriate Reactor Building sump.

34. The RCIC injection valve is open only during RCIC turbine operation. Injection line check valves on either side of the containment provide immediate leak isolation, if required. RCIC-V-13 auto closes ~~on a~~ when the turbine throttle valve closes following a turbine trip (see note 32~~, above~~).

35. The RCIC steam exhaust valve, RCIC-V-68, is normally open at all times. Should a leak occur, it would be detected by and alarmed the RCIC room high temperature leak detection system. ~~The alarm, annunciated in the control room, would alert the operator to remote-manually isolate the RCIC system.~~ (See Note 32)

36. The RCIC vacuum pump discharge valve, RCIC-V-69, is normally open at all times. The valve could be remote-manually closed by the operator upon indication that vacuum (annuniated in Main Control Room) can no longer be maintained in the barometric condenser.

37. System isolation valves are normally closed. System is placed in operation only if the hydrogen monitors detect hydrogen buildup after a LOCA.

The operator has flow indication, in the main control room, of gas leaving and entering the containment. Should these flows vary significantly from one another, it would be detected in the main control room and the process loop in service could be shutdown.

38. The minimum flow valve for an ECCS pump is open only between time of ECCS initiation and the time at which the system flow to the RPV exceeds 640 gpm. The valve is shut at all other times. Should a leak occur when the valve is open, it will be detected by a high level alarm in the appropriate Reactor Building sump.

~~39. Normally closed. Not required to be open during post LOCA period. Leads to an ESF system which is considered an extension of the primary containment. An error or failure resulting in the valve remaining open would not result in any release of activity. Valve can be remote-manually operated.~~

39. Valve is open only during shutdown. Valve position is indicated in the control room to provide operator confirmation of valve status.

TABLE 6.2-16 (Continued)

40. Normally closed. Signalled to open if reactor building pressure exceeds wetwell pressure by 0.5 psid. Valves automatically reshut when the above condition no longer exists. Operator to use valve position indicator as confirmation of valve status.

41. Indication of containment air compressor discharge header pressure and a low pressure alarm exist in the main control room. The operator can remote-manually shut valve CIA-V-20 should the containment air compressors become unavailable. The isolation check valve, CIA-V-21, provides immediate isolation.

42. Indication of nitrogen bottle header pressure and a low pressure alarm exist in the main control room. The operator can remote-manually shut valve CIA-V-30(A,B) should the nitrogen bottle bank pressure decrease below the alarm setpoint. The isolation check valves, CIA-V-31(A,B) provide immediate isolation.

43. The operator's indication that remote-manual closure of the TIP shear valves is required, is failure of the TIP ball valves to close as monitored on Panel S.

44. Normally closed. Opened only when testing wetwell to drywell vacuum breakers.

45. ~~Normally closed. Valve is interlocked with CAC system to open when CAC system is placed in operation and to shut when CAC system is shutdown. The CAC system is considered an extension of the primary containment.~~ Under design review.

46. These valves are the ECCS suction and discharge isolation valves. ECCS operation is essential during the LOCA period; therefore, there are no automatic isolation signals. ~~The ECCS is considered an extension of the primary containment. (See reply to Questions 22.50 and 212.003 for evaluation and consequences of ECCS leakage post-LOCA). All valves are capable of remote-manual operation.~~ The valve closure requirement will be indicated by a high level alarm in the appropriate Reactor Building Sump, which will be indicative of excessive ECCS leakage into secondary containment.

~~47. Under design review.~~

Q. 22.045

You state in 6.2.4.1 of the FSAR that instrumentation lines are designed to the provisions of Regulatory Guide 1.11. Provide the analysis performed which demonstrates that in the event of a rupture of any component in the instrument lines outside the primary containment, the integrity and functional performance of the secondary containment and its associated filtration systems are maintained.

RESPONSE:

An analysis is not warranted since each instrument line that penetrates the containment includes an excess flow check valve immediately outside the containment as an isolation valve. The leakage from a line ruptured downstream of this valve would therefore be negligible (less than 0.1 gpm) since the check valve will seal the line.

The instrument lines from the containment through the excess flow check valve are Seismic Category 1, meet ASME Section III, Class I requirements if part of the reactor pressure boundary, and have been protected from pipe whip and missiles.

Q. 22.046

Revise Table 6.2-16 of the FSAR to include the isolation provisions for instrumentation lines penetrating the primary containment.

RESPONSE:

Table 6.2-16* has been revised to include the instrument lines penetrating the primary containment (see the response to question 22.027). The individual instrument penetrations for a given type were not listed separately since the information given would be repetitious and can be adequately covered by a single entry.

*A revised Table 6.2-16 has been submitted with question 22.044.

Q. 022.47

You state in Section 6.2.5.1 of the FSAR that purging hydrogen from the containment is not required as a backup system to the hydrogen recombiners since all components of the recombiners are redundant. We have provided guidance in Section C.4 of Regulatory Guide 1.7 which states that the capability of a controlled purge of the containment atmosphere should be provided to aid in cleanup. Discuss your plans to comply with the guidance contained in Regulatory Guide 1.7.

Response:

Refer to 6.2.1.1.8.3, 6.2.5.1.m, and 6.2.5.2.4.*

*See attached draft.

All containment purge valves, including the 2" bypass valves, are designed to shut within four seconds of receipt of a containment isolation signal and to shut against full containment design pressure of 45 psig. The containment isolation signals and the purge valves are part of the containment isolation system which is an ESF system. Each purge line has two isolation valves. These valves are opened by allowing compressed air to oppose a spring in the valve actuator. On a loss of compressed air, loss of electrical signal, or on a containment isolation signal the valve is shut. If the purge system were operating at the time of a LOCA, the system will automatically be secured. The level of the activity released through the purge system before isolation would be limited to the activity present in the coolant prior to the accident since the purge system will be isolated before any postulated fuel failure could occur.

6.2.1.1.8.3 Post - LOCA

The unit coolers are not required after a LOCA since heat removal is then accomplished by the containment cooling system, a subsystem of the RHR system, as described in 6.2.2. ~~Similarly, containment purge is not required following a LOCA.~~ Two 100% redundant hydrogen recombiners are ~~then~~ available to be placed in operation to ensure that the hydrogen buildup does not reach a ~~dangerous~~ flammable level.

Any equipment located inside the primary containment which is required to operate subsequent to a LOCA has been designed to operate in the worst anticipated accident environment for the required period of time (See 3.11).

6.2.1.1.9 Post Accident Monitoring

A description of the post accident monitoring systems is provided in 7.5.

6.2.1.2 Containment Subcompartments

The two areas within the primary containment considered subcompartments are the area within the sacrificial shield wall and the area above the refueling bulkhead plate at elevation 583'.

All potential pipe breaks within the sacrificial shield wall have been evaluated. The information is contained in References 3.8-5; 3.8-6 and 3.8-7. These references have been previously submitted to the NRC.

Two analyses are being performed to ensure the adequacy of the refueling bulkhead and inner refueling bellows at elevation 583'. The first analysis, a break of the RCIC head spray line, will determine the maximum downward loading due to pipe breaks, and the second analysis, a break of the RRC suction line, will determine the maximum upward loading. These analyses will be incorporated into the FSAR by means of an amendment.

Containment purge has the capability for a controlled purge of the containment atmosphere to aid in hydrogen control, if necessary.

k. The system is designed to meet quality assurance, redundancy, power supply and instrumentation requirements for an engineered safety feature system.

l. Since the system is redundant and is not shared with other nuclear units, transportation of the hydrogen recombiners is not required.

~~m. Since all components of the system are redundant, a containment purge as a backup system is not required. A containment purge system used for other environmental controls is discussed in 6.2.1.1.8.~~

6.2.5.2 System Design

The containment atmosphere control system provides effective control of the hydrogen generated following a postulated LOCA. Piping and instrumentation for the system is shown in Figures 3.2-17, 3.2-15 and 3.2-6. Equipment details are given in Table 6.2-17.

The system consists of the following:

1. A hydrogen mixing system which operates to assure a well mixed atmosphere in both the drywell and suppression chamber. This system is the containment spray system and can be actuated approximately 10 minutes after the postulated LOCA.

2. A hydrogen concentration monitoring system measures the amount of hydrogen in the drywell and suppression chamber atmosphere.

3. Two 100 percent capacity hydrogen recombiners, one of which is manually initiated approximately five hours after the accident to preclude the hydrogen concentration from exceeding four percent by volume. The recombiners are catalytic type hydrogen oxygen recombiners.

6.2.5.2.1 Hydrogen Mixing System

The function of the hydrogen mixing system is to provide a well mixed atmosphere in the drywell and suppression chamber.

m. Since all components of the system are redundant, an engineered safety feature containment purge system is not required. However, containment purge, discussed in 6.2.1.1.8, has the capability for a controlled purge of the containment atmosphere to aid in hydrogen control, if necessary.

The cooling water supplied to the aftercooler is returned to the standby service water system. The cooling water supplied to the scrubber is discharged to the suppression pool.

All components of the containment atmosphere control system are redundant. Controls include the control panel located in the main control room and the local control panel for each recombiner located in environmentally suitable rooms in the reactor building. All of the functions necessary to control the system are located in the main control room.

6.2.5.2.4 Containment Purge

~~Since active and passive components of the containment atmosphere control system are redundant, containment purge as a backup system is not required.~~

6.2.5.3 Design Evaluation

Based on the assumptions of the model described below, it is calculated that the hydrogen concentration in the drywell eventually reaches 4% by volume approximately 10.0 hours after the postulated LOCA if the hydrogen recombiner is not in operation. The recombiner is started, however, when the hydrogen concentration reaches approximately 3.5% by volume (5 hours after the postulated LOCA) to limit the hydrogen concentration below 4% by volume. Figure 6.2-26 shows the drywell and suppression chamber hydrogen concentration as a function of time, with and without operation of the hydrogen recombiner system at design capacity of 150 scfm and reduced capacity of 105 scfm.

The determination of the time dependent hydrogen concentration in the drywell and suppression chamber atmospheres is based on a two-region model of the primary containment, a drywell and a suppression chamber atmosphere.

The drywell and suppression chamber free volumes contain air and water vapor at atmospheric pressure just prior to the postulated LOCA. Gases considered available for hydrogen dilution are the non-condensibles and water vapor present during normal operating conditions. Water vapor generated from blowdown is not considered. The radiolytic generation of free oxygen is added to the total inventory of gases. The pressure in containment is assumed to remain at atmospheric pressure and the temperature history of Figure 6.2-7 curve a, is used.

Containment purge, discussed in 6.2.1.1.8, has the capability for a controlled purge of the containment atmosphere to aid in hydrogen control, if necessary.

Q·22.048

You state in 6.2.6.3.1.3 of the FSAR that the corrosion of aluminum, zinc, and zinc base paints located either in the drywell or in the suppression chamber were determined to be insignificant. However, we have determined that a potential hydrogen release from the corrosion of zinc following a postulated loss-of-coolant accident should be considered in the analysis of the total hydrogen production and accumulation within the containment. Accordingly, provide the following information:

a. Provide the corrosion rate as a function of temperature for all materials in the containment that could become a source of hydrogen due to corrosion.

b. Describe how the corrosion rates assumed for the materials identified in Item (a) were established: Identify the experimental data base, including the appropriate references, and discuss the conservation in the applicability of the data in view of the calculated environmental conditions following a postulated loss-of-coolant accident.

c. Provide the mass and surface area of zinc paint and galvanized steel and other corrodible materials in both the drywell and the wetwell.

d. Provide a graphic representation of the total hydrogen concentration inside the containment as a function of time with (1) no hydrogen recombiners operating; (2) one recombiner operating; and (3) both recombiners operating.

e. Provide a graphic representation of the contribution of each source of hydrogen as a function of time.

f. Describe the periodic surveillance that will be done to demonstrate the operability of the hydrogen recombiners and the backup purge system.

g. Identify the location of (1) the hydrogen sample points in the drywell and the suppression chamber, and (2) the suction and discharge points of the combustible gas control system with respect to nearby structures and equipment.

Response:

g. See the response to question 22.025.

The response to the remaining questions will be submitted to the NRC by March 1979. This delay is due to a recalculation and a review of all zinc coated areas to confirm our previous statement.

Q. 22.049

The information presented in Section 6.2.6.1 of the FSAR regarding fluid lines penetrating the containment which will be vented and drained to ensure exposure of the system containment isolation valves to the containment atmosphere and the full differential pressure during the Type A containment integrated leakage rate test, is incomplete. For example, the following systems have not been included in the discussion: (1) the reactor core isolation cooling system; (2) the reactor pressure vessel instrumentation lines; (3) the neutron monitoring system; (4) the equipment and floor drain collection systems; and (5) the primary containment chilled water piping. Identify the status of these lines during the integrated leakage rate test. Provide the following additional information:

a. The design provisions that will permit venting and draining of those lines that will be exposed to the containment atmosphere during the integrated leakage rate test.

b. Justification for not venting and draining those eight systems listed on page 6.2-82 of the FSAR.

RESPONSE:

A tabulation of isolation valve status during Type A tests is given below. Included is the justification for not venting systems as applicable. Also note that WNP-2 does not have a primary containment chilled water system but rather only the reactor closed cooling system that penetrates containment.

System	CTMT ISO Valve Status - Type A Test	Justification For Not Venting
1. Reactor Closed Cooling	Open	a. Required to maintain CTMT temperature during ILRT
2. RHR	Closed (except pump min. flow), if required to cool reactor, necessary valves will be open.	a. System is normally filled* with water and is operated under post-LOCA conditions. b. Required to cool reactor during shutdown.
3. HPCS	Closed	a. System is normally filled* with water and operated under post-LOCA conditions.

Sytem	CTMT ISO Valve Status - Type A Test	Justification For Not Venting
4. LPCS	Closed (except suction line)	a. System is normally filled* with water and operated under post-LOCA conditions.
5. Standby Liquid Control	Closed	a. System is normally filled. Required to be filled during all phases of plant operation.
6. Reactor Water Cleanup	Closed (except suction line at feedwater)	a. System is normally filled with water. b. System suction is off the RRC pump suction line which must be flooded to maintain reactor water level during the Type A test. Consequently, the suction piping will remain flooded also.
7. Feedwater System	Closed (except for M.O. gate)	a. System is filled with water. b. System will potentially operate post-LOCA.
8. RCIC	Closed (Steam supply to isolation valve drained and vented. Downstream of isolation valves also vented.)	a. System is normally filled* with water. b. System will operate post-LOCA.
9. Equipment and Floor Drain Systems	Closed	a. System will be water sealed at its low point. b. During and following a LOCA the sumps will be filled with water and thus seal these systems from the containment atmosphere.

System	CTMT ISO Valve Status - Type A Test	Justification For Not Venting
10. Reactor Recirc. Sampling	Closed	a. System will be filled with water. b. System ties into the RRC system which must remain full during Type A test and consequently the sampling system remains filled also.
11. Control Rod Drive	Line up per scram configuration	a. The seismic portion of the system is water sealed. The nonseismic portion of the system is vented.
12. Neutron Monitoring System (TIP)	Ball Valves Closed	a. The TIP mechanism will be withdrawn and the ball valves closed. The TIP system will be exposed to the Type A test pressure to the extent of system leakage.
13. Reactor Instrumentation Lines	-	a. The RPV wil be vented as will the related instrumentation. This instrumentation will thus be exposed to the Type A test pressure.

*Water leg pumps provided to maintain water level in the pipe.

All piping to be exposed to the Type A test pressure is provided with low point drains and vents to ensure adequate removal of water from the effected systems. The RCIC steam supply and the reactor instrumentation will then be exposed to the Type A test pressure since the reactor vessel is vented.

Q. 22.050

Those closed systems outside containment which must function following an accident become extensions of the containment boundary after a postulated loss-of-coolant accident. Certain of these systems may also be identified as one of the redundant containment isolation barriers. Since these systems may circulate water or the containment atmosphere which may circulate water or the containment atmosphere which may be contaminated, components of these particular systems which may leak are relied on to provide containment integrity. Accordingly, provide the proposed leakage limit for each system that becomes an extension of the containment boundary following a postulated loss-of-coolant accident. Discuss your plans for leak testing the systems either hydrostatically or pneumatically. Discuss how the process leakage limits will be included in the radiological assessment of the site.

RESPONSE:

Closed systems which become an extension of the primary containment during the post-LOCA period are the:

High Pressure Core Spray (HPCS)
Low Pressure Core Spray (LPCS)
Residual Heat Removal (RHR)
Containment Atmosphere Control (CAC)
Reactor Core Isolation Coolant (RCIC)*

The above systems will be given a hydrostatic or pneumatic test following system completion per Section III of the ASME Code. This test will be repeated once every ten years per the requirements of Section XI of the ASME Code. In addition to these tests, the HPCS, LPCS, RHR and RCIC (water side) systems are maintained under constant pressure. These systems are kept full of water and pressurized by either water leg pumps or by the suppression pool static head. During normal operation any significant leakage from valve packing or pump seals in these systems would be detectable by visual observation or by sump level alarms. Also the pumps will be flow tested quarterly and the valves will be exercised per the ASME, Section XI inspection program. During the tests a visual inspection for water leakage from the component will be made. In addition, All containment isolation valves in the above systems subject to reactor operating pressure are monitored during normal operation for valve stem leakage by the valve packing leak detection system (see Figure 3.2-6 (Note 5), 7, and 8 (Note 4)).

*The RCIC system is included here as it is a closed system outside containment and may briefly operate following a LOCA. It is not required to operate post-LOCA, however, and will be isolated once reactor pressure is reduced.

Defining the threshold value at which leakage from a component would become visible is difficult, however the value can realistically be assumed to be below .1 gpm. Based on this and the fact that excess leakage paths would be repaired, any water leakage during the post-LOCA period is expected to be negligble.

The RCIC steam lines from the reactor to the inside containment isolation valve and the CAC system will be open to the primary containment atmosphere during the Type A test. Leakage from these lines will be part of the measured allowable leakage for the Type A test.

All these systems are entirely within the secondary containment and consequently any leakage during the post-LOCA period will be processed by the standby gas treatment system (SGTS). Appendix B to the Standard Review Plan 15.6.5 deals with leakage from ESF systems during a LOCA and states "when ESF - grade filters are supplied, no doses resulting from passive failures need be considered." Since the SGTS includes ESF - grade filters these doses have not been included in the site radiological assessment total LOCA dose figure. However, an analysis has been done to confirm the fact that the doses resulting from passive failures such as minor leaks in ESF systems is negligible and is outlined in the response to question 312.12.

Q. 22.051

Discuss your plans for including in the Type A tests, the reactor building pressure sensing lines which will become extensions of the containment boundary following a postulated loss-of-coolant accident.

RESPONSE:

The reactor building pressure sensing lines will be valved off at the instrument isolation valves. This is done to preclude instrumentation damage upon exposure to the high pressure associated with Type A tests. Also this prevents the ECCS related pressure switches from activating with the high drywell pressure of the Type A test. The Type A test will include all tubing up to the isolation valves however.

No Type C tests are planned with these lines either as they are designed to the requirements of Reg. Guide 1.11.

Q. 22.052

Identify the valves for which the test pressure is not applied in the same direction of the pressure existing when the valve is required to perform a safety function. Provide a demonstration that the valve leakage rates for these particular valves are equivalent to or greater than the leakage rates which would occur if the test pressure were to be applied in the same direction as the pressure existing when the valve is required for its safety function.

RESPONSE:

The response to question 22.010 identifies the containment isolation valves that will be tested in the reverse direction from their safety function. The justification for this is also given in that response. Note also that the gate valves have a shop leak test applied to both sides of the valve. These test results have been reviewed and found acceptable. The results for these tests are on file at the WNP-2 site and are available for inspection.