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see Reports

SUBJECT: Advises that addl secondary containment bypass leakage paths identified as result of final verification of pipe whip studies, changing accident analysis for offsite doses. W/eight oversize encl & 27 oversize drawings.

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NIAGARA MOHAWK

NIAGARA MOHAWK POWER CORPORATION/300 ERIE BOULEVARD WEST, SYRACUSE, N.Y. 13202/TELEPHONE (315) 474-1511

June 30, 1986
(NMP2L 0761)

Ms. Elinor G. Adensam, Director
BWR Project Directorate No. 3
U.S. Nuclear Regulatory Commission
7920 Norfolk Avenue
Washington, DC 20555

Dear Ms. Adensam:

Re: Nine Mile Point Unit 2
Docket No. 50-410

As a result of the final verification of the pipe whip studies at Nine Mile Point Unit 2, additional secondary containment bypass leakage paths were identified. This changes the accident analysis for offsite doses.

The changes involve analysis of additional paths, including instrument air, nitrogen system and containment purge system paths. The results of the analysis show that the totals are still below the allowable values. Further, based upon the percentage increase, we believe that the staff independent assessment of the offsite doses for these cases will be in conformance with 10 CFR 100.11.

Updated Final Safety Analysis Report pages are provided in Attachment 1 which show the results. Isometric drawings are also provided for the above-listed systems in Attachment 2. Proposed Technical Specification changes are provided in Attachment 3. Refer to Final Safety Analysis Report figures 9.4-8, 9.3-20, 9.3-1, which show the containment purge, nitrogen and instrument air systems piping and instrumentation diagrams, respectively.

Our staff is available to discuss these matters or meet on this topic at your convenience.

Very truly yours,

CVMangan

C. V. Mangan
Senior Vice President

NLR:ja
1746G

Attachment
xc: R. A. Gramm, NRC Resident Inspector
Project File (2)

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of)

Niagara Mohawk Power Corporation) Docket No. 50-410

(Nine Mile Point Unit 2))

AFFIDAVIT

C. V. Mangan, being duly sworn, states that he is Senior Vice President of Niagara Mohawk Power Corporation; that he is authorized on the part of said Corporation to sign and file with the Nuclear Regulatory Commission the documents attached hereto; and that all such documents are true and correct to the best of his knowledge, information and belief.

C. Mangan

Subscribed and sworn to before me, a Notary Public in and for the State of New York and County of Onondaga, this 30th day of June, 1986.

Janis M. Macro
Notary Public in and for
Onondaga County, New York

My Commission expires:
JANIS M. MACRO
Notary Public in the State of New York
Qualified In Onondaga County No. 4784555
My Commission Expires March 30, 1987

Railcar entrance to the reactor building railroad airlock is through an interlocking double door airlock system. The railroad airlock is completely within and along the northeast side of the reactor building at el 261 ft. One of the interlocked doors is the exterior railcar door at the north end of the railroad airlock, and the other is the interior railcar door at the south end of the railroad airlock. A smaller door for personnel ingress and egress is incorporated into the design of the interior railcar door. All three doors must be closed before any one of them can be opened.

The reactor building pressure control function automatically maintains a uniform subatmospheric pressure of 0.25 in W.G. by monitoring the differential pressure between the reactor building interior and the external atmospheric pressure. The differential pressure is monitored by a differential pressure transmitter. The signal that indicates the differential pressure also controls the position of the recirculation dampers in the HVRS supply fan units. In the event of reactor building isolation, the reactor building pressure control instrumentation regulates the reactor building pressure by controlling the SGTS recirculation flow.

The reactor building pressure control instrumentation is designed to eliminate fluctuations in reactor building pressure caused by such factors as wind gusts. Reactor building pressure is indicated and recorded and loss of negative pressure is alarmed in the main control room.

6.2.3.2.3 Bypass Leakage Paths

Table 6.2-56 presents a tabulation of all primary containment process piping penetrations including the potential reactor building bypass leakage paths. The potential bypass leakage paths are routed through the reactor building and terminate in the radwaste, standby gas treatment, turbine generator building, or yard. No guard pipes are used on penetrations and, therefore, guard pipes cannot constitute a bypass leakage path. All process lines that rely on a closed system within the primary containment as a leakage boundary terminate within the reactor building. Therefore, these lines are not considered potential bypass leakage paths.

Bypass leakage is included in the radiological evaluation of design basis events. This is discussed in Section 15.6.5.5. Tables 6.2-55a and 6.2.55b show the bypass leakage paths considered. They include four main steam lines, two main

Several process lines eliminate bypass leakage by the use of water seals. These are discussed below and include condensate makeup and drawoff (CNS), reactor core isolation cooling (RCIC) and high pressure core spray (HPCS). Feedwater system (FWS) is also discussed below, but no credit for water seals is applied for that system. A typical loop seal is shown on Figure 6.2-88.

CNS

While not directly connected to the primary containment, the condensate makeup and drawoff system is used as the alternate fill source to the RHR, HPCS, LPCS, and RWCU systems. Each condensate fill connection to these systems is isolated by means of a normally closed globe valve. The main supply line into the secondary containment contains a check valve at the low point which, in case of a pipe break outside the containment, is sealed by a 70-ft leg of water. Although the condensate makeup and drawoff system is not of seismic design, any line break within the reactor building would provide a preferential flow path, for containment atmosphere leakage into the reactor building atmosphere. Under this condition, gaseous leakage would be collected by the SGTS and thus not be classified as bypass leakage.

steam drain lines, one reactor water cleanup line, one feedwater line, four post-accident sampling lines, six primary containment purge lines, four drywell floor and equipment vent and drain lines, and six nitrogen/instrumentation lines.

The analysis used to predict the bypass leakage rates is discussed in Section 6.2.3.2.4. Single failure is included in the analysis in that failure of one division of electrical power is assumed. This results in all motor-operated containment isolation valves on that division failing as is (assumed open), thereby reducing the restrictions to bypass leakage. This is the worst single failure to consider for this evaluation.

All leakage is conservatively assumed to be across isolation valve seats and to remain within the system piping until released to the environment. Any leakage escaping across outboard isolation valve stem packing would be released to the secondary containment or main steam tunnel. Any leakage into the secondary containment would be processed by the standby gas treatment system. Contaminants leaked into the main steam tunnel will be transported to the environment more slowly due to the much larger cross-sectional area of the tunnel and the resulting slower average velocities.

No credit is taken for a reduction in bypass leakage due to water inboard of or trapped between isolation valves. The isolation valves are assumed to leak containment atmosphere instantaneously following the accident. No credit is taken for the time required to initially pressurize the volume between the isolation valves.

Leakage transport time to the environment is based on 1/2 of the available horizontal and vertically downward flow piping located between the outboard isolation valve and the environment.

Further conservatism is added to the analysis by the assumption that all isolation valves in these paths, except the main steam isolation valves (MSIV) and feedwater check valves, leak at a rate equal to the maximum permissible, ASME Section XI, Subsection IWV-3426, recommended acceptance level of 7.5 scf/day per inch of nominal valve diameter at functional pressure. The MSIVs are assumed to leak at 6 scfh, nearly three times the valve design limit. Leakage across check valves, except the feedwater check valves, is assumed to be at twice the recommended rate of 7.5 scf/day per inch of nominal valve diameter, as provided for by ASME Section XI, Subsection IWV-3426. Leakage across the feedwater valves is assumed to be 12 scfh.

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RCIC

The RCIC path from the primary containment to the condensate storage building is protected from bypass leakage. When RCIC is taking suction from the condensate storage tank (2CNS-TK1A), the tank static head pressure maintains a 23-psig water seal at valve 2ICS*V28 and/or 2ICS*MOV136 (Figure 6.2-81). Also, the piping arrangement as shown in Figure 6.2-81 provides a loop seal with a high point at 2ICS*MOV136. Thus, any containment atmosphere leakage through this valve during the period that containment pressures exceed water seal pressure would be trapped at this high point. If a LOCA and an SSE take place simultaneously and a condensate line break occurs, 2ICS*MOV129 on the condensate tank line will shut automatically, creating an additional barrier to bypass leakage.

HPCS

The arrangement of the HPCS suction line from condensate storage tank 2CNS-TK1B provides enough static head pressure to keep a 75-ft (32 psig) water seal at the line low point (valve 2CSH*MOV101) in Figure 6.2-83. Further, the piping arrangement as shown in Figure 6.2-83 provides two intermediate loop seals with high points at valves 2CSH*MOV118 and 2CSH*V59, ensuring that any containment atmosphere leakage occurring during the 20 min that containment pressures exceed water seal pressure would be trapped between these high points. If a LOCA and an SSE take place simultaneously and a condensate line break occurs, 2CSH*MOV101 on the condensate storage tank line will shut automatically, creating an additional barrier against bypass leakage.

FWS

For loss-of-coolant accidents not involving a feedwater line break, sufficient water exists in the vertical feedwater piping between the containment penetration and the reactor vessel to prevent bypass leakage for at least 30 days after the accident. See Figure 6.2-84.

For a break in feedwater piping inside containment, bypass leakage through this piping is included in the analysis of Section 15.6. However, as discussed below, a water seal, restored after the break, will effectively prevent escape of containment atmosphere to the environment after 10 min. 21

In considering a break in the feedwater piping within the primary containment, credit can be given to the piping arrangement which provides low stress levels along with pipe whip restraints. Consequently, it can be stated that the containment penetration is a break exclusion area. Assuming a break in the feedwater line at the end of the break exclusion region inside the primary containment (see Section 3.6A and Figure 3.6A-20), sufficient water will remain in the line, even after flashing due to initial depressurization, to maintain a vertical water seal on the feedwater isolation valves (Figure 6.2-84). Water losses due to long-term containment pressure reduction and the associated water vaporization and the backleakage through the two isolation check valves for 30 days will be replenished by reactor water leaking from the break. Within ten minutes after the break, the ECCS injection water will reflood the reactor to above the level of the feedwater sparger. At that point, water would flood back into the feedwater piping and then into the intact containment penetration piping (Figure 6.2-84). This would more than make up for any losses due to leakage out the containment isolation valves. Thus, a continuous water seal is provided to prevent any bypass leakage through the feedwater lines after the initial ten minute refilling period. Notwithstanding the above, bypass leakage through a ruptured feedwater line is included in the radiological analysis for the entire 30 day period to ensure conservative analysis results.

In addition to the two isolation check valves, each feedwater line has a remote-manual gate valve outboard of the isolation valves that may be shut subsequent to a LOCA anytime the operators determine that feedwater flow is unnecessary or unavailable. The gate valve provides further back leakage control. However, this valve is assumed to remain open for the purpose of evaluating bypass leakage.

6.2.3.2.4 Bypass Leakage Rates

Bypass leakage rates as a function of time after the postulated LOCA are predicted for each path by two methods, assuming isothermal flow and isentropic flow. Table 6.2-55a lists the bypass paths considered and their contributions to the total bypass leakage, assuming isothermal flow determined with the following equation:

$$\dot{m} = K \left\{ (P_u^2 - P_D^2)/RT_u \right\}^{1/2} \qquad (6.2\text{-}12)$$

Where:

P_u = Upstream absolute pressure (post-LOCA pressure/temperature profile per Section 6.2.1)

P_D = Downstream absolute pressure

T_u = Upstream absolute temperature

R = Gas constant

K = Constant (determined from the technical specification of allowable leak rate)

$\dot{m}$ = Mass flow rate

To quantify the sensitivity of the bypass leakage analysis to the flow model assumption, the bypass calculation was repeated considering the leakage flow to be characterized as isentropic flow through an orifice. Table 6.2-55b summarizes the isentropic flow results determined with the following equation:

$$\dot{m} = A \left\{ 2\, g_c \left(\frac{\gamma}{\gamma-1}\right) \left(\frac{P_u^2}{RT_u}\right) \left(\frac{P_D}{P_u}\right)^{\frac{2}{\gamma}} \left[1 - \left(\frac{P_D}{P_u}\right)^{\frac{\gamma-1}{\gamma}}\right] \right\}^{1/2} \qquad (6.2\text{-}13)$$

Where:

Line Description	Termination Region	Bypass Leakage Barrier	Leak Rate[3] Tech Spec SCFH[1,4]	Leak Rate[3] Fraction/Day[2]	Containment Bypass Leak Rate (Fraction/Day)[5] 0-2 hr	0-8 hr	8-24 hr	1-4 day	4-30 day
Inst. air to SRV accumulators	Yard	1-1 1/2" SOV							
Inst. air to drywell	yard	1-1 1/2" SOV							
Inst. air to drywell	yard	1-1 1/2" SOV							
Inst. air to CPS valve in supp. chamber	yard	1-1 1/2" check valve	Combined leakage 3.6[7]	(8) $.124 \times 10^{-3}$	(9) $.180 \times 10^{-3}$	(9) $.163 \times 10^{-3}$	(9) 1.58×10^{-3}	(9) $.141 \times 10^{-3}$	(9) $.979 \times 10^{-4}$
Inst. air to CPS valve in supp. chamber	yard	1-1 1/2" check valve							
N_2 purge to TIP index mechanism	yard	1-1/2" check valve							

(1) Std. Conditions: 14.7 psia and 68°F
(2) Fraction/Day is defined as fraction of drywell volume leakage/day per line under test conditions.
(3) Test Conditions: Air medium: 40 psig and 80°F
(4) The leak rate is based on ASME Section XI (Subsection IWV-3426) applied to each valve, except for main steal lines and feedwater lines.
(5) Fraction/Day is defined as fraction of drywell volume leakage/day under LOCA conditions.
(6) Leak rate is defined as a fraction of entire primary containment volume under LOCA conditions.
(7) All these paths terminate at 2GSN-TK2 within the reactor building and only one line goes out of the reactor building.
(8) Leak Rate (Fraction/Day) is defined as a fraction of the suppression chamber volume under test conditions.
(9) Fraction/Day is defined as a fraction of the suppression chamber volume under LOCA conditions.

Line Description	Termination Region	Bypass Leakage Barrier	Leak Rate(3) Tech Spec SCFH(1,4)	Fraction/ Day(2)	Containment Bypass Leak Rate (Fraction/Day)(5) 0-2 hr	0-8 hr	8-24 hr	1-4 day	4-30 day
Inst. air to ADS accumulators	yard	1-1 1/2" check valve	.9375	$.217 \times 10^{-4}$	$.317 \times 10^{-4}$	$.286 \times 10^{-4}$	$.277 \times 10^{-4}$	$.249 \times 10^{-4}$	$.172 \times 10^{-4}$
Inst. air to ADS accumulators	yard	1-1 1/2" check valve	.9375	$.217 \times 10^{-4}$	$.317 \times 10^{-4}$	$.286 \times 10^{-4}$	$.277 \times 10^{-4}$	$.249 \times 10^{-4}$	$.172 \times 10^{-4}$

(1) Std. Conditions: 14.7 psia and 68°F
(2) Fraction/Day is defined as fraction of drywell volume leakage/day per line under test conditions.
(3) Test Conditions: Air medium: 40 psig and 80°F
(4) The leak rate is based on ASME Section XI (Subsection IWV-3426) applied to each valve, except for main steal lines and feedwater lines.
(5) Fraction/Day is defined as fraction of drywell volume leakage/day under LOCA conditions.
(6) Leak rate is defined as a fraction of entire primary containment volume under LOCA conditions.
(7) All these paths terminate at 2GSN-TK2 within the reactor building and only one line goes out of the reactor building.
(8) Leak Rate (Fraction/Day) is defined as a fraction of the suppression chamber volume under test conditions.
(9) Fraction/Day is defined as a fraction of the suppression chamber volume under LOCA conditions.

Line Description	Termination Region	Bypass Leakage Barrier	Leak Rate[3] Tech Spec SCFH[1,4]	Leak Rate[3] Fraction/Day[2]	Containment Bypass Leak Rate (Fraction/Day)[5] 0-2 hr	0-8 hr	8-24 hr	1-4 day	4-30 day
Inst. air to SRV accumulators	Yard	1-1/2" SOV							
Inst. air to drywell	yard	1-1 1/2" SOV							
Inst. air to drywell	yard	1-1 1/2" SOV							
Inst. air to CPS valve in supp. chamber	yard	1-1 1/2" check valve	Combined leakage 3.6[7]	(8) $.124\times10^{-3}$	(9) $.189\times10^{-3}$	(9) $.175\times10^{-3}$	(9) 1.70×10^{-3}	(9) $.160\times10^{-3}$	(9) $.126\times10^{-3}$
Inst. air to CPS valve in supp. chamber	yard	1-1 1/2" check valve							
N_2 purge to TIP index mechanism	yard	1-1/2" check valve							

(1) Std. Conditions: 14.7 psia and 68°F
(2) Fraction/Day is defined as fraction of drywell volume leakage/day per line under test conditions.
(3) Test Conditions: Air medium: 40 psig and 80°F
(4) The leak rate is based on ASME Section XI (Subsection IWV-3426) applied to each valve, except for main steal lines and feedwater lines.
(5) Fraction/Day is defined as fraction of drywell volume leakage/day under LOCA conditions.
(6) Leak rate is defined as a fraction of entire primary containment volume under LOCA conditions.
(7) All these paths terminate at 2GSN-TK2 within the reactor building and only one line goes out of the reactor building.
(8) Leak Rate (Fraction/Day) is defined as a fraction of the suppression chamber volume under test conditions.
(9) Fraction/Day is defined as a fraction of the suppression chamber volume under LOCA conditions.

Line Description	Termination Region	Bypass Leakage Barrier	Leak Rate[3] Tech Spec SCFH[1,4]	Leak Rate[3] Fraction/Day[2]	0-2 hr	Containment Bypass Leak Rate (Fraction/Day)[5] 0-8 hr	8-24 hr	1-4 day	4-30 day
Inst. air to ADS accumulators	yard	1-1 1/2" check valve	.9375	$.217\times10^{-4}$	$.331\times10^{-4}$	$.307\times10^{-4}$	$.298\times10^{-4}$	$.282\times10^{-4}$	$.221\times10^{-4}$
Inst. air to ADS accumulators	yard	1-1 1/2" check valve	.9375	$.217\times10^{-4}$	$.331\times10^{-4}$	$.307\times10^{-4}$	$.298\times10^{-4}$	$.282\times10^{-4}$	$.221\times10^{-4}$

(1) Std. Conditions: 14.7 psia and 68°F
(2) Fraction/Day is defined as fraction of drywell volume leakage/day per line under test conditions.
(3) Test Conditions: Air medium: 40 psig and 80°F
(4) The leak rate is based on ASME Section XI (Subsection IWV-3426) applied to each valve, except for main steal lines and feedwater lines.
(5) Fraction/Day is defined as fraction of drywell volume leakage/day under LOCA conditions.
(6) Leak rate is defined as a fraction of entire primary containment volume under LOCA conditions.
(7) All these paths terminate at 2GSN-TK2 within the reactor building and only one line goes out of the reactor building.
(8) Leak Rate (Fraction/Day) is defined as a fraction of the suppression chamber volume under test conditions.
(9) Fraction/Day is defined as a fraction of the suppression chamber volume under LOCA conditions.

TABLE 6.2-56 (Cont)

b. The system leakage boundary piping/components are designed in accordance with Quality Group B standards as defined by Regulatory Guide 1.26.

c. The system leakage boundary is designed to meet Seismic Category I design requirements.

d. The system leakage boundary is designed to at least the primary containment pressure and temperature design conditions.

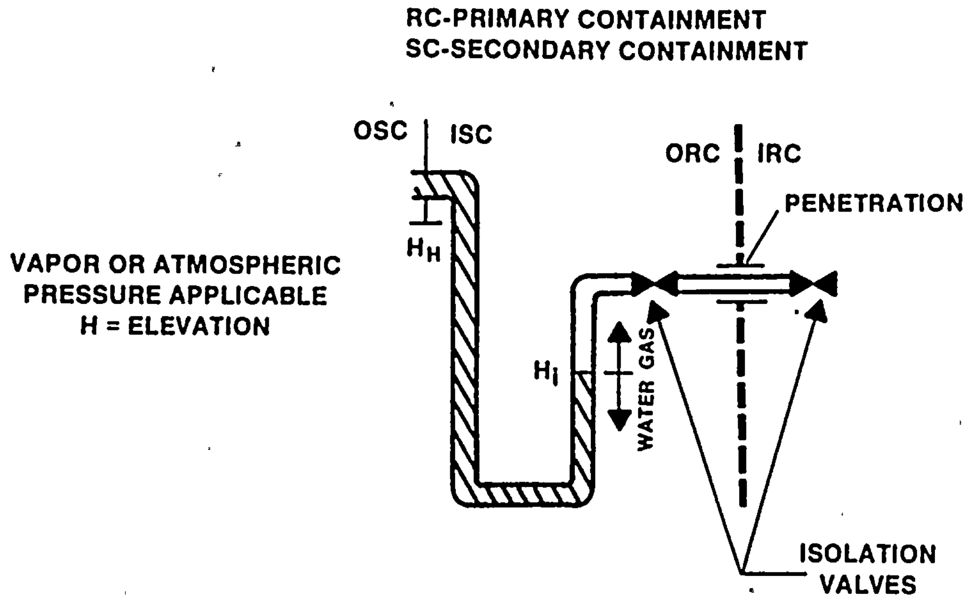
e. The system leakage boundary is designed for protection against pipe whip, missiles, and jet forces in a manner similar to that for engineered safety features.

f. The system leakage boundary is tested for leakage, unless system integrity is demonstrated to be maintained during normal plant operations.

(30) This line/path is excluded from further consideration as a potential bypass leakage path, because a water seal is provided to prevent leakage from bypassing the secondary containment. There is sufficient fluid available to maintain the seal for at least 30 days following a loss-of-coolant accident (see Section 6.2.3.2.3 for seal details).

(31) This line/path is excluded from further consideration as a potential bypass leakage path because (per Branch Technical Position CSB 6-3, Section A) leakage from the primary containment cannot circumvent the secondary containment boundary and escape directly to the environment; that is, leakage cannot bypass the leakage collection and filtration systems of the secondary containment. Filtration of leakage is assured, because either the piping terminates in the secondary containment or leakage is directly routed to the filtration systems.

(32) In addition to a swing check valve inside containment and a positive acting check valve outside containment, similar to an Atwood-Morrill boiler feed check valve as described in Catalog 63, Section I, a third valve with high leak-tight integrity will be provided in each line outside containment. The spring-loaded piston operator of the positive acting check valve will be held open by



LOOP SEAL

FIGURE 6.2-88

TYPICAL WATER LOOP SEAL

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NINE MILE POINT-UNIT 2
FINAL SAFETY ANALYSIS REPORT

b. Feedwater line
c. Post-accident sampling lines (4)
d. Main steam drain lines (2)
e. Reactor water cleanup line
f. Drywell equipment drain and vent lines (2)
g. Drywell floor drain and vent lines (2)
h. Primary containment purge lines (4)
i. Primary containment purge lines (2)
   Instrument air lines (3)
   Nitrogen inerting system line (1)
j. Instrument air lines to ADS valve accumulators (2)

Section 6.2.3 describes in detail the two methods used to determine the leak rates through the isolation valve(s) for each path. These two methodologies, one considering an isothermal flow process and the other considering an isentropic flow process, define the two separate approaches to the flow design basis analysis.

Using the leak rate data from Tables 6.2-55a and 6.2-55b, a prerelease holdup time is calculated for each bypass leakage path using the slug-flow method. The slug-flow method assuems that the

	Design Basis Assumptions: Isentropic Case		Design Basis Assumptions: Isothermal Case		Realistic Basis Assumptions
Iodine concentration ratios	0-8 hr	0.0	0-8 hr	0.0	0.0
	8-24 hr	0.0	8-24 hr	0.0	0.0
	24-24.37 hr	0.0	24-31.74 hr	0.0	0.0
	24.37-96 hr	0.273	31.74-96 hr	0.255	0.0
	96-720 hr	0.04	96-720 hr	0.047	0.0
Pipe inside diameter (actual/design basis)	25.23 in/25.23 in		25.23 in/25.23 in		N/A
Pipe length (actual/design basis)	508 ft/312 ft		508 ft/312 ft		N/A
Deposition surface (actual/design basis)	3,355 ft^2/2,060 ft^2		3,355 ft^2/2,060 ft^2		N/A
Temperature transient - pipe inside surface	0-1 day 450°F		0-1 day 450°F		N/A
	1-2 day 450-350°F		1-2 day 450-350°F		
	2-3 day 350-250°F		2-3 day 350-250°F		
	3-4 day 250-120°F		3-4 day 350-120°F		
	4-30 day 120°F		4-30 day 120°F		
c. Inboard main steam drain line					
Bypass leakage rates (fraction of drywell volume per day) (main steam tunnel release)	0-2 hr	0.0(2)	0-2 hr	0.0(2)	0.0
	0-5.12 hr	0.0	0-5.51 hr	0.0	0.0
	5.12-8 hr	5.93-5	5.51-8 hr	5.44-5	0.0
	8-24 hr	5.97-5	8-24 hr	5.55-5	0.0
	24-96 hr	5.64-5	24-96 hr	4.97-5	0.0
	96-720 hr	4.42-5	96-720 hr	3.44-5	0.0
Iodine concentration ratios	0-5.12 hr	0.0	0-5.51 hr	0.0	0.0
	5.12-720 hr	0.04	5.51-720 hr	0.04	0.0
Pipe inside diameter (actual/design basis)	5.761 in/5.761 in		5.761 in/5.761 in		N/A
Pipe length (actual/design basis)	84.3 ft/84.0 ft		84.3 ft/84.0 ft		N/A
Deposition surface (actual/design basis)	127 ft^2/127 ft^2		127 ft^2/127 ft^2		N/A
Temperature transient - pipe inside surface	0-720 hr 120°F		0-720 hr 120°F		N/A

	Design Basis Assumptions				Realistic Basis Assumptions
	Isentropic Case		Isothermal Case		
d. Four post accident sampling lines					
Bypass leakage rates	0-2 hr	3.31-5(2)	0-2 hr	3.17-5(2)	0.0
(fraction of drywell volume per day)	0-8 hr	3.07-5	0-8 hr	2.86-5	0.0
(PASS panel release)	8-24 hr	2.98-5	8-24 hr	2.77-5	0.0

	Design Basis Assumptions(5)		Realistic Basis Assumptions
p. 3 instrument air lines 2 CPS lines 1 GSN line			
Bypass leakage rate (fraction of primary containment volume per day) (SGTS building release)	0-1 hr	0.0	NA
	1-8 hr	1.71-4	NA
	8-24 hr	1.70-4	NA
Iodine concentration factor	24-96 hr	1.60-4	NA
	96-720 hr	1.26-4	NA
	0-1 hr	0.0	NA
	1-720 hr	0.04	NA
Pipe inside diameter (actual design basis)	2.469"/2.469"		
Pipe lengths (actual/design basis)	223'/223'		
Deposition surface (actual/design basis)	144 ft^2/144 ft^2		
Temperature transient - pipe inside surface	120°F		
q. 2 instrument air lines to ADS accumulation	0-.64 hr	0.0	NA
	.64-8 hr	6.06-5	NA
Bypass leakage rate (fraction of primary containment volume per day)	8-24 hr	5.96-5	NA
	24-96 hr	5.64-5	NA
(SGTS building release)	96-720 hr	4.42-5	NA
Iodine concentration factor	0-.64 hr	0.0	
	.64-720 hr	0.04	

	Bypass Path Pen Z53A	Bypass Path Pen Z53B
Pipe inside diameter (actual/design basis)	1.049"/1.049"	1.049"/1.049"
Pipe lengths (actual/design basis)	225'/225'	219'/219'
Deposition surface (actual/design basis)	62 ft^2/62 ft^2	60 ft^2/60 ft^2
Temperature transient pipe inside surface	120°F	120°F

	Design Basis Assumptions(5)	Realistic Basis Assumptions
r. Containment leakage rate (main stack release)	1.1% per day of primary containment volume for duration of accident	1.1% per day of primary containment volume for duration of accident
s. Transfer incore probe leakage rate (main stack release from t = 129s to t = 720 hr) (radwaste/reactor building vent release from t = 0 to t = 129s)	0.21% per day of primary containment volume for duration of accident	N/A
t. Reactor building leak rate (main stack release)	3,500 cfm through standby gas treatment (SGTS)	3,500 cfm through SGTS
u. Percentage mixing in reactor building air	50%	50%
v. Reactor building pressurization time (radwaste/reactor building vent release)	129 sec	129 sec
w. SGTS halogen filtration efficiency	99%	99%
x. ESF leakage to reactor building (main stack release)		
(1) Leak rate	1 gpm	0.0
(2) Iodine partition factor (air/water)	0.1	0.0
3. All other pertinent data		
a. Primary containment		
(1) Drywell free air volume	2.85+5 ft^3	N/A
(2) Primary containment free air volume	4.73+5 ft^3	4.73+5 ft^3
(3) Suppression pool volume	1.45+5 ft^3	N/A
b. Reactor building		
(1) Free air volume	3.88+6 ft^3	3.88+6 ft^3

	Design Basis Assumptions(5)	Realistic Basis Assumptions
c. Control room		
(1) Free air volume	3.81+5 ft^3	3.81+05 ft^3
(2) Intake rate	1.50+3 cfm	1.50+3 cfm
(3) Recirculation rate	7.50+2 cfm	7.50+2 cfm
(4) Intake/recirculation halogen filtration efficiency	99%	99%
4. Dispersion data (s/m^3)		
a. Stack		
0-2 hr FAB	2.97-5	1.16-7
0-8 hr LPZ	1.03-5	4.32-7
8-24 hr LPZ	8.85-7	3.21-7
24-96 hr LPZ	3.66-7	1.69-7
96-720 hr LPZ	1.03-7	6.73-8
0-8 hr control room	8.10-5	8.10-5
8-24 hr control room	2.44-8	2.44-8
24-96 hr control room	2.10-8	2.10-8
96-720 hr control room	1.69-8	1.69-8
b. Radwaste/reactor building vent(4)		
0-2 hr FAB	1.90-4	2.19-5
0-8 hr LPZ	1.78-5	6.48-6
8-24 hr LPZ	1.19-5	N/A
24-96 hr LPZ	4.93-6	N/A
96-720 hr LPZ	1.40-6	N/A
0-8 hr control room	2.13-4	2.13-4
8-24 hr control room	1.66-4	N/A
24-96 hr control room	9.88-5	N/A
96-720 hr control room	4.70-5	N/A

	Design Basis Assumptions(5)		Realistic Basis Assumptions
c. Main steam tunnel			
0-2 hr FAB	1.90-4	N/A	
0-8 hr LPZ	1.78-5	N/A	
8-24 hr LPZ	1.19-5	N/A	
24-96 hr LPZ	4.93-6	N/A	
96-720 hr LPZ	1.40-6	N/A	
0-8 hr control room	1.29-3	N/A	
8-24 hr control room	9.90-4	N/A	

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TABLE 15.6-15b

LOSS-OF-COOLANT ACCIDENT (DESIGN BASIS ANALYSIS)
ACTIVITY RELEASE TO ENVIRONMENT* (ISENTROPIC APPROACH)

(Ci)

Isotope	Activity
I-129	2.60-2
I-131	2.88+5
I-132	2.57+3
I-133	6.30+4
I-134	2.11+3
I-135	1.31+4
I-136	4.44+2
Br-83	2.18+2
Br-84	1.72+2
Br-85	1.50+2
Br-87	1.62+2
Kr-83m	4.05+4
Kr-85m	8.44+4
Kr-85	3.94+5
Kr-87	9.69+4
Kr-88	1.74+5
Kr-89	1.17+5
Xe-131m	1.88+5
Xe-133m	4.28+5
Xe-133	2.20+7
Xe-135m	1.35+6
Xe-135	8.76+5
Xe-137	2.62+5
Xe-138	2.98+5
Total	2.67+7

*Total release for 30 days.

TABLE 15.6-16b

LOSS-OF-COOLANT ACCIDENT (DESIGN BASIS ANALYSIS)
RADIOLOGICAL EFFECTS (ISENTROPIC APPROACH)

	Whole-Body Dose (rem)	Thyroid Dose (rem)	Beta Dose (rem)
Exclusion area (2 hr)	5.0	90.2	3.6
Low-population zone (30-day)	2.5	74.4	1.9
Control room (30-day)	1.6	29.5	21.8

ATTACHMENT 2

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ATTACHMENT 3

T3.6.1.2-1 (continued)

Allowable Leak Rates Through Valves in Potential Bypass Leakage Paths

Line Description	Valve Mark No.	Termination Region	Per Valve* Leak Rate, SCFH
Inst. Air to ADS Valve Accumulator	IAS*SOV164 IAS*V448	Yard Area	0.9375
Inst. Air to ADS Valve Accumulator	IAS*SOV165 IAS*V449	Yard Area	0.9375
N_2 Purge to TIP Index Mechanism	GSN*SOV166 GSN*V170	Yard Area	**
Inst. Air to SRV Accumulator	IAS*SOV166 IAS*SOV184	Yard Area	**
Inst. Air to Drywell	IAS*SOV167 IAS*SOV185	Yard Area	**
Inst. Air to Drywell	IAS*SOV168 IAS*SOV180	Yard Area	**
Inst. Air to CPS Valve in Suppression Chamber	CPS*SOV132 CPS*V50	Yard Area	**
Inst. Air to CPS Valve in Suppression Chamber	CPS*SOV133 CPS*V51	Yard Area	**

* Test Conditions - Air Medium, 40 PSIG

** The combined leakage of these six penetrations shall not exceed 3.6 SCFM. The leakage through each penetration shall be that of the valve with the highest rate in that penetration.

SUMMARY

Due to the design of the Posi-Seal butterfly valve with the disc being asymmetrical, flow in the preferred direction tends to close the valve. In the nonpreferred direction the disc tends to stay in the open position until it reaches an angle of approximately 75 degrees open, then tends to close. The preferred direction is with the stem side of the disc upstream and the retaining ring downstream. See Figure 1 on Page 2.

Per Reference (1) all the subject valves will be installed in the preferred direction based on the flow going from containment to outside containment.

If a Loss of Coolant Accident (LOCA) does occur, the scenario given below describes what effect the large flows resulting from the LOCA will have on the subject valves.

A. <u>If all the subject valves are fully open</u>

All the valves will close. However, for valves AOV 105, 107, 109, 110 and 111 due to the torque resulting from a LOCA, the disc pins will be overstressed, possible resulting in the valve not properly seating.

It should be noted that all the valves except AOV 104 and 105 will partially close prior to receiving the signal to close.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
Niagara Mohawk Power Corporation	)	Docket No. 50-410
(Nine Mile Point Unit 2)	)	

AFFIDAVIT

C. V. Mangan, being duly sworn, states that he is Senior Vice President of Niagara Mohawk Power Corporation; that he is authorized on the part of said Corporation to sign and file with the Nuclear Regulatory Commission the documents attached hereto; and that all such documents are true and correct to the best of his knowledge, information and belief.

CVMangan

Subscribed and sworn to before me, a Notary Public in and for the State of New York and County of Onondaga, this 13th day of June, 1986.

Janis M. Macro
Notary Public in and for
Onondaga County, New York

My Commission expires:

JANIS M. MACRO
Notary Public in the State of New York
Qualified in Onondaga County No. 4784555
~~My Commission Expires March 30, 1987~~

TABLE 6.2-56 (Cont)

Penetration No.	System Designation	GDC or Reg. Guide	ESF System	Fluid	Size (in)	FSAR Arrangement Figure(1)	Location of Valve Inside/Outside Primary Containment	Length of Pipe - Containment to Outside Isolation Valve	Type Test (1)	Potential Bypass Leakage Path	Valve(9) Number SWEC	Number GE	Type	Operator	Actuator Mode Primary	Actuator Mode Secondary	Position Normal (3)	Position Shutdown	Position Post-Accident	Position Power Failure(10)	Isolation Signal (4)	Closure Time (5,6)	Power Source (7)	Notes
Z-4A	Feedwater line A to RPV	55	No	Water	24	6.2-70 Sh. 3	Outside	2'-1"	C	Yes	2FWS*AOV23A	B22-F032A	Swing Check	AOV	Process	Spring (test only)	Open	Closed	Closed	N/A	Reverse flow	The time it takes for one valve volume to pass through the valve	N/A	11,32
							Inside		C		2FWS*V12A	B22-F010A	Swing Check	N/A	Process	N/A	Open	Closed	Closed	N/A	Reverse flow			
							Outside	16'-4"	C		2FWS*MOV21A	B22-F065A	Gate	MOV	Elec.	Manual	Open	Closed	Closed	FAI	RM	N/A	Div I	
				Water	8	6.2-70 Sh. 3	Outside	[illegible]'-8"	C		2WCS*MOV200	G33-F040	Globe	MOV	Elec.	Manual	Open	Open	Closed	FAI	RM	N/A	Div I	
Z-4B	Feedwater line B to RPV	55	No	Water	24	6.2-70 Sh. 3	Inside		C	Yes	2FWS*V12B	B22-F010B	Swing Check	N/A	Process	N/A	Open	Closed	Closed	N/A	Reverse flow	The time it takes for one valve volume to pass through the valve	N/A	11,32
							Outside	2'-1"	C		2FWS*AOV23B	B22-F032B	Swing Check	AOV	Process	Spring (test only)	Open	Closed	Closed	N/A	Reverse flow			
							Outside	16'-4"	C		2FWS*MOV21B	B22-F065B	Gate	MOV	Elec.	Manual	Open	Closed	Closed	FAI	RM	N/A	Div II	
				Water	8	6.2-70 Sh. 3	Outside	65'-8"	C		2WCS*MOV200	G33-F040	Globe	MOV	Elec.	Manual	Open	Open	Closed	FAI	RM	N/A	Div I	
Z-5A	RHS Pump A suction from suppression pool	56	Yes	Water	24	6.2-70 Sh. 4	Outside	5'-6"	C	No(29)	2RHS*MOV1A	E12-F004A	Tricentric butterfly	MOV	Elec.	Manual	Open	Closed	Open	FAI	RM	45	Div I	13
Z-5B	RHS Pump B suction from suppression pool	56	Yes	Water	24	6.2-70 Sh. 4	Outside	20'-9"	C	No(29)	2RHS*MOV1B	E12-F004B	Tricentric butterfly	MOV	Elec.	Manual	Open	Closed	Open	FAI	RM	45	Div II	13
Z-5C	RHS Pump C suction from suppression pool	56	Yes	Water	24	6.2-70 Sh. 4	Outside	9'-9"	C	No(29)	2RHS*MOV1C	E12-F004C	Tricentric butterfly	MOV	Elec.	Manual	Open	Closed	Open	FAI	RM	45	Div II	13
Z-6A	RHS test line Loop B to suppression pool	56	Yes	Water	18	6.2-70 Sh. 6	Outside	[illegible]-3"	C	No(29)	2RHS*MOV30B	E12-F201B	Tricentric butterfly	MOV	Elec.	Manual	Open	Closed	Open	FAI	RM	85	Div I	15

TABLE 6.2-56 (Cont)

Pene-tration No.	System Designation	GDC or Reg. Guide	ESF System	Fluid	Size (in)	FSAR Arrange-ment Figure(1)	Location of valve Inside/Outside Primary Contain-ment	Length of Pipe - Con-tainment to Outside Isolation Valve	Type Test (1)	Potential Bypass Leakage Path	Valve(9) Number SWEC	Number GE	Type	Oper-ator	Actuator Mode Primary	Actuator Mode Secondary	Position Normal (3)	Position Shutdown	Position Post-Accident	Position Power Failure (10)	Isola-tion Signal (4)	Closure Time (5,6)	Power Source (7)	Notes
Z-21A	Steam to ICS turbine and RHS heat exchangers	55	Yes	Steam	10	6.2-70 Sh. 16	Outside	0'-9"	C	No(29)	2ICS*MOV121	E51-F064	Gate	MOV	Elec.	Manual	Open	Closed	Open	FAI	M,BB,CC, DD,K,H,RM	14	Div I	
							Inside		C		2ICS*MOV128	E51-F063	Gate	MOV	Elec.	Manual	Open	Closed	Open	FAI	M,BB,CC, DD,K,H,RM	14	Div. II	
	ICS turbine steam supply bypass to inboard isolation valve			Steam			Inside		C	No(29)	2ICS*MOV170	E51-F076	Globe	MOV	Elec.	Manual	Closed	Closed	Closed	FAI	M,BB,CC, DD,K,H,RM	5	Div. II	
Z-21B	Spare		No		4				A															
Z-22	ICS to RPV	55	Yes	Water	6	6.2-70 Sh. 17	Outside	0'-6"	C	No(29)	2ICS*AOV156	E51-F065	Check	AOV	Process	Air (Test only)	Closed	Open	Open	Closed	Rev flow	N/A	125VDC	
							Inside		C		2ICS*AOV157	E51-F066	Check	AOV	Process	Air (Test only)	Closed	Open	Open	Closed	Rev flow	N/A	125VDC	
							Outside	4'-3"	C		2ICS*MOV126	E12-F013	Gate	MOV	Elec.	Manual	Closed	Closed	Open	FAI	RM	12		
	RHR reactor head spray			Water	6	6.2-70 Sh. 17	Outside	29'-5	C		2RHS*MOV104	E12-F023	Globe	MOV	Elec.	Manual	Closed	Open	Closed	FAI	A,L,M,CC RM,DD	32	Div I	
Z-23	WCS supply from RCS & RPV	55	No	Water	8	6.2-70 Sh. 18	Inside		C	Yes	2WCS*MOV102	G33-F001	Globe	MOV	Elec.	Manual	Open	Open	Closed	FAI	B,J,U,S,RM,DD	13	Div II	
				Water	8		Outside	1'-3"	C		2WCS*MOV112	G33-F004	Globe	MOV	ELec.	Manual	Open	Open	Closed	FAI	B,J,U,S,W, RM,DD	12	Div I	
Z-24	Spare		No		3				A															
Z-25	RDS lines to RPV 53 Insert 53 Withdrawal		Yes	Water	1 3/4	N/A	Outside Outside	125'-0" 125'-0"		No(29)							See Note 17							
Z-26	RDS lines to RPV 39 Insert 39 Withdrawal		Yes	Water	1 3/4	N/A	Outside Outside	125'-0" 125'-0"		No(29)							See Note 17							
Z-27	RDS lines to RPV 54 Insert 54 Withdrawal		Yes	Water	1 3/4	N/A	Outside Outside	125'-0" 125'-0"		No(29)							See Note 17							

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TABLE 6.2-56 (Cont)

Penetration No.	System Designation	GDC or Reg. Guide	ESF System	Fluid	Size (in)	FSAR Arrangement Figure(1)	Location of valve Inside/Outside Primary Containment	Length of Pipe - Containment to Outside Isolation Valve	Type Test (1)	Potential Bypass Leakage Path	Valve(9) Number SWEC	Number GE	Type	Operator	Actuator Mode Primary	Actuator Mode Secondary	Position Normal (3)	Position Shutdown	Position Post-Accident	Position Power Failure (10)	Isolation Signal (4)	Closure Time (5,6)	Power Source (7)	Notes
Z-28	RDS lines to RPV 39 Insert 39 Withdrawal		Yes	Water	1 3/4	N/A	Outside Outside	125'-0" 125'-0"		No(29)							See Note 17							
Z-29	SLCS to RPV	55	Yes	Boron solution	1 1/2	6.2-70 Sh. 43	Inside Outside Outside	 2'-10" 3'-10"	C C C	No(31)	2SLS*V10 2SLS*MOV5A 2SLS*MOV5B	C41-F007 C41-F006A C41-F006B	Check Stop check globe Stop check globe	N/A MOV MOV	Process Elec. Elec.	N/A Manual Manual	Closed Closed Closed	Closed Closed Closed	Closed Closed Closed	N/A Closed Closed	Reverse flow Reverse flow Reverse flow	N/A N/A N/A	N/A N/A N/A	
Z-30A	Spare		No		3				A															
Z-30B	Spare		No		3				A															
Z-31A	TIP drive guide tube to RPV	57	No	Note 19	1 1/2	6.2-70 Sh. 19	Outside Outside	2'-4"	C C	No(31)	N/A N/A	C51-J004 C51-J004	Ball Shear	SOV N/A	Elec. N/A	N/A N/A	Closed Open	Closed Open	Closed Open	Closed Open	B,F,RM RM	N/A N/A	120 VAC 125 VDC	18, 19, 28, 34
Z-31B	TIP drive guide tube to RPV	57	No	Note 19	1 1/2	6.2-70 Sh. 19	Outside Outside	5'-4"	C C	No(31)	N/A N/A	C51-J004 C51-J004	Ball Shear	SOV N/A	Elec. N/A	N/A N/A	Closed Open	Closed Open	Closed Open	Closed Open	B,F,RM RM	N/A N/A	120 VAC 125 VDC	18,19 28,34
Z-31C	TIP drive guide tube to RPV	57	No	Note 19	1 1/2	6.2-70 Sh. 19	Outside Outside	2'-4"	C C	No(31)	N/A N/A	C51-J004 C51-J004	Ball Shear	SOV N/A	Elec. N/A	N/A N/A	Closed Open	Closed Open	Closed Open	Closed Open	B,F,RM RM	N/A N/A	120 VAC 125 VDC	18,19 28,34
Z-31D	TIP drive guide tube to RPV	57	No	Note 19	1 1/2	6.2-70 Sh.19	Outside Outside	2'-4"	C C	No(31)	N/A N/A	C51-J004 C51-J004	Ball Shear	SOV N/A	Elec. N/A	N/A N/A	Closed Open	Closed Open	Closed Open	Closed Open	B,F,RM RM	N/A N/A	120 VAC 125 VDC	18,19 28,34
Z-31E	TIP drive guide tube to RPV	57	No	Note 19	1 1/2	6.2-70 Sh. 19	Outside Outside	2'-7"	C C	No(31)	N/A N/A	C51-J004 C51-J004	Ball Shear	SOV N/A	Elec. N/A	N/A N/A	Closed Open	Closed Open	Closed Open	Closed Open	B,F,RM RM	N/A N/A	120 VAC 125 VDC	18,19, 28,34
Z-32	N_2 purge to TIP index mechanism	56	No	N_2	1	6.2-70 Sh.42	Outside Inside	7'-2" -	C C	yes	2GSN*SOV166 2GSN*V170		Globe Check	SOV N/A	Elec Process	N/A N/A	Open Open	Closed Closed	Closed Closed	N/A N/A	B,F,RM Reverse flow	N/A N/A	120 VAC N/A	
Z-33A	CCP supply to RCS Pump A	56	No	Water	4	6.2-70 Sh. 20	Inside Outside	[illegible]"	C	No(31)	2CCP*MOV94A 2CCP*MOV17A	- -	Gate Gate	MOV MOV	Elec. Elec.	Manual Manual	Open Open	Open Open	Closed Closed	FAI FAI	B,F,RM B,F,RM	20 20	Div II Div I	6

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Pene-tration No.	System Designation	GDC or Reg. Guide	ESF System	Fluid	Size (in)	FSAR Arrange-ment Figure(1)	Location of valve Inside/Outside Primary Contain-ment	Length of Pipe - Con-tainment to Outside Isolation Valve	Type Test (1)	Potential Bypass Leakage Path(2)	Valve(9) Number SWEC	Number GE	Type	Oper-ator	Actuator Mode Primary	Actuator Mode Secondary	Position Normal (3)	Position Shutdown	Position Post-Accident	Position Power Failure(10)	Isolation Signal (4)	Closure Time (5,6)	Power Source (7)	Notes
Z-33B	CCP to RCS Pump B	56	No	Water	4	6.2-70 Sh. 20	Inside		C	No(31)	2CCP*MOV94B	-	Gate	MOV	Elec.	Manual	Open	Open	Closed	FAI	B,F,RM	20	Div II	
							Outside	7'-0"	C		2CCP*MOV17B	-	Gate	MOV	Elec.	Manual	Open	Open	Closed	FAI	B,F,RM	20	Div I	
							Inside		N/A		2CCP*RV170	-	Relief	N/A	Auto	N/A	Closed	Closed	Closed	N/A	N/A	N/A	N/A	
Z-34A	CCP return from RCS Pump A	56	No	Water	4	6.2-70 Sh. 21	Inside		C	No(31)	2CCP*MOV16A	-	Gate	MOV	Elec.	Manual	Open	Open	Closed	FAI	B,F,RM	20	Div II	
							Outside	7'-0"	C		2CCP*MOV15A	-	Gate	MOV	Elec.	Manual	Open	Open	Closed	FAI	B,F,RM	20	Div I	
Z-34B	CCP return from RCS Pump B	56	No	Water	4	6.2-70 Sh. 21	Inside		C	No(31)	2CCP*MOV16B	-	Gate	MOV	Elec.	Manual	Open	Open	Closed	FAI	B,F,RM	20	Div II	
							Outside	7'-0"	C		2CCP*MOV15B	-	Gate	MOV	Elec.	Manual	Open	Open	Closed	FAI	B,F,RM	20	Div I	
							Inside		N/A		2CCP*RV171	-	Relief	N/A	Auto	N/A	Closed	Closed	Closed	N/A	N/A	N/A	N/A	
Z-35	Spare				4				A															
Z-36	Service air to drywell	56	No	Air	2	6.2-70 Sh. 22	Outside	0'-7"	C	No(31)	2SAS*HCV161	-	Globe	Manual	Manual	N/A	Closed	Open	Closed	N/A	LMC,LC	N/A	Div I	
							Inside				2SAS*HCV163	-	Globe	Manual	Manual	N/A	Closed	Open	Closed	N/A	LMC,LC	N/A	Div II	
Z-37	Breathing air to drywell	56	No	Air	2	6.2-70 Sh. 22	Outside	0'-7"	C	No(31)	2AAS*HCV134	-	Globe	Manual	Manual	N/A	Closed	Open	Closed	N/A	LMC,LC	N/A	Div I	
							Inside		C		2AAS*HCV136	-	Globe	Manual	Manual	N/A	Closed	Open	Closed	N/A	LMC,LC	N/A	Div II	
Z-38A	RDS to recirc pump A seal	55	No	Water	3/4	6.2-70 Sh. 23	Inside		C	No(29)	2RCS*V60A	B35-F013A	Check	N/A	Process	N/A	Open	Closed	Closed	N/A	Reverse flow	N/A	N/A	
							Outside	0'-0"	C		2RCS*V90A	B35-F009A	Check	N/A	Process	N/A	Open	Closed	Closed	N/A	Reverse flow	N/A		
							Outside	33'-0"	C		2RCS*V59A	B35-F017A	Check	N/A	Process	N/A	Open	Closed	Closed	N/A	Reverse flow	N/A		
Z-38B	RDS to recirc Pump A seal	55	No	Water	3/4	6.2-70 Sh. 23	Inside		C	No(29)	2RCS*V60B	B35-F013B	Check	N/A	Process	N/A	Open	Closed	Closed	N/A	Reverse flow	N/A	N/A	
							Outside	0'-0"	C		2RCS*V90B	B35-F009B	Check	N/A	Process	N/A	Open	Closed	Closed	N/A	Reverse flow	N/A		
							Outside	31'-0"	C		2RCS*V59B	B35-F017B	Check	N/A	Process	N/A	Open	Closed	Closed	N/A	Reverse flow	N/A		
Z-39	Floor drains from drywell	56	No	Air	6	6.2-70 Sh. 24	Inside		C	Yes	2DFR*MOV121	-	Gate	MOV	Elec.	Manual	Open	Closed	Closed	FAI	B,F,RM	28	Div II	
							Outside	1'-6"	C		2DFR*MOV120	-	Gate	MOV	Elec.	Manual	Open	Closed	Closed	FAI	B,F,RM	28	Div I	
Z-40	Equipment drains from drywell	56	No	Water	4	6.2-70 Sh. 24	Inside		C		2DER*MOV119	-	Gate	MOV	Elec.	Manual	Open	Closed	Closed	FAI	B,F,RM	22	Div II	
							Outside	4'-2"	C	Yes	2DER*MOV120	-	Gate	MOV	Elec.	Manual	Open	Closed	Closed	FAI	B,F,RM	22	Div I	

Penetration No.	System Designation	GDC or Reg. Guide	ESF System	Fluid	Size (in)	FSAR Arrangement Figure(1)	Location of valve Inside/ Outside Primary Containment	Length of Pipe - Containment to Outside Isolation Valve	Type Test (1)	Potential Bypass Leakage Path	Valve(9) Number SWEC	Number GE	Type	Operator	Actuator Mode Primary	Actuator Mode Secondary	Position Normal (3)	Position Shutdown	Position Post-Accident	Position Power Failure(10)	Isolation Signal (4)	Closure Time (5,6)	Power Source (7)	Notes
Z-41	Reactor coolant recirc to sample cooler	55	No	Water	3/4	6.2-70 Sh. 25	Inside Outside	0'-0"	C C	No(31)	2RCS*SOV104 2RCS*SOV105	B35-F019 B35-F020	Globe Globe	SOV SOV	Elec. Elec.	N/A N/A	Closed Closed	Closed Closed	Closed Closed	Closed Closed	B,C,RM B,C,RM	N/A N/A	Div II Div I	
Z-42A	Fire protection for reactor recirc pump	56	No	Water	2	6.2-70 Sh. 26	Inside Outside	3'-0"	C C	No(31)	2FPW*SOV219 2FPW*SOV218	- -	Globe Globe	SOV SOV	Elec. Elec.	N/A N/A	Closed Closed	Closed Closed	Closed Closed	Closed Closed	B,F,RM B,F,RM	N/A N/A	Div II Div I	
Z-42B	Fire protection water for reactor recirc pump	56	No	Water	2	6.2-70 Sh. 26	Inside Outside	3'-0"	C C	No(31)	2FPW*SOV221 2FPW*SOV220	- -	Globe Globe	SOV SOV	Elec. Elec.	N/A N/A	Closed Closed	Closed Closed	Closed Closed	Closed Closed	B,F,RM B,F,RM	N/A N/A	Div II Div I	
[illegible]3	Drywell floor drain tank vent	56	No	Water	3	6.2-70 Sh. 27	Inside Outside	20'-10"	C C	Yes	2DFR*MOV140 2DFR*MOV139	- -	Gate Gate	MOV MOV	Elec. Elec.	Manual Manual	Open Open	Closed Closed	Closed Closed	FAI FAI	B,F,RM B,F,RM	13 13	Div II Div I	
Z-44A	Capped spare				3				A															
Z-44B	Capped spare				3				A															
Z-44C	Capped spare				3				A															
Z-44D	Capped spare				3				A															
Z-44E	Service air to drywell	56	No	Air	2	6.2-70 Sh. 22	Outside Inside	0'-5"	C C	No(31)	2SAS*HCV160 2SAS*HCV162	- -	Globe Globe	Manual Manual	Manual Manual	N/A N/A	Closed Closed	Open Open	Closed Closed	N/A N/A	LMC,LC LMC,LC	N/A N/A	Div I Div II	
Z-44F	Breathing air to drywell	56	No	Air	2	6.2-70 Sh. 22	Outside Inside	0'-5"	C C	No(31)	2AAS*HCV135 2AAS*HCV137	- -	Globe Globe	Manual Manual	Manual Manual	N/A N/A	Closed Closed	Open Open	Closed Closed	N/A N/A	LMC,LC LMC,LC	N/A N/A	Div I Div II	
Z-45	Equipment drain tank (2DER-TK1) vent to drywell	56	No	Air	2	6.2-70 Sh. 27	Inside Outside	0'-0"	C C	Yes	2DER*MOV130 2DER*MOV131	- -	Globe Globe	MOV MOV	Elec. Elec.	Manual Manual	Open Open	Closed Closed	Closed Closed	FAI FAI	B,F,RM B,F,RM	9 9	Div II Div I	
Z-46A	CCP supply to drywell space cooler	56	No	Water	8	6.2-70 Sh. 28	Inside Outside	7'-0"	C C	No(31)	2CCP*MOV273 2CCP*MOV265	- -	Gate Gate	MOV MOV	Elec. Elec.	Manual Manual	Open Open	Open Open	Closed Closed	FAI FAI	B,F,RM B,F,RM	36 38	Div II Div I	

TABLE 6.2-56 (Cont)

Pene-tration No.	System Designation	GDC or Reg. Guide	ESF System	Fluid	Size (in)	FSAR Arrange-ment Figure(1)	Location of valve Inside/Outside Primary Contain-ment	Length of Pipe - Con-tainment to Outside Isolation Valve	Type Test (1)	Potential Bypass Leakage Path	Valve(9) Number SWEC	Number GE	Type	Oper-ator	Actuator Mode Primary	Actuator Mode Secondary	Position Normal (3)	Position Shutdown	Position Post-Accident	Position Power Failure(10)	Isola-tion Signal (4)	Closure Time (5,6)	Power Source (7)	Notes
Z-46B	Capped spare				4				A															
Z-46C	Fire protection water for con-tainment hose reel standpipe						See Note 20			No(31)														
Z-46D	Capped spare				4				A															
Z-47	CCP return from drywell space cooler	57	No(31)	Water	8	6.2-70 Sh. 28	Inside		C	No(31)	2CCP*MOV122	-	Gate	MOV	Elec.	Manual	Open	Open	Closed	FAI	B,F,RM	38	Div II	
							Outside	7'-3"	C		2CCP*MOV124	-	Gate	MOV	Elec.	Manual	Open	Open	Closed	FAI	B,F,RM	36	Div I	
Z-48	Purge exhaust from drywell	56	No	Air	14	6.2-70 Sh. 29	Inside	-	C	No(31)	2CPS*AOV108	-	Butter-fly	AOV	Pneu-matic	Manual	Closed	Closed	Closed	Closed	B,F,Y,RM	5	Div II	21
							Outside	7'-4"	C		2CPS*AOV110	-	Butter-fly	AOV	Pneu-matic	Manual	Closed	Closed	Closed	Closed	B,F,Y,RM	5	Div I	
Z-49	Purge inlet to drywell	56	No	Air/N_2	14	6.2-70 Sh. 29	Inside	-	C	Yes	2CPS*AOV106	-	Butter-fly	AOV	Pneu-matic	Manual	Closed	Closed	Closed	Closed	B,F,Y,RM	5	Div II	21
							Outside	4'-0"	C		2CPS*AOV104	-	Butter-fly	AOV	Pneu-matic	Manual	Closed	Closed	Closed	Closed	B,F,Y,RM	5	Div I	
Z-50	Purge inlet to wetwell	56	No	Air/N_2	12	6.2-70 Sh. 29	Inside	-	C	Yes	2CPS*AOV107	-	Butter-fly	AOV	Pneu-matic	Manual	Closed	Closed	Closed	Closed	B,F,Y,RM	5	Div II	21
							Outside	4'-3"	C		2CPS*AOV105	-	Butter-fly	AOV	Pneu-matic	Manual	Closed	Closed	Closed	Closed	B,F,Y,RM	5	Div I	
Z-51	Purge exhaust from wetwell	56	No	Air	12	6.2-70 Sh. 29	Inside	-	C	No(31)	2CPS*AOV109	-	Butter-fly	AOV	Pneu-matic	Manual	Closed	Closed	Closed	Closed	B,F,Y,RM	5	Div II	21
							Outside	6'-6"	C		2CPS*AOV111	-	Butter-fly	AOV	Pneu-matic	Manual	Closed	Closed	Closed	Closed	B,F,Y,RM	5	Div I	
Z-52A	Capped spare				1				A															
Z-52B	Capped spare				1				A															
Z-53A	Instrument air to ADS valve accumulators	56	No	N_2	1 1/2	6.2-70 Sh. 30	Outside	1'-0"	C		2IAS*SOV164		Globe	SOV	Elec.	N/A	Open	Open	Open	Closed	B,F,RM	N/A	Div I	
							Inside		C	Yes	2IAS*V448		Check	N/A	Process	N/A	Open	Open	Open	N/A	Reverse flow	N/A	N/A	

TABLE 6.2-56 (Cont)

Penetration No.	System Designation	GDC or Reg. Guide	ESF System	Fluid	Size (in)	FSAR Arrangement Figure(1)	Location of valve Inside/Outside Primary Containment	Length of Pipe - Containment to Outside Isolation Valve	Type Test (1)	Potential Bypass Leakage Path	Valve(9) Number SWEC	Valve(9) Number GE	Valve(9) Type	Valve(9) Operator	Valve(9) Actuator Mode Primary	Valve(9) Actuator Mode Secondary	Valve(9) Position Normal (3)	Valve(9) Position Shutdown	Valve(9) Position Post-Accident	Valve(9) Position Power Failure(10)	Isolation Signal (4)	Closure Time (5,6)	Power Source (7)	Notes
Z-53B	Instrument air to ADS valve accumulators	56	No	N_2	1 1/2	6.2-70 Sh. 30	Outside Inside	1'-0"	C C	Yes	2IAS*SOV165 2IAS*V449	- -	Globe Check	SOV N/A	Elec. Process	N/A N/A	Open Open	Open Open	Open Open	Closed N/A	B,F,RM Reverse flow	N/A N/A	Div II N/A	
Z-53C	Instrument air to MSRV accumulator tank	56	No	N_2	1 1/2	6.2-70 Sh. 30	Outside Inside	1'-0"	C C	Yes	2IAS*SOV166 2IAS*SOV184	- -	Globe Globe	SOV SOV	Elec. Elec.	N/A N/A	Open Open	Open Open	Closed Closed	Closed Closed	B,F,RM B,F,RM	N/A N/A	Div I Div II	
Z-54A	Capped spare				3				A															
Z-55A	Hydrogen recombiner 1A supply to wetwell	56	Yes	Air	3	6.2-70 Sh. 31	Inside Outside	2'-0"	A, C A, C	No(31)	2HCS*MOV4A 2HCS*MOV1A	- -	Globe Globe	MOV MOV	Elec. Elec.	Manual Manual	Closed Closed	Closed Closed	Open Open	FAI FAI	B,F,RM B,F,RM	19 19	Div I Div I	12, 22
Z-55B	Hydrogen recombiner 1B supply to wetwell	56	Yes	Air	3	6.2-70 Sh. 31	Inside Outside	2[illegible]	[illegible]C [illegible]C	No(31)	2HCS*MOV4B 2HCS*MOV1B	- -	Globe Globe	MOV MOV	Elec. Elec.	Manual Manual	Closed Closed	Closed Closed	Open Open	FAI FAI	B,F,RM B,F,RM	19 19	Div II Div II	12, 22
Z-56A	Hydrogen recombiner 1A return from drywell	56	Yes	Air	3	6.2-70 Sh. 31	Inside Outside	2'-0"	A, C A, C	No(31)	2HCS*MOV6A 2HCS*MOV3A	- -	Globe Globe	MOV MOV	Elec. Elec.	Manual Manual	Closed Closed	Closed Closed	Open Open	FAI FAI	B,F,RM B,F,RM	19 19	Div I Div I	12, 22
Z-56B	Hydrogen recombiner 1B return from drywell	56	Yes	Air	3	6.2-70 Sh. 31	Inside Outside	2'-0"	A, C A, C	No(31)	2HCS*MOV6B 2HCS*MOV3B	- -	Globe Globe	MOV MOV	Elec. Elec.	Manual Manual	Closed Closed	Closed Closed	Open Open	FAI FAI	B,F,RM B,F,RM	19 19	Div II Div II	12, 22
Z-57A	Hyrdogen recombiner 1A return from wetwell	56	Yes	Air	3	6.2-70 Sh. 31	Inside Outside	2'-0"	A, C A, C	No(31)	2HCS*MOV5A 2HCS*MOV2A	- -	Globe Globe	MOV MOV	Elec. Elec.	Manual Manual	Closed Closed	Closed Closed	Open Open	FAI FAI	B,F,RM B,F,RM	19 19	Div I Div I	12, 22
Z-57B	Hyrodgen recombiner 1B return from wetwell	56	Yes	Air	3	6.2-70 Sh. 31	Inside Outside	2'-0"	A, C A, C	No(31)	2HCS*MOV5B 2HCS*MOV2B	- -	Globe Globe	MOV MOV	Elec. Elec.	Manual Manual	Closed Closed	Closed Closed	Open Open	FAI FAI	B,F,RM B,F,RM	19 19	Div II Div II	12, 22
Z-58	Containment purge to drywell	56	No	Air	2	6.2-70 Sh. 29	Inside Outside	 3'-4"	C C	Yes	2CPS*SOV122 2CPS*SOV120	- -	Globe Globe	SOV SOV	Elec. Elec.	N/A N/A	Closed Closed	Closed Closed	Closed Closed	Closed Closed	B,F,Y RM B,F,Y RM	N/A N/A	Div II Div I	

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TABLE 6.2-56 (Cont)

Pene-tration No.	System Designation	GDC or Reg. Guide	ESF System	Fluid	Size (in)	FSAR Arrange-ment Figure(1)	Location of valve Inside/ Outside Primary Contain-ment	Length of Pipe - Con-tainment to Outside Isolation Valve	Type Test (1)	Potential Bypass Leakage Path	Valve(9) Number SWEC	Number GE	Type	Oper-ator	Actuator Mode Primary	Actuator Mode Secondary	Position Normal (3)	Position Shutdown	Position Post-Accident	Position Power Failure(10)	Isola-tion Signal (4)	Closure Time (5,6)	Power Source (7)	Notes
Z-83	Capped spare				1				A															
Z-85	Capped spare				1				A															
Z-86	Capped spare				1				A															
Z-87	Capped spare				1				A															
Z-88A	RHS safety valve discharge to suppression pool	56	Yes	Steam	12	6.2-70 Sh. 34	Outside	116'2"	A	No(29)							See Note 23							
Z-88B	RHR safety valve discharge to suppression pool	56	Yes	Steam	12	6.2-70 Sh. 34	Outside	106'-3"	A	No(29)							See Note 24							
Z-89A	LMS from dry-well	56	No	Air	3/4	6.2-70 Sh. 35	Inside Outside	0'-2"	C C	No(31)	2LMS*SOV152 2LMS*SOV153	- -	Globe Globe	SOV SOV	Elec. Elec.	N/A N/A	Closed Closed	Closed Closed	Closed Closed	Closed Closed	B,F,RM B,F,RM	N/A N/A	Div II Div I	
Z-89B	Capped spare				3/4				A															
Z-89C	LMS from wet-well	56	No	Air	3/4	6.2-70 Sh. 35	Inside Outside	0'-2"	C C	No(31)	2LMS*SOV156 2LMS*SOV157	- -	Globe Globe	SOV SOV	Elec. Elec.	N/A N/A	Closed Closed	Closed Closed	Closed Closed	Closed Closed	B,F,RM B,F,RM	N/A N/A	Div II Div I	
Z-89D	Capped spare				3/4				A															
Z-90	ICS vacuum breaker	56	Yes	Air	1 1/2	6.2-70 Sh. 36	Outside Outside	23'-10" 29'-11"	C C	No(29)	2ICS*MOV148 2ICS*MOV164	E51-F086 E51-F080	Globe Globe	MOV MOV	Elec. Elec.	Manual Manual	Open Open	Closed Closed	Open Open	FAI FAI	F&H,RM F&H,RM	9 9	Div II Div I	
Z-91A	Instrument air to drywell	56	No	N_2	1 1/2	6.2-70 Sh. 37	Outside Inside	1'-0"	C C	Yes	2IAS*SOV167 2IAS*SOV185	- -	Globe Globe	SOV SOV	Elec. Elec.	N/A N/A	Open Open	Open Open	Closed Closed	Closed Closed	B,F,RM B,F,RM	N/A N/A	Div I Div II	
Z-91B	Instrument air to drywell	56	No	N_2	1 1/2	6.2-70 Sh. 37	Outside Inside	1'-0"	C C	Yes	2IAS*SOV168 2IAS*SOV180	- -	Globe Globe	SOV SOV	Elec. Elec.	N/A N/A	Open Open	Open Open	Closed Closed	Closed Closed	B,F,RM B,F,RM	N/A N/A	Div I Div II	
Z-91C	Capped spare				1 1/2				A															
Z-91D	Capped spare				1 1/2				A															

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