GENERAL ELECTRIC

NUCLEAR POWER
SYSTEMS DIVISION

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MFN 003-80

January 4, 1980

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

Attention: Dr. D. F. Ross, Jr., Acting Director
Division Project Management

Gentlemen:

SUBJECT: RESPONSE TO SUPPLEMENTARY TEN (10) SYSTEM QUESTIONS CONCERNING NEDO-24708

References:
1) Letter, W. J. Armstrong (BWR Owners' Group) to D. F. Ross (USNRC), same subject, January 2, 1980
2) Letter, D. F. Ross (USNRC) to T. D. Keenan (BWR Owners' Group), "Additional Information Required for NRC Staff Generic Report on Boiling Water Reactors", October 12, 1979

The enclosure to Reference 1 was previously transmitted to Mr. W. Hodges of your staff on November 28, 1979. This enclosure responds to the ten (10) systems questions concerning NEDO-24708 of Reference 2. At the request of Mr. C. O. Thomas, this enclosure is being retransmitted to you directly. Therefore, this letter officially transmits to you, on behalf of the BWR Owners' Group, sixty copies of the enclosure to Reference 1.

If you have any questions, please contact Mr. S. J. Stark of my staff at (408) 925-1822.

Very truly yours,

RHBuchholz

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R. H. Buchholz, Manager
BWR Systems Licensing
Safety & Licensing Operation

RHB:rm/104X

Enclosure

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SYSTEM QUESTIONS CONCERNING NEDO-24708

1. According to Section 3.1.1.1.2.1.6 of NEDO-24708, LPCS or LPCI must be throttled by the operator, for some plants, to insure adequate NPSH. Can these lines be orificed to achieve the same goal without compromising the adequacy of the system(s)? What are the consequences of not throttling?

2. Notes 5-8, 6-8 and 9-8 for Table 2.1-2a state that some plants require lube oil and seal cooling. Which plants does this refer to?

3. With regard to Tables 2.1.4a thru 2.1.4n which provide a description, in matrix form, of system initiation, permissives, manual valves line-ups, etc., it is noted that additional valves installed by AE are not included. These Tables should be complete. Furthermore, are they administratively controlled?

4. Table 2.1-2a under Items 1-4, 4-4, and 14-4, it is noted that some plants require on-site AC power for small break protection. Prolonged operation of RCIC & HPCI can require AC powered space coolers. The following information is required:

   (a) How long can these systems operate without space coolers?

   (b) What is operating temperature limit w/o coolers?

   (c) Power source for coolers.

   (d) What specific components in each system require cooling and temperature limitation on components.

5. Table 2.1-2a Items 1-8, 2-8, 3-8, 4-8, 5-8, 6-8, 9-8 identify auxiliary systems that may require cooling for long-term operation. Answer questions 4a-d with regard to auxiliary systems.

6. Table 2.1-2a Column 9b power source list is incomplete. Should identify AC requirements and if on-site or off-site, i.e., power source for auxiliary systems not identified.

7. Table 2.1-2a and 2.1-2b Column 11, manual actions required and how long they take, is a short-term item that was not addressed.

8. Table 2.1-2b, note 2-8, how long can insulation condenser remove heat without makeup?

9. Tables 2.1-4 for systems such as LPCI, LPCS and HPCS. Are there no trips on component malfunctions, i.e., high pump bearing temperatures or loss of coolant to pump bearing.

10. One of the systems requests for information that has not been adequately addressed in NEDO-24708 is the loss of feedwater transient coupled with a stuck-open SRV and loss of off-site power and diesels. From the information provided, it is not possible to determine what the end result of this scenario would be. Since all the plants have various combinations of HPCI, RCIC and IC systems, SRV with varying relieving

capacities, and varying stored energies, the results are plant specific. Therefore, for all the plants or plant types identified in NEDO-24708, provide the following time dependent plots for the above scenario:

(a) steam and coolant inventory lost

(b) coolant temperature and pressure

(c) coolant makeup (where applicable)

(d) reactor vessel water level relative to top of active fuel

(e) fuel and cladding temperatures

The initial plant conditions assumed in the analyses, the time assumed for startup of the available systems and the time the RCIC and HPCI can operate before the system depressurizes below their operating conditions should be provided. In addition, identify when equilibrium conditions are achieved (core covered and water level maintained in normal operating range); if core uncovery occurs identify when, time duration, and extent of core damage (include basis).

QUESTION #1 - Systems Questions Concerning NEDO-24708

1. According to Section 3.1.1.1.2.1.6 of NEDO-24708, LPCS or LPCI must be throttled by the operator, for some plants, to insure adequate NPSH. Can these lines be orificed to achieve the same goal without compromising the adequacy of the system(s)? What are the consequences of not throttling?

RESPONSE TO QUESTION #1

Big Rock - N/A

Humbolt Bay - N/A

Dresden #1 - No orifices or throttling required.

Oyster Creek - N/A

Nine Mile Point, Unit I - N/A for Nine Mile Point, Unit I. No throttling required for LPCS, as this unit does not have a LPCS system.

Dresden Units 2 & 3 - No orifices or throttling required.

Quad Cities Station - LPCS and LPCI is not orificed or throttled. No flow limiting is required.

Millstone Station Unit #1 - N/A

Pilgrim Unit #1 - LPCI at Pilgrim Station does not have any installed orifices nor does the system have to be throttled.

Browns Ferry 1, 2 & 3 - Throttling not required to maintain NPSH.

Peach Bottom - No throttling required to maintain required NPSH.

Dwane Arnold - It is not required that LPCS or LPCI are throttled at DAEC.

Brunswick - The RHR (LPCI) pumps at Brunswick plant have already been orificed to eliminate the need for throttling and to ensure adequate NPSH. The LPCI system at the Brunswick plant does not require throttling.

Hatch - The LPCS at Hatch does throttle with a minimum flow valve for injection to the vessel to assure adequate NPSH. After the LPCS discharge injection valve opens, the injection minimum flow valve closes. LPCI also throttles injection to the vessel via a flow control valve.

Fitzpatrick - LPCI system restriction orifices are presently in place. No throttling is required.

Zimmer - Zimmer has minimum flow lines around the LPCS and LPCI pumps to ensure an adequate NPSH.

Shoreham - Operation of the Shoreham Core Spray and LPCI system does not require throttling to maintain adequate NPSH.

La Salle - LPCS system is presently orificed. LPCI is not orificed - could place orifice in the line.

Consequences of not throttling is unknown. Runout will be tested during pre-op testing.

QUESTION #2 - Notes 5-8, 6-8 and 9-8 for Table 2.1-2a state that some plants require lube oil and seal cooling. Which plants does this refer to?

RESPONSE TO QUESTION #2

Big Rock Point - N/A

Humbolt Bay - N/A

Dresden #1 - Yes, post incident pumps

Oyster Creek - Seal cooling required for shutdown cooling pumps only.

Nine Mile Point, Unit #1 - Regarding note 5-8 LPCS: The Nine Mile Point Unit #1 LPCS has a self-contained lube oil and seal cooling system.

Regarding note 6-8: The Nine Mile Point Unit #1 design does not include a LPCI.

Regarding not 9-8: The Nine Mile Point Unit #1 Containment Spray System has a self-contained lube oil and seal cooling system. The Shutdown Cooling System pumps lube oil and seal cooling is by the RBCLCWS which has already been indicated as required for operation of the shutdown cooling system.

Dresden #2 & #3 - 5-8 LPCS; 6-8 LPCI; 9-8 RHR require cooling. The cooling is automatically initiated upon system actuation. The shutdown cooling pump bearing is cooled by the RBCCW system.

Quad Cities Station - 5-8 LPCS; 6-8 LPCI; 9-8 RHR require cooling. The cooling is automatically initiated upon system actuation.

Millstone - N/A

Pilgrim Unit #1 - Pertaining to Sections 5-8, 6-8 and 9-8, of Table 2.12A. These concerns do pertain to Pilgrim Station.

Browns Ferry 1, 2 & 3 - Seal cooling is required.

Peach Bottom - RCIC Lube Oil Cooling; HPCI Lube Oil Cooling; RHR & LPCI Seal water and room cooling; LPCS Room cooling.

Dwane Arnold - Both LPCS and LPCI require seal cooling ESW.

Brunswick - The motor thrust bearing oil reservoir on both Core Spray and RHR pumps have a heat exchanger cooled by the pump discharge flow. A seal cooler, which uses service water as a cooling medium, is used on the RHR pumps.

Hatch - The LPCI pump use plant service water for seal cooling while LPCS pumps use pump discharge water to cool both pump and motor.

Fitzpatrick - Seal cooling is required on RHR pumps.

Zimmer - For the LPCS, LPCI and RHR system, cooling water from the Reactor Building Closed Cooling water system is used in the pump seal coolers.

Shoreham - N/A

La Salle - 5-8 LPCS required CSCS cooling, hours into initiation. Therefore, it is manually initiated. 6-8 LPCS requires RHR Service water - automatically initiated. 9-8 RHR requires RHR Service water - automatically initiated.

QUESTION #3 - With regard to Tables 2.1.4a thru 2.1.4n which provide a description, in matrix form, of system initiation, permissives, manual valve lineups, etc., it is noted that additional valves installed by AE are not included. These Tables should be complete. Furthermore are they administratively controlled?

RESPONSE TO QUESTION #3

Millstone - Yes, valves are administratively controlled.

Dresden & Quad Cities - The tables shown here were intended to be general and only include basic system flow patterns. Some valves such as vents and drains by AE were not included. These valves would be administratively controlled by a locked valve checklist or other method of verifying valve positions.

Fitzpatrick - The following are differences between JAF systems and the diagrams shown in NEDO-24708:

(a) In the HPCI system, the flow diagram has 2 closed MOV in series outside the containment against one normally opened MOV and one normally closed MOV as shown in NEDO-24708.

(b) The HPCI system has 2 MOV in series in the suction line from the suppression pool to HPCI.

(c) In the LPCI system, there are two MOV for each loop in series which are normally open as against one shown in NEDO-24708. Also, the Heat Exchanger bypasses for JAF are normally open.

(d) In the Torus cooling line, instead of normally open MOV in NEDO-24708, JAF has AOV which is normally shut.

All of the above were previously provided in sketches for the original request by the NRC.

Brunswick - 2.1-4a-Add: (1) Steam supply valves do not open; 4b-N/A: 4b-N/A; 4c-N/A; 4d-Add: (1) Full flow test to torus valve open; (2) CST empty. Transfer to torus blocked; (3) Full flow test to CST open; 4e-No additional valves; 4f-N/A; 4g-Add: (1) Full flow test valve to torus open; (2) Valves to radwaste open; (3) Valves to fuel pool open; (4) Valves; (5) Cross tie valve open; 4h-No additional valves; 4i-N/A; 4j-No additional valves; 4k-See 4g; 4l-N/A; 4m-No other valves; 4n-N/A.

Big Rock Poing, Humboldt Bay & Dresden Unit #1 - Item 1, we believe a response should state the following. Although the specific plant that General Electric analyzed for this table did not include valves installed by the AE. The review by each utility assured all valves in the system were considered for the trip and degraded conditions of each system. And, for some of the older plants, many of the systems as a whole are designed for the AE, in which case, a review had to include valves installed by them. In regard to administrative control, all BWR/1 Plants do administratively control their valve lineups.

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Duane Arnold - Need clarification on what exactly is being asked. Table 2.1.4a through .1.4n do not address manual valve lineups. The normal valve lineups are shown on Figure 2.1-1 through 2.1-13. In addition, Table 2.1-2a shows (1) Direct or Indirect valve indications in Column 2. (2) Failed state of valves in Colume 3 and (3) Method of valve position verification in Column 28a and 28b.

Peach Bottom - All AE supplied main flow path valves, with the exception of the following, were included in the original submittal:

A. CRD pump suction filter valves

B. Manual valve between CRD pump discharge and the drive water filter suction.

C. CRD reactor return line manual valves.

D. Manual isolation valve between CRD drive and cooling water pressure control valves.

The CRD system is normally in service, therefore, these valves would normally be in their proper positions. Administrative controls are applied whenever valve positions must be changed for system maintenance.

Pilgrim - N/A

Cooper - N/A

Hatch - Valves (manual or otherwise) are not added by the AE without NSSS knowledge and approval. The following plant systems are provided by the AE:

(1) Reactor Feedwater System

(2) Reactor Building Closed Cooling Water System

(3) RHR/LPCI/LPCS Jockey Pump System

These systems are in operation in support of plant operation and manual valve alignment is assured by observing and monitoring operating plant parameters. The following systems are provided by the NSSS:

1. RCIC - the following is a list of status for the manual valves within the system process stream.

(See Next Page)

VALVE MPL INDENTIFIER	SERVICE	NORMAL POSITION	CONTROL
2E51-F001 E51-F001	RCIC Turbine Exh. To Suppression Chamber	Locked Open	Admin. Cont. of Keys
2E51-F009 E51-F009	RCIC Pump Suction From Condensate Storage Tank	Locked Open	Admin. Cont. of Keys
2E51-F016 E51-F016	RCIC Pump Maint. Suction Valve	Locked Open	Admin. Cont. of Keys

The following is a list and status for the manual valves outside the process stre m important to system operation.

Valve MPL Identifier	SERVICE	NORMAL POSITION	CONTROL
2E51-F002 E51-F002	Barometric Condenser Vacuum Pump Disch Valve	Locked Open	Admin. Cont. of Keys
2E51-F038 -F039 -F095	RCIC Turbine Steam Supply Piping Cond. Removal System	Locked Open	Admin. Cont. of Keys
E51/2E51- F049	Barometric Condenser Cond. Pump Disch. Valve	Throttled Open	Position Verified at System Operability Testing

2. HPCI - The following is a list of manual valves, their status & control for this system

E41/2F41 F021	HPCI Turbine Exhaust To Suppression Chamber	Locked Open	Admin. Cont. of Keys
E41/2F41 F022	HPCI Turbine Exhaust Line Cond. Removal Sys. Valve	Locked Open	Admin. Cont. of Keys
E41/2F41 F010	HPCI Pump Suction From Cond. Storage Tank	Locked Open	Admin. Cont. of Keys
E41/2F41 F036, F037 & F095	HPCI Turb. Stm. Supply Piping Cond. Removal System	Locked Open	Admin. Cont. of Keys
E41/2F41 F058	Barometric Condenser Condensate Pump Disch. Valve	Throttle Open	Position Verified at System Operability Testing

3. LPCS - The LPCS (Core Spray) system has one valve per train that is deemed manual and position - essential. This valve is the core spray pump suction from the condensate storage tank (E21/2F21-F002 "A and/or B"). This valve is locked closed and the key is controlled.

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4. RHR/LPCI - The RHR/LPCI trains are provided with manual valves for pump maintenance and piping system drainage (valves E11/2E11 - F034 A, B, C, & D, F071 A, B, C, & D and F072 A, B, C, & D). These valves are locked open and locked closed respectively. Keys are administratively controlled.

5. The RHR Heat Exchanger influent and effluent valves (service water) are locked open, as are the RHR service water pump disch. valves. Keys to the locks are administratively controlled.

   RHRSW Pump Motor bearing cooling water, and system strainer in & out valves are not locked in position, however these valves are determined to be in the correct position during surveillance testing.

6. Main Steam Relief Valves/Ads Valves - There are no manual block valves in the MSRV/ADSV inlet or outlet lines.

Shoreham

Additional manual AE supplied valves have been added to Tables 2.1-4a thru n (affected tables attached). Only those valves in main process paths have been included. Vent and drain valves, test connection valves, and instrumentation connections have been specifically excluded.

There are no AE supplied valves, other than manual valves, in the main flow paths such that the AE supplied valves do not affect other portions of the Tables (e.g., initiation, permissives, trip conditions).

Valve numbers indicated in additional responses are Shoreham specific, from P&IDs issued by GE for Shoreham.

The manual valves being discussed are administratively controlled.

Zimmer

The required information is supplied in Table Form in ATTACHMENT I.

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ATTACHMENT I

Questions from Table II

Question Number	Information Requested
1.	Are the instruments and equipment affected by containment flooding (yes/no)?
2,3	Normal position of valves, indication location direct or indirect indications. Failed state of each valve (provided in Table Form)
4.	Power Sources required for system operation
5,6	Number of safety and relief valves, relieving capacity. Relief and safety valve setpoints
5A.	Air sources for pneumatic valves, cycling capacity. Are there alternate air supplies?
7.	System Trips
8.	Are auxiliary systems required for operation (yes/No)? If yes, what are they?
8A	Methods of cooling system components
8B	Safety classification and seismic category
9.	Automatic startup logic (initiation signals) and power source (AC/DC).
10.	Auto initiation built in the delay (yes/No)? If yes, what is time required?
10A	Auto sequencing back on to Diesel Following Reset (Yes/No)?
11	Primary Water Source, total and dedicated supply time available.
12	Are there strainers in system? (yes/No) If yes, give location and size (Fine/coarse)

CRD Hydraulic System

1. No

2.3 See Table

4.	4.16KV	1A	CUB #12
	4.16KV	1B	CUB #17
	480VAC	Rx. Mcc	1E & 1F
	120 VAC	Rx. Mcc	1F

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5. Number of Relief Valves = 4

6.

Valve	Set Point	Flow
F100 A,B	950 PSIG	2075 SCFM Air
F001 A, B	150 PSIG	Unavailable

5A Source of Air = Instrument Air
No other sources of air

7. No system trips

8. Auxiliary Systems

Instrument air
RBCCYY
RPS
Reactor Manual Control System
Power Supplies

8A RBCCW Cools CRD system

8B Seismic Class I
Safety Class A, B, D. E

9. System always operational
Rod insertion on any scram signal

10. No time delays

10A. NO

11. Primary Water Source Condensate Storage Tank

12. No.

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Nine Mile - Additional valves installed by AE are either motor operated or administratively controlled (i.e., locked open, etc.).

Oyster Creek - Major manual valves on safety, feedwater and condensate systems are administratively controlled.

Browns Ferry 1, 2 & 3 - Attached are tables indicating all valves in the flow path. Manual valves are placed in the correct position for system operation and administratively controlled.

BROWNS Ferry 1, 2, 3

QUESTION #3

SYSTEM RBCCW

GENERAL DESIGN INFORMATION

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
HCV-70-601A(B)	A(B) Htx inlet	O	N	N	NA	NA	NA	NA	NA
HCV-70-603A(B)	A(B) Htx outlet	O THROTTLING	N	N	NA	NA	NA	NA	NA

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POOR ORIGINAL

SYSTEM CRD

GENERAL DESIGN INFORMATION

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
FCV 85-56	Pump Suction	O	Y	~~Y~~ N	Y	N	N	N	Y
FCV 1-85-8 ~~[illegible]~~ FCV 2-85-8	Unit 1 & 2 Pump Crosstie	C	Y	Y	Y	N	N	N	Y
FCV 85-11A&B	Drive Water Control Valves	O	Y	Y	Y	N	N	Y	N
FCV 85-54 FCV 85-55	Recirc Pump Seal Water	O	N	N	NA	NA	N	N	Y
PCV 85-23	Drive Water Pressure Control valve	O	Y	Y	Y	N	N	N	Y
PCV 85-27	Cooling Water Pressure Control Valve	O	Y	Y	Y	N	N	N	Y
FCV 85-20A&B FCV 85-21A&B	STABILIZATION Valves	Two open ~~One~~ Two closed	N	N	N	N	N	Y	N

POOR ORIGINAL

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SYSTEM CRD

GENERAL DESIGN INFORMATION

LEGEND:
- O - Open
- C - Closed
- Y - Yes
- N - No
- NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
FCV 85-50	Exhaust Water Isolation	C	Y	Y	Y	N	N	N	Y
FCV 85-39A (1-185)	SCRAM Inlet Valves	C	Y	N	Y	N	Y	N	N
FCV 85-39B (1-185)	SCRAM ~~Exit~~ Outlet Valves	C	Y	N	Y	N	Y	N	N
FCV 85-40(AD) (1-185)	Directional Control Valves	C	N	N	N	N	N	Y	N
FCV 85-37A	SCRAM Discharge Volume Drain	O	N	Y	Y	N	N	Y	N
FCV 85-37B/C	SCRAM Discharge Volume Vents	O	N	Y	Y	N	N	Y	N
FCV [illegible]									

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SYSTEM Condensate Storage Tank

GENERAL DESIGN INFORMATION

LEGEND:
- O - Open
- C - Closed
- Y - Yes
- N - No
- NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
FCV-2-170 Unit 1	Storage Tank Isolation MOV	O	Y	Y	Y	N	N	N	Y
FCV-2-166 Unit #3	Storage Tank Isolation MOV	O	Y	Y	Y	N	N	N	Y
FCV-2-162 Unit #2	Storage Tank Isolation MOV	O	Y	Y	Y	N	N	N	Y

SYSTEM Feedwater

GENERAL DESIGN INFORMATION

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
FCV-3-92	'C' RFP Discharge Testable CK valve	O	N	Y	Y	N	NA	NA	NA
FCV-3-93	'B' RFP Discharge Testable CK Valve	O	N	Y	Y	N	NA	NA	NA
FCV-3-94	A RFP Discharge Testable CK Valve	O	N	Y	Y	N	NA	NA	NA
FCV-3-5	'C' RFP Discharge MOV	O	Y	Y	Y	N	N	N	Y
FCV-3-12	'B' RFP Discharge MOV	O	Y	Y	Y	N	N	N	Y
FCV-3-19	A RFP Discharge MOV	O	Y	Y	Y	N	N	N	Y
FCV-3-38	'A' HP Heater Inlet	O	Y	Y	Y	N	N	N	Y
FCV-3-31	'B' HP Heater Inlet	O	Y	Y	Y	N	N	N	Y
FCV-3-24	'C' HP Heater Inlet	O	Y	Y	Y	N	N	N	Y
FCV-3-75	'A' HP Heater Outlet	O	Y	Y	Y	N	N	N	Y
FCV-3-76	'B' HP Heater Outlet	O	Y	Y	Y	N	N	N	#Y
FCV-3-77	'C' HP Heater Outlet	O	Y	Y	Y	N	N	N	Y
HCV-3-67	FW Line A Isolation valve	O	Visual Y	O only	Y	N	NA	NA	[illegible]
HC[illegible]-66	FW Line B Manual Isolation Valve	O	Visual Y	O only	Y	N	NA	NA	NA
[illegible]	[illegible]	C	Y Visual	N	N	N	N	N	Y

POOR ORIGINAL

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SYSTEM Feedwater

GENERAL DESIGN INFORMATION

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
FCV-2-31	'B' SJAE Inlet Iso. MOV	O	Y	Y	Y	N	N	N	Y
FCV-2-36	'A' SJAE Inlet Iso. MOV	O	Y	Y	Y	N	N	N	Y
FCV-2-41	'A' SJAE Outlet Isolation MOV	O	Y	Y	Y	N	N	N	Y
FCV-2-35	'B' SJAE Outlet Isolation MOV	O	Y	Y	Y	[illegible]	N	N	Y
PCV-2-190	SPE Bypass	O (throttle)	Y	N	Y	N	N	Y	N ?
FCV-2-130	Demin Bypass	C	Y	Y	Y	N	Y	N	N
FCV-2-72	'A' Lo Press Inlet	O	Y	Y	Y	N	N	N	Y
FCV-2-84	B Lo Press Inlet	O	Y	Y	Y	N	N	N	Y
FCV-2-96	C Lo Press Inlet	O	Y	Y	Y	N	N	N	Y
FCV-2-124	A Lo Press [illegible]	O	Y	Y	Y	N	N	N	Y
FCV-2-125	B Lo Press. Outlet	O	Y	Y	Y	N	N	N	Y
FCV-2-126	C Lo Press. Outlet	O	Y	Y	Y	N	N	N	Y
FCV-2-83	Rx Feedpump Suction	O	Y	Y	Y	N	N	N	Y
FCV-2-95	'B' RFP Suction	O	Y	Y	Y	N	N	N	Y
FCV-2-108	'C' RFP Suction	O	Y	Y	Y	N	N	N	Y

POOR ORIGINAL

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SYSTEM Recirculation

GENERAL DESIGN INFORMATION

VALVES

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
FCV 68-1	"A" Pump Suction	O	N	Y	Y	N	N	N	YZ
FCV 68-3	"A" Pump Discharge	O	N	Y	Y	N	N	N	Y
FCV 68-77	"B" Pump Suction	O	N	Y	Y	N	N	N	Y
FCV 68-79	"B" Pump Discharge	O	N	Y	Y	N	N	N	YO
FCV 68-33 FCV 68-35	Equalizing Valves	One Open One Closed	N	Y	Y	N	N	N	

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SYSTEM CRD

GENERAL DESIGN INFORMATION

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
FCV 85-56	Pump Suction	O	Y	~~Y~~ N	Y	N	N	N	Y
FCV 1-85-8 ~~FCV 85-~~ FCV 2-85-8	Unit 1 & 2 Pump Crosstie	C	Y	Y	Y	N	N	N	Y
FCV 85-11A&B	Drive Water Control Valves	O	Y	Y	Y	N	N	Y	N
FCV 85-54 FCV 85-55	Recirc Pump Seal Water	O	N	N	NA	NA	N	N	Y
PCV 85-23	Drive Water Pressure Control Valve	O	Y	Y	Y	N	N	N	Y
PCV 85-27	Cooling Water Pressure Control Valve	O	Y	Y	Y	N	N	N	Y
FCV 85-20A&B FCV 85-21A&B	STABILIZATION Valves	Two open ~~One~~ Two closed	N	N	N	N	N	Y	N

POOR ORIGINAL

9000083303

SYSTEM CRD

GENERAL DESIGN INFORMATION

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
FCV 85-50	Exhaust ~~Water~~ Isolation	C	Y	Y	Y	N	N	N	Y
FCV 85-39A (1-185)	SCRAM Inlet Valves	C	Y	~~Y~~ N	Y	N	Y ~~N~~	~~Y~~ N	N
FCV 85-39B (1-185)	SCRAM ~~Inlet~~ Outlet Valves	C	Y	~~Y~~ N	Y	N	Y ~~N~~	N	N
FCV 85-40(A-D) (1-185)	Directional Control Valves	C	N	N	N	N	N	Y	N
FCV 85-37A	SCRAM Discharge Volume Drain	O	N	Y	Y	N	N	Y	N
FCV 85-37B&C	SCRAM Discharge Volume Vents	O	N	Y	Y	N	N	Y	N
FCV 85-?68									

POOR ORIGINAL

90008304

SYSTEM Condensate Storage Tank

GENERAL DESIGN INFORMATION

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA = Not Applicable

POOR ORIGINAL

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
FCV-2-170 Unit 1	Storage Tank Isolation MOV	O	Y	Y	Y	N	N	N	Y
FCV-2-166 Unit #3	Storage Tank Isolation MOV	O	Y	Y	Y	N	N	N	Y
FCV-2-162 Unit #2	Storage Tank Isolation MOV	O	Y	Y	Y	N	N	N	Y

90008305

SYSTEM Feedwater

GENERAL DESIGN INFORMATION

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
FCV-3-92	'C' RFP Discharge Testable CK valve	O	N	y	y	N	NA	NA	NA
FCV-3-93	'B' RFP Discharge Testable CK Valve	O	N	y	y	N	NA	NA	NA
FCV-3-94	A RFP Discharge Testable CK Valve	O	N	y	y	N	NA	NA	NA
FCV-3-5	'C' RFP Discharge MOV	O	y	y	y	N	N	N	y
FCV-3-12	'B' RFP Discharge MOV	O	y	y	y	N	N	N	y
FCV-3-19	A RFP Discharge MOV	O	y	y	y	N	N	N	y
FCV-3-38	'A' HP Heater Inlet	O	y	y	y	N	N	N	y
FCV-3-31	'B' HP Heater Inlet	O	y	y	y	N	N	N	y
FCV-3-24	'C' HP Heater Inlet	O	y	y	y	N	N	N	y
FCV-3-75	'A' HP Heater Outlet	O	y	y	y	N	N	N	y
FCV-3-76	'B' HP Heater Outlet	O	y	y	y	N	N	N	y
FCV-3-77	'C' HP Heater Outlet	O	y	y	y	N	N	N	y
HCV-3-67	FW Line A Manual Isolation Valve	O	Visual y	O only	y	N	NA	NA	NA
HC[illegible] 66	FW Line B Manual Isolation Valve	O	Visual y	O only	y	N	NA	NA	NA
[illegible]	[illegible]	C	y [illegible]	N	N	N	N	N	y

POOR ORIGINAL

9000830б

POOR ORIGINAL

SYSTEM Feedwater

GENERAL DESIGN INFORMATION

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set	
FCV-2-31	'B' SJAE Inlet Iso. MOV	O	Y	Y	Y	N	N	N	Y	
FCV-2-36	'A' SJAE Inlet Iso. MOV	O	Y	Y	Y	N	N	N	Y	
FCV-2-41	'A' SJAE Outlet Isolation MOV	O	Y	Y	Y	N	N	N	Y	
FCV-2-35	'B' SJAE Outlet Isolation MOV	O	Y	Y	Y	N	N	N	Y	
PCV-2-190	SPE Bypass	O (throttle)	Y	N	Y	N	N	Y	N	?
FCV-2-130	Demin Bypass	C	Y	Y	Y	N	Y	N	N	
FCV-2-72	'A' Lo Press Inlet	O	Y	Y	Y	N	N	N	Y	
FCV-2-84	B Lo Press Inlet	O	Y	Y	Y	N	N	N	Y	
FCV-2-96	C Lo Press Inlet	O	Y	Y	Y	N	N	N	Y	
FCV-2-124	A Lo Press Outlet	O	Y	Y	Y	N	N	N	Y	
FCV-2-125	B Lo Press. Outlet	O	Y	Y	Y	N	N	N	Y	
FCV-2-126	C Lo Press. Outlet	O	Y	Y	Y	N	N	N	Y	
FCV-2-83	'A' Rx Feedpump Suction	O	Y	Y	Y	N	N	N	Y	
FCV-2-95	'B' RFP Suction	O	Y	Y	Y	N	N	N	Y	
[illegible]	[illegible]	O	Y	Y	Y	N	N	N	Y	

SYSTEM Recirculation

GENERAL DESIGN INFORMATION

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Sec
FCV 68-1	"A" Pump Suction	O	N	Y	Y	N	N	N	Y[illegible]
FCV 68-3	"A" Pump Discharge	O	N	Y	Y	N	N	N	Y
FCV 68-77	"B" Pump Suction	O	N	Y	Y	N	N	N	Y
FCV 68-79	"B" Pump Discharge	O	N	Y	Y	N	N	N	YO
FCV 68-33 FCV 68-35	Equalizing Valves	One Open One Closed	N	Y	Y	N	N	N	Y

POOR ORIGINAL

90008508

SYSTEM RCIC

GENERAL DESIGN INFORMATION

LEGEND:
O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
71-2 FCV	1st isolation from Rx Vessel steam	open	N	Y	~~N~~ y	~~yes~~ N	N	N	y
71-3 FCV	Outboard steam isolation vlv. 1st vlv outside pri. Containment	open	Y	Y	y	N	N	N	y
71-8 FCV	RCIC Steam Supply	close	Y	Y	y	N	N	N	Y
71-9 FCV	Turbine Trip & Throttle	open	y Visual	Y	Y	N	N	N	Y
71-10 FCV	Turbine Control	open	N	Y	Y	N	Y	N	N
71-14 HCV	Exhaust Isolation MANUAL	open	Y	Y	Y	N	NA	NA	NA
FCV 71-19	Cond. Suction Iso.	O	Y	Y	Y	N	N	N	Y
71-16 HCV	Manual Iso Alt. Suction	O	Y	Y	Y	N	NA	NA	NA
FCV-71-17	ALT. Suction Iso. MOV	C	Y	Y	Y	N	N	N	Y

9000080309

POOR ORIGINAL

SYSTEM RCIC

GENERAL DESIGN INFORMATION

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
FCV-71-18	ALt Section Isolation MOV	C	Y	Y	Y	N	N	N	Y
FCV-71-37	Discharge Inboard Isolation MOV	O	Y	Y	Y	N	N	N	Y
FCV-71-39	outboard Discharge Isolation MOV	C	Y	Y	Y	N	N	N	Y
FCV-71-40	Discharge Testable Check Valve	C	N	Y	# Y	# N	NA	NA	NA

9000831O

SYSTEM HPCI

GENERAL DESIGN INFORMATION

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
FCV-73-2	Inboard Steam Iso.	O	N	Y	Y	N	N	N	Y
FCV-73-3	Outboard Steam Iso.	O	Y	Y	Y	N	N	N	Y
FCV-73-16	Turbine Steam Supply MOV	C	Y	Y	Y	N	N	N	Y
FCV-73-18	Turbine Stop Valve	C	Y visual	Y	Y	N	N	Y	N
FCV-73-19	Turbine Control Valve	C	N	Y	Y	N	N	Y	N
HCV-73-23	Exhaust Iso. Manual Valve	O	Y	Y	Y	N	NA	NA	NA
FCV-73-40	CST Pump Suction	O	Y	Y	Y	N	N	N	Y
HCV-73-25	Manual Torus Suction Isolation Valve	O	Y	Y	Y	N	NA	NA	NA
FCV-73-26	Torus Inbd. Suction Iso. MOV	C	Y	Y	Y	N	N	N	Y
FCV-73-27	Torus Outbd. Suction Iso. MOV	C	Y	Y	Y	N	N	N	Y
FCV-73-34	Inbd Discharge MOV	O	Y	Y	Y	N	N	N	Y
FCV-73-44	Outbd Discharge MOV	C	Y	Y	Y	N	N	N	Y
FCV-73-45	Discharge Testable Check valve	C	N	Y	Y	N	NA	NA	NA

POOR ORIGINAL

9000831 1

SYSTEM Core Spray

GENERAL DESIGN INFORMATION

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
SYSTEM I									
HCV-75-1	Manual Isolation Torus Suction	OPEN	N	~~Yes~~	Y	N	N/A	NA	NA ~~Yes (Locked open)~~
FCV-75-2	Pump A Suction	O	Y	Y	Y	N	N	N	Y
FCV-75-11	Pump C Suction	O	Y	Y	Y	N	N	N	Y
HCV-75-10	Pump A Discharge	O	N	Y	Y	N	N/A	N/A	NA ~~Y (locked open)~~
HCV-75-18	Pump C Discharge	O	N	Y	Y	N	N/A	N/A	NA ~~O (locked open)~~
~~HCV-75-17~~ HCV-75-12	Condensate Suction Pump C, I	C	N	Y	Y	N	NA	NA	NA ~~C (Locked Closed)~~
HCV-75-3	Condensate Suction to Pump A	C	N	Y	Y	N	NA	NA	~~Y (Locked Closed)~~ NA
FCV-75-22	Pump Test	C	Y	Y	Y	N	NA	N/A	Y
FCV-75-23	Outboard Admission	O	Y	Y	Y	N	NA	NA	Y
FCV-75-25	Inboard Admission	C	Y	Y	Y	N	NA	NA	Y
				Y	Y	N	NA	NA	NA
FCV-75-26	Testable Check	C	N	Y	Y	N	NA	NA	~~Y (locked open)~~ NA
HCV-75-27	Discharge Isolation	O	N	Y	Y	N	NA	NA	NA ~~Y (Locked open)~~
HCV-75-17	C Pump Miniflow Isol.	O	N	Y	Y	N	NA	NA	NA ~~Y (Locked open)~~
HCV-75-8	A Pump Miniflow Isol	O	N	Y	Y	N	NA	NA	NA ~~Y (Locked open)~~
FCV-75-9	Miniflow Bypass	O	Y	Y	Y	N	N/A	NA	Y

POOR ORIGINAL

90008312

SYSTEM Core Spray

GENERAL DESIGN INFORMATION

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
SYSTEM 2									
HCV-75-29	Manual Isolation Torus Suction	OPEN	N	Y	Y	N	NA	NA	NA ~~Y (locked open)~~
					Y	N	N	N	Y
FCV-75-31	D Pump Suction	O	Y	Y	Y	N	N	N	Y
FCV-75-30	B Pump Suction	O	Y	Y					
HCV-75-38	B Pump Disch	O	N	Y	Y	N	N/A	NA	NA ~~Y (Locked open)~~
HCV-75-46	D Pump Disch	O	N	Y	Y	N	NA	NA	NA Y ~~(Locked open)~~
HCV-75-31	CONDENSATE SUCTION TO B PUMP	C	N	Y	Y	N	NA	NA	NA ~~Y (Locked closed)~~
HCV-75-40	CONDENSATE SUCTION TO D PUMP	C	N	Y	Y	N	NA	NA	NA ~~Y (Locked closed)~~
FCV-75-50	Pump Test	C	Y	Y	Y	N	NA	NA	Y
FCV-75-51	Outboard Admission	O	Y	Y	Y	N	NA	NA	Y
FCV-75-53	Inboard Admission	C	Y	Y	Y	N	NA	NA	Y
FCV-75-54	Testable Check	C	N	Y	Y	N	NA	NA	NA
HCV-75-55	Disch. Isolation	O	N	Y	Y	N	NA	NA	NA ~~Y (Locked Open)~~
HCV-75-45	Mini. Flow Isol-D pump	O	N	Y	Y	N	NA	NA	NA ~~Y (Locked open)~~
HCV-75-36	Mini. Flow Isol-B pump	O	N	Y	Y	N	NA	NA	NA ~~Y (Locked open)~~
FCV-75-37	Mini. Flow Bypass	O	Y	Y	Y	N	NA	NA	Y

SYSTEM LPCI

GENERAL DESIGN INFORMATION

LEGEND:
O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
System I & Common HCV-74-49	Shutdown Cooling Supply Manual Isolation	O	N	Y	Y	NA	NA	NA	~~Y~~ NA (~~Locked OPEN~~)
FCV-74-48	Shutdown Cooling Inboard Supply Isolation	C	N	Y	Y	N/A	N	N	Y
FCV-74-47	Shutdown Cooling Outboard Supply Isolation	C	~~[illegible]~~ Y	Y	Y	NA	N	N	Y
FCV-74-13	Shutdown Cooling Suction C	C	Y	Y	Y	NA	N	N	Y
FCV-74-2	Shutdown Cooling Suction A	C	Y	Y	Y	NA	N	N	Y
FCV-74-97	Unit 2 & 3 Pump C Crosstie	C	Y	Y	Y	NA	N	N	Y
FCV-74-96	Unit 2 & 3 Pump A Crosstie	C	Y	Y	Y	NA	N	N	Y
FCV-74-12	Pump C Torus Suction	O	Y	Y	Y	NA	N	N	Y
FCV-74-1	Pump A Torus Suction	O	Y	Y	Y	NA	N	N	Y
H[illegible]74-85	Torus Suction	O	N	Y	Y	NA	NA	NA	~~Y~~ NA (~~Locked Open~~)

POOR ORIGINAL

90008314

SYSTEM LPCI

GENERAL DESIGN INFORMATION

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
System Ident									
HCV-74-10	Heat Exchanger A Outlet	O	N	Y	Y	N	NA	NA	~~Y~~ NA (~~Locked Open~~)
HCV-74-22	Heat Exchanger C Outlet	O	N	Y	Y	N	NA	NA	~~Y~~ NA (~~Locked Open~~)
FCV-74-100	Units 2&3 Heat Exchanger A&C Crosstie	C	Y	Y	Y	N	N	N	Y
FCV-74-52	Outboard Admission	O	Y	Y	Y	N	N	N	Y
FCV-74-46	Crosstie	C - Units 1&2 O - Unit 3	Y	Y	Y	N	N	N	Y
HCV-74-150 Unit 3 only	Crosstie	O	N	Y	Y	N	NA	NA	~~Y~~ NA (~~Locked Open~~)
FCV-74-53	Inboard Admission	C	Y	Y	Y	N	N	N	Y
FCV-74-54	Testable Check	C	N	Y	Y	N	NA	NA	NA
HCV-74-55	RHR Shutdown Cooling & Isolation	O	N	Y	Y	N	NA	NA	~~Y~~ (~~Locked Open~~) NA
FCV-74-57	Suppression Pool Spray and Recirculation Isolation	C	Y	Y	Y	N	N	N	Y
FCV-74-58	Suppression Pool Spray Isolation	C	Y	Y	Y	N	N	N	Y
FCV-74-59	Suppression Pool Recirculation & [illegible]	C	Y	Y	Y	N	N	N	Y

90008315

SYSTEM LPCI

GENERAL DESIGN INFORMATION

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

POOR ORIGINAL

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
SYSTEM 1 FCV-74-60	Containment Spray Outboard Isolation	C	Y	Y	Y	N	N	N	Y
FCV-74-61	Containment Spray Inboard Isolation	C	Y	Y	Y	N	N	N	Y
FCV-78-61	(Units 2&3 only) Fuel Pool Makeup	C	Y	Y	Y	N	N	N	Y (Locked Closed)
FCV-74-76	Head Spray (Unit 2&3 only)	C	N	N	N	Y (flow indicator)	N	Y	N
FCV-74-77	(Units 2&3 only) Shutdown Cooling Head Spray Isolation	C	Y	Y	Y	N	N	N	Y
FCV-74-78	(Unit 2&3 only) Head Spray Inboard Isolation	C	N	Y	Y	N	N	N	Y
HCV-74-86	A-Miniflo Isolation	O	N	Y	Y	N	NA	NA	~~Y (Locked Open)~~ NA
HCV-74-87	C-Miniflo Isolation	O	N	Y	Y	N	NA	NA	~~Y (Locked Open)~~ NA
FCV-74-7	Mini-flo	O	Y	Y	Y	N	N	N	Y
HCV-74-11	Condensate Supply to A Pump	C	N	Y	Y	N	NA	NA	~~Y~~ NA
HCV-74-23	Condensate Supply to C Pump	C	N	Y	[illegible]	N	NA	NA	~~Y~~ NA

90008316

SYSTEM LPCI

GENERAL DESIGN INFORMATION

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
SYSTEM 2									
FCV-74-36	Shutdown Cooling Suction D	C	Y	Y	Y	NA	N	N	Y
FCV-74-25	Shutdown Cooling Suction B	C	Y	Y	Y	NA	N	N	Y
FCV-74-98	(Units 1&2) B pump Suction Crosstie	C	Y	Y	Y	NA	N	N	Y
FCV-74-99	(Units 1&2) D pump Suction Crosstie	C	Y	Y	Y	NA	N	N	Y
FCV-74-35	Pump D Suction from Torus	O	Y	Y	Y	NA	N	N	Y
FCV-74-24	Pump B Suction from Torus	O	Y	Y	Y	NA	N	N	Y
HCV-74-88	Torus Suction	O	N	Y	Y	NA	NA	NA	~~Y (Locked Open)~~ NA
HCV-74-44	Htx D outlet	O	N	Y	Y	N	NA	NA	~~Y (Locked Open)~~ NA
HCV-74-33	Htx B outlet	O	N	Y	Y	N	NA	NA	~~Y (Locked Open)~~ NA
FCV-74-101	(Units 1&2) B&D Htx Crosstie	C	Y	Y	Y	N	N	N	Y
FCV-74-66	Outboard Admission (LPCI mode)	O	Y	Y	Y	N	N	N	Y
FCV-74-67	Inboard Admission (LPCI mode)	C	Y	Y	Y	N	N	N	Y
FCV-74-68	Testable Check	C	N	Y	Y	N	NA	NA	NA
HCV-74-69	RHR Shutdown Cooling Isolation	O	N	Y	Y	N	NA	NA	~~Y (Locked open)~~ NA
[illegible]	... Spray	[illegible]	Y	Y	Y	N	N	N	Y

POOR ORIGINAL

900008317

SYSTEM LPCI

GENERAL DESIGN INFORMATION

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
FCV-74-72	Supression Pool Spray Isolation	C	Y	Y	Y	N	N	N	Y
FCV-74-73	Supression Pool Recirc & Pump Test	C	Y	Y	Y	N	N	N	Y
FCV-74-74	Containment Spray Outboard Isolation	C	Y	Y	Y	N	N	N	Y
FCV-74-75	Containment Spray Inboard Isolation	C	Y	Y	Y	N	N	N	Y (Locked Closed)
FCV-78-61	(Unit 1 Only) Fuel Pool Makeup	C	N	N	N	Y (Flow Indicator)	N	Y	N
FCV-74-76	(Unit 1) Head Spray Flow Control	C	Y	Y	Y	N	N	N	Y
FCV-74-77	(Unit 1) Shutdown Cooling Head Spray Isolation	C	N	Y	Y	N	N	N	Y
FCV-74-78	(Unit 1) Head Spray Inboard Isolation	C	N	Y	Y	N	NA	NA	~~Y (Locked Open)~~ NA
HCV-74-90	Min Flow Manual Isolation - D pump	O	N	Y	Y	N	NA	NA	~~Y (Locked Open)~~ NA
HCV-74-89	Min Flow Manual Isolation - B pump	O	Y	Y	Y	N	N	N	Y
FCV-74-30	Mini. Flow (Sys II)	O	N	Y	Y	N	NA	NA	~~Y (Locked Closed)~~ NA
HCV-74-91	Fuel Pool to RHR	C	N	Y	Y	N	NA	NA	~~Y~~ NA
HCV-74-45	Condensate Supply to D pump	C	N	Y	Y	N	NA	NA	~~Y~~ NA
HCV-74-34	Condensate Supply to B pump	C							

SYSTEM ADS

GENERAL DESIGN INFORMATION

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

POOR ORIGINAL

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
PCV 1-5 PCV 1-19 PCV 1-22 PCV 1-30 PCV 1-31 PCV 1-34	Depressurization of primary system during accident to enable low pressure systems to inject water into the primary system	C	N	Y	N	Y	N	Y	N

90008519

SYSTEM MS·RV

GENERAL DESIGN INFORMATION

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

SAFETY AND RELIEF VALVES (ADS and MSRV, MSSV)					
Valve No.	Function	Setpoint	Cap.	Operations w/out Air	Alt. Air Supply
PCV-1-4	Primary System	4 valves set @ 1105 psig	859000		Y
PCV-1-5	Pressure Relief	4 valves set @ 1115 psig	LB/Hr	min. 5	Y
PCV-1-18	and manual	5 valves set @ 1125 psig			Y
PCV-1-19	back-up for			min. 5	Y
PCV-1-22	ADS			min. 5	Y
PCV-1-23					Y
PCV-1-30				min. 5	Y
PCV-1-31				min. 5	Y
PCV-1-34				min. 5	Y
PCV-1-41					Y
PCV-1-42					Y
PCV-1-179					Y
PCV-1-180					Y

90008320

SYSTEM RHR

GENERAL DESIGN INFORMATION

LEGEND:
O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
SAME AS LPCI									

Standby Coolant Supply System
(RHRSW/EECW)

GENERAL DESIGN INFORMATION

LEGEND:
O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Oper.	Fails Closed	Fails Set
RHRSW Header A									
HCV-23-507	Pump A2 Discharge Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-23-504	A1 to A2 Crosstie	O	N	N	NA	NA	NA	NA	NA
HCV-23-503	Pump A1 Discharge Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-23-31	A Heat Exchanger Inlet Isolation	O	N	Y	Y	N	NA	NA	NA
HCV-23-34	Heat Exchanger Outlet Isolation	C	Y	Y	Y	N	N	N	Y
Suction Pit Supply									
HCV-23-616	Suction Pit Supply	O	N	N	NA	NA	NA	NA	NA
HCV-23-617	Suction Pit Supply	O	N	N	NA	NA	NA	NA	NA
HCV-23-614	Suction Pit Supply	O	N	N	NA	NA	NA	NA	NA
HCV-23-615	Suction Pit Supply	O	N	N	NA	NA	NA	NA	NA
HCV-23-612	Suction Pit Supply	O	N	N	NA	NA	NA	NA	NA
HCV-23-613	Suction Pit Supply	O	N	N	NA	NA	NA	NA	NA

POOR ORIGINAL

90008322

STANDBY COOLANT SUPPLY SYSTEM

SYSTEM (RHRSW/EECW)

GENERAL DESIGN INFORMATION

LEGEND:
O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fail Oper.	Fa[illegible]	Fail Set
RHRSW Header B									
HCV-23-527	Pump B2 Disch Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-23-524	Pump B1 to B2 crosstie	O	N	N	NA	NA	NA	NA	NA
HCV-23-523	B1 discharge Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-23-43	B HTx Inlet Isolation	O	N	Y	Y	N	NA	NA	NA
FCV-23-46	B HTx Outlet Isolation	C	Y	Y	Y	N	N	N	Y
FCV-23-57 (Unit 2 only)	Standby Coolant Supply	C	Y	Y	Y	N	N	N	Y

POOR ORIGINAL

90008323

SYSTEM Standby Coolant Supply System (RHRSW/EESW)

GENERAL DESIGN INFORMATION

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
RHRSW Header C									
HCV-23-543	Pump C2 Discharge Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-23-544	C1 to C2 Crosstie	O	N	N	NA	NA	NA	NA	NA
HCV-23-547	Pump C1 Discharge Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-23-37	C Heat Exchanger Inlet Isolation	O	N	Y	Y	N	NA	NA	NA
FCV-23-40	Heat Exchanger Outlet Isolation	C	Y	Y	Y	N	N	N	Y

STANDBY COOLANT SUPPLY SYSTEM

SYSTEM (RHRSW/EECW)

GENERAL DESIGN INFORMATION

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
RHRSW Header D									
HCV-23-562	D2 Disch Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-23-563	D1 to D2 Crosstie	O	N	N	NA	NA	NA	NA	NA
HCV-23-566	D1 Disch. Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-23-49	D HTx Inlet Isolation	O	N	Y	Y	N	NA	NA	NA
FCV-23-52	D HTx Outlet Isolation	C	Y	Y	Y	N	N	N	Y
FCV-23-57 (UNIT 1 ONLY)	Standby Coolant Supply	C	Y	Y	Y	N	N	N	Y

SYSTEM Standby Coolant Supply System (RHRSW/EECW)

GENERAL DESIGN INFORMATION

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
EECW ~~Header~~ Pump A	~~Pump~~								
HCV-23-589	Pump A3 Discharge Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-23-681	A1 to A3 Crosstie Isolation	C	N	N	NA	NA	NA	NA	NA
North Header									
HCV-67-623	Diesel Engine C ~~Supply~~ Cooler Supply	O	N	N	NA	NA	NA	NA	NA
~~[illegible]~~						NA	NA	NA	NA.
HCV-67-518	Engine Cooler C Outlet	Set for ~~pump~~ flow	N	N	NA	NA	NA	NA	NA
HCV-67-626	Diesel Engine D Cooler Supply	O	N	N	NA	NA	NA	NA	NA
HCV-67-511	Engine Cooler D Outlet	Set for fl	N	N	NA	NA	NA	NA	NA
HCV-67-629	Diesel Engine B Cooler Supply	O	N	N	NA	NA	NA	NA	NA
HCV-67-525	Engine Cooler B Outlet	Set for flow	N	N	NA	NA	NA	NA	NA
HCV-67-633	Diesel Engine A Cooler Supply	O	N	N	NA	NA	NA	NA	NA
HCV-67-532	Engine Cooler A Outlet	Set for flow	N	N					
FCV-67-13	Diesels Sectionalizing	O	Y	Y	Y	N	N	N	Y
~~HCV-67-637~~	~~RHR Pump & Heat Exchangers Supply~~	~~O~~	~~N~~	~~N~~	~~NA~~	~~NA~~	~~NA~~	~~NA~~	~~NA~~

POOR ORIGINAL

90008526

SYSTEM Standby Coolant Supply System (RHRSW / EECW)

GENERAL DESIGN INFORMATION

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

POOR ORIGINAL

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Oper	Fails Closed	Fails Set
EECW ~~Header~~ C									
HCV-23-595	Pump C3 Header Isolation	O	N	N	NA	NA	NA	NA	NA
FCV-67-49	C1 to C3 Crosstie Isolation	C	Y	Y	Y	N	N	N	Y
HCV-67-637	RHR Pump A/C Seal Heat Exchanger Supply	O	N	N	NA	NA	NA	NA	NA
HCV-67-571	RHR Pump A Seal Heat Exch Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-67-572	RHR Pump A Seal Heat Exch Throttling	Set for flow	N	N	NA	NA	NA	NA	NA
HCV-67-574	RHR Pump A Seal Heat Exch. Outlet	O	N	N	NA	NA	NA	NA	NA
HCV-67-560	RHR Pump C Seal Heat Exch Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-67-561	RHR Pump C Seal Heat Exch Throttling	Set for flow	N	N	NA	NA	NA	NA	NA
HCV-67-562	RHR Pump C Seal Heat Exch. Outlet	O	N	N	NA	NA	NA	NA	NA
HCV-67-565	RHR Pump Room A/C Coolers Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-67-566	RHR A/C Room Cooler Throttling	Set for flow	N	N	NA	NA	NA	NA	NA
HCV-67-567	RHR A/C Room Cooler Throttling	Set for flow	N	N	NA	NA	NA	NA	NA
HCV-67-569	RHR Pump Room A/C Cooler Outlet	O	N	N	NA	NA	NA	NA	NA
HCV-67-570	RHR Pump Room A/C Cooler Outlet	O	N	N	NA	NA	NA	NA	NA

90008327

Standby Coolant Supply System

SYSTEM (RHRSW/EECW)

GENERAL DESIGN INFORMATION

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

POOR ORIGINAL

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
EECW Pump B									
HCV-23-592	Pump B3 Disch Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-23-582	B1 to B3 Crosstie Isolation	C	N	N	NA	NA	NA	NA	NA
South Header									
HCV-67-527	Diesel A Cooler Supply	O	N	N	NA	NA	NA	NA	NA
HCV-67-520	Diesel B Cooler Supply	O	N	N	NA	NA	NA	NA	NA
HCV-67-513	Diesel C Cooler Supply	O	N	N	NA	NA	NA	NA	NA
HCV-67-503	Diesel D Cooler Supply	O	N	N	NA	NA	NA	NA	NA
FCV-67-14	Diesel Sectionalizing	O	Y	Y	Y	N	N	N	Y
[redacted] HCV-67-557	[redacted] Pump Seal HTX Supply	O	N	N	NA	NA	NA	NA	NA
[redacted] HCV-67-540	Header Supply Isolation to bearing room coolers [redacted]	O	N	N	NA	NA	NA	NA	NA
HCV-67-543	Core Spray Bearing Cooler Isolation	C	N	N	NA	NA	NA	NA	NA
HCV-67-547	E Core Spray Bearing Cooler Isolation	C	N	N	NA	NA	NA	NA	NA
HCV-67-550	Isolation to Core Spray room coolers (A&C)	O	N	N	NA	NA	NA	NA	NA
HCV-67-551	Throttling Valve to A&C Core Spray Room Coolers	Set for Flow	N	N	NA	NA	NA	NA	NA
HCV-67-553	Core Spray Room Cooler Isolation	O	N	N	[illegible]	NA	NA	NA	NA
				N	NA	NA	NA	NA	NA

90008328

Standby Coolant Supply System

SYSTEM (RHRSW / EECW)

GENERAL DESIGN INFORMATION

LEGEND:
- O - Open
- C - Closed
- Y - Yes
- N - No
- NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Oper	Fails Closed	Fails Set
EECW Pump ~~[illegible]~~ D HCV-23-598	Pump D3 Disch Isolation	O	N	N	NA	NA	NA	NA	NA
FCV-67-48	D1 to D3 Crosstie Isolation	C	Y	Y	Y	N	N	N	Y

POOR ORIGINAL

90008329

Standby Coolant Supply System

SYSTEM (RHRSW / EECW)

GENERAL DESIGN INFORMATION

LEGEND:
O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
HCV-67-537	Control Bay Chiller Isolation	C	N	N	NA	NA	NA	NA	NA
HCV-67-788	Isolation to Emergency Chiller	C	N	N	NA	NA	NA	NA	NA
FCU-67-51	RBCCW HTX Isolation	C	N	Y	Y	N	N	Y	N
HCV-67-575	RBCCW HTX Isolation	O	N	N	NA	NA	NA	NA	NA
FCU-67-18 (Unit 1 & 2)	Sectionalized Isolation	O	Y	Y	Y	N	N	N	Y
HCV-67-583	Core Spray B & D Bearing Room Coolers	O	N	N	NA	NA	NA	NA	NA
HCV-67-5[illegible]	Header Isolation for RHR Seal [illegible] Room Coolers	O	N	N	NA	NA	NA	NA	NA
HCV-67-60[illegible]	RHR Pump Isolation for B seal Cooler [illegible]	O	N	N	NA	NA	NA	NA	NA
HCV-67-603	B RHR Pump B Seal Cooler Throttling Valve [illegible]	O [illegible]	N	N	NA	NA	NA	NA	NA
HCV-67-60[illegible]	RHR Pump B Seal [illegible] Cooler outlet	O	N	N	NA	NA	NA	NA	NA
HCV-67-61[illegible]	Isolation for D Cooler RHR Pump D	O	N	N	NA	NA	NA	NA	NA

POOR ORIGINAL

90008530

Standby Coolant Supply System
SYSTEM (RHRSW/EECW)

GENERAL DESIGN INFORMATION

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
HCV-67-599	RHR Pump B&D Seal HTx Supply	O	N	N	NA	NA	NA	NA	NA
HCV-67-602	RHR Pump "B" Seal HTx Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-67-603	RHR Pump "B" seal HTx Throttling	Set for flow	N	N	NA	NA	NA	NA	NA
HCV-67-605	RHR Pump "B" Seal HTx Outlet	O	N	N	NA	NA	NA	NA	NA
HCV-67-613	RHR Pump "D" Seal Htx Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-67-614	RHR Pump "D" seal HTx Throttling	Set for flow	N	N	NA	NA	NA	NA	NA
HCV-67-616	RHR Pump "D" seal HTx Outlet	O	N	N	NA	NA	NA	NA	NA
HCV-67-606	RHR Pump Room "B&D" Coolers Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-67-607	RHR Pump Room "B&D" Cooler Throttling	Set for flow	N	N	NA	NA	NA	NA	NA
HCV-67-611	RHR Pump Room "B&D" Cooler outlet	O	N	N	NA	NA	NA	NA	NA
HCV-67-609	RHR Pump Room "B&D" Cooler Throttling	Set for flow	N	N	NA	NA	NA	NA	NA

SYSTEM Standby Coolant Supply System (RHRSW/EECW)

GENERAL DESIGN INFORMATION

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
HCV-67-647	Core Spray A&C Room Coolers Supply	O	N	N	NA	NA	NA	NA	NA
HCV-67-650	Control Bay Chiller Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-67-651	Control Bay Chiller Isolation	C	N	N	NA	NA	NA	NA	NA
HCV-67-786	Emergency Chiller Isolation	C	N	N	NA	NA	NA	NA	NA
HCV-67-640	RBCCW Heat Exchangers Isolation	O	N	N	NA	N	N	Y	N
FCV-67-50	RBCCW Heat Exchangers Isolation	C	N	Y	Y	NA	NA	NA	NA
HCV-67-643	Station Air Compressors Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-67-644	Station Air Compressors Isolation	O	N	N	NA	N	N	Y	N
HCV-67-653	Station Air Compressors Isolation	C	N	Y	Y	N	N	N	Y
FCV-67-17	Sectionalizing Units 1 & 2	O	Y	Y	Y	N	N	N	Y
HV-[illegible]-655	Core Spray B&D Bearing&Room Coolers	O	N	N	NA	NA	NA	NA	NA

POOR ORIGINAL

90008332

SYSTEM Standby Coolant Supply System (RHRSW/EECW)

GENERAL DESIGN INFORMATION

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
HCV-67-586	Core Spray B Bearing Cooler Isolation	C	N	N	NA	NA	NA	NA	NA
HCV-67-590	Core Spray D Bearing Cooler Isolation	C	N	N	NA	NA	NA	NA	NA
HCV-67-593	Core Spray B&D Room Cooler Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-67-594	Core Spray B&D Room Cooler Throttling	Set for flow	N	N	NA	NA	NA	NA	NA
HCV-67-596	Core Spray B&D Room Cooler Discharge	O	N	N	NA	NA	NA	NA	NA
HCV-67-742	Emergency fuel pool cooling north header	C	N	N	NA	NA	NA	NA	NA
HCV-67-658	RHR Pumps B&D Seal Htx Supply	O	N	N	NA	NA	NA	NA	NA
FCV-67-21	North Header Unit 2 Sectionalizing	O	Y	Y	Y	N	N	N	Y
FCV-67-25	North Header Unit 3 Sectionalizing	O	Y	Y	Y	N	N	N	Y

POOR ORIGINAL

90008333

POOR ORIGINAL

Standby Coolant Supply System

SYSTEM (RHRSW/EECW)

GENERAL DESIGN INFORMATION

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
HCV-67-610	RHR Pump Room BBD Cooler Outlet	O	N	N	NA	NA	NA	NA	NA
HCV-67-793 (South Header)	Emer. Fuel Pool Cooling	C	N	N	NA	NA	NA	NA	NA
[redacted] FCV-67-22	South Header U2 [redacted] Sectionalizing	O	Y	Y	Y	N	N	N	Y
FCV-67-26	South Header Unit [redacted] 3 Sectionalized Isolation	O	Y	Y	Y	N	N	N	Y
HCV-67-743	South Header Supply to Unit 3 Diesel Generator	O	N	N	NA	NA	NA	NA	NA
HCV-67-702	Diesel Generator 3B Engine Cooler Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-67-692	Diesel Gen. 3A Inlet Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-67-712	Diesel Gen. 3C Inlet Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-67-722	Diesel Gen 3D Inlet Isolation	O	N	N	NA	NA	NA	NA	NA
67-733	Isolation to U3 SD board Chillers	C	N	N	NA	NA	NA	NA	NA

90008334

SYSTEM Standby Coolant Supply System (RHRSW/EECW)

GENERAL DESIGN INFORMATION

LEGEND:
O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
HCV-67-744	North Header Supply to Unit 3 Diesel Generator	O	N	N	NA	NA	NA	NA	NA
HCV-67-701	Diesel Gen 3B Engine Cooler Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-67-709	Diesel Gen 3B Engine Cooler Throttling	Set for flow	N	N	NA	NA	NA	NA	NA
HCV-67-691	Diesel Gen 3A Engine Cooler Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-67-699	Diesel Gen 3A Engine Cooler Throttling	Set for flow	N	N	NA	NA	NA	NA	NA
HCV-67-711	Diesel Gen 3C Engine Cooler Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-67-719	Diesel Gen 3C Engine Cooler Throttling	Set for flow	N	N	NA	NA	NA	NA	NA
HCV-67-721	Diesel Gen 3D Engine Cooler Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-67-729	Diesel Gen 3D Engine Cooler Throttling	Set for flow	N	N	NA	NA	NA	NA	NA
	Isolation to Unit 3	C	N	N	NA	NA	NA	NA	NA

POOR ORIGINAL

90008335

SYSTEM RBCCW

GENERAL DESIGN INFORMATION

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
FCV-70-1	Demin. Makeup to Surge Tank	C	N	Y	Y	N	N	Y	N
HCV-70-609	Surge Tank Drain	C	N	N	NA	NA	NA	NA	NA
HCV-70-608	Surge Tank Isolation	O	N	N	NA	NA	NA	NA	NA
FCV-70-13 (Unit 1)	Spare Pump Isolation (Suction Side)	C	Y	Y	Y	N	N	N	Y
HCV-70-613A	Pump 1A Inlet Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-70-613B	Pump 1B Inlet Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-70-501A	Pump 1A Outlet Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-70-501B	Pump 1B Outlet Isolation	O	N	N	NA	NA	NA	NA	NA
FCV-70-14	Spare Pump Dsch. Isolation	C	Y	Y	Y	N	N	N	Y
FCV-70-48	Sectionalizing Isolation	O	Y	Y	Y	N	N	N	Y
HCV-70-563	RB Equip. Drn. Sump HTX	O	N	N	NA	NA	NA	NA	NA
HCV-70-564	RB Equip. Drn Sump Htx Inlet	O	N	N	N	NA	NA	NA	NA

POOR ORIGINAL

90008336

SYSTEM RBCCW

GENERAL DESIGN INFORMATION

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
HCV-70-569	RB Equip Drn. Sump HTx Outlet	O	N	N	NA	NA	NA	NA	NA
HCV-70-570	RB Equip. Drn. Sump HTx Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-70-572	Rx Clean Up Recirc. Pump Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-70-573A	Rx. Clean Up Recirc Pump A	O	N	N	NA	NA	NA	NA	NA
HCV-70-573B	Rx. Clean Up Recirc. Pump B	O	N	N	NA	NA	NA	NA	NA
HCV-70-577A(B)	Rx Clean Up Recirc. Pump A(B) Bearing Cooler	O	N	N	NA	NA	NA	NA	NA
HCV-70-575A(B)	Rx. Clean Up Recirc. Pump A(B) ving cooler	O	N	N	NA	NA	NA	NA	NA
HCV-70-578A(B)	Rx. Cleanup Recirc. Pump A(B) Return Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-70-579	Rx. Clean up Recirc. Pump Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-70-580	Rx. Clean Up Non-Regen HTx Isolation	O	N	N	NA	NA	NA	NA	NA

SYSTEM RBCCW

GENERAL DESIGN INFORMATION

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
FCV-70-49	Rx Clean Up Non Regen Htx Outlet	Throttling	N	N	NA	NA	Y	N	N
HCV-70-588	Rx. Clean Up Non-Regen Htx Outlet Isolation	Throttling	N	N	NA	NA	NA	NA	NA
HCV-70-594A(B)	Fuel Pool Cooling HTx A(B) inlet	C	N	N	NA	NA	NA	NA	NA
HCV-70-599A(B)	Fuel Pool Cooling Htx A(B) outlet	Throttled	N	N	NA	NA	NA	NA	NA
DRYWELL ATMOSPHERE COOLING COIL A1 (Typical for A2, A3, A4, A5, B1, B2, B3, B4 + B5)									
HCV-70-508A	DW Atmosphere Cooling Coil Inlet Isolation	O	N	N	NA	NA	NA	NA	NA
FCV-70-16	Cooling Water Supply to Cooling Coil	Set to throttle	N	Y	Y	N	Y	N	N
HCV-[illegible]-514A	Cooling Coil Outlet Isolation	O	N	N	NA	NA	NA	NA	NA

SYSTEM RBCCW

GENERAL DESIGN INFORMATION

LEGEND:
- O - Open
- C - Closed
- Y - Yes
- N - No
- NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
HCV-70-547	Drywell Equip Sump Htx Inlet Isol	O	N	N	NA	NA	NA	NA	NA
HCV-70-551	Drywell Equip Sump Htx Outlet Isol	O	N	N	NA	NA	NA	NA	NA
Rx Recirc Pump Typ of A&B									
HCV-70-552A	Rx Recirc motor Bearing Supply Isol Vlv	O	N	N	NA	NA	NA	NA	NA
HCV-70-554A	Rx Recirc motor Upper Bearing Discharge Isol	~~Locked~~ O	N	N	NA	NA	NA	NA	NA
HCV-70-556A	Rx Recirc Pump Seals ~~and~~ Supply Isolation	O	N	N	NA	NA	NA	NA	NA
HCV-70-557A	Rx Recirc Pump Seal Inter Cooler Discharge Isol	O	N	N	NA	NA	NA	NA	NA

POOR ORIGINAL

9000839

SYSTEM RBCCW

GENERAL DESIGN INFORMATION

LEGEND: O - Open
C - Closed
Y - Yes
N - No
NA - Not Applicable

VALVES

Valve No.	Function	Normal Position	Local Ind.	Remote Ind.	Direct Ind.	Indirect Ind.	Fails Open	Fails Closed	Fails Set
HCV-70-558	Rx Recirc pump seal outer cooler discharge isol	O	N	~~NA~~ N	NA	NA	NA	NA	NA
FCV-70-47	Routing from Pri Cont	O	Y	Y	Y	N	NA	NA	Y
HCV-70-560 (~~[illegible]~~) Typ of 3 units	Primary Cont Return Hdr Drain	C	N	N	NA	NA	NA	NA	NA
HCV-70-571 (~~[illegible]~~ Typ of 3 units	~~[illegible]~~ Prim Cont Discharge Hdr Vent	C	N	N	NA	NA	NA	NA	NA
HCV-0-70-601	Spare ~~[illegible]~~ Htx inlet isolation	C	N	N	NA	NA	NA	NA	NA
HCV-0-70-607	Spare Htx outlet isolation	C	N	N	NA	NA	NA	NA	NA

POOR ORIGINAL

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4. Table 2.1-2a under items 1-4, 4-4, and 14-4, it is noted that some plants require on-site AC power for small break protection. Prolonged operation of RCIC & HPCI can require AC powered space coolers. The following information is required:

a) How long can these systems operate without space coolers?

b) What is operating temperature limit w/o coolers?

c) Power source for coolers

d) What specific components in each system require cooling and temperature limitation on component?

Responses to Question #4

Millstone

N/A

Dresden & Quad Cities

Calculations indicate that HPCI and RCIC can operate up to 60 hrs. and (RCIC longer due to smaller capacity) before exceeding 200°F. line break isolation trip temperature without space coolers. Even with that temp. (200°F) the turbine is not temperature limited. Limiting temperature is 200°F isolation trip for line break concern.

The space coolers are powered from safety system diesel buses.

HPCI and RCIC both have self-contained cooling systems for oil which rely only on pump discharge water.

La Salle

La Salle also has high temperature isolation but trip point is not determined yet.

The Operating temperature limit is 212°F for 0 to 6 hrs. and 150°F for 6 hrs. to 100 days. Space Coolers are powered from ESS Buses.

Fitzpatrick

RCIC does not require on-site AC power
HPCI - does not require on-site AC power.
Reactor feedpumps - needs off-site AC for condensate pumps and condensate Booster pumps.

a) How long can these systems operate without space coolers -

RCIC & HPCI systems are not required for long-term operation but do have redundant space coolers supplied by on-site AC. Continued operation without space coolers would result in trip of turbines on area high temperature.

c) Power Source - Emergency diesels.

Brunswick

HPCI, RHR and CS could probably operate from five to ten hours without room coolers. The room coolers are supplied by the vital nuclear service water header. Nuclear service water is powered by on-site and off-site AC power.

Big Rock Point, Dresden Unit 1 & Humboldt Bay

N/A

Duane Arnold

(a) How long can these systems operate without space coolers?

(b) HPCI - Emergency Cooler - 175°F Ambient - 175°F - System isolates on one signal reaching setpoint
Vent Air In-Out - dt - 50°F

RCIC - Emergency Cooler - 175°F Ambient 175°F - System isolates on one signal reaching setpoint
Vent Air In-Out dt 50°F

No operating limit as such - but if temperatures above arc reach systems isolate.

(c) HPCI coolers (IV-AC-14A&B) - Vent fans powered from Essential switchgear (1B 34 & 44)

RCIC coolers (IV-AC-15 A&B) - Vent fans powered from Essential switchgear (1B34&44)

Cooling water supplied by Emergency Service Water Essential switchgear (1B32&42)

(d) Specific components requiring cooling and temperature limit of each component?

Condensate pump
Vacuum pump

Peach Bottom

a. Answer not available at this time but it will be available in approximately two weeks.

b. HPCI and RCIC have been designed to operate at a maximum ambient temperature of 150°F.

c. The compartment unit coolers for the HPCI and RCIC systems are supplied cooling water by the Service Water System during normal plant operation. On loss of off-site power, the Emergency Service Water System automatically supplies cooling water. The fans and their controls for the unit coolers are fed from onsite AC power supplies. All Emergency Service Water System equipment is fed from on-site AC supplies. The controls for the Emergency Service Water pumps are DC.

d. The design temperature limit in answer 4B is applicable to all components of these systems.

Pilgrim

The HPCI and RCIC Systems will operate without space coolers until steam line temperature switches isolate the systems at 150°F. These temperature switches serve to protect against HPCI and RCIC steam line break transients and are not located in the equipment rooms. The loss of area space coolers can be expected to affect operation of the RCIC or HPCI system because the PNPS FSAR states that the Safety Design Basis of the equipment area cooling system is to supply cooling to the core standby cooling system electrical components. Study to date to supply an answer to questions 4a, b, and d has been unable to determine specific temperature limits, operation time or component limitations.

c. The power source for equipment area coolers is preferentially in the event of an accident i the Standby AC Power System.

Cooper

Under evaluation

Hatch

Matrix for response attached.

Shoreham

a) RCIC and HPCI do not have the capability of operation without space cooling. However, general space cooling for the systems is fully redundant, powered from onsite power sources. Total loss of space cooling is not a credible event.

b) The maximum operating temperature limit of HPCI and RCIC without unit coolers is 104°F. (The limiting components are Motor Control Centers, which will be located in an isolated environment controlled by seaprate, safety-related, and protected unit coolers).

c) Off-site and on-site AC Class IE
On-site DC Class IE

d) All HPCI and RCIC electrical equipment requires cooling with the following temperature limits:

Component	Temperature Limit
DC Motors (aux lube oil pump)	148 F
DC MOVs	212 F
RCIC Valves in the Main Steam Tunnel Penetration Area	340 F
MCCs	104 F
Cable	340 F
Penetrations (electrical)	340 F
Remote Shutdown Panel	120 F
Instrumentation	212 F
Turbine Controls	104 F Continuous - 148 F for 1 hour.

Zimmer N/A

90008343

TABLE 2.1-51-1
HATCH/UNIT 1

POOR ORIGINAL

OUT OF SERVICE	RCIC	HPCI	CST	LPCI	ADS	SRV	RHR	SCSS	LBCCW	CRD	CST	FW	Tech Spec	Time
RCIC	NA	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	3/4.5.E	7D
HPCI	YES	NA	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO	3/4.5.0	7D
CS	NO	NO	NA	YES	NO	NO	NO	NO	NO	NO	NO	NO	3/4.5.A	7D
LPCI	NO	NO	YES	NA	NO	NO	NO	NO	NO	NO	NO	NO	3/4.5.B	7D
ADS	NO	YES	NO	NO	NA	NO	NO	NO	NO	NO	NO	NO	3/4.5.F	7D
SRV	NO	NO	NO	NO	NO	NA	NO	NO	NO	[illegible]	NO	NO	1/2.6.A	0
RHR*	NO	NO	NO	NO	NO	NO	NA	NO	NO	NO	NO	NO	3/4.5.6	NA
SCSS*	NO	NO	NO	NO	NO	NO	NO	NA	NO	NO	NO	NO	3/4.5.6	7D/P 1-22/P
RBCCW	NO	NO	NO	NO	NO	NO	NO	NO	NA	NO	NO	NO	NA	NA
CRD	NO	NO	NO	NO	NO	NO	NO	NO	NO	NA	NO	NO	NA	NA
CST	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NA	NO	NA	NA
FW .	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NA	NA	NA
ONE DSL	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	3.9.B.1	7D

* - Shutdown cooling steam condensing, torus cooling, containment spray

* - Standby coolant supply steam

90008344

TABLE 2.1-51-2
HATCH/UNIT 2

OUT OF SERVICE	RCIC	HPCI	CST	LPCI	ADS	SRV	RHR	SCSS	RBCCW	CRD	CST	FW	Tech Spec	Time
RCIC	NA	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	3/4.7.3	14D
HPCI	YES	NA	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO	3/4.5.1	14D
CS	NO	NO	NA	YES	NO	NO	NO	NO	NO	NO	NO	NO	3/4.5.3.1	7D
LPCI	NO	NO	YES	NA	NO	NO	NO	NO	NO	NO	NO	NO	3/4.5.3.2	7D
ADS	NO	YES	YES	YES	NA	NO	NO	NO	NO	NO	NO	NO	3/4.5.2	14D
SRV	NO	NO	NO	NO	NO	NA	NO	NO	NO	NO	NO	NO	3/4.4.2	0
RHR*	NO	NO	NO	NO	NO	NO	NA	NO	NO	NO	NO	NO	3/4.6.5.2	30D/P 7D/P
SCSS#	NO	NO	NO	NO	NO	NO	NO	NA	NO	NO	NO	NO	3/4.5.6	30D/P 7D/P
RBCCW	NO	NO	NO	NO	NO	NO	NO	NO	NA	NO	NO	NO	NA	NA
CRD	NO	NO	NO	NO	NO	NO	NO	NO	NO	NA	NO	NO	NA	NA
CST	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NA	NO	NA	NA
FW	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NA	NA	NA
ONE DSL	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	3.8.1.1	72 HR

* - Shutdown cooling steam condensing, torus cooling, containment spray

- Standby coolant supply steam

90008345

Nine Mile Point Unit #1 - N/A.

Oyster Creek - N/A.

Browns Ferry 1, 2 & 3 - (a) RCIC - min. 2½ hours possibly much longer*; HPCI - min. 2½ hours possibly much longer*; Main Feedwater System indefinite.

(b) 148°F @ 100% humidity for RCIC & HPCI* indefinite for Main Feedwater system.

(c) RCIC & HPCI are cooled by Rx building ventilation or Core Spray and/or RHR room coolers if in operation.

Power Source: Rx building ventilation - 480V Rx Vent Bd A&B (on-site power) (backfeed); RHR or Core Spray; Room Coolers 480V Rx MOV Bd's A & B (on-site power).

Main feedwater system turbine building ventilation - 480 Turbine Bldg. Vent Bd. (off-site power).

(d) RCICS: Oil cooling - maximum oil temperature 160°F
HPCIS: Oil cooling - maximum oil temperature 160°F
Main feedwater system: Oil cooling - maximum oil temp. 180°F**

* Reference - FSAR Vol. 7, Tab - Responses to AEC Questions, dated March 25, 1971, Page Q4.8-2

** GEK 15542

QUESTION #5 - Table 2.1-2a Items 1-8, 2-8, 3-8, 4-8, 5-8, 6-8, 9-8 identify auxiliary systems that may require cooling for long-term operation. Answer questions 4a-d with regard to auxiliary systems.

RESPONSE TO QUESTION #5

Millstone - 2-8 Isolation Condenser makeup is required after 40 minutes' operation. The auxiliary system required for makeup is the firewater system which can be powered by on, off-site or diesel pump power.

4-8 HPCI/FWCI - the auxiliary system required is the instrument air system. The instrument air system requires on or off-site power and the TBSCCW system which also requires on or off-site power.

5-8 LPCS - auxiliary system required on or off-site power.

6-8 auxiliary system required on or off-site power.

9-8 shutdown cooling - auxiliary system required RBCCW system. Supplementary Pool Cooling - auxiliary system required Emergency Service Water.

4-8 auxiliary system to HPCI/FWCI - instrument air, TBSCCW; 4a-without cooling 5 minutes; 4b- 300°F; 4c-TBSCCW Power from on or off-site AC; 4d-compressor water jacket 300°F.

9-8 auxiliary system to shutdown cooling - RBCCW power from on or off-site AC - no auxiliary cooling required.

Auxiliary system to Supplementary Pool Cooling - ESW, no auxiliary cooling required.

Dresden & Quad Cities - Dresden & Quad Cities have space coolers in HPCI, RCIC, LPCI, LPCS rooms to provide cooling during accident conditions. Power for these coolers and water is from diesel generator cooling water pumps. HPCI and RCIC systems are good for 60 hours + operation without coolers. LPCI and LPCS can operate up to 24 hours, reaching a room temperature calculated to be approximately 265°F. Motor temperature design ratings are 104 and 122°F for CS and LPCI. Recommendations have been made to restore water within one hour.

Fitzpatrick - RCIC-None; HPCI-None; LPCS-None; LPCI & RHR-RHR SW pumps, RBCCW/ESW

Brunswick - See answer to Question #3.

Big Rock Point, Dresden Unit #1 & Humboldt Bay - N/A

Duane Arnold - Item 1-8 - RCIC space cooler - answered in Question #3; 2-8 - N/A DAEC (Isolation Condenser); 3-8 - N/A DAEC (HPCS); 4-8 - HPCI space cooler - answered in Question #3; 5-8 - LPCS - space cooling, lube oil and seal cooling?

Core spray is powered by on-site AC power 4160 essential switchgear. The core spray pump has an oil lubricated thrust bearing. The cooling water for the core spray lube oil is supplied by Emergency Service water,

90008347

which is also powered from the essential switchgear (onsite AC power). Therefore, power available for core spray will also mean power available for its lube oil cooling.

6-8 LPCI - same situation as core spray - auxiliary seal water cooling powered from essential switchgear as are RHR pumps.

9-8 RHR - same as LPCI and Core spray - auxiliary systems powered from same bus as primary component (RHR).

Peach Bottom - Table 2.1.2a Items 1-8, 3-8, 4-8, 5-8, 6-8 and 9-8 indicates that auxiliary cooling systems may be required for long-term operation of such primary systems as RCIC, HPCI, Core Spray and RHR. It does not indicate that there are other auxiliary systems which require cooling for the primary system to be operable. Information on space cooling required for long-term operation of the HPCI and RCIC systems is provided by Answer #4.

The compartment unit coolers for the RHR/LPCI and core spray systems, and the motor oil coolers for the core spray pumps are normally supplied cooling water by the Service Water Systems. On loss of off-site power, these components are supplied with cooling water from the Emergency Service Water System. The fans and their controls for the unit coolers are fed from on-site AC power supplies. All Emergency Service Water system equipment is fed from on-site AC supplies. The controls for the Emergency Service Water System pumps are fed from DC supplies.

Information concerning how long these primary systems can operate without space cooling is not available at this time. The RHR/LPCI and Core Spray systems have been designed to operate with a maximum ambient temperature of 150°F. This design temperature limit is applicable to all components of these systems.

Pilgrim - The RHR and Core Spray Systems require cooling from the equipment area cooling system. Question #4 comments are also applicable to this question.

Cooper - RCIC-requires cooling for long-term operation; Iso. Cond.-N/A; HPCS-N/A; HPCI-requires cooling for long-term operation; LPCS-requires cooling for long-term operation; LPCI-requires cooling for long-term operation; RHR-requires cooling for long-term operation. Under evaluation.

Hatch - See Matrix Form responses to Questions 4a-d, attached to Question #3 (4).

Shoreham - None of the auxiliary systems listed require space coolers for long-term operation. Item 2-8 (Isolation Condenser) and 3-8 (HPCS) are not applicable to Shoreham. Items 5-8 (LPCS), 6-8 (LPCI) and 9-8 (RHR) do not have lube oil systems.

Zimmer - Same as La Salle.

Browns Ferry #1, 2 & 3 - (a) 1-8 none; 2-8 N/A; 3-8 N/A; 4-8 None; 5-8 EECW no space coolers/located outside; 6-8 EECW no space coolers/located outside; 9-8 EECW same as 6-8; RHRSW no space coolers/located outside.

(b) 1-8 N/A; 2-8 N/A; 3-8 N/A; 4-8 N/A; 5-8 N/A; 6-8 N/A; 9-8 N/A.

(c) 1-8 N/A; 2-8 N/A; 3-8 N/A; 4-8 N/A; 5-8 N/A; 6-8 N/A; 9-8 N/A.

(d) 1-8 N/A; 2-8 N/A; 3-8 N/A; 4-8 N/A; 5-8 N/A; 6-8 N/A; 9-8 N/A

Oyster Creek - Item 2-8, auxiliary systems required for isolation condenser operation. None; Item 5-8, auxiliary systems required for LPCS. Normally, recirculation fans provides cooling for the rooms in which the core spray pumps are located; however, loss of these fans will not lead to pump failure.

(a) system will operate indefinitely after loss of recirculation fan for core spray pump rooms.

(b) see (a) above, exact temperature limit is not known.

(c) on-site or off-site AC.

(d) core spray pumps, temperature limitations not known.

Item 9-8 auxiliary system required for the shutdown cooling system is component cooling water (from RBCCW) for the shutdown cooling pump seals.

(a) when component cooling water is lost, pumps will keep on running, but will be leakage of primary water.

(b) information not available.

(c) Source of component cooling water is RBCCW pumps which depend on on-site or off-site AC. Operation of RBCCW system depends on service water system, power source for service water pumps are on-site and off-site AC.

(d) specific components requiring cooling or shutdown cooling pumps, temperature limitation is not known.

Item 9-8 auxiliary systems required for containment spray system include

1. recirculation fans for containment spray pump rooms
2. emergency service water system

However, containment spray pumps will continue to operate even without recirculation fans for an indefinite period without failure. The emergency service water system requires no cooling.

Nine Mile Point #1 - N/A.

QUESTION #6

Table 2.1-2a column 9b power source list is incomplete. Should identify AC requirements and if onsite or offsite, i.e., power source for auxiliary systems not identified.

RESPONSE TO QUESTION #6

Millstone

Power source requirements include for Aux. System

1. RCIC - N/A
2. Isolation cond. DC, Aux. system, makeup, on off site or diesel fire pump.
3. HPCS - N/A
4. HPCI/FWCI - DC, AC on or offsite, aux. system inst. air, on, or offsite pwr.
5. LPCS - DC, AC on or offsite
6. LPCI - DC, AC on or off site
7. ADS - DC
8. SRV - N/A
9. Shutdown cooling - DC and AC on or offsite supp.
   Suppl pool cooling
   Cont. spray
10. SSW (ESW) AC on or offsite
11. RBCCW AC on or offsite
12. CRDs DC and AC on or offsite
13. CST None required
14. Main fd.wtr. system - AC on or offsite (includes aux. sys. inst. air & TBSCCW)
15. Recirc. Pump - AC on or offsite motor cooling system

Dresden & Quad Cities

Column 9b of Table 2.1-2.a addresses power supply for logic system and they are as listed in the Table.

Fitzpatrick

RCIC - None
HPCI - None
LPCS - None
LPCI - RBCCW - Off-site AC
RHR RHR SW - on-site AC
Space coolers "
RBCCW - Service water off-site AC with automatic transfer to ESW onsite AC
CRDS - Turbine or Rx. bldg. cooling water off-site AC
CST - None
Feed - Condensate off-site AC
TBCCW - off-site AC
SW - Offsite AC
Feedpump ventilation on-site AC
instrument air for startup - on site AC
Recirc. - RBCCW - off-site AC

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Brunswick

RCIC, HPCI, RHR, and CS room coolers are supplied by nuclear service water. Power supply is AC on-site and AC off-site.

Big Rock Point, Dresden Unit #1 & Humboldt Bay

N/A

Duane Arnold

Column 9b is designated to identify the power source requirements for the system initiation logic listed in column 9a. The power source requirements for system operation are identified in Column 4 of Table 2.1-2a.

Peach Bottom

The response in Table 2.1.2a column 96 identifies the power source requirements for the automatic initiation logic of the ECCS systems. No AC power supplies are required for this relay logic to operate. The HPCI and RCIC room coolers receive initiation signals from the same logic that starts the systems they serve. A auxiliary contacts in the pump motor breakers provide initiation signals for the core spray and the RHR/LPCI room coolers.

Pilgrim

Auxiliary Systems power source		Main F.W. System	AC
RHR	AC		
SSW	AC	Recirc. pp.	
RBCCW	AC	Motor Cooling Sys.	AC
CRC	AC		

Cooper:

Under evaluation

Zimmer

Power for space coolers is from essential busses.
Service water pumps are powered from essential busses.

Hatch

The power source denoted in column 9.G of Table 2.1-2a is the logic power source for automatic initiation systems only. The power source required for total system operation including auxiliary systems required is denoted in Table 2.1-2a Column 4.

Shoreham

Power source required for system operation (including support systems) is listed under Table 2.1-2a column 4 - which includes AC onsite, offsite etc. as applicable. Column 9b appears to reference power source for auto-startup logic. If so, the power source as listed under 9b is correct i.e. logic curcuits are powered from onsite battery (DC).

Oyster Creek - Power sources required for system (including auxiliary systems) operation:

1.	Isolation Condenser	On-site, DC
2.	LPCS	DC, On-site or off-site, AC
3.	ADS	DC
4.	Safety Valves	None
5.	Relief Valves	DC
6.	Shutdown cooling, Containment Spary	DC, On-site or off-site, AC
7.	SSW	DC, On-site or off-site, AC
8.	RBCCW, Recirculation Pump/Motor Cooling System	DC, On-site or off-site, AC
9.	CRDS	DC, On-site or off-site, AC
10.	CST	DC, Off-site, AC
11.	Main Feedwater System	DC, Service air, off-site, AC

Nine Mile Point - We originally responded to this question thinking the NRC was asking power source for startup logic. Power source for system and auxiliary systems in Items 9b are as follows:

All systems require off-site AC (115 kV) or on-site AC (diesel/generator) except for: HPCI (FWCI) - requires off-site AC not loaded on diesels; ADS - requires DC power for operation of solenoids; SRV - requires no power source; CST - requires no power source.

Browns Ferry - See Attached Pages.

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Browns Ferry

		Power Sources/Auxiliary Systems						
		Primary System			Auxiliary System			
		Normal A.C.	Emerg. A.C.	D.C.	Name	Normal A.C	Emerg. A.C.	D.C.
RCICS	1-9b	N/A	N/A	Y	ALT. D-C	N/A	N/A	Y
	2-9b	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	3-9b	N/A	N/A	N/A	N/A	N/A	N/A	N/A
HPCIS	4-9b	N/A	N/A	Y	ALT D.C.	N/A	N/A	Y
Core Spray	5-9b	Y	Y	no	CONTROL POWER	N/A	N/A	Y
					EECW	Y	Y	NO
					ROOM COOLER	Y	Y	no
					CHG. H_2O	Y	no	no

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Browns Ferry

	Power Sources/Auxiliary Systems						
	Primary System			Auxiliary System			
	Normal A.C.	Emerg. A.C.	D.C.	Name	Normal A.C	Emerg. A.C.	D.C.
LPCI 6-9b	Y	Y	no	CONTROL POWER	n/A	n/A	Y
				EECW	Y	Y	N
				ROOM COOLER	Y	Y	N
				CHARGING H_2O	Y	N	N
ADS 7-9b	N	N	Y	ALT D.C.	N	N	Y
SRV 8-9b	N	N	Y	ALT D.C.	N	N	Y
RHR 9-9b (incl. S.D. COOLING, SUPP. POOL COOLING, CNTMT SPRAY)	Y	Y	Y*	CONTROL POWER	N/A	N/A	Y
				EECW	Y	Y	N
				ROOM COOLER	Y	Y	N
				CHG. WATER	Y	N	N
				RHRSW	Y	Y	N
Standby Service 10-9b Water (assumed RHRSW)	Y	Y	N	CONTROL POWER	N	N	Y

*(D.C. REQUIRED FOR S.D. COOLING, FCV 74-47)

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Browns Ferry

		Power Sources/Auxiliary Systems						
		Primary System			Auxiliary System			
		Normal A.C.	Emerg. A.C.	D.C.	Name	Normal A.C	Emerg. A.C.	D.C.
RBCCW	11-9b	Y	Y	N	CONTROL POWER	N	N	Y
					RAW COOLING WATER	Y	Y	N
					RCW CONTROL POWER	N	N	Y
					EECW	Y	Y	N
					DEMIN WATER	Y	N	N
					CONTROL AIR	Y	Y	N
CRD	12-9b	Y	Y	N	CONTROL POWER	N	N	Y
					CONTROL AIR	Y	Y	N
					RAW COOLING H_2O	Y	Y	N
					RAW COOLING H_2O CONTROL POWER	N	N	Y
CST	13-9b	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Browns Ferry

POOR ORIGINAL

	Power Sources/Auxiliary Systems						
	Primary System			Auxiliary System			
	Normal A.C.	Emerg. A.C.	D.C.	Name	Normal A.C	Emerg. A.C.	D.C.
Main Fd. Wtr. Sys. 14-7b	Y	N	Y	CCW	Y	N	N
				OFF. GAS	Y	N	Y(logic)
				MAIN STEAM	Y	N	Y(logic)
				RAW COOLING WATER	Y	Y	N
				CNDS SYS.	Y	N	N
Recirc. Pump / Motor Cooling Sys. 15-9b	Y	Y	Y VLV OPERATION + OIL PUMP ONLY	CRD	Y	Y	N
				RBCCW	Y	Y	N
				RAW COOLING H2O	Y	Y	N

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QUESTION #7

Table 2.1-2a and 2.1-2b column 11, manual actions required and how long they take is a short term item that was not addressed.

RESPONSE TO QUESTION #7

Millstone

1.	RCIC N/A	
2.	Isolation Cond. -	No action required
3.	HPCS N/A	
4.	HPCI/FWCI	No action required
5.	LPCS	No action required
6.	LPCI	No action required, Operator may adjust flow
7.	ADS	No operator action required
8.	SRV	No action required
9.	Shutdown cooling	Operator may control cooldown
	Supp. Pool Cool.	No action required
	Cont. spray	No action required
10.	SSW (ESW)	Operator may adjust flow
11.	RBCCW	No action required
12.	CRDs	No action required
13.	CST	No action required
14.	Main Fd. wtr. Sys	No action required
15.	Recirc. pump/motor Cooling system	No action required

Dresden & Quad Cities

Specific times were not addressed initially due to various plant differences. For CECo BWR plants manual initiation from the control room can be accomplished from 2 to 5 minutes.

Fitzpatrick

RCIC - <5 min.
HPCI - "
LPCI - "
ADS - "
SRV - "
RHR - <15 min.
RBCCW - <30 "
CRDS - <10 "
CST - N/A
Rx. feed - <10 min.
Recirc. - <10 min.

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Brunswick

a. RCIC - Open steam supply valve and injection valve are less than one minute.

b. Isolation condenser - N/A

c. HPCS - N/A

d. HPCI - Open steam supply valve and injection are less than one min.

e. LPCS - Start pump open injection valve is less than one minute

f. LPCI - Start pump open injection valve is less than one minute

g. ADS - Turn control switches are less than one minute.

Big Rock Point, Dresden Unit 1 & Humboldt Bay

The manual actions performed in the control room, it was thought, which could be done in a matter of seconds were not described here as it is purely arbitrary. Where actions were required outside the control room approximate times were denoted for the BWR/1 plants. Note 9a-11 to take 2.1-2b should be edited as the less than 15 minute time period applies to all three plants not just D-1 and HB.

Duane Arnold

Table 2.1-2b not applicable to DAEC.

Time required for manual initiation of operable system, normal full power lineup

a) RCIC

Actions 1) Start ESW pumps
2) Start area coolers
3) Open lube oil cooler valve
4) Start vacuum pump
5) Open stm supply valve
6) Open inject valve, control flow with auto/man controller

Total time = 1-2 minutes

b) Isol. cond. - system not at DAEC
c) HPCS - system not at DAEC
d) HPCI

Actions 1) Start ESW pumps
2) start area coolers
3) Open lube oil cooler valve
4) start vacuum pump
5) open stm. supply valve
6) start aux. oil pump
7) Open inject valve, control flow with auto/man controller

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Total time 1-3 minutes

e) LPCS

Actions 1) start ESW pumps
2) start room coolers

3) start core spray pumps
4) open inboard throttle valve when core spray reactor low pressure interlock allows it.

Total time: 1 min. or less per system if reactor low press. signal is already in.

f) LPCI

Actions
1) start ESW pumps
2) start room coolers
3) isolate recirc loops and secure reactor recirc pumps
4) start RHR pumps
5) Open inject valve on selected loop when RHR reactor low pressure signal removes the interlock

Total time: 4 min. or less if RHR reactor low press. signal is already in.

g) ADS

Actions 1) Open 4 ADS Valves

Total time: 20 seconds

Peach Bottom

Table 2.1.2a column II responded to the question "Can manual initiation of the system be done in the control room? (yes/no). If no, what actions are required and how long will they take? Since we answered yes for all systems, no information on actions required and times involved had to be provided.

Pilgrim

N/A

Cooper

N/A

Hatch

As mentioned in the report in section 2.1.2 System Actuation, paragraph 2.1.2.5, all manual actions can be accomplished from the control room, so procedures, time required, and manpower required are not relevant.

These systems are lined up to be auto started or are in operation during normal plant operation. Actuation time in all cases should only be a function of the time for the operator to reset to initiate the system. There should be no time delays required for any system acutation or restart.

Shoreham

The question originally addressed in the short term was whether manual initiation of each system could be done in the control room, and if not, what actions would be required and how long would they take. In fact, as shown in the generic submittal, all systems in question can be operated manually from the control room, therefore manual actions outside the control room, and times required, are not applicable to this response. Note: For RHR system, RPV head spray in the shutdown cooling mode and system warmup prior to shutdown cooling may require valve lineup in the reactor building depending on the RHR pumps available and selected. These actions would take approximately 15 minutes,but are not essential for post accident recovery.

Zimmer

Since no manual actions are required none were given.

Oyster Creek

Since systems can be manually initiated in the Control Room, they can be accomplished in seconds.

Nine Mile Point #1

Manual actions required are only for operation to turn a switch to activate a system. Less than 30 seconds.

Browns Ferry Unit 1, 2 & 3

No response to this question required. All answers were yes.

90008360

QUESTION #8

Table 2.1-2b, Note 2-8, how long can isolation condenser remove heat without makeup?

RESPONSE TO QUESTION #8

Millstone - Isolation condenser can operate for 40 minutes without makeup - makeup is automatic.

Dresden & Quad Cities - N/A

Fitzpatrick - N/A

Brunswick - N/A

Big Rock Point, Dresden Unit 1 & Humboldt Bay - Capacities for the isolation condensers to remove heat without makeup are BRP, 4 hours; D-1 and HB, 8 hours.

Duane Arnold - N/A

Peach Bottom - Does not apply to BWR 4's.

Pilgrim - N/A

Cooper - N/A

Hatch - N/A

Shoreham - N/A

Zimmer - N/A

Oyster Creek - N/A

Nine Mile Point - N/A

Browns Ferry Unit 1, 2 & 3 - N/A

QUESTION #9

Tables 2.1-4 for systems such as LPCI, LPCS and HPCS. Are there no trips on component malfunctions. i.e., high pump bearing temperatures or loss of coolant to pump bearing.

RESPONSE TO QUESTION #9

MILLSTONE

Trips on motor current.

DRESDEN & QUAD CITIES

Dresden and Quad Cities have no trips on component malfunctions other than overcurrent.

La Salle has LPCI trips of overcurrent, suction valves not full open and lost voltage LPCS trips of overcurrent and low voltage.

NPCS trips on overcurrent only.

FITZPATRICK

HPCI & RCIC have no such trips.
LPCS & LPCI have immediate over current trip for rotor lockout.

BRUNSWICK

No, all trips are listed.

ZIMMER

There are no trips of the type listed in the question.

BIG ROCK POINT, DRESDEN UNIT 1 & HUMBOLDT BAY

N/A

DUANE ARNOLD

LPCI - RHR pumps are protected with overload trips which are set to maintain power to the motors as long as possible without immediate damage to the motors or harm to the emergency power supply.

LPCS - Core spray pumps are protected with overload trips also.

PEACH BOTTOM

Core Spray and LPCI pump motors are provided with overload and undervoltage protection. No other trips exist.

PILGRIM

N/A previously answered.

COOPER

Our LPCI pumps have no high bearing temp. trips.

HATCH

Tables 2.1-4 for systems such as LPCI, LPCS, and HPCS. Are there no trips on component malfunctions i.e., high pump bearing temp. or loss of coolant to pump bearing.

SHOREHAM

Tables 2.1-4 for systems such as LPCI, LPCS, and HPCS. There are no trips or component malfunctions, i.e., high pump bearing temperatures or loss of coolant to pump bearing.

Ans.

System	Component Malfunction trips
RCIC	----------
HPCI	-----------
LPCS	Electrical faults
LPCI	Electrical faults
RHR	Electrical faults
SSW	Electrical faults
RBCLCW	Electrical faults
CRDS	Electrical faults
FEEDWATER	------------
RECIRC/	Electrical faults Lube oil pressure, oil temp. high

NINE MILE POINT

N/A

BROWNS FERRY 1, 2 & 3

N/A

90009003

OYSTER CREEK

Trips due to component malfunction:

System	Trips
Isolation Condenser	None
LPCS - core spray pumps	bus undervoltage, motor fault, ground fault
- booster pump	bus undervoltage, motor fault
ADS	loss of DC Power
Safety Valves	None
Shutdown Cooling	Overcurrent trip for pumps
Containment Spray	Overcurrent trip for pumps
RBCCW	Undervoltage and overcurrent trip for pumps
CRDS	Undervoltage and overcurrent trip for pumps
CST	Overcurrent trip for condensate transfer pumps

QUESTION #10

One of the systems requests for information that has not been adequately addressed in NEDO-24708 is the loss of feedwater transient coupled with a stuck-open SRV and loss of off-site power and diesels. From the information provided, it is not possible to determine what the end result of this scenario would be. Since all the plants have various combinations of HPCI, RCIC and IC systems, SRV with varying relieving capacities, and varying stored energies, the results are plant specific. Therefore, for all the plants or plant types identified in NEDO-24708, provide the following time dependent plots for the above scenario:

(a) steam and coolant inventory lost

(b) coolant temperature and pressure

(c) coolant makeup (where applicable)

(d) reactor vessel water level relative to top of active fuel

(e) fuel and cladding temperatures

The initial plant conditions assumed in the analyses, the time assumed for startup of the available systems and the time the RCIC and HPCI can operate before the system depressurizes below their operating conditions should be provided. In addition, identify when equilibrium conditions are achieved (core covered and water level maintained in normal operating range); if core uncovery occurs, identify when, time duration, and extent of core damage (include basis).

RESPONSE TO QUESTION #10

Question #10 was answered by General Electric in their September 28th submittal as Question #13.

90009004