GENERAL ELECTRIC

NUCLEAR POWER

SYSTEMS DIVISION

GENERAL ELECTRIC COMPANY, 175 CURTNER AVE., SAN JOSE, CALIFORNIA 95125
MC 682, (408) 925-5722
RHB 016-80

MFN 055-80

March 12, 1980

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

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

Gentlemen:

Subject: RESPONSE TO TEN SYSTEMS QUESTIONS CONCERNING NEDO-24708

References:

1) 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

2) Letter, W.J. Armstrong (BWR Owners' Group) to D.F. Ross (USNRC), "Response to Supplementary Ten (10) System Questions Concerning NEDO-24708," January 2, 1980

3) Letter, R.H. Buchholz (GE) to D.F. Ross (USNRC), "Response to Supplementary Ten (10) System Questions Concerning NEDO-24708," January 4, 1980

Reference 2 transmitted to you the responses to the questions contained in Reference 1. Reference 3 transmitted sixty copies of the same.

Reference 2 included a plant-unique response for Vermont Yankee dated December 26, 1979 which was not included in the Reference 3 package. A plant-unique response for Monticello dated January 25, 1980 was not included in either Reference 2 or Reference 3. In order to complete the responses for all operating plants, this letter officially transmits to you sixty copies of both the Vermont Yankee and Monticello responses.

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

Very truly yours,

R H Buchholz

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

RHB:jlk/1315-16

Enclosure

cc: W. J. Armstrong
T. D. Keenan
P. W. Marriott

VERMONT YANKEE NUCLEAR POWER CORPORATION

SEVENTY SEVEN GROVE STREET

RUTLAND, VERMONT 05701

REPLY TO:
ENGINEERING OFFICE
TURNPIKE ROAD
WESTBORO, MASSACHUSETTS 01581
TELEPHONE 617-366-9011

B.4.1.1
WVY 79-146

December 26, 1979

Mr. W. J. Armstrong
BWR Owners Group
c/o Boston Edison Company
800 Boylston Street
Boston, MA 02199

Reference: Your letter NOD Letter No. 79-221 of October 16, 1979.

Dear Sir:

Answers to Systems Questions on NEDO-24708
(I&E Bulletin 79-08 Generic Answer by GE)

Enclosed please find our response, for further transmittal to the United States Nuclear Regulatory Commission.

Very truly yours,

VERMONT YANKEE NUCLEAR POWER CORPORATION

R. L. Smith
Licensing Engineer

RLS/nj

Enclosure

Question No. 10/1

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?

Answer

RHR system is orificed. No throttling is required. Core Spray System does not require any throttling initially. Operating procedure contains sufficient guidelines should throttling in the long-term (when reactor pressure is low or atmospheric) be necessary.

Question No. 10/2

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?

Answer

Core spray pump and motor require no water cooling. RHR pumps require seal cooling which is required only for shutdown cooling mode. Cooling is supplied by RBCCW system which operates automatically in the event of a loss of power. Service water operates automatically also, to cool RBCCW.

Question No. 33/1

With regard to Tables 2.1.4a through 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?

Answer

For all valves in the system refer to latest P&ID drawings submitted to B&O Task Force with answers to Containment questions. Generally AE did not add additional valves to NSSS vendor safety systems.

Question No. 33/3

In Figures 2.1.2 and 2.1.5 why are turbine stop valves and control valves shown open for RCIC and closed for HPCI System?

Answer

Valves are shown in the correct positions for standby condition for systems. Both turbines are of Terry Company supply but control valves function differently. HPCI valves are opened by oil pressure, RCIC valves are closed by oil pressure.

Question No. 33/4

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 and 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?

Answer

HPCI

(a) There is no space cooler in the HPCI room. This turbine pump set is located in a separate room, off the southwest corner of the reactor building basement. Room cooling is provided by the normal building HVAC which supplies air to the room and exhausts it. (Additional Cooled air enters the room through the single door, from the adjacent room housing the CRD pumps and a 4200 cfm space cooler, powered by emergency on-site AC. This flow is induced by normal HVAC).

During accident conditions, reactor building HVAC is stopped, thus there is no cooling to the HPCI room even with diesels available.

During all surveillance tests to date, room temperature has not been a problem. However, these were done with normal HVAC in service.

Scoping calculations indicate that room temperature should not be a problem, with the only cooling being by conduction through the concrete walls, floor and ceiling. More than sufficient heat removal capacity exists because the room is very large and underground.

(b) Operating temperature limit of the governor is approximately 150°F for the point beyond which failure could occur.

(c) Diesels, but not applicable.

(d) HPCI lube oil is cooled by the water pumped, so it will remain within operational limits regardless of room air temperature.

The electronic governor requires no forced cooling but must operate at 150° or less, it is estimated, to prevent failure.

RCIC

(a) - (d)

Same situation as HPCI, except no cooled air from an adjacent room; just HVAC cooling.

Question No. 33/5

Table 2.1a Item 14-4, Why doesn't CST require power for level indication?

Answer

CST level indication does require power. This level indication is not needed for immediate safety function, i.e., HPCI injection; it is only needed to eventually automatically transfer HPCI suction to the torus when CST tank is low, which will happen on loss of power.

Question No. 33/6

Table 2.1-2a Items 1-8, 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.

Answer

1-8 RCIC Same situation as HPCI described in answer to question 4.

2-8, 3-8. Not applicable to Vermont Yankee.

4-8 HPCI Answered in Question 4.

5-8, 6-8, 9-8 Core Spray and RHR Systems (LPCI and RHR modes).

These pumps are AC powered and located in sets in the Northeast and Southeast corner rooms of the reactor building. The RHR service water pumps are in the same rooms. There are two coolers in each room powered by emergency AC. Auxiliaries are Reactor Building Closed Cooling Water for RHR and Service Water to RBCCW.

The coolers are AC powered as are the pumps.

The Service Water pumps are located in the pump house, adjacent to the river. There are multiple roof ventilators, AC powered. The building is large and would be cooled by natural circulation and conduction in the event of loss of all ventilators during a reactor accident. Under these conditions only one service water pump will be required. The pump and motor will remain well below a temperature at which failure might occur under these conditions.

Question No. 33/7

Table 2.1-2a Item 14-8. What are requirements for feed pump ventilation system? Answer questions 4a-d with regard to this system.

Answer

The feed pump room is cooled by four AC air coolers, cooled by service water. Feed pumps would not be run unless off-site AC power was available. Feed and condensate pumps are AC powered. Failure of all four feed pump room coolers is not likely.

Question No. 33/8

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.

Answer

Original response in Column 9b listed power source for the relay logic in Columns 9a. Motive power sources for equipment listed in Column 4. Power source for needed auxiliaries is on-site AC, but main feedwater would not be used in the absence of off-site AC.

Question No. 33/9

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.

Answer

If manual initiation of any one ECCS system was required, assuming failure to initiate automatically, this can easily be done from the Control Room in much less than one minute. This time is measured from the point where the operator decides to manually initiate the system.

RCIC	open steam valve, start turbine and auxiliary, open injection valve
HPCI	same as RCIC
LPCS	start pump, open injection valve
LPCI	same as core spray
ADS	open valve
SRV	NA
RHR	alter LPCI auto initiate, all other functions are manual
SSW	start pump
RBCCW	start pump
CRDS	start pump
CST	start pump

Question No. 33/10

Table 2.1-2a Column 12, there appears to be an inconsistency between note I-12 which states that logic system functional tests and surveillance testing of systems may impede systems for auto initiating and response as given in Column 12.

Answer (33/10)

When instruments are tested, this is done one at a time. If an accident happens, systems will still initiate due to one out of two, twice, logic. When relay logic is tested once every six months, ECCS subsystems are disabled one at a time; RHR is only one system for the logic test. All other systems must be operable during this test.

Question No. 33/11

Table 2.1-2a Column 13, inconsistency between response and notes. Plants for which operation is performed should be identified. Also for ADS doesn't operator eventually have to close ADS valves?

Answer

Optional Operator actions within 2 hours are:

RCIC	flow setpoint adjust to control reactor level
HPCI	flow control. If not done, unit will trip on high level, restart on low.
LPCS	throttling to control flow and pump cavitation at low reactor pressures. Not necessary.
LPCI	None
ADS	None. Valves will close by spring force at very low pressure, reopen if pressure rises again.
RHR	Manual initiation of torus cooling, torus spray or containment spray is required.
SSW	None
RBCCW	None

Question No. 33/12

Table 2.1-2a and 2.1-2b Column 17c. Identify size debris strainer will allow to pass instead of just stating strainer size is coarse.

Answer

Core Spray, RCIC, HPCI, RHR strainer size one eighth inch. RHRSW strainer one eighth inch. Service water strainer 1/32 inch.

Question No. 33/13

Table 2.1-2a, for note X-24 clarify what is meant by indirect indication on manual valves. Also identify which plants comments applicable to.

Answer (33/13)

See answer to question 1. Indirect indication does not apply to Vermont Yankee. All in-line valves have direct indication in the Control Room.

Question No. 33/14

Table 2.1-2a, there appears to be an inconsistency between "no" responses in Column 25 and Note X-25.

Answer

Vermont Yankee has a procedure for shutdown from outside the Control Room. There is no remote shutdown panel.

uestion No. 33/15

Table 2.1-2a, Column 26, identify other means of detecting leaking SRV.

Answer

Vermont Yankee has thermocouples on relief discharge pipes. Pressure switches to detect leakage will be installed early in 1980, when delivered. Sensing lines for these pressure switches were installed during the last refueling outage. Acoustic detectors will be added to SV's.

Question No. 33/16

Table 2.1-2a, and 2.1-2b, response incomplete. Would like to know plants that perform independent procedure verification and which do physical verification and if there is any significant differences in performance.

Answer

At Vermont Yankee a valve lineup is made from check sheet. This is reviewed by the Shift Supervisor. Changes in lineup for maintenance are done with written tagging orders. Changes for surveillance are done by procedure. There is no physical second check of valve position once formally reported by an operator.

Question No. 33/23

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?

Answer

Protective trips are as listed, except that core spray and RHR pump motors are protected by standard overcurrent protective relaying in the circuit breakers.

Question No. 33/24

Table 2.1-4d, what is source of auto isolation signal identified under trip conditions?

Answer

"Auto isolation" of HPCI as a turbine trip refers to all the trips listed above under "Turbine Isolation Trips".

Question No. 33/25

Table 2.1-4m&n identify turbine and pump protection trips. Table 2.1-4m under degraded conditions, reduced capacity, what is significance of term "Open"?

Answer

Don't understand question. Does not appear correct. Table 2.1-4n-2, Motor Driven Feedwater Pumps, under degraded conditions, air operated valves fail "as in", locking in position on loss of air or electric signal.

Question No. 33/30

Table 2.1-2a, Column 8. Isn't service air required as an auxiliary system to operate the main feedwater system?

Answer

Instrument air is required, for normal operation. Valves can be opened without air, locally, if necessary.

Question No. 33/32

Table 2.1-2a, Column 16d. For small break is ADS required for manual operation of backup water source sufficient to prevent core uncovery if HPCI or HPCS not available?

Answer

See response to NUREG 2.1.7 SBA guidelines.

NSP

NORTHERN STATES POWER COMPANY

Monticello Nuclear Generating Plant
Monticello, MN 55362

January 25, 1980

W. J. Armstrong
Boston Edison Company
General Offices
800 Boylston Street
Boston, Massachusetts 02199

Dear Mr. Armstrong;

Per your letter dated October 16, 1979, the attached responses to the NRC TMI related questions are submitted.

Sincerely,

M. H. Clarity
Plt. Supt., Engr. & Rad. Prot.

by D. D. Antony
D. D. Antony
Supt., Operations Engineering

MHC/DDA/sdd

Attachment(s)

RESPONSE TO SYSTEMS QUESTION CONCERNING NEDO-27708

1. The LPCI System at Monticello does not have to be throttled to insure adequate NPSH. Operating procedures for the LPCS system require throttling to assure adequate NPSH. We are presently in the process of verifying the need for throttling and will evaluate the possibility of additional orificing if throttling is required.

   If adequate NPSH is not available cavitation can occur. Operation of a pump under cavitation conditions over a period of time can result in cavitation erosion or pitting of the impeller.

2. With respect to lube oil and seal cooling, Note 9-8 for Table 2.1 - 2a applies to Monticello.

RESPONSE TO NRC TMI QUESTIONS (1-33) - MONTICELLO PLANT

1. We need a clarification on what is being asked. Tables 2.1.4a thru 2.1.4n do not address manual valves.

2. Not applicable to Monticello.

3. The stop and control valves for both the HPCI and RCIC systems are hydraulic (oil) operated valves. The HPCI system has an electrically driven auxiliary oil pump that supplies oil to these valves to open them upon HPCI initiation. The RCIC System has no auxiliary oil pump. Oil pressure is obtained from a turbine-driven oil pump. Therefore to operate the valves, they must initially be open to allow steam to drive the turbine. Once oil pressure is sufficient they are driven to their normal operating positions.

4. (a) The HPCI can operate for 60 hours without space cooling. The RCIC can operate for 115 hours without space cooling.

   (b) The operating temperature limit for both systems w/o coolers is 148°F.

   (c) One HPCI cooler is powered from the #15 emergency bus and the other is powered from the #16 emergency bus. The RCIC only has one cooler. It is powered from the #16 emergency bus.

   (d) The limiting component in each system which requires cooling is the turbine governor panel and associated components. The temperature limitation is 148°F.

5. The CST's do require power for level indication. The power source is on-site (essential) AC.

6. Items 1-8, 2-8, 3-8, 4-8, 5-8 and 6-8 have no auxiliary systems. Item 9-8, RHR, does require RBCCW and RHR SW. These auxiliary systems do not require any space cooling.

7. Ventilation is not required for feed pump operation.

8. Table 2.1-2a Column 9b is complete. There is no AC power required for startup logic. (The question and column 9b do not address auxiliary systems).

9. Table 2.1-2b Column 11 is correct and complete. The question required further information on required action and time if negative answers were given.

10. For items 1, 4, 5 and 7 (RCIC, HPCI, LPCS and ADS) ECCS initiation signals override all other modes of operation. LPCI will not be automatically initiated if RHR is in the shutdown cooling or fuel pool cooling modes.

11. Notes 1-13, 4-13, 5-13 and 6-13 apply to Monticello as written. No actions are required for operation of the system, however the operator will throttle the system flow once water level is recovered. Notes 2-13 and 3-13 do not apply since Monticello does not have an Isolation Condenser or HPCS. No, the operator does not eventually close the ADS valves. The valves automatically close at 20 psig and will re-open when pressure rises to 20 psig.

12. The strainers for items 1, 4, 5, 6 and 9 have one-eighth inch (1/8") holes. Item 10 at Monticello has no strainers. Item 14 has condensate pump suction strainers, however, we have been unable to find documentation of the size.

13. Note X-24 is applicable to Monticello on all systems except items 7 and 8, ADS and SRV. These two systems have no manual valves. All manual valves in the main flow paths of the emergency safeguards systems (items 1, 4, 5, 6 and 9) are locked open and administratively controlled. All manual valves on these systems that are inside containment and in the main flow path also have control room position indication. Indirect indication means that system parameters such as flow and pressure are used to verify the manual valves are in the correct position.

14. Monticello does not have a remote shutdown control panel.

15. The discharge temperature sensors are the only means Monticello has of detecting SRV leakage.

16. At Monticello, independent procedure verifications are performed by the Shift Supervisor and System Engineer.

17. - 22. Questions 17 through 22 are not applicable to Monticello.

23. Each of the LPCI and LPCS pumps will trip on motor ground fault or phase overcurrent conditions. There are no other component malfunction trips.

24. The auto isolation signals are:

    1. HPCI steam line high flow (300,000 lb/hr or 150,000 lb/hr sustained for 45 seconds).

    2. HPCI steam line low pressure (126 psig).

    3. HPCI steam line area high temperature (186°F).

25. This question does not apply to the CST's (Table 2.1-4m). Monticello has motor driven feedwater pumps (Table 2.1-4n-2). The pumps are provided with a low suction pressure (less than 85 psig for 5 seconds) trip.

26. - 29. Questions 26 through 29 are not applicable to Monticello.

30. Yes

31. Not applicable to Monticello.

32. For a small break with HPCI not available, manual operation of the backup water source (suppression pool) is not required to prevent core uncovery since ADS, LPCI and LPCS will auto initiate.

33. Not applicable to Monticello.