POWER AUTHORITY OF THE STATE OF NEW YORK

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

Attention: Mr. Steven A. Varga, Chief
Operating Reactors Branch No. 1
Division of Licensing

Subject: Indian Point 3 Nuclear Power Plant
Docket No. 50-286
Reactor Coolant System Vents
(Item II.B.1, NUREG - 0737)

Dear Sir:

The enclosed Attachment I to this letter contains the Authority's responses to your request, dated February 25, 1982, for additional information concerning the Indian Point 3 reactor coolant system vents.

Should you or your staff have any questions, please contact us.

Very truly yours,

J.P. Bayne
Senior Vice President
Nuclear Generation

cc: Attached

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cc: Mr. W.H. Baunack, Acting Chief
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ATTACHMENT I

ADDITIONAL INFORMATION FOR

REACTOR COOLANT SYSTEM VENTS

April 26, 1982

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
DOCKET NO. 50-286

Question 1

Verify that the reactor vessel head vent system (RVHVS) flow restriction orifices are smaller than the size corresponding to the definition of a loss-of-coolant accident (10 CFR Part 50, Appendix A) by providing the pertinent design parameters of the reactor coolant makeup system and a calculation of the maximum rate of loss of reactor coolant through the RVHVS flow restriction orifices (reference NUREG-0737 Item II.B.1 Clarification A.(4)).

Response:

The orifices on the vent system are 3/8 inch I.D. The mass flow through a 3/8 inch break has been calculated as 120 gpm, which is well within the capacity of the normal makeup water system (180 gpm).

Question 2

For the portion of the RVHVS that forms a part of the reactor coolant pressure boundary, up to and including the second normally closed valve, describe the materials of construction and verify that they are compatible with the reactor coolant chemistry and will be fabricated and tested in accordance with SRP Section 5.2.3, "Reactor Coolant Pressure Boundary Materials."

Response:

The piping, valves, and supports designated QA Category 1 are classified Seismic Category 1. The design conditions of the piping and valves are 650°F and 2485 psig. The piping and valve material in contact with reactor coolant water is austenitic stainless steel of the following types which are compatible with reactor coolant system chemistry.

Component	Material
Piping	SA-376TP316
Fittings (Except Laterals)	SA-182F316
Laterals	SA-403WP316
Solenoid Valves (Body)	SA-182F316
Manual Valve (Body)	SA-182F316
Modified Top Cap	SA-479TP304

All material was purchased fabricated and tested in accordance with ASME Section III, Class 1 or 2 requirements.

Question 3

Verify that the following RVHVS failures have been analyzed and found not to prevent the essential operation of safety-related systems required for safe reactor shutdown or mitigation of the consequences of a design basis accident:

a. Seismic failure of RVHVS components that are not designed to withstand the safe shutdown earthquake.

b. Postulated missiles generated by failure of RVHVS components.

c. Fluid sprays from RVHVS component failures. Sprays from normally unpressurized portions of the RVHVS that are Seismic Class 1 and Safety Class 1, 2, or 3 and have instrumentation for detection of leakage from upstream isolation valves need not be considered.

Response:

a. All components and piping have been designed to withstand the SSE.

b. and c. Per NRC Branch Technical Position MEB 3-1, it is not necessary to postulate breaks in piping of diameter one inch or less. Therefore jet impingement, pipe whip, or missile analysis is not required.

Question 4

Since your submittal states that power lockout of vent valves is not considered necessary, describe the design features (e.g., physically separated valve switches, distinctive valve switch labeling, or distinguishing alarms) or administrative procedures that will be employed to ensure that human error will not result in inadvertent actuation of the RVHVS (reference NUREG-0737 Item II.B.1 Clarification A.(7)).

Response:

Each of the reactor head vent valves will be operated by its individual close/open selector switch. Indicating lights will be mounted with each switch to indicate the closed and open valve position. A nameplate located between each selector switch and series of closed/open lights will identify the system (RVHVS), and the individual valve number.

In order to actuate the vent system, both selector switches of any one safety train must be placed in the "open" position. A monitor light, with an appropriate nameplate, will be energized when all of the reactor head vent valves will be closed.

Question 5

Since your submittal states that the existing power operated relief valves (PORVs) can be used as the required pressurizer vent, verify that positive indication of the positions of the block valves will be provided in the control room (reference NUREG 0737 Item II.B.1 Clarification A.(5)).

Response:

Each of the motor operated block valves, tagged 535 and 536 and located upstream of the power operated relief valves PCV-455C and PCV-456, are furnished with closed/open limit switches which energize a green and red indicating light, respectively, for each block valve. The indicating lights are located on panel FCF in the control room. In addition, position indication of the PORVs is provided by both limit switches and acoustic monitoring.

Question 6

Verify that operability testing of the PORVs and block valves will be performed in accordance with subsection IWV of Section XI of the ASME Code for Category B valves (reference NUREG 0737 Item II.B.1 Clarification A.(11)).

Response:

As agreed upon during the April 1, 1980 meeting with your staff, the block and PORV valves are not included in the Indian Point 3 ISI program. However, these valves are tested for operability each refueling outage (Table 4.1-3 of the Technical Specifications).

Question 7

In addition to the generic guidelines for operation of the RVHVS, provided as part of your response to NUREG 0737 Item II.B.1, provide the following additional information:

a. Procedural guidelines similar to the previously submitted reactor vessel head vent guidelines, for venting of the pressurizer using the PORV system (reference NUREG 0737 Item II.B.1 Position (2) and Clarifications A.(2) and C.(3)).

b. Procedural guidelines for operation of the reactor coolant pumps to ensure that sufficient liquid or steam will flow through the steam generator U-tube region so that decay heat can be effectively removed from the reactor coolant system (reference your response to NUREG 0737 Item II.B.1 Clarification C.(2) on p. III-2 of your July 31, 1981 submittal).

Response:

a. and b.: The attached procedural guidance addresses both requests.

REMOVAL OF A NON-CONDENSABLE BUBBLE IN THE REACTOR COOLANT SYSTEM

1.0 DISCUSSION OF CONDITION

This emergency condition may result from the Reactor Coolant System pressure dropping below saturation condition initiating localized boiling and water disassociation with the subsequent result of a non-condensable bubble being formed in the Reactor Coolant System. This bubble could be located in either the Reactor Head or in the Steam Generators.

A bubble formed in the Reactor Head is not a problem until the RCS is depressurized at which time it will expand and possible reduce the core cooling capacity.

A bubble can only be formed in the Steam Generators when all the reactor coolant pumps are secured. Under this condition, the bubble will act to impede or possibly prevent natural circulation of the Reactor Coolant System.

FOR ADDITIONAL INFORMATION ON THE CLASSIFICATION OF THE EVENTS CONTAINED IN THIS EMERGENCY PROCEDURE, REFER TO "EMERGENCY CONDITIONS, INDICATORS AND CATEGORIES" (TABLE 4.1) OF THE EMERGENCY PLAN.

2.0 INDICATION TO OPERATOR

2.1 Reactor Coolant System pressure has been or is below saturation conditions.
2.2 Possible increase on the incore thermocouples.
2.3 A rapid and unexplained increase in pressurizer level.
2.4 Possible increase in Reactor Coolant pump vibration due to cavitation.

3.0 IMMEDIATE AUTOMATIC ACTIONS

None.

4.0 IMMEDIATE OPERATOR ACTIONS

None.

5.0 SUBSEQUENT OPERATOR ACTIONS

A) Gas bubble in Steam Generator

NOTE: This can only occur during natural circulation and not if the reactor coolant pumps are running.

5.A.1 Start up Reactor Coolant pumps as per normal operating procedure.

5.A.2 Operate the pressurizer sprays to strip the gas from the Reactor Coolant System and place it in the pressurizer vapor space. Operate the pressurizer heaters to maintain pressure above saturation.

5.A.3 Monitor core and Reactor Coolant System temperature to insure adequate cooling is available.

5.A.4 If Reactor Coolant pumps cannot be run, manually start a safety injection pump and provide a flow path for injection by opening the pressurizer power operated relief valve. Monitor core and Reactor Coolant System temperature to insure adequate cooling is available.

5.A.5 Make the pressurizer water solid with the safety injection pumps running and a power operated relief valve open.

5.A.6 Pressure is controlled by reducing safety injection flow by throttling in on the discharge. Gradually reduce Reactor Coolant System pressure so as to allow the bubble to expand to the top of the hot leg, into the loop and then, if it is large enough, it will be forced into the pressurizer via the surge line and out the PORV. The core would not be uncovered so long as safety injection flow is maintained.

5.A.7 If the low level alarm in the RWST is received, place the SI system in the recirculation mode as per PEP-ES-1A.

B. Gas bubble in Reactor Head

NOTE: With a gas bubble located in the upper head several methods of core cooling are unaffected. The steam generator can be used to remove decay heat using reactor coolant pump forced flow or natural circulation. The safety injection system can be used to cool the core while venting through the pressurizer power operated relief valve. Core cooling by any of these methods can proceed indefinitely if the primary coolant pressure is held constant. If a lower system pressure is desired, a controlled depressurization will allow the bubble to grow slowly until it uncovers the top of the hot legs.

5.B.1 With the reactor coolant pumps running depressurize the Reactor Coolant System by burping the pressurizer via the power operated relief valves or by using the pressurizer sprays to reduce the steam bubble.

5.B.2 As pressure is decreased slowly, the non-condensable bubble will expand until it reaches the top of the hot leg. The reactor coolant pumps will scrub the bubble and carry small bubbles away. These bubbles can be removed from the Reactor Coolant System either via the spray line to the PRZ vapor space or through the CVCS letdown system to the VCT where it will be vented to the gas decay tanks.

5.B.3 If the Reactor Coolant pumps cannot be used, make the pressurizer water solid with the safety injection pumps running and a power operated relief valve open.

5.B.4 Pressure is controlled by reducing safety injection flow by throttling in on the discharge. Gradually reduce Reactor Coolant System pressure so as to allow the bubble to expand to the top of the hot leg, into the loop and then up into the Steam Generators.

5.B.5 Continued depressurization will cause the bubble to expand until, if it is large enough, it will be forced into the pressurizer via the surge line and out the PORV. The core would not be uncovered so long as safety injection flow is maintained.