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New York Power Authority

John C. Brons
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January 3, 1989
IPN-89-001

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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Washington, D.C. 20555

Subject: Indian Point 3 Nuclear Power Plant
Docket No. 50-286
Implementation of Expeditious Actions Recommended by Generic Letter No. 88-17, "Loss of Decay Heat Removal."

Reference: 1. Letter IPN-87-043 from Mr. J.C. Brons to NRC, "Response to Generic Letter 87-12, 'Loss of Residual Heat Removal while Reactor Coolant System is Partially Filled'," dated September 21, 1987.

Dear Sir:

This letter provides the Authority's response to the expeditious actions recommended in the subject generic letter (GL 88-17). Prior to receipt of this letter (11/4/88), an unscheduled shutdown of Indian Point 3 (IP-3) occurred on October 20, 1988, which eventually required mid-loop operation. An advanced copy of GL 88-17 was used to effect changes that addressed the majority of the expeditious actions associated with operating the plant at reduced coolant inventory conditions. Operator experience in safely controlling the RCS at the mid-loop condition determined the most practical and expeditious means of reducing the potential hazards identified in GL 88-17. The attached response reflects procedures and training which were implemented prior to conducting mid-loop operations during the unscheduled shutdown. Further enhancements to procedures for mid-loop operations will be made based on evaluations performed in responding to the long term recommendations of GL 88-17.

The Authority does not anticipate operation at mid-loop with irradiated fuel in the vessel during the next refueling outage which is scheduled to commence February 4, 1989. A full core discharge is planned to facilitate the replacement of all four steam generators, thus precluding application of GL 88-17 to the upcoming refueling outage. Nozzle dams specifically designed for use in the new steam generators will be delivered as part of the replacement package. Not withstanding the special precautions of GL 88-17 associated with installation/removal of nozzle dams, their use during subsequent outages will allow the inspection of steam generators (SGs) without the need for extended operation at mid-loop. Use of the new nozzle dams in the replacement SGs during shutdown inspections will eliminate a heretofore major contributor to the amount of time the Reactor Coolant System (RCS) operated in a reduced inventory condition. Also, enhanced RCS water chemistry combined with design improvements in the new steam generators will greatly reduce the need for SG inspections. Therefore, future exposure of the reactor plant to the potential hazards of mid-loop operations during shutdown conditions will be sharply reduced at IP-3.

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Should you or your staff have any further questions regarding this letter, please contact Mr. P. Kokolakis of my staff.

Very truly yours,

John C. Brons
Executive Vice President
Nuclear Generation

STATE OF NEW YORK
COUNTY OF WESTCHESTER

Subscribed and sworn to before me this
3rd day of January, 1989.

Barbara Ann Taggart
Notary Public

BARBARA ANN TAGGART
NOTARY PUBLIC, State of New York
No. 4851437
Qualified in Putnam County 90
Commission Expires Jan. 27, 19__

Attachment
cc: U.S. Nuclear Regulatory Commission
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RESPONSE TO GENERIC LETTER NO. 88-17
RECOMMENDED EXPEDITIOUS ACTIONS

(1) **Diablo Canyon Event**

RECOMMENDATION:
Discuss the Diablo Canyon event, related events, lessons learned, and implications with appropriate personnel. Provide training shortly before entering a reduced inventory condition.

RESPONSE:
Issuance of Generic Letter 88-17 (GL 88-17) occurred concurrently with an unscheduled shutdown of Indian Point 3 (IP-3) that eventually required mid-loop operations. Training was completed on the Diablo Canyon loss of RHR event prior to licensed operators assuming a watch involving mid-loop operation and in all cases by November 7, 1988. Procedural changes and new administrative controls to address GL 88-17 recommendations were reviewed as part of that training. Training materials also included a Westinghouse video tape on vortexing, NUREG-1269 ("Loss of Residual Heat Removal at Diablo Canyon on April 10, 1987"), an INPO case study on loss of RHR events and GL 88-17.

Emphasis was placed on misleading indications and assumptions which prevented Diablo Canyon operators from early recognition of the event and taking prompt remedial actions. Thermal hydraulic considerations (including decay heat loads involved) in this event and how they relate to IP-3 NSSS were reviewed. The desirability of a hot leg vent path to prevent pressurization and the potential for blowdown through a cold leg opening was discussed. Also, covered was the fact that hot leg injection may be required to insure flow through the core in the event of a cold leg opening.

(2) **Containment Closure**

RECOMMENDATION:
Implement procedures and administrative controls that reasonably assure that containment closure will be achieved prior to the time at which a core uncovery could result from a loss of DHR coupled with an inability to initiate alternate cooling or addition of water to the RCS inventory. Containment closure procedures should include consideration of potential steam and radioactive material release from the RCS should closure activities extend into the time boiling takes place within the RCS. These procedures and administrative controls should be active and in use:

(a) prior to entering a reduced RCS inventory condition for NSSSs supplied by Combustion Engineering or Westinghouse,

and should apply whenever operating in those conditions. If such procedures and administrative controls are not operational, then either do not enter the applicable condition or maintain a closed containment.

RESPONSE:
The Shift Supervisor is required to maintain control of all openings and any operations with the potential for release from the Containment Building. He is responsible for ensuring the best method for rapid closure of all release paths. Parts and/or equipment required for closure are kept at work sites involving potential release paths.

The Shift Supervisor will implement actions to "close" Containment as rapidly as possible if a loss of RHR occurs concurrently with an inability to alternately cool the core and an inability to supply makeup water to the core. "Closure" is accomplished when a single barrier exists to prevent the release of radioactivity in any release path from the Containment Building.

Installation requirements for the equipment hatch and Containment closure times have not been specified. These and other barrier requirements of GL 88-17 will be considered during the development of the analytical basis for procedures associated with reduced inventory operation as recommended by the letter's long term program enhancements. There is no urgent need to establish more stringent closure requirements in the near future since the Authority is planning a full core discharge during the next refueling outage and does not anticipate mid-loop operation with irradiated fuel in the vessel.

(3) **RCS Temperature**

RECOMMENDATION:
Provide at least two independent, continuous temperature indications that are representative of the core exit conditions whenever the RCS is in a mid-loop condition and the reactor vessel head is located on top of the reactor vessel. Temperature indications should be periodically checked and recorded by an operator or automatically and continuously monitored and alarmed. Temperature monitoring should be performed either:

(a) by an operator in the control room (CR), or

(b) from a location outside of the containment building with provision for providing immediate temperature values to an operator in the CR if significant changes occur. Observations should be recorded at an interval no greater than 15 minutes during normal conditions.

RESPONSE:
Whenever the RCS level is below the top of the RV flange with head in place, at least two core exit thermal couples (CETs) in different quadrants are monitored in the Control Room (CR). These CETs are digitally trended on the plant computer and logged at regular intervals. If the plant computer digital trend becomes inoperable the CR operator can observe CET readings on the Qualified Safety Parameter Display (QSPDS) and log these values as required.

(4) **RCS Water Level**

RECOMMENDATION:
Provide at least two independent, continuous RCS water level indications whenever the RCS is in a reduced inventory condition. Water level indications should be periodically checked and recorded by an operator or automatically and continuously monitored and alarmed. Water level monitoring should be capable of being performed either:

(a) by an operator in the CR, or

(b) from a location other than the CR with provision for providing immediate water level values to an operator in the CR if significant changes occur. Observations should be recorded at an interval no greater than 15 minutes during normal conditions.

RESPONSE:
RCS level is provided in the CR by visual observation of a reference water column. A more complete description of the system currently in use is described in Reference (1) including precautions and limitations

for placing this equipment in service and operating it. This system is normally in service whenever the RCS is drained below 10% level on the pressurizer (5' 8" above the RV flange).

Both control room and local readings are recorded at regular intervals. In addition, observations indicative of RCS level change are logged and closely monitored as necessary. These include but are not limited to:

(a) Erratic or loss of RHR flow,

(b) Increasing RCS temperature,

(c) Local observation by the Nuclear Plant Operator (NPO) of pump cavitation or low discharge pressure.

When level indication in the CR is unavailable, the reference column is monitored locally with constant communication established with the CR and readings frequently logged at the established intervals.

For the short term it is not practical to implement a second means of level indication without significant plant hardware changes. The evaluation of such changes and their need will be discussed in the Authority's response to the longer term "program enhancements" recommended by GL 88-17.

(5) **RCS Perturbation**

RECOMMENDATION:
Implement procedures and administrative controls that generally avoid operations that deliberately or knowingly lead to perturbations to the RCS and/or systems that are necessary to maintain the RCS in a stable and controlled condition while the RCS is in a reduced inventory condition.

If operations that could perturb the RCS or systems supporting the RCS must be conducted while in a reduced inventory condition, then additional measures should be taken to assure that the RCS will remain in a stable and controlled condition. Such additional measures include both prevention of a loss of DHR and enhanced monitoring requirements to ensure timely response to a loss of DHR should such a loss occur.

RESPONSE:
The procedure governing operation with RCS drained below the RV flange cautions that operations which could cause perturbations to the RCS (or to systems that are necessary to maintain the RCS in a stable and controlled condition), should be avoided while the RCS is drained to the mid-loop. As previously discussed in Reference (1), plant administrative procedures establish controls over testing and maintenance that could affect plant operation through the CR operators under the direction of the Shift Supervisor, regardless of plant condition. Measures that assure continuity of the RCS condition and supporting systems include work clearances, operating orders and shift turnover practises.

(6) **RCS Inventory Addition**

RECOMMENDATION:
Provide at least two available or operable means of adding inventory to the RCS that are in addition to pumps that are a part of the normal DHR systems. These should include at least one high pressure injection pump. The water addition rate capable of being provided by each of the means should be at least sufficient to keep the core covered. Procedures for use of these systems during loss of DHR events should be provided. The path of water addition must be specified to assure the flow does not bypass the RV before exiting any opening in the RCS.

RESPONSE:
Two operable means of adding inventory to the RCS will normally be made available during a reduced inventory condition with irradiated fuel in the RV. They may consist of but are not limited to:

(a) Blended makeup via the Chemical Volume Control System,

(b) Gravity fill via the Reactor Water Storage Tank,

(c) High pressure injection into the RCS via hot or cold leg paths.

Operators have received instructions for establishing either hot and cold leg high pressure injection paths as may be required by plant conditions. Procedures will be analyzed during the "programed enhancements" review to determine those plant conditions, if any, which may require the use of high pressure injection as one of the two available makeup paths. Operator guidance based on analysis of possible plant conditions/configurations will be provided to insure a makeup rate capable of keeping the core covered.

(7) **Nozzle Dams**

RECOMMENDATION:
Implement procedures and administrative controls that reasonably assure that all hot legs are not blocked simultaneously by nozzle dams unless a vent path is provided that is large enough to prevent pressurization of the upper plenum of the RV.

RESPONSE:
Nozzle dams are currently not in use at IP-3. However, they are planned for use following replacement of steam generators during the next refueling outage. Appropriate procedures for their use reflecting the above recommendation will be developed when they become available at IP-3. This will limit shutdown operation at mid-loop to that minimal time required for installation or removal of nozzle dams. Averaged over an 18 month operating cycle this represents a very small fraction of the total plant time at normal conditions, thus minimizing the impact on overall plant safety and reducing the need for extensive hardware or administrative changes to address reduced inventory operation.

(8) **Loop Stop Valves**

This action item recommends controls similar to item (7) above to prevent simultaneously blocking all hot legs with closed loop stop valves. This recommendation is not applicable to the IP-3 NSSS which does not have RCS loop stop valves.