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J. Phillip Bayne
Executive Vice President
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IPN-83-69

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 Unit 3
Docket No. 50-286
Additional Information Regarding Low
Temperature Overpressure Protection System

Dear Sir:

Attachment A to this letter provides the Authority's responses to your letter of September 7, 1982 which requested clarification of the capabilities and limitations of the Indian Point 3 variable setpoint low temperature overpressure protection system.

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

Very truly yours,

J. P. Bayne
Executive Vice President
Nuclear Generation

cc: Resident Inspector's Office
Indian Point 3
P. O. Box 66
Buchanan, New York 10511

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ATTACHMENT A

RESPONSE TO NRC's SEPT. 7, 1982

REQUEST FOR ADDITIONAL INFORMATION

ON

INDIAN POINT 3 LOW TEMPERATURE

OVERPRESSURE PROTECTION SYSTEM

Question 1a: It is not apparent that your low temperature overpressure protection system (LTOPS) adequately protects the reactor vessel during some transient events. For example, the start of a reactor coolant pump (RCP) in a loop with a hot steam generator, when the reactor coolant system (RCS) is solid with non-flowing water, will cause the temperature and pressure of the RCS water to increase. Your system would automatically raise the PORV set point as a function of auctioneered cold or hot leg water temperature. However, the reactor vessel may not be uniformly heated in this transient. To protect the welds in the coldest portion of the belt line region of the vessel, the PORV set point should remain at that determined by the initial RCS temperature.

Response: The Indian Point 3 overpressure protection system (OPS) is a three-channel analog curve tracking arrangement which can initiate an appropriate chain of coincidence logic for the purpose of automatically preventing the reactor vessel RCS pressure from exceeding the operating Technical Specifications pressure-temperature limit curves (Appendix G curves). The OPS utilizes wide range (0-600°F) RCS cold leg temperature sensors (RTD) as inputs to the logic function. The temperature inputs are continuously converted to maximum RCS pressures allowed at those temperatures (Appendix G curves). The system logic first annunciates a main control board alarm in the control room whenever the actual RCS pressure, transmitted by three 0 to 1500 psig transmitters, approaches within a pre-determined minimum value of the allowable pressure. The alarm will alert the control room operators that a pressure

tual measured RCS pressure, an actuation trip open signal is transmitted to each pressurizer power operated relief valve (PORV) if any two-out- of three of the differences between the Appendix G curve pressure and the actual RCS pressure is smaller than the preset minimum. Thus, the OPS PORV's set point is a variable function programmed by RCS cold leg temperature to follow the Appendix G curve. The Authority will confirm by analysis that the PORV setpoints are set by the requirement that the final RCS peak pressure, calculated for a heat input pressure transient (such as start of a reactor coolant pump with the steam generators at a temperature higher than the RCS), will not exceed the Appendix G pressure limit corresponding to the initial RCS temperature associated with the start of the transient.

Question 1b: Another example is that if, during a cooldown, the cold leg temperature detector, which is downstream of the generator being used, is in a failed condition during a water mass input event (e.g., an inadvertent operation of a charging pump or a safety injection pump), your LTOPS may not protect the coldest portion of the vessel since the set point would not be based on the coldest fluid temperature.

Response: The OPS is a three-channel sensing system utilizing a two out of three logic. The loss of one channel will not impair the capability of the system in performing its intended function, since the other two cold leg temperature sensors will be available and all sensors are measuring essentially the same temperature. The Authority will confirm by analysis that the temperature gradient between the cold leg sensing point and the belt line region will not compromise the capability of the OPS to protect the coldest portion of the vessel belt line region.

times when the RCS water temperature is changing, your LTOPS protects the coldest portion of the reactor vessel. Include in your analysis the effect of all significant response times of components and subsystems such as that for the PORV and its associated nitrogen system, the temperature detectors, the pressure detectors, and the logic circuitry. Please explicitly list these response times along with a justifiable error band for each that can be continually maintained. Also include in your analysis the most limiting single failure and provide the basis for this choice.

Response: The Authority is presently reevaluating the original analysis performed for the design of the OPS and will provide the requested information when the analysis is completed.

Question 2: In regard to the most limiting single failure, please consider an event to be a loss of a D.C. bus which results in the isolation of the letdown flow path and the single failure to be that of the PORV which is powered by another D.C. bus.

Response: The Authority considers that the above event is highly unlikely. This event would require the above stated conditions coincident with the failure of plant operators to recognize an imminent overpressurization and respond to the alerting alarms indicating that a pressure transient is occurring.

Existing procedures (including those addressing the RCS being in a water solid condition) reflect the need for an operable OPS and list the parameters affecting RCS pressure. In addition, the Authority will modify procedures to specifically address the loss of a D.C. bus and the consequences related to RCS overpressurization.

Question 3: At an RCS temperature of 250° F, the maximum allowable pressure on the Adjusted Heatup Curve is higher than the PORV set point (1318 psig vs. 1225 psig). Please explain this.

Response: This question pertains to previous submittals that are not presently relevant. The set points discussed (1318 psig vs. 1225 psig) relate to the service period up to 2EFPY. The OPS set point curve currently in effect is for the service period up to 9.26 EFPY. This curve has been compared to the heatup and cooldown curves and verification that the PORV set point is consistent has been established.

The above referenced 9.26 EFPY curves were submitted on August 24, 1979 (IPN-79-64), to the NRC in Supplement 1 to Application for Amendment to Operating License DPR-64.