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March 2, 1979
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Director, Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Mr. Albert Schwencer, Chief
Operating Reactors Branch No. 1
Division of Operating Reactors

Subject: Indian Point 3 Nuclear Power Plant
Docket No. 50-286
Containment Purging During
Normal Plant Operation

Dear Sir:

The Authority has reviewed your letter of November 28, 1978 and its attachments, with regard to the subject item.

The Indian Point 3 Containment Purge System and its associated containment isolation provisions are described in Sections 5.2.2 and 5.3.2 of the FSAR. The redundant 36-inch containment isolation valves in both the purge supply and exhaust ducts are normally maintained in the closed position during reactor power operation. The Containment Purge System is used for containment atmosphere cleanup, cooldown and ventilation immediately prior to and during shutdown modes when containment personnel access is required. In addition, the purge system may be utilized to facilitate containment personnel access at those infrequent instances when containment entry during reactor power operation maybe necessary.

As described in FSAR Sections 5.2.2 and 5.3.2, the 10-inch Containment Pressure Line is utilized to periodically relieve containment pressure buildup during reactor power operation. This line simply provides a pressure relief capability and does not incorporate the normal ventilation functions of fresh air intake and air circulation that the Containment Purge System does.

The Containment Purge System and Containment Pressure Relief Line valves were designed to seismic Class I Criteria and meet the single failure criterion for the containment isolation function. In addition, these valves are designed to close within two (2) seconds following the receipt of the containment isolation signal.

The Authority plans to justify "unlimited purging" and "unlimited pressure relief" during normal plant operation for the Indian Point 3 facility. The Authority has initiated a detailed evaluation of the consequences of open valves in the Containment Purge System and Containment Pressure Relief Line during LOCA initiation. Attachments 1 and 2 to this letter contain Authority responses to those issues relating to purging and pressure relief during normal operation as described in Revision 1 of Standard Review Plan Section 6.2.4, and its associated Branch Technical Position (CSB 6-4), respectively. Westinghouse has been contacted to assist the Authority in completing this evaluation. Discussions to date have given the Authority confidence that both unlimited purging and continuous pressure relief can be justified for the Indian Point 3 facility due to the rapid valve closure times and the margins available in the Westinghouse February 1978 ECCS evaluation model. As an integral part of that evaluation, Westinghouse will perform the ECCS recalculation and address the offsite consequences of a LOCA occurring when the valves are open. Since this will require time to complete, in the interim, preliminary hand calculation will be performed to demonstrate that unlimited purging and continuous pressure relief will not interfere with the proper operation of the ECCS. It is expected that the results of these calculations will be made available to the NRC by early May, 1979. At that time, the Authority will be able to give you a schedule for submitting the complete ECCS analysis. The Authority is confident that the evaluation, when completed, will provide the justification for unlimiting purging and continuous pressure relief during normal plant operation.

During the period in which the evaluation effect is being performed, and pending NRC staff review of the results, the Authority will limit containment purging, exclusive of pressure relief, at the Indian Point 3 facility during power operation to a minimum, not to exceed 90 hours per year.

During power operation, there is a need to provide periodic containment pressure relief to compensate for air leakage into containment from various instrument air and weld channel and containment pressurization system sources as well as from other pressurized sources within the containment. The Indian Point O.T.S. Section 3.6-(b) requires that the containment pressure be kept below 2 psig during plant operation. To meet this requirement it has been necessary to pressure relieve the containment approximately two hours every other day. The Authority must continue this practice in order not to severely limit its ability to continue plant operations.

Relative to the additional request in your letter of November 28, 1978 for a review of the design of all safety actuation signal circuits which incorporate a manual override, Attachment 3 to this letter provides the requested information.

Should you have any questions on this matter, please contact us.

Very truly yours,

Joseph R. Schmieder
Chief Engineer

ATTACHMENT 1

# CONTAINMENT PURGING DURING NORMAL PLANT OPERATION

## RESPONSE TO ISSUES IN REVISION 1

## OF STANDARD REVIEW PLAN

## SECTION 6.2.4 CONTAINMENT ISOLATION SYSTEM

Power Authority of the State of New York
Indian Point 3 Nuclear Power Plant
Docket No. 50-286
February 26, 1979

STANDARD REVIEW PLAN SECTION 6.2.4
ACCEPTANCE CRITERIA

Item II.1. The design of the containment isolation provisions for the Containment Purge System and Containment Pressure Relief line meets the requirements of General Design Criteria 55 and 56.

Each ventilation purge duct penetration is provided with two tight-closing butterfly valve, which are closed during reactor power operation and actuated to the closed position automatically upon a containment isolation or a containment high radiation signal. One valve is located inside and one valve is located outside the containment at each penetration. The space between the valves is pressurized by air from the Penetration and Weld Channel Pressurization System whenever they are closed.

The containment pressure relief line is similarly protected. However, since this line is used frequently during reactor power operation, three tight closing butterfly valves in series are provided, one inside and two outside the containment. These valves also are actuated to the closed position upon a containment isolation or containment high radiation signal. The two intravalve spaces are pressurized by air from the Penetration and Weld Channel Pressurization System whenever they are closed.

In an accident condition the space between the two containment isolation valve in each line are sealed by pressurizing with air from the Penetration and Weld Channel Pressurization System. The air is introduced into each space at approximately 2 psi above the containment design pressure through a separate line from the Penetration and Weld Channel Pressurization System. Parallel (redundant) fail open valves in each injection line open on the appropriate containment isolation signal to provide a reliable supply of pressurizing air. A flow limiting orifice in each injection line prevents excessive air consumption if one of these valves spuriously fails to open, or if one of the containment isolation valves fails to respond to the "trip" signal.

All containment isolation valves, actuators and controls are located so as to be protected against missiles which could be generated as a result of a loss of coolant accident. Only valves so protected are considered to qualify as containment isolation valves.

Operability of these valves in the accident environment is ensured by proper design, construction and installation as reflected by the following considerations:

All components in the valve installation, including valve bodies, trim and moving parts, actuators, instrument air and control and power wiring, are constructed of materials sufficiently temperature resistant to be unaffected by the accident environment. Special attention is given to electrical insulation, air operator diaphragms and steam packing material.

In addition to normal pressures, the valves are designed to withstand maximum pressure differentials in the reverse direction imposed by the accident conditions. This criterion is particularly applicable to the butterfly type isolation valves used in the containment purge and pressure relief lines.

Item II.2. Not Applicable

Item II.3. Not Applicable

Item II.4. The Containment Purge System and Containment Pressure Relief Line isolation valves are located directly next to the containment penetrations.

Item II.5. The Containment Purge System and Containment Pressure Relief Line isolation valves are normally closed and close automatically under an accident condition. In the event of power failure, the purge and pressure relief valves operate to the "safe" closed position. The valves are spring loaded to close on the loss of air or power to the valve operators. All purge and pressure relief valves have position indication in the control room.

Item II.6. The diversity of parameters sensed which initiate containment isolation include: high containment pressure, low pressurizer level with low pressurizer pressure, indications of steam line breaks in containment, high-high containment pressure, high air particulate or radio-gas in containment, and manual operator initiation.

Item II.7. The purge and pressure relief lines are equipped with an air particulate and radio-gas monitors as described below:

Channel R-11 Containment Air Particulate Monitor-

This monitor measures air particulate radioactivity inside the containment building. A continuous sample is taken from the inlet of two recirculation air filtration units located on diametrically opposite sides of the

containment building. On a high radiation indication the channel will alarm in the Central Control Room and will automatically initiate closure of the containment purge and exhaust valves, and pressure relief line valves.

Channel R-12 Containment Radio-Gas Monitor

This channel measures radio-gas activity of the air sampled by Channel R-11. Sampling for this channel is also continuous. On a high radiation level indication, this channel will also alarm in the Central Control Room and initiate containment ventilation and purge system isolation.

Item II.8. The purge and pressure relief line isolation valves are designed to close in two (2) seconds or less upon the receipt of the containment isolation signal.

An evaluation of the impact of purging during normal operation on ECCS performance due to reduced containment backpressure, and an evaluation of the radiological consequences of any design bases accident requiring purging operations will be provided at a later date.

Item II.9. Not Applicable

Item II.10. The purge and pressure relief line isolation valves and piping between them are designed to seismic Category I criteria as described in FSAR Section 5.2.1. The quality standards applied to these isolation valves and piping are described in FSAR Section 5.1.4.3.

Item II.11. The purge and pressure relief line isolation valves can be operated remotely from the Central Control Room. The operator has instruments to measure containment temperature, pressure and radiation level to allow him to know when to isolate these lines.

Item II.12. The purge and pressure relief lines have provisions for operability testing of the valves and the intravalve spaces are monitored by the Weld Channel Pressurization System which indicates and alarms in the Central Control Room. The isolation valve testing program is consistent with that of other engineered safety features. The acceptance criteria for the leakage rate testing are covered by Appendix J to 10 CFR 50 and described in the Technical Specifications, Section 4.4.

ATTACHMENT 2

CONTAINMENT PURGING DURING NORMAL PLANT OPERATION

RESPONSE TO ISSUES IN BRANCH TECHNICAL POSITION CSB 6-4

Power Authority of the State of New York
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Item B.1.a. The performance and reliability of the purge and pressure relief line isolation valves is assured by the periodic tests required by the surveillance requirements in the Technical Specifications. The design basis for the valves and actuators includes the buildup of containment pressure for the LOCA break spectrum, and the purge and pressure relief lines flows as a function of time up to and during valve closure.

Item B.1.b. There is only one purge supply and exhaust line and one pressure relief line.

Item B.1.c. The purge line is 36" in diameter and the pressure relief line is 10" in diameter.

The containment purge system includes provisions for both supply and exhaust air. The supply system includes roughing filters, heating coils, fan, supply penetration with two butterfly valves for bubble tight shutoff, and a purge supply distribution header inside containment. The exhaust system includes exhaust penetration with two butterfly valves identical to those above, exhaust ductwork, filter bank with roughing, HEPA and charcoal filters, fans and exhaust vent. The full purge flow design rate is 40,000 cfm. The quick closing isolation valves are capable of closing within two seconds of receipt of the accident signal.

When containment purging for access following reactor shutdown is in progress, releases from the plant vent are continuously monitored with a gas monitor.

The purge supply and exhaust ducts butterfly valves, both inside and outside the containment, are closed during power operation. The spaces between the closed valves are pressurized with air by the Penetration and Weld Channel Pressurization System. The valves are designed for rapid automatic closure by the containment isolation signal (derived from any automatic safety injection signal), or upon a signal of high activity level within the containment in the event of a radioactivity release when the purge line is open.

Item B.1.d. The purge and pressure relief lines were designed to engineered safety features standards.

Item B.1.e. The instrument and control systems for the purge and pressure relief lines are independent and actuated by diverse parameters including any containment isolation signal or a high activity signal within the containment in the event of a radioactivity release when the line is open.

The large butterfly valves used to isolate the containment ventilation purge ducts are each equipped with spring-assisted air positions. These valves fail to the closed position on loss of air or control signal.

Item B.1.f. The purge and pressure relief line isolation valves close in two seconds.

Item B.1.g. An evaluation to demonstrate that isolation valve closure will not be prevented by debris which could potentially become entrained in the escaping air and steam will be provided at a later date.

Item B.2. The purge or pressure relief lines are not relied upon for temperature and humidity control within the containment. This function is provided by the containment fan cooler units.

Item B.3. There are small recirculation fans installed in the containment used for iodine removal. However, these fans are not adequate to maintain the radiological and environmental conditions for performing work inside the containment.

Item B.4. The leak rate of the valves is continuously monitored by utilization of the weld channel system. The containment isolation capability is tested concurrently with other engineered safeguards logic during the refueling outage.

Item B.5. An analysis of the radiological consequences of a loss of coolant accident occuring during purging operation will be provided at a later date.

Item B.5.b. An analysis of the provisions to protect structures and safety related equipment located beyond the purge system isolation valves against loss of function from the environment created by the escaping air and steam will be provided at a later date.

Item B.5.c. An analysis of the reduction in the containment pressure resulting from the partial loss of containment atmosphere during the accident for ECCS determination will be provided at a later date.

Item B.5.d. The allowable leak rates of the purge and pressure relief isolation valves for the design basis pressures and flows against which the valves must close will be provided at a later date.

ATTACHMENT 3

# REVIEW OF THE DESIGN OF ALL SAFETY ACTUATION SIGNAL CIRCUITS WHICH INCORPORATE A MANUAL OVERRIDE

Power Authority of the State of New York
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Docket No. 50-286
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A review of all safety actuation circuits was conducted to determine if manual over-riding of one safety actuation signal does not also cover the bypass of any other safety actuation signal.

This review identified two areas of concern:

1) The isolation signals which are required to automatically close redundant containment purge and pressure relief valves could be over-riden if purging was conducted with a high radiation signal continuously present. This could occur if containment ventilation isolation reset buttons are depressed. This practice, however, is not utilized at Indian Point. Instead, administrative controls require that the alarm setpoint be raised or if indication was offscale, the actuation relay from the radiation monitor would be blocked in accordance with the Station Administrative Procedures. These actions would not prevent an Engineered Safety Systems Actuation Signal from closing these valves, if required.

2) Following initiation of an Engineered Safeguards Actuation Signal, plant design prevents re-actuation of an Engineered Safeguards sequence following manual actuation of the reset buttons. This is necessary to prevent interruption of subsequent steps during recovery operations. The blocking scheme utilizes contacts off the reactor trip breakers and will prevent re-actuation unless the trip breakers are closed momentarily. When blocked, a status light is illuminated on the safeguard supervisory panel in the Central Control Room.

   With the plant in a shutdown condition, following an inadvertent SIS actuation, this could prevent the safeguards system from being automatically actuated. To preclude this condition, the reactor trip breakers will be momentarily reclosed or simulated closed following reset of the Engineered Safeguards Signal. An administrative procedure has been implemented to cover this contingency.

For both of the above cases, the Power Authority feels there are sufficient administrative controls to prevent over-riding of safety related functions and does not propose any modifications to the plant.