September 22, 1998

Mr. James Knubel Chief Nuclear Officer Power Authority of the State of New York 123 Main Street White Plains, NY 10601

SUBJECT: CHANGES TO TECHNICAL SPECIFICATION BASES PAGES (TAC NO. MA01572 AND MA00334)

Dear Mr. Knubel:

By letter dated March 26, 1998, you informed the NRC of revised Technical Specification (TS) Bases pages 2.1-2 and 2.1-3, concerning steam generator tube plugging limits. Also by letter dated December 22, 1997, you informed the NRC of revised TS Bases pages 3.3-15, 3.3-19, 3.6-2, and 3.7-5 concerning elimination of transfer of control room air conditioning unit to the nonessential service water header during post loss-of-coolant accident recirculation and operation with a steam bubble in the pressurizer and the reactor coolant system in cold shutdown.

Enclosed is a copy of the revised TS Bases pages 2.1-2; 2.1-3; 3.3-15; 3.3-19; 3.6-2; and 3.7-5.

If you have any questions, please call me at (301) 415-1494.

Sincerely,

Original Signed by:

George F. Wunder, Project Manager Project Directorate I-1 Division of Reactor Projects - I/II Office of Nuclear Reactor Regulation

Docket No. 50-286

Enclosure: As stated

cc w/encl: See next page

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UNITED STATES NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

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James Knubel Power Authority of the State of New York

CC:

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Mr. Eugene W. Zeitmann, President and Chief Operating Officer
Power Authority of the State of New York
99 Washington Ave., Suite # 2005
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Mr. Robert J. Barrett Site Executive Officer Indian Point 3 Nuclear Power Plant P.O. Box 215 Buchanan, NY 10511

Ms. Charlene D. Faison Director Nuclear Licensing Power Authority of the State of New York 123 Main Street White Plains, NY 10601

Mr. F. William Valentino, President New York State Energy, Research, and Development Authority Corporate Plaza West 286 Washington Ave. Extension Albany, NY 12203-6399

Charles Donaldson, Esquire Assistant Attorney General New York Department of Law 120 Broadway New York, NY 10271 Indian Point Nuclear Generating Unit No. 3

Resident Inspector Indian Point 3 Nuclear Power Plant U.S. Nuclear Regulatory Commission P.O. Box 337 Buchanan, NY 10511

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Mayor, Village of Buchanan 236 Tate Avenue Buchanan, NY 10511

Mr. Richard L. Patch, Director Quality Assurance Power Authority of the State of New York 123 Main Street White Plains, NY 10601

Mr. Paul Eddy New York State Dept. of Public Service 3 Empire State Plaza, 10th Floor Albany, NY 12223

Mr. Harry P. Salmon, Jr. Vice President - Engineering Power Authority of the State of New York 123 Main Street White Plains, NY 10601 In meeting the DNB criterion, uncertainties in operating parameters, nuclear and thermal parameters, fuel fabrication parameters and computer codes must be considered. As described in the FSAR, the effects of these uncertainties have been statistically combined with the correlation uncertainty. Design limit DNBR values have been determined that satisfy the DNB criterion.

Additional DNBR margin is maintained by performing the safety analyses to a higher DNBR limit. This margin between the design and safety analyses limit DNBR values is used to offset known DNBR penalties (e.g., rod bow and transition core) and to provide DNBR margin for operating and design flexibility.

The curves of Figure 2.1-1 show the loci of points of thermal power, Reactor Coolant System pressure and vessel inlet temperature for which the calculated DNBR is no less than the Safety Limit DNBR value or the average enthalpy at the vessel exit is less than the enthalpy of saturated liquid.

The calculation of these limits includes:

1.

 $F_{\Delta H} = F_{\Delta H}$ limit at Rated Thermal Power (RTP) specified in the COLR.

- 2.** an equivalent steam generator tube plugging level of up to 30% in any steam generator provided the equivalent average plugging level in all steam generators is less than or equal to 24%, ⁽²⁾
- 3. a reactor coolant system total flow rate of greater than or equal to 375,600 gpm as measured at the plant,
- 4. a reference cosine with a peak of 1.55 for axial power shape.

Figure 2.1-1 includes an allowance for an increase in the enthalpy rise hot channel factor at reduced power based on the expression:

 $F_{\Delta H}^{N} \leq F_{\Delta H}^{RTP} (1 + PF_{\Delta H} (1-P))$

Where P is the fraction of Rated Thermal Power.

 F_{AH} is the F_{AH} limit at Rated Thermal Power specified in the COLR, and PF_{AH} is the Power Factor Multiplier specified in the COLR.

When flow or $F_{\Delta H}$ is measured, no additional allowances are necessary prior to comparison with the limits presented. A 2.9% measurement uncertainty on Flow and a 4% measurement uncertainty of $F_{\Delta H}$ have already been included in the above limits.

** A lower SG plugging level of 2% is presumed for the Loss of Normal Feedwater and Loss of AC Power analyses. A reduction in assumed SG tube plugging levels makes the curves in Figure 2.1-1 more conservative (i.e., adds greater margin).

2.1-2

Amendment No. 27, 40, 48, 61, 86, 101, 103, 143, 170, 173, Revised by letter dated

September 22, 1998

These limiting heat flux conditions are higher than those calculated for the range of all control rods fully withdrawn to the maximum allowable control rod insertion limit (specified in the COLR) assuming the axial power imbalance is within the limits of the $f(\Delta I)$ function of the Overtemperature ΔT trip. When the axial power imbalance is not within the tolerance, the axial power imbalance effect on the Overtemperature ΔT trips will reduce the setpoints to provide protection consistent with core safety limits.

References

1. FSAR Section 3.2.2

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 "Safety Evaluation for Indian Point Unit 3 with Asymmetric Tube Plugging Among Steam Generators", WCAP-10705 (Westinghouse Non-Proprietary), October 1984.

2.1-3

Amendment No. 14, 27, 40, 48, 61, 86, 101, 103, Revised by letter dated September 22, 1998 cold shutdown condition, utilizing normal shutdown and cooldown procedures. In the cold shutdown condition there is no possibility of an accident that would damage the fuel elements or result in a release in excess of 10 CFR 100 and 10 CFR 50 dose limits.

The plant operating procedures require immediate action to effect repairs of an inoperable component, and, therefore, in most cases repairs will be completed in less than the specified allowable repair times. The limiting times to repair are based on two considerations:

- 1) Assuring with high reliability that the safeguard system will function properly if required to do so.
- 2) Allowances of sufficient time to effect repairs using safe and proper procedures.

Assuming the reactor has been operating at full rated power, the magnitude of the decay heat decreases after initiating hot shutdown. Thus, the requirement for core cooling in case of a postulated loss-of-coolant accident while in the hot shutdown condition is significantly reduced below the requirements for a postulated loss-of-coolant accident during power operation. Putting the reactor in the hot shutdown condition significantly reduces the potential consequences of a loss-of-coolant accident, and also allows more free access to some of the engineered safeguards components in order to effect repairs.

Failure to complete repairs within 1 hour of going to the hot shutdown condition is considered indicative of a requirement for major maintenance and, therefore, in such a case the reactor is to be put into the cold shutdown condition.

The limits for the Refueling Water Storage Tank and the accumulators insure the required amount of water with the proper boron concentration for injection into the reactor coolant system following a loss-of-coolant accident is available. These limits are based on values used in the accident analysis.^{(9) (13)}

Amendment No. 34, 108, 139, Revised by letter dated September 22, 1998

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A total of six service water pumps are installed. Only two of the set of three service water pumps on the header designated the essential header are required immediately following a postulated loss-of-coolant accident.⁽⁰⁾ During the recirculation phase of the accident, two service water pumps on the non-essential header will be manually started to supply cooling water for one component cooling system heat exchanger, one control room air conditioner, and one diesel generator; the other component cooling system heat exchanger, the other control room air conditioner, the two other diesel generators and remaining safety related equipment are cooled by the essential service water header.⁽¹⁴⁾ During the recirculation phase of the accident, both control room air conditioner units may be cooled by the essential service water header.

The operability requirements on service water temperature monitoring instrumentation and the frequency of service water temperature monitoring insures that appropriate action can be taken to preclude operation beyond established limits. The locations selected for monitoring river water temperature are typically at the circulating or service water inlets, at the circulating water inlet boxes to the condenser hotwells or at the service water supply header to the fan cooler units. Temperature measurements at each of these locations are representative of the river water temperature supplied to cool plant heat loads. Alternate locations may be acceptable on this basis. The limit on the service water maximum inlet temperature insures that the service water and component cooling water systems will be able to dissipate the heat loads generated in the limiting design basis accident⁽¹⁵⁾. This restriction allows up to seven hours for river water temperature due to tidal effects to dissipate.

The operability of the equipment and systems required for the control of hydrogen gas ensures that this equipment is available to maintain the hydrogen concentration within containment below the flammable limit during post-LOCA Hydrogen concentration exceeding the flammable limit could conditions. potentially result in a containment wide hydrogen burn. This could lead to overpressurization of containment, a breach of CONTAINMENT INTEGRITY, containment leakage, unacceptably high offsite doses, and damage to safety-related equipment located in containment. Two full rated recombiner units are provided in order to control the hydrogen evolved in containment following a loss-of-coolant accident. Each unit is capable of preventing the hydrogen concentration from exceeding the flammable limit. Each recombiner is installed such that independence is maintained and redundancy is assured. Each hydrogen recombiner system consists of a recombiner located inside containment, and a separate power supply, and control panel located outside containment such that they are accessible following a design basis accident.

3.3-19

Amendment No. \$\$, \$\$, \$\$, \$\$, \$\$, \$\$

C. <u>Containment Temperature</u>

- 1. The reactor shall not be taken above the cold shutdown condition unless the containment ambient temperature is greater than 50°F.
- 2. Containment ambient temperature shall not exceed 130°F when the reactor is above the cold shutdown condition. If the temperature is greater than 130°F, reduce the temperature to within the limit within 8 hours, or be in hot shutdown within the next 6 hours and in cold shutdown within the following 30 hours.
- 3. Containment ambient temperature as specified in 3.6.C.1 and 3.6.C.2 shall be the arithmetic average of temperatures measured at no fewer than 4 locations, at least once per 24 hours.

D. <u>Containment Vent and Purge System</u>

The reactor shall not be taken above the cold shutdown condition unless the containment vent isolation valves (PCV - 1190, - 1191, - 1192) are closed or limited to a maximum valve opening angle of 60° (90° - full open) by mechanical means.

The reactor shall not be taken above the cold shutdown condition unless the containment purge supply and exhaust isolation valves (FCV - 1170, - 1171, - 1172, - 1173) are closed.

If the above conditions cannot be met within one hour, the reactor shall be in the hot shutdown condition within six hours and in the cold shutdown condition within the next 30 hours.

<u>Basis</u>

The Reactor Coolant System must be in the cold shutdown condition in order to relax containment integrity. When the Reactor Coolant System is in the cold shutdown condition, the pressurizer may have an internal temperature above 200°F for purposes of drawing and maintaining a steam bubble, provided that the reactor has been subcritical for at least 24 hours. Operation in this manner ensures that, in case of an accidental RCS coolant release under cold shutdown conditions, the ensuing offsite radiation doses will be within the limits of 10 CFR 100.

The shutdown margins are selected on the type of activities that are being carried out. The shutdown margin requirement of specification 3.8.D when the vessel head bolts are less than fully tensioned precludes criticality during refueling. When the reactor head is not to be removed, the specified cold shutdown margin of $1\% \Delta k/k$ precludes criticality in any occurrence.

3.6-2

Amendment No. \$\$, \$\$, Revised by letter dated September 22, 1998

One battery charger shall be in service on each battery so that the batteries will always be at full charge in anticipation of a loss-of-AC

power incident. This insures that adequate D.C. power will be available for starting the emergency generators and other emergency uses.

The plant can be safely shutdown without the use of offsite power since all vital loads (safety systems, instruments, etc.) can be supplied from the emergency diesel generators.

Any two of three diesel generators, the station auxiliary transformer or the separate 13.8 to 6.9 KV transformer are each capable of supplying the minimum safeguards loads, and therefore provide separate sources of power immediately available for operation of these loads. Thus the power supply system meets the single failure criteria required of safety systems. To provide maximum assurance that the redundant or alternate power supplies will operate if required to do so, the redundant or alternate power supplies are verified operable prior to initiating repair of the inoperable power supply. Continued plant operation is governed by the specified allowable time period for the power source, not the specified allowable time period for those items determined to be inoperable solely because of the inoperability of its normal or emergency power source provided the conditions defined in specification 3.7.G are satisfied. These conditions assure that the minimum required safequards will be operable. If it develops that (a) the inoperable power supply is not repaired within the specified allowable time period, or (b) a second power supply in the same or related category is found to be inoperable, the reactor, if critical, will initially be brought to the hot shutdown condition utilizing normal operating procedures to provide for reduction of the decay heat from the fuel, and consequent reduction of cooling requirements after a postulated loss-of-coolant accident. If the reactor was already subcritical, the reactor coolant system temperature and pressure will be maintained within the stated values in order to limit the amount of stored energy in the Reactor Coolant System. The stated tolerances provide a band for operator control. After a limited time in hot shutdown, if the malfunction(s) are not corrected, the reactor will be brought to the cold shutdown condition, utilizing normal shutdown and cool-down In the cold shutdown condition there is no possibility of an procedures. accident that would damage the fuel elements or result in a release in excess of 10 CFR 100 and 10 CFR 50 dose limits.

Conditions of a system-wide blackout could result in a unit trip. Since normal off-site power supplies as required in Specification 3.7.A.1 are not available for startup, it is necessary to be able to black start the unit with gas turbines providing the incoming power supplies as a first step in restoring the system to an operable status and restoring power to customers for essential services. Specification 3.7.C provides for startup using 37 MW's of gas turbine power (nameplate rating at 80°F) which is sufficient to carry out a normal plant startup. A system-wide blackout is deemed to exist when the majority of Con Edison electric generating facilities are shutdown due to an electrical disturbance and the remainder are incapable of supplying the system therefore necessitating major load shedding.

Amendment No. \$\$, 1\$3, Revised by letter dated September 22, 1998