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October 31, 1994 IPN-94-138

U.S. Nuclear Regulatory Commission ATTN: Document Control Desk Mail Station P1-137 Washington, DC 20555

Subject: Indian Point Unit 3 Nuclear Power Plant Docket No. 50-286 Inspection Report 50-286/93-16, Unresolved Item 93-16-10 Post Accident Sampling System Discrepancies

References: 1. NYPA letter IPN-82-067, J. P. Bayne to NRC, dated October 12, 1982, "NUREG-0737 Item II.B.3, Post Accident Sampling System."

- NRC letter S. A. Varga to L. W. Sinclair, dated June 30, 1982, NUREG-0737 Item II.B.3 "Post Accident Sampling System."
- 3. NYPA letter IPN-86-05, J. C. Brons to NRC, dated January 7, 1986, "Regulatory Guide 1.97 Implementation Program."

Dear Sir:

The Authority has completed its evaluation of the Post Accident Sampling System (PASS), and the implementation of NUREG-0737 Item II.B.3 and Regulatory Guide 1.97 commitments, as part of the Restart and Continuous Improvement Plan (RCIP). The Authority's response to the PASS unresolved issues (URI 93-16-10) from Inspection Report 50-286/93-16 is provided in Attachment I.

Unresolved Issue (URI) 93-16-10 included a discrepancy with the PASS sampling and analysis time criteria of Regulatory Guide 1.97, which recommends a 3 hour limit for sampling and analysis of pH from the time a decision is made to take a sample. In response to this issue, the Authority changed the PASS to be capable of obtaining a sample and analyzing it in 3 hours in accordance with the criteria of Regulatory Guide 1.97. In addition, a procedure was issued and the PASS satisfactorily tested to demonstrate the capability to sample and analyze for pH within 3 hours.

During the Authority's evaluation of commitments to the NRC for PASS, additional PASS commitment discrepancies were identified and are addressed in Attachment I. The discrepancies concern the ranges for chloride and boron analysis and the performance of chloride analysis on an essentially undiluted sample. These discrepancies were resolved, and by this letter the Authority is informing the NRC of the changes to past commitments.

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Attachment II lists the Authority's commitments made by this submittal. If you have any questions, please contact Mr. K. Peters of my staff.

Very truly yours,

William J. Cahill, Jr.

Executive Vice President and Chief Nuclear Officer Nuclear Generation

Attachments: I.

Response to Post Accident Sampling System Unresolved Issues

II. Commitments Associated with the Response to Unresolved Issues of Inspection Report 50-286/93-16 cc:

U.S. Nuclear Regulatory Commission Region I 475 Allendale Road King of Prussia, Pennsylvania 19406

Resident Inspector's Office Indian Point Unit 3 U.S. Nuclear Regulatory Commission P.O. Box 337 Buchanan, NY 10511

Mr. Nicola F. Conicella, Project Mgr. Project Directorate I-1 Division of Reactor Projects - I/II U.S. Nuclear Regulatory Commission Mail Stop 14B2 Washington, DC 20555 (w/attach)

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ATTACHMENT I TO IPN-94-138

RESPONSE TO POST ACCIDENT SAMPLING SYSTEM UNRESOLVED ISSUES

NEW YORK POWER AUTHORITY INDIAN POINT 3 NUCLEAR POWER PLANT DOCKET NO. 50-286 DPR-64

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RESPONSE TO POST ACCIDENT SAMPLING SYSTEM UNRESOLVED ISSUES

During an NRC review of the annual Health Physics drill, portions of the Post Accident Sampling System (PASS) drill were observed and an unresolved issue (URI 93-16-10) was reported in Inspection Report 50-286/93-16, dated September 29, 1993. The unresolved issue concerned the Authority's commitments to NUREG-0737 TMI Action Plan Item II.B.3, "Post Accident Sampling System" (PASS), and Regulatory Guide 1.97, "Accident Sampling Capability". At the time of the inspection, the Authority was reviewing the implementation of commitments for NUREG-0737 and Regulatory Guide 1.97. However, further reviews by the Authority did not identify any exceptions or commitment to the three hour time limit for pH determinations. The following summarizes the inspector's findings for this issue (Unresolved Issue 93-16-10).

A. Finding

- 1. Sampling and analysis for pH was not included in PASS drills and procedures and not performed within three (3) hours in accordance with Regulatory Guide 1.97.
- 2. The NRC's Supplemental Safety Evaluation Report (SER), dated July 1, 1985, stated for NUREG-0737 Action Item II.B.3, that the PASS provides in-line monitoring for conductivity, chloride, dissolved oxygen, and hydrogen in the reactor coolant, and hydrogen in the containment atmosphere. However, the as-built PASS is a grab sampling system that includes in-line monitoring capability only for dissolved oxygen.
- 3. FSAR Section 9.4.2.1 does not clearly state that an undiluted sample must be used in the analysis for pH. Therefore, the FSAR may be in error and require correction.

B. Assessment of NRC Findings

1. Sampling and Analysis of pH Within Three Hours

The commitments for PASS were in accordance with NUREG-0737, which did not identify pH as a sample variable. The initial system would sample the NUREG-0737 required variables in three hours. The requirement to sample pH was incorporated into NUREG-0737 by letter (Reference 2) which referenced Regulatory Guide 1.97 Revision 2. The Authority committed to the Regulatory Guide 1.97 sampling requirements that included pH but did not clarify its position on the three hour sampling criteria.

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RESPONSE TO POST ACCIDENT SAMPLING SYSTEM UNRESOLVED ISSUES

B. Assessment of NRC Findings (cont'd)

2. Grab versus In-line Sampling

The Authority's response to revised NUREG-0737 criteria (Reference 2) was by letter dated October 12, 1982. The response (Reference 1) for NUREG-0737 criterion 2(c) and 2(d) stated specifically that "a grab sampling system is the method by which the Authority would obtain post-accident samples at Indian Point 3. The only in-line instrumentation currently installed and operating at Indian Point 3 is a Rex-Nord oxygen analyzer." The SER and supplemental SER do not reflect these statements.

3. FSAR Clarification

FSAR Section 9.4.2.1 did not state that the sample for pH must be undiluted. The FSAR was changed by Revision 5, issued July 18, 1994, to clarify the sampling process specifically noting that an undiluted sample is to be used for pH.

C. Commitment Background

The PASS was designed in accordance with the guidance of NUREG-0578 and NUREG-0737, which do not have a pH requirement. The PASS was installed, tested and declared operable on January 8, 1981, prior to the NRC's letter (Reference 2) containing post implementation review requirements. The post implementation NRC review letter (Reference 2) contained the requirement to measure pH within three hours by referencing Regulatory Guide 1.97. The Authority responded to the NRC's post implementation review letter on October 12, 1982 (Reference 1). In part, the Authority responded that the PASS has the ability to sample and analyze reactor primary coolant for pH. In addition, a detailed discussion of how samples were obtained, via *grab sampling*, was provided with statements that the primary sampling method was grab and not in-line.

The NRC completed its review of the Authority's responses to TMI Action Item II.B.3, submitted by letters dated October 12, 1982 and May 10, 1983, and reported the results in a Safety Evaluation Report (SER), dated August 15, 1983 and a Supplemental SER dated July 1, 1985.

The Authority addressed Regulatory Guide 1.97 recommendations by response letters IPN-84-20, dated June 29, 1984, and IPN-86-05, dated January 7, 1986. The Authority's response included a commitment for accident sampling capability for pH and chlorides. The Authority's response to Regulatory Guide 1.97 for PASS (Index Item No. 518) did not take exception to the Note 17 (Note 20 in Revision 3) time criteria of three (3) hours for post-accident sampling and analysis of pH.

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RESPONSE TO POST ACCIDENT SAMPLING SYSTEM UNRESOLVED ISSUES

C. Commitment Background (cont'd)

The NRC reviews of the Authority's responses to Regulatory Guide 1.97 were documented in Safety Evaluation Reports (SERs) dated October 31, 1985 and April 3, 1991. The SER stated for Accident Sampling that "there were deviations to the Regulatory Guide 1.97 requirements which were beyond the scope of the SER and that the accident sampling issue would be addressed as part of the review of NUREG-0737, Item II.B.3." However, PASS issues of NUREG-0737 Item II.B.3 had by that time been addressed by the Authority and SER's issued, except for a confirmatory item on criterion 10 (i.e., standard test matrix of analytical procedures). This item was closed by NRC letter dated January 30, 1986, which was also referenced as a bases for closing Inspection Report followup item 85-04-09 (revised unresolved item 84-10-05).

An inspection to verify and validate the adequacy of the implementation of Action Item II.B.3 of NUREG-0737 was recorded in Inspection Report 50-286/84-10. The inspector concluded that "the PASS performance testing verified the integrated ability to collect and analyze a sample within the time and dose constraints of NUREG-0737, Action Item II.B.3." A previous assessment of PASS was performed by the NRC in an emergency preparedness appraisal, and reported in Inspection Report 50-286/81-05, dated November 19, 1981, concluding that the sampling was adequate and completed within the required 3 hours. The analysis of pH was not demonstrated during these inspections.

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D. Other Discrepancies

The Authority's review also identified the following additional discrepancies:

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1. Chlorides

NRC SER dated April 3, 1991, Section 3.3.12, "Accident Sampling", stated for item number 2; "Chloride concentration minimum observable concentration is 0.04 ppb." However, the Authority's response to Regulatory Guide 1.97 by letter IPN-86-05, dated January 7, 1986 (Reference 3) provided a range of 0.15 ppm to 100 ppm (i.e., 0.15 ppm not 0.04 ppm). The SER identified the Authority's range for chlorides as a deviation from Regulatory Guide 1.97, which requires a range of 0 to 20 ppm.

The Authority's response for NUREG-0737 Item II.B.3 Criterion 5 (Reference 1) stated that chloride analysis could be performed on an *essentially undiluted* sample as low as **18 ppb**, within a 24 hour period, and indicated the analysis was performed by chloride specific ion electrode. The Authority supplemented its NUREG-0737 response by letter dated December 2, 1983 noting a range for chlorides of 40 ppb to 20 ppm.

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RESPONSE TO POST ACCIDENT SAMPLING SYSTEM UNRESOLVED ISSUES

D. Other Discrepancies

1. Chlorides (cont'd)

However, because of iodide interference and dose concerns, the method for analyzing chlorides was changed to ion chromatography, resulting in ranges of 0.10 ppm to 20 ppm. The Authority advised the NRC that chloride analysis would be by ion chromatography in a letter dated October 2, 1985. The actual range of the installed capability for chloride, as measured in the reactor coolant system, is **0.10 to 20 ppm**, based on a sample dilution of 1:1.5 and using the NRC's standard test matrix. Current capabilities can not measure the Regulatory Guide 1.97 lower limit of 0 ppm. Therefore, 0.10 ppm was chosen because it is within the system's capabilities while meeting dose criteria, can be met without interferences, and is within the maximum acceptable limit for normal operation (0.15 ppm) identified in Technical Specification 3.1.E.

The NRC's SER for NUREG-0737 Item II.B.3, dated August 15, 1983, stated that chloride analysis is capable of determining, in *undiluted* samples, chloride concentrations as low as approximately 20 ppb. However, Authority responses dated October 12, 1982, and October 2, 1985, noted some dilution, and the latest response to Regulatory Guide 1.97 on chloride range (Reference 3) provided a minimum value of 0.15 ppm. Although the system is capable of obtaining a second undiluted sample for future analysis, it is the Authority's position that the data from the sample diluted by 1.5 is equally as accurate as an undiluted sample and does not require the taking of an undiluted sample. Therefore, the Authority is informing the NRC that commitments on measuring chlorides is revised to a range of 0.10 to 20 ppm using a dilution of 1:1.5.

2. Boron

In accordance with Regulatory Guide 1.97, the PASS should be capable of analyzing boron in the range of 0 to 6000 ppm. The Authority's response dated December 2, 1983, stated the existing PASS capability for measuring boron was 130 ppm to 10, 000 ppm. The Authority's response to Regulatory Guide 1.97 (Reference 3) stated the range for boron was 10 to 10,000 ppm. The NRC's SER dated April 3, 1991, discussed the Authority's deviation from the Regulatory Guide 1.97 recommendations for boron, noting a minimum observable concentration of 10 ppm. Interferences were identified as a result of performing a test matrix evaluation, resulting in not being able to achieve the reported lower limit of detection (i.e., 10 ppm). The Authority has revised the analysis procedure in order to meet the 130 ppm minimum previously provided by letter dated December 2, 1983, and is informing the NRC of the changes for boron measurement to an analytical range of 130 ppm to 6000 ppm.

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RESPONSE TO POST ACCIDENT SAMPLING SYSTEM UNRESOLVED ISSUES

D. Clarifications

1. Sampling and Analysis of pH Within Three Hours

The Authority's October 12, 1982 letter stated that separate samples are obtained for chloride and pH due to sample preparation necessary for chloride analysis. Because the PASS has a water loop seal to measure the sample's total gas, which is then routed to a sample beaker, the *initial sample* is diluted with water, making it unsuitable for pH analysis. In addition, a separate chemical sample could not be used for chloride analysis if a pH measurement was performed. This is because the pH probe contains chlorides that would contaminate the sample, making it unsuitable for chloride analysis. Therefore, at the time of the inspection, the PASS capability for analyzing pH could not be performed concurrently with dissolved hydrogen and total gas, nor sampled separately and consistently provide a complete analysis within the three (3) hour time limit.

The PASS sampling parameters were defined by NUREG-0737 Action Item II.B.3 and clarification criteria provided in the NRC's letter dated June 30, 1982. The criteria basis that was defined for the PASS radiological and chemical analysis (Criterion 10) was to estimate the degree of core damage, verify shutdown margin (Boron), and assess coolant corrosion potential.

The NRC's guidelines identified four variables for use in assessing coolant corrosion potential; 1) Chloride, 2) Hydrogen or total gas, 3) Oxygen, and 4) pH. In accordance with the Authority's response to NUREG-0737 Item II.B.3 and Regulatory Guide 1.97 criteria based on Indian Point 3 use of brackish water (chlorides), sampling and analysis for chlorides would be performed within twenty-four (24) hours. Hydrogen or total gas is obtained and analyzed within three (3) hours, and oxygen is measured in-line after twenty-four (24) hours post-accident. Because of interference with other required chemical measurements for assessment of coolant corrosion potential, pH was analyzed later and therefore may have not met the combined sample and analysis time of three (3) hours. However, the PASS was modified to ensure it has the capability to sample and analyze for pH within 3 hours.

2. Chloride Sampling and Analysis

The NRC's post implementation review letter for NUREG-0737 Item II.B.3, dated June 30, 1982 (Reference 2) stated that chloride samples may be diluted up to a factor of 1000 for initial scoping provided the minimum detectable concentration is not greater than 10 ppm.

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RESPONSE TO POST ACCIDENT SAMPLING SYSTEM UNRESOLVED ISSUES

D. Clarifications (cont'd)

2. Chloride Sampling and Analysis (cont'd)

Also, the NRC's criteria stated that if the chloride analysis is performed on a diluted sample, an undiluted sample must also be taken and retained for analysis within 30 days, consistent with ALARA. As previously stated the Authority's response for NUREG-0737 Item II.B.3 stated that chloride analysis could be performed on an *essentially undiluted* sample within a 24 hour period. The PASS has the capability to collect a second, undiluted sample within 24 hours, but the Authority believes it meets the NRC criteria based on the fact that the 1:1.5 system dilution performed on the sample for chloride analysis is negligible and the 0.10 ppm sensitivity meets the intent of NRC criterion 5 without the need for collecting an additional sample.

3. Procedures and Tests for PASS Sampling and Analysis of pH

The Authority's Emergency Operating Procedure (EOP) E-1, "Loss of Reactor or Secondary Coolant," contains a step for initiating evaluation of plant status by directing the Chemistry Department to obtain samples. The implementing procedure used by the Chemistry Department to perform post-accident liquid sampling and analysis is procedure RE-CS-042, "Sampling Reactor Coolant During Accident Conditions." Procedure RE-CS-042 was changed to identify pH as a parameter to measure and to clearly describe a method for sampling and analysis of pH. The method described in procedure RE-CS-042 can be completed within 24 hours. Procedure RE-CS-042A, "Sampling Reactor Coolant pH During Accident Conditions," is a new implementing procedure used by the Chemistry Department to perform post-accident (liquid) sampling and analysis for pH to meet the 3 hour time criteria of Regulatory Guide 1.97.

The procedure used during the drill that the inspector observed, RE-CS-043, "Reactor Coolant Post Accident Sampling Training," was changed by Revision 4, dated September 30, 1994, to describe testing for pH. The method described in procedure RE-CS-043 is for sampling and analysis of pH within 24 hours. A new procedure was developed, RE-CS-043A, and a test was performed that demonstrated the capability to sample and analyze for pH within 3 hours.

The PASS is tested annually for operability in accordance with procedure 3PT-A18A, "Post Accident Reactor Coolant Sample System Operability Test." Procedure 3PT-A18A includes steps to verify the capability to measure pH and addresses the method described in procedure RE-CS-042, "Sampling Reactor Coolant During Accident Conditions," that samples and analyzes for pH in 24 hours.

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RESPONSE TO POST ACCIDENT SAMPLING SYSTEM UNRESOLVED ISSUES

E. Conclusions

- 1. The implementation of PASS requirements was described in the Authority's response to NUREG-0578 Item 2.1.8.a and NUREG-0737 Action Item II.B.3. In its response the Authority stated a second sample would be required for pH. The Authority did not take specific exception to the revised criteria of Regulatory Guide 1.97 to provide sampling and analysis of pH within three hours. The Authority has made changes to the PASS to sample and analyze pH within 3 hours. A test was performed that demonstrated the capability to sample and analyze for pH within 3 hours.
- 2. The Authority's responses to NUREG-0737 Item II.B.3 requirements (but not the NRC SERs) and the FSAR description indicates that PASS is a "grab sample" capability (collect, transport, and analyze), and not an "in-line" monitoring capability, except for oxygen.
- 3. FSAR Section 9.4.2.1 did not state that the sample for analyzing pH must be undiluted. The FSAR has been changed to clarify the sampling process, specifically noting that an undiluted sample is to be used for pH. The changes were submitted by letter IPN-94-090, dated July 18, 1994.

Nuclear safety evaluations were performed for the resolution of deficiencies associated with pH measurement and PASS analysis upgrades. Evaluations of PASS analysis upgrades were performed by Nuclear Safety Evaluation (NSE) 94-3-301 PS, and evaluations of deficiencies associated with pH measurement were performed by Nuclear Safety Evaluation (NSE) 94-03-122 PS.

A resolution of PASS sampling issues and commitment implementation discrepancies has been identified in the Authority's Restart and Continuous Improvement Plan (RCIP) as a restart action item under Restart Issue NRC-73 (NAP II.25). The RCIP Action Plan for this issue is R-2.1.2.2.

ATTACHMENT II TO IPN-94-138

COMMITMENTS ASSOCIATED WITH THE RESPONSE TO UNRESOLVED ISSUES OF

INSPECTION REPORT 50-286/93-16

NEW YORK POWER AUTHORITY INDIAN POINT 3 NUCLEAR PLANT DOCKET NO. 50-286 DPR-64

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COMMITMENTS IDENTIFIED FOR RESPONSE TO INSPECTION REPORT URI 93-16-10

<u>Commitment No.</u>	Commitment Description	Due Date
IPN-94-138-01	The PASS was changed, procedure RE-CS-042A issued, and the system tested to sample and analyze for pH within 3 hours.	Currently complete
IPN-94-138-02	Procedure RE-CS-042 was revised to provide a method of sampling and analysis of pH.	Currently complete
IPN-94-138-03	Training (drill) Procedure RE-CS-043 was revised to describe testing for sampling and analysis of pH.	Currently complete
IPN-94-138-04	The PASS will sample and analyze for chloride with a range of 0.10 ppm to 20 ppm based on a sample dilution of 1:1.5.	Currently complete
IPN-94-138-05	The PASS will sample and analyze for boron with a range of 130 ppm to 6000 ppm.	Currently complete