July 10, 2000

Mr. A. Alan Blind
Vice President - Nuclear Power
Consolidated Edison Company of
New York, Inc.
Indian Point 2 Station
Broadway and Bleakley Avenue
Buchanan, NY 10511

SUBJECT: NRC AUGMENTED INSPECTION TEAM FOLLOW-UP - STEAM GENERATOR TUBE FAILURE - REPORT NO. 05000247/2000-007

Dear Mr. Blind:

This letter transmits the results of a safety inspection conducted by an NRC team at your Indian Point 2 reactor facility from May 15 through May 26, 2000. On May 26, 2000, the results were discussed with you and other members of your staff.

The Augmented Inspection Team (AIT) inspection was conducted immediately after the steam generator tube failure to promptly establish the facts associated with the event. This AIT Follow-up inspection was performed after your initial recovery efforts, and focused on your short term corrective actions and the enforcement aspects of the issues previously identified during the AIT inspection. As a result, many of the issues discussed in the AIT report are further discussed in this report. The cause of the tube failure is outside the scope of this inspection, and is being reviewed separately by the NRC. In addition, the emergency preparedness findings related to the event will be discussed in Inspection Report No. 05000247/2000-006.

We found that the short term corrective actions taken in response to the February 2000 event for issues within the scope of this inspection were adequate. During this inspection, the team identified several additional examples of performance issues surfaced in the AIT. These involve deficient corrective actions in the engineering support and operations areas. For example, we noted problems in restoring the remote start capability of gas turbines Nos. 2 and 3. We recognize that your staff was in the process of implementing a station improvement program as detailed in your Business Plan before the event. This event and the follow-up inspections highlight the importance of ensuring the proper scope and implementation of these station improvement efforts.

Based on the results of this inspection, seven issues of very low risk significance (Green) were identified. These seven issues were also determined to involve violations of NRC requirements. However, the violations were not cited because they were of very low safety significance and have been entered into your corrective action program. These issues involved: (1) Technical Specification cooldown limit, (2) procedure guidance for the pressurizer spray flow alignment, (3) verification and validation for a revision to the emergency operating procedure changes, (4)

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procedure guidance achieving cold shutdown after an event, (5) corrective actions for the steam generator leak monitoring (N-16) recorder, (6) an operability determination for the charging pump system seal water tank, and (7) a safety evaluation for a modification to the chemical volume and control system. If you contest these non-cited violations, you should provide a response within 30 days of the date of this report, with the basis for your denial, to the Nuclear Regulatory Commission, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Indian Point 2 facility.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/NRC/ADAMS/index.html (the Public Electronic Reading Room). Should you have any questions regarding this report, please contact Mr. David C. Lew at 610-337-5120.

Sincerely,

/RA/

Wayne D. Lanning, Director
Division of Reactor Safety

Docket No. 05000247
License No. DPR-26

Enclosure: Inspection Report 05000247/2000-007

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REGION I

Docket No.	05000247
License No.	DPR-26
Report No.	05000247/2000-007
Licensee:	Consolidated Edison Company of New York, Inc.
Facility:	Indian Point 2 Nuclear Power Plant
Location:	Broadway and Bleakley Avenue Buchanan, New York 10511
Dates:	May 15-19 and 22-26, 2000
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Approved by:	David C. Lew, Chief Performance Evaluation Branch Division of Reactor Safety

SUMMARY OF FINDINGS

Indian Point 2 Nuclear Power Plant
NRC Inspection Report 05000247/2000-007

The inspection was conducted from May 15-26, 2000, using the guidance contained in NRC Inspection Manual Chapter 2515. The inspection followed an NRC Augmented Inspection Team (AIT) review of the steam generator tube failure event that occurred on February 15, 2000. The Augmented Inspection Team (AIT) inspection was conducted immediately after the steam generator tube failure to promptly establish the facts associated with the event. The results of the AIT inspection is documented in Inspection Report No. 05000247/2000-002. This AIT Follow-up inspection was performed after Con Edison's initial recovery efforts, and focused on Con Edison's short term corrective actions and the enforcement aspects of the issues previously identified during the AIT inspection. As a result, many of the issues discussed in the AIT report are further discussed in this report. The cause of the tube failure was outside the scope of this inspection, and was being reviewed separately by the NRC. In addition, the emergency preparedness findings related to the event will be discussed in Inspection Report No. 05000247/2000-006. The report also includes an NRC review of permanent plant modifications performed on April 17-26, 2000. The significance of issues is indicated by their color (GREEN, WHITE, YELLOW, RED) and was determined by the Significance Determination Process in Inspection Manual Chapter 0609 (see Attachment 1).

Cornerstone: Mitigating Systems

- **Green** - The final calculation for the charging pump seal water tank, which provided the long term basis for operability, was not approved, accepted or entered into the Con Edison Calculation Indexing Program contrary to procedure requirements. This issue was determined to have very low risk significance since the equipment operability was not impacted. Deficient control, review and approval of these calculations and of the associated operability determination are collectively considered a violation of 10 CFR 50, Appendix B, Criterion V and is being treated as a non-cited violation (Section R15).

- **Unresolved Problem** - Con Edison did not resolve conditions adverse to quality associated with the gas turbine Nos. 2 and 3 remote start capabilities. This problem had been identified by Con Edison for several years. This issue is unresolved pending additional NRC review (Section R16).

- **Green** - The safety evaluation for a modification to the chemical volume and control system power supply did not completely define the scope of work. The safety evaluation incorrectly stated that the associated modification did not add any new wires or cables. The failure to assess the full scope of the modification in the safety evaluation was determined to be a non-cited violation. Failure to include and evaluate the new cables in the safety evaluation was determined to have very low risk significance because it did not change the overall conclusions reached in the safety evaluation regarding an unreviewed safety question, and did not adversely impact the plant design modification (Section R17).

- **Green** - Con Edison did not take timely corrective actions for the steam generator leak monitoring (N-16) recorder deficiency. The failure to take adequate corrective actions was determined to be a non-cited violation, and was an issue of very low risk significance in that there was a minimal impact on the operators' ability to determine the magnitude of the steam generator tube leak (Section 4OA2).

Cornerstone: Initiating Events

- **Green** - During the initial plant cooldown following a tube leak in the steam generator, the Technical Specification cooldown limit for the reactor coolant system was exceeded. The evaluation of the excessive cooldown determined that there was no adverse impact on the reactor coolant system components and, therefore, is considered a very low risk significant issue. This non-cited violation resulted from the operation crew's deficient monitoring of plant parameters and high pressure steam dump system deficiencies (Section OA3.1).

- **Green** - Deficiencies in emergency operating procedures delayed necessary plant cooldown actions by the operators. The non-cited violation was determined to be an issue of very low risk significance, because the cooldown delay did not result in a measurable increase in the release of activity during the steam generator failure event (Section OA3.1).

- **Green** - Deficiencies in standard operating procedures delayed necessary plant cooldown actions by the operators. The non-cited violation was determined to be an issue of very low risk significance, because the cooldown delay did not result in any appreciable increase in the release of activity during the steam generator failure event (Section OA3.1).

Other

Cross-cutting Issues: Identification and Resolution of Problems

- **Green** - Con Edison did not properly disposition or enter some conditions adverse to quality into their corrective action program as required by procedure. A selected review of the Communications to Staff (CTS) database, a database of procedure enhancement recommendations, determined that one CTS item was not adequately resolved and two additional CTS items met the threshold for initiating a condition report (CR) for which a CR was not initiated. This non-cited violation is associated with the failure to initiate condition reports as required by Con Edison's procedures. The issue was determined to be of very low risk significance, because the most notable problem was related to a delay in reducing plant pressure, and did not result in any appreciable increase in the release of activity during the steam generator tube failure event (Section 4OA2).

- **No Color** - The control room operators did not enter significant plant items, such as event declaration and implementation of the emergency plan, in the control room logs, as required by Con Edison procedures. This procedure violation was a problem that was also noted for the August 31, 1999, loss of bus event. The failure to enter significant items into the control room logs was determined to be a non-cited violation. Although this issue does not affect any of the seven cornerstones (Attachment 1), it was

considered important because prior corrective actions were not effective (Section 4OA2.3).

- **No Color** - In the operations and engineering support areas, corrective actions to resolve known problems were untimely or incomplete. While the problems were of very low risk significance, some of these procedure and equipment problems caused unnecessary challenges to the operators and delays in achieving cold shutdown after the event. These problems included difficult procedural guidance for aligning pressurizer spray flow, non-functional steam generator leak monitoring (N-16) recorder, high pressure steam dump system deficiencies, and the lack of gas turbine Nos. 2 and 3 remote start capability (Section 4OA5).

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BACKGROUND

Summary of Plant Event

On February 15, 2000, at 7:17 p.m., the Indian Point 2 nuclear plant experienced a steam generator tube failure (SGTF) that required the declaration of an Alert at 7:29 p.m., and a manual reactor trip at 7:30 p.m. Operators identified that the #24 steam generator (SG) was the source of the leak and completed its isolation by 8:31 p.m. At 9:02 p.m., operators opened the high pressure steam dump valves (HPSDVs) and established an excessive primary plant cooldown rate that caused a rapid reduction in pressurizer level and required the operators to manually initiate safety injection (SI). Operators reset the SI (9:21 p.m.), reduced primary plant pressure to about 970 psig (9:32 p.m.), and recommenced a plant cooldown at 11:35 p.m. The residual heat removal (RHR) system was placed in service on February 16, 2000, at 12:38 p.m., and primary plant pressure was reduced below that of the #24 SG to terminate the SG tube leakage at 2:20 p.m. The cooldown continued and the plant entered cold shutdown at 4:57 p.m. Con Edison exited the Alert at 6:50 p.m.

Event Follow-Up

The NRC immediately responded to the event with resident inspector oversight and a subsequent Augmented Inspection Team (AIT), which reviewed the causes, safety implications, and Con Edison's immediate corrective actions. The AIT was completed on March 3, 2000, and the findings are documented in NRC Inspection Report 05000247/2000-002.

This AIT Follow-Up inspection was conducted with the plant shutdown for refueling and steam generator repair. This inspection focused on Con Edison's SGTF event evaluation and associated corrective actions. The AIT Follow-Up Team (the Team) also addressed enforcement actions related to the equipment and human performance issues described in the AIT inspection report.

1. REACTOR SAFETY
(Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity)

1R15 Operability Evaluations (71111.15)

a. Inspection Scope

The Team reviewed nine operability determinations (OD) scheduled to remain in effect after plant startup. The ODs were reviewed to determine if the associated safety evaluations and technical bases were in conformance with NRC requirements. These ODs are identified at the end of the report.

b. Issues and Findings

The Team found that Con Edison did not perform a formal OD for a deficiency documented in CR 199909430, regarding charging pump seal water tank operability. Additionally, Con Edison's preliminary calculation that provided the basis for operability was not formalized nor attached to the subject CR. The preliminary calculation was not a standalone document because it was missing a date, calculation number, preparer

signature, and reviewer signature. The final calculation, completed by a contractor, was not formally approved or accepted by Con Edison nor entered into the Con Edison Calculation Indexing Program. This is contrary to the procedural requirements provided in Station Administrative Order, SAO-112, "Corrective Action Program," Station Administrative Order, SAO-451, "Verification, Documentation and Traceability of Calculations," and SE-SQ-12.317, "Equipment Operability Assessment."

Upon identification of the deficiencies, Con Edison formalized the preliminary calculation that was used as the initial basis for operability and attached it to CR 199909430. Also, Con Edison formally accepted and entered the final calculation (FFX-00789-00) into the Con Edison Calculation Indexing Program. Con Edison initiated CR 200002832 to review their failure to properly formalize preliminary and final calculations.

Failure to properly document and accept the bases for the OD is considered a violation of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," which states, in part, that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. The Team determined that the lack of calculation control was of very low risk significance because the equipment operability was not impacted and resulted in a Green finding. This violation is being treated as a Non-Cited Violation, consistent with Section VI.A of the Enforcement Policy, issued on May 1, 2000 (65 FR 25368). **(NCV 05000247/2000-007-01)**

1R16 Operator Workarounds (71111.16)

a. Inspection Scope

The Team evaluated the 18 operator workarounds (OWAs) and 27 central control room deficiencies (CCRDIs) to determine if human reliability and functional capability of mitigating systems were adversely affected. Also, the status of repairs for 14 OWAs and 23 CCRDIs scheduled in the current refueling outage was verified. This inspection included discussions and plant tours with operations department personnel, and the review of Con Edison's corrective actions associated with a gas turbine system OWA documented in CR 199902844.

The gas turbine operator workaround review included the following documents:

- Operability determination (OD) 99-040, Rev. 0, November 5, 1999
- OD 99-040, Rev. 1, May 24, 2000
- Request for Engineering Support 13179-98, December 7, 1998
- Condition reports (CR) 199804169, 199808923, 199902844, 200003818, and 200004559
- Technical Specifications and Updated Final Safety Analysis Report
- Safety Evaluation 00-378-EV, "Gas Turbines."

b. Issues and Findings

The three gas turbines (GTs) are designed to provide an alternate power source to the station in case of a loss of offsite power and concurrent loss of onsite emergency power (station blackout). In addition, the GTs provide an auxiliary power supply for alternate safe shutdown systems. One of the three GTs is needed to provide sufficient power for these two conditions and for meeting Technical Specification operability requirements. GT No.1 is located on the site, GT's Nos. 2 and 3 are located approximately one mile from the site.

Updated Final Safety Analysis Report (UFSAR) section 8.2.1, "Electrical System Design/Network Interconnections," states in part that the GTs can be manually started from the central control room when required. Contrary to the above, CR 199808923, dated October 8, 1998, documented multiple occasions in which GTs Nos. 2 and 3 could not be started from the control room. The failure to start was determined to be a computer communication failure between the central control room and the remote GT computer located one mile offsite. The remote start failures were a known problem since the computer system was installed in the 1994 time frame.

This UFSAR nonconformance related to the degraded remote start capabilities was not documented until the initiation of OD 99-040, Rev. 0, November 5, 1999. The OD stated that "In its present condition, we have no remote start capability for both GTs. This capability is described in the FSAR in section 8.5 pages 8.5-1 and 8.5-2." NRC Generic Letter GL 91-18, "Information To Licensee's on Resolution of Degraded and Nonconforming Conditions," and Con Edison's station administrative order SAO-204, "Work Control," state in part that if a degraded or non-conforming system, structure, or component is different than described in the UFSAR then there are two options available to resolve the issue:

1) restore the Structure system or component back to its previous condition in a timely manner OR
2) if the condition is accepted "as-is" then the condition should be considered a change and is subject to a 50.59 review

Contrary to the above, the gas turbine remote start condition was not corrected in a timely manner or accepted "as-is" with a 50.59 safety evaluation.

CR 199809923 noted that a request for engineering support (RES) 13179-98 was initiated several months before the CR was written. This RES was initiated on December 7, 1998. The RES provided a thorough description of the remote start problems and the associated actions needed to correct the degraded condition. At the time of our inspection, this RES was still in the initial stage of the engineering review process. The Team determined that this engineering response was untimely.

After the Team's review, the initial OD was revised on May 24, 2000, to provide a more detailed and thorough description of the GT system's capabilities. On June 2, 2000, Con Edison initiated safety evaluation 00-378-EV, "Gas Turbines," to revise the UFSAR criteria for the gas turbines and to document the current system capabilities.

After additional review by Con Edison, CR 200004559 was initiated to document a prior concern with reactor coolant pump (RCP) seal failures during a postulated loss of AC power and a corresponding lack of seal cooling. The RCP seal failure issue resulted in a commitment, by Con Edison, to ensure the gas turbines were capable of starting "well within one hour." Written correspondence between Con Edison and the NRC suggested that some safe shutdown loads, RCP seal cooling, would be operational within approximately 30 minutes. Con Edison has not demonstrated that the GTs are capable of starting within 30 minutes. Con Edison has withdrawn safety evaluation 00-378-EV pending resolution of the 30 minute gas turbine start capability. This issue is considered unresolved **(URI 05000247/2000-007-02)** pending Con Edison's final resolution and corrective action program review under CR 200004559.

1R17 Permanent Plant Modifications (71111.17)

a. Inspection Scope

The Team reviewed six plant modifications and associated safety evaluations (SEs) scheduled for installation during the current refueling outage to verify that regulatory requirements and design bases were correctly translated into specifications, drawings, procedures, and instructions; that appropriate quality standards were included in design documents; and that adequate verification was provided. These modifications are identified at the end of the report.

The Team also interviewed selected design engineers and system engineers associated with some of the modifications.

b. Issues and Findings

The Team reviewed modification FPX-96-12153-F, "Chemical Volume and Control System Power Supply Enhancements," and identified deficiencies with the associated Safety Evaluation (SE) (98-274-MM). Section II, "Work Description," and Section V.1, "Conclusion," of the SE stated that a new fuse, fuse block, and wiring circuit would be installed to supply 118 Vac from instrument bus #21 spare breaker #4 to central control room (CCR) instrument rack A6. Additionally, Section III, "Analysis," states that new electrical cables will also be installed to complete the wiring change. SE Section V.8, "Conclusion," incorrectly stated, "This modification does not add any new wiring or cables." Also, Attachment III, "Safety Impact Questionnaire," to the SE, was incorrectly marked "No" to the Section IV.4 electrical question, "Does the proposed change add cable or affect cable routing." The SE content did not meet the procedural requirements provided in station administrative order SAO-460, "10 CFR 50.59 Safety Evaluations."

Con Edison stated that they would revise the SE to properly identify and evaluate the scope of work in the SE. Con Edison initiated CR 200002836 to address this issue. The Team noted that correction of the above deficiencies did not change the conclusion of the SE.

Failure to properly identify and evaluate the full scope of the modification in the SE is considered a violation of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," which states, in part, that activities affecting quality shall be prescribed by

documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. The Team determined that the lack of control was of very low safety significance because it did not adversely impact the plant design modification or overall safety evaluation conclusion and resulted in a Green finding. This violation is being treated as a Non-Cited Violation, consistent with Section VI.A of the Enforcement Policy, issued on May 1, 2000 (65 FR 25368). **(NCV 05000247/2000-007-03)**

1R19 Post-Maintenance Testing (71111.19)

a. Inspection Scope

The Team verified that Con Edison has incorporated post maintenance tests within maintenance work packages. This was accomplished by selected verification of risk-significant maintenance activities. Additionally, the Team confirmed that outstanding post-maintenance tests were scheduled in the current forced outage. The scope also included status verification of outstanding post-maintenance tests from the performance observation documented in NRC inspection report 05000247/2000-01.

b. Issues and Findings

There were no findings identified.

1R23 Temporary Modifications (71111.23)

a. Inspection Scope

The Team reviewed and discussed the active temporary facility changes (TFC) with operations department personnel to verify that the safety functions of important systems were not affected. Also, a detailed review of the following TFCs was performed using the Updated Final Safety Analysis Report, Technical Specifications, and procedure SAO-206, "Temporary Facility Changes."

- TFC 98-222 Service water pump strainer blowdown valves
- TFC 99-147 Install resistors in rod position indicator circuits
- TFC 99-164 Channel 4 over temperature delta-T monitoring

b. Issues and Findings

There were no findings identified.

4. OTHER ACTIVITIES

4OA2 Identification and Resolution of Problems (71152, 71153)

.1 Resolution of Equipment Deficiencies

a. Inspection Scope

The Team assessed Con Edison's corrective action program implementation by examining how Con Edison dealt with various equipment problems related to the February 15, 2000, steam generator tube failure (SGTF) event and sampling other non-event related items. Additionally, selected equipment work orders and condition reports that Con Edison generated following the SGTF event were reviewed. The Team focused on those items that Con Edison did not plan to work during the current refueling outage to determine if there were any equipment operability issues that would impact plant operation or affect safety-related systems.

b. Issues and Findings

SGTF Event Equipment Issues

NRC AIT inspection report 05000247/2000-002 documented a long-standing equipment issue on the steam generator nitrogen-16 radiation monitor recorder and associated power level potentiometer. This issue affected the operators' ability to monitor and trend steam generator primary to secondary leakage. The recorder malfunctions were identified in April 1999, and the potentiometer problems were identified by Con Edison in December 1999. At the time of the SGTF event neither equipment deficiency was corrected. The Team determined that Con Edison did not implement timely corrective actions for the recorder malfunction identified in April 1999. This failure is considered a violation of 10 CFR 50 Appendix B, Criterion XVI, which states, in part, that measures shall be established to assure that conditions adverse to quality are promptly identified and corrected. The Team determined that this violation is an issue of very low risk significance since it did not affect the consequences of the tube failure event. Also, Con Edison entered this issue into the corrective action process. This finding was determined to be Green. This violation is being treated as a Non-Cited Violation, consistent with Section VI.A of the Enforcement Policy, issued on May 1, 2000 (65 FR 25368). **(NCV 05000247/2000-007-04)**

The inspectors also reviewed Con Edison's resolution of several long-standing issues with the gas turbine system. Details of Con Edison's untimely corrective actions related to this system are described in Section 1R16 of this report, "Operator Workarounds".

Equipment Problems Outside Scope of Current Refueling Outage

No findings were identified.

.2 Communications to Staff Computer Database

a. Inspection Scope

The Team reviewed a sample of procedure enhancement recommendations contained in the Communications to Staff (CTS) computer data base. The CTS computer data base provides a mechanism for all departments to forward procedure enhancement recommendations to the Generation Support procedure group for review and incorporation into the applicable procedure. The CTS items were evaluated to determine if they met the Condition Report (CR) system threshold as defined in Station Administrative Order (SAO) 112, "Corrective Action Program."

b. Issues and Findings

The Team reviewed a sample of approximately 50 CTS items and identified 13 items that were potential CR issues. The 13 CTS items are identified at the end of the report. The Team found that CRs were previously written for three of the items. However, Con Edison acknowledged that CRs should have also been written for three additional CTS items. Accordingly, Con Edison initiated CR Nos. 200003876, 200003894, and 200003879 to correct the errors. The Team concluded that CRs were not required for the remaining 7 CTS items.

The Team noted that in a previous safety assessment, "An Independent Safety Assessment of Indian Point Station Unit 2," preformed in May 1998, problems were noted related to the Communication to Staff program. The Corrective Action section of the report stated that, "though the Operation's Communications to Staff captured improvement recommendations, independent databases also create a variety of inefficiencies and problems associated with item closure such that closure may occur without a full understanding of the original intent, thereby increasing the potential for corrective actions not to be accomplished or changed to no longer resolve the original problem." The concern regarding this action tracking system still exists in that CRs were not generated for CTS items as described above. Con Edison is currently reviewing all lower tier corrective action tracking systems, including CTS, to ensure conformity with the existing corrective action program and procedures.

As an example of a CTS item that was closed without a full understanding of the original intent or a full understanding of the impact on plant operations, the Team found that CTS 99-0533, which was written in July 1999, described a procedure problem when initiating pressurizer auxiliary spray. The issue stated that emergency operating procedure (EOP) guidance for a steam generator tube failure event did not address the specific steps for placing pressurizer auxiliary spray in service during the plant cooldown. The problem resolution and extent of condition review were weak and missed an opportunity to add the needed operator actions required to isolate normal spray flow before using the auxiliary spray. Consequently, during the steam generator tube failure event in February 2000, operators did not isolate normal spray before initiating auxiliary spray causing approximately a one hour delay in achieving plant cooldown and adversely affecting the ability to reach cold shutdown conditions. Upon closure of the normal spray valves, reactor coolant pressure control was regained and the plant cooldown continued.

Station administrative order SAO-112, "Corrective Action Program," requires personnel to identify all nonconforming or anomalous conditions that are discovered. The procedure was not followed for three of the items identified above though Con Edison did eventually write CRs based on a review of the CTS data base and associated observations by the Team. A CR was not written on the CTS issue regarding the pressurizer auxiliary spray valve lineup problem discussed above since that issue was identified and corrected in conjunction with the steam generator tube failure event. Failure to initiate CRs and take appropriate corrective actions is considered a violation of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," which states, in part, that activities affecting quality shall be prescribed by documented procedures of a type appropriate to the circumstance and shall be accomplished in accordance with these procedures. Additionally, the failure to write a CR to correct the procedure problems associated with pressurizer spray valve line-ups contributed to a delay in stopping the primary to secondary steam generator leak. This issue was of low risk significance in that there was a minimal impact on safety, since the delay in establishing auxiliary spray only delayed the time required to meet cold shutdown conditions. This issue was a Green finding. This violation is being treated as a Non-Cited Violation, consistent with Section VI.A of the Enforcement Policy, issued on May 1, 2000 (65 FR 25368). **(NCV 05000247/2000-007-05)**

.3 Operator Log Keeping (71152, 71153)

a. Inspection Scope

The Team reviewed the control room operator computerized log entries related to the steam generator tube failure event to determine if the data met the operations administrative directive (OAD-3), "Plant Surveillance and Log Keeping." In addition, the corrective actions related to deficient control room log keeping for the August 31, 1999, loss of bus event were reviewed.

b. Issues and Findings

Procedure OAD-3, section 4.4.6.(1), requires a log entry for the following items:

- abnormal indications or conditions that could affect operation
- significant events which affect or could affect operation
- conversations with NRC, State or Local authorities

Contrary to the above requirements, the AIT noted that control room operator log entries did not include significant plant items such as the event declaration, implementation of the emergency plan, abnormal indications, and major plant evolutions as required by procedure. The log keeping procedure violation was a repeat from the August 31, 1999, loss of bus event. Some of the corrective actions from the previous event were implemented during the Steam generator tube rupture event in that a dedicated operator was used to collect data. However, a second operator did not enter some of the required information into the computerized control room log. Con Edison entered into the correction action process this recent failure to record required information in the control room logs.

Technical Specification 6.8.1.a. requires written procedures to be implemented for activities referenced in Appendix "A" of Regulatory Guide 1.33, Rev. 2. Appendix A includes the requirement for item "h", "Log Entries, Record Retention, and Review Procedures." The repetitive failure to follow procedures and enter the required data into the control room log indicates a performance trend which resulted in a violation. Although this issue does not affect any of the seven cornerstones, it was considered more than minor because the corrective actions for the August 1999 event were not completely effective. This violation is being treated as a Non-Cited Violation, consistent with Section VI.A of the Enforcement Policy, issued on May 1, 2000 (65 FR 25368). **(NCV 05000247/2000-007-06)**

4OA3 Event Follow-Up (71153)

.1 (Closed) Licensee Event Report (LER) 05000247/2000-001-00: Manual Reactor Trip Following Steam Generator Tube Rupture

a. Inspection Scope

For the event described in the subject LER, the Team evaluated Con Edison's event investigation and associated corrective actions. The Team also evaluated the human performance and equipment issues related to the excessive reactor coolant system (RCS) cooldown rate achieved during the event. Reference documents included CR 200000983 and its associated significance level 1 (SL-1) report; SAO 112, "Corrective Action Program;" and Con Edison and Westinghouse technical evaluations regarding the effects of the excessive cooldown.

Emergency response issues contained in the LER were reviewed by the Team and determined to be corrected satisfactorily. Additional event related emergency preparedness issues were reviewed during the June 1, 2000, exercise and the NRC's assessment will be documented in Inspection Report No. 05000247/2000-006.

Details of this event are also described in NRC Augmented Inspection Team report 05000247/2000-002.

b. Issues and Findings

Significance Level 1 Corrective Action Report Review

Con Edison's significance level 1 (SL-1) corrective action report in response to Licensee Event Report (LER) No. 2000-001 was adequate. However, the documented root cause evaluation performed by Con Edison's event investigation team missed an opportunity to identify any lessons learned regarding the event and to detect some event related procedure deficiencies contained in a database containing procedural enhancement recommendations, as describe in Section 4OA2. The inspector concluded that these missed opportunities did not significantly impact the results of the SL-1 Report. Also the inspector observed that Con Edison initiated condition reports for these minor deficiencies.

Excessive Reactor Coolant System Cooldown Rate

Following isolation of the ruptured steam generator, control room operators commenced a RCS cooldown in accordance with emergency operating procedures (EOPs). The cooldown was performed using the high pressure steam dump (HPSD) system, which directs steam from the steam generators to the main condenser. During the beginning of this cooldown, operators exceeded the Technical Specification (TS) RCS cooldown limit of 100 degrees per hour.

Con Edison entered the excessive cooldown issue into the corrective action process. The actual rate achieved was determined to be 103 degrees per hour. Con Edison's post-event evaluation determined that several HPSD problems contributed to the excessive cooldown. Specifically, 1) the HPSD system was known to function erratically at low steam flows in the automatic pressure control mode; 2) the HPSD controller was not properly tuned; 3) known HPSD design deficiencies, such as imprecise valve position indication in the control room, complicated system operation; and 4) the simulator's HPSD system model did not match the actual plant response (HPSD system response in the simulator was ten times slower than the plant). The Team determined that the operation crew's deficient verification of the HPSD system response also contributed to the excessive cooldown, since indications of RCS temperature and pressure were available in the control room to assess the initial system response.

The Team reviewed evaluations provided by Con Edison and Westinghouse related to the effects of the excessive RCS cooldown rate. Also, the excessive core differential temperature after placing the residual heat removal system in service was reviewed to evaluate the potential impact on core baffle bolts. The associated documents are identified at the end of this inspection report. These evaluations determined that no significant degradation of the RCS components occurred, and the Team agreed with the evaluations.

The failure to maintain RCS cooldown rate within required limits is a violation of TS 3.1.B. The Team considered this violation to be of more than minor significance in the reactor safety cornerstone. Based on consultation with a regional NRC risk analyst, the Team concluded that this issue had a negligible effect on the initiating event frequency for a reactor pressure vessel rupture, which is approximately less than one per 10^5 years. This issue was determined to be of very low safety significance, which resulted in a Green finding. This violation is being treated as a Non-Cited Violation, consistent with Section VI.A of the Enforcement Policy, issued on May 1, 2000 (65 FR 25368). **(NCV 05000247/2000-007-07)**

Emergency Operating Procedure (EOP) Quality

In order to continue the RCS cooldown to cold shutdown, EOP ES-3.1, "Post Steam Generator Tube Rupture Cooldown Using Backfill," directed control room operators to align the residual heat removal (RHR) system for shutdown cooling. ES-3.1 required an RCS pressure less than 300 psig before placing RHR in service. However, standard operating procedures for the reactor coolant pumps (RCPs) required them to be stopped if RCS pressure is less than 350 psig. As a result, operators delayed placing RHR in service because they wanted to maintain the RCPs running to provide normal

pressurizer spray, instead of using auxiliary spray without the RCPs running. After additional evaluation, Con Edison applied 10 CFR 50.54 (x), "Conditions of Licenses," to change the EOP requirements to allow the initiation of the RHR system with the RCS pressure above 350 psig. The Team determined that Con Edison's technical basis, a vendor evaluation, for this decision was appropriate.

Further inspection revealed that in August 1998, Con Edison revised the RHR shutdown cooling pressure limit in ES-3.1 from 450 psig to 300 psig. Generation Support Administrative Directive 3, "Emergency Operating Procedures Maintenance Program," requires that EOP changes be validated and verified. Con Edison did not validate and verify this revision because it was considered to be an administrative change. Failure to verify and validate the ES-3.1 change is a violation of TS 6.8.2, "Procedures and Programs," which requires that changes to procedures referenced in Reg Guide 1.33 (e.g., EOPs) shall be reviewed and approved for implementation in accordance with approved administrative procedures. This issue was determined to be of very low safety significance, because the delay occurred after the steam generator release was stopped, and resulted in a Green finding. This violation is being treated as a Non-Cited Violation, consistent with Section VI.A of the Enforcement Policy, issued on May 1, 2000 (65 FR 25368). **(NCV 05000247/2000-007-08)** The Team verified that Con Edison has appropriately revised procedure ES-3.1.

Other procedure inadequacies were revealed while operators continued the cooldown to cold shutdown. Each of the following issues also delayed achieving cold shutdown conditions since additional evaluations and procedure changes were required.

- Standard Operating Procedure (SOP) 4.2, "Residual Heat Removal System Operation," did not provide adequate guidance for placing the RHR system in service following a safety injection system actuation. The procedure did not account for the automatic repositioning of component cooling water valves in the RHR system.

- SOP 4.2 did not provide adequate RHR heat exchanger isolation points for system warm prior to being placed in service. This prolonged system warm up until Con Edison changed SOP 4.2 to include additional isolation valves.

- SOP 1.4, "Pressurizer Pressure Control," did not contain adequate guidance for auxiliary spray operation. The procedure did not address the need to isolate the normal pressurizer spray valve before initiating auxiliary spray. This delayed plant depressurization because effective pressurizer spray could not be obtained with the normal spray valve open since auxiliary spray flow was directed back to the reactor coolant loop through the normal spray valve.

These procedure inadequacies are a violation of 10 CFR 50, Appendix B, Criterion III, "Design Control," which requires, in part, that system design information be translated into plant procedures. This issue was determined to be of very low safety significance because the delay occurred after the steam generator release was stopped, and resulted in a Green finding. This violation is being treated as a Non-Cited Violation, consistent with Section VI.A of the Enforcement Policy, issued on May 1, 2000 (65 FR 25368). **(NCV 05000247/2000-07-09)** The Team verified that Con Edison has taken corrective

actions for the noted problems, including reviews of other EOPs to ensure that similar problems do not exist.

Emergency Response Organization Performance

The emergency response issues contained in the LER were reviewed by the Team and determined to be corrected satisfactorily. Additional event related emergency preparedness issues were reviewed during the June 1, 2000, exercise and the NRC's assessment will be documented in NRC Inspection Report No. 05000247/2000-006.

4OA4 Cross-cutting Issues

In the operations and engineering support areas, several corrective actions to resolve procedure and equipment problems were untimely and ineffective. While the problems were of very low risk significance, some of these procedure and equipment problems caused unnecessary challenges to the operators and delays in achieving cold shutdown after the event. These problems included weak procedural guidance for aligning pressurizer spray flow, non-functional steam generator leak monitoring (N-16) recorder, high pressure steam dump system deficiencies, and the lack of gas turbine Nos. 2 and 3 remote start capability.

4OA5 Recovery/Business Plan

a. Inspection Scope

The inspection scope involved selected verification of the Con Edison Business Plan corrective actions, verification of revision 3 to the Recovery Plan to the Business Plan integration, and discussions with cognizant managers.

b. Issues and Findings

The Team confirmed that Con Edison senior management periodically reviews and monitors the status of Business Plan actions. To support senior management periodic reviews, individual departmental managers provide bi-weekly updates on the status of corrective actions. The Team verified that a majority of the periodic updates were provided to senior management. An exception was noted for the work control manager who was not able to perform periodic updates due to collateral responsibilities such as the outage director and responsibilities for corrective actions related to the work control improvement plan. The Business Plan was recently revised in April 2000 to address, in part, previous NRC observations of the Business Plan. The Team verified selected completed actions within the corrective action plan, operations plan, and the work control plan were appropriate.

The recent forced outage has delayed completion of some departmental improvement plan actions. One specific action delayed involved the establishment and staffing of the work control organization initially scheduled for completion in June 2000. The primary purpose of the additional staff was used to support reduction in the maintenance backlogs through improvements and efficiency within the work control center.

Though some improvement has been noted in Con Edison's performance indicators associated with the Business Plan, an overwhelming majority of issues have not met the established goals. For example, the corrective action program performance indicators show that improvement was achieved in timeliness of resolution; however, Con Edison has just recently initiated actions to evaluate the quality of the analyses and root causes.

The Team confirmed that only one specific item was added to the Business Plan as a result of the steam generator tube failure event on February 15, 2000. That issue was in the Operations Improvement Plan to re-evaluate the quality of control room logs. The upgrade to improve the quality of control room logs had previously been identified in the improvement plan and the previously identified actions had been completed. The departmental managers stated that performance issues associated with this event were identified for resolution within the corrective action process. Continuous self-assessment of Business Plan items with current performance observations appeared inconsistent and the overall expectation was not evident. The inconsistencies involved use of judgement to correlate corrective action completion dates to associated Business Plan end dates. This observation was acknowledged by Con Edison during the inspection period.

The Team confirmed that Con Edison had adequately cross referenced Business Plan actions with the November 8, 1999, Recovery Plan revision 3 long-term corrective actions.

4OA6 Management Meetings

.1 Exit Meeting Summary

On May 26, 2000, the Team presented their overall findings to members of Con Edison management led by Mr. A. Alan Blind. Con Edison management acknowledged the findings presented and agreed with the Team's conclusions. The reactor coolant system excessive cooldown evaluations contained some Westinghouse proprietary information. The proprietary information was reviewed and returned to Con Edison and was not included in the report.

During the exit, the seven non-cited violations were discussed related to this inspection and two additional non-cited violations related to a Regional inspector's review of the permanent modification area. Should Con Edison management elect to contest these NCVs, a written response should be provided within 30 days of the date of this inspection report, with the basis for their denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Indian Point 2 facility.

PARTIAL LIST OF PERSONS CONTACTED

J. Baumstark, Vice President, Nuclear Power Engineering
J. McCann, Manager, Nuclear Safety and Licensing
J. Ferrick, Operations Manager
Jim Tuohy, Manager Design Engineering
Gerald Ryff, Manager Configuration Management
William O'Toole, Manager QA Programs
Mark Entenberg, Manager Facilities Engineering
Patrick Russell, Manager Corrective Action Program
Anthony Spaziani, Nuclear Safety and Licensing Engineer
Charles Balen, Design Engineering
Valerie Myers, Design Engineering
Mike Faggioli, System Engineering
Curtis Ingram, System Engineering
Brian Meek, System Engineering
Peter DeStefano, System Engineering
Paul Cordero, System Engineering
Gary Hinrichs, Corrective Action Program
John Ventosa, Manager Site Engineering
Al Gorman, Section Manager Generation Support

ITEMS OPENED AND CLOSED

Opened

URI 05000247/2000-007-02	URI	Failure to perform a timely resolution of the degraded condition for a risk significant system, gas turbines

Opened/Closed

NCV 05000247/2000-007-01	NCV	Failure to properly document and accept the bases for the OD
NCV 05000247/2000-007-03	NCV	Failure to properly identify and evaluate the full scope of the modification in the SE
NCV 05000247/2000-007-04	NCV	Failure to correct deficiencies associated with the steam generator nitrogen-16 monitors
NCV 05000247/2000-007-05	NCV	Failure to properly initiate CRs and initiate appropriate corrective action
NCV 05000247/2000-007-06	NCV	Failure to follow procedures and enter the required data into the control room log
NCV 05000247/2000-007-07	NCV	Failure to maintain RCS cooldown rate within required TS limits
NCV 05000247/2000-007-08	NCV	Failure to validate and verify an EOP change
NCV 05000247/2000-007-09	NCV	Procedure inadequacies

Closed

LER 05000247/2000-001-00	LER	Manual Reactor Trip Following Steam Generator Tube Rupture

LIST OF DOCUMENTS REVIEWED

Procedures:

- Equipment Operability Assessment Procedure, SE-SQ-12.317, Rev. 1.
- 10 CFR 50.59 Safety Evaluations, Station Administrative Order (SAO) 460, Rev. 9.
- Preparation and Approval of Plant Modification Packages and Review of Maintenance and Repair Packages, DE-SQ-12.512, Rev. 4.
- Verification, Documentation and Traceability of Calculations, SAO 451, Rev. 5.
- Corrective Action Program, SAO 112, Rev. 2.

Permanent Plant Modifications:

- FMX-96-11874-C, Central Control Room Ventilation Mode Upgrade
- FMX-00-12238-M, Isolation Valve Seal Water System Modification
- FPX- 98-13131-F, Power Operated Relief Valve Nitrogen Accumulator Volume Upgrade
- FPX- 00-12334-F, Reactor Coolant Pump Oil Collection Modification
- FPX- 97-12709-F, Installation of Fiber Optic Cable Through VC electrical Penetration
- FPX- 96-12153-F, Chemical Volume and Control System Power Supply Enhancements

Operability Determinations (OD):

- 97-058, Residual Heat Removal system check valves not In-Service Testing program
- 97-057, Safety Injection system valves not tested
- 98-011, Residual Heat Removal system valve obstruction
- 99-030, Pressure Control Valve, PCV-1139, leaking past seat
- 99-036, #23 accumulator level indication drift
- 99-039, Degraded steam generator tubes
- 00-008, Fire main booster pump failed operability test
- 00-002, High energy line break door (separation barrier) broken/missing window

Communications to Staff (CTS)

- 98-1354, Radiation Monitoring System, Adjust power level at N-16 monitor.
- 99-0533, Chemical and Volume Control System, Inadequate pressurizer auxiliary spray if normal spray is in-service at the same time.
- 99-0797, Generator System, Procedure inconsistencies regarding valve lineup.
- 99-0803, Water Treatment System, Valve lineup sequence causes high level alarm in Control Room.
- 99-0804, Waste Disposal System, Inconsistent procedure requirements regarding conducting a reactor trip versus immediately placing the reactor in a subcritical condition.
- 99-0805, Main Steam, Operator action and procedure steps inconsistent regarding starting a heater drain pump.
- 99-0806, Heating, Ventilation and Air Conditioning System, Power supply incorrectly listed in procedure.
- 99-0820, Emergency Diesel Generator, No procedural guidance regarding taking required local flow measurements.
- 99-0823, Fire Protection System, No procedural guidance regarding the positioning of a needle valve and pressure reducer so as not to challenge the integrity of the city water piping.
- 00-0030, Primary Water Make Up, Inadequate directions for filling the PWST.
- 00-0143, Generator System, Conductivity cells are mislabeled as valves in the procedure.

- 00-0157, Residual Heat Removal System, Insufficient water level in the reactor coolant system to accomplish procedural requirement regarding pressurizer heaters.
- 00-0203, 13.8 KVAC Electrical System, Procedure confusing regarding terminology and regarding a caution statement manual tap changer.

Other Documents

- Con Edison Indian Point Unit 2, SL-1 Report for CR 200000983, Steam Generator Tube Leak Alert, dated March 28, 2000.
- Licensee Event Report 2000-001-00, "Manual Reactor Trip Following Steam Generator Tube Rupture," dated 3/17/2000.

Excessive Cooldown Documents

- Operability Determination No.00-011, Rev 0, 5/10/00, "Ensuring the Functional Capability of a System or Component", Attachment 7.1SE-SQ-12.317 Rev 1
- Safety Evaluation No. 00-341-EV, Rev 0, 4/11/00, Con Edison Acceptance of Vendor Safety Evaluation no. SECL-00-056, "Post-SGTR Cooldown Effect on Core ΔT Limit"
- SECL-00-056 Nuclear Safety Evaluation, Indian Point Unit 2, "Post-SGTR Cooldown Effect on Core ΔT Limit", 5/10/00
- American Society of Mechanical Engineers Boiler and Pressure Vessel Code Section XI, 1992 Edition, Appendix E, "Evaluation of Unanticipated Operating Events".
- American Society of Mechanical Engineers Boiler and Pressure Vessel Code Section III, 1992 Edition, Appendix G, "Pressure Vessels".
- Code of Federal Regulations, Part 50, Appendix G, Fracture Toughness Requirements

<u>Westinghouse Proprietary Class 2</u>

- SECL-88-612 Safety Evaluation for a Reduction in the Minimum Flowrate during Mid-Operation at Indian Point Unit 2

LIST OF ACRONYMS USED

AIT	Augmented Inspection Team
CCR	Central Control Room
CFR	Code of Federal Regulations
Con Edison	Consolidated Edison Company of New York, Inc.
CR	Condition Report
CTS	Communication to Staff
EOP	Emergency Operating Procedure
GT	Gas Turbine
HPSD	High Pressure Steam Dump
LER	Licensee Event Report
NCV	Non-Cited Violation
NRC	Nuclear Regulatory Commission
OD	Operability Determination
OWA	Operator Workarounds
PARS	Publicly Available Records
RCS	Reactor Coolant System
RCP	Reactor Cooling Pump
RES	Request for Engineering Services
RHR	Residual Heat Removal
SAO	Station Administrative Order
SE	Safety Evaluation
SG	Steam Generator
SGTF	Steam Generator Tube Failure
SI	Safety Injection
SL-1	Significance Level One
SOP	Standard Operating Procedure
TFC	Temporary Facility Change
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report

ATTACHMENT 1
NRC's REVISED REACTOR OVERSIGHT PROCESS

The federal Nuclear Regulatory Commission (NRC) recently revamped its inspection, assessment, and enforcement programs for commercial nuclear power plants. The new process takes into account improvements in the performance of the nuclear industry over the past 25 years and improved approaches of inspecting and assessing safety performance at NRC licensed plants.

The new process monitors licensee performance in three broad areas (called strategic performance areas): reactor safety (avoiding accidents and reducing the consequences of accidents if they occur), radiation safety (protecting plant employees and the public during routine operations), and safeguards (protecting the plant against sabotage or other security threats). The process focuses on licensee performance within each of seven cornerstones of safety in the three areas:

Reactor Safety	Radiation Safety	Safeguards
• Initiating Events	• Occupational	• Physical Protection
• Mitigating Systems	• Public	
• Barrier Integrity		
• Emergency Preparedness		

To monitor these seven cornerstones of safety, the NRC uses two processes that generate information about the safety significance of plant operations: inspections and performance indicators. Inspection findings will be evaluated according to their potential significance for safety, using the Significance Determination Process, and assigned colors of GREEN, WHITE, YELLOW or RED. GREEN findings are indicative of issues that, while they may not be desirable, represent very low safety significance. WHITE findings indicate issues that are of low to moderate safety significance. YELLOW findings are issues that are of substantial safety significance. RED findings represent issues that are of high safety significance with a significant reduction in safety margin.

Performance indicator data will be compared to established criteria for measuring licensee performance in terms of potential safety. Based on prescribed thresholds, the indicators will be classified by color representing varying levels of performance and incremental degradation in safety: GREEN, WHITE, YELLOW, and RED. GREEN indicators represent performance at a level requiring no additional NRC oversight beyond the baseline inspections. WHITE corresponds to performance that may result in increased NRC oversight. YELLOW represents performance that minimally reduces safety margin and requires even more NRC oversight. And RED indicates performance that represents a significant reduction in safety margin but still provides adequate protection to public health and safety.

The assessment process integrates performance indicators and inspection so the agency can reach objective conclusions regarding overall plant performance. The agency will use an Action Matrix to determine in a systematic, predictable manner which regulatory actions should be taken based on a licensee's performance. The NRC's actions in response to the significance (as represented by the color) of issues will be the same for performance indicators as for inspection findings. As a licensee's safety performance degrades, the NRC will take more and increasingly significant action, which can include shutting down a plant, as described in the Action Matrix.

More information can be found at: http://www.nrc.gov/NRR/OVERSIGHT/index.html.