U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket No.	50-247
License No.	DPR-26
Report No.	99-09
Licensee:	Consolidated Edison Company of New York, Inc.
Facility:	Indian Point 2 Nuclear Power Plant
Location:	Buchanan, New York
Dates:	September 7 through October 25, 1999
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EXECUTIVE SUMMARY

Indian Point 2 Nuclear Power Plant
NRC Inspection Report No. 50-247/99-09

This integrated inspection included aspects of licensee operations, engineering, maintenance, and plant support. The report covers a six-week period of inspection by resident inspectors. The inspector observed the facility was operated safely and generally in accordance with regulatory requirements.

Operations

The inspectors noted several degraded conditions on Gas Turbine No. 1 (GT-1) that were not properly addressed in the corrective action process. The deficiencies did not impact the operability of GT-1. Con Edison prepared the plant for cold weather, and scheduled timely corrective maintenance on risk significant components. (02.1)

The NRC noted continued performance lapses in the temporary facility change (TFC) process. Two errors during a TFC to supply alternate control power to safety bus 2A resulted in a condition prohibited by technical specifications 3.0.1, which was not recognized by the operators in a timely manner. Subsequent actions to complete the TFC and correct the errors were well controlled. Con Edison assured that no emergency condition was created while implementing the TFC. Procedures did not provide detailed guidance for the declaration of an emergency on the loss of control room annunciators. (02.2)

An operability determination and safety evaluation associated with a degraded 480V safety tie-breaker were acceptable. The procedures impacted by the degraded condition were appropriately revised. In addition, the breaker is not relied upon for accident mitigation. (O2.3)

The inspector observed that operator actions during the reactor startup were consistent with the requirements in plant operating procedure (POP) 1.2, "Reactor Startup." The pre-job briefings for the reactor startup were consistent with the station expectations. Reactor engineering provided good support to operations during the startup. Equipment problems that occurred during the reactor startup were appropriately addressed. (04.1)

Poor work coordination challenged operators and caused an unexpected reactor coolant system pressure increase. Operators inappropriately increased seal injection flow to a value greater than allowed in a system operating procedure. (04.2)

Operators properly responded to Hurricane Floyd, and management provided appropriate support. NRC inspection identified locations in which rainwater ingress potentially impacted operability of risk significant equipment. Con Edison took prompt actions to protect the safety-equipment. (04.3)

Executive Summary (cont'd)

Control room deficiencies were properly evaluated by Con Edison consistent with NRC guidance in Generic Letter 91-18 to justify extending the time to correct degraded conditions. Operability assessments were technically justified and timely, and compensatory measures were appropriate. (07.1)

Operations self-assessments were critical and identified areas for improvement; however, due dates for specific goals were exceeded for improvement items. (07.2)

Maintenance

The conduct of maintenance was acceptable. The actions to investigate degraded conditions and restore a gas turbine to an operable status were timely. Deficiencies were noted in the control of fuses and the conduct of breaker testing. The pre-job briefing, and communication and coordination of activities were good for risk significant maintenance on a containment isolation relay. (M1.1)

The conduct of surveillances was acceptable. The pre-job briefing and work coordination of activities were good for risk significant testing of the rod drive motor generator set. An example of inattention to detail was noted during a test of the diesel fire pump. (M1.2)

A leak in a high pressure feedwater sample cooler caused service water contamination in all four steam generators and significantly increased impurity levels above normal limits. The failure to fully evaluate operating experience was a missed opportunity to prevent the event. An operability determination provided an adequate basis to conclude the steam generator tubes were not significantly affected by the secondary chemistry excursion. (M2.1)

The installed containment hydrogen monitoring system remained inoperable due to the heat trace system deficiencies. The licensee had established an alternate monitoring method within the required time period. However, the delays in recognizing that the hydrogen analyzer was inoperable and in establishing appropriate compensatory measures were performance deficiencies. (M2.2)

The NRC identified several examples of long-standing degraded conditions on safety-related and risk significant pumps, which indicate a weakness in problem identification and corrective actions. The conditions revealed deficiencies in the tracking and review of degraded conditions, in causal analysis, in understanding of the licensing basis, and corrective actions effectiveness. (M2.3)

Engineering

The modification of the 21 and 23 auxiliary feed water pump blackout timers was consistent with the Safety Analysis Report and removed a vulnerability for the loss of the 480V emergency power supply bus. (E2.1)

Executive Summary (cont'd)

Con Edison identified, during charging pump breaker testing, that control wires from the amptector to the current transformer were improperly terminated. Corrective actions were adequate to preclude a recurrence of this condition. (E2.2)

The operability determination was adequate for a design deficiency resulting in a potential diesel generator overload during a loss of offsite power, reactor trip, and concurrent loss of a 125V DC bus. (E2.3)

Con Edison actions to address a fire protections design deficiency for postulated seismic events were prompt and demonstrated a good regard for preserving safety system operability (LER 99-017). The NRC noted a need to improve an assessment of postulated events when making reports under 10 CFR 50.73. (E8.1)

Plant Support

Con Edison corrective actions in response to a radiological event were appropriate. The inspector independently determined that worker exposures as a result of the event were below NRC limits. (R1.1)

The early injection of boric acid into the secondary system was performed outside the conditions specified by the chemistry procedure, and resulted in steam generator boric acid concentration and pH significantly outside the acceptable values. (R4.1)

Procedural deficiencies were identified during emergency preparedness remedial training. Con Edison entered the deficiencies in the problem identification system and performed adequate short-term actions to address emergency training quality. (P3.1)

TABLE OF CONTENTS

Table of Contents (cont'd)

ATTACHMENTS

Report Details

I. OPERATIONS

O1 Conduct of Operations

The plant was in hot shutdown at the start of the inspection on September 7, 1999, to complete corrective actions following the August 31, 1999, plant trip. Inspection Reports 99-08 and 99-13 provide additional NRC review of that event. Con Edison addressed short term equipment, process and organizational issues during this period. The plant was heated up above 350 F on October 10, and was at normal operating temperature of 547 F at 7:00 p.m. on October 11. The reactor was taken critical at 7:01 p.m. on October 13, and the turbine-generator was placed on line at 4:56 a.m. on October 16. The plant was operating at 100% FP at 12:34 a.m. on October 18, and remained at full power for the remainder of the inspection period.

The inspectors observed plant operations and to verify that the facility was operated safely and in accordance with regulatory requirements.

O2 Operational Status of Facilities and Equipment

O2.1 Operational Safety Verification (71707)

a. Inspection Scope (71707)

Using Inspection Procedure 71707, the inspectors conducted frequent reviews of ongoing plant operations. Specific events, noteworthy activities, and observations are described in the sections below.

b. Observations and Findings

The inspectors performed regular tours in the following areas:

Control room
Electrical switchgear rooms
Auxiliary feedwater building
Emergency diesel generator building
Turbine building
Primary auxiliary building

Gas Turbine Tour

On September 9, 1999, the inspector observed portable equipment and temporary configurations supporting the operation of gas turbine no. 1 (GT-1). The conditions included a portable ventilation fan near a gas turbine motor control center, the use of fire hoses to spray city water onto the turbine's glycol cooler, and a tarp placed above the starting diesel to divert water from a roof leak. The above conditions were discussed with Con Edison personnel, who initiated condition report (CR) 199906867.

Con Edison determined that all three conditions did not impact the operability of the Gas Turbine. However, the corrective actions for CR 199906867 were not complete, and the CR was closed without identifying actions to address the roof leakage and whether supplementary cooling for the glycol coolers was necessary. Further Con Edison review determined that the supplementary cooling was not necessary during GT-1 operation for design basis electrical loads (approximately 2 megawatts versus the 12 megawatt capacity). The inspector confirmed that system operating procedures were consistent with the use of glycol cooler supplementary cooling. Although the system engineer documented in CR 199906867 the need for a gas turbine low load test to confirm the operability decision, the testing was not completed. Con Edison also initiated a request for engineering services (RES 12153-99) to upgrade the gas turbine lubricating oil system to eliminate the need for supplemental cooling.

The temporary ventilation fan was used to keep motor control center temperatures within acceptable limits when a turbine casing leak previously existed. The motor control center temperature was significantly below the temperature limit, and there was no casing leakage at the time of this inspection. The operability determination for use of the temporary ventilation fan was adequate. Con Edison subsequently removed the temporary ventilation.

Winterization Preparations

The inspector reviewed Con Edison controls and inspections to winterize the plant. The inspector confirmed that condition reports were prepared for degraded conditions and scheduled into the work control system prior to the onset of cold weather.

The program requirements are documented in an operations administrative directive, which identifies applicable reference procedures and start times for plant and system inspections. The inspector reviewed the status of inspections by operators using system operating procedure (SOP) 11.5, "Space Heating and Winterization," and Check Off List (COL) 11.5, "Space Heating and Winterization."

The inspector identified a repeat occurrence of untimely completion of winterization checks by operations personnel. The operations directive state that SOP 11.5 and COL 11.5 will be completed by October 15, 1999, yet neither procedure was completed until October 19, 1999. NRC inspection report 50-247/98-17 previously described untimely completion of winterization checks in 1998. This was identified to Con Edison who initiated condition report (CR) 199908012.

The inspector independently confirmed that most CRs prepared in response to COL 11.5 and SOP 11.5 were either completed or scheduled for maintenance in either October or November 1999. Two CRs (199906359 and 199907906) were initially placed in the twelve week schedule, but were later added to the winterization work schedule to be completed in the next few months. The issues involved reinstallation of insulation on piping associated with the 14 waste disposal storage tank, and insulation of hypochlorination line located at the intake structure.

Con Edison scheduled timely corrective maintenance on risk significant components: specifically, for refueling water storage tank heating coil steam traps and damaged pipe lagging, missing insulation on the service water test header stop valve, and the heat tracing for the city water supply to the auxiliary feedwater system.

c. Conclusions

The inspector noted several degraded conditions on Gas Turbine (GT-1) that were not properly addressed in the corrective action process. The deficiencies did not impact the operability of GT-1. Con Edison prepared the plant for cold weather, and scheduled timely corrective maintenance on risk significant components. However, as noted in 1998, not all winterization checks were completed on schedule.

O2.2 Implementation of Temporary Facility Changes

a. Inspection Scope (71707)

The inspector evaluated performance associated with temporary facility changes (TFCs).

b. Observations and Findings

TFC 99-057, Alternate 125 Volt DC Control Power to Safety Bus 2A Transfer Switch

The purpose of temporary facility change (TFC) 99-057 was to provide alternate 125 volt DC control power to 480 volt safety bus 2A. The alternate was necessary to isolate the normal control power during corrective maintenance on a transfer switch. The transfer switch failed during preventive maintenance in March 1999 (as described in NRC inspection report 50-247/99-02 and licensee event report (LER) 99-007-00).

On October 6, 1999, two installation errors occurred that were self-revealing to the control room operators. The first error occurred when the alternate power lead was removed instead of the normal power lead. The consequence of this error was the loss of control power to 480 volt bus 2A for less than a minute. This required entrance into technical specification (TS) 3.0.1 since the requirements of TS Table 3.5-3 Item 3.a was not met for 480V bus undervoltage protection. The second error was the improper connection of the altered circuit to the "load" side of a 3 Amp fuse and disconnecting the altered circuit on the line side of the fuse. The consequence of the error was the loss of indication for the Bus 2A undervoltage protection. The TFC installation errors and TS 3.0.1 entry were documented in condition reports (CRs) 199907577 and 199907583. The Con Edison review of the cause and corrective actions for the errors continued at the end of the inspection period.

The inspector concluded the operators did not recognize entry into technical specification 3.0.1 in a timely manner. The time from the loss of control power to a decision that TS 3.0.1 applied was approximately five hours. Discussions with operations and other support organizations occurred prior to concluding that TS 3.0.1 applied. No limiting conditions for operations were exceeded.

Later on October 6, 1999, the inspector observed maintenance personnel correct the TFC 99-057 installation errors on the 125 DC control power fuse connections. The inspector observed deliberate and controlled actions with appropriate instructions to conduct polarity checks, fuse checks, and maintenance of a lifted lead sheet. The inspector observed operators pre-positioned in the 480 volt switchgear room and the control room to monitor various safety indications to support the work. The operators were stationed due to the planned loss of power to 7 control room annunciator panels. The annunciators were out of service for approximately 45 minutes.

Prior to the maintenance, the operators confirmed that no emergency action level (EAL) was met by counting the affected annunciators and dividing by the total number of annunciators. The loss of control power resulted in a loss of approximately 30 percent of the total annunciators. The inspector verified that loss of annunciators did not meet the EAL requiring an UNUSUAL EVENT declaration, because less than 75 percent of the safety-related annunciators were impacted. The inspector noted that no procedural definition existed for the UNUSUAL EVENT emergency declaration on loss of control room annunciators. Abnormal operating instruction (AOI) 27.1.4, "Loss of Flight or Supervisory Panel Annunciators" does not define what 75 percent of Safety Related Annunciators loss is, but does refer to the emergency action levels for applicability. The inspector discussed this observation with a shift manager who processed a request to change procedure AOI 27.1.4.

TFC Implemented With No Pre-implementation Review

CR 199907359 was issued on September 28 due to the failure to assure that temporary facility change (TFC) 99-128 was reviewed by the Station Nuclear Safety Committee (SNSC). The TFC for the control rod drive fan back draft damper was installed without prior SNSC review. The TFC was not processed correctly due to an error by the Watch Engineer, who mistakenly assumed the SNSC review had occurred. The SNSC subsequently approved TFC 99-128. Con Edison initiated a Significance Level 2 report to determine the root cause for the error and recommend corrective actions; and, stopped issuing TFCs on September 28-29 while the event was reviewed with Operations personnel.

The inspector noted Con Edison has experienced recent problems implementing TFCs in accordance with the administrative controls. Inspection 99-06 described the failure to initiate and properly implement TFCs in July 1999.

b. Conclusions

The NRC noted continued performance lapses in the temporary facility change (TFC) process. Two errors during a TFC to supply alternate control power to safety bus 2A resulted in a condition prohibited by technical specifications 3.0.1, which was not recognized by the operators in a timely manner. Subsequent actions to complete the TFC and correct the errors were well controlled. Con Edison assured that no emergency condition was created while implementing the TFC. Procedures did not provide detailed guidance for the declaration of an emergency on the loss of control room annunciators.

O2.3 Operability of 480 volt Safety Bus Tie Breaker 2AT3A

a. Inspection Scope (71707)

The inspector reviewed and verified compensatory actions for operability determination (OD) 99-037 and safety evaluation 99-261-EV, which were written for bus tie breaker 52/2AT3A after it became mechanically jammed and was left degraded during plant heat-up and startup.

b. Observations and Findings

During the performance of a surveillance check on September 29, 1999, the 480 volt bus tie breaker between safety buses 2A and 3A became stuck in the mid-position. The safety function for this breaker is to maintain 480 V bus electrical separation during plant operations by being racked out to prevent tying two buses together and cross connecting the emergency diesel generators. The corrective maintenance for this degraded breaker is planned during the next refueling outage.

Con Edison completed operability determination 99-037 on October 7, 1999 that concluded the breaker was operable in the partially racked in position. The basis was that a mechanical interlock (draw-out) precluded racking a closed breaker to the connected position, and control power fuses were removed to preclude remote breaker closure. Con Edison performed a seismic analysis of the condition and found it to be acceptable. The inspector verified that the last breaker preventive maintenance confirmed successful operation of the draw-out interlock. The inspector confirmed that the breaker control circuit does not contain electrical interlocks to prevent the 22 emergency diesel generator output breakers from operating. The inspector concluded that the operability determination justified leaving of the tie-breaker in the partially racked in position during power operations.

The inspector confirmed that procedures impacted by the degraded condition were appropriately revised and that no emergency or abnormal procedure relies upon closure of the breaker for accident mitigation strategies. The inspector reviewed annunciator response procedures, emergency operating procedures, abnormal operating instructions, and system operating procedures to identify if any post-accident condition credits the closure of the 52/2AT3A breaker. Checkoff list (COL) 27.1.5, "480 Volt AC Distribution," and plant checkoff list (PCO) -2, "Plant Heatup Greater than 350F," was changed to reflect the breaker status. AOI 27.1.1.1, "Loss of 138KV Contingency with 6.9KV bus 5 Removed from Service," provides instructions on closure of tie breaker 52/2AT3A but only during a shutdown condition for planned maintenance on bus 5.

Con Edison completed a safety evaluation pursuant to 10 CFR 50.59 to evaluate the degraded condition of the tie breaker. The evaluation concluded that no unreviewed safety question exists. Proposed changes to the Updated Final Safety Analysis report section 8.1.1. were appropriate.

c. Conclusions

An operability determination and safety evaluation associated with a degraded 480V safety tie-breaker were acceptable. The procedures impacted by the degraded condition were appropriately revised. In addition, the breaker is not relied upon for accident mitigation.

O4 Operator Knowledge and Performance

O4.1 Reactor Startup

a. Inspection Scope (71715)

The inspector reviewed the preparations for plant restart and observed a reactor startup on October 13, 1999.

b Observations and Findings

Prior to the reactor startup, the inspector confirmed that no outstanding degraded condition reports existed on components required to be operable for reactor criticality. The components verified included the power operated relief valves, safety injection pumps, recirculation pumps, various emergency core cooling system valves, weld channel and containment pressurization system, main steam safety valves, control room filtration system, and cable tunnel exhaust fans. The inspector confirmed that the number of operating control rod drive mechanism fans was consistent with system operating procedure (SOP) 16.1.1, "Rod Control System Operation."

The pre-job briefings for the reactor startup were consistent with SAO-202, "Conduct of Infrequently Performed Tests or Evolutions." The discussions included operating experience involving reactivity management, and actions by shift crew on contingencies if the sole operating rod control motor generator set were to fail.

The inspector confirmed that no concurrent reactivity changes occurred during reactor startup. The operator actions during the reactor startup were consistent with the requirements in plant operating procedure (POP) 1.2, "Reactor Startup." Reactor criticality occurred within the tolerance established for the estimated critical boron concentration and control bank "D" rod position. Reactor engineering support and coordination with the operators was good in the use of 1/M plots. The approach to criticality was completed in a deliberate and controlled manner. Additional operators were stationed in the control room to support activities such as taking logs and phone communications within the plant. Acceptable communications occurred between the control room supervisor and the reactor operator at the controls (ROTC).

During the reactor startup several minor equipment deficiencies were identified. The deficiencies involved a loss of voltage indication on the digital volt meter for two control rods each in shutdown bank "C" and control bank "B," a "sticking" individual rod position indication (IRPI) for control rod C-11, a "Control Rod or Power Distribution" alarm during

control rod group overlap, and a "Rod Control Urgent Failure Alarm." The inspector confirmed that appropriate actions were taken for the deficiencies, such as manual acquisition of digital voltmeter input checks by instrument and controls personnel, verification of proper bank overlap, and resetting the Rod Urgent Failure alarm as required in abnormal operating instruction (AOI) 16.1.5, "Rod Control Urgent Failure." Though not significant, the operator actions were inappropriate to continually tap the IRPI cover for rod C-11 to address a "sticking" indication. The IRPI for rod C-11 returned to the full out indication when shutdown bank "A" was fully withdrawn. Each of the above deficiencies was documented in the condition reporting system. Throughout the reactor startup, operators observed individual rod position indication and bank positions to verify deviations remained within the limits of TS 3.10.6.1.

c. Conclusions

The inspector observed that operator actions during the reactor startup were consistent with the requirements in plant operating procedure (POP) 1.2, "Reactor Startup." The pre-job briefings for the reactor startup were consistent with the station expectations. Reactor engineering provided good support to operations during the startup. Equipment problems that occurred during the reactor startup were appropriately addressed.

O4.2 Reactor Coolant Pump (RCP) Operations - NCV 50-247/99-009-01

a. Inspection Scope (71707)

The inspection scope involved an assessment of operator performance to operate reactor coolant pumps on September 21 and October 11, 1999.

b. Observations and Findings

Poor work coordination challenged operators and resulted in an unexpected reactor coolant system (RCS) pressure increase. The poor work coordination was the simultaneous maintenance on reactor coolant pump seal return flow transmitter and the pressurizer modulating heaters. The pressurizer modulating heaters were removed from service on September 20, 1999, during maintenance on the supply breaker. On September 21, 1999, beginning at approximately 1:31 a.m., Con Edison started the 22 reactor coolant pump (RCP) and secured the 24 RCP to perform maintenance on the 24 seal return flow transmitter. The transmitter had a temporary facility change that was considered an operator workaround. The seal return transmitter failed in early August 1999. Operators were logging seal return flow on a supplementary log during the time the transmitter was out of service.

Initial reactor coolant system conditions were 330 F and about 850 psig. Between 1:31 a.m. and 6:20 a.m., RCS pressure slowly rose to about 1,250 psig. RCS pressure remained below the technical specification limits. Operators attributed the RCS pressure rise to expected reduced pressurizer spray flow when using the 22 RCP instead of the 24 RCP. System operating procedure (SOP) 1.3, "RCP Startup and Shutdown," step 2.13, states that the 24 RCP is preferred operating pump since it provides the most

effective pressurizer spray. Pressurizer spray is used to reduce pressure in the pressurizer during these plant conditions. The planned maintenance on the pressurizer modulating heaters and concurrent securing of the 24 RCP resulted in ineffective RCS pressure control (i.e., poor pressurizer spray flow, and use of smaller heaters for pressure control). In response, operators restarted the 24 RCP and restored pressurizer modulating heaters prior to work on the seal return flow transmitter. No violations were identified related to the use of RCP 24.

On October 11, 1999, operators started the 21 RCP and operated the pump for approximately 37 minutes. During this operation, the operator increased seal injection flow to a value greater than allowed in system operating procedure (SOP) 1.3, "Reactor Coolant Pump Startup and Shutdown," and SOP 3.1, "Chemical and Volume Control System. " Specifically, the operator adjusted seal injection flow periodically to about 18 gallons per minute (gpm), whereas both procedures required the flow be maintained between 6 - 10 gpm.

The inspector observed that during 21 RCP startup, the operators had appropriately changed SOP 1.3 to allow starting the idle RCP with seal injection temperature up to 160 F (previously limited to 150F). The reason for the procedure change was that low flow existed, which caused the lower journal bearing metal temperature and seal inlet temperature to increase. The inspector confirmed the seal inlet temperature increased when the pump was secured on October 10, 1999. The 21 RCP was secured due to a decision to balance the pump due to higher than normal vibration readings.

The inspector observed that operators failed to adhere to SOP 1.3 by adjusting seal flow in an attempt to lower inlet temperatures to the pump and failed to initially document this procedural adherence issue in the condition reporting system. The inspector discussed this item with operations management throughout the inspection period and condition report 199908438 was prepared at the end of the period. Technical Specification (TS) 6.8.1 requires that written procedures be implemented covering activities referenced in Regulatory Guide 1.33, Revision 2, February 1978. Appendix A of Regulatory guide 1.33 recommends written procedures for startup and shutdown of the reactor coolant system. Contrary to this requirement, operators operated the 21 RCP outside SOP 1.3 limits on seal injection flowrate. This Severity Level IV violation is being treated as a Non-Cited Violation consistent with Appendix C of the NRC Enforcement Policy. This violation is in Con Edison's corrective action system as Condition Report #199908438. **(NCV 50-247/99-009-01)**

c. <u>Conclusions</u>

Poor work coordination challenged operators and caused an unexpected reactor coolant system pressure increase. Operators inappropriately increased seal injection flow to a value greater than allowed in a system operating procedure.

O4.3 Hurricane Floyd

a. Inspection Scope (71707)

The inspectors observed plant activities during Hurricane Floyd.

b. Observations and Findings

On September 15, 1999, operators appropriately entered into abnormal operating instruction (AOI) 28.0.7, "Hurricane/Tornado/High Winds/Severe Thunderstorm," and AOI 28.0.4, "Conventional Flooding." Operators appropriately notified the NRC pursuant to technical specification (TS) 3.14.a when a hurricane with winds in excess of 87 knots was within 500 nautical miles of the facility. By September 16, 1999, Con Edison had operated the emergency diesel generators and conducted plant walkdowns for potential missile generators. The inspector observed adequate Con Edison management presence and partial activation of the emergency response team.

The reactor was shutdown at the time, with reactor coolant system parameters at 330 F and pressure at 1,340 psig. Con Edison reduced reactor coolant system pressure to 820 psig to provide improved timeliness to use residual heat removal if necessary for decay heat removal. Con Edison appropriately expedited the installation of a temporary facility change to provide backup nitrogen to the overpressure protection system accumulators in the event that a plant cooldown was necessary. The unit was not placed in a cold shutdown condition throughout the event as hurricane force winds were not predicted and did not occur at the Indian Point station throughout the afternoon of September 16, 1999.

Prior to the storm arrival at Indian Point Unit 2, the inspector conducted frequent tours of risk significant areas within the facility. The areas toured included the auxiliary feedwater pump room, the 480 volt switchgear room, station auxiliary transformer yard, emergency diesel generator building, and the service water strainer room. The inspectors identified numerous locations where rainwater ingress potentially impacted operability of risk significant equipment. The inspectors noted significant rainwater ingress into the 480 volt switchgear room, outside the auxiliary feed pump room (i.e. near the main feedwater regulating valves), and in the conduit cover between the station auxiliary transformer and the associated 6.9 kilovolt bus sections. The above observations were identified to
Con Edison, who took appropriate prompt actions to protect the safety-equipment.

The inspector observed adequate staffing to support short-term repairs for the leakage locations. Con Edison repaired the source of in-leakage into the 480 volt switchgear (work order NP-99-11039). The leakage was an unsealed conduit in the transformer yard that connected into a junction box within the 480 volt switchgear room. Con Edison activities continued at the end of the inspection period to resolve in-leakage points outside the auxiliary boiler feedwater pumps room. Condition reports 199907062 and 199907424 were prepared for each of the leakage points.

c. Conclusions

Operators properly responded to Hurricane Floyd, and management provided appropriate support to operations. NRC inspection identified locations in which rainwater ingress potentially impacted operability of risk significant equipment. Con Edison took prompt actions to protect the safety-equipment.

O7 Quality Assurance in Operations

O7.1 Extent of Condition Reviews on Degraded Components

a. Inspection Scope (71707)

On October 6, 1999, the inspector selected twenty control room deficiencies to determine whether maintenance was completed during the forced outage to correct the deficiency or that adequate justification existed to maintain the component in a degraded condition beyond plant restart.

b. Observations and Findings

The deficiencies reviewed involved the fan cooler units, containment isolation valves, accumulator level indication, 24 DC bus grounds, containment sump level indication, rod position indication, 24 feedwater regulating valve, recirculation sump level, and reactor coolant pump vibration monitoring.

Fourteen of the items were addressed with corrective maintenance during the forced outage. The remaining six items were assessed to confirm that Con Edison evaluations (i.e., operability and/or 10 CFR 50.59 evaluations) were consistent with the guidance in NRC Generic Letter 91-18 revision 1, "Information to Licensees Regarding NRC Inspection Manual Section on Resolution of Degraded and Nonconforming Conditions." The deficiencies not corrected during the outage included: fan cooler unit weir level calibration checks, position indication on two containment isolation valves (Pressure Relief Tank to the Gas Analyzer), 480 volt tie breaker (2AT3A) stuck in mid-position, source check failures for containment particulate and gaseous radiation monitor, and failure of recirculation sump level transmitter (LT-3300).

The inspector concluded that adequate bases existed for extending the time to correct degraded conditions. Operability assessments were technically justified and timely, and compensatory measures were appropriate. The inspector confirmed that redundancy existed for the recirculation sump level transmitters, the number of operable transmitters was within the license requirements, and corrective maintenance was scheduled for the next refueling outage. The containment isolation valves were being maintained inoperable and the penetration was appropriately isolated. The degraded condition for the fan cooler unit weir flow control checks involved the in-leakage flow monitoring. Operability of the FCU weirs is based upon a continuous recorder and bistable (alarm function). Adequate compensatory measures were taken by Con Edison to provide an

alternate flowrate measurement. The review of the bus tie breaker operability determination is provided in Section O2.3.

c. Conclusions

Control room deficiencies were properly evaluated by Con Edison consistent with NRC guidance in Generic Letter 91-18 to justify extending the time to correct degraded conditions. Operability assessments were technically justified and timely, and compensatory measures were appropriate.

O7.2 Operations Self-Assessment Activities

a. Inspection Scope (71707)

The inspection was to evaluate Con Edison's integration of self and independent assessments of Operations in 1999.

b. Observations and Findings

Operations department assessments were critical and identified areas for improvement. Each of the specific observations were included in a strategic goal with an owner established and implementing action or measure established. Each of the specific tactical goals were assigned a due date. However, numerous activities in the operations department goal tracking exceeded the expected due date. Further, an excessive amount of time was expended to develop and assign strategic goal owners.

c. Conclusions

Operations self-assessments were critical and identified areas for improvement; however, due dates for specific goals were exceeded for improvement items.

O8 Miscellaneous Operations Issues

O8.1 (Closed) LER 99-015; Reactor Trip and Unusual Event

This LER described the reactor trip with complications on August 31, 1999. The reactor tripped when a spurious electrical spike on over temperature delta temperature (OTDT) channel 4 occurred while protection channel 3 was in trip for maintenance. The voltage on the safety buses decreased during the fast transfer of station auxiliaries to the offsite supply. An undervoltage condition on 480 volt buses 5A or 6A resulted in a station blackout signal, which loaded the 480 VAC buses onto the emergency diesel generators (EDG). Bus 6A was powered from EDG 23 for about 12 seconds and then de-energized when the EDG output breaker tripped open due to an apparent overcurrent condition. Plant operators responded to a suspected fault on Bus 6A or it attached loads. However, Con Edison subsequently found that the diesel output breaker overcurrent trip setting was about 55 percent of the intended value. One of the loads lost from Bus 6A was Battery Charger 24. Battery 24 powered its DC loads for about 7 and ½ hours.

During that time, power was not restored to Battery Charger 24 and Instrument Bus 24 de-energized when voltage on DC Bus 24 became too low for Inverter 24 to provide AC power to the instrument bus. A Notification of Unusual Event (NOUE) was declared at 9:50 p.m. on August 31 due to the unplanned loss of about 75 percent of the safety system annunciators for greater than 15 minutes. The NOUE was terminated at 3:30 a.m. on September 1, 1999, when power was restored after confirming no electrical fault existed.

Con Edison's response included a post trip review to evaluate the direct causes for the plant and equipment responses, and an independent review by the Utility Assistance Team to evaluate the management oversight and responses to the event. The OTDT spike was caused by an intermittent ground on DC Bus 24, but the cause for the ground was not determined. The 480 volt bus undervoltage condition was caused by the inability of the station auxiliary transformer (SAT) to automatically maintain 480 volt bus voltage following the fast bus transfer of buses 2A and 3A to the offsite supply because the SAT load tap changer control switch was in the manual position. The EDG 23 output breaker tripped prematurely because the amptector setpoint was inappropriately set during a calibration to trip at 3200 amps instead of the intended 6000 amps. The NRC identified weaknesses in management response, including deficiencies in leadership, command and control, communications and processes. A Con Edison Recovery Organization was formed to assure issues associated with the event were addressed.

The NRC review of the event was described in several inspections, including Resident Inspection 99-07, an Augmented Inspection Team (AIT) Inspection 99-08, and an AIT Followup Team Inspection 99-13. Con Edison presented an IP2 Recovery Plan to the NRC during a meeting at the NRC Region I Offices on September 14, 1999; the Plan was revised through Revision 2 during the NRC AIT followup inspection. Con Edison planned to submit Revision 3 of the IP2 Recovery Plan to the NRC by November 22, 1999 to describe the long term actions to describe the improvement efforts to the broad organizational performance issues that influenced the event. The results of the NRC review were described in a letter to Con Edison dated October 12, 1999. The NRC found that sufficient progress was made in addressing issues designated as needing resolution prior to restart. NRC review of the August 31, 1999 event was in progress at the conclusion of this inspection period.

LER 99-15 provided an accurate description and analysis of the event. The root cause analysis for the event, together with the corrective actions, were in progress when the LER was issued on September 30, 1999. Con Edison planned to submit a supplemental report when the determination of root causes is completed and the corrective actions are identified. This LER is closed.

II. MAINTENANCE

M1 Conduct of Maintenance

M1.1 Maintenance Observations

a. Inspection Scope (62707)

The inspectors reviewed selected maintenance work activities and supporting work documentation. Activities were selected for systems, structures, or components in the scope of the maintenance rule.

b. Observations and Findings

NP-99-10924, 480 Volt Breaker Testing

The inspector observed high current testing of a DB-75 breaker on September 12, 1999. The test was performed using high current test equipment. During testing the inspector observed several primary and secondary ammeter readings being recorded although the work package did not specify these readings as necessary. Later in the evening, Quality Assurance personnel observed similar testing and a work hold was called based on their observations. The deficiencies noted included unclear directions, improper documentation of data, and qualification of instrument and controls (I&C) technicians. Con Edison generated condition report 199906914.

Temporary Operating Instruction (TOI) 264, Replacement of Containment Ventilation Isolation Relay V1 Below 350 F

On October 7, 1999, the inspector observed I&C personnel replacing an isolation relay for the containment ventilation isolation valves. The corrective maintenance was classified as an infrequently performed test or evolution due to the potential of an inadvertent safety injection. The quality and depth of pre-evolution briefings met the expectations of station administrative order (SAO)-202, "Conduct of Infrequently Performed Tests or Evolutions." The inspector noted good communication and coordination that resulted in successful replacement of the relay.

NP-99-10789, 23 Emergency Diesel Generator Output Breaker Testing

The inspector observed portions of amptector current testing on the 23 emergency diesel generator output breaker. Instrument and control technicians were properly adhering to the applicable calibration procedure.

NP-98-03865, Station Auxiliary Transformer Tap Changer Replacement

On September 6, 1999, the inspector observed Con Edison personnel replace the station auxiliary transformer tap changer. The replacement component was not identical to the installed tap changer and was properly evaluated under the material substitution process

when first identified in September 1998. The nuclear plant operator assigned to provide communications between the job site and the control room was not in attendance at the pre-job briefing. The activities were postponed until the operator had been briefed on the activities and responsibilities during the maintenance activity.

Inoperable Gas Turbines

GT-1 Inoperable: Con Edison determined GT-1 to be inoperable when the starting diesel failed to start during testing at 9:30 a.m. on October 18. GT-1 did not start due to an apparent low oil temperature condition trip in effect on the starting diesel generator. Con Edison investigated the GT-1 starting diesel control circuit during the remainder of October 1999. The failure was caused by a bad coil in relay 3R in the lubricating oil low temperature monitoring circuit (reference Drawing EDSK 100106). Con Edison replaced the obsolete ASCO 3R relay with an equivalent GE relay. Other corrective actions included adjusting building ventilation to raise GT-1 room temperatures, and cleaning contacts in the jacket water heater (relay 2R) and in the starting sequence control (relay TDR) circuits. Con Edison actions to test and restore GT-1 to an operable status continued at the end of the inspection period.

GT- 2 and 3 Inoperable: Operators performed a routine test of GT-2 and then GT-3 on October 18, 1999. Both were started and tested satisfactorily. While shutting down the GT-3 black start diesel and shifting the 480 volt supply to the normal source, breaker GT-3/52 NS failed and could not be closed. The breaker provided an interlock to prevent closure of the GT-3 auxiliary bus emergency supply breaker, GT-3/52 ES. Thus, both the GT-3 auxiliary bus normal and emergency supply was not available, and the GT-2 auxiliary bus emergency was not available. The operators declared GT-2 and GT-3 inoperable at 6:00 p.m. on October 18 and entered the action statement for TS 3.7.C.3, which requires that at least one gas turbine be made operable within 7 days.

Further investigation determined that GT-3/52 NS was inoperable due to a burned coil in the lockout relay. The licensee removed the normal supply breaker from its motor control center at 9:17 p.m., which allowed the GT-3 black start diesel to be placed in service and the GT-3 auxiliaries to be energized. Both GT-2 and GT-3 were declared operable with the restoration of the black start capabilities, and the plant exited the TS 3.7.C.3 LCO.

Con Edison replaced the faulty lockout relay in the DB-25 breaker. However, the control circuit fuses blew during post maintenance testing for the normal supply breaker. The licensee performed continuity and meggar checks on the breaker and cubicle, which were satisfactory. Fuses of the incorrect size had been installed for the post maintenance test. The licensee replaced the fuse in the breaker cubicle and the normal supply breaker was returned to service. The black start diesel was shutdown and GT-2 and GT-3 were considered fully operable at 5:27 p.m. on October 2.

c. Conclusions

The conduct of maintenance was acceptable. The actions to investigate degraded conditions and restore a gas turbine to an operable status were timely. Deficiencies were noted in the control of fuses and the conduct of breaker testing. The pre-job briefing, and communication and coordination of activities were good for a risk significant maintenance on a containment isolation relay.

M1.2 Surveillance Observations

a. Inspection Scope (61726)

The inspector reviewed selected surveillance activities and supporting documentation. Activities were selected for systems, structures, or components in the scope of the maintenance rule.

b. Observations and Findings

PT - M40, "Diesel Driven Fire Pump"

The inspector observed the pre-job brief and portions of this monthly test. The pre-job brief was performed consistent with the Station Administrative Order (SAO) 204 "Communications." During the test set up, the inspector observed the operators open the Diesel Pump Recirculation Stop valve, FP-704, 1/4 turn of the handwheel instead of 1/4 of the full stroke open as called for by procedure. The inspector informed the operators, who opened the valve to the proper position prior to starting the pump.

SOP 16.1.2, "Rod Drive Motor Generator Set Operation"

On October 19, 1999, the inspector observed the pre-job briefing and system operation for this infrequently performed test or evolution (IPTE). The IPTE briefing covered procedural objectives, precautions and limitations, discussions of past problems and contingency actions. The brief was performed consistent with Station Administrative Order (SAO) 202, "Conduct of Infrequently Performed Tests or Evolutions."

The evolution restored the 21 motor generator set to operation following corrective maintenance. The operators monitored the status of control rods during this evolution, since a loss of the operating motor generator set would result in a "silent" reactor trip. A "silent" reactor trip involves inward motion of control rods without a reactor protection signal trip. The evolution was successfully accomplished. Good coordination was observed between the control room and field operators to accomplish the startup and synchronization of the 21 motor generator set. There was good coordination with the work group in the accomplishment of post-maintenance tests.

AOI 16.1.5, Rod Control Urgent Failure

On October 13, 1999, the inspector observed a nuclear plant operator implement abnormal operating instruction (AOI) 16.1.5 in response to a control room annunciator for "ROD CONTROL URGENT FAILURE." The control room operators appropriately stopped control rod withdrawal and the nuclear plant operator inspected the control rod power cabinets. A local alarm on control rod bank overlap was reset and the withdrawal of control rods continued without receipt of this alarm. Condition report (CR) 199907782 was initiated by Con Edison to document the actions taken in response to the control room alarm.

c. Conclusions

The conduct of surveillances was acceptable. The pre-job briefing and work coordination of activities were good for a risk significant testing of the rod drive motor generator set. An example of inattention to detail was noted during a test of the diesel fire pump.

M2 Maintenance and Material Condition of Facilities and Equipment

M2.1 Service Water Leakage into Steam Generators

a. Inspection Scope (62703)

The inspector reviewed the Con Edison analysis and investigation of the introduction of service water into the steam generators.

b. Observations and Findings

The steam generator chemistry was within expected conditions prior to October 14, 1999, in preparation for plant startup. However, at 4:15 a.m. on October 14, 1999, the process monitors for chlorides went into an alarm condition. At that time operators had started a main boiler feedwater pump to start-up the main feedwater system. The plant was a hot standby condition at normal operating temperatures and pressures with the reactor critical.

Secondary side steam generator chemistry samples showed elevated impurity concentrations. Impurities such as chlorides, sulfates, sodium, and conductivity were at concentrations greater than the limits specified in System Operating procedure (SOP) 8.2, "Secondary Plant Chemistry Controls." Specifically, chlorides concentration for all generators was approximately 20 parts per million (ppm), sulfate were at 8 ppm, and sodium was greater than 8 ppm; the limit for all the above impurities is less than 100 parts per billion (ppb) prior to exceeding 5 percent rated thermal power.

The inspector attended Con Edison strategy meetings which addressed the optimum plant condition for removal of the impurities and the potential impact the impurities could have on the steam generator tubes. Various industry experts including assistance from

Indian Point Unit 3 were consulted. Con Edison concluded that the best course was to maintain the plant in hot standby and maximize steam generator blow down to remove the impurities. A technical basis for this conclusion was that oxidation was more likely in a cold shutdown condition and would have more impact on the steam generator tube corrosion rates. Additionally, while steam generator tube "pit" formation was aggressive at normal operating temperature (547 F), it becomes more aggressive at a steam generator temperature of 350 F. By October 17, 1999, the impurities had been reduced to concentrations within the limits of SOP 8.2.

Steam Generator Operability Determination

Con Edison completed an engineering evaluation per station procedure SE-SQ-12.318 to assess whether the chemical intrusion adversely impacted the operability of the steam generator tubes, which are a part of the reactor coolant pressure boundary. The inspector observed the presentation of the operability evaluation to the Station Nuclear Safety Committee on October 15, 1999. The evaluation considered the tube material (Alloy 600), the annealing process used during tube manufacture, the time and duration of exposure, and the potential for crevice attack and hideout return of contaminants. The evaluation concluded chemical excursion with elevated chloride, sodium and sulfate concentrations had minimal effect on steam generator tube life and the integrity of the reactor coolant pressure boundary.

The evaluation concluded that the high boron concentrations on the carbon steel feed water piping was minimized by the low system temperatures during the period of exposure. The licensee conclusions were reviewed with NRR engineering personnel and NRR subject matter experts. The inspector noted that the instructions provided in Abnormal Operating Instruction AOI 1.2 reflected the current industry guidance that assured close monitoring of potential steam generator tube leakage and prompt action to shutdown the reactor in response to indications of degrading tube integrity. No inadequacies were identified in the operability evaluation bases or conclusions. Con Edison plans a 100 percent inspection of steam generator tubes during the 2000 refueling outage.

Event Cause and Corrective Actions

The inspector observed good exchange of ideas and validation of the source of contaminates by a Con Edison root cause analysis team on October 14, 1999. The group considered possible leak locations, work activities that could have resulted in the impurities during the forced outage, and evaluations to correlate feedwater makeup with any known substances. Con Edison concluded the contamination was from a tube leak on a high pressure feedwater sample cooler, which introduced Hudson River water into the steam generators. A leak at this location explained why the condensate system remained within chemistry specifications and the impurity level increased in the steam generators after the main boiler feedwater pump was started. Main feedwater had been isolated from the steam generators since August 31, 1999. The leaky sample cooler was in a line that communicated with an isolated portion of the main feedwater system between the main boiler feedwater pump discharge valves and the feedwater regulating

valves. Con Edison estimated approximately 200 gallons of service water had entered this portion of the main feedwater system from the cooler leak while the plant was shutdown.

The condensate and feedwater systems have seven sample coolers that are cooled by service water. The coolers are located on the heater drain pump discharge, condensate pump discharge, and high pressure feedwater heat exchanger. The licensee had addressed sample cooler leaks prior to the October 14 event (reference work order NP-99-10428). One sample cooler in the steam and water analysis panel was replaced after a tube leak developed into a through-wall leak on the cooler body. An adjacent cooler was replaced as a preventive measure. A third sample cooler leak caused the October 14 event. The October 14 event could have been prevented by more timely actions to address the extent of condition for other sample coolers in the feedwater train. Sample coolers in the high pressure feedwater train were replaced after the October 14 event, or the coolers were isolated.

The inspector reviewed the last system health status report for the secondary sampling system. The report was completed by the system engineer on June 14, 1999. Overall, the condition of the system was considered good and capable of performing its required function. The primary function of the secondary sampling system is to provide samples and continuous in-line chemical monitoring of the steam, condensate and feedwater system to ensure that piping and equipment corrosion is minimized. The report did not focus on the condition of the sample coolers, or postulated improvements to the coolers.

The inspector observed that Con Edison's root cause analysis team had identified that a previous industry event documented a similar occurrence at the Oconee Nuclear Station Unit 3 on March 18, 1999. The unit had experienced increased sodium levels in the secondary system after restoring the feedwater system after a refueling outage. The source of the sodium contaminants in the feedwater system was attributed to a leaking moisture separator drain tank sample cooler. This operating experience was received at Con Edison, but was not entered into the problem identification process nor provided to the system engineer or other cognizant individuals to evaluate lessons-learned. The initial evaluation of this event was narrowly focused on the specific application of the cooler and cooling medium used (component cooling water vs. service water).

The inspector reviewed various system operating procedures (SOPs) to determine if procedural actions exist to isolate sample coolers during layup of condensate and feedwater systems. No guidance on sample cooler layup exists in SOP 24.1, "Service Water Operation," or in SOP 21.2 "Filling the Feedwater and Condensate Systems." SOP 8.5, "Plant Layup," mentions in general terms the need to remove service water heat exchangers placed in standby; however, the initial condition for this procedure is cold shutdown with an expected plant layup for greater than one week.

Con Edison assigned this item as a significance level I condition report. A team charter was developed on October 15 consistent with the expectations in station administrative order (SAO)-112, "Corrective Action Program." The investigation team consisted of

individuals from operations, engineering, chemistry, and the corrective action group. The inspector periodically observed activities of the root cause team.

c. Conclusions

A leak in a high pressure feedwater sample cooler caused service water contamination in all four steam generators and significantly increased impurity levels above normal limits. The failure to fully evaluate operating experience was a missed opportunity to prevent the event. An operability determination provided an adequate basis to conclude the steam generator tubes were not significantly affected by the secondary chemistry excursion.

M2.2 Containment Hydrogen Monitoring System Heat Trace Deficiencies

a. Inspection Scope

The inspector reviewed documentation, and interviewed personnel to evaluate the licensee's response to inoperable heat tracing installed on the containment hydrogen monitoring system.

b. Observations and Findings

The containment hydrogen monitoring system was installed to measure the hydrogen concentration during post-accident conditions. A heat trace system was installed on the hydrogen analyzer sample lines to maintain the containment atmospheric samples in a vapor phase during post-accident conditions. Technical Specification (TS) Table 3.5-5, item 11 required the hydrogen monitoring system to be operable when the plant temperature exceeded 350°F; otherwise, the TS required that an alternating containment hydrogen monitoring method be established within 7 days.

A chemistry technician identified multiple heat trace system deficiencies on September 17, 1999, and initiated a work order (WO NP-99-11038) to investigate and repair these deficiencies. An instrument and controls (I&C) technician checked the heat trace system on October 5, 1999, and concluded that it was functioning properly. The operators performed a plant heat-up and increased the reactor coolant system temperature above 350°F on October 10, 1999. On October 12, 1999, the chemistry technician discussed the heat trace system deficiencies with the system engineer (SE). The SE subsequently confirmed that the heat trace system deficiencies had not been corrected. The SE determined that the heat trace deficiencies rendered the containment hydrogen analyzers inoperable.

The operators declared the hydrogen analyzers inoperable on October 12 and noted in the operating log that an alternate method for monitoring the containment hydrogen concentration had been established. The inspector interviewed a chemistry supervisor on October 15, 1999, and learned that the planned alternate method had not been implemented due to uncertainties regarding the environmental qualification of the alternate monitoring instrument. The licensee subsequently developed an alternate

sampling method that involved collection and transport of the sample to the Indian Point 3 for analysis. The inspector reviewed the temporary procedure change request (TPC 99-29CH) that described the alternate sampling procedure and did not identify any discrepancies. The licensee initiated a condition report (CRS 199907748) to identify any further corrective actions associated with this event.

The inspector noted some human performance deficiencies during review of this event. The heat trace system checkout on October 5 appeared inadequate given the subsequent identification of the system problems that were documented in the original work order. This led to the failure of station personnel to recognize that the containment hydrogen monitoring system was inoperable prior to heating the plant above 350°F. An alternate containment hydrogen monitoring method had not been established as documented in the operations log on October 12, 1999. The licensee initiated an condition report to evaluate this event and to determine the appropriate corrective actions.

Licensee actions to address heat trace system deficiencies and restore the hydrogen monitoring system to an operable status continued at the end of the inspection period.

c. Conclusions

The installed containment hydrogen monitoring system remained inoperable due to the heat trace system deficiencies. The licensee had established an alternate monitoring method within the required time period. However, the delays in recognizing that the hydrogen analyzer was inoperable and in establishing appropriate compensatory measures were performance deficiencies.

M2.3 Component Material Conditions

a. Inspection Scope (62707)

The purpose of the inspection was to assess the material conditions of plant components through direct observations during inspection tours and interviews with plant personnel.

b. Observation and Findings

During inspection tours of the plant on October 11, 1999, the inspector identified several examples of degraded equipment conditions, which indicated a weakness in problem identification and corrective actions.

24 RCP Lower Motor Bearing Lube Oil leak (1 gallon/2 months)

The inspector identified that lube oil leaks from the lower motor bearing have existed for several years and no formal evaluation has been performed to determine the root cause. This RCP has experienced higher than expected vibration due to an un-balanced shaft since 1981. The inspector noted that actions implemented to correct this condition have not been fully effective. More recently, during the forced shutdown, the licensee was

able to reduce vibration on this pump from 13 mills down to 8 mills by removing a balancing weight. The oil additions created a high worker exposure (within limits) on operators (100 to 300 mRem per addition). A temporary modification was implemented during the forced shutdown to allow oil additions from outside the biological shield to reduce radiation exposure. The inspector reviewed the applicable 50.59 safety evaluation for this modification and found it acceptable. The system engineer stated that the long standing vibration problem may be the cause of the oil leaks. The licensee plans to replace this motor during the 2000 refueling.

Although operators log oil additions to the RCPs and record the RCP oil collection tank levels to ensure compliance with the Fire Hazard Analysis, no trending of this data was performed. As a result, the licensee did not investigate an unexplained level increase from 6 inches to 10 3/4 inches, that was recorded on October 8, 1999. Further, a request by engineering for operators to drain the tanks at 10 inches had not been implemented.

The system engineer determined that no immediate operability concern existed based on normal pump/motor parameters. However, the inspector was concerned because this level increase equated to 33 gallons in each tank, which was much larger than the quantity of oil that was added in the last month. Additionally, at 10 3/4 inches in tank level, the volume in each tank would be 53 gallons, which would result in insufficient capacity to meet the license condition per Appendix R (not enough empty space to accommodate the total inventory of one RCP). The safety evaluation report (SER) specified that the collection tanks are sized to collect the total inventory of one RCP (250 gallons). Con Edison was working on a revision to the design basis to show that there was 200 gallons of lube oil in each RCPs, and that the capacity of an oil collection tank is 275 gallons. Thus, with 53 gallons in each collection tank (and crediting only one tank), a 22 gallon margin to handle the inventory from one RCP remains which assures compliance with the Appendix R licensing basis.

After prompting by the inspector and to address the question of additions to the tank, a containment entry was made on October 23 to (i) measure the tank level and confirm the remaining capacity, (ii) establish the addition rate on the basis of the recent measurements, and (iii) extrapolate the input to the tank to confirm both addition rate and remaining tank capacity justify further delays in draining the tanks. The October 23 investigation determined that level in the tanks had not increased. The actual tank level was 6inches and not 10 3/4 inches. The licensee stated that inconsistencies on readings by different operators caused the error. CRS 199908108 was issued to address the inadequate response to the tank level increases on October 8. Con Edison plans to drain the oil collection tanks on November 8, 1999.

The licensee has been slow to address similar concerns documented by a April 1998 Condition Report (CRS 199801646) which indicated that each tank contained a quantity of oil and or water mixture that appeared to be well in excess of the margin between the tank capacity (275 gallons) and the inventory of oil in one RCP (250 gallons) as stated in the license submittal to the NRC. In response to NRC questioning the licensee discovered that the two RCP oil collection tanks are not identified in the Fire Hazard

Analysis for the zones in which they are located. The licensee demonstrated a lack of understanding of the licensing basis when defining conditions adverse to quality. A CRS has been initiated.

21 Spent Fuel Pool Pump- Large Seal Leak

This condition was first reported by the licensee on May 11, 1999 (CRS 199903750). The initial operability screening called for immediate cleanup of the boron to prevent seal failure and a work order was initiated for seal replacement. The inspector identified a corrective action weakness in that the recommended clean-up has not been performed as of October 11, 1999. Additionally, the inspector was concerned because the pump continues to be challenged and no corrective actions have been implemented. The concern is that boron crystals may block the seal leak-off basin drain, causing the reservoir to fill to the shaft level where the water could be transferred into the bearing-housing resulting in bearing damage. Con Edison took actions in response to inspector concerns to clean boron from the pump and initiated plans to replace the seal.

22 CCW Pump Inboard Bearing Lube Oil Leak (2.5 ounces/day)

The inspector identified a weakness in the licensee's evaluation of this degraded condition. The initial operability screening was weak because it did not consider the size of the reservoir (the reservoir holds only 12 ounces of oil), nor did it evaluate the cause for the oil leak. Additionally, the system engineer had no adequate trending data of the oil leak/consumption nor any technical standard or specification to properly access acceptable leakage. Further, the licensee had not considered the potential worker radiation exposure for oil additions under post accident conditions (1,660 Mr/hr field) to maintain the pump operable. The inspector concluded that this degraded condition did not impact plant safety due to adequate pump redundancy (3 pumps) since only one pump is needed for accident conditions.

22 Charging Pump Oil Leak (1 gallon/day) & 23 Charging Pump Oil Leak (1 gallon/week)

The licensee has implemented several modifications to correct this excessive oil leakage. However, these actions have been ineffective. The inspector identified a weakness in that no adequate pump operability had been performed taking in consideration the large oil leak versus the 17 gallons available in the lube oil reservoir. The inspector concluded that this degraded condition was inconsequential because these pumps are not safety related nor are they required to mitigate any accident conditions. However, the inspector was concerned because these pumps are required during normal power operation to supply cooling to the reactor coolant pumps to prevent a seal LOCA. To address the inspector concerns, the system engineer re-opened a CRS to implement repairs (replace oil seals with different design/item equivalency evaluation) in an expedited manner. Additionally, the CRS will evaluate the repetitive problem.

Fire Alarms on PAB and RCP areas Upon Starting the RCPs

On October 10, upon start of the 24 RCP, several fire detectors in the PAB and the RCP area alarmed. The inspector learned from control room operators that the RCP fire alarms were a common problem potentially caused by dust particles lifting during the pump start. The inspector identified a minor weakness in that no documentation or an evaluation of this long-standing problem had been performed. The fire protection engineer stated that the PAB fire alarm activation was a first time occurrence and that a CRS has been initiated to evaluate the condition.

c. Conclusions

The NRC identified several examples of long-standing degraded conditions on safety related and risk-significant pumps, which indicate a weakness in problem identification and corrective actions. The conditions revealed deficiencies in the tracking and review of degraded conditions, in causal analysis, a lack of understanding of the licensing basis, and corrective action effectiveness.

III. ENGINEERING

E2 Engineering Support of Facilities and Equipment

E2.1 Auxiliary Feed Water Pump Blackout Timer Modification

a. Inspection Scope (37551)

The inspector reviewed the modification of the auxiliary feed water pump timers.

b. Observations and Findings

The inspector reviewed FPX-99-12265-F, which modified the auxiliary boiler feed water pump blackout timers. This modification was developed after the unit trip and subsequent loss of the 480 V bus 6A on August 31, 1999. A potential vulnerability for an overcurrent condition on the bus existed when two pumps start simultaneously. This modification changed the start time for the auxiliary feed water pumps from 12 seconds after diesel start until 20 seconds. The inspector also reviewed several calculations to verify this vulnerability was removed. The inspector determined that this change in timer settings would preclude two pumps from starting concurrently. The inspector reviewed the Safety Analysis Report for this event and determined that the change did not effect the analyzed event which had assumed a pump start at 60 seconds.

c. Conclusions

The modification of the 21 and 23 auxiliary feed water pump blackout timers was consistent with the Safety Analysis Report and removed a vulnerability for the loss of the 480V emergency power supply bus.

E2.2 Corrective Action Effectiveness for Amptector Maintenance

a. Inspection Scope (37551)

The inspector reviewed a deficiency identified by Con Edison on August 26, 1999, regarding a charging pump breaker in which the wires from the amptector to the current transformer were installed incorrectly.

b. Observations and Findings

On August 26, 1999, Con Edison documented in condition report (CR) 199906531 that control wires from the amptector to the current transformer for a charging pump breaker were terminated on the wrong current transformer tap. This error was identified during breaker testing prior to installation of the breaker into the 480 volt switchgear. The incorrect current tap points did not impact past operability of the charging pump since the breaker had been recently purchased by Con Edison and designated as a "spare" charging pump breaker. The inspector confirmed that Con Edison corrective actions in response to a violation documented in report 50-247/97-12 adequately precluded recurrence of this condition.

c. Conclusions

Con Edison identified, during charging pump breaker testing, that control wires from the amptector to the current transformer were improperly terminated. Corrective actions were adequate to preclude a recurrence of this condition.

E2.3 Operability Determination for Emergency Diesel Generators

a. Inspection Scope (37551)

The inspection evaluated Con Edison's identification and operability evaluation for a design deficiency. The design deficiency could result in the emergency diesel generators being overloaded during a postulated loss of offsite power signal, reactor trip, and failure of one 125 volt DC bus.

b. Observations and Findings

On August 19, 1999, Con Edison reported to the NRC a condition outside the design basis of the facility. During preparations for the 2000 refueling outage, a contractor design engineer identified that, under a postulated loss of offsite power, reactor trip, and failure of one train of 125V direct current power, the emergency diesel generator load sequencer would initiate early and potentially overload the emergency diesel generators.

Operability determination 99-032 concluded that the emergency diesel generators were operable. The basis for operability considered that: the emergency diesel generators have a capability to simultaneously load a component cooling water pump and service water pump (loads impacted by design deficiency); the bus frequency and voltage

decrease are within the capabilities of the individual supply breakers and sufficient margin exists to the undervoltage trip; and the amptector setting on the emergency diesel generator output breaker was set to 6,000 amperes.

On August 31, 1999, the unit experienced a unit trip and loss of offsite power to the safety-related buses (See Section O8.1 above). One deficiency noted during the transient was the premature opening of the 23 emergency diesel generator output breaker. Con Edison completed an evaluation to determine whether several deficiencies identified during the August 31 transient would impact Operability Determination 99-032. The deficiencies included the as-found amptector setting on the emergency diesel generator output breaker, the voltage drop due to operation with the station auxiliary tap changer in manual, and the failure to test the undervoltage reset values. Con Edison concluded there was no impact on the conclusions of operability determination 99-032. Plant modification FIX-99-12273 is being planned to eliminate the design vulnerability during the next refueling outage. The inspector reviewed the licensee evaluation and identified no inadequacies.

c. Conclusions

The operability determination was adequate for a design deficiency resulting in a potential diesel generator overload during a loss of offsite power, reactor trip, and concurrent loss of a 125V DC bus.

E8 Miscellaneous Engineering Issues

E8.1 Review of Licensee Event Report: (Closed) LER 99-017

a. Inspection Scope (92700)

The inspector reviewed licensee actions to make reports per 10 CFR 50.73 and to address degraded conditions.

b. Observations and Findings

(Closed) LER 99-017; Potential Flooding Due to Fire System Deficiency

During reviews in response to Information Notice 98-31 of components installed in fire protection (FP) system, Con Edison identified that pipe couplings might fail when subjected to postulated Design Basis Earthquake loads. Con Edison performed field walkdowns to identify locations where as-found clearances between piping and adjacent structures were less than acceptable. If pipe movement during a seismic event was greater than the clearances, impact was assumed to occur and an impact evaluation was necessary. The mechanical (Victaulic) couplings were reviewed in particular because they were deemed most susceptible to impact loads. The results of an engineering evaluation by a contract engineering firm were reported to Con Edison by letter dated September 21, 1999.

One of nine locations evaluated had unacceptable impact stresses on a section of 4 inch diameter piping on the PAB 80 ft elevation (FP line number 2097). If the FP pipe failed, flooding could occur in the lower level of the primary auxiliary building (PAB). The postulated flood event could impact the safety related residual heat removal pumps located on the PAB 15 ft elevation. Condition Report CRS 199907141 was written to describe the event, conduct reportability evaluations, and address corrective actions. This item was reported to the NRC at 3:55 p.m. on September 21, 1999, per 10 CFR 50.73(a)(2)(ii)(B) as a condition found to be outside the design basis of the plant.

The immediate and short term actions were appropriate to: isolate the fire protection header to the PAB by closing manual isolation valves FP-815 and FP-827 (CautionTag 99-401); evaluate the fire protection system degradation relative to SAO-703 and Operability Determination (OD) 99-34 with the conclusion that the PAB fire header remained available to the fire brigade for manual fire suppression; and implementing a plant design change using the generic pipe support modification process to install one seismic restraint on FP Line 2097 and one restraint on the adjacent house heating steam line (Work Order 99-11113) to limit pipe movement to less than the allowed clearance. The support modifications were completed and the PAB fire header was restored to the normal alignment at 6:50 p.m. on September 22, 1999.

The inspector verified the Con Edison actions to isolate the FP header, evaluate the fire system per SAO-703, and complete modifications to resolve the design deficiency. The inspector completed a walkdown of the fire header inside the PAB to review other support deficiencies, which identified a missing u-bolt support on the 80 ft elevation. The licensee evaluated the discrepancy as not significant relative to the remaining dead weight supports for the header, and initiated actions to replace the missing u-bolt. Con Edison actions to address the seismic issue were prompt and demonstrated a good regard for preserving safety system operability.

The inspector noted that LER 99-17 contained minor editorial errors, but was generally accurate in the description of the event and the corrective actions taken. However, in the event analysis, Con Edison concluded only that there was no safety consequences since an actual fire header failure potentially disabling safety-related equipment never occurred. The LER did not provide a complete assessment of the safety implications of the event, as required by 10 CFR 50.73(b)(3). There appears to be a weakness in the Con Edison reporting of events under 10 CFR 50.73, since this is the second recent NRC observation of an inadequate assessment (reference Inspection 99-04, Section E8.9 regarding LER 99-04). Con Edison initiated CR 19990844 on November 4, 1999 as a result of this observation. Consistent with the NRC Enforcement Policy, enforcement is not normally issued for minor violations. This LER is closed.

c. Conclusions

Con Edison actions to address a fire protection design deficiency for postulated seismic events were prompt and demonstrated a good regard for preserving safety system operability (LER 99-017). The NRC noted a need to improve an assessment of postulated events when making reports under 10 CFR 50.73.

IV. PLANT SUPPORT

R1 Radiological Protection and Chemistry (RP&C) Controls

R1.1 Unit 1 Contamination Event

a. Inspection Scope (71750)

The inspector reviewed Con Edison actions in response to a radiological event at Unit 1 on September 29, 1999 (reference Condition Report 199907407). The inspector reviewed the licensee actions with the assistance of NRC Region I Health Physics specialists.

b. Observation and Findings

While processing wastes under radiation work permit (RWP) 99-0519, a contractor used an air sparge while transferring the contents of a sump pit in the 345,000 gallon waste water storage pool, which caused an radioactive airborne condition and local floor contamination on the 70 ft elevation of the fuel handling facility. The air sparge was used previously without problem while transferring wastes. The licensee determined that the contractor failed to keep the air hose submerged during the operations on September 29, which caused the radioactive contamination on the side of the sump pit to become airborne. Subsequent Con Edison actions were appropriate to terminate work activities, survey and apply radiological controls to the affected Unit 1 areas, cleanup the contamination, and evaluate the worker exposures to radiation.

c. Conclusions

Con Edison corrective actions in response to a radiological event were appropriate. The inspector independently determined that worker exposures as a result of the event were well below NRC exposure limits.

R4 Staff Knowledge and Performance in RP&C

R4.1 Boration Controls on the Secondary Side (NCV 99-09-02)

a. Inspection Scope (71750)

The inspection reviewed actions to borate the secondary system in preparations for plant start-up on October 14, 1999. This review was in response to the steam generator chemistry event discussed in Section M2.1 above.

b. Observations and Findings

Approximately four days prior to plant criticality and operation of the main feedwater system, Con Edison chemistry personnel initiated actions to add boric acid to the main feedwater system. A residual boron concentration in the range of 5 to 10 ppm is

required in the bulk fluid of the steam generators to mitigate steam generator tube denting. The action was taken prior to plant restart based on experience during the last startup where boric acid concentration was out of specification low at the 30 percent full power hold point. Specifically, chemistry noted that blowdown rates were high during secondary startup and wanted to ensure that boric acid was within the limits of SOP 8.2, prior to the unit reaching five percent rated thermal power.

The consequence of the early boric acid addition was to increase the concentration to 65 parts per million (ppm) in the steam generators when the feedwater system was started up, and decrease pH to 6.5. The resulting concentration was six times greater than the allowable, and reduced the steam generator pH below the acceptance criteria of 7. The calculated pH was approximately 5.0 in the main feedwater line. The action to reduce the boron concentration through steam generator blowdown subsequently increased pH to greater than 7.0 prior to reaching 5 percent rated thermal power.

The inspector reviewed the procedures for feeding the steam generators from the boric acid addition tanks and walked down the system using drawing 9321-F-2038-39. The instruction are identified in procedure IPC-S-031-S, "Boric Acid Feed System." The boric acid concentration in the steam generators is maintained by a combination of adjusting the boric acid tank concentration and setting flow on the boron addition feed pumps. The procedure sets boric acid concentration based on the average steam generator blowdown flowrates. The technician is then directed to use the boron addition pump setting at 40 percent flow for normal operation or 60 percent feed for preparation of shutdown conditions.

The guidance in IPC-S-031-S did not provide instructions for injection into an isolated main feedwater line. Since August 31, 1999, the main feedwater line was isolated from the steam generators between the discharge check valve and the main feedwater regulating valves. The use of IPC-S-031-S was misapplied for this condition as the boric acid injection was not going to the steam generators but was concentrating in the isolated sections of the main feedwater system. The consequence of this action outside of procedures was a significant increase in boron concentration in the steam generators when the main feedwater system was placed in service on October 14, 1999. Further, Con Edison did not question this evolution as being outside the procedure guidance, but considered it a matter left to the discretion of the supervisor.

Technical Specification (TS) section 6.8.1 requires that written procedures be implemented covering activities referenced in Regulatory Guide 1.33, Revision 2. Appendix A of Regulatory guide 1.33 recommends written procedures that governs procedural adherence. Station Administrative Order (SAO)-133, "Procedure, Technical Specification and License Adherence and Use Policy," section 4.1 state that procedures shall be followed. Procedure IPC-S-031-S, "Boric Acid Feed System" was not followed in that the procedure assumes that boric acid is being injected into the steam generators not into an isolated feedwater line. This Severity Level IV violation is being treated as a Non-Cited violation consistent with Appendix C of the NRC Enforcement Policy. This violation is in Con Edison's corrective action system as Condition Report #199907794 and 199907795. **(NCV 50-247/99-009-02)**

c. Conclusions

The early injection of boric acid into the secondary system was performed outside the conditions specified by the chemistry procedure, and resulted in steam generator boric acid concentration and pH significantly outside the acceptable values.

P3 EP Procedures and Documentation

P3.1 Emergency Planning Training

a. Inspection Scope (71750)

On October 11, 1999, the inspector observed the training of various emergency response organization personnel.

b. Observations and Findings

The objective of the training was to review roles and responsibilities of various members of the Con Edison emergency planning organization. Those in attendance at the training included the Technical Support Center (TSC) managers, Operational Support Center (OSC) managers, OSC coordinators, and the plant operations manager (POM). The training was initiated based upon observations during a scheduled emergency planning drill, as documented in report 50-247/99-12.

In general, the training accomplished the objective to review roles and responsibilities of various emergency response coordinators. However, Con Edison observed that emergency response procedure deficiencies existed. The deficiencies occurred because the training was not conducted with the latest revision of the applicable procedures. Each of the deficiencies were documented in condition report (CR) 199907710. The deficiencies included out-of-date procedures and various discrepancies in procedures IAP-13, "Plant Operations Manager," IP-1035, "Technical Support Manager," and IP-1023, "Operational Support Center." In response, Con Edison upgraded the quality of this training and reperformed it on October 14, 1999. QA performed a surveillance on the quality of the ungraded training, and concluded that training had improved.

c. Conclusions

Procedural deficiencies were identified during emergency preparedness remedial training. Con Edison entered the deficiencies in the problem identification system and performed adequate short-term actions to address emergency training quality.

X1 Exit Meeting Summary

The resident inspectors presented the inspection results to members of Con Edison management at an exit meeting held on November 4, 1999. The inspectors were not

informed by the Con Edison attendees that any of the issues discussed at the exit or materials examined during the inspection period should be considered proprietary.

X2 Commissioner Merrifield Visit

On September 9, 1999, Commissioner Merrifield visited Indian Point Station. The visit included a plant tour and discussions with Con Edison management on a variety of technical issues. Observations during the plant tour were discussed with Con Edison. One observation was high ambient temperatures in the auxiliary building piping penetration area impacting service life of safety-related equipment. The second observation involved the controls for separation of cable trays in the electrical penetration room. Con Edison documented the observations with condition reports (CRs) 199906923 and 199906924. Inspector review of licensee actions for both observations concluded that Con Edison adequately addressed the issues.

Attachment 1

INSPECTION PROCEDURES USED

37551	Onsite Engineering
61726	Surveillance Observation
62707	Maintenance Observation
71707	Plant Operations
71750	Plant Support

ITEMS OPENED and CLOSED

Opened

NCV 99-009-01	Operators Not Adhering to System Operating Procedure
NCV 99-009-02	Boron Injection Outside Procedure

Closed

LER 99-015-00	Reactor Trip and Notification of Unusual Event
LER 99-017-00	Fire System Design Deficiency Resulting in Potential Flooding
NCV 99-009-01	Operators Not Adhering to System Operating Procedure
NCV 99-009-02	Boron Injection Outside Procedure

LIST OF ACRONYMS USED

AIT	augmented inspection team
AOI	abnormal operating instruction
COL	check off list
CR	condition report
CRS	containment recirculation spray
CVCS	chemical and volume control system
EDG	emergency diesel generator
FCU	fan cooler unit
FP	fire protection
gpm	gallons per minute
GT	gas turbine
IC	Instrument & Control
IPTE	infrequently performed test or evolution
IRPI	individual rod position indicator
LER	licensee event report
LOCA	loss-of-coolant accident
NRR	Nuclear Reactor Regulation, Office of
NOUE	notification of unusual event
OD	operability determination
OSC	operational support center
OTDT	over-temperature delta temperature
PAB	primary auxiliary building
PCO	plant check off
POM	plant operations manager
ppb	parts per billion
ppm	parts per million
psig	pounds per square inch, gauge
RCP	reactor coolant pump
RCS	reactor coolant system
ROTC	reactor operator at the controls
RP&C	radiological protection and chemistry controls
RWP	radiation work permit
SAO	station administrative order
SAT	station auxiliary transformer
SE	system engineer
SER	safety evaluation report
SNSC	station nuclear safety committee
SOP	system operating procedure
TDR	technical data report or test deficiency report
TFC	temporary facility change
TS	technical specification
TSC	technical support center
WO	work order