U.S. NUCLEAR REGULATORY COMMISSION

REGION III

REPORT NO. 50-456/95017; 50-457/95017

FACILITY

Braidwood Nuclear Plant, Units 1 and 2
License Nos. NPF-72; NPF-77

LICENSEE

Commonwealth Edison Company
Opus West III
1400 Opus Place
Downers Grove, IL 60515

DATES

November 15, 1995 through January 5, 1996

INSPECTORS

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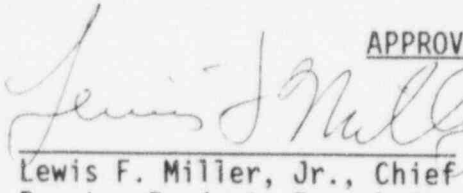

Lewis F. Miller, Jr., Chief
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2/2/96
Date

AREAS INSPECTED

A routine, unannounced inspection of operations, engineering, maintenance, plant support, and material condition was performed. Follow-up inspection was performed for non-routine events and for certain previously identified items.

RESULTS

Assessment of Performance

The following assessments were based on activities during this report period. The significant issues raised to the licensee at the end of this period were: the inspectors were concerned about the failure of several pieces of equipment upon the return to service of Unit 1 from a refueling outage, the inspectors were concerned about several NRC identified material condition problems, weaknesses in the coordination of troubleshooting efforts, and problems with procedure adequacy and adherence.

OPERATIONS

- The conduct of operations in the control room was good based on inspectors' observations during the Unit 1 refueling outage and return to operation (paragraphs 1.1, 1.2, and 2.11). However, poor practices involving adjusting safety injection accumulator level (paragraph 1.4), the inadvertent start of an emergency diesel generator (paragraph 1.10), and failing to follow the out-of-service procedure (paragraph 1.11) were also observed.

- Configuration control outside the control room was weak. The licensee found four valves out of position (paragraph 1.5). Cooling water was not supplied to the Unit 1 startup feed water pump because a procedure prerequisite was not adhered to (paragraph 1.6). In addition, battery 112 voltage was below technical specification limits on several occasions because the equipment operator rounds log was not updated after a battery modification (paragraph 1.7).

MAINTENANCE

- Conservative decision making was demonstrated during breaker inspections (paragraph 2.2) and rod control testing (paragraph 2.11).

- The inspectors observed that good maintenance practices were generally adhered to (paragraph 2.1). However, in two cases the procedure was inadequate for the work performed (paragraphs 2.4 and 2.6). Administrative procedures were not adhered to when the temporary modification procedure was not followed (paragraph 2.3) and the plant barrier impairment procedure was not followed (paragraph 2.12). In one other case post-maintenance testing was inadequate (paragraph 2.12).

- The inspectors noted weaknesses in coordination of troubleshooting of the 1A centrifugal charging pump seal, the 1B auxiliary feedwater pump, and the N31 Unit 1 source range nuclear instrument noise (paragraphs 2.4, 2.5, and 2.6).

- In contrast to these problems, the inspectors observed good procedural adherence practices during several surveillances (paragraph 2.8).

- The inspectors noted an improving trend in communications between operators and maintenance personnel (paragraph 2.13)

ENGINEERING

- Poor communications between system engineers and operations personnel delayed corrective action for the steam generator power operated relief valve power supplies inspection (paragraph 3.1).

PLANT SUPPORT

- The inspectors determined that the licensee's identification, assessment, and resolution of a fire hazard caused by oil soaked lagging was excellent (paragraph 4.1).

MATERIAL CONDITION

- The licensee had adequate plans and good initiatives to improve material condition, but implementation was not yet effective (paragraph 5.1).

- There were several equipment problems that occurred during the Unit 1 return to service (paragraph 5.2).

- The inspectors were concerned that the NRC identified several material condition problems that were not identified by the licensee (paragraph 5.3).

Summary of Open Items

Violations: Section 1.7
Unresolved Item: None
Inspection Follow-Up Items: Sections 1.5, 1.8, 1.9, and 3.1
Non-Cited Violations: Sections 1.6, 1.11, 2.3, 2.4, 2.6, 2.10, and 2.12

Summary of Closed Items

LERs: Sections 1.10 and 2.12
Violations: Sections 1.11, 2.13, 3.2, and 4.2
Inspection Follow-Up Items: Sections 1.11, 2.13, and 3.2

INSPECTION DETAILS

1.0 OPERATIONS:

NRC Inspection Procedure 71707 was used in the performance of an inspection of plant operations.

1.1 Unit 1 Refueling Outage On December 14, Unit 1 was synchronized to the offsite electrical power grid, ending the 5th cycle refueling outage. The outage was originally scheduled to end November 16, but was extended because of problems with a 1B diesel generator governor, the rod control system, the 1B auxiliary feedwater (AFW) pump overspeed circuit, and the N-31 source range nuclear instrument.

Overall, control room conduct of operations for the shutdown unit was good based on the following observations made by the inspectors:

- Three-way communications with outplant operators (equipment operators) was used.
- Personnel traffic and outage activities were controlled and coordinated by the Unit Supervisor.
- Control room shift manning exceeded minimum technical specification requirements.
- Shift personnel were knowledgeable of ongoing outage activities as well as completed items including system modifications (such as a modification to the 1B AFW pump remote start switch).
- Reactor Operators monitored core parameters at an appropriate frequency to ensure proper core cooling while shutdown cooling was operating.

1.2 Startup from Refueling Outage Overall, reactor operator control of startup activities was excellent based on the following observations made by the inspectors:

- Teamwork among reactor operators and supervision was observed during swaps of the condensate/condensate booster pumps and adjustment of feedwater flow.
- Excellent heightened level of awareness briefings were conducted for surveillances of Phase A containment isolation and control rod drop timing.
- Strong control was exercised over repair activities and the effects on system configuration for emergent maintenance on two letdown system valves, 1CV8160 and 1CV8147.

1.3 Power Range Instrumentation Problem On December 23, while Unit 1 power range instrument channel N-43 was out-of-service for calibration, indication on channel N-42 became erratic and the channel was subsequently declared inoperable. With two of four power range channels inoperable, the licensee then entered Technical Specification (TS) 3.0.3, which required the reactor be in Mode 3 within six hours. Channel N-43 was returned to service within two hours and the need to change modes no longer existed. A faulty power supply for channel N-42 was subsequently replaced and channel indication returned to normal. The inspectors discussed the entry in TS 3.0.3 with the licensee and concluded that the actions in response to the two inoperable channels appeared good.

1.4 Safety Injection Accumulator Level Adjustments On December 7, the inspectors noted that reactor operators lowered the level in the 1A safety injection (SI) accumulator, which had risen the past several days, via an approximately four-hour purge of the high radiation sampling system (HRSS). The level adjustment was done as part of a sampling of the accumulator for boron. Chemistry and control room personnel stated the HRSS was routinely used for lowering accumulator level. Whereas chemistry procedure BwCP 613-5, "SI Accumulator Grab Sample," allowed for purging longer than the typical 15 minutes, operations department procedure BwOP SI-6, "Lowering SI Accumulator Level," did not specify the use of HRSS for this purpose. The inspectors reviewed the procedures and concluded no procedure violation occurred; however, routinely using the HRSS system to lower SI accumulator level was a poor practice. The Operations Manager stated that HRSS would not be used for accumulator level adjustment in the future.

1.5 Configuration Control Problems The inspectors identified a trend when during the inspection period the licensee found several valves in incorrect positions. The valves found mispositioned were: the 1B Residual Heat Removal (RH) heat exchanger tube-side drain valve found partially open, the Unit 1 reactor vessel flange leak detection isolation valve found closed, and an HRSS sample valve found open. The inspectors brought this trend to the attention of licensee management. The trend was being reviewed by the licensee for commonalities. The inspectors were concerned about the trend and concluded that these were examples of weak configuration control outside the control room. The licensee's corrective actions regarding configuration control are an inspection unresolved item (95017-01).

1.6 Failure To Perform Proper Valve Line Up On December 7, the licensee found the Unit 1 startup feedwater pump running with non-essential service water (WS) to the lube oil cooler isolated. The pump is used during plant startup and has no safety function. If the pump had failed, the auxiliary feedwater (AFW) system was available to provide feedwater to the steam generators. The pump was placed in service at 1915 on December 6 by a non-licensed operator using procedure BwOP FW-05, "Operation of a Startup Feedwater Pump," and the licensee discovered

WS was isolated at 0120 on December 7. Prerequisite 5 of the procedure required the operator to assure WS was supplying the lube oil cooler; however, this was not done and oil temperature rose. The isolation valve was subsequently opened and oil temperatures returned to normal. The System Engineer checked the pump for damage and found none. Oil samples indicated no bearing damage. The non-licensed operator was counseled on following procedures. The licensee planned a reinforcement of procedural adherence requirements for the entire station on January 22, 1996.

Technical Specification 6.8, "Procedures and Programs," requires that procedures be established, implemented, and maintained. The inspectors determined in this case the procedure was not followed; however, this licensee-identified and corrected violation is being treated as a Non-Cited Violation, consistent with Section VII of the NRC Enforcement Policy.

1.7 Equipment Operator Log Inadequacies On December 3, during the performance of 1BwOS 8.2.1.2.A-2, "125 Volt DC Battery and Battery Charger 112 Weekly Operability Surveillance," the licensee found the battery terminal voltage on battery 112 to be 129.1 volts. This was below the TS weekly surveillance required voltage of 130.5 volts. The licensee found the cause of the low terminal voltage was that the battery charger float voltage drifted down to 129 volts. The licensee also found equipment operator (EO) electronic logs contained incorrect terminal voltage values so float voltage was not increased. The values, which were for the previously used Gould batteries, had not been changed when the Gould batteries were replaced with AT&T batteries. In addition to the problem on December 3, the licensee identified 19 other occurrences in operator rounds on battery 112 and 29 occurrences on battery 111 where the voltage was below the TS limit. The inspectors reviewed the safety significance of this event and found that the battery was operable down to 124 volts. The TS required 130.5 Volt float voltage ensured the battery was fully charged.

The licensee subsequently entered the correct float voltage values into the rounds and the float voltage was adjusted to 132 volts. In addition, licensee personnel stated that the licensee will make temporary procedure changes to BwAP 2321-12, "Plant Modifications Designed By Engineering" and BwAP 2321-21, "Exempt Changes" to include a review of equipment operator rounds when a modification is performed. However, the EO logs were not reviewed for other parameters that may have been affected by modifications or setpoint changes.

The failure to update the EO logs after the modification to the Unit 1, 125 vdc batteries was a violation of 10 CFR Part 50, Appendix B, Criterion V (95017-02).

1.8 Chemical and Volume Control System (CVCS) Relief Valve Lifts On November 16, a sudden increase in the differential pressure on the Unit 1 reactor coolant filter caused the lifting of relief valve

1CV8119 and damage to the valve's internal bellows. An ensuing leak through a weep hole on the valve body resulted in the local spread of contamination. The subsequent repairs required isolating normal letdown and maintaining system parameters with the excess letdown portion of the CVCS. This plant configuration required heightened operator attention due to the solid condition of the primary plant and reduced the available means for dealing with system transients as preparations were being made for moving from Mode 5 to Mode 4.

The inspectors attended multidepartmental meetings held to discuss repair options and observed reactor operators change the letdown line up before and after the repairs. The inspectors concluded that the meetings and operator actions were well conducted. The repairs were successful and the CVCS was returned to the normal configuration. According to licensee personnel, similar problems with the relief valve have occurred in the past. The circumstances of those problems and the corrective actions are an inspection followup item (95017-03).

1.9 Post Accident Monitoring System The inspectors reviewed the post accident neutron monitoring (PAM) system, which provides indication of neutron flux during post accident conditions in the event that the normal nuclear instruments are unavailable. The following issues were identified:

- Surveillance and Calibration Testing The inspectors noted that the PAM system was calibrated on an 18-month frequency. However, between calibrations no log readings or surveillances were performed to verify that these instruments were operating properly.

- Operator Training From discussion with licensee personnel, the inspectors concluded that minimal classroom training was provided on the operation and use of this system. In addition, the inspectors identified that simulator training did not incorporate the PAM system into accident scenarios. Overall, the inspectors concluded that training on the operation and use of the PAM system was poor.

Further review of operability and surveillance requirements for this system are an inspection followup item (95017-04).

1.10 Follow-Up on Non-Routine Events NRC Inspection Procedures 90712 and 92700 were used to perform a review of written reports of non-routine events.

(Closed) Licensee Event Report (LER) 50-456/95014, Revision 0: 1A Diesel Generator Output Breaker Failed to Close Due to Equipment Failure. This event was the subject of special Inspection Report 95016.

(Closed) LER 50-457/95007, Revision 0: Inadvertent Start of the 2B Emergency Diesel Generator Due to Personnel Error While Attempting to Place the Control Switch in the Pull-To-Lock Position. On December 15, a reactor operator inadvertently started the 2B emergency diesel generator when attempting to place the main control room switch to the pull-to-lock (PTL) position prior to relay replacement. The diesel was immediately shutdown by the operator after the start. According to the licensee, the operator stated he had difficulty on the first attempt to place the switch in the PTL position and turned it too far toward the start position when preparing for a second attempt. The switch was checked by another operator as part of the licensee's investigation. No problems with the switch were identified and the inadvertent start was attributed to operator error. The operator was counselled on the need to exercise care in operating switches. The licensee notified the NRC Operations Center as required by 10 CFR 50.72(b)(2)(ii), manual initiation of an engineered safety feature. The inspectors discussed the event with licensee management and concluded that the licensee response to the operator error was good.

1.11 Follow-Up on Previously Opened Items A review of previously opened items was performed per NRC Inspection Procedure 92901.

(Closed) Violation 94028-01: Reactor Trip Breakers Not Opened During Digital Rod Position Indication (DRPI) System Testing. The inspectors reviewed the licensee's corrective actions which included a revision to the heightened level of awareness (HLA) procedure BwAP 100-12, "Human Performance Awareness," a revision to the DRPI surveillance procedure BwVS 1.3.3-1, "Digital Rod Position Indication (DRPI) Operability," and training for both licensed operators and system engineers.

Subsequently, the inspectors observed numerous HLA briefings and concluded that this process had improved significantly. In addition, on November 20, 1995, during a Unit 1 DRPI surveillance, the inspectors observed operators immediately open the reactor trip breakers in accordance with TS 3.10.5 when unexpected digital rod position indications were received. The inspectors concluded that the licensee's corrective actions were good.

(Closed) Inspection Followup Item (IFI) 95015-01: Both Unit 1 Emergency Diesel Generators Taken Out-of-service at the Same Time. Further review of the incident by the licensee indicated both diesels were not out-of-service (OOS) at the same time. The 1B diesel had been taken OOS to allow work on the governor; however, because of an error in the preparation of the OOS paperwork, three components on the 1A diesel were also taken OOS: the jacket water heater, the lube oil heater, and the pre-lube oil pump. About an hour after the three components were taken OOS, the error was

identified and corrected. The licensee subsequently determined that the 1A diesel was operable with the three components OOS.

The licensee and the inspectors concluded that the error was caused by a lack of self-checking on the part of the licensed reactor operator who prepared the OOS paperwork, and inattention to detail by another licensed reactor operator and a senior reactor operator (SRO) who both reviewed the paperwork.

Corrective actions for this problem included counseling of the operators, presenting training on the problem to all licensed and non-licensed operators during routine training, and emphasizing to operations shift management that important tasks should be assigned only after due consideration of potential human factors limitations, such as perceived task time constraints, operator familiarity with the task, and how many hours an operator may have worked recently. In addition, the licensee temporarily assigned an extra SRO to review OOS paperwork. Finally, the licensee performed a random check on 10 additional OOSs to verify correctness. The inspectors concluded that the licensee's root cause investigation of this event was well done and the corrective actions appeared good.

The failure of the SRO to verify that the proper components were listed on the paperwork is contrary to BwAP 330-1, "Station Equipment Out-of-Service Procedure," and another example of a violation of TS 6.8, "Procedures and Programs;" however, this licensee-identified and corrected violation is being treated as a Non-Cited Violation, consistent with Section VII of the NRC Enforcement Policy.

2.0 MAINTENANCE

NRC Inspection Procedures 62703 and 61726 were used to perform an inspection of maintenance and testing activities.

2.1 General Maintenance Observations The inspectors observed workers replacing rigid small bore piping with flexible hosing on a diesel generator. The maintenance activities were conducted using the instruction provided in the work packages and the workers were using good maintenance practices. The supervisor was present for portions of the work. The inspectors noted maintenance was conducted in an appropriate manner.

The inspectors also observed a worker replacing the pump on the OPR09J, component cooling water heat exchanger outlet process radiation monitor. The station has had a long standing problem with the sample pumps on the process radiation monitor skids failing. The pump replacement was an ongoing activity to replace the pumps with a different model pump to correct the problems. The worker was using the procedure and was using good work practices.

2.2 Unit 1A Component Cooling Water Pump Breaker Failure On November 18, equipment operators had difficulty racking in the 1A component cooling water pump breaker after a surveillance and it was removed from the cubicle for examination. Subsequently, the licensee identified one of the six rosettes had fallen off a contact and one more was misaligned. The cause was attributed to the rosettes catching on a faulty safety door in the cubicle. The licensee checked other breaker cubicles where breakers were racked out and an additional three problems were found with sticking shutter doors. The licensee functionally tested all breakers inspected. Sticking shutter doors had no effect on breakers that were previously racked-in. The inspectors observed the troubleshooting efforts and reviewed the licensee's corrective actions. The licensee planned to inspect breakers of other equipment when taken out-of-service for planned maintenance during normal maintenance windows. The inspectors concluded that licensee actions to inspect other breaker cubicles and functionally test the breakers after racking them in were good. The door and the breaker were repaired. This problem, along with other problems with 480-volt breakers, was being addressed by the licensee as part of its corrective action for a recent problem with a diesel generator breaker (Inspection Report 95016).

2.3 Unauthorized Alteration of the Hydrogen Monitor System On December 28, prompted by an unrelated problem with hydrogen monitors at another plant, the licensee identified a tee-connector installed on the 0.25-inch calibration tubing in 3 of 4 hydrogen monitor panels. The licensee indicated that the connector was an unauthorized alteration of the system to aid instrument maintenance (IM) personnel in calibrating the monitors. The licensee determined that the alteration did not render the monitors inoperable, but could not determine how long the connectors had been installed. The inspectors concluded that the tee-connectors had no effect on the hydrogen monitors. The connectors were subsequently removed and IM personnel were counseled on the need to not alter plant systems without authorization. The unauthorized installation of the tee-connectors was contrary to procedure BwAP 2321-18, "Temporary Alterations," and another example of a violation of TS 6.8, "Procedures and Programs"; however, this violation was of minor significance and is being treated as a Non-Cited Violation, consistent with Section IV of the NRC Enforcement Policy.

2.4 1A Centrifugal Charging Pump Seal Leak On November 25, with Unit 1 in Mode 4, the inspectors identified an active leak on the 1A centrifugal charging (CV) pump inboard seal. This seal had been replaced recently due to excessive leakage.

In response to this finding, the licensee started the pump to determine if the leakage would subside, however, the leakage increased significantly. The pump was then secured.

Subsequently, the maintenance department replaced the seal. However, when the seal was valved in, excessive leakage was again observed. The seal was then successfully replaced after a third attempt.

The inspectors reviewed the licensee's actions and root cause investigation in response to this event and identified the following issues:

Seal Installation Procedure Inadequacies Following the second replacement of the inboard seal, the licensee identified that the cause of the observed leakage was the failure to properly re-install access plugs removed to allow disassembly of the seal mating ring.

In addition, the licensee reviewed the seal replacement procedure BwMP 3100-024, "Removal/Inspection/Replacement of The Mechanical Seals In The Centrifugal Charging Pump," and identified that the procedure failed to include a step to re-install the access plugs, although a step existed to remove them.

The inspectors reviewed the licensee's findings and concluded that although these seals had been repaired on numerous occasions in the past, maintenance workers had not identified this problem or requested that the procedure be revised to include a step to re-install the access plugs.

The inspectors reviewed the licensee's corrective actions which included a revision to the maintenance procedure and training of maintenance workers and concluded the actions were adequate to prevent recurrence.

10 CFR 50, Appendix B, Criterion V, required that activities affecting quality be prescribed by documented procedures of a type appropriate to the circumstances. The problem as described above is an example where this requirement was not met. However, this licensee-identified and corrected violation is being treated as a Non-Cited Violation, consistent with Section VII of the NRC Enforcement Policy.

Troubleshooting Weakness During the seal replacement after the leak had been identified, the seal was removed without taking as found data. The inspectors concluded that a troubleshooting weakness existed since recording as found data during disassembly of the seal could have aided in a root cause determination.

2.5 1B Auxiliary Feedwater (AFW) Pump Overspeed Trip Failures On November 3, the maintenance department replaced the 1B AFW pump tachometer drive shaft which was previously identified as cracked (Inspection Report 95009). This shaft drives a magnetic speed pickup device which provides a signal into a local speed indicator and an overspeed trip device.

On November 22, the licensee conducted a post-maintenance overspeed trip surveillance which failed. During the initial troubleshooting, efforts were concentrated on the replacement of electrical components, without adequate consideration of the drive shaft, which was the only component replaced. As a result, the licensee needed an extensive period of time to identify the problem, which was due to a material defect in the drive shaft. Subsequently, the drive shaft was modified to correct the defect and the overspeed trip testing was successfully completed.

The inspectors concluded that the troubleshooting efforts were initially weak since components replaced during the outage were initially discounted as the source of the problem.

2.6 Source Range Nuclear Instrument (SRNI) Maintenance On December 4, the inspectors attended several status and planning meetings for troubleshooting noise on the N-31 SRNI. The inspectors observed at the meetings that the licensee was unclear as to what troubleshooting information had already been obtained and what information still needed to be gathered. The inspectors concluded that there had been little coordination of troubleshooting activities conducted over the previous two days, a weekend. The noise developed around November 21, when two of the four reactor coolant pumps were started as part of coolant system heatup coming out of the outage.

On December 5, the inspectors observed IM personnel replace and insulate a cable located between the containment penetration and the SRNI pre-amplifier utilizing BwHP 4006-008, "WCSF-N Sleeve Installation for In-Line Butt Splice Crimped Connections." During the replacement, the inspectors identified numerous examples where the procedure was incorrect for the application. As a result, numerous procedural steps were not performed. Examples included:

- The method to determine the length of insulation to be applied was not in accordance with the procedure.
- The sealing sleeve was not marked with tape.
- Dimensions concerning orientation of the shims and sealing sheath were not recorded.

The inspectors reviewed the work performed with licensee maintenance management and determined that the procedural inadequacies and failure to perform certain steps had no effect on the final results.

Inadequate procedures and procedure adherence problems have been identified and documented in previous inspection reports. The inspectors concluded that the event described above was another example of this problem.

10 CFR 50, Appendix B, Criterion V, requires that activities affecting quality be prescribed by procedures appropriate to the circumstances. The inspectors concluded that contrary to this requirement, BwHP 4006-008 was inadequate. However, this violation was of minor significance and is being treated as a Non-Cited Violation, consistent with Section IV of the NRC Enforcement Policy.

On December 7, in the main control room, the inspectors observed a system engineer identify that indicated counts on the N-31 SRNI had unexpectedly dropped from the previous value. Followup by the licensee determined that the drop occurred about 45 minutes earlier when an oscilloscope was connected to N-31 components in a back panel as part of the noise investigation. The scope was disconnected and counts returned to the previous value. The IM supervisor involved with connecting the scope stated he thought the scope would not affect the indicated counts. The lack of a channel check after connecting the scope was an example of poor troubleshooting. As of the end of the inspection period, the licensee was still investigating the noise.

2.7 Debris Control Near System and Auxiliary Transformers The inspectors concluded that the licensee poorly controlled debris generated from turbine and service building roof repairs. The problem involved outdoor transformers and had the potential to disturb the station's electrical distribution system. The licensee indicated that in both instances the material originated from repair work on the roofs. On November 30, a large piece of plastic was removed from one of the 345 kilovolt (kv) lines and the insulator of another line on a Unit 1 System Auxiliary Transformer. On December 6, a piece of metal was removed from on top of a Unit 2 Unit Auxiliary Transformer and insulation was removed from between the associated 4.16 kv and 6.9 kv busses.

2.8 General Surveillance Observations The inspectors observed portions of a surveillance of the DRPI system in the control room. The surveillance was performed by reactor operators with assistance of two system engineers. The inspectors noted that the surveillance was performed according to procedure and the workers performing the surveillance were knowledgeable of the evolution. The procedure met TS-requirements and the required approvals had been obtained prior to beginning the surveillance.

The inspectors observed portions of a VOTES (Valve Operation Test and Evaluation System) testing of 1SX001B, the Essential Service Water pump discharge valve, in the auxiliary building. The engineer and two electricians performing the task seemed knowledgeable of the test and were using the test procedure. Proper approvals had been obtained prior to beginning the testing.

Operations and system engineering personnel were observed performing procedure 1BwVS 7.1.2.3.C-1, "Unit One Auxiliary Feedwater Diesel Prime Mover Surveillance," in the control room and at the diesel-driven AFW pump. Operations demonstrated good procedure adherence practices. A procedure deviation form was necessary to complete the test due to a malfunctioning gauge on local panel. The test was delayed by operators until the form was completed. A good questioning attitude was demonstrated by the Equipment Operator. The EO questioned the test engineer regarding test specifics until the EO fully understood the test and was comfortable with running the diesel for the surveillance.

2.9 Cold Weather Preparations The inspector reviewed the completed surveillance OBOS XFT-A1, "Freezing Temperature Equipment Protection Annual Surveillance." The surveillance assured that exposed instrumentation and piping was protected from cold weather by verifying heat tracing was operational, thermostats were properly set, and heating circuits were energized. The surveillance indicated that, overall, the station was prepared for cold weather. Supporting this conclusion was the fact that no freeze-related problems occurred during the extreme cold weather the weekend of December 9.

2.10 Steam Generator Tube Eddy Current Testing Westinghouse Electric Corporation personnel performed full length eddy current testing (ECT) of 100 percent of the in-service steam generator tubes in the Unit 1 steam generators (SGs). All tubes with circumferentially oriented cracking were stabilized and plugged.

Identification of potentially significant growth of circumferential indications, in a relative short operating cycle, at the top of the tubesheet area was the basis for the licensee to reexamine the previous ECT data, from February 1995. The licensee identified an anomaly at the eighth support plate of SG-C. This ODSCC (outside diameter stress corrosion cracking) indication was confirmed to exist in the ECT data from previous outages and the pre-service examination of the SG tubes.

The licensee determined the failure to identify the one indication was due to analyst error. The inspectors reviewed the data and concluded that the one indication should have been identified as an circumferential indication.

The failure to identify the ODSCC circumferential indication in SG-C as a repairable defect during the February 1995 outage was a violation of TS 4.4.5.4.b, which required the plugging of all tubes which exceed the plugging limit or contain throughwall cracks. However, this violation was of minor significance and is being treated as a Non-Cited Violation, consistent with Section IV of the NRC Enforcement Policy.

2.11 Rod Control Testing on Unit 1 During Shutdown A series of problems with the Unit 1 rod control system occurred during the outage. The inspectors determined that all were of minor safety significance and corrective actions were adequate.

On November 17, during DRPI operability testing and with Unit 1 in Mode 5, rod K-14 did not move with the other rods in the bank. The reactor trip breakers were opened and all rods were reinserted into the core. The inspectors concluded that opening of the reactor trip breakers was conservative. The root cause was a blown fuse for a stationary gripper.

On December 7, with Unit 1 in Mode 3, four problems occurred and in each case the reactor trip breakers were conservatively opened by reactor operators. In the first instance, an alarm sensing card failed, while in the second instance, a dirty fuse or fuse holder was suspected of causing the problem. The licensee considered the subsequent two problems to be failures of test relays in the automatic rod drop testing circuitry. The licensee stated that this circuitry had not been tested prior to the rod drop test, but would be tested during a future outage.

On December 9, with Unit 1 in Mode 3, rod E-13 did not move with the other rods in the bank. The reactor trip breakers were not opened in this case, but all rods were reinserted into the core. The root cause was a blown fuse for a stationary gripper.

At separate times on December 10, with Unit 1 in Mode 2, two non-urgent alarms were received and control bank C did not move when motion was demanded in manual. The master controller was zeroed and then reset to actual rod position. Subsequently, rods moved as expected. The licensee attributed the root cause to a random, intermittent electronics problem.

2.12 Follow-Up on Non-Routine Events NRC Inspection Procedures 90712 and 92700 were used to perform a review of written report of a non-routine event.

(Closed) LER 50-456/95007, Revision 0: Inadequate Testing of Diesel Generator (DG) Voltage Regulator. On August 15, 1995, the licensee identified that post-maintenance testing for a 1A DG voltage regulator, that was replaced on July 13, 1988, was not adequate to verify that the regulator would respond in an emergency condition and that adequate testing was not conducted until October 1989.

The licensee determined the root cause was the failure of personnel to recognize the potential operability impact of voltage regulator replacements and, as a result, the post-maintenance testing inadequately verified the performance of the 1A DG in the emergency mode of operation.

As part of the corrective actions, the licensee conducted an extensive maintenance history review to identify additional problems and none were found. In addition, in the future, if DG voltage regulator maintenance occurs which affects the emergency mode of operation, the DG will be tested under transient loading conditions in the emergency operating mode.

The inspectors determined that the safety significance of the event was minimal since the voltage regulator successfully passed the emergency mode loading surveillance performed in October 1989. The inspectors reviewed the licensee's corrective actions and concluded they were adequate.

10 CFR 50, Appendix B, Criterion X, requires that all testing required to demonstrate that a system will perform satisfactorily in service is identified and performed in accordance with written test procedures which incorporate the requirements and acceptance limits contained in applicable design documents. The event as described above is an example where this requirement was not met. However, this licensee-identified and corrected violation is being treated as a Non-Cited Violation, consistent with Section VII of the NRC Enforcement Policy.

(Closed) LER 50-456/95008, Revision 0: Emergency Core Cooling System (ECCS) Differential Pressure Not Maintained. On August 18, 1995, a system engineer discovered that floor plugs above the 1B RH pump room had been removed in preparation for planned maintenance. As a result, differential pressure between the pump room and the outside atmosphere was estimated to be less than TS requirements until the auxiliary building equipment access door was closed.

A few hours later, a system engineer noted that differential pressure was again less than TS requirements due to a hose being run through an auxiliary building access doorway. The hose was removed, the door was closed, and differential pressure returned to within TS requirements.

In both cases, the licensee's Plant Barrier Impairment (PBI) program was not implemented which would have informed system engineering of the planned condition for approval. In addition to the licensee's immediate corrective actions which restored auxiliary building differential pressure to within TS requirements, the following actions were accomplished to prevent recurrence:

The licensee revised BwAP 1110-3, "Plant Barrier Impairment Program," to provide clearer descriptions of what constitutes a plant barrier. In addition, an attachment to the procedure was generated listing all ECCS equipment rooms which noted that any impairment to wall, floors, or ceilings, required a review by system engineering.

All ECCS equipment room doors and floor plugs were labeled to indicated that a PBI was required prior to impairing those access openings.

Training for all station personnel on the revised procedure was conducted.

The inspectors reviewed this event and determined that although the TS differential pressure requirements were not met, a negative differential pressure existed throughout the time that the auxiliary building doors were propped open. As a result, air flow was still from outside the auxiliary building to inside the auxiliary building.

TS 3.7.7 required that ECCS equipment room be maintained at a negative pressure of greater than or equal to 1/4 inch water gauge relative to the outside atmosphere. The condition of having the 1B RH pump room differential pressure less than 1/4 inch water gauge is a violation of this requirement. However, this licensee-identified and corrected violation is being treated as a Non-Cited Violation, consistent with Section VII of the NRC Enforcement Policy.

2.13 Follow-up on Previously Opened Items NRC Inspection Procedure 92902 was used to perform follow-up inspection of the following item:

(Closed) IFI 94022-05: Adverse Trend in Communications Between Maintenance and Operations. The inspectors observed numerous maintenance activities during the Unit 1 refueling outage and identified no significant communication weaknesses between the two departments. The inspectors concluded that communications between the two groups had improved.

(Closed) Violation 95005-04: Both Hydrogen Monitors Inoperable. As discussed in special Inspection Report 95004, upon discovery of disconnected hydrogen monitor sensing lines, the lines were reconnected and the operability of the hydrogen monitor was restored. In addition, the licensee performed the following corrective actions:

The Unit 1 and Unit 2 integrated leakrate test (ILRT) lineup and restoration sheets were revised to indicate the exact location at which disconnections and reconnections were to be performed.

A review of all ILRT lineup and restoration sheets was performed to ensure they contained adequate disconnection and reconnection location instructions.

The maintenance department developed a guideline for initiation of PIFs and trained workers on the guideline.

To improve performance and the safety culture, a set of standards for human performance were developed and presented to all station personnel.

During the inspection period, the inspectors observed portions of the Unit 1 ILRT and concluded that the corrective actions

described above were effectively implemented to prevent recurrence of the event.

(Closed) IFI 95008-02: Ineffective Maintenance Department Self-Assessments. As described in Inspection Report 95015, the licensee initiated a maintenance observation program with results documented in field observation reports and discussed weekly.

In addition, the maintenance department has begun reviewing work packages to identify and trend instances of repeat work, failed post-maintenance testing, and failed quality control checks. This information was also discussed during maintenance department meetings.

The inspectors concluded that both initiatives appeared to improve the maintenance department self-assessment process.

(Closed) IFI 95013-02: Shaft Runout Readings Out of Tolerance. The licensee was unable to determine when the 1B RH pump locknut became loose. The inspectors reviewed licensee efforts which included a review of previous work packages and discussions with the vendor and concluded that the effort was adequate.

3.0 ENGINEERING

NRC Inspection Procedure 37551 was used to perform an onsite inspection of the engineering function.

3.1 Previously Unknown Trip Function for the Steam Generator Power-Operated Relief Valves On December 26, during troubleshooting of steam leakage on the 2A steam generator power-operated relief valve (PORV), the licensee identified a previously unknown trip function that would prevent operators from opening or modulating closed PORVs from the control room and prevent the valves from automatically opening if steamline pressure exceeded the setpoint. The trip would still allow the PORVs to be closed if the control room switch was moved from the "auto" position to the "close" position. There was no main control room alarm or indicator of the tripped condition.

The issue was identified when the system engineer noticed a lit indicator light for a trip circuit in the control panel for the 2D PORV, located in the auxiliary electrical equipment room. The licensee was unsure how long the 2D PORV was in a tripped condition. According to a subsequent review of the vendor manual, the trip is actuated on high current for the DC motor that drives the PORV's hydraulic pump or on high temperature in the heat sink for the motor.

Corrective actions included posting instructions at the control panel for resetting the trip, informing reactor operators of the trip function, evaluating the effects of a trip on a steam generator tube

rupture accident scenario, checking for a trip indication on each PORV on a daily basis, evaluating the need to provide main control room indication of a trip, and determining the cause of the 2D PORV trip. The results of the last two actions, which were not complete at the end of the current inspection, are an inspection follow-up item (IFI 95017-05). The inspectors noted that problems with communications between operations and engineering resulted in a delay of several days before the trip circuits were checked on a daily basis.

The inspectors concluded that steamline overpressure protection was also provided by the five safety relief valves while operating with a PORV potentially unable to automatically open. In addition, a tripped PORV could be locally opened manually or the trip could be reset in the auxiliary electric equipment room which is adjacent to the control room.

3.2 Follow-up on Previously Opened Items NRC Inspection Procedure 92903 was used to perform follow-up inspection of the following item:

(Closed) IFI 95008-02: Both Trains of Containment Spray Chemical Additive Systems Inoperable. As described in Inspection Report 95008, the licensee determined that current licensing and design bases did not support the independence of the containment spray and spray additive system technical specifications. As a result, LER 50-456/95005 was generated and will be used to track this ongoing issue.

(Closed) Violation 95010-01: Control of Leak Detection Sumps and Floor Drains. As part of the immediate corrective actions, all leak detection sumps and drains, including the 1A RH room floor drain which was plugged with crystallized boric acid, were flushed. For long-term actions the licensee planned a surveillance to periodically verify that floor drains in the auxiliary building were clear and free flowing and a surveillance to periodically inspect and clean all leak detection sumps. These actions appeared adequate.

(Closed) IFI 95013-04: Capacity of Diesel Generator Jacket Water Standpipe Less than the Value Listed in the Updated Final Safety Analysis Report (UFSAR). From a review of other design basis documents, the licensee determined that the current, actual 420-gallon capacity of the standpipe was what was originally specified during design of the plant, and more than met jacket water requirements. The 590-gallon value listed in the UFSAR was the capacity of the standpipe offered by the diesel vendor for non-nuclear (non-seismic) applications. The licensee stated that the UFSAR would be revised to list the correct value. The inspectors concluded that the 420-gallon capacity was adequate.

4.0 PLANT SUPPORT

NRC Inspection Procedure 71750 was used to perform an inspection of Plant Support Activities.

4.1 Fire Protection In the evening of December 24, an equipment operator noticed a strong burning odor in the Unit 1 turbine building and identified the source as oil-soaked lagging on a feedwater heater extraction steam pipe. Operating personnel determined that with the reactor at 75% power and increasing, the temperature of the pipe would increase closer to the flash point of the oil. The oil leak was subsequently contained and the decision made to remove the lagging. An HLA was conducted because of the possibility of the oil igniting as the lagging was removed and more oxygen became available. The lagging was removed without incident and stored outdoors in an open area. A periodic firewatch was established and, approximately three hours after removal, on December 25, the lagging started on fire. The fire was quickly extinguished.

The inspectors determined through discussions with licensee personnel that the identification, assessment, and resolution of the fire hazard was excellent. The oil that soaked the lagging came from an inadequate cleanup of an oil spill on an upper elevation earlier that month.

4.2 Follow-up on Previously Opened Items NRC Inspection Procedure 92904 was used to perform follow-up inspection of the following item:

(Closed) Violation 94007-02: Transient Combustibles. The inspectors observed the licensee's control of transient combustibles during the Unit 1 refueling outage and concluded that corrective actions were effective.

5.0 MATERIAL CONDITION

The inspectors assessed the licensee's plans and progress toward long term material condition improvement.

5.1 Plans and Initiatives

Improvement Strategy Plan The material condition improvement strategy plan was assessed as adequate in Inspection Report 95013. The inspectors reevaluated the plan. Some longstanding equipment problems such as fuel pool cooling, 1A letdown, and 2B RH heat exchanger leakage were not addressed. The inspectors discussed the above problems with station management. These repairs were not yet scheduled, primarily because a satisfactory time and method of repair had not yet been determined. The inspectors again concluded that the plan was adequate.

Operator Workarounds Progress on operator workarounds had been slow. At the beginning of the inspection period there were less than 40

workarounds identified and few of those had a completed plan to fix the problem. However, 108 new workarounds were added to the list at the end of the inspection period. These new workarounds have not yet been assessed by the inspectors. Attendance at workaround committee meetings was poor due to the Unit 1 outage. Not all operators have been trained on the contents of the operator workaround list. The inspectors concluded that the operator workaround program was not yet effective.

Leak Repair Efforts Engineering designated a leak repair system engineer and created a leak repair committee. The purpose was to generate a single list of leaks in the plant and provide engineering assistance to maintenance to repair chronic leaks. These two goals have not yet been achieved. The single data base has not yet been generated and maintenance personnel were not made aware of the existence of the engineering assistance. The inspectors concluded that although this was an excellent initiative, the program was not yet effective.

Craft Skill Testing Maintenance performed basic skill testing of about 20 percent of the mechanical and electrical maintenance shops prior to the Unit 1 refueling outage A1R05. The results revealed skill weaknesses in such areas as valve packing, rigging, and bearing repair. The entire mechanical maintenance department was retrained in all three areas and the electrical maintenance shop was retrained on rigging and bearing repair. The licensee planned to continue the skill based testing. A formalized, ongoing basic skills testing program based on the job assignment matrix for each department was scheduled to be in place by January 2, 1996. The inspectors discussed the program with licensee management and concluded that this was an excellent initiative and appeared to be well implemented, however, not enough time had elapsed for the program to be completely effective.

5.2 Unit 1 Return To Service Material Condition Overall, the material condition of Unit 1 appeared to improve during the refueling outage. However, there were several problems that resulted in the delay of the Unit 1 startup from the outage.

Unit 1 Containment Tour The inspectors toured the Unit 1 containment on November 29. Overall, the containment was in good condition. There were several packing leaks, small amounts of tape and tools were found lying around, and several light bulbs were found burned out or broken. The inspectors identified a minor flange leak on the chemical volume control system that the licensee repaired prior to advancing to Mode 3.

Chemical Volume Control System Relief Valve This problem resulted in the spill of contaminated water and complicated pressure control while the Unit was solid (Section 1.8).

1A Component Cooling Water Pump Breaker This problem resulted in the delay of the mode change from 4 to 3 (Section 2.2).

1A Centrifugal Charging Pump The pump seal and rotating element was replaced during the outage and, upon return to service, the seal began to leak badly and had to be repaired (Section 2.4).

1B Auxiliary FeedWater Pump The pump repeatedly failed overspeed post maintenance testing that delayed Unit 1 startup for several days (Section 2.5).

Rod Control System Several problems occurred during rod control system testing that delayed completion (Section 2.11).

Bus 112 125-VDC Battery Charger Intermittent failure of the charger put the unit in a 24-hour limiting condition of operation shortly after startup. No root cause was found.

5.3 NRC Identification of Material Condition Problems The majority of obvious problems such as fluid leaks were identified by the licensee. However, the inspectors did observe and report to the licensee several (about 17) material condition problems that were not previously identified. Examples were a sticking startup rate meter in the Unit 1 control room, severe leakage from the 1A centrifugal charging pump seal, minor oil leakage from the 1A containment spray pump, and partial blockage of the 1B RH pump floor drain. The inspectors were concerned that these easily identified problems had not been previously identified.

5.4 Auxiliary Feedwater (AFW) System Walkdown The AFW System was walked down and system alignment was checked using BwOP AF-M1 and M2, "Operating Mechanical Lineup Unit 1" and "Operating Mechanical Lineup Unit 2." Overall, the AFW System appeared to be operating as designed with problems being identified and action requests written in a timely manner by operating and system engineering personnel. The AFW System had numerous leaks, missing pipe insulation, and valves difficult to operating. Unit 1 AFW system material condition was better than Unit 2.

Surveillance procedures reviewed were documented correctly and all acceptance criteria were satisfied. A discrepancy in locations for vibration monitoring points between the procedure and the points labeled on the pumps was identified. The System Engineer was notified of the discrepancy.

6.0 VIOLATIONS FOR WHICH A "NOTICE OF VIOLATION" WILL NOT BE ISSUED

The NRC uses the Notice of Violation as a standard method for formalizing the existence of a violation of a legally binding requirement. However, because the NRC wants to encourage and support licensee's initiatives for self-identification and correction of problems, the NRC will not generally issue a Notice of Violation for violations of a minor nature or a violation that meets the tests of the NRC Enforcement Policy. These tests are: 1) the violation was

identified by the licensee; 2) the violation would be categorized as Severity Level IV; 3) the violation will be corrected, including measures to prevent recurrence, within a reasonable time period; and 4) it was not a violation that could reasonably be expected to have been prevented by the licensee's corrective action for a previous violation. Violations of regulatory requirements identified during this inspection for which a Notice of Violation will not be issued are discussed in Sections 1.6, 1.11, 2.4, 2.6, 2.10, and 2.12

7.0 DEFINITIONS

7.1 Inspection Follow-Up Items Inspection Follow-up Items are matters which have been discussed with the licensee, which will be reviewed by the inspector and which involve some action on the part of the NRC or licensee or both. Inspection Follow-up Items disclosed during the inspection are discussed in Sections 1.5, 1.8, 1.9, and 3.1.

8.0 PERSONS CONTACTED AND MANAGEMENT MEETINGS

Systematic Assessment of Licensee Performance (SALP) Meeting On November 27 the Regional Administrator Mr. H. Miller and members of his staff, and the Director of Project Directorate 3 Mr. Robert Capra from NRR and members of his staff toured the plant and conducted interviews of ComEd personnel. On November 28 the above managers met with Unicom, Chief Executive Officer, Mr. J. O'Connor and ComEd Senior Vice President and Chief Nuclear Officer, Mr. M. Wallace and members of his staff to discuss the findings described in the SALP report.

Exit Meeting The inspectors contacted various licensee operations, maintenance, engineering, and plant support personnel throughout the inspection period. Senior personnel are listed below.

At the conclusion of the inspection on January 5, 1996, the inspectors met with licensee representatives (denoted by *) and summarized the scope and findings of the inspection activities. The licensee did not identify any of the documents or processes reviewed by the inspectors as proprietary.

*K. Kaup, Site Vice President
*T. Tulon, Station Manager
*R. Flessner, Site Quality Verification Director
*G. Groth, Maintenance Superintendent
*R. Byers, Work Control Superintendent
*D. Miller Technical Services Superintendent
*K. Bartes, Regulatory Assurance Supervisor
A. Checca, System Engineer Supervisor
*J. Meister, Engineering and Construction Manager
*D. Cooper, Operations Manager
C. Dunn, Site Quality Verification

*J. Lewand, Regulatory Assurance - NRC Coordinator
*H. Pontius, Nuclear Licensing Administrator
*J. Nalewajka, Integrated Analysis Administrator