U.S. NUCLEAR REGULATORY COMMISSION

REGION III

REPORT NO. 50-456/95015; 50-457/95015

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

October 1 through November 14, 1995

INSPECTORS

C. Phillips, Senior Resident Inspector
S. Ray, Acting Senior Resident Inspector
E. R. Duncan, Resident Inspector
M. A. Kunowski, Resident Inspector
J. Cameron, Radiation Specialist
Z. Falevits, Reactor Engineer
J. Lennartz, Reactor Operations Assessment Representative
J. Roman, Illinois Department of Nuclear Safety
T. Esper, Illinois Department of Nuclear Safety

APPROVED BY

Martin J. Farber, Chief
Reactor Projects Branch 4

12/8/95
Date

AREAS INSPECTED

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

RESULTS

Assessment of Performance

The following assessments are based on activities during this report period.

OPERATIONS

- During a unit 1 refueling outage, the licensee discovered that both diesels generators were inoperable for about 12 days due to a diesel generator output breaker not fully racked into the switchgear. This is the subject of a special inspection discussed in inspection report 50-456/95016.

- On October 6, an out-of-service for the 1B diesel generator was inadvertently written, approved, and hung on components associated with the 1A diesel generator. This is an Unresolved Item pending further review.

- During a unit 1 refueling outage, the licensee made an inappropriate decision to add chemicals at a time and location which rendered the 1A residual heat removal (RHR) pump inoperable.

- During a local leak rate test (LLRT), operations personnel failed to fully review the procedure and consider the effects of the steps to be performed. As a result, during restoration from the LLRT, about 500 gallons of reactor coolant was inadvertently drained from the reactor coolant system due to an inadequate procedure.

- The inspectors identified that handwheels used to manually operate the bridge crane were not tethered to prevent them from being accidentally dropped into the pool. This finding was an example of a violation of the licensee's foreign material exclusion requirements.

- Due to poor planning and poor material condition of the sodium hypochlorite system, the licensee failed to meet their Generic Letter 89-13 commitment.

MAINTENANCE

- The inspectors identified unattended clear plastic, yellow bags, and other loose debris within a few feet of the spent fuel pool. In addition, the inspectors identified that diesel generator fuel pump suction pipes were open and unattended, without foreign material exclusion (FME) barriers present. Both cases were examples of a violation of the licensee's FME requirements.

- During the inspection period, the licensee and the inspectors identified numerous mispositioned safety-related lube oil cooler end bells (heads) which isolated or significantly reduced cooling water flow. This is an Unresolved Item pending further NRC review.

ENGINEERING

- During the inspection period, the licensee identified four studs on a containment spray valve which had been degraded due to boric acid corrosion. In addition, the licensee determined that the body-to-bonnet studs were undertorqued due to inappropriate vendor manual specifications.

- On October 29, the licensee conducted a modified performance discharge test for the safety-related bus 112 dc battery. During the surveillance, expected battery capacity was not obtained. The licensee performed an operability determination and concluded that the battery was operable. This is an Inspection Follow-Up Item pending further NRC review.

- Engineering evaluation and proposed corrective actions to address refueling water storage tank level oscillations which occurred during a spent fuel pit heat exchanger draining evolution were good.

PLANT SUPPORT

- The licensee's as-low-as-reasonably-achievable (ALARA) planning and dose control for the unit 1 refueling outage were excellent.

- The licensee's contamination control efforts resulted in minimal personnel contamination incidents during the unit 1 refueling outage, none of which resulted in any radiological significant dose.

Summary of Open Items

Violations: Sections 1.6 and 2.1
Deviations: Section 1.7
Unresolved Items: Sections 1.4 and 2.3
Inspection Follow-Up Items: Sections 1.3, 2.5, 3.2, 4.2.1, and 4.2.2
Non-Cited Violations: Sections 1.4, 1.5, 1.9, and 2.1

INSPECTION DETAILS

1.0 OPERATIONS:

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

1.1 Shutdown for Refueling On September 30, unit 1 was shutdown for refueling outage A1RO5. Major activities planned for the outage included 1A and 1B diesel generator tear down inspections, steam generator eddy current inspections, loop bypass line removal modifications, and core refueling.

1.2 Diesel Generator Operability Problems From October 3 until October 19, there were no operable diesel generators for unit 1. The licensee determined that the 1B diesel generator output breaker had not been fully racked in since October 2 following a safety injection surveillance. On October 3, with unit 1 in Mode 5, the 1A diesel generator (DG) was taken out of service for scheduled maintenance. On October 19, the 1B DG output breaker failed to close during the monthly surveillance. Troubleshooting efforts revealed the output breaker was not fully racked into the switchgear which rendered the diesel generator inoperable. The breaker was subsequently racked in and the surveillance was accomplished successfully. This event is the subject of a special inspection documented in report 50-456/95016.

1.3 Diesel Generator Out-of-Service Error On November 6 with unit 1 in Mode 5, post-maintenance testing was in progress on the 1B diesel generator. The 1A diesel generator was operable to meet TS requirements.

Due to problems encountered during the testing of the 1B diesel generator, operations created additional out-of-service tags to de-energize equipment for further troubleshooting. However, the out-of-service tags were written, approved, and hung on the 1A diesel generator, rendering both diesel generators inoperable. The condition was identified and corrected within a short period of time after it occurred; no technical specification violation occurred. This is an Inspection Follow-Up Item (95015-01) pending further NRC review.

1.4 Source Range Nuclear Instrument Replacement On September 30, unit 1 entered Mode 3 in preparation for refueling. At that time, the licensee entered TS 3.3.1 for an inoperable source range nuclear instrument (SRNI). The action statement for this TS limiting condition for operation (LCO) required that the detector be restored to operable status within 48 hours or within the next hour open the reactor trip breakers, suspend all operations involving positive reactivity changes, and verify that all boron dilution protection system (BDPS) valves are closed. During the SRNI replacement and testing the following issues were encountered:

Safety Component Made Inoperable to Meet Schedule On October 1, the licensee added hydrogen peroxide to the reactor coolant system to create a crudburst. However, due to the inoperable SRNI, the normal addition path was not available to meet TS requirements. As a result, the licensee chose to add the hydrogen peroxide through the pump casing of the 1A residual heat removal (RHR) pump. In order to add the chemicals in this manner the 1A RHR pump was placed in pull-to-lock which rendered the A train inoperable.

The inspectors reviewed the licensee's actions and concluded that although TS action requirements were met, the decision itself was inappropriate since the RHR system was an important back-up source of core decay heat removal.

Positive Reactivity Controls The licensee identified two events which caused positive reactivity additions in violation of TS 3.3.1.

On October 4, a reactor coolant pump was started and secured for crudburst control. As a result, temperature oscillations of up to 5 degrees below the initial reactor coolant system (RCS) temperature occurred, resulting in a positive reactivity addition in violation of TS requirements. On October 5, makeup from the RWST was at a slightly lower boron concentration than the RCS which also resulted in a positive reactivity addition in violation of TS requirements. This is an Unresolved Item (95015-02) pending further NRC review.

Boron Dilution Protection System Valve Configuration Control In addition to TS 3.3.1 described above, the licensee also entered TS 3.1.2.7 for the boron dilution protection system (BDPS). This TS required that the boron dilution protection valves remain closed except when required to be open to support plant evolutions. This exception to allow opening the valves to support plant evolutions was not written in TS 3.3.1.

On October 2, operators commenced additional boration of the RCS for refueling utilizing the BDPS valves as allowed by TS 3.1.2.7. However, the operators failed to consider TS 3.3.1 which did not provide for the support of this evolution. As a result, a violation of TS 3.3.1 occurred.

The licensee conducted an investigation for this event and determined that the root cause was an inadequate surveillance procedure and a personnel error. The surveillance used to verify that the BDPS valves were closed and secured contained a step in the acceptance criteria which allowed the valves to be opened to support plant evolutions, although this exception was not written in TS 3.3.1. In addition, operators failed to verify that the surveillance met all TS requirements, including TS 3.3.1.

As part of the licensee's immediate corrective actions, all BDPS valves were closed and the surveillance procedure was revised to clarify TS 3.3.1 requirements. The planned long term corrective action was to

revise TS 3.3.1 to be consistent with TS 3.1.2.7 to allow BDPS valves to be opened to support plant evolutions.

The inspectors reviewed this event and have no further questions. Boration of the RCS utilizing BDPS valves was in violation of TS 3.3.1. However, this licensee-identified and corrected violation is being treated as a Non-Cited Violation, consistent with Section VII of the NRC Enforcement Policy.

1.5 Inadvertent Loss of Reactor Coolant On October 5, with unit 1 shutdown for refueling, a containment penetration local leak rate test (LLRT) was performed. During restoration from the LLRT, about 500 gallons of reactor coolant was inadvertently drained from the reactor coolant system (RCS).

The licensee performed a root cause investigation and determined that the cause of the event was an inadequate LLRT procedure. Specifically, the procedure incorrectly directed that the normal flow path be re-established prior to isolating the drain path. As a result, when the flow path was re-established, coolant was lost through an open drain valve. In addition, the licensee performed a procedure review and identified two additional procedures with similar problems.

The inspectors reviewed this event and concluded that although the LLRT procedure was inadequate, operations personnel failed to fully review the procedure and consider the effects of the steps to be performed. 10 CFR 50, Appendix B, Criterion V, requires that activities affecting quality be prescribed by procedures that are appropriate for the circumstances. The events as described above was a violation of that 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.

1.6 Refueling Observations On October 26, the inspectors observed core refueling activities. Overall, work was accomplished in a safe and professional manner and in accordance with the licensee's procedures.

The inspectors noted one problem in the control of material around the refueling cavity. Specifically, the inspectors identified that handwheels used to manually operate the bridge crane were not tethered to prevent them from being accidentally dropped into the pool. BwAP 100-21, "Foreign Material Exclusion," requires that lanyards be used to prevent losing items into systems such as the reactor vessel cavity. The events as described above were examples of a violation of that requirement (95015-02).

1.7 Failure to Meet Hypochlorite Injection Commitment On October 27, 1994, in response to Generic Letter 89-13, "Service Water system Problems Affecting Safety-Related Equipment," the licensee committed to continuous injection of sodium hypochlorite into the essential service water (SX) system for a five-week period as the cooling lake

transitioned through 65 degrees Fahrenheit. This was to ensure that no shelled mollusks would become permanently established in the SX system.

On October 12, 1995, the licensee lined up the chemical feed (CF) system and commenced continuous hypochlorite injection into the SX system. The CF system utilized a temporary hypochlorite tank and an air-driven transfer pump. The following problems were encountered which resulted in the failure to meet the above commitment:

- On two separate occasions, the hypochlorite tank was exhausted with no replenishment source on site. Licensee personnel were not adequately focused on maintaining adequate hypochlorite level in the supply tank.

- In addition, on one occasion, the air-driven transfer pump failed and a replacement pump was not available for about 1 day because the spare pump had been shipped offsite for storage. Upon further review, the inspectors determined that this pump had failed on numerous occasions in the past. Therefore, the inspectors concluded that the lack of an onsite replacement pump was an example of poor control of spare equipment.

As described above, Braidwood Station response to GL 89-13 included a commitment to continuously inject sodium hypochlorite into the SX system as the cooling lake transitioned through 65 degrees fahrenheit. However, the events as described above were an example where that commitment was not met. The failure to meet this commitment is a deviation (95015-03).

1.8 Procedure Review and Questioning Attitude During reactor coolant system draining activities on unit 1 and prior to a monthly control rod drive surveillance on unit 2, the inspectors observed examples of good procedure review and questioning attitude by two reactor operators. Management aggressively responded to the questions and in the case of the surveillance, a permanent procedure change was made.

1.9 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) LER 50-456/95010, Revision 0: Inadequate Surveillance Procedure. On August 24, the licensee identified that a TS surveillance, which verified the position of mechanical stops on safety injection system throttle valves, was inadequate. Specifically, a portion of the surveillance prescribed incorrect throttle valve positions for manipulated throttle valves.

The licensee determined that although the procedure had been incorrectly revised in March 1993, no throttle valve had been manipulated nor placed in an incorrect position.

As part of the licensee's corrective actions, the procedure was revised to correctly reflect the required throttle valve positions. In addition, similar surveillances were reviewed and verified to be satisfactory. This LER is closed.

10 CFR 50, Appendix B, Criterion V, required that activities affecting quality be prescribed by procedures appropriate for the circumstances. The events as described above did not meet this requirement and is a violation. 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 50-456/95009, Revision 0: Missed Control Room Ventilation LCO Due to Personnel Error and Equipment Failure. This event was discussed in inspection report 95013. A notice of violation was issued for the failure to meet technical specification action requirements for an inoperable radiation monitor. This LER is closed.

(Closed) LER 50-456/95006, Revision 0: Missed Control Room Ventilation LCO Due to Procedure Deficiency and Personnel Error. The details of this event are discussed in inspection report 95010. A similar event occurred again and is discussed in LER 95009 and in inspection report 95013 for which a notice of violation was issued. This LER is closed.

(Closed) LER 50-457/95006, Revision 0: Failure to Perform Axial Flux Difference Surveillance Due to Personnel Error. On August 22, the unit 2 process computer malfunctioned, which rendered the axial flux difference (AFD) alarm inoperable. An AFD surveillance was initiated as required by TS. Later that day, the computer was restored and the AFD surveillance was terminated. Subsequently, the licensee discovered that the AFD alarm setpoints had not been re-entered when the process computer was restored and, as a result, TS surveillance requirements were not met.

The licensee determined that the root cause of the event was an inadequate computer re-start procedure which did not re-enter the alarm setpoints during a computer re-start. In addition, the licensee determined that AFD limits were not exceeded during the period the AFD alarm was inoperable.

As part of the licensee's immediate corrective actions, the AFD surveillance was initiated. The licensee subsequently entered the alarm setpoints into the process computer and the TS surveillance was terminated. As part of the licensee's long term corrective actions, both unit 1 and unit 2 re-start procedures were revised to re-enter AFD alarm setpoints. This LER is closed.

Technical Specification surveillance requirement 4.2.1.1 requires that with the AFD monitor alarm inoperable, the licensee monitor and log indicated AFD. The events as described above are an example where this requirement was not met and is a violation. 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 50-456/95011, Revision 0: Boron Dilution Protection Valve Opened in Mode 5 and One Source Range Nuclear Instrument Inoperable. This event is discussed in section 1.4 for which a Non-Cited Violation was issued. This LER is closed.

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

(Closed) Violation 94026-01: Failure to Follow Procedures. The inspectors reviewed the licensee's actions for this violation which included a clarification and revision of the requirements of BwAP 100-20, "Procedure Use and Adherence." In addition, the licensee trained all personnel on proper procedure adherence in accordance with the revised BwAP 100-20. The inspectors concluded that the licensee's response to this violation was adequate. This violation is closed.

2.0 MAINTENANCE

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

2.1 Foreign Material Exclusion (FME) Control Weaknesses The inspectors reviewed the licensee's FME program and concluded that although FME practices were adequate in most cases, some weaknesses existed. The following specific issues were identified:

Spent Fuel Pool Observations On October 4, the inspectors identified unattended clear plastic, yellow bags, and other loose debris within a few feet of the spent fuel pool. The inspectors brought these FME concerns to the licensee's attention and the material was immediately removed.

BwAP 100-21, "Foreign Material Exclusion," requires that clear plastics not be present in the spent fuel pool area due to the difficulty in identification of clear plastic in water and the potential component fouling which could occur. The events as described above is an example of a violation of 10 CFR 50, Appendix B, Criterion V (95015-04).

Diesel Generator Maintenance Observations The inspectors observed FME controls during the 1A and 1B diesel generator tear down inspections. Although FME controls were used extensively during the work, there were occasions in which lapses occurred. For example, on October 16, the inspectors identified that during fuel pump maintenance, pump suction pipe openings were left unattended without FME barriers present.

In each case, the inspectors discussed FME controls with the cognizant supervisor who immediately corrected the situation. However, the inspectors concluded that FME controls required additional management attention.

BwAP 100-21, "Foreign Material Exclusion," required that process line openings be protected from foreign material intrusion. The events as described above is an example of a violation of 10 CFR 50, Appendix B, Criterion V (95015-04).

1A Steam Generator Inspection Observations During eddy current testing of the 1A steam generator, the licensee identified a foreign object in the bottom of the generator on the tubesheet. Due the location, the FME could not be identified or removed. The licensee performed an evaluation and concluded that the steam generator could be safely operated with the FME in place.

1A Centrifugal Charging (CV) Pump Maintenance On October 22, during a post-maintenance surveillance, the licensee identified that the 1A CV pump cubicle cooler fans were energized with herculite (a plastic material) packed inside the fan housings. The upper fan was stopped and appeared jammed with the material, while the lower fan was running. It appeared that the lower fan had chopped up the herculite in its housing since small pieces were found around the pump room. In response to this condition, the licensee replaced the upper fan.

The inspectors followed up on this event and determined that the herculite was originally placed in the housing as an FME barrier against water being used to support hydroblasting work. However, due to poor control of the maintenance, the herculite was not removed following completion of the work. Subsequently, when the pump was started, the herculite became FME and was drawn into the fan.

The inspectors concluded that proper controls for FME should have included the herculite material used to prevent foreign material from entering the cubicle cooler.

BwAP 100-21, "Foreign Material Exclusion," requires that following maintenance, a post-maintenance inspection is conducted to ensure FME devices are removed. The events 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.

2.2 Reactor Coolant System (RCS) Bypass Line Removal Modification During the inspection period the licensee performed the resistance temperature detector (RTD) bypass line modification. The modification removed the RCS loop bypass lines and valve manifold arrangements used to measure RCS loop temperatures and replaced them with fast-acting RTDs inserted directly into the RCS hot leg and cold legs.

The modification was performed satisfactorily and all post-maintenance testing was acceptable. Information concerning accumulated dose and other ALARA concerns pertaining to the modification are discussed in section 4.1.

2.3 Safety-Related Lube Oil Cooler Head Positioning Errors On October 6, during a routine lube oil cooler inspection, maintenance workers identified that the 1A essential service water (SX) pump lube oil cooler return head was rotated 90 degrees from its required position, which isolated all SX flow through the cooler. Subsequently, the workers identified that the 2A SX lube oil cooler head was also mispositioned. On October 10, the inspectors were informed of the event and independently identified that the 2A safety injection (SI) pump lube oil cooler and the 1B centrifugal charging (CV) pump lube oil cooler also had heads rotated 90 degrees. Subsequently, the licensee identified that the 2B auxiliary feedwater (AF) pump lube oil cooler head was also incorrectly positioned. This is an Unresolved Item (95015-04) pending further NRC review.

2.4 Steam Generator Inspection Results During the unit 1 refueling outage the licensee performed 100 percent eddy current inspections on all four Westinghouse D-4 steam generators. These generators are scheduled for replacement in September 1998. In addition, on November 13 the licensee was granted an amendment which revised the tube plugging criteria from a 1 volt eddy current amplitude to a 3 volt amplitude. Following the inspections, the licensee identified one tube which exceeded the new 3 volt criteria. Additionally, the licensee identified and plugged 25 tubes with circumferential cracks.

2.5 1A Diesel Generator 10-Year Inspection The inspectors reviewed maintenance and engineering activities associated with the 10-year inspection of the 1A diesel generator (DG). The inspection included completion of a modification to remove the lower oil scraper rings and end caps from the DG pistons. These components had been implicated in development of hot spots resulting in localized removal of the cylinder tin layer.

The inspectors concluded that, overall, maintenance work and engineering support went well. Good oversight by station management and the site quality verification and quality control groups was also evident.

There were, however, several problems associated with the work, some of which contributed to a delay in the return of the DG to service by about 6 days. These problems included the need to repair erosion (from essential service water flow) of the divider plates in the jacket water coolers, delays in completion of a fire protection surveillance in the 1A DG room, initial lack of acceptance criteria for eddy current testing of jacket water cooler tubes, repair of a jacket water cooler tube bundle gasket, delay in obtaining lube and fuel oil, and inadequate engineering support for the replacement of hard pipe lube oil lines from the cylinder head to the fuel pump pedestal with flexible hoses.

1B Diesel Generator 18-Month Inspection The inspectors also reviewed activities associated with the 18-month inspection of the 1B DG. Included in this work was replacement of 8 pistons and completion of the modification to remove the lower oil scraper rings and piston end caps. As with work on the 1A DG, overall

engineering support and maintenance activities were well executed. Good management and quality group oversight was observed.

Some delay in returning the DG to service occurred because of problems with cam cover gaskets, exhaust silencer rupture discs, and the failure of the electro-hydraulic governor (which had not been worked during the 18-month inspection) during post-maintenance testing of the DG.

During troubleshooting of the governor, the licensee identified rust and excessive wear on the governor drive connection. During manufacture of the governor drive pedestal, a sleeve was installed to compensate for an overboring of an opening in the pedestal; however, an oil hole in the sleeve was not drilled out to allow normal oil flow. The licensee determined that a similar problem did not exist on the 1B DG overspeed governor and stated that the two governors on the 1A DG would be checked before the end of the current outage. The governors on the unit 2 DGs are scheduled to be inspected during the spring 1996 refueling outage. The DG vendor was checking records to determine if additional pedestals with the sleeves had been distributed. The results of that review is an Inspector Follow-up Item (95015-06). The inspectors noted good efforts by maintenance supervisors and system engineers and their managers during the governor troubleshooting.

2.6 Field Observation Reports Late in September, the maintenance department initiated a management walkdown program. The program involved daily plant tours by the three master mechanics and the maintenance department superintendent. The walkdown results were documented in Field Observation Reports. The program was intended to help better define the worker skill problem (Inspection Report No. 95009) and to re-enforce station expectations in industrial safety, radiation protection, and procedural adherence. Problem Identification Forms (PIFs) were generated as necessary and all results, even those not warranting a PIF, were tabulated and evaluated. The results of the walkdowns are discussed in the weekly maintenance management meetings. The walkdown program appeared to be a good initiative.

2.7 Maintenance Department Performance Trending The maintenance department has been reviewing work packages monthly since July to identify and trend instances of repeat work, failed post-maintenance verification and testing, and failed quality control checks. This information was discussed at monthly maintenance department meetings. The performance trending program appeared to be a good initiative.

2.8 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 50-457/95005, Revision 0: Control Rod Bank Failed to Withdraw During Surveillance. On August 4, during a unit 2 routine monthly rod control surveillance, operators were unable to withdraw

shutdown bank "E" following insertion from 231 steps to 215 steps. During troubleshooting efforts, maintenance workers identified a defective withdrawal relay associated with the rod bank. This relay was replaced and shutdown bank "E" was restored to fully withdrawn position. The surveillance was completed without any further complications. This LER is closed.

3.0 ENGINEERING

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

3.1 Boric Acid Buildup on Safety-Related Components As documented in Inspection Report 95010, the inspectors identified that a 14-inch valve, 1CS001B, had large boric acid crystal deposits at the body-to-bonnet connections around the carbon steel nuts and bolts. In that report, the inspectors also determined that the licensee performed only a visual inspection of bolt and nut surfaces to resolve boric acid corrosion concerns. The inspectors concluded that this was ineffective since threaded areas were not visible for inspection.

During this inspection period, the licensee performed maintenance on 1CS001B and identified four studs which had been degraded due to boric acid corrosion. In the future, the licensee plans to perform additional inspections on other potentially affected components.

In addition, the licensee contacted the vendor and determined that the body-to-bonnet studs on the CS001 valves were undertorqued due to inappropriate vendor manual specifications. As a result, the licensee concluded that the compressive stresses on the gasket were not adequate to prevent leakage. The inspectors concluded that the engineering effort to resolve this issue was excellent.

3.2 Safety-Related Battery 112 Testing Results On October 29, the licensee conducted a modified performance discharge test for the safety-related bus 112 DC battery. This test was performed to satisfy industry recommendations since a new battery had been installed within the last 2 years. Expected capacity was not achieved during the performance of this test nor did the results of the test meet TS acceptance criteria. The licensee performed an operability determination and concluded that the battery was operable.

The licensee reviewed the modified performance test results and concluded that the less than anticipated capacity was the result of the manufacturer's pre-test recommendations not being met. Specifically, the vendor recommends that prior to a discharge capacity test, the battery should be on a float discharge for at least 30 days without a boost charge and without a battery discharge exceeding 30 minutes. However, about 6 days prior to the test, the battery was discharged for about 2 hours.

Due to the inability to meet the initial requirements of a modified performance discharge test, the licensee successfully completed a service test to satisfy TS requirements of performing a battery discharge test every 18 months.

In order to demonstrate that the capacity of the battery had been fully restored, the licensee planned the following:

- single cell modified performance discharge tests on representative cells of battery 112 following a minimum of 30 days on continuous float charge will be performed.
- battery 112 impedance measurements will be periodically recorded and trended.
- a modified performance discharge test will be performed during the next available outage of sufficient duration.

The inspectors reviewed the licensee's operability determination and compensatory actions and have no further questions. The completion and review of a successful modified performance discharge test is an Inspection Follow-Up Item (95015-07).

3.3 RWST Level Detector Operability On August 13, during draining of the spent fuel pit heat exchanger to the recycle hold up tank, operators noted a 3 percent oscillation in the indicated refueling water storage tank level on all four channels. The drain evolution was secured pending a resolution of the level oscillation.

Operators reviewed the applicable drawings and determined that the root cause for the level oscillation was backleakage of water through a check valve into the reference legs of the four RWST level detectors which occurred during the heat exchanger draining. The reference legs were subsequently drained and level indicated correctly.

System engineering reviewed the system design and verified the operators' conclusions. In addition, the system engineer identified additional sources of water from various safety-related pump relief valves and the RWST leak detection system which could also leak past the check valve and result in erroneous level indication.

In response to this event, a temporary alteration was designed for both units to isolate the potential sources of backleakage from the RWST reference legs. In addition, operators were briefed on this event and provided guidance in the event of recurrence. As a long term corrective action, the licensee planned a modification to ensure backleakage will not occur.

The inspectors reviewed this event and the licensee's corrective actions and concluded that the immediate actions and long term plans to resolve this issue were good.

4.0 PLANT SUPPORT

NRC Inspection Procedures 71750 and 83750 were used to perform an inspection of Plant Support Activities.

4.1 Occupational Radiation Exposure

4.1.1 Maintaining Occupational Exposure ALARA The licensee's efforts at maintaining occupational exposure ALARA during the unit 1 refueling outage were excellent. As of November 6, the outage dose was 174 person-rem versus an outage goal of 236 person-rem. The licensee's dose goal for calendar year 1995 was 260 person-rem, and the licensee is striving to achieve a calendar year dose of less than 226 person-rem. That dose would be the lowest outage year dose of record for Braidwood. The outage job with the highest contribution to the outage dose was the unit 1 resistance temperature detector (RTD) bypass elimination modification project. The licensee's pre-outage ALARA goal for the modification was 78 person-rem. The licensee completed the job with approximately 53 person-rem, an industry record for lowest dose for a first attempt of that particular modification. The licensee plans to perform the RTD Bypass elimination modification on unit 2 during the outage in the spring of 1996.

4.1.2 Control of Radioactive Materials and Contamination, Surveys and Monitoring The licensee's control of contamination during the outage was good. There were no personnel contamination incidents that resulted in any radiologically significant dose. However, the licensee discovered a problem during the outage with rain water traversing a contaminated area. This problem is described in section 4.2.1.

4.1.3 High Radiation Area Boundary Controls During the early stages of the outage, the licensee experienced problems with the control of several high radiation area boundaries. The problems included:

- failure to properly post two accesses to the unit 1 containment as high radiation areas;
- propping open the doors to two high radiation areas without making the postings on the back of the doors visible and without providing a second access controlling measure to an area with radiation levels in excess of 1 rem per hour (1 rem/hr) (0.01 Sv/hr); and
- an example of an individual inadvertently bypassing hi-hi radiation area access requirements.

None of the instances resulted in any radiologically significant dose to station personnel or in any inadvertent entrances to high radiation areas. The licensee appropriately corrected each identified instance and issued a reminder to all station personnel to heighten awareness of high radiation area boundary control requirements. Those measures

appeared to prevent recurrence of the boundary control problems. The inspectors had no further questions regarding this issue.

4.1.4 Radiation Worker (Rad-Worker) Performance During the review of outage activities, the inspectors observed several instances of poor rad-worker performance in the radiologically controlled areas. Although the observations indicate potential problems with worker awareness of acceptable rad-worker practices, none of the observations resulted in any identified personnel contamination incidents.

Two of the observations, however, are of particular concern to the inspectors. In one instance, involving a radiation protection technician (RPT), the RPT removed her outer protective gloves in order to make notes while providing coverage of steam generator work. With just her cotton liners, the RPT repeatedly touched her coveralls and her face, potentially contaminating her face. In the other case, a technician performing magnetic particle examinations on a section of the "A" steam generator, removed his safety glasses and laid them down in a contaminated area. In addition, his coveralls were unzipped approximately 20 centimeters, exposing bare skin. When questioned by the inspector regarding his safety glasses, the technician picked up the glasses and put them on, without being aware of the potential spread of contamination to his face. The technician was surveyed by an RPT and no contamination was found.

Other examples observed by the inspectors included loitering in containment and several other instances of workers removing and donning safety glasses without observing proper contamination control techniques. The licensee was attempting to improve rad-worker performance through training and by reminding the RPTs to be vigilant and correct poor practices immediately when observed.

4.2 Radioactive Waste Treatment, and Effluent and Environmental Monitoring

4.2.1 Potential Unmonitored Release of Contaminated Rain Water Inside Protected Area In support of outage activities, the licensee built a Seavan structure attached to the unit 1 containment emergency escape hatch. The Seavans are used to store radioactive wastes generated during the outage. During periods of heavy rain, water entered a Seavan through seams joining the Seavan to the structure. The rain water traversed through contaminated areas within the Seavan, out of the Seavan, and deposited onto the soil beneath the Seavan structure. The rain water was not monitored for radioactivity or volume released to the soil; therefore, there was a potential for contamination of the soil under and around the Seavan. However, the contamination levels within the Seavan were on the order of 1K - 5K dpm per 100 square centimeters and any soil contamination would not likely be significant.

The licensee sealed the seams between the Seavans and the structure to prevent further releases. The licensee will not be able to access the potentially contaminated soil until after the outage is completed and the Seavans are removed. Until then, the licensee has posted "Do Not

Dig" signs near the affected areas. After the outage, the licensee will sample the soil and perform an isotopic analysis. The results of the licensee's analysis are an Inspection Follow-Up Item (95015-08).

4.2.2 Audits and Appraisals During September 1995, the licensee's site quality verification performed an audit of the chemistry department, at the request of the chemistry department. The audit was requested due to significant problems previously identified with the in-line monitoring program, including the containment atmosphere sample panel and the post accident sampling system.

The audit resulted in several findings, the most significant of which involved the licensee's failure to take containment air samples and dilute reactor coolant samples in accordance with NRC commitments. There were several reasons given for not taking the samples; however, the primary reason appears to be poor communications between responsible chemistry department personnel, the system engineer responsible for the sampling systems, and the maintenance department. A contributing factor appears to be the termination of centralized corporate support for the post accident sampling system in 1993. The audit identified a downward trend in performance following termination of that support.

The licensee's initial corrective actions included getting the required samples up to date. The licensee planned to provide additional corrective actions in a chemistry department final report. The effectiveness of all of the licensee's corrective actions is an Inspection Follow-Up Item (95015-09).

4.3 Nuclear General Employee Training (NGET) Testing On October 5, the inspectors identified the following concerns during an NGET security training course and examination:

- some of the questions on a plant security examination were marked to indicate incorrect answers;
- the inside of a desk drawer contained potentially testable information; and
- an individual who had completed the examination held a conversation with an individual taking the examination.

The inspectors conducted additional inspection which consisted of a review of examination booklets, inspection of the testing environment, and interviews with the NGET instructor. Following these efforts, the inspectors concluded that the concerns appeared to be isolated.

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

4.4.1 (Closed) Inspection Followup Item 95002-01: The inspectors reviewed the licensee's efforts at improving the operability of its liquid discharge monitors and the licensee's frequent use of alternate monitoring

methodology during the periods of inoperability. The licensee has improved the operability of its monitors and has minimized its reliance on the alternate monitoring methodology. This item is closed.

5.0 PERSONS CONTACTED AND MANAGEMENT MEETINGS

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 November 14, 1995, 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
*A. Haeger, Executive Assistant
W. McCue, Support Services Director
R. Flessner, Site Quality Verification Director
G. Groth, Maintenance Superintendent
D. Skoza, Engineering 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
*G. Watts, Human Resources Supervisor
*M. Turbak, Independent Safety Engineering Group Supervisor
*C. Dunn, Site Quality Verification
*J. Lewand, Regulatory Assurance - NRC Coordinator
*M. Pavey, Licensing

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 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 or V; 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 1.4, 1.5, 1.9, and 2.1.

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 1.3, 2.5, 3.2, 4.2.1, and 4.2.2.

7.2 Unresolved Items Unresolved Items are matters about which more information is required in order to ascertain whether they are acceptable items, violations, or deviations. Unresolved Items disclosed during the inspection are discussed in sections 1.4 and 2.3.