

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Nos: 50-456, 50-457

License Nos: NPF-72, NPF-77

Report No: 50-456/97002; 50-457/97002

Licensee: Commonwealth Edison (ComEd)

Facility: Braidwood Nuclear Plant, Units 1 and 2

Location: RR #1, Box 84  
Braceville, IL 60407

Dates: January 11 - February 21, 1997

Inspectors: C. Phillips, Senior Resident Inspector  
J. Adams, Resident Inspector  
T. Tongue, Project Engineer  
T. Esper, Illinois Department of Nuclear Safety

Approved by: R. D. Lanksbury, Chief, Projects Branch 3  
Division of Reactor Projects

## EXECUTIVE SUMMARY

### Braidwood Nuclear Plant, Units 1 & 2 NRC Inspection Report 50-456/97002; 50-457/97002

This inspection included aspects of licensee operations, engineering, maintenance, and plant support. The report covers a 6-week period of resident inspection.

#### Operations

- Inspectors performed a detailed walkdown of the Unit 1 safety injection system. The inspectors reviewed or verified the system mechanical and electrical lineups, surveillance performance, system calibrations, system material condition, and compliance with technical specifications (TS) and Updated Final Safety Analysis Report (UFSAR). The inspectors concluded the system was in good material condition and was operated within design requirements. (Section O2.1)
- The inspectors observed several shift turnovers and heightened level of awareness meetings and concluded that the meetings were well conducted and that the licensee was in compliance with the appropriate station procedures governing the performance of these meetings. (Section O4.1)

#### Maintenance

- The inspectors observed portions of maintenance on the 1A safety injection system during a scheduled maintenance outage. The inspectors concluded that the maintenance performed on the 1A safety injection pump was conducted in a well organized manner in accordance with prescribed maintenance procedures. (Section M1.1)
- During the inspection period the inspectors observed the performance of 11 surveillance procedures. The surveillance procedures appeared to be in compliance with the TS, appropriately tested the system design as described in the UFSAR, and were properly performed. (Sections M2.1)
- On February 19 and 20, the inspectors identified unacceptable levels of loose debris on the auxiliary and fuel handling building roofs. Loose debris on roof tops had resulted in a loss of offsite power to Unit 2 in January 1996. The inspectors concluded that the licensee provided inadequate supervision of the work performed on this occasion and failed to take adequate corrective action for the previous occurrence. Compounding this problem, even after identification of the problem the licensee narrowly focused on correcting the specific conditions pointed out initially by the inspectors. A broader focus by the licensee would have identified even greater problems on an adjacent roof. The failure to take adequate corrective actions resulted in a Notice of Violation. (Section M2.2)

## Engineering

- The inspectors observed a special test developed to flush an accumulation of sediment from the 2A auxiliary feed pump alternate suction line and to collect data for incorporation into a permanent procedure. The procedure accomplished the purpose for which it was written. The evolution was well coordinated and supported. (Section E2.1)

## Plant Support

- The inspectors concluded that the control of a radiologically posted area in the Unit 2 turbine building was poor. Plant procedures established for use of hoses and to control calibration of radiation protection department instrumentation were not followed at the installation of the contaminated area posted around OPR10J, station blowdown radiation monitor. The failure to follow procedures resulted in a Notice of Violation. (Section R2.2)
- The inspectors observed the decontamination of the spent fuel transfer canal prior to maintenance in that area. The inspectors concluded that the precaution taken to minimize the dose to the workers, to monitor the work in progress, and prevent the spread of contamination were excellent. (Section R4.1)
- The inspectors observed the performance of a radiation protection technician to monitor oxygen levels in the 1A safety injection pump room during the performance of freeze seal work and concluded it was excellent. (Section 4.2)
- Zone coverage by radiation protection technicians of designated areas of the auxiliary building was implemented during this inspection period and had resulted in improved conditions in the auxiliary building, including reduction in contaminated area, reduction in general area clutter, and timely RP response to abnormal conditions. (Section R6.1)

## Report Details

### Summary of Plant Status

Unit 1 began this inspection period at 100% power. On January 15, the licensee placed a camera in the Unit 1 containment to monitor leakage from the reactor head vents. At the end of the inspection period, leakage from the reactor head vents was about 0.20 gallons per minute. On January 23, the licensee determined from increasing levels of iodine-131 and xenon-133 in the reactor coolant indicated that a minor fuel failure had developed. On January 28, the licensee reduced power by 11 megawatts electric, because of increasing turbine generator vibration. The main generator vibration remained stable for the remainder of the inspection period. On February 4, Unit 1 increased power and completed the period operating at or near 100%.

Unit 2 began this inspection period at 100% power and operated at or near that power level for the entire period.

## I. Operations

### **O2 Operational Status of Facilities and Equipment**

#### **O2.1 Engineered Safety Feature (ESF) System Walkdowns (71707)**

##### **a. Inspection Scope (71707)**

The inspectors performed a detailed walkdown of the accessible portions of the Unit 1 safety injection (SI) system. The inspectors performed the following:

- reviewed electrical and mechanical lineups;
- reviewed system drawings (P&ID) and compared drawings to the as-built configuration, along with UFSAR and TS descriptions;
- performed a physical walkdown of all accessible portions of the Unit 1 SI system;
- reviewed selected completed surveillances and instrument calibration documentation;
- checked material condition, labeling, and cleanliness of system components;
- reviewed system Out of Services (OOS);
- observed system maintenance (refer to Section M1.1); and
- checked for interfering ancillary equipment.

b. Observations and Findings

The inspectors performed a physical walkdown of accessible portions of the Unit 1 safety injection system. After completing the physical walkdown, the inspectors compared the system's configuration to the Unit 1 SI mechanical lineup documentation and the system piping and instrumentation drawing (P&ID). The inspectors found that the actual valve positions matched the positions in the lineup with one exception. The 1A SI pump discharge pressure gage instrument root valve was shut in order to isolate a minor leak. The inspectors verified that the leak was properly documented by the licensee. The inspectors also determined that the P&ID did accurately reflect the as-built system configuration.

The inspectors conducted a review of two Unit 1 SI surveillances with a 18-month frequency and one Unit 1 surveillance with a quarterly frequency. Refer to Section M2.1 of this report for inspectors observations and findings.

The inspectors checked the material condition of system components during the physical walkdown. The inspectors found little evidence of system leakage. The inspectors observed six valves with minor amounts of boric acid crystals evident. In all cases, the inspectors determined that the licensee had documented the problem. The inspectors observed proper lubrication levels in the 1A and 1B SI pump motors. The pump motor vents and the cubical cooler cooling coils appeared clean. The area between the motor and pump was free of significant accumulations of oil or water. The inspectors verified proper operation of the refueling water storage tank (RWST) heating pump and heater. The inspectors verified that the RWST temperature was within TS limits.

The inspectors verified the Unit 1 SI electrical lineup with the electrical lineup procedure, BwOP SI-E1. The inspectors found no deviation between the actual equipment positions and the positions required by BwOP SI-E1. The inspectors had the licensee open selected breaker, electrical, and instrumentation cabinets to assess cleanliness and the condition of conductor terminations. All enclosures observed were clean and free of debris. Conductor terminations appeared tight and properly crimped. The inspectors observed no installed jumpers.

The inspectors reviewed selected instrumentation's calibration. The inspectors verified the calibration on 33 instruments and found that all had been calibrated within the required interval.

The inspectors reviewed the three outstanding TS required out of services (OOSs) and the 18 outstanding action requests (AR). The inspectors checked that each OOS was properly performed. The inspectors observed that all the outstanding ARs were for minor problems or for work required during the outage. Of the 18 ARs, only three were older than 6 months. Of the three ARs older than 6 months, only one was older than 1 year.

The inspectors made the following general observation:

- general area cleanliness was good and was noticed to improve during the inspection period;
- all major components were labeled;
- no interference between Unit 1 SI components and ancillary equipment were observed;
- no flammable materials or ignition sources were observed in close proximity to Unit 1 SI components;

c. Conclusions

The inspectors concluded the following:

- the Unit 1 SI system operation and maintenance was consistent with TS and UFSAR;
- the electrical and mechanical material condition was generally good;
- surveillance procedures met performance frequency requirements, met applicable acceptance criteria, and ensured that TS and UFSAR requirements were maintained;
- system instrumentation was calibrated;
- valves, breakers, and fuses were in their proper positions;

**03 Operations Procedures and Documentation**

**03.1 Unit 0 Station Air Compressor Startup**

a. Inspection Scope (71707)

On January 30, the inspectors observed the startup of the Unit 0 station air compressor (SAC) and the Unit 0 instrument air (IA) dryer; observed the pre-job briefing; interviewed operators and the shift foreman; and reviewed procedures BwOP SA-1, "Startup and Operation of Station Air Compressors," Revision 14, and BwOP IA-1, "Station Instrument Air Dryer Startup," Revision 8E1; the Pall-Trinity-Micro Corp Manual for Station Instrument Air Dryers; and Updated Final Safety Analysis Report Section 9.3.1.



b. Observations and Findings

The pre-job brief was clear as to the sequence of the work to be performed. Roles and responsibilities were clearly delineated. The non-licensed operator (NLO) assigned to align the Unit 0 SAC and Unit 0 instrument air dryer demonstrated excellent knowledge of the system status. For example, the shift foreman made an incorrect statement about the control status of the Unit 2 SAC unloader valve and was quickly corrected by the NLO. In addition, the NLO asked questions about the status of abandoned thermocouple wires on the Unit 0 SAC. The system engineer was called to verify the status of the wires.

The inspectors observed that the operators performed the evolution with the procedure in hand and verified the procedure used was the most current revision. The inspectors identified one procedural problem. A note in Step F.11 of BwOP IA-1 warned the operators not to open the dryer outlet valve until all the water had been blown down from the dryer prefilters. However, there was no step in the procedure to blow down water from the prefilters and there was no step to verify/open a manual isolation valve to the prefilter auto blow down valve. The inspectors verified that the prefilters were blown down by the operators and the auto blow down manual isolation valve was opened. The inspectors informed the shift of the procedural problems and a procedure change was initiated.

c. Conclusion

The inspectors concluded the evolution to start the Unit 0 SAC and instrument air dryer was well conducted. The inspectors concluded that the procedure to align the instrument air dryer was weak but adequate because of the problems identified by the inspectors. The air dryer vendor manual stated that the purpose of the prefilters was to allow the desiccant in the air dryers to last longer. The inspectors concluded that the air dryer still would have performed its function had the auto blow down isolation valve not been opened. However, the inspectors were concerned that the procedure weakness was not identified and corrected by the operator performing the evolution.

**O4 Operator Knowledge and Performance**

**O4.1 Operations Shift Turnover Observations**

a. Inspection Scope (71707)

The inspectors observed operations shift turnover and performed an extended control room observation on January 22, 1997, and observed operations shift turnover and a "heightened level of awareness" (HLA) meeting on February 10, 1997. The inspectors also reviewed the following procedures:

- BwAP 335-1, "Operating Shift Turnover and Relief," Revision 13
- BwAP 100-12, "Human Performance Awareness," Revision 4E2

- BwAP 300-3, "Briefings," Revision 1
- BwAP 300-2, "Communications Standard For Operations," Revision 1E3
- BwAP 320-1, "Shift Manning," Revision 8E1

b. Observations and Findings

The inspectors observed both the nuclear station operators (NSO) and the unit supervisor (US) use checklists applicable to their position in their turnovers. The inspectors observed both the NSOs and the US conduct a control panel walkdown as part of their turnover. During the extended control room observation, the inspectors observed proper face-to-face communications by the US and NSOs. The NSO remained vigilant of the control room indications and did not get involved in administrative tasks. The inspectors also observed the shift manning level and verified that the manning levels met procedural and TS requirements.

The inspectors attended two shift briefings and a HLA briefing. The shift manager led the shift briefings and discussed evolutions that were in progress, evolutions expected to start during the shift, major equipment out of service, and the unit status.

The inspectors observed a HLA for a essential service water (SX) freeze seal. The Unit 1 US discussed the work to be performed, sequence of task performance, who was responsible for directing the activity, limiting condition for operation entry, expected final outcome of the activity, potential problems, and contingency plans with operations and mechanical maintenance personnel.

c. Conclusion

The inspectors concluded the following:

- control room turnovers were performed in accordance with BwAP 335-1;
- control room communications were performed in accordance with BwAP 300-2;
- control room manning levels met or exceeded TS 6.2.2.a and BwAP 320-1;
- shift briefings were conducted in accordance with BwAP 300-3;
- the HLA meeting was conducted in accordance with BwAP 100-12; and
- the procedures reviewed were well written and provided clear guidance.



**O8 Miscellaneous Operations Issues (92700)**

- O8.1 (Closed) Inspector Followup Item (IFI) 50-456/457/96002-04(DRP): Unit 2 Loss of Offsite Power on January 18, 1996. The procedure used to transfer the Unit 2 loads to Unit 1 and secure the emergency diesel generators (EDGs) did not anticipate that the EDGs would be in the emergency mode. The affected procedures; 2BwOA ELEC-4, "Loss of Offsite Power Unit 2" and 1BwOA ELEC-4, "Loss of Offsite Power Unit 1" were modified to assure a conservative and controlled transfer of power as identified. These procedures were reviewed by the inspectors and this item is closed.
- O8.2 (Closed) Unresolved Item 50-457/96011-02: Degraded Unit 2 Reactor Coolant Leakage Detection Equipment. The licensee issued a Licensee Event Report (50-457/96008) that stated 2PRO11J, the Unit 2 containment atmosphere radiation monitor was inoperable between July 6 and July 16, 1996. The Licensee Event Report was closed in Inspection Report 96015 and resulted in a non-cited violation (50-457/96015-01). This item is closed.

**II. Maintenance**

**M1 Conduct of Maintenance**

**M1.1 1A Safety Injection System Outage**

**a. Inspection Scope (62703)**

The inspectors observed portions of maintenance on the 1A safety injection system during a scheduled maintenance outage January 12 to 15. Work packages 960101915-01, 960015594-01, and 960088380, were reviewed and observed the changing of a lube oil filter, the installation of the lube oil reservoir, and the replacement of a cubicle cooler essential service water isolation valve were observed. The inspectors reviewed the post maintenance testing requirements for all the work performed and verified the adequacy of the testing. The inspectors also observed the pre-job briefing for the operators that took the system out-of-service and the pre-job brief for freeze seal work on the cubicle room cooler.

**b. Observations and Findings**

The inspectors observed and or verified the following items:

- the instructions to the operators removing the system from service were clear and well organized;
- the coordination between the maintenance foreman and the operators during a pre-job brief for establishing a freeze seal was good, contingency actions and roles for failure of the freeze seal were clearly defined, and a non-

licensed operator demonstrated a good questioning attitude by challenging some of the items discussed;

- the ball valve 1SX1073A (1A cubicle cooler essential service water outlet valve) maintenance procedure required the ball and seat to be lubricated; however, the valve maintenance procedure did not specify the type of lubricant for the ball and seats. When asked, the maintenance foreman told the inspectors that the ball and seat was water lubricated. The inspectors looked up the lubrication requirements in the ITT Grinnell technical manual and found that Dow Corning #111 silicon grease was specified. The inspectors interviewed the mechanic that performed the ball and seat replacement. The mechanic indicated that Dow Corning #111 silicon grease was used;
- a radiological hot spot located in the vicinity of the work was shielded to reduce radiation exposure;
- procedures were followed and quality control hold points were observed during the course of maintenance;
- trip testing results on the 1A safety injection pump breaker were specifically verified and the results were within acceptance criteria tolerance;
- the work was completed on schedule and the 1A safety injection train valves returned to service in a timely manner; and
- the licensee performed a probabilistic risk assessment evaluation of on line maintenance.

c. Conclusions

The inspectors concluded that the maintenance performed on the 1A safety injection pump was conducted in a well organized manner in accordance with prescribed maintenance procedures. The inspectors concluded that the maintenance foreman did not have a complete knowledge of the maintenance requirements used for the cubical cooler ball valve ball and seat replacement.

**M2 Maintenance and Material Condition of Facilities and Equipment**

**M2.1 Surveillance Observations**

a. Inspection Scope (61726)

The inspectors observed all portions of the following surveillance activities:

- 2 BwOS 8.2.1.1-1, "Unit Two 125V DC Bus 211/212 Operability Weekly," Revision 1;

- 2 BwOS 8.3.1-1, "Unit Two Division 21 ESF Onsite Power Distribution Weekly," Revision 4;
- 2 BwOS 8.3.1-2, "Unit Two Division 22 ESF Onsite Power Distribution Weekly," Revision 4;
- 2 BwOS 0.5.CV.1, "CVCS System Isolation Valve Stroke Quarterly," Revision 0;
- 2BwOS 6.3.3-3, "Component Cooling Containment Isolation Valve Stroke Quarterly," Revision OE1;
- 2 BwOS 0.5.4, "Pressurizer System Power Operated Relief Valve (PORV) Isolation Valve Stroke Revision 1E2;
- 2 BwOS 6.3.3-8, "Process Sampling Containment Isolation Valve Stroke Quarterly," Revision 5;
- BwIS NR-200, "Channel Verification Of Post Accident Neutron Monitoring Channels A and B," Revision 1E1, Section F.5;
- 2BwVS 0.5-3.AF.1-1, "Unit Two Motor Driven Auxiliary Feedwater Pump ASME Quarterly Surveillance," Revision 2;
- 2BwOS 7.1.2.1.a.1-1, "Unit Two Motor Driven Auxiliary Feedwater Pump Monthly Surveillance," Revision 2; and
- 1BwVS 0.5-3.SX.1-1, "ASME Surveillance Requirements for 1A Essential Service Water Pump," Revision OE1.

The inspectors also conducted a review of the completed documentation for two Unit 1 safety injection surveillances with an 18-month frequency and one Unit 1 surveillance with a quarterly frequency. The inspectors reviewed the following previous two performances of the 18-month surveillances and the previous four performances of the quarterly surveillances:

- 1BwOS 0.5.SI.2-2, "Unit One Safety Injection System SVAG Valve Stroke Quarterly Surveillance," Revision 0, OE1, OE2, and 1;
- 1BwVS 0.5.SI.3-1 and BwVS 0.5-2.SI.3, "Safety Injection System Isolation Valve Indication 18-Month Surveillance," Revision 0 and Revision 7 respectively; and
- 1BwVS 0.5-2.SI.2-3, "Safety Injection System Check Valve Stroke Test," Revisions 4, 5, and 7.

b. Observations and Findings

The inspectors observed the performance of the above listed procedures. All surveillances were performed in accordance with the procedure. The personnel that performed the surveillance were knowledgeable of the procedural requirements. The inspectors observed the use of self-checking techniques in accordance with BwAP 100-12A1, the performance of independent verifications in accordance with BwAP 100-18, and verbal communication in accordance with BwAP 300-2. The inspectors verified that the surveillances satisfied TS and UFSAR requirements and that the surveillances were completed within the required frequency.

The inspectors performed a review of the surveillances listed above in the second paragraph. The inspectors found all applicable sections properly completed and documented. The inspectors verified that the surveillances satisfied TS, UFSAR, and American Society of Mechanical Engineers (ASME) Section XI requirements.

c. Conclusions

The inspectors concluded that the observed surveillances were performed in accordance with their applicable procedures and acceptance criteria were met. The procedures provided the necessary guidance for successful completion.

M2.2 Inadequate Control of Materials On Auxiliary Building Roof

a. Inspection Scope (62703)

On January 18, 1996, Braidwood Unit 2 lost offsite power due to a loss of both Station Auxiliary Transformers (SAT). The probable cause for the loss of the SATs was presented in LER 96-001, "Inadequate Control of Staged Roofing Materials Leads to a Loss of Offsite Power Due to a Loss of Both Unit 2 Station Auxiliary Transformers," as flashing from the service building roof causing a phase-to-ground arc on SAT 242-1. High winds at the time of the event were thought to have blown flashing off the service building roof and on to the SAT.

As a result of the event on January 18, 1996, an NRC violation (96002-01) for the failure to take corrective actions was issued because debris had been observed blowing off the roof for several days.

Corrective actions described in LER 96-001 included: "To prevent recurrence of staged construction materials from blowing off the roof, materials staged on the roof will be limited to materials that will not blow off the roof, such as buckets of tar, etc. Materials that could potentially blow off the roof will be staged on the roof daily for the work to be performed that day or stored in an area that will prevent them from being blown off."

The inspectors toured the auxiliary building roof on February 19 and 20, 1997, where roofing maintenance was in progress, to verify corrective actions of LER 96-001 and NRC violation 96002-01 were being implemented.

The inspectors interviewed licensee management after items were discovered on the roof by the inspectors.

b. Observations and Findings

The inspectors toured the auxiliary building roof on February 19. Maintenance activities were not in progress on February 19, but equipment and materials were staged on the roof for re-roofing work. The inspectors later questioned site construction personnel on the reasons for suspended activities and were told that roofing had been delayed for about 2 weeks due to cold temperatures.

On February 19, the inspectors found several sheets of a material that consisted of foam substance in the middle with paper binding on the outside of the foam. The 2-inch thick sheets varied in size from approximately 1 ft. by 4 ft. up to approximately 4 ft. by 4 ft. The sheets were found at several locations around the roof and no measures were in place to prevent the sheets from blowing off the roof.

The inspectors reported the condition to the operating shift at 10:00 a.m. on February 19, and actions were taken to remove the material from the auxiliary building roof. Additionally, a problem identification form (PIF) 456-201-97-0451 was generated by the operating department to investigate the problem.

On February 20, the inspectors again toured the auxiliary building roof to verify the licensee's corrective actions. The sheets of large foam material were secured to prevent them from being blown off the roof. However, the inspectors noted that a ramp was in place to allow access to the adjacent fuel handling building. The inspectors proceeded to tour the fuel handling building roof and found plywood, plastic wrap, tin cans, metal banding material (approximate 4-5 foot long by 1/2 inch wide by 1/16 inch thick), and large quantities of used metal flashing. The inspectors notified the operating shift of the conditions found on the fuel handling building and the additional materials identified on February 20 were either removed from the roof or were secured to prevent them from being blown off the roof.

The inspectors toured the auxiliary building roof and fuel handling building roof again on February 21 and verified that all loose materials were either removed or secured.

Licensee management stated the maintenance on the roof was supervised by both contractor and ComEd employees; however, inadequate acceptance standards had been used by the supervisors overseeing the work.

c. Conclusions

A large variety of material susceptible to being blown off the roof were found on two successive days on the auxiliary building and the fuel handling building roofs.



Corrective actions listed in LER 96-001 and in the licensee's response to NRC violation 96002-01 were not effective in preventing personnel from leaving large amounts of loose material unattended on roofs at the Braidwood Station.

The inspectors concluded that the oversight of the roof repair was poor. Contractor and ComEd supervisors failed to understand the significance of loose material on the roof tops. The licensee's corrective actions were narrowly focused on the specific problem initially identified by the inspectors and failed to identify an even more significant problem on an adjacent roof.

Failure to maintain control of materials on site buildings is a violation of 10 CFR Part 50, Appendix B, Criteria XVI, Corrective Action (50-456/97002-01(DRP); 50-457/97002-01(DRP)).

**M8 Miscellaneous Maintenance Activities (92902)**

- M8.1 (Open) Violation 50-456/457/95015-04(DRP): Failure to Implement Foreign Material Exclusion (FME) Requirements. This was also addressed in Inspection Report 50-456/457/96012. The licensee has effectively completed all of the short term corrective actions. However, the commitment to implement a corporate wide FME procedure related to all six Commonwealth Edison nuclear stations had not been completed as of February 7, 1997. During this inspection period, the Nuclear Station Work Procedure "NSWP-A-03 Foreign Material Exclusion" was apparently in draft and being reviewed for comment by the six stations. This item will remain open until the corporate procedure "NSWP-A-03" has been implemented.

**III. Engineering**

**E2 Engineering Support of Facilities and Equipment**

**E2.1 Observation of the 2A Auxiliary Feed Pump Essential Service Water Suction Line Flush Test**

**a. Inspection Scope (37551)**

On January 16, the inspectors observed a special test developed to flush an accumulation of sediment from the 2A auxiliary feed pump alternate suction line 2SX25AA-6 and to collect data for incorporation into a permanent procedure. The inspectors also reviewed special test procedure SPP-97-004.

**b. Observations and Findings**

The inspectors reviewed the events that required the development of the special test procedure. The inspectors found that on December 30, 1996, the licensee discovered 2.5 inches of sediment on the bottom of the 2A auxiliary feed pump essential service water suction line, 2SX25AA-6. The sediment deposition was discovered by the licensee during the performance of ultrasonic inspections to

satisfy NRC Generic Letter 89-13 commitments. The licensee developed the special test procedure to satisfy one of the corrective actions identified in Operability Screening 97-001.

The inspectors observed test preparation activities which included the removal of blind flanges down stream of the 1B auxiliary feed diesel SX return line flush tap (1SX252) and 2A auxiliary feed SX supply line flush tap (2SX253), the installation of a hose between the two valves, and the installation of an ultrasonic flow meter on line 2SX25AA-6. The inspectors verified the hose's pressure rating with the system engineer and observed the leak test of the hose.

The inspectors observed the initiation of the flush and the establishment of the desired flow rate. The inspectors verified that the flow rate and flush duration specified by SPP-97-004 were maintained.

After the flush was secured, the inspectors observed the inservice inspection group perform ultrasonic measurements of the sediment depth at the same locations that the sediment was initially found. The system engineer told the inspectors that there were no indication of sediment in the suction line. The inspectors also observed the restoration of the essential service water to its normal configuration.

c. Conclusions

The inspectors concluded that the test was performed in accordance with the special test procedure, SPP-97-004, and all acceptance criteria were met. The procedure accomplished its purpose as demonstrated by the lack of measurable sediment following the test. The inspectors concluded the system engineer did a good job of coordinating the test. Operations and maintenance support for the test was good.

E2.2 System Engineer Performance During Station Surveillance

a. Inspection Scope (37551)

The inspectors observed the performance of system engineers during the performance of 2BwVS 0.5-3.AF.1-1, "Unit Two Motor Driven Auxiliary Feedwater Pump ASME Quarterly Surveillance," Revision 2 and 2BwOS 7.1.2.1.a.1-1, "Unit Two Motor Driven Auxiliary Feedwater Pump Monthly Surveillance," Revision 2, on January 17; and 1BwVS 0.5-3.SX.1-1, "ASME Surveillance Requirements for 1A Essential Service Water Pump," Revision OE1, on February 11 (also see paragraph M2.1).

b. Observations and Findings

The inspectors observed the following:

- The system engineers followed the applicable procedures and did not deviate in step performance or step order;

- The system engineers acted as the test directors for the surveillances and were present in the field during performance of the entire test. The system engineers were knowledgeable on operation of the plant equipment and use of test equipment.

c. Conclusions

The inspectors concluded that system engineering support for performance of the routine surveillances was good.

**E8 Miscellaneous Engineering Issues (92903)**

E8.1 (Closed) IFI 50-456/96011-05: 30 Day Limit For Isolating Nitrogen To The Spray Additive Tank. The inspectors questioned an operability evaluation that stated the nitrogen blanket could be removed from the containment spray sodium hydroxide tank for 30 days without any detrimental effects. In response to the question the licensee provided the inspectors with a chemistry evaluation dated September 18, 1996, that demonstrated via calculation that the exposure to the atmosphere for 30 days would have insignificant negative effects on the concentration of sodium hydroxide in the tank. The inspectors reviewed the calculation and had no further concerns. This item is closed.

E8.2 (Closed) Inspection Followup Item (IFI 50-456/457/95010-05): During an inspection at Byron in May of 1994, the inspectors identified a questionable PORV accumulator check valve leak test methodology. The test procedure required the blowdown of the PORV accumulator and its repressurization to the test pressure. The blowdown of the accumulator caused the check valve to open, potentially cleansing the seating surface and affecting the test results. A similar problem was subsequently identified at Braidwood. The inspectors reviewed the revised version of BwVS 4.4.4.1.b, "Pressurizer PORV Instrument Air Accumulator Check Valve Test," and concluded that the procedure prevents the lifting and reseating of the PORV accumulator check valve. This item is closed.

#### IV. PLANT SUPPORT

**R2 Status of RP&C Facilities and Equipment**

**R2.2 Radiologically Posted Area in Unit 2 Turbine Building**

a. Inspection Scope (83822)

Due to work being performed on OPR10J, station blowdown radiation monitor, a contaminated area was established in the Unit 2 turbine building condensate pump pit at elevation 357, column J.2-31. The inspectors monitored this radiologically posted area on several occasions during the inspection period. The inspectors reviewed procedures BwAP 575-2, "Hose Identification," Revision 2; BwRP 5000-7, "Unescorted Access to and Conduct in Radiologically Posted Areas,"

Revision 2; BwRP 5010-1, "Radiological Posting and Labelling Requirements," Revision 5; and BwRP 5800-6, "Administrative Requirements for Health Physics Instrumentation," Revision 0. The inspectors also interviewed radiation protection department personnel.

b. Observations and Findings

On January 9, 1997, the inspectors observed that a radiologically posted contaminated area was established in the Unit 2 condensate pump pit around OPR10J, station blowdown radiation monitor. The inspectors noted that a green hose appeared to have fallen across the contaminated area boundary. Station procedure BwAP 575-2, Step F.2.d, stated that "green hoses shall be used for uncontaminated general applications in uncontrolled areas." Since the area was radiologically posted as a contaminated area, use of a green hose in the area was prohibited by the procedure.

Upon discovery of the condition, the inspectors notified the radiation protection department. Plant personnel subsequently removed the green hose from the contaminated area, checked it for contamination, and re-ran the hose in the overhead piping (approximately 7 feet above the floor).

On February 14, the inspectors found the green hose again in the contaminated area. At this time, the hose was found coiled up somewhat, indicating that it had not fallen from the overhead but had been taken down. The hose was found again crossing the contaminated area without any control to prevent the spread of contamination.

Upon further review of the contaminated area installation, the inspectors found that the local contamination monitor used to provide personnel frisking was not within the posted calibration due date. The monitor, model PRM-6, RP department identification number 1355, had a calibration due date specified as "January 31, 1977." The monitor was found in the plant on February 14, indicating that the monitor may have been in place for up to 2 weeks without proper calibration.

Procedure BwRP 5800-6, Step F.8, listed required actions for out-of-calibration instrumentation. These actions include storing and segregating out-of-calibration instrumentation to prevent inadvertent use of the instrument. The actions listed in BwRP 5800-6 were not performed for RP instrument 1355 for the 2 weeks from January 31 until February 14.

The inspectors reported the conditions found on February 14, to the RP department and the radiation monitor was immediately removed from the plant. Additionally, the green hose was checked for contamination and removed from the contaminated area. The inspectors verified plant personnel generated PIF 456-201-97-0401 to investigate the reason for the green hose being used in a radiologically posted area contrary to the requirements of BwAP 575-2. Additionally, PIF 456-201-97-0402

was generated to investigate reasons for use of radiation monitor 1355 contrary to the requirements of BwRP 5800-6. Subsequent calibration of the radiation monitor found it to be within calibration.

The area around OPR10J was cleaned and the contaminated area posting was removed after problems with the installation were identified on February 14.

c. Conclusions

The inspectors concluded that control of the contaminated area in the turbine building was poor.

Plant procedures established for use of hoses and to control calibration of instrumentation were not followed during the installation of the contaminated area posted in Unit 2 turbine building around OPR10J.

Failure to follow procedures BwAP 575-2 and BwRP 5800-6 are examples of 2 violations of TS 6.8.1, Procedures and Programs (50-457/97002-02a(DRP) and 50-457/97002-02b(DRP)).

**R4 Staff Knowledge and Performance in RP&C**

**R4.1 Spent Fuel Pool Transfer Canal Maintenance**

a. Inspection Scope (71750)

The inspectors observed radiation protection technicians (RPTs) wash down the walls of the spent fuel pool transfer canal in preparation for maintenance on the fuel transfer equipment.

b. Observations and Findings

The inspectors observed the following items:

- both RPTs were remotely monitored electronically for dose and dose rate received, were visually monitored by another RPT, and one worker was in continuous contact via radio with the RPT performing the visual monitoring;
- the RPTs were wearing respiratory protection, the transfer canal was ventilated by a high efficiency filter unit, and the refuel floor was monitored continuously by a portable air monitor with an alarm function; and
- to prevent a sudden change in building pressure and a possible spread of contamination, the large equipment doors to the refuel floor were physically restricted from use.



c. Conclusions

The inspectors concluded that the precautions taken to minimize the dose to the workers, to monitor the work in progress, and prevent the spread of contamination were excellent.

R4.2 Radiation Protection Maintenance Support Observations

a. Inspection Scope (71750)

On January 14, 1997, the inspectors observed RP support for the repair of the 1A safety injection cubical cooler essential service water outlet valve (SX2037A).

b. Observations and Findings

The inspectors observed a pre-job briefing performed by the RPT with maintenance personnel that covered the general area radiation levels, hot spot radiation levels, and hot spot locations. The RPT also issued the maintenance personnel oxygen monitors and instructed them on their use.

During the establishment of the freeze seal, the inspectors observed the RPT continuously survey the areas around the freeze seal for oxygen deficiency. The RPT directed maintenance to secure the flow of liquid nitrogen and evacuate the 1A SI pump room when oxygen levels approached 19.5%. The inspectors investigated the rate of flow of liquid nitrogen to the freeze seal and found that it was within the allowable limits of procedure BwMP 3300-018, "Application of Liquid Nitrogen Freeze Seal to All Piping." The inspectors observed the RPT direct maintenance personnel to setup additional temporary ventilation. The inspectors observed no other problems with oxygen levels during the remainder of the work.

c. Conclusions

The inspectors concluded that the RPT provided maintenance personnel the necessary information and support to minimize their exposure to radiation and to detect a potential oxygen deficient atmosphere. The inspectors concluded that the RPT diligently monitored and took conservative actions to protect personnel from potential hazards. The freeze seal evolution was performed in accordance with the procedure.

R6 RP&C Organization and Administration

R6.1 Radiation Protection Department Auxiliary Building Zone Coverage

a. Inspection Scope (83822)

During the inspection period, the RP department initiated a new program in the auxiliary building to provide additional control of radiological and non-radiological conditions. The program, named radiologically protected area (RPA) zone coverage,

provided dedicated radiation protection technicians to areas of the auxiliary building. Since the program was established, the inspectors have routinely monitored auxiliary building conditions.

b. Observations and Findings

The licensee defined zone coverage as a group of radiation technicians assigned to each major elevation of the auxiliary building. The technicians were assigned to specific areas for a period of 3 months. Zone technician responsibilities included the following:

- provide radiological monitoring coverage for the zone;
- provide non-radiological monitoring, such as confined space checks, for the zone;
- survey tools and equipment out of contaminated areas in the zone; and
- assist workers in locating carts and other equipment.

Additionally, the zone technicians use their spare time to clean the zone and remove equipment not being used.

Since the program was implemented, overall condition of the auxiliary building improved. Contaminated area square footage was reduced, particularly in the residual heat removal pump rooms, containment spray pump rooms, and curved wall areas. The reduction in contaminated area resulted in improved access to equipment. Tools and equipment not in use were being removed from the auxiliary building and a noticeable reduction in the general area clutter was seen throughout the auxiliary building.

Zone technicians are normally available during business hours to provide radiological monitoring. The inspectors utilized zone technicians on several occasions for radiological monitoring and the coverage was provided in a timely manner.

The zone technicians also provided response to abnormal conditions in their area. On February 11, the inspectors observed a plant equipment operator who found a puddle of water at auxiliary building elevation 346, column M-16. Since the operator was not sure of the origin of the puddle, he immediately notified the RP department zone technician, who was in the area. The RP zone technician immediately took actions to prevent personnel from walking in the water. The zone technician then surveyed the area to check for contamination. No contamination was found and the zone technician proceeded to clean up the spill. The spill was found to be heating system steam drain water that had overflowed from a drain.

c. Conclusions

RPA zone coverage implemented in the auxiliary building resulted in improved conditions in the auxiliary building, including a reduction in contaminated area square footage, reduction in general area clutter, and timely RP response to abnormal conditions.

V. Management Meetings

**X1 Exit Meeting Summary**

The inspectors presented the inspection results to members of licensee management at the conclusion of the inspection on February 21, 1997. The licensee acknowledged the findings presented.

The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

**X3 Management Meeting Summary**

- X3.1 On January 27, 1997, a management meeting was held at the NRC Region III office to discuss the event and violation identified in Inspection Report 50-456/96018(DRP). The issue related to the unplanned opening of the Unit 1 pressurizer power operated relief valve while cooling down on October 12, 1996. Handouts used in the licensee's presentation at the meeting have been sent to the Public Document Room.

## PARTIAL LIST OF PERSONS CONTACTED

### Licensee

- + H. G. Stanley, Site Vice President
- + \*T. Tulon, Station Manager
- \*H. Pontious, Nuclear Licensing Administrator
- E. Roche, Executive Assistant
- W. McCue, Support Services Director
- \*R. Flessner, Site Quality Verification Director
- R. Byers, Maintenance Superintendent
- D. Miller, Work Control Superintendent
- \*T. Simpkin, Regulatory Assurance Supervisor
- H. Cybul, System Engineering Supervisor
- J. Meister, Engineering Manager
- + \*R. Wegner, Operations Manager
- \*A. Haeger, Health Physics/Chemistry Supervisor
- \*J. Nalewajka, Independent Safety Engineering Group Supervisor
- M. Paevey, Regulatory Performance Administrator
- \*M. Cassidy, Regulatory Assurance - NRC Coordinator
- \*J. Stone, Maintenance Work Director
- \*D. Skoza, System Engineering Group Lead
- \*D. Radice, Site Engineering Design Supervisor
- \*J. Walker, Training Director
- \*M. Di Ponzio, RPA

### NRC

- + J. Grobe, Deputy Director, Division of Reactor Projects
- + \*R. Lanksbury, Chief, Reactor Projects Branch 3
- + \*C. Phillips, Senior Resident Inspector
- \*J. Adams, Resident Inspector
- + T. Tongue, Project Engineer

### IDNS

- \*T. Esper

+ Denotes the attendees at the Management Meeting held on January 27, 1997.

\* Denotes those who attended the exit interview conducted on February 21, 1997.

## INSPECTION PROCEDURES USED

IP 37551: Onsite Engineering  
 IP 61726: Surveillance Observations  
 IP 62703: Maintenance Observation  
 IP 71707: Plant Operations  
 IP 71750: Plant Support Activities  
 IP 83822: Radiation Protection  
 IP 92700: Onsite Followup of Written Reports of Nonroutine Events at Power Reactor Facilities  
 IP 92902: Followup - Plant Maintenance  
 IP 92903: Followup - Engineering

## ITEMS OPENED, CLOSED, AND DISCUSSED

### Opened

|  |     |  |
|--|-----|--|
| 50-456/97002-01; 50-457/97002-01         | VIO | failure to maintain control of materials on site buildings |
| 50-457/97002-02a and<br>50-457/97002-02b | VIO | failure to follow procedures                               |

### Closed

|   |            |   |
|---|------------|---|
| 50-456/95010-05; 50-457/95010-05                    | IFI        | questionable PORV accumulator check valve leak test methodology                             |
| 50-456/96002-04; 50-457/96002-04<br>50-457/96011-02 | IFI<br>UR! | Unit 2 loss of offsite power<br>degraded Unit 2 reactor coolant leakage detection equipment |
| 50-456/96011-05                                     | IFI        | 30-day limit for isolating nitrogen to spray additive tank                                  |

### Discussed

|  |            |   |
|--|------------|---|
| 50-456/95015-04; 50-457/95015-04<br>50-457/96015-01            | VIO<br>NCV | failure to implement FME requirements<br>Unit 2 containment atmosphere radiation monitor inoperable |
| 50-457/96001   | LER        | inadequate control of staged roofing materials  |
| 50-456/96002-01; 50-457/96002-01<br>50-456/96012; 50-457/96012 | VIO        | failure to take corrective actions  |



## LIST OF ACRONYMS USED

|       |  |
|-------|--|
| AR    | Action Request                           |
| ASME  | American Society of Mechanical Engineers |
| CFR   | Code of Federal Regulations              |
| EDG   | Emergency Diesel Generator               |
| ESF   | Engineered Safety Features               |
| FME   | Foreign Material Exclusion               |
| HLA   | Heightened Level of Awareness            |
| IA    | Instrument Air                           |
| IFI   | Inspection Followup Item                 |
| LER   | Licensee Evaluation Report               |
| NLO   | Non-Licensed Operator                    |
| NRC   | Nuclear Regulatory Commission            |
| NSO   | Nuclear Station Operator                 |
| OOS   | Out of Service                           |
| PDR   | Public Document Room                     |
| P&ID  | System Drawings                          |
| PIF   | Problem Identification Form              |
| PORV  | Power Operated Relief Valve              |
| RP    | Radiation Protection                     |
| RPA   | Radiologically Protected Area            |
| RPT   | Radiation Protection Technician          |
| RWST  | Refueling Water Storage Tank             |
| SAC   | Station Air Compressor                   |
| SAT   | Station Auxiliary Transformer            |
| SI    | Safety Injection                         |
| SX    | Essential Service Water System           |
| TS    | Technical Specification                  |
| UFSAR | Updated Final Safety Analysis Report     |
| US    | Unit Supervisor                          |