U.S. NUCLEAR REGULATORY COMMISSION

REGION III

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Report No:	50-456/99006(DRP); 50-457/99006(DRP)
Licensee:	Commonwealth Edison Company
Facility:	Braidwood Nuclear Plant, Units 1 and 2
Location:	RR #1, Box 84 Braceville, IL 60407
Dates:	March 2 through April 13, 1999
Inspectors:	C. Phillips, Senior Resident Inspector J. Adams, Resident Inspector D. Pelton, Resident Inspector J. Roman, Illinois Department of Nuclear Safety
Approved by:	Michael J. Jordan, Chief Reactor Projects Branch 3 Division of Reactor Projects

EXECUTIVE SUMMARY

Braidwood Nuclear Plant, Units 1 and 2
NRC Inspection Report 50-456/99006(DRP); 50-457/99006(DRP)

This inspection included aspects of licensee operations, maintenance, engineering, and plant support. The report covers a 6-week period of resident inspection from March 2 through April 13, 1999.

Operations

- The licensee conducted a reactor shutdown and startup on April 5 and April 8, respectively, due to a failure of the Unit 1 heater drain tank rupture disk. The inspectors concluded that both evolutions were well planned and controlled. Pre-evolution planning, clear communications, and strict procedural compliance resulted in a reactor shutdown and startup free of human performance errors. Additionally, the operators successfully addressed challenges due to material condition problems during the performance of the unit startup. (Section O1.1)

- The inspectors observed control room operators throughout the inspection period and concluded that operators routinely performed good turnover briefings, control board operations, response to alarms, and three-way communications. The unit supervisors demonstrated good performance in the minimization of control room distractions, in the direction of personnel, in the conduct of briefings, and in the control of evolutions. The inspectors concluded that the control room operators assigned to perform surveillance and special test kept the unit nuclear station operator informed of plant changes and the unit nuclear station operator was not distracted from his responsibility of unit oversight. (Section O1.2)

- The inspectors observed fuel handling personnel during the receipt of new nuclear fuel for Refueling Outage A2R07 and concluded that fuel handling personnel had properly established foreign material exclusion areas; carefully moved and opened fuel shipping containers; carefully upended fuel elements; closely monitored the Dillon Load Scale during movement of the fuel to the fuel storage vaults; and carefully inspected the new fuel using check sheets from the new fuel inspection procedure. Fuel handling personnel were knowledgeable of new fuel inspection requirements. The fuel handling supervisor directly supervised the movement and inspection of new fuel, maintained tag boards, and properly documented fuel receipt activities in accordance with the applicable procedures. (Section O1.3)

- Between March 20 and March 27, the position of 1AB8465, a suction valve to the Unit 0 boric acid pump, which was required for the emergency boration of Unit 1, was poorly controlled. A procedure error in 1BwOP AB-7, "Transfer of the Boric Acid Batching Tank to Unit 2 Boric Acid Tank," Revision 10, regarding the correct position of the valve upon completion of the procedure, went unnoticed by non-licensed operators twice. On one occasion non-licensed operators noted the procedure error regarding the correct position of the valve at the conclusion of the procedure and notified their supervisor. However, due to unclear communication between the work execution center supervisor and an operations procedure writer, BwOP AB-7 was not corrected before the next time it was used. Procedure BwOP AB-7 was not properly maintained which was a Non-Cited Violation of Technical Specification 5.4.1. (Section O2.1)

Maintenance

- The inspectors identified several weaknesses in the control of measurement and test equipment during a maintenance activity on the 2A containment spray pump. An electrician demonstrated a lack of knowledge of the requirements for use of maintenance and test equipment on safety-related components. The maintenance department demonstrated an example of poor control of maintenance and test equipment by being unable to find a piece of equipment when it was due for calibration and then using it later on safety-related equipment. The work package used to measure 2A CS pump end play was weak, in that, it did not include instruction to perform required post maintenance calibration checks of the maintenance and test equipment used. (Section M1.1)

- The inspectors concluded that the three surveillance tests observed adequately tested the systems, the operators followed the procedures, and that the procedures included the required surveillance testing described in the Improved Technical Specifications. Additionally, the inspectors concluded that the two completed seismic instrumentation surveillance procedures that were reviewed by inspectors contained acceptance criteria that addressed Improved Technical Specification requirements, and supported system operability. (Section M1.2)

  Three secondary plant material condition problems resulted in transients that impacted reactor power levels this period. The licensee's root cause approach into the secondary plant failures was aggressive but was not completed for review by the end of the inspection period. (Section M1.2)

Plant Support

- The as-low-as-reasonably-achievable briefing for the removal of 2A containment spray pump provided complete and useful information to the workers performing the task. (Section R1.1)

- The inspectors reviewed the results of several chemical analysis that were conducted in March 1999. The inspectors concluded that the results of all analyses met Technical Specification acceptance criteria. (Section R1.2)

Report Details

Summary of Plant Status

Unit 1 entered the period at or near 100 percent power. A Unit 1 shutdown was commenced at 3:00 a.m. on April 5, due to a failure of the heater drain tank rupture disc. After repairs were completed, the licensee performed a startup of Unit 1 and synchronized the main generator to the grid at about 7:32 p.m. on April 8. Unit 2 entered the period at about 100 percent power and by the end of this report period coasted down to about 85 percent power in anticipation of a refueling outage scheduled to commence April 24, 1999.

I. Operations

O1 Conduct of Operations

O1.1 Unit 1 Forced Shutdown and Startup Due to Failed Heater Drain Tank Rupture Disc

a. Inspection Scope (93702)

On April 5 at about 1:50 a.m., the control room operators received indications that the Unit 1 heater drain tank rupture disc had failed. The inspectors reviewed, Braidwood Startup/Shutdown Procedure (1BwGP) 100-2, "Plant Startup," Revision 12E3; BwGP 100-3, "Power Ascension 5 percent to 100 percent," Revision 16E2; BwGP 100-4, "Power Descension," Revision 12; BwGP 100-5, "Plant Shutdown and Cooldown," Revision 18E1; Braidwood Administrative Procedure (BwAP) 100-12, "Human Performance Awareness of Pre-Job Briefings/Meetings and Self Checking," Revision 5; Technical Specification 3.4.1, "Reactor Coolant System Pressure, Temperature, and Flow Departure from Nucleate Boiling Limits"; and Technical Specification 3.3.3, "Post-Accident Monitoring Instrumentation."

b. Observations and Findings

On April 5 at about 1:50 a.m., the control room operators received indications that the Unit 1 heater drain tank rupture disc failed. Since the rupture disc could not be repaired with the unit on line, a Unit 1 shutdown was commenced at 3:00 a.m on April 5. The heater drain tank system was modified and the rupture disc was relocated from a vertical run of pipe to a horizontal run of pipe. Also, the pipe was insulated to prevent moisture coming in contact with the rupture disc. Following replacement of the heater drain tank rupture disc, the licensee performed a startup of Unit 1 on April 8. The inspectors observed pre-evolution briefings for both the startup and shutdown; observed portions of the operators performance during the shutdown and startup; and reviewed the shutdown and startup procedures. The inspectors determined that the briefings met the minimum requirements of BwAP 100-12, "Human Performance Awareness of Pre-Job Briefings/Meetings and Self Checking," Revision 5. The inspectors observed operations management during the briefings as they ensured that operating personnel were aware of their specific responsibilities. Communications were clear and the inspectors observed the use of three-way communications during the Unit 1 shutdown and startup. Procedural compliance was obvious during the performance of the observed evolutions.

While conducting feedwater lineup changes, the operators experienced difficulty maintaining pressurizer pressure as required by Technical Specification 3.4.1, "Reactor Coolant System Pressure, Temperature, and Flow Departure from Nucleate Boiling Limits," which specifies a pressurizer pressure limit of 2,219 pounds per square inch gauge condition for power operation. In each instance the limiting condition for operation was entered, pressurizer pressure was restored well within the 2 hours allowed by Technical Specification, and the limiting condition for operation exited. The difficulty in maintaining pressurizer pressure at low power on Unit 1 was first observed after the steam generator replacement. The licensee identified the causes to be possibly a pressurizer spray valve leaking, a spray bypass valve positioning issue or an auxiliary spray valve leaking. The licensee was pursuing a root cause investigation into this problem.

The inspectors observed that operators were challenged by some material condition problems during the Unit 1 startup. These included the failure of the B-train reactor vessel indicating system, and problems with the turbine digital electronic-hydraulic control system. In all cases the shift successfully identified the problem and assured technical specifications compliance before proceeding.

c. Conclusions

The licensee conducted a reactor shutdown and startup on April 5 and April 8, respectively, due to a failure of the Unit 1 heater drain tank rupture disk. The inspectors concluded that both evolutions were well planned and controlled. Pre-evolution planning, clear communications, and strict procedural compliance resulted in a reactor shutdown and startup free of human performance errors. Additionally, the operators successfully addressed challenges due to material condition problems during the performance of the unit startup.

O1.2 Control Room Observations

a. Inspection Scope (71707)

The inspectors observed the conduct of operation during normal operating conditions, during the performance of a special test to determine maximum reactive load capability of the main generators, and during the performance of surveillance tests. The inspectors interviewed nuclear station operators, unit supervisors, and shift managers with regard to the ongoing activities.

b. Observations and Findings

The inspectors observed control room operators throughout the inspection period. The inspectors noted that during normal operating conditions the nuclear station operators were attentive, used operating procedures, used self-checks when manipulating equipment, obtained peer-checks when required, and used three-way communications. The operators promptly addressed alarms, referred to the annunciator response procedures, and informed supervisors of alarms. The inspectors noted that unit supervisors minimized control room distractions, clearly directed personnel, clearly communicated personnel assignments and plant status during shift briefings, and effectively controlled evolutions.

In addition to the above attributes observed during normal operations, the inspectors noted that the operators with specific testing responsibilities demonstrated a heightened-level-of-attentiveness to critical parameters associated with the systems being tested. For example, during the performance of surveillance tests on a diesel generator, the inspectors observed the operator assigned to run the diesel generator frequently monitor the associated safety-related bus voltage, frequency, and load during the period when the diesel was connected to the bus. Also, during the special test to determine the maximum reactive load capability of the main generators, the inspectors observed operators frequently monitoring generator capability curves and safety-related bus voltages. While following the test procedure the operators kept the unit nuclear station operator informed of changes to the plant's configuration and critical plant parameters. The inspectors noted that the unit nuclear station operator did not allow himself to become distracted by the testing and maintained oversight of the unit.

c. Conclusions

The inspectors observed control room operators throughout the inspection period and concluded that operators routinely performed good turnover briefings, control board operations, response to alarms, and three-way communications. The unit supervisors demonstrated good performance in the minimization of control room distractions, in the direction of personnel, in the conduct of briefings, and in the control of evolutions. The inspectors concluded that the control room operators assigned to perform surveillance and special tests kept the unit nuclear station operator informed of plant changes and the unit nuclear station operator was not distracted from his responsibility of unit oversight.

O1.3 New Fuel Receipt

a. Inspection Scope (71707)

The inspectors observed the performance of fuel handling personnel during the receipt of new nuclear fuel for Refueling Outage A2R07. The inspectors discussed the handling of new fuel with fuel handling personnel and reviewed the following procedures:

- Braidwood Fuel Handling Procedure (BwFP) FH-1, "New Fuel Receipt," Revision 8E1;
- BwFP FH-2, "New Fuel Inspection," Revision 5E1;
- BwFP FH-3, "New Fuel Transfer To/From Storage Vault," Revision 4; and
- Nuclear Station Procedure (NSP) WC-3008, "Foreign Material Exclusion," Revision 1.

b. Observations and Findings

On March 10, the inspectors observed the performance of fuel handling personnel during the receipt of new nuclear fuel for Refueling Outage A2R07. The inspectors checked the tamper indicating devices fastened to the exterior of the shipping container and noted all were intact and there were no signs of tampering. The inspectors verified

that fuel handling personnel had established foreign material exclusion areas in the new fuel unloading area and in the area of the new fuel storage vaults. The inspectors noted that personnel entering these areas complied with the posted entry requirements.

The inspectors observed the movement of the shipping containers from the truck to the new fuel unloading area noting careful handling by personnel. The inspectors verified that the shipping containers were placed in the upending area, opened, and the fuel upended in accordance with BwFP FH-1. The inspectors observed the attachment of the Dillon Load Scale and the new fuel handling tool, and noted that fuel handling personnel monitored the Dillon Load Scale during the movement of fuel to the new fuel storage vaults.

The inspectors observed fuel handling personnel perform an inspection of the new fuel prior to insertion into the new fuel vault. The inspectors verified that fuel handling personnel were properly using the check sheet required by BwFP FH-2T1, "New Fuel Data Table." The inspectors determined that fuel handling personnel performing new fuel inspections were knowledgeable of the attributes listed on the check sheet. The inspectors also noted that the fuel handling supervisor directly supervised the movement and inspection of new fuel, maintained tag boards, and properly documented these activities in accordance with the requirements specified in BwFP FH-1, BwFP FH-2, and BwFP FH-3.

c. Conclusions

The inspectors observed fuel handling personnel during the receipt of new nuclear fuel for Refueling Outage A2R07 and concluded that fuel handling personnel had properly established foreign material exclusion areas; carefully moved and opened fuel shipping containers; carefully upended fuel elements; closely monitored the Dillon Load Scale during movement of the fuel to the fuel storage vaults; and carefully inspected the new fuel using check sheets from the new fuel inspection procedure. Fuel handling personnel were knowledgeable of new fuel inspection requirements. The fuel handling supervisor directly supervised the movement and inspection of new fuel, maintained tag boards, and properly documented fuel receipt activities in accordance with the applicable procedures.

O2 Operational Status of Facilities and Equipment

O2.1 Unit 0 Boric Acid Pump Suction Valve Mispositioning

a. Inspection Scope (71707)

The inspectors reviewed the circumstances regarding the mispositioning of 1AB8465 the Unit 0 boric acid pump suction valve from the Unit 1 boric acid tank.

b. Observations and Findings

Operations personnel added boric acid to the Unit 2 boric acid tank three times between March 20 and March 27 using Braidwood Operations Procedure BwOP AB-7, "Transfer of the Boric Acid Batching Tank to Unit 2 Boric Acid Tank," Revision 10. The Unit 1 boric acid pump had high vibrations and was valved out of service and the Unit 0 boric acid pump was valved in to supply boric acid to Unit 1 from the Unit 1 boric acid tank.

Procedure BwOP AB-7 called for the use of the Unit 2 boric acid pump to transfer boric acid from the batch tank to the Unit 2 boric acid tank but also had valve alignment steps to be followed if the 0 boric acid pump was lined up for operation to Unit 1. Procedure BwOP AB-7, Step F.1.e required closing 1AB8465, the suction valve to the Unit 0 boric acid pump from the Unit 1 boric acid tank. However, upon completion of the procedure the valve restoration did not include reopening 1AB8465.

On March 20, non-licensed operators added boric acid to the Unit 2 boric acid tank using BwOP AB-7. The non-license operators did not report any procedure problems and later stated to the inspectors that procedure BwOP AB-7 was followed. Following the procedure would have left 1AB8465 closed making it impossible to automatically add boric acid to Unit 1. However, unit operator logs indicated that boric acid was added to Unit 1 several times between March 20 and March 24. There was no non-licensed operator log entry or problem identification form written to indicate that someone else found 1AB8465 closed and opened it. The non-licensed operators did not identify that the procedure did not adequately restore the valve lineup for the Unit 0 boric acid pump upon completion of adding boric acid to the Unit 2 boric acid tank. This indicated a lack of awareness of system operating conditions by the non-licensed operators. The inability to explain how 1AB8465 was opened demonstrated a lack of positive administrative control over the valve.

On March 24, non-licensed operators again added boric acid to the Unit 2 boric acid tank using BwOP AB-7. This time, upon system restoration, the operators identified that 1AB8465 should have been left opened to maintain system operating conditions. The non-licensed operators informed the work execution center supervisor that the procedure was in error and the non-licensed operator left the valve open. The work execution center supervisor stated that he submitted a procedure change request and spoke directly to the operations procedure change coordinator. The work execution center supervisor also stated that due to amount of work at the end of shift time he forgot to turn the procedure problem over to either the oncoming work control supervisor, the unit supervisor, or the shift manager. The inspectors reviewed BwAP 100-20, "Procedure Use and Adherence," Revision 10, and determined that the operators were in compliance with the procedure requirements. Procedure BwAP 335-1,"Operating Shift Turnover Relief," Revision 14E1, had no requirements for work execution center supervisor turnover. The communication between the work execution supervisor and the operations procedure change coordinator should have been adequate to initiate a procedure change in a timely manner. However, the priority of the change to procedure BwOP AB-7 was not clearly communicated between the work execution center supervisor and the operations procedure change coordinator. Consequently, BwOP AB-7 was not changed before the next addition of boric acid to the Unit 2 boric acid tank on March 27.

On March 27, non-licensed operators again added boric acid to the Unit 2 boric acid tank using BwOP AB-7. The non-licensed operators that performed the addition of boric acid to the Unit 2 boric acid tank did not recognize the procedure error that had been previously identified and 1AB8465 was left closed upon the completion of the addition of boric acid to the Unit 2 boric acid tank. The mispositioned valve was identified between two and three hours later when there was an automatic makeup to the Unit 1 volume control tank and the Unit 1 nuclear station operator noticed that there was no boric acid flow. In addition, the non-licensed operators stated that 1AB8465 was found closed when they began the evolution. There was no non-licensed operator log entry or

problem identification form written to indicate that someone else found 1AB8465 open and closed it. There was no addition of boric acid to Unit 1 between March 24 and March 27 to indicate if 1AB8465 was open or closed during that time. The inability to explain how 1AB8465 was closed again demonstrated a lack of positive administrative control over the valve. Emergency Operating Procedure 1BwFR-S.1, "Response to Nuclear Power Generation/ATWS [anticipated transient without scram]," Revision 1, Step 4.b.2, required emergency boration using the boric acid pump. An automatic emergency boration of Unit 1 could not have been performed without delay with the 1AB8465 closed and operation of the pump with the suction isolated could have resulted in damage to the pump.

Technical Specification 5.4.1 states, in part, that written procedures shall be established, implemented, and maintained covering the applicable procedures recommended in Appendix A of Regulatory Guide 1.33, Revision 2, February 1978. Regulatory Guide 1.33, Appendix A, states that there shall be instruction for changing modes of operation for the chemical and volume control system. The boric acid pumps and associated valves are part of the chemical and volume control system as stated in the Updated Final Safety Analysis Report, Section 9.3.4.

On March 20, 24, and 27, 1999, the Unit 0 Boric Acid Pump was the pump required to be lined up to provide boric acid to Unit 1.

Procedure BwOP AB-7, "Transfer of the Boric Acid Batching Tank to Unit 2 Boric Acid Tank," Revision 10, Step F.1.e of BwOP AB-7, stated, "Verify/Close 1AB8465," (the Unit 0 boric acid pump suction from the Unit 1 boric acid tank) but did not specify that 1AB8465 be reopened.

Contrary to the above, on March 20, 24, and 27, 1999, the licensee failed to establish a written procedure for the transfer of boric acid to the Unit 2 boric acid tank, BwOP AB-7, "Transfer of the Boric Acid Batching Tank to Unit 2 Boric Acid Tank," Revision 10, in that after Step F.1.e. required the operator to close 1AB8465 and the restoration instructions did not require the re-opening of valve 1AB8465 to restore a flow path from the Unit 1 boric acid tank to Unit 1 reactor coolant system.

This Severity Level IV violation is being treated as a non-cited violation (50-456/457/99006-01(DRP)), consistent with Appendix C of the NRC Enforcement Policy. This violation is in the licensee's corrective action program as Problem Identification Form (PIF) A1999-00834.

c. Conclusions

Between March 20 and March 27, the position of 1AB8465, a suction valve to the Unit 0 boric acid pump which was required for the emergency boration of Unit 1, was poorly controlled. A procedure error in BwOP AB-7, "Transfer of the Boric Acid Batching Tank to Unit 2 Boric Acid Tank," Revision 10, regarding the correct position of the valve upon completion of the procedure, went unnoticed by non-licensed operators twice. On one occasion non-licensed operators noted the procedure error regarding the correct position of the valve at the conclusion of the procedure and notified their supervisor. However, due to unclear communication between the work execution center supervisor and an operations procedure writer, BwOP AB-7 was not corrected before the next time

it was used. Procedure BwOP AB-7 was not properly maintained which was a Non-Cited Violation of Technical Specification 5.4.1.

II. Maintenance

M1 Conduct of Maintenance

M1.1 Unit 2A Containment Spray (CS) Pump Motor Bearing Replacement

a. Inspection Scope (62707)

The inspectors observed portions of two separate maintenance activities (Work Request (WR) 970025008-01 and 950041446) which included measurements of thrust bearing movement on the 2A CS pump motor and resulted in removal of the motor and the pump to replace the bearings. The inspectors reviewed the work packages and the following procedures: BwAP 100-12, Revision 5; NSP-WC-3006, "On Line Maintenance," Revision 1; BwMP 3400-004, "Calibration of Distance Measuring Equipment," Revision 0; and BwAP 400-4, "Control of Portable Measurement and Test Equipment," Revision 12.

b. Observations and Findings

The licensee measured motor axial end play on the 2A CS pump in response to a problem identified at another station where bearings were found to be incorrectly installed. The inspectors observed the craft personnel jack the motor and using a dial indicator to measure shaft end play. The end play measurement was not within acceptance criteria established in the work instructions and the maintenance technicians left to discuss the problem. The inspectors identified that the calibration sticker for the dial indicator had expired the previous month. Procedure BwAP 400-4, "Control of Portable Measurement and Test Equipment," Revision 12, Step F.4.c, stated, "On a monthly basis, the maintenance and test equipment coordinator will generate and distribute to the responsible person in each department a list designating equipment due for certification/calibration." Maintenance management personnel stated that the dial indicator in question was not calibrated in accordance with the scheduled periodicity because it could not be found at the time the monthly calibration notification was made. Title 10 of the Code of Federal Regulations, Part 50, Appendix B, Section XII states that measures shall be established to assure that tools, gages, instruments, and other measuring and testing devices used in activities affecting quality are properly controlled, calibrated, and adjusted at specified periods to maintain accuracy with necessary limits. This one failure constitutes a violation of minor significance and is not subject to formal enforcement action.

Work Request 970025008-01, Step 3A-3, required the use of a dial indicator to read and record total lift of the shaft. Step 3A-3 did not specifically require the use of a calibrated dial indicator. The inspectors asked one of the electricians if the past due calibration was noticed and the electrician answered yes but a calibrated dial indicator was not called for in the work instructions. Licensee maintenance management personnel stated that their expectation was that electricians know that only calibrated measuring and test equipment was to be used for work on safety related equipment. Since the CS pumps are safety related, the individual was retrained on proper use of calibrated equipment, and the maintenance department was briefed on this issue.

Maintenance procedure, BwMP 3400-004, "Calibration of Distance Measuring Equipment," Revision 0, Step F.7, contained a caution statement that required the dial indicator calibration be rechecked after use in a safety-related application. The dial indicator was used in a safety-related application but WR 970025008-01 did not require the post maintenance calibration check to be performed. The dial indicator was post maintenance calibration checked because of questions raised by the inspectors. The dial indicator passed the post maintenance calibration check. This one failure constitutes a violation of minor significance and is not subject to formal enforcement action.

The licensee decided to replace the lower motor bearing on the 2A CS pump because the bearing end play readings were out-of-specification. During the pump removal, the pump impeller could not be removed from the pump shaft. Since the work could not continue without pump impeller removal, the licensee decided to reinstall the pump and perform an operability evaluation on the out of specification pump end play. The licensee determined that the end play reading obtained could be acceptable depending on the bearing configuration. The pump will be removed from service again in June to determine the bearing configuration.

c. Conclusions

The inspectors identified several weaknesses in the control of measurement and test equipment during a maintenance activity on the 2A containment spray pump. An electrician demonstrated a lack of knowledge of the requirements for use of maintenance and test equipment on safety-related components. The maintenance department demonstrated an example of poor control of maintenance and test equipment by being unable to find a piece of equipment when it was due for calibration and then using it later on safety-related equipment. The work package used to measure 2A CS pump end play was weak in that it did not include instruction to perform required post maintenance calibration checks on the maintenance and test equipment used.

M1.2 Observation of Miscellaneous Surveillance Activities

a. Inspection Scope (61726)

The inspectors observed all or portions of the following surveillance activities:

- Unit 2 Braidwood Operating Surveillance Procedure (2BwOSR) 3.3.5.1-1, "Bus 241 Undervoltage Protection Monthly Surveillance," Revision 0;

- 2BwISR 3.3.1.10-M204, "Operational Test and Channel Verification/Calibration for Loops 2T-0441 and 2T0442," Revision 1E3;

- Unit 1 Braidwood Engineering Surveillance Procedure (1BwVSR) 5.5.8.SI.1, "ASME [American Society of Mechanical Engineers] Surveillance Requirements for the 1A Safety Injection Pump," Revision 1E1.

The inspectors reviewed the following completed surveillance procedures:

- Braidwood Engineering Surveillance Procedure (BwVS) Technical Requirements Manual (TRM) 3.3.b, "Seismic Instrumentation 92 And 184 Day Operability Verification," Revision 0, performed on February 2; and

- BwVS TRM 3.3.b.r, "Seismic Instrumentation Event Data Retrieval Surveillance," Revision 0, performed on March 28.

b. Observations and Findings

During this inspection period, the inspectors observed the performance of the above listed surveillance tests. For each surveillance test, the inspectors observed the establishment of initial conditions required for the surveillance test, the operation of equipment, the communications between the licensed operators in the control room and non-licensed operators in the plant, and the restoration of affected equipment. The inspectors determined that each of these activities were performed in accordance with the applicable procedure. The inspectors reviewed the data obtained during the surveillance tests and noted that it met the required acceptance criteria specified in the surveillance test procedures. The inspectors also reviewed the associated portions of the Updated Final Safety Analysis Report and the Improved Technical Specifications and determined that the surveillance test procedures demonstrated the systems performed as designed.

The inspectors performed an assessment of the site's seismic monitoring instrumentation. During the assessment, the inspectors reviewed the completed surveillance procedures listed above and determined that the surveillance tests were performed prior to their critical date, and contained acceptance criteria addressing Improved Technical Specification requirements. The inspectors noted that the data obtained during the performance of the seismic instrumentation surveillance procedures supported system operability.

c. Conclusions

The inspectors concluded that the three surveillance tests observed adequately tested the systems, the operators followed the procedures, and that the procedures included the required surveillance testing described in the Improved Technical Specifications. Additionally, the inspectors concluded that the two completed seismic instrumentation surveillance procedures that were reviewed by inspectors contained acceptance criteria that addressed Improved Technical Specification requirements, and supported system operability.

M2 Maintenance and Material Condition of Facilities and Equipment

M2.1 Material Condition Problems

a. Inspection Scope (61707)

The inspectors reviewed three equipment failures that impacted operations this inspection period.

b. Observations and Findings

The first equipment failure the inspectors reviewed which impacted operations was a waterhammer on the Unit 2B low pressure feedwater heater string. The licensee was isolating the 25B feedwater heater to perform scheduled maintenance. In order to secure the 25B feedwater heater, the normal drain valve from the 26B feedwater heater required to be closed. In order to close the normal drain valve, the level in the 26B feedwater heater must be controlled by the emergency drain valve which sends the water directly to the condenser. The emergency drain valve actuator of the 26B feedwater heater did not respond as expected which resulted in a high water level in the 26B feedwater heater and an extraction steam isolation. When the 26B emergency drain valve finally opened, level dropped and extraction steam was reinitiated. A water hammer resulted that damaged several extraction steam pipe hangers and instrument air lines. The secondary plant transient resulted in an addition of positive reactivity due to the addition of colder feedwater. Unit 2 reactor power level rose to about 100.8 percent for a short period of time which was within the acceptable guidance and control rods stepped out in automatic about four steps to maintain primary plant temperature.

The second equipment failure that the inspectors reviewed which impacted operations was during the restoration to service of the 26B feedwater heater, the opening of a manual isolation valve downstream of the 26B feedwater heater emergency drain valve caused a minor water hammer that affected the 26B feedwater heater level controllers. The water hammer was apparently cause by water in the drain line leaking past the emergency drain valve. This caused an isolation of the 26B feedwater heater and eventually the 27B feedwater heater. This secondary plant transient caused reactor power to increase up to 101.8 percent for about 20 minutes which was also within acceptable guidelines.

The third equipment failure that the inspectors reviewed which impacted operations was a failure of the Unit 1 heater drain tank rupture disc. This was a pressure relieving device between the heater drain tank and the condenser. The repair could not be made with a vacuum in the condenser so the unit was taken off line on April 5. The licensee determined that the rupture disc failed because of the collection of condensation on the disc and performed a modification to the disc to prevent further collection of condensation. The licensee was still investigating the root cause at the end of the period.

The licensee aggressively undertook root cause investigations into each occasion. No work was allowed on feedwater heaters for an indefinite period until all the causes of the waterhammer events were identified and addressed.

c. Conclusions

Three secondary plant material condition problems resulted in transients that impacted reactor power levels this period. The licensee's root cause approach into the secondary plant failures was aggressive but was not completed for review by the end of the inspection period.

IV. Plant Support

R1 Radiological Protection and Chemistry (RP&C) Controls

R1.1 Radiation Protection Briefing On The 2A CS Pump Removal

a. Inspection Scope (71750)

The inspectors attended the radiation protection as-low-as-reasonably-achievable (ALARA) briefing prior to maintenance on the 2A CS Pump.

b. Observations and Findings

The inspectors attended the pre-job ALARA briefing for the repair of 2A CS pump and motor. The appropriate individuals attended the meeting. The radiation conditions present at the job site, radiation work permit requirements, communications between different work areas, and specific actions to reduce the spread of contamination were discussed. There were an appropriate number of radiation protection technicians assigned to cover the maintenance activities.

c. Conclusions

The as-low-as-reasonably-achievable briefing for the repair of 2A CS pump and motor provided complete and useful information to the workers performing the task.

R1.2 Review of Chemical Analyses Required by Improved Technical Specification

a. Inspection Scope (71750)

The inspectors reviewed results of the following chemical analyses performed in March 1999 and the associated technical specifications:

- Unit 1 and Unit 2 dose equivalent iodine;
- Unit 1 and Unit 2 reactor coolant gross specific activity;
- Unit 1 and Unit 2 safety injection accumulator boron concentration;
- Unit 1 and Unit 2 reactor water storage tank born concentration;
- Unit 1 and Unit 2 spray additive solution concentration;
- Spent fuel pool boron concentration; and
- Secondary specific activity.

The inspectors discussed the results of the previously listed analyses with chemistry personnel.

b. Observations and Findings

The inspectors obtained the results of the previously listed chemical analyses for the month of March and performed a review of the results. The inspectors compared the results to the applicable Improved Technical Specification acceptance criteria and noted that all chemical analyses met their associated acceptance criteria. The results of the chemical analyses were clearly documented.

c. Conclusions

The inspectors reviewed the results of several chemical analysis that were conducted in March 1999. The inspectors concluded that the results of all analyses met Technical Specification acceptance criteria.

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 April 13, 1999. 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.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

*M. Cassidy, Regulatory Assurance - NRC Coordinator
*R. Graham, Work Control Manager
L. Guthrie, Maintenance Manager
A. Haeger, Radiation Protection Manager
*T. Luke, Engineering Manager
*K. Schwartz, Station Manager
*T. Simpkin, Regulatory Assurance Manager
T. Tulon, Site Vice President
R. Wegner, Operations Manager

NRC

J. Adams, Resident Inspector
M. Jordan, Chief, Reactor Projects Branch 3
D. Pelton, Resident Inspector
*C. Phillips, Senior Resident Inspector
T. Tongue, Project Engineer

IDNS

J. Roman

* Denotes those who attended the exit interview conducted on April 13, 1999.

INSPECTION PROCEDURES USED

IP 61726:	Surveillance Observations
IP 62707:	Maintenance Observation
IP 71707:	Plant Operations
IP 71750:	Plant Support Activities
IP 93702:	Prompt Onsite Response to Events at Operating Power Plants

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-456/99006-01; 50-457/99006-01 NCV failure to follow procedure

Closed

50-456/99006-01; 50-457/99006-01 NCV failure to follow procedure

Discussed

None

LIST OF ACRONYMS USED

ALARA	As-Low-As-Reasonably-Achievable
ASME	American Society of Mechanical Engineers
ATWS	Anticipated Transient Without Scram
BwISR	Braidwood Instrument Surveillance Procedure
BwAP	Braidwood Administrative Procedure
BwFP	Braidwood Fuel Handling Procedure
BwFR	Braidwood Emergency Operating Procedure
BwGP	Braidwood Startup/Shutdown Procedure
BWOSP	Braidwood Operating Surveillance Procedure
BwOP	Braidwood Operating Procedure
BwVS	Braidwood Engineering Procedure
CFR	Code of Federal Regulations
CS	Containment Spray
DRP	Division Reactor Projects
EP	Emergency Preparedness
NRC	Nuclear Regulatory Commission
NRR	Nuclear Reactor Regulations
NSP	Nuclear Station Procedure
PIF	Problem Identification Form
psig	Pounds Per Square Inch Gauge
RP	Radiation Protection
RP&C	Radiological Protection & Chemistry
RVLIS	Reactor Vessel Level Indicating System
TRM	Technical Requirements Manual
VIO	Violation
WR	Work Request