

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

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Report No: 50-456/96012; 50-457/96012

Licensee: Commonwealth Edison (ComEd)

Facility: Braidwood Nuclear Plant, Units 1 and 2

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

Dates: July 27 through September 6, 1996

Inspectors: C. Phillips, Senior Resident Inspector  
M. Kunowski, Resident Inspector  
E. Cobey, Resident Inspector  
T. Esper, Illinois Department of Nuclear Safety

Approved by: Lewis F. Miller, Jr., Chief  
Reactor Projects Branch 4

## EXECUTIVE SUMMARY

Braidwood Nuclear Plant, Units 1 & 2  
NRC Inspection Report 50-456/96012; 50-457/96012

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

### Operations

- On August 14, operators failed to close 1D0001D, the 1D diesel generator fuel oil storage tank inlet isolation valve, and failed to verify the valve closed on August 16. The failure to ensure the valve was closed resulted in an inadvertent transfer of about 2000 gallons of diesel fuel oil between outside storage tanks and the 1B and 1D diesel fuel oil tanks on August 16 while operators were trying to fill the 1B diesel-driven auxiliary feedwater pump day tank.
- On August 21, the inspectors identified that independent verification of valve manipulations performed during the 2B DG operability monthly surveillance was not conducted as required by the surveillance procedure. Subsequent interviews by the inspectors of several operators indicated the operators were not familiar with the requirements of Braidwood Administrative Procedure BwAP 100-18, "Independent Verification."
- On August 25, valve 1AB8478, the Unit 1 boric acid tank recirculation throttle valve, was found mispositioned open during the performance of procedure BwOP AB-6, "Transfer Of The Boric Acid Batching Tank To Unit 1 Boric Acid Tank." The licensee concluded the valve had been mispositioned the previous day during an earlier performance of BwOP AB-6. The inspectors concluded that the failure to throttle and close 1AB8478 was due to a personnel error.

### Maintenance

- On July 31, the inspectors identified the section of the surveillance procedure used to perform the monthly operability run required the operator to start the diesel in accordance with BwOP-11, "DG Startup." BwOP-11 required the operator to manually cycle 1SX169A, the essential service water valve to diesel jacket water cooling valve, prior to the diesel generator start. The inspectors concluded that cycling 1SX169A prior to the start of the diesel was preconditioning the diesel generator.

- The inspectors observed instrument maintenance (IM) personnel perform surveillance test Bwis 6.4.1-200, "Analog Operational Test/Surveillance Calibration of Containment Hydrogen Monitoring Analyzer Indicating Loop, for 1PS48J, Train B Containment Hydrogen Monitor," and concluded that the IM personnel understood the task, utilized good work practices, and followed plant procedures.

#### Engineering

- The inspectors identified that control room drawings that were marked as "AUTHORIZED FOR USE" were not up to date and had no indication that a revision was pending, and were being used in the control room for work involving troubleshooting and preparing out-of-service boundaries. In addition, the licensee identified a backlog of 65 completed modifications involving over 2000 drawings which had not been updated. The inspectors concluded the backlog of out-of-date drawings was a significant weakness.

#### Plant Support

- The inspectors observed during frequent routine tours that contaminated and high radiation areas were clearly marked, that general areas and emergency core cooling pump rooms were clean and free of debris, and that leakage of potentially contaminated liquid was minimal and properly contained.

## Report Details

### Summary of Plant Status

Unit 1 entered the period at or near 100 percent power and operated routinely for nearly the entire period. The unit began a ramp down to full shutdown at 8:00 p.m. on September 6 to repair steam leaks on the C and D steam generators.

Unit 2 entered the period at or near 100 percent power and operated routinely until July 29, at 1:00 p.m. At this time, the licensee reduced power to 42 percent due to a leaking safety injection system relief valve (paragraph 01.1). The relief valve was gagged and Unit 2 was returned to 100 percent power at 7:00 a.m. on July 30 and operated at or near 100 percent power for the remainder of the period.

## I. Operations

### 01 Conduct of Operations

#### 01.1 Unit 2 Power Reduction Due To Safety Injection (SI) Relief Valve Leakage

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

On July 29, during the performance of BwVS 5.2.f.2-1, "ASME Surveillance Requirements for the 2A SI Pump," the safety injection relief valve, 2SI8851, lifted which caused both trains of SI to be potentially inoperable. The relief valve was on a common header for both SI trains. As a result, the licensee entered Technical Specification (TS) 3.0.3 and commenced reducing power in preparation for a plant shutdown to less than 350°F. The licensee subsequently made a one hour non-emergency report in accordance with 10 CFR 50.72(b)(1)(i)(A). The inspectors attended several planning meetings and observed several tests associated with the valve lifting.

##### b. Observations and Findings

Prior to plant shutdown, the licensee determined that the relief valve, 2SI8851, could be gagged shut and both trains of SI declared operable, based on engineering judgement that the two remaining relief valves in the system were sufficient to provide over-pressure protection. This action was approved by the Plant Operations Review Committee and the plant shutdown was subsequently terminated. The licensee initiated a Level II Problem Identification Form (PIF) to investigate and determine the root cause of this event.

##### c. Conclusions

The inspectors concluded the licensee's decisions regarding the Unit 2 power reduction, engineering evaluation, and return to power were appropriate.

## 02 Operational Status of Facilities and Equipment

### 02.1 Essential Service Water (SX) System

#### a. Inspection Scope (71707)

The inspectors reviewed the SX system, including system lineups and drawings, and the design bases in the updated final safety analysis report. The inspectors also performed a walkdown of the system and safety-related components cooled by the system for proper configuration. In addition to SX system piping and components, safety-related components checked for proper configuration included diesel generator coolers, component cooling water system heat exchangers, diesel and motor driven auxiliary feedwater pump coolers, centrifugal charging pump coolers, SI pump coolers, residual heat removal pump coolers, spent fuel pool cooling pump coolers, and primary containment refrigeration units. The inspectors also interviewed the SX system engineer and site engineering personnel.

#### b. Observations and Findings

The inspectors performed a walkdown of the SX pump rooms and noted the following items:

- The condition of the floors and walls was good and had improved since repairs for ground water leakage were completed.
- Previously identified seal leaks on the pumps were repaired. The walkdown revealed only one small water leak (packing leak on 1A0V-SX178, the SX return from auxiliary feedwater pump 1B heat exchangers isolation valve) which was contained and properly routed to a floor drain.
- Action requests (ARs) had been generated and AR identification tags were in place for items requiring repair or preventive maintenance (PM). There were about 20 AR tags found in the 1B & 2B SX pump room and about 16 AR tags found in the 1A & 2A SX pump room. Conditions addressed on the AR tags included oil leaking from motor operated valve (MOV) operators, incorrectly set MOV limit switches, minor SX pump bearing oil leaks, missing/damaged insulation, and a valve replacement PM task required.
- The 1B SX pump suction strainer must be manually backwashed due to an auto timer malfunction, as indicated by caution tag 95-1-0626 hung on October 3, 1995.
- Tools, hoses, and equipment were stored in a back corner of the 1A and 2A SX pump room. The tools and equipment were not in use and no work was in progress in the area. This condition was reported to the operating shift.

- All items on the system requiring maintenance were identified by AR tags, which indicated that operations and engineering personnel were monitoring the system.

The SX system and associated components were aligned as required by BwOP SX-M1, "Unit 1 Operating Mechanical Alignment," and BwOP SX-M2, "Unit 2 Operating Mechanical Alignment."

c. Conclusions

The inspectors concluded the following:

- The overall material condition of the SX system was satisfactory with an improving trend.
- The housekeeping in the SX pump rooms was acceptable.
- The alignment of the SX system components was good.

04 **Operator Knowledge and Performance**

04.1 Overfill of the 1B and 1D Diesel Generator (DG) Oil Storage Tanks

a. Inspection Scope (71707)

On August 16, the 1B and 1D DG fuel oil storage tanks were overfilled. The licensee was unable to determine how much oil was spilled. However, the inspectors estimated about 2000 gallons of fuel was inadvertently transferred from outside tanks to the inside 1B and 1D tanks because of a valve mispositioning. The inspectors reviewed the licensee's prompt investigation report of the event; walked down the valve locations; reviewed BwOP DO-13, "Filling the Unit 1 Diesel Auxiliary Feedwater Pump Day Tank From The 125,000 or 50,000 Gallon Fuel Oil Tanks," and BwOP DO-7, "Filling a Unit 1 DG Storage Tank From The 50,000 or 125,000 Gallon Fuel Oil Storage Tank"; interviewed one of the operators involved in the event; and discussed the event with operations management.

b. Observations and Findings

The licensee's prompt investigation report stated the following:

- the 1B and 1D DG fuel oil storage tanks were filled on August 14;
- the supply isolation valve (1D0001D) to the 1D DG fuel oil storage tank was left throttled open on August 14, when it should have been closed, per step F.22 of BwOP DO-7, due to an incomplete turnover by operators and an incorrect valve position verification by an operator after filling the DG fuel oil storage tanks;
- licensee personnel were attempting to fill the 1B auxiliary feedwater pump day tank on August 16 which shares a common fill line with the 1B and 1D DG fuel oil storage tanks;



- 1D0001D was required to have been verified closed by BwOP DO-13 prior to the start of filling the 1B auxiliary feedwater pump day tank and the operator incorrectly verified the valve closed on August 16 by visually observing the stem position instead of physically checking the valve shut;
- the operator that checked the valve shut on August 16 understood that a visual verification of valve position was acceptable; and
- the excess fuel oil was collected in the fire and oil sump which was later flushed to the waste water treatment system.

The inspectors interviewed the operator that checked the 1D0001D shut on August 16. He stated that he thought, at the time, it was acceptable to visually verify a valve position. However, operations management later stated to the inspectors that visual verification of valve position did not meet their expectations.

The licensee performed the following corrective actions:

- All crews of non-licensed operators were taken into the field and instructed on how to properly verify the position of a valve.
- The operators involved with filling the 1B and 1D diesel fuel oil tanks and the 1B diesel-driven auxiliary feedwater pump day tank were counselled.
- Operations training staff were instructed on valve position verification.

The inspectors reviewed diesel fuel oil tank readings from August 15 and concluded that licensee personnel inadvertently transferred about 2000 gallons of fuel oil from outside fuel oil tanks to inside fuel oil tanks on August 16 because 1D0001D was mispositioned.

#### c. Conclusions

The inspectors concluded that the failure to close 1D0001D on August 14 and verify the valve was closed on August 16 was a violation of 10 CFR 50, Appendix B, Criterion V. This licensee identified and corrected violation is being treated as a Non-Cited Violation, consistent with Section VII.B.1 of the NRC Enforcement Policy (50-456/96012-01).

Valve mispositionings and configuration control weaknesses were discussed in Inspection Report 96005. Five violations were issued and a civil penalty was assessed. Unclear expectations regarding the manipulation and independent verification of valves was not identified at the time as a root cause; therefore, no corrective actions were proposed.

The inspectors also concluded that the operations personnel interviewed were unaware of management expectations to physically check a valve in its proper position were not clearly communicated to operations personnel.

04.2 Improper Independent Verification of Valve Manipulations During DG Surveillance Testing

a. Inspection Scope (61726)

The inspectors observed the monthly operability surveillance for the 2B DG on August 21, which was performed in accordance with 2BwOS 8.1.1.2.a-2, "2B DG Operability Monthly (Staggered) And Semi-annual (Staggered) Surveillance," BWOP-11, "DG Startup," and BWOP-12, "DG Shutdown."

b. Observations and Findings

During the performance of 2BwOS 8.1.1.2.a-2, the inspectors identified that independent verification of valve manipulations performed in steps F.9.7 through F.9.9 was not conducted. These steps required independent verification of the manipulation of the 2B DG day tank instrument leg drain valve (2D02116B), the 2B DG starting air receiver drain valves (2SA147B/D), and the 2B DG starting air separator drain valves (2SA141B/D).

Braidwood Administrative Procedure BWAP 100-18, "Independent Verification," required independent verification of proper system alignment during the performance of safety-related surveillances. In addition, BWAP 100-18 required the type of independent verification to be "apart-in-action" which was defined as each individual had to independently verify that the action to be taken was correct prior to taking the action and then verify that the correct action was taken. However, the operator performing the valve manipulations did not independently verify the position of any of the valves upon completion of their operation. The independent verification performed consisted of one operator watching the other perform the evolution without performing any specific action which would have verified that the proper action had occurred.

Subsequent interviews of the two operators who performed the independent verification and two senior reactor operators (SROs) from the same operating crew revealed the following:

- The operators stated they did not understand that they were required to independently perform the same actions.
- The operators stated that if they knew what the valve was, checking the valve label was not required.
- The operators and at least one SRO knew that there was guidance on how to perform independent verifications but did not know in what procedure it could be found.



- The operators could not remember the last time they were trained on independent verification.

In response to the inspectors concerns, the licensee discussed independent verification with all the operations crews during shift turnovers. During this discussion, the procedural requirements of BWAP 100-18 were reviewed.

c. Conclusions

The inspectors concluded that the failure to perform independent verification of valve manipulations as specified in the surveillance procedure was a violation of 10 CFR 50, Appendix B, Criterion V (50-457/96012-02a). The inspectors also concluded that the operators did not understand how to correctly perform independent verification in accordance with BWAP 100-18, "Independent Verification."

04.3 Unit 1 Boric Acid Tank Recirculation Throttle Valve Mispositioned

a. Inspection Scope (71707)

On August 25, valve 1AB8478, the Unit 1 boric acid tank recirculation throttle valve, was found opened instead of closed, by the licensee, during the performance of procedure BWOP AB-6, "Transfer Of The Boric Acid Batching Tank To Unit 1 Boric Acid Tank." Licensee personnel performed a prompt investigation into the event. The inspectors reviewed the investigation report, BWOP AB-6, BWAP 100-20, "Procedure Usage and Adherence," BWAP 100-18, "Independent Verification," and interviewed one of the operators involved in the event.

b. Observations and Findings

According to BWAP 100-20, the station had three procedure use categories:

- "Continuous Use" procedures required that each step be read prior to the performance of the step.
- "Reference Use" procedures required that the procedure be reviewed prior to the performance of the task, the procedure be available at the location, and stated that the procedure should be referred to, as needed, by the workers to ensure the steps were being performed in the proper order, and procedural steps should be signed off as the appropriate steps were completed.
- "Information Use" procedures should be reviewed prior to the performance of the task, the procedure should be available at the locations, and should be referred to, as needed, by the workers.

The licensee stated the following observations and findings in the prompt investigation report:

- BwOP AB-6 required that 1AB8478 be opened, throttled to a boric acid transfer pump discharge pressure between 105 and 111 pounds per square inch gauge (psig), and then closed after the boric acid transfer. BwOP AB-6 had last been performed on August 24, but valve 1AB8478 had not been throttled or closed at that time.
- BwOP AB-6 was an "Information Use" procedure. BwAP 100-20 stated that "Information Use" procedures should be reviewed before and after the task.
- BwAP 100-18 required that alignments of safety-related valves be independently verified to be in the correct position. Several safety-related components were manipulated during BwOP AB-6, but BwOP AB-6 did not require an independent verification of valve position upon completion of the evolution.
- 1AB8477, the isolation valve for 1AB8478, was closed as required and the Unit 1 boric acid tank recirculation loop was isolated as required on August 24.

One of the two operators involved in the evolution stated to the inspectors that he did not remember closing or checking closed 1AB8478 on August 24. The operator also stated to the inspectors that 1AB8478 was not throttled on August 24. The operator stated that the purpose of throttling the valve was to prevent pump runout should the control room inject boric acid into the unit during performance of BwOP AB-6. The operator also stated that in his nine years of experience the control room operators had never injected boric acid without first calling down to ensure the proper lineup of the system. The operator stated that throttling the valve was unnecessary and slowed down the evolution.

The licensee planned to take the following corrective actions: all operating procedures were reviewed for the realignment of safety-related valves; operating procedures involving safety-related valve manipulations would be made "Reference Use" procedures by October 15, 1996; and where appropriate, an independent verification requirement would be added to operating procedures by March 30, 1997. The operators involved in the performance of BwOP AB-6 on August 24, were counselled about their incorrect actions to not shut 1AB8478.

#### c. Conclusions

The inspectors concluded that the failure to throttle and close 1AB8478 on August 24 was a violation of 10 CFR 50, Appendix B, Criterion V. This licensee identified and corrected violation is being treated as a Non-Cited Violation, consistent with Section VII.B.1 of the NRC Enforcement Policy (50-456/96012-03).

The inspectors concluded that the failure to throttle and close 1AB8478 was due to a combination of a personnel error, the operator's belief that experience outweighed procedural requirements, and that BwOP AB-6 did not require an independent verification of safety-related valves.

#### 04.4 Conclusions on Operator Knowledge and Performance

The inspectors concluded that non-licensed operator performance indicated a lack of understanding of management expectations regarding valve position verification, independent verification requirements, and procedure adherence. The inspectors reviewed licensee prompt investigation documentation as discussed in paragraphs 04.1 and 04.3. Instructions on how to perform a prompt investigation were initiated after a previous investigation into an event (50-457/96009-02) was not initiated for several weeks afterwards. The inspectors concluded that in the case of the diesel oil tank overfill and the boric acid valve mispositioning the prompt investigation rapidly collected and documented good, accurate information.

#### 08 Miscellaneous Operations Issues (92700)

- 08.1 (Closed) Inspection Followup Item (IFI) 50-457/96009-02: No Valve Position Lights Lit For 2SI8801. The breaker for the motor operator for valve 2SI8801A, the charging pumps to cold leg injection isolation valve, was found not closed on May 14, 1996. The licensee's root cause analysis was unable to determine a cause for the change in the breaker's position.

The licensee identified the non-licensed operator who went to the breaker and returned it to service on May 14. The operator stated to the inspectors that in his opinion the breaker was in a tripped position, but he was not positive. The licensee performed an operability assessment of the breaker and discounted the operator's statement because no credible equipment failure mechanisms could be identified. Based on the assessment, the licensee concluded that the breaker was mispositioned, but no root cause for the mispositioning was identified. The licensee's root cause analysis stated that if the breaker were to be found in the tripped condition again it would be declared inoperable. The inspectors reviewed the root cause analysis and operability assessment and had no further concerns.

In Inspection Report 96009, the inspectors concluded that the progress of the licensee's investigation was slow based on a lack of any investigation into the event one month after it occurred. The licensee's corrective action was to issue guidance on what type of event would be included for prompt investigation, what information was to be gathered, and who was responsible for starting and conducting the investigation. The inspectors considered these corrective actions acceptable, and had no further concerns regarding the slowness of the investigation.

## II. Maintenance

### M1 Conduct of Maintenance

#### M1.1 Preconditioning of a DG SX Valve Prior to DG Surveillance Testing

##### a. Inspection Scope (61726)

The inspectors observed the monthly operability surveillance for the 1A DG on July 31, which was performed in accordance with 1BwOS 8.1.1.2.a-1, "1A DG Operability Monthly (Staggered) And Semi-annual (Staggered) Surveillance," BwOP-11, "DG Startup," and BwOP-12, "DG Shutdown."

##### b. Observations and Findings

The inspectors identified a concern regarding the preconditioning of 1SX169A, the DG SX cooling valve. Surveillance procedure 1BwOS 8.1.1.2.a-1, step F.2.5, required the DG to be started in accordance with BwOP DG-11, "DG Startup." The inspectors identified that prior to the DG start, BwOP DG-11, step F.1, required the verification of SX flow, which provided cooling to the DG jacket water system, by cycling 1SX169A, from the DG local control panel. This step was also utilized to verify the annunciator system was operable by verifying that the annunciators "MCC Not Proper for Auto Operation" and "ESS Service Water Flow Low" changed states when 1SX169A was cycled. This cycling resulted in the valve being tested prior to the DG start from the local control panel and during the DG start from the auto open circuit. The automatic opening of the 1SX169A valve upon a DG start was essential to the operability of the diesel generator.

##### c. Conclusions

The inspectors concluded that the cycling of 1SX169A prior to the DG constituted preconditioning of the diesel generator prior to performing a technical specification surveillance. 10 CFR 50, Appendix B, Criterion II, "Quality Assurance," requires in part that activities affecting quality shall be accomplished under suitably controlled conditions. Surveillance testing required by technical specifications to verify operability of equipment was an activity affecting quality. On numerous occasions, including July 31, 1SX169A was cycled prior to the DG start. This is considered a violation of 10 CFR 50, Appendix B, Criterion II, in that the technical specification surveillance testing was not accomplished under suitable conditions (50-456/96012-04). In addition, the inspectors noted that, similarly, the SX valves 1SX169B, 2SX169A, and 2SX169B for the 1B, 2A, and 2B DGs were also cycled prior to monthly starts.

## M1.2 Surveillance Test of 1PS48J, Train B Containment Hydrogen Monitor

### a. Inspection Scope (62707)

The inspectors observed two Instrument Maintenance (IM) technicians performing surveillance procedure BwIS 6.4.1-200, Analog Operational Test/Surveillance Calibration of Containment Hydrogen Monitoring Analyzer Indicating Loop, for 1PS48J, Train B Containment Hydrogen Monitor, for procedural and technical specification compliance.

### b. Observations and Findings

The inspectors noted the following items:

- Personnel were working to surveillance procedure and work package instructions.
- All instruments used were calibrated within the accuracy requirements of the test procedure and test report package. Instruments used in the test were of proper range and scale.
- The work area was well defined and all tools being used by IM personnel were stored neatly within the work area.
- Proper personal safety equipment (hard hats, safety glasses, ear plugs, gloves) was used by IM personnel.
- Control room personnel were notified before any step that would change control room indications or cause an alarm.
- Technicians used self-checking and three-way communications techniques to prevent errors.
- Upon completion of the test, the technicians removed all equipment and tools used for the test and restored the area to pre-test conditions.

### c. Conclusions

IM personnel performing surveillance test BwIS 6.4.1-200 on 1PS48J, the train B containment hydrogen monitor, understood the task being performed, utilized good work practices, and followed plant procedures.

## M8 Miscellaneous Maintenance Issues (92902)

- M8.1 (Open) Violation 50-456;457/95015-01: Failure to adequately implement foreign material exclusion (FME) controls as required by Braidwood Administrative Procedure, BwAP 100-21, "Foreign Material Exclusion." The licensee had completed immediate corrective actions to resolve the specific deficiencies identified. However, the FME program was being revised to address the adverse trend of FME events that the licensee had experienced.



The licensee had several procedures which provided varying guidance on FME controls including BwAP 100-21, "Foreign Material Exclusion," and Standardized Maintenance Procedure, SMP-M-04, "Foreign Material Exclusion." The latter was initially implemented in August 1995; however, this guidance was not completely implemented since previously written work packages were not immediately updated with those requirements. As new work packages were generated, the new requirements were incorporated into them.

The licensee recognized that all departments had not received training and were not required to follow the guidance contained in standardized maintenance procedures. As a result, the licensee was in the process of revising the guidance and incorporating all of the procedures governing FME into one Nuclear Station Work Procedure, NSWP-A-03, "Foreign Material Exclusion." Additionally, approximately one-third of the maintenance personnel had not attended the required training on FME. The licensee indicated that this training would be completed prior to the start of the next scheduled outage October 1996.

This item will remain open pending completion of the currently planned program revisions.

### III. Engineering

#### **E2 Engineering Support of Facilities and Equipment**

##### **E2.1 Control Room Drawings**

###### **a. Inspection Scope (37551)**

Braidwood Administrative Procedure BwAP 1340-1, "Drawings Issued Procedure," Revision 10, identified two types of design drawings: 1) "AUTHORIZED FOR USE" drawings were verified current by the station's Central File office before issuance and were for repairs, modifications, troubleshooting, procedure writing, or hanging out-of-service cards for safety-related, ASME (American Society of Mechanical Engineers) Code, or other regulatory-related equipment, and 2) "FOR REFERENCE" or "FOR INFORMATION ONLY" drawings were not verified current before issuance and were not for work on safety-related, ASME Code, or other regulatory-related equipment.

On August 8, the inspectors were in the main control room when an annunciator for the Unit 2 loop A Tave channel alarmed. The inspectors observed that the circuit card configuration for the Tave channel had been changed as part of the reactor coolant system resistance temperature detector bypass elimination modification (RTDBE) completed during the Unit 2 refueling outage which ended in May 1996. However, the control room drawings had not yet been revised. In that the drawing used was for "REFERENCE USE" only, the presence of out-of-date drawings was not unexpected by control room personnel; however, a problem identification form was written to document what had happened.



The inspectors subsequently reviewed sets of piping and instrumentation diagrams (P&IDs) and electrical bus schematics ("key diagrams") used in the control room for day-to-day operations and occasional out-of-service (OOS) preparation. These drawings were stamped "AUTHORIZED FOR USE."

In addition, the inspectors interviewed personnel in the site engineering group who were responsible for marking-up drawings to show changes that were part of planned or ongoing modifications. After a modification was completed and the affected components or systems were returned to service, this group was responsible for drafting final revisions of the drawings and sending them to the offsite, corporate Central Drawing Facility, where final drawings were made and converted to microfilm.

Finally, the inspectors interviewed personnel from the station's Central File office, in which a copy of marked-up drawings for modifications was maintained, and from which "AUTHORIZED FOR USE" drawings were distributed to maintenance personnel and others in need of current drawings and "REFERENCE USE" drawings were distributed to workers who did not necessarily need current revisions. Central File personnel also updated the "AUTHORIZED FOR USE" drawings used by control room personnel.

b. Observations and Findings

The response of the control room crew to the alarm was good. There were good communications among operators and supervisors and a good review of control room indications to ensure a plant transient was not occurring. Likewise, the initial troubleshooting by the operators involving a review of computer points and electrical drawings was done with enthusiasm and a sense of challenge.

However, the inspectors observed during a review of the "AUTHORIZED FOR USE" control room drawings, that sheet 2 of M-60, the Unit 1 reactor coolant system, and sheet 4 of M-135, the Unit 2 reactor coolant system, had not been marked up to show the equipment affected by the PIDBE or marked to indicate a revision to the drawing was pending. The RTDBE had been complete on Unit 1 in the fall of 1995 and on Unit 2 in the spring of 1996.

In addition, the inspectors noted that several key diagrams were not the current revisions or marked up to show revisions were pending:

- diagrams 20E-1-4007A and D, 480V ESF Substation Busses 131X (1AP10E) and 132X (1AP12E), revisions L (current revisions were M),

- diagrams 20E-1-4012A-D, 120 VAC Instrument Bus 111-114, revisions P, N, L, and S (current revisions were R, P, M, and T), and
- diagram 20F-1-4008E, 480V Aux Bld ESF MCC 131X2 (1AP25E) and 131X2A (1AP25E-A), was not marked up to show revisions pending for modifications P20-1-92-601 (October 30, 1995) and E20-1-96-254 (July 2, 1996).

Braidwood Administrative Procedure, BwAP 1340-1, "Drawings Issued Procedure," Revision 10, stated, in part, that P&IDs or key diagrams which were issued and maintained current through Central File were marked as "AUTHORIZED FOR USE," would have open design changes listed on the drawing, and could be used for troubleshooting, writing temporary procedures, or preparing an out-of-service. Procedure BwAP 330-1, "Conduct Of Operations," Revision 18, required, in part, that only controlled, approved documents, such as P&IDs and key diagrams, were to be used by shift operating personnel to conduct operations, and that these documents were to be maintained current. Contrary to these two procedures, as of August 8, P&IDs and key diagrams that were marked "AUTHORIZED FOR USE" and used by shift operating personnel in the control room were not maintained current.

As part of corrective actions, the licensee removed all identified drawings marked as "AUTHORIZED FOR USE" from use and replaced them with "INFORMATION USE ONLY" drawings. The licensee has ensured that all "AUTHORIZED FOR USE" drawings must be obtained from a Central File clerk. Administrative clerks were auditing all drawings and stamping them "revision pending" where appropriate.

Finally, the site engineering group apprised the inspectors that there was a large backlog of incorporating drawing changes (over 2000) from the two RTDBEs into approved design drawings, such as P&IDs and electrical drawings. The backlog was attributed to available staffing levels and the need to convert the original manually marked-up drawings to the computer drafting format. The inspectors also asked about the status of drawing revisions for other modifications that had been completed. Site engineering personnel were unable to provide the status on the 65 modifications that were currently completed. At the exit meeting on September 5, the licensee stated to the inspectors that additional designers had been assigned to work on the backlog and that many of the RTDBE drawings had since been revised and sent offsite for conversion to microfilm. A schedule had been established for further reducing the backlog. All RTDBE drawings were scheduled to be revised by December 11. In addition, a monthly report on the status of drawing revisions for completed modifications had been initiated, based on corporate engineering guidelines.

c. Conclusions

The inspectors concluded that the failure to provide current revisions of "AUTHORIZED FOR USE" drawings to control room personnel was an example of a violation of 10 CFR 50, Appendix B, Criterion V (50-456/96012-02b). The inspectors also concluded that the untimely revision of RTDBE design drawings and the lack of a current status of drawing revisions for completed modifications was a significant weakness.

**E8 Miscellaneous Engineering Issues (92903)**

- E8.1 (Open) Licensee Event Report (LER) 50-456/96009: Violation of Technical Specifications Due to Safety Injection Valves Lifting and Failing to Reseat. As discussed in OI.1, on July 29, during an extended run of the 2A SI pump, the licensee identified that valve 2SI8851, the common cold leg injection line relief valve, lifted and failed to reseat. The pump run was terminated and the valve was subsequently gagged closed while the licensee investigated why the valve lifted. On August 2, as part of the investigation, the licensee ran the 1A SI pump to determine if the associated relief valves lifted. Valve 1SI8853A, the 1A SI pump hot leg injection line relief valve, lifted and was subsequently gagged closed. It was replaced on August 15. The licensee bench tested the valve after its replacement and determined that it was set to lift at 1680 psig vice the 1750 psig setpoint. The valve was subsequently sent offsite to a contracted laboratory for further evaluation. The replacement of valve 2SI8851, which requires both trains of SI to be out-of-service, was scheduled for the spring 1997 Unit 2 refueling outage.

In addition to the vendor evaluation of 1SI8853A and the replacement of 2SI8851, other corrective actions included adding the SI relief valves to the station's inservice testing (IST) program, an evaluation of other relief valves for periodic testing, verifying the lift setpoint of the SI relief valves at the next unit refuel outage, and conducting an effectiveness review of all corrective actions for this problem. As discussed in Inspection Report 93011, the licensee was not required by the current governing 1983 version of ASME Section XI, to include the relief valves in the IST program.

The inspectors monitored the licensee's investigation and subsequent testing. The lack of a pre-job walkdown of the work area by radiation protection and maintenance personnel caused a delay in replacing the 1SI8853A valve on August 15, but overall, the investigation and testing were well conducted. This LER will remain open pending inspector review of the vendor's evaluation of the 1SI8853A valve and completion of the corrective actions.

#### IV. PLANT SUPPORT

##### **R1 Radiological Protection and Chemistry Controls**

###### **R1.1 General Comments (71750)**

Using Inspection Procedure 71750, the inspectors conducted frequent tours of the radiologically protected area and found that high radiation areas and contaminated areas were clearly marked. General areas and emergency core cooling system pump rooms were clean and leakage was minimal and contained. The amount of contaminated area was small and provided only a minimal barrier to normal operations.

##### **R8 Miscellaneous Radiological Protection and Chemistry Controls Issues**

R8.1 (Closed) Violation 50-456;457/96002-02: Inadequate procedure for operating sample heat trace control equipment while taking a containment air sample. The inspectors verified through discussion with personnel and a review of documents that the corrective actions stated in the licensee's response, dated April 10, 1996, to the Notice of Violation had been taken. The actions appeared adequate.

##### **F2 Status of Fire Protection Facilities and Equipment**

###### **F2.1 Repair of Carbon Dioxide System Valves (71750)**

###### **a. Inspection Scope**

On August 14, the inspectors observed equipment operators place an OOS to repair OC0036, the master selector valve for the auxiliary building carbon dioxide system, to repair a flange leak. A week earlier, the valve had been replaced when it and IC0030A, the local release valve for area 1EE1 of the Unit 1 upper cable spreading room, were found by licensee personnel to be leaking by their seats during a routine surveillance. The inspectors also verified that firewatch personnel had been stationed in the seven rooms affected by the OOS.

###### **b. Observations and Findings**

The maintenance work on OC0036 was delayed about five hours while a fourth valve was added to the original three valves in the OOS. From discussions with licensee personnel, the inspectors determined that poor communications in the operations department caused the delay. A reactor operator (RO) in the OOS group did not approve the original three-valve OOS request, but wanted the fourth valve added. The disapproval, which occurred at the end of the RO's shift (day shift), was relayed to the fire marshall, who wrote the OOS request, but the explanation for the disapproval was not. Because of a perceived urgency to start the work, the fire marshall had an SRO on afternoon shift approve the OOS. The next day, when the RO returned to work, the need to add the fourth valve



to the OOS was conveyed to the fire marshall, who subsequently halted work until that was done.

The inspectors also reviewed the licensee's investigation of the failure of the original OC0036 valve. The licensee found that six internal screws were missing from the valve disc retainer plate. One screw was found in the seat of the LC0030A valve, causing it to leak, but the other five were not found and were believed by licensee personnel to be somewhere in the carbon dioxide system. The licensee's initial evaluation indicated that the remaining five screws would not prevent any of the 36 area valves in the system from opening, because of the valve design, but that a screw could lodge in the seat and prevent valve closure. The licensee was not able to determine if the screws were missing because of a maintenance error, manufacturing error, or design problem.

Procedure BwHS 4002-025, "Upper Cable Spreading Room Zone 1S-50 Low Pressure CO<sub>2</sub> System Actuation Surveillance," was revised to improve controls over access to tested areas in case one or more of the remaining five screws lodged in a local release valve after the valve was opened for a test and to require a visual check of the valve after the test to look for any screws. The licensee also planned to either inspect the currently in place OC0036 valve for improperly tightened screws or to verify the valve to be new or rebuilt by the vendor.

## F2.2 Fire Drill

### a. Inspection Scope

On August 31, the inspectors observed a weekend fire drill, which included the town of Braidwood volunteer fire department.

### b. Observations and Findings

The inspectors determined that overall, the fire drill went well. The inspectors observed good communications between personnel from the town of Braidwood fire department and station fire protection personnel. An unlabelled inoperable fire hydrant was discovered by the licensee during the drill and a PIF was written. The licensee's follow-up review determined that the need to label the hydrant as OOS was not printed out on the list used by the group that implemented fire protection compensatory measures because the entire list was not electronically transferred from the fire marshall. The licensee no longer electronically transmits the data. The licensee planned to hand deliver the list of compensatory measures to the fuel handling department.

## F2.3 Conclusions on Status of Fire Protection Facilities and Equipment

The inspectors concluded that the delayed OOS on the carbon dioxide system valves and the unlabelled hydrant indicated that support of some fire protection activities needed improvement.

The reason for the failure of OCO036 is an Inspection Followup Item 50-456/96012-05. The inspectors concluded the performance of the station fire brigade and the coordination with the Braidwood fire department during the drill was good. The inspectors concluded that the safety consequence of the outside fire hydrant being unlabeled was small because it was not a fire suppression system required by 10 CFR 50, Appendix R.

#### 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 September 5, 1996. 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

- \*H. G. Stanley, Site Vice President
- \*T. Tulon, Station Manager
- \*H. Pontious, Nuclear Licensing Administrator
- \*M. Pavey, Regulatory Performance Administrator
- \*J. Nalewajka, Integrated Analysis Administrator
- K. Bartes, 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
- \*A. Haeger, Health Physics/Chemistry Supervisor
- \*W. Dupuis, Maintenance Staff Supervisor
- \*J. Meister, Engineering Manager
- D. Cooper, Operations Manager
- M. Turbak, Independent Safety Engineering Group Supervisor
- \*B. Claveau, Operations
- \*M. Cassidy, Regulatory Assurance - NRC Coordinator

### NRC

- L. Miller, Chief, Reactor Projects Branch 4
- \*C. Phillips, Senior Resident Inspector
- \*M. Kunowski, Resident Inspector
- \*E. Cobey, Resident Inspector

### IDNS

T. Esper

- \* Present at the exit meeting

## INSPECTION PROCEDURES USED

IP 37551:	Onsite Engineering
IP 61726:	Surveillance Observations
IP 62707:	Maintenance Observation
IP 71707:	Plant Operations
IP 71750:	Plant Support Activities
IP 92700:	Onsite Followup of Written Reports of Nonroutine Events at Power Reactor Facilities
IP 92902:	Followup - Maintenance
IP 92903:	Followup - Engineering

## ITEMS OPENED, CLOSED, AND DISCUSSED

### Opened

50-456/96012-01	NCV	diesel fuel oil valve mispositioned
50-456/96012-02	VIO	failure to follow procedures
50-456/96012-03	NCV	boric acid valve mispositioned
50-456/96012-04	VIO	failure to ensure suitable conditions for testing
50-456/96012-05	IFI	reason for valve failure

### Closed

50-456/96002-02; 50-457/96002-02	VIO	inadequate procedure for operating sample heat trace control equipment
50-457/96009-02	IFI	no valve position lights lit for 2SI8801
50-456/96012-01	NCV	diesel fuel oil valve mispositioned
50-456/95012-03	NCV	boric acid valve mispositioned

### Discussed

50-456/96009	LER	violation of TS due to SI valves lifting and failing to reseal
50-456/95015-01; 50-457/95015-01	VIO	failure to adequately implement FME controls

## LIST OF ACRONYMS USED

AR	Action Request
ASME	American Society of Mechanical Engineers
CFR	Code of Federal Regulations
DG	Diesel Generator
ESF	Emergency Safety Feature
FME	Foreign Material Exclusion
IFI	Inspection Followup Item
IM	Instrument Maintenance
IST	Inservice Testing
LER	Licensee Event Report
MOV	Motor Operated Valve
NCV	Non-Cited Violation
NRC	Nuclear Regulatory Commission
OOS	Out of Service
PIF	Problem Identification Form
P&ID	Piping and Instrumentation Diagrams
PDR	Public Document Room
PM	Preventive Maintenance
psig	Pounds Per Square Inch Gauge
RO	Reactor Operator
RTDBE	Resistance Temperature Detector Bypass Elimination Modification
SI	Safety Injection
SRO	Senior Reactor Operator
SX	Essential Service Water System
TS	Technical Specification
VIO	Violation