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Report No: 50-456/97015(DRP); 50-457/97015(DRP)

Licensee: Commonwealth Edison (ComEd)

Facility: Braidwood Nuclear Plant, Units 1 and 2

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

Dates: August 12 through September 22, 1997

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EXECUTIVE SUMMARY

Braidwood Nuclear Plant, Units 1 and 2
NRC Inspection Report No. 50-456/97015(DRP); 50-457/97015(DRP)

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

Operations

- The inspectors concluded that the removal of the Unit 1 system auxiliary transformer from service on September 3, and the subsequent restoration on September 4, was well planned and executed. Operations personnel conducted a thorough heightened level of awareness briefing; operated control room, switchgear room, and switchyard equipment safely; and followed applicable procedures. (Section O1.1)
- The inspectors concluded that prompt actions were taken by operating personnel in response to a failure of the 2B feedwater pump speed controller card on August 26. The actions taken minimized the secondary plant transient. Operators promptly restored control rod bank position to within Technical Specification limits and stabilized plant conditions. (Section O1.2)
- The 2B containment spray eductor drain valve (2CS012B) was found closed as required, but unlocked on August 20. The valve had been verified locked by two operators on August 12 and by two different operators on August 14. The licensee's root cause evaluation was unable to conclude why the valve became unlocked. The root cause evaluation also found that operators were not properly using the administrative controls for maintaining status of locked valves and that operators were not following administrative procedures to verify the position of locked valves. The inspectors concluded, based on interviews, observations of the valve type and location, and information from the licensee that the probability of the valve becoming unlocked by itself was remote. The inspectors concluded that the administrative controls in place for locked valves was not followed by non-licensed operators. Mispositioned components have been discussed in previous inspection reports. Incorrect verification of valve position has been a recurring problem. Training of operators on valve position verification was performed in 1996 as part of corrective actions for this problem (see Paragraph O8.1). The licensee has averaged about four mispositioned components per month for the last 5 months. The licensee's corrective actions for this problem have not been fully effective. A violation was issued. (Section O4.1)

Maintenance

- The inspectors concluded that the preparation for and performance of the maintenance activities on the 1B main steam isolation valve (MSIV) on August 15 were excellent. The maintenance activities were well planned and executed. The different functional groups demonstrated excellent team work in the performance of the repairs. The work package was well written and contained sufficient detail for the scope of the work being performed. Procedures and instructions were followed. The maintenance activities appeared effective and no re-work was required.

The inspectors also concluded that the licensee demonstrated an excellent safety focus. For example, contingency plans for the unit shutdown were in place in the event that the MSIV could not be repaired and returned to an operable status within the time allowed by the limiting condition for operation. Also, the licensee assigned a sufficient number of maintenance personnel to allow for the simultaneous repair of the o-ring and the sight glass; and pre-staged replacement parts, tools, and personnel in an effort to minimize the time that the plant was operated with the 1B MSIV inoperable. (Section M1.1)

- The inspectors concluded that the receipt of new fuel on September 5 was properly conducted in a safe and expeditious manner. Plant personnel were knowledgeable of the applicable procedures, their responsibilities, and the use of fuel movement equipment. Foreign material exclusion controls were in place as required and were followed by the personnel participating in the new fuel receipt. Inspection of the new fuel was thorough. Documentation and status boards were maintained as required by procedure. (Section M4.1)
- The inspectors concluded that the performance of the Unit 1 SAT deluge alarm test on August 25 was poorly executed. The communications between the supervising operator and the trainee were not adequate to ensure the supervising operator knew what actions the trainee was about to take. The supervising operator allowed himself to become distracted and did not take adequate steps to ensure the procedure was followed correctly. The trainee did not perform an adequate self-check and operated the wrong equipment while the supervising operator was distracted, which resulted in the fire protection system deluge of the 142-V transformer. The potential consequence of this error was minimized because the supervising operator acted quickly to isolate the deluge system thus avoiding an unplanned SAT trip. Loss of a SAT would have resulted in at least a partial loss of off-site power to Unit 1. The actual consequence of this error was that for a short time period (about a day), both Unit 1 SAT's were removed from service to clean corrosion particles from the SAT insulation bushings. This issue was a non-cited violation. (Section M4.2)

Engineering

- The inspectors identified that the lack of a procedure for post modification testing on the engineered safety feature switchgear and miscellaneous electric equipment room ventilation systems, in July 1996, resulted in a poorly conducted test which failed to identify that the modification had been installed improperly. In addition, the licensee's root cause investigation failed to identify that the test was performed without a procedure. A violation was issued. (Section E4.1)

Report Details

Summary of Plant Status

Unit 1 operated at or near 100 percent power during for the entire inspection period.

Unit 2 entered the period at or near 100 percent power and operated routinely until August 26, when a speed control failure of the 2B feedwater pump forced operators to reduce reactor power to 50 percent. Unit 2 remained at 50 percent power for three days while corrective actions were performed. On August 30, operators began a power ascension to 100 percent power. On August 31, Unit 2 reached 100 percent power where it operated until September 11. On September 11, full power could no longer be maintained due to fuel depletion and turbine load reductions were necessary for primary coolant temperature control. Unit 2 ended the period at 87 percent power.

I. Operations

O1 Conduct of Operations

O1.1 System Auxiliary Transformer (SAT) 142-2 Outage

a. Inspection Scope (71707)

The inspectors reviewed procedures BwOP AP-18, "Isolating System Auxiliary Transformer 142-2 with Unit 1 UAT [Unit Auxiliary Transformer] Energized," Revision 7E1; BwOP AP-20, "Restoring System Auxiliary Transformer 142-2 With Unit 1 UAT Energized," Revision 8E1; 1BWOA ELEC-3, "Loss of 4KV ESF [Engineered Safety Feature] Bus Unit 1," Revision 54; 1BWOA ELEC-4, "Loss of Offsite Power Unit 1," Revision 4; BwOP AP-14, "Removing The Ground and Test Device From a 4160V [volt] or 6900V Cubicle," Revision 7; and BwOP AP-6, "Racking-In a 4160V or 6900V Circuit Breaker," Revision 7. The inspectors observed heightened level of awareness meetings and the performance of portions of BwOP AP-18 and BwOP AP-20.

b. Observations and Findings

The inspectors observed that BwOP AP-6, BwOP AP-14, BwOP AP-18, BwOP AP-20, 1BWOA ELEC-3, and 1BWOA ELEC-4, were well written and satisfactory to perform the evolution.

On September 3 and again on September 4, the inspectors attended heightened level of awareness briefings and observed that all participants were in attendance, the applicable procedure was satisfactorily reviewed, individuals assigned specific tasks were made aware of their responsibilities, and feedback from all individuals present was sought by the briefing leaders.

The inspectors observed that the procedure steps were followed in order, operators observed all electrical safety precautions, operators properly obtained and posted a boundary impairment permit prior to opening the non-essential switchgear room roll up door, proper three way communications were used between operators in the control room and operators in the field, peer checking was used to verify proper equipment when

operating breaker controls in the control room, and that the amount of supervision was appropriate.

c. Conclusion

The inspectors concluded that the removal of the Unit 1 system secondary transformer from service on September 3 and the subsequent restoration on September 4, was well planned well and executed. Operations personnel conducted a thorough heightened level of awareness briefing; operated control room, switchgear room, and switchyard equipment safely; and followed applicable procedures.

O1.2 2B Feedwater Pump Speed Control Failure

a. Inspection Scope (71707)

On August 26, the 2B feedwater pump speed controller failed resulting in a loss of flow from the 2B feedwater pump. As a result, Unit 2 steam generator levels decreased causing operators to initiate a rapid power reduction. In response to the event, the inspectors reviewed the operator's actions and the plant response; interviewed the nuclear station operators, the unit supervisor, and the operations manager; and reviewed the following documents:

- 2BwGP 100-4, "Power Descension," Revision 9E1
- 2BwOA SEC-1, "Secondary Pump Trip," Revision 52
- 2BwOA PRI-2, "Emergency Borate," Revision 55A
- BwAR 1-10-B6, "Rod Bank Low Insertion Limit," Revision 7
- BwAR 1-10-A6, "Rod Bank LO-2 Insertion Limit," Revision 6
- BwAR 2-16-D2, "FW [Feedwater] Pump Dsch [Discharge] Flow High," Revision 6
- BwAR 2-16-B1, "FW Pump Trip," Revision 5E3
- Braidwood Technical Specification 3.1.3.6
- Braidwood Station Shift Engineers Log for August 26 and 27, 1997
- Braidwood Station Control Room Log-Unit 2 for August 26 and 27, 1997
- Braidwood Unit 2 Event History for August 26, 1997, from 10 pm to 11 pm
- NDIT 960028, "Operating Limits Report for Braidwood Unit 2 Cycle 6," Revision 1

b. Observations and Findings

On August 26, Unit 2 was operating at 100 percent power when operators received a 2C feedwater pump high flow alarm. Operators observed speed control problems with

the 2B feedwater pump and performed the following actions: initiated a main turbine generator runback to 50 percent power, verified control rods were stepping in, commenced an emergency boration and attempted to restore flow from the 2B feedwater pump. After attempts to restore flow were ineffective, operators tripped the 2B feedwater pump and manually stabilized steam generator levels.

The inspectors performed a review of the plant's response to the loss of the 2B feedwater pump. Inspectors found that the plant responded as it should have. For example, the master feedwater flow controller increased feedwater flow from the 2C feedwater pump in response to the steam generator feed flow-steam flow mismatch signal, control rods automatically stepped in response to the coolant average temperature control deviation, and the turbine throttle and governor valves responded correctly to the operator initiated turbine run back. Inspectors reviewed the alarm history and chart recorded traces for the steam generator levels and found that the alarms received were expected for the transient conditions and that the lowest levels reached during the transient did not challenge the steam generator low level trip setpoints.

However, the main turbine generator ran back further than the control room operators expected. The operators were expecting the turbine runback to stop at about 700 megawatts electrical output. However, the turbine ran back to about 500 megawatts. Further inspection indicated the runback set point had been changed to about 500 megawatts. The inspectors were unable to determine why the operators were unaware of this change by the end of the inspection period and planned to review the documentation that changed the runback setpoint during the next inspection period.

The inspectors reviewed the actions taken by operators in response to the event and found that their actions were consistent with the applicable annunciator response and abnormal operating procedures. For example, operators promptly identified the pump that had experienced the high flow conditions, placed the feedwater pump controller in manual and attempted to match feed flow with steam flow, and entered 2BWOA SEC-1 as directed by BwAR 2-16-D2. The operators also promptly addressed the "Rod Bank LO-2 Insertion Limit" alarm by entering BwAR PRI-2 and initiated an emergency boration at a rate of 40 gallons per minute. The inspectors verified that the operators entered and followed the appropriate procedures.

The inspectors verified that the operators entered the limiting condition for operation (LCO) for Technical Specification 3.1.3.6, "Control Rod Insertion Limits," when the rod insertion limit alarm was received; and that control rod banks C and D were restored within limits within two hours as required. The operators promptly initiated an emergency boration that allowed the withdrawal of control rod banks to above the rod insertion limit.

c. Conclusions

The inspectors concluded that prompt actions taken by operating personnel in response to a failure of the 2B feedwater pump speed controller card prevented a large steam generator level transient and the possible trip of the unit. In response to the event, operators referred to the correct procedures, followed the steps in those procedures, and promptly restored control rod bank position to within technical specification limits.

O4 Operator Knowledge and Performance

O4.1 Unit 2 Containment Spray Eductor Drain Valve Found In Correct Position But Unlocked

a. Inspection Scope (71707)

The inspectors reviewed the August 20 Shift Managers Log; Problem Identification Form A1997-03478; 0BwOS XKK-M1, "U0, U1, and U2 Locked Safety Related Valve Monthly Key Audit," Revision 5; BwAP 330-11, "Operations Locked Safety Related Valve Key Control," Revisions 1 and 2; BwOP CS-M2, "Operating Mechanical Lineup Unit 2," Revision 3; and BwAP 340-2, "Use Of Mechanical And Electrical Lineups," Revision 15E1. The inspectors interviewed three non-licensed operators, a shift manager, and an operations department staff member.

b. Observations and Findings

A non-licensed operator found the 2B containment spray eductor drain valve (2CS012B) closed but unlocked on August 20 during normal building rounds. The lock was found open and on the floor under the valve. The valve had been dual verified to be locked closed during the clearing of an out-of-service (OOS) on August 12 after system maintenance and dual verified locked closed during a system lineup to return the system to service on August 14. BwOP CS-M2 required the normal position of 2CS012B to be locked close.

The licensee's root cause investigation was unable to determine why 2CS012B became unlocked. Two possibilities were presented: 1) the lock was never actually locked, came open and fell off the valve by itself, or 2) the lock had been removed by an unknown person for an unidentified task without using the key log. Interviews with the operators conducted by the licensee's staff revealed that the operators that performed the mechanical lineup on 2CS012B, on August 14, checked the valve shut and tugged on the chain. BwAP 340-2, Step C.3.c.8 required the locking device to be removed before verifying a valve's position and then reinstalling the locking device when the verification is complete. The licensee's root cause investigation stated that the key log required to document use of valve lock keys required by BwAP 330-11, "Operators Locked Safety Valve Key Control," Revision 1, was not always filled out correctly or completely. The licensee's root cause evaluation was unable to conclude why the valve became unlocked. The root cause evaluation also found that operators were not properly using the administrative controls for maintaining status of locked valves and that operators were not following administrative procedures to verify the position of locked valves.

The inspectors interviewed three operators that performed the clearing of the OOS and the system lineup. The operators stated that they verified the valve was locked closed. One operator stated he checked the valve locked closed a second time during the day as a self-check. The inspectors interviewed a member of the operations staff, who stated, that the condition of the lock was inspected by licensee personnel and found to be in good condition. The inspectors also inspected the location and position of the valve and the lock and concluded the possibility of the lock becoming unlocked and falling off the valve handle by itself was remote.

The inspectors checked the maintenance schedule for any maintenance or surveillance that might have required the operation of 2CS012B between August 14 and August 20 and found none. The inspectors reviewed the key log and found that the key for 2CS012B had been checked out and returned on August 12 to clear the OOS on the valve. There had been no key log entry for the key to 2CS012B between August 12 and August 20.

Operators physically rechecked all accessible locked valves on both units on August 30 and August 31, and found no additional discrepancies. The licensee revised BwAP 330-11 on September 19. The inspectors reviewed the revision and verified the instructions for use were clarified. All operations management staff and non-licensed operators were informed of the change by electronic mail notification and formal training was planned with a due date of April 3, 1998. The two operators that performed the mechanical lineup were counseled on how to properly verify a valve that is locked open or closed. All shift personnel in the operations department will receive training on the administrative procedures concerning positioning of components and the required method of verifying component positions by April 3, 1998.

The proper positioning of components at Braidwood has been a recurring problem. This issue has been discussed in Inspection Reports 96005, 96008, 96009, and 96012. The licensee has failed to take effective corrective action to prevent recurrence. The failure to take effective corrective action regarding the proper positioning of components is a violation of 10 CFR Part 50, Appendix B, Criterion XVI (50-457/97015-01(DRP))

c. Conclusion

The 2B containment spray eductor drain valve (2CS012B) was found closed as required but unlocked on August 20. The valve had been verified locked by two operators on August 12 and by two different operators on August 14. The licensee's root cause evaluation was unable to conclude why the valve became unlocked. The root cause evaluation also found that operators were not properly using the administrative controls for maintaining status of locked valves and that operators were not following administrative procedures to verify the position of locked valves. The inspectors concluded, based on interviews, observations of the valve type and location, and information from the licensee that the probability of the valve becoming unlocked by itself was remote. The inspectors concluded that the administrative controls in place for locked valves was not followed by non-licensed operators. Mispositioned components have been discussed in previous inspection reports. Incorrect verification of valve positions has been a recurring problem. Corrective actions for training operators on valve position verification was performed in 1996 (see paragraph O8.1). The licensee has averaged about four mispositioned components per month for the last 5 months.

O7 Quality Assurance in Operations

O7.1 Corrective Actions Audit QAA 20-97-10

a. Inspection Scope (71707)

The inspectors reviewed Quality Audit Report QAA 20-97-10, "Corrective Actions," dated September 12, 1997. The inspectors also interviewed Site Quality Assurance management personnel regarding the content of the report.

b. Observations and Findings

The inspectors reviewed the scope of the audit which covered, the timeliness of the investigations generated from the PIF process, the completeness and timeliness of corrective actions, the quality of root cause analyses, the performance of effectiveness reviews, a review of the performance of plant operational review committee meetings, and a verification of corrective actions on closed previously identified findings, appeared to be satisfactory. The sample sizes from the areas reviewed appeared to be adequate. The report had three findings documented, all of which were of minor safety significance.

The audit team consisted of 10 qualified auditors. One individual was trained in root cause analysis from the ComEd corporate office, and another had performed effectiveness reviews at D.C. Cook.

c. Conclusion

The inspectors concluded, based on the content of the report and the interviews with station management, that the audit scope was satisfactory, the number and size of document samples reviewed were satisfactory, and the size and background of the audit team was good. The report findings were good and were of minor safety consequence.

O8 Miscellaneous Operations Issues (92700)

- O8.1 (Closed) Violation 50-456/96012-02a(DRP) and 50-457/96012-02b(DRP): Two examples of failure to follow procedure. The first was a failure to follow 2BwOS 8.1.1.2.a, "2B Diesel Generator Operability Monthly (Staggered) And Semi-annual (Staggered) Surveillance," Steps F.9.7 through F.9.9 because operators failed to correctly perform an independent verification of the position of several valve's positions. The licensee counseled the individuals that performed the surveillance. The licensee also trained all non-licensed operators on how to properly verify a valve position and how to perform an independent verification. The inspectors reviewed the training records, observed a classroom training session, and observed operators in the field performing an independent verification of valve positioning. The proper positioning of plant components has been a recurring issue. The inspectors planned to continue to follow this issue through the corrective action violation describe in Section O4.1 of this report (50-457/97015-01(DRP)). The second example was a failure to follow BwAP 1340-1, "Drawings Issued Procedure," in that drawings marked "AUTHORIZED FOR USE" and used by shift operating personnel in the control room had outstanding revisions and were not stamped "REVISION PENDING." Engineering department personnel initiated a monthly drawing report that identifies the outstanding pending revisions on drawings.

Control room aperture cards were audited and classified "FOR REFERENCE." Aperture cards were not to be used for preparation of out-of-service cards because they do not indicate a drawing revision is pending. The inspectors reviewed the list of pending revisions against several controlled copies of drawing sets in the plant. No additional discrepancies were identified and the inspectors had no further concerns. This violation is closed.

ii. Maintenance

M1 Conduct of Maintenance

M1.1 Repair of the 1B Main Steam Isolation Valve (MSIV)

a. Inspection Scope (62707)

The inspectors attended a heightened level of awareness (HLA) briefing held to discuss the replacement of a leaking o-ring on the 1B MSIV actuator oil piping and the replacement of a leaking sight glass on the actuator's oil reservoir. Inspectors observed the performance of the maintenance activities on the 1B MSIV actuator, interviewed the maintenance foreman, and reviewed the contents of work packages WR# 970086892 and WR# 970086893.

b. Observations and Findings

On August 15, the inspectors were informed by the licensee of their intention to declare the 1B MSIV active and standby actuators inoperable, enter the four hour LCO associated with the inoperability of one MSIV, and perform corrective maintenance activities to repair a leaking o-ring on actuator oil piping and a leaking sight glass on the actuator's oil reservoir. The inspectors attended the HLA briefing and observed that all participants attended, work packages were reviewed, contingency plans discussed, individual responsibilities were assigned, and that feedback from all individuals present was sought by the briefing leader.

Following the HLA, the inspectors reviewed the work packages and interviewed the mechanical maintenance foreman. The inspectors found the work packages contained direction in sufficient detail for the performance of the specified maintenance activities and the mechanical maintenance foreman was knowledgeable. The mechanical maintenance foreman told the inspectors that the replacement parts had been obtained from the storeroom and the tools required to perform the work were staged outside of the 1B MSIV room.

The inspectors observed the placement of the OOS on the specified boundary points and the proper verification of the OOS by mechanical maintenance personnel. The licensee assigned sufficient personnel to allow the simultaneous performance of both maintenance activities. The inspectors observed maintenance personnel following the work package steps, taking precautions to exclude foreign material, and working safely and expeditiously. Maintenance personnel performed a final self-check prior to releasing the OOS. Following the clearance of the OOS, maintenance personnel were observed performing leak checks on the pipe fitting with the new o-ring and on the reservoir sight

glass. The field supervisor and the maintenance foreman conducted a debrief with the system engineer, maintenance, and operations personnel to determine if anyone had concerns with the maintenance activity performed or with the operability of the valve. No concerns with the repairs or with the material condition of the 1B MSIV were identified. The field supervisor reported to the control room that the maintenance activities on 1B MSIV actuators were complete.

c. Conclusions

The inspectors concluded that the preparation for and performance of the maintenance activities on the 1B MSIV actuator on August 15 were excellent. The maintenance activities were planned well and executed well. The different functional groups demonstrated excellent team work in the performance of the repairs. The work package was well written and contained sufficient detail for the scope of the work being performed. Procedures and instructions were followed. The maintenance activities appeared effective and no re-work was required.

The inspectors also concluded that the licensee demonstrated an excellent safety focus. For example, contingency plans for the unit shutdown were in place in the event that the MSIV could not be repaired and returned to an operable status within the time allowed by the LCO. Also, the licensee assigned a sufficient number of maintenance personnel to allow for the simultaneous repair of the o-ring and the sight glass; and pre-staged replacement parts, tools, and personnel in an effort to minimize the time that the plant was operated with the 1B MSIV inoperable.

M4 Maintenance Staff Knowledge and Performance

M4.1 New Fuel Receipt Activities

a. Inspection Scope (62707)

The inspectors observed the receipt of new fuel, and interviewed fuel handling and radiation protection personnel. The inspectors also reviewed the following procedures: BwAP 370-3, "Administrative Control During Refueling," Revision 16; BwFP FH-1, "New Fuel Receipt," Revision 3; BwFP FH-2, "New Fuel Inspection," Revision 5; and BwFP FH-31, "Fuel Handling Foreign Material Exclusion Area Requirements," Revision 5.

b. Observations and Findings

On September 5, the inspectors observed portions of the new fuel receipt activities in the fuel handling building. Inspectors verified that plant personnel used and followed the steps included in procedures BwAP 370-3, BwFP FH-1, and BwFP FH-2 in the movement of the new fuel. The inspectors found the procedures to be well written and easily understood.

Inspectors observed the fuel handling supervisor verify that all tamper indicating devices were intact, all accelerometers were in the untripped condition, and all shipping containers were in good condition. The fuel handling supervisor and nuclear engineering personnel inspected each fuel assembly in accordance with the requirements contained

in BwFP FH-2 as it was removed from the shipping container. No deficiencies in the condition of the new fuel were identified.

The fuel handlers were proficient in the use of fuel movement equipment and radiation protection personnel closely monitored unpacking of new fuel assemblies for radiation and contamination (see also section R1.1). The inspectors verified that the fuel handling areas of the fuel building were properly identified as foreign material exclusion areas and controlled in accordance with procedure BwFP FH-31.

c. Conclusions

The inspectors concluded that the receipt of new fuel on September 5 was properly conducted in a safe and expeditious manner. Plant personnel were knowledgeable of the applicable procedures, their responsibilities, and the use of fuel movement equipment. Foreign material exclusion controls were in place as required and were followed by personnel participating in the new fuel receipt. Inspection of the new fuel was thorough. Documentation and status boards were maintained as required by procedure.

M4.2 Failure To Follow Procedure Resulted In Unit 1 System Auxiliary Transformer (SAT) Sprinkler System Deluge

a. Inspection Scope (71707)

The inspectors reviewed Problem Identification Form (PIF) A1997-03528; 1BwOS FP-Q1, "Unit 1 Transformer Deluge Systems Alarm Test Quarterly Surveillance," Revision 4E2; and the licensee's prompt investigation results. The inspectors interviewed the non-licensed operators and the operations field supervisor involved in the event.

b. Observations and Findings

The Unit 1 transformer deluge sprinkler system alarm surveillance test procedure, 1BwOS FP-Q1, Step 3.e required opening the alarm test valve. On August 25, the operator performing the surveillance test pulled down the system actuation hand switch instead of opening the alarm test valve which resulted in a fire protection system sprinkler deluge of SAT 142-2.

The operator that made the error was a trainee. The trainee did not adequately compare the label of equipment he operated to the procedure step he performed. The operator responsible for supervising the trainee had been distracted and unaware of what the trainee was about to do. The trainee did not clearly communicate the actions he was about to perform and performed the action prior to getting an adequate response from the supervising operator. The supervising operator quickly isolated the deluge which had lasted about 10 seconds.

The licensee stopped all non-licensed operator (NLO) in-plant training until expectations on how to perform plant evolutions had been reinforced to all supervising operators and trainees. All the operating crews were informed of the details of this event.

Human error reduction training for NLO's in the on-the-job training portions of training was scheduled to be completed by October 15, 1997 and self-check simulator training by

December 31, 1997. The training department incorporated human error reduction and self-check simulation training into future initial NLO training.

The trainee had observed the performance of this surveillance twice immediately prior to making this mistake. The trainee stated to the inspectors that he did not feel confused about his actions prior to taking them. The trainee stated that he was using three way communication techniques during the performance of this evolution.

Technical Specification 6.8.1.g states, in part, that written procedures shall be established, implemented, and maintained covering the Fire Protection Program implementation. The failure to follow 1BwOS FP-Q1 was a violation of Technical Specification 6.8.1.g (50-456/97015-02(DRP)).

However, this non-repetitive, licensee identified and corrected violation is being treated as a non-cited Violation consistent with Section VII.B.1 of the NRC Enforcement Policy.

c. Conclusions

The inspectors concluded that the performance of the Unit 1 SAT deluge alarm test on August 25 was poorly executed. The communications between the supervising operator and the trainee were not adequate to ensure the supervising operator knew what actions the trainee was about to take. The supervising operator allowed himself to become distracted and did not take adequate steps to ensure the procedure was followed correctly. The trainee did not perform an adequate self-check and operated the wrong equipment which resulted in the fire protection system sprinkler deluge of the 142-2 transformer. The potential consequence of this error was minimized because the supervising operator acted quickly to isolate the deluge system thus avoiding an unplanned SAT trip. Loss of a SAT would have resulted in at least a partial loss of offsite power to Unit 1. The actual consequence of this error was that for a short time period (about a day) both Unit 1 SAT's were removed from service to clean corrosion particles from the SAT insulation bushings.

III. Engineering

E2 Engineering Support of Facilities and Equipment

E2.1 Poor Communication Between System Engineers and Operations Regarding Control Room Ventilation Operability

a. Inspection Scope (37551)

The inspectors interviewed a system engineering group leader and the Unit 1 unit supervisor. The inspectors reviewed PIF A1997-03379 and 1BwOS 3.2.1-810, "Unit One Quarterly Slave Relay Surveillance (Train B - K602 and K647)," Revision 6.

b. Observations and Findings

The inspectors spoke with a member of system engineering management on August 12 and were told that during troubleshooting on the flow rate of the "A" control room ventilation (VC) train system engineering personnel measured a flow rate greater than allowed by technical specifications. However, the trouble-shooting was performed with uncontrolled test equipment and the flow measurement technique was not as meticulous as if it had been done for a surveillance. For these reasons system engineering personnel did not immediately consider the "A" VC train inoperable. The operations unit supervisor was called by system engineering personnel for permission to take more accurate readings. The engineering personnel did not clearly communicate the potential operability concern to the unit supervisor. The unit supervisor delayed the testing on the "A" VC train about 24 hours because surveillance testing on the "B" VC train was to be performed. When the "A" VC was finally tested, the test results verified that the "A" VC train was actually inoperable due to flow conditions higher than allowed by technical specification requirements. The licensee was able to restore the "A" VC train to operability within the 7 day limiting condition for operation.

c. Conclusion

The inspectors concluded that system engineering personnel failed to clearly communicate an operability concern on the "A" VC train to operations management personnel.

E.4 Engineering Staff Knowledge and Performance

E4.1 Inadequate Post Modification Testing of Unit 1 Switchgear Room Ventilation

a. Inspection Scope (37551)

Inspection Report 96019, Section E2.2, discussed inadequate post modification testing of the Unit 1 Engineered Safety Feature (ESF) electrical switchgear room ventilation system. The licensee self identified that their testing had not detected that the modification had not been properly installed and the root cause analysis stated that there had been several instances of inadequate post modification testing in the last 2 years. The issue was left unresolved (50-456/96019-05(DRP)) because the inspectors were not confident that the licensee's corrective actions addressed a potential for a programmatic problem. The inspectors reviewed PIF 456-201-96-2207; modification approval letter CHRON #0311589 for Exempt Change No. E20-95-209-010; BwAP 2321-21, "Exempt Changes," Revisions 0 1, and 2; and BwAP 1610-5, "Development of Modification Tests," Revisions 3 and 4. The inspectors also interviewed the system engineer, the system engineering group leader, and the site engineering modification supervisor.

b. Observations and Findings

The inspectors identified that the post modification testing on the Unit 1 ESF switchgear room ventilation system was performed without an approved post modification test procedure. A root cause investigation (PIR 456-201-96-2207), performed by the licensee to determine why the Unit 1 switchgear room ventilation system did not perform properly following a modification, did not identify that an approved modification test procedure was

not used. Consequently, no corrective actions were documented for that problem. The inspectors verified that there was no post modification testing procedure for documentation of the results of any testing on the Unit 1 ESF switchgear room ventilation system performed.

During follow up questioning by the inspectors on February 20, 1997, the inspectors learned that, in addition to the problem with the Unit 1 ESF switchgear room ventilation system, the group leader authorized post modification testing on the miscellaneous electrical equipment room (MEER) ventilation system knowing there was no written procedure to perform the testing. Based on additional questioning on February 25, 1997, the inspectors determined the following:

- the system engineer responsible for performing the testing on the MEER ventilation system was at home sick the day the testing was scheduled;
- the group leader called the system engineer at home to ask where the testing procedure was located;
- the system engineer stated that the modification coordinator stated that a post modification test procedure was not necessary for the testing to be performed for the MEER ventilation system because it consisted of functional testing only;
- the group leader assigned the testing to the backup system engineer and if any difficulties were encountered they would have stopped and written a test procedure;
- the group leader accompanied the backup system engineer during the testing because he felt uncomfortable performing the testing without a procedure;
- the group leader expressed surprise that a test procedure was not required, but did not call the modification coordinator to verify that a test procedure was not required.

The inspectors verified that the modification approval letter CHRON #0311589 for Exempt Change No. E20-1-95-209-010 specifically called out modification testing requirements. BwAP 1610-5, Step C.2.a, stated, "Modification tests will be conducted using test procedures developed in accordance with this procedure."

As a follow-up action to the inspectors concern regarding modification testing without an approved procedure, 124 completed exempt changes were reviewed by the licensee on February 22, 1997, for testing documentation. Three additional safety-related exempt changes were completed without accurate documentation of the testing performed. The licensee determined from the existing documentation that adequate testing on those systems had been performed. The inspectors reviewed the documentation and agreed with the licensee's conclusion.

The system engineer was counseled on the importance of following plant procedures. The system engineering department was trained on this event on December 18, 1996. The site engineering group was trained on this event on November, 13, 1996. Both training sessions addressed the importance of adhering to procedures. BwAP 1610-5

was revised on April 22, 1997, to include instructions on how to document testing on all design changes not just modifications. The inspectors reviewed the revision to BwAP 1610-5 and concluded that the instructions were more detailed.

The failure to perform post modification testing without an approved procedure is a violation of Technical Specification 6.8.1 which endorses Regulatory Guide 1.33, Appendix A. Regulatory Guide 1.33, Appendix A recommends that modifications be tested to assure that the systems, components and structures continue to perform as designed (50-456/97015-03(DRP)).

c. Conclusions

The inspectors concluded that the post modification testing on the ESF switchgear and MEER ventilation systems were poorly conducted. The inspectors identified that post modification testing was performed without an approved procedure as required by BwAP 1610-5. In addition, the inspectors concluded that the licensee's original corrective actions were inadequate because the licensee's root cause investigation failed to identify that the test was performed without an approved procedure. A violation was issued.

E8 Miscellaneous Engineering Issues (92902)

- E8.1 (Closed) Unresolved Item 50-456/96019-05(DRP): The inspectors reviewed previous instances of improper post modification testing and the assessment process for programmatic problems. The inspectors concluded the licensee's corrective actions were incomplete because the root cause investigation failed to identify that the post modification testing was performed without an approved procedure. The review was completed and none of the previous instances identified had a common cause related to the issue of failure to have a post modification test procedure. This was discussed in greater detail in Section E4.1.

IV. Plant Support

R1 Radiological Protection and Chemistry (RP&C) Controls

R1.1 Radiation Protection Monitoring of New Fuel Receipt

a. Inspection Scope (71750)

The inspectors observed receipt of new fuel, and interviewed radiation protection personnel. The inspectors also reviewed procedure BwRP 5610-5, "Surveying Radioactive Material Shipments," Revision 5.

b. Observations and Findings

The inspectors observed radiation protection personnel perform surveys of the shipping containers. The radiation protection technician performed both exposure rate and removable contamination surveys of each shipping container. Inspectors observed the surveys of the exterior and interior of the shipping container, the protective plastic covering, the new fuel, and no contamination was found.

The inspectors observed that the radiation survey instruments were properly used and were in calibration. The results of the surveys were documented in accordance with BWRP 5610-5.

c. Conclusion

The inspectors concluded that radiation protection personnel properly performed and documented the surveys specified in BWRP 5610-5 during the receipt of new fuel on September 5. The receipt of new fuel was properly supported by the radiation protection technician.

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 22, 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.

X2 Pre-Decisional Enforcement Conference Summary

On September 11, 1997, a pre-decisional enforcement conference was held at the NRC Region III office to discuss potential enforcement issues identified in Inspection Report 97009. The issues related to the failure to literally comply with technical specification requirements to vent the pump casing and discharge piping of chemical and volume control system every 31 days.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

- *T. Tulon, Site Vice President/Station Manager
- A. Haeger, Health Physics and Chemistry Supervisor
- R. Byers, Maintenance Superintendent
- R. Graham, Work Control Superintendent
- *T. Simpkins, Regulatory Assurance Supervisor
- *C. Dunn, System Engineering Supervisor
- *J. Stone, Maintenance Work Director
- *T. Kirman, Mechanical Maintenance Superintendent
- *J. Hancewajca, Independent Safety Engineering Group Supervisor
- *K. Eartre, Manager Quality and Safety Assessment
- *J. Meister, Engineering Manager
- *R. Wegner, Operations Manager
- *R. Lemke, Offsite Review
- *B. Claveau, Operations Assessment Coordinator
- *M. DePonzio, RPA
- *C. Herzog, Equipment Attendant
- *M. Cassidy, Regulatory Assurance - NRC Coordinator

NRC

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

IDNS

- *T. Esper

*Denotes those who attended the exit interview conducted on September 22, 1997.

INSPECTION PROCEDURES USED

IP 37551: Onsite Engineering
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

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-457/97015-01	VIO	failure to take effective corrective actions
50-456/97015-02	NCV	failure to follow procedure
50-456/97015-03	VIO	failure to have adequate procedure

Closed

50-456/96012-02a	VIO	failure to follow procedure
50-457/96012-02b	VIO	failure to follow procedure
50-456/96019-05	URI	improper testing
50-456/97015-02	NCV	failure to follow procedure
50-456/97015-03	VIO	failure to have adequate procedure

LIST OF ACRONYMS USED

CFR	Code of Federal Regulations
DSCU	Discharge
EA	Escalated Action
ESF	Engineered Safety Features
FW	Feed Water
HLA	Heightened Level of Awareness
LCO	Limiting Condition for Operation
MEER	Miscellaneous Electrical Equipment Room
MSIV	Main Steam Isolation Valve
NLO	Non-Licensed Operator
NRC	Nuclear Regulatory Commission
OOS	Out-of-Service
PDR	Public Document Room
PIF	Problem Identification Form
RP&C	Radiological Protection & Chemistry
SAT	System Auxiliary Transformer
UAT	Unit Auxiliary Transformer
V	Volt
VA	Auxiliary Building Ventilation System
VC	Control Room Ventilation
VIO	Violation