U. S. NUCLEAR REGULATORY COMMISSION

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Licensee:	Commonwealth Edison Company
Facility:	Braidwood Nuclear Plant, Units 1 and 2 Byron Generating Station, Units 1 and 2 Quad Cities Nuclear Power Station, Units 1 and 2
Location:	Braidwood Nuclear Plant RR#1, Box 84 Braceville, IL 60407 Byron Generating Station 4450 N. German Church Road Byron, IL 61010 Quad Cities Nuclear Power Station 22710 206th Avenue North Cordova, IL 61242
Dates:	June 28 - July 21, 1999
Inspectors:	E. Cobey, Byron Senior Resident Inspector (Team Leader) C. Phillips, Braidwood Senior Resident Inspector K. Walton, Quad Cities Resident Inspector D. Wrona, Monticello Resident Inspector
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EXECUTIVE SUMMARY

Braidwood Nuclear Plant, Units 1 and 2
Byron Generating Station, Units 1 and 2
Quad Cities Nuclear Power Station, Units 1 and 2
NRC Inspection Report 50-254/99010(DRP); 50-265/99010(DRP);
50-454/99009(DRP); 50-455/99009(DRP); 50-456/99010(DRP); 50-457/99010(DRP)

This regional initiative inspection was conducted in response to the continuing configuration control occurrences at the Braidwood, Byron, and Quad Cities Stations. This inspection included an evaluation of the effectiveness and consistency of the licensee's corrective action approach. The inspection also included an evaluation of the licensee's implementation of the configuration control processes at each site.

- (Braidwood, Byron, and Quad Cities) The licensee did not consistently implement the standardized processes for operational configuration control and verification practices. In addition, the policies and expectations were not proceduralized, and differences existed regarding who was authorized to manipulate plant equipment. The implementation of processes at each site which had not been standardized including aspects of the out-of-service program, the system line-up process, and the locked valve program. These inconsistencies were notable since the licensee frequently shared personnel between sites. These individuals may not be aware of the differences. (Section O3.1)

- (Braidwood, Byron, and Quad Cities) The manner in which standardized procedures had been implemented at each of the sites resulted in a large backlog of procedures in the review and approval process. Consequently, some standardized procedures were not implemented in a timely manner. In addition, a lack of rigor in the licensee's implementation of the procedural review and approval process resulted in multiple procedures existing for the same topic and insufficient training on some procedure changes. This contributed to knowledge weaknesses regarding the implementation of verification practices and the abnormal component position process. (Section O3.2)

- (Byron and Quad Cities) Station personnel generally understood who was authorized to operate plant equipment and their understanding was consistent with the station's policies. (Section O4.1)

- (Braidwood) Station personnel did not have a consistent understanding of who was authorized to operate plant equipment, specifically, who was authorized to operate equipment within out-of-service boundaries. (Section O4.1)

- (Braidwood, Byron, and Quad Cities) The inspectors concluded that with the exception of operators, station personnel were not knowledgeable of the abnormal component position process delineated in Common Work Practice Instruction NSP-OP-1-20, "Operational Configuration Control." (Section O4.2)

- (Braidwood, Byron, and Quad Cities) Station personnel had an inconsistent understanding of verification practices. Specifically, confusion existed regarding the differences between the verification practices, when each was required to be performed, and who was allowed to perform these verification practices. (Section O4.3)

- (Braidwood, Byron and Quad Cities) Station personnel generally did not recognize and understand the configuration control and human performance issues that existed at their site. As a result, the licensee had not been fully effective in improving performance in these areas since station personnel did not recognize the need to improve. (Section O4.4)

- (Braidwood, Byron, and Quad Cities) First line supervision did not meet licensee management's expectation to spend between 40 and 50 percent of their time in the field reinforcing standards and expectations. First line supervision also exhibited an insufficient understanding of the station's performance issues and demonstrated knowledge weaknesses in the areas of verification practices and the abnormal component position process. Consequently, the effectiveness of first line supervision was limited. (Section O4.5)

- (Braidwood, Byron, and Quad Cities) In June 1998, the licensee identified configuration control as a multi-site issue that affected all sites within the Nuclear Generation Group. In response to the continuing configuration control occurrences, the licensee implemented numerous corrective action initiatives to improve performance in this area. While these initiatives have resulted in improved performance, the continuing events at the Braidwood, Byron, and Quad Cities Stations indicated that the corrective actions had not been fully effective. These occurrences were primarily attributable to human performance deficiencies with the largest contributor to these occurrences involving maintenance activities. (Section O7.1)

- (Braidwood, Byron, and Quad Cities) The Nuclear Generation Group Configuration Control Action Plan represented a comprehensive corrective action initiative. (Section O7.2)

- (Braidwood, Byron, and Quad Cities) Several of the Nuclear Generation Group Configuration Control Action Plan items had not been completed. In addition, the licensee had not evaluated the effectiveness of the action plan in addressing the long-standing configuration control issue at each of the sites. (Section O7.2)

- (Braidwood, Byron, and Quad Cities) The licensee implemented corrective actions to address the issues identified during the Corporate Nuclear Oversight Five Station Configuration Control Assessment, which was conducted in June 1998, with the following exception. The licensee had not implemented corrective actions to address the finding that nuclear oversight inconsistently responded to configuration control events and missed opportunities to provide the stations with configuration control event insights. (Section O7.3)

- (Braidwood, Byron, and Quad Cities) The inspectors concluded that the Nuclear Oversight Monthly Issues Report contained a thorough evaluation of the issues that needed to be resolved at each station. (Section O7.4)

- (Braidwood, Byron, and Quad Cities) The inspectors concluded that the site nuclear oversight organizations were occasionally not effective at identifying precursor level issues prior to their manifestation in plant events. In addition, site nuclear oversight organizations were not consistently escalating long-standing issues to ensure that the issues were addressed effectively and in a timely manner. (Section O7.4)

- (Braidwood, Byron, and Quad Cities) The licensee did not consistently perform self-assessments regarding operational configuration control and human performance to a standard; and in some cases, these assessments were not self-critical. Consequently, the quality and effectiveness of these self-assessments varied significantly. (Section O7.5)

- (Byron, and Quad Cities) The licensee's evaluation of NRC Information Notice 98-34, "Configuration Control Errors," was incomplete. Specifically, Byron Station focused too narrowly on the specific examples identified in the information notice and did not evaluate the issue generically. In addition, Quad Cities Station addressed the issue broadly, but did not evaluate the specific examples identified in the information notice. (Section O7.6)

- (Braidwood, Byron, and Quad Cities) The licensee did not fully utilize the intra-lessons learned program to ensure that configuration control problems identified at other Commonwealth Edison stations were addressed at each site. Specifically, the licensee frequently focused too narrowly on the details of the issue identified in the nuclear operations notification and did not address the causes of the problem. (Section O7.7)

- (Braidwood, Byron, and Quad Cities) The licensee did not fully utilize the effectiveness review process to evaluate implemented corrective actions to address recurring configuration control issues. Consequently, the licensee had missed opportunities to proactively identify which corrective action initiatives had not been fully effective in addressing the long-standing configuration control issues at each of these stations. (Section O7.8)

- (Braidwood, Byron, and Quad Cities) The licensee's communication method (e.g., daily station bulletin handouts, departmental briefings, and bulletin boards) for establishing and maintaining a consistent awareness and understanding of plant issues had not been fully effective. (Section O8.1)

Report Details

I. Operations

O3 Operations Procedures and Documentation

O3.1 Implementation of Configuration Control Processes

a. Inspection Scope (71707)

The inspectors evaluated several configuration control processes including verification practices, the out-of-service program, the system line-up process, and the locked valve program. The inspectors also interviewed numerous operations, maintenance, and engineering department personnel and reviewed the following procedures.

- Braidwood Administrative Procedure (BwAP) 100-18, "Braidwood Station Independent Verification Procedure," Revision 4
- BwAP 330-1, "Station Equipment Out of Service Procedure," Revision 28
- BwAP 330-3, "Locked Equipment Program," Revision 11E2
- BwAP 330-6, "Caution Card/Abnormal Position Procedure," Revision 10
- BwAP 340-2, "Use of Mechanical and Electrical Lineups," Revision 16E1
- Braidwood Station Maintenance Manager Memorandum MSL-20-99-002, "Maintenance Shop Work at Braidwood Station," Revision 2, dated April 1, 1999
- Braidwood Station Operations Manager Memorandum, "Manipulation of Plant Equipment," dated May 15, 1998
- Braidwood Station Policy Memorandum 125, "Independent Verification," Revision 0
- Byron Administrative Procedure (BAP) 330-1, "Station Equipment Out-of-Service Procedure," Revision 29
- BAP 330-3, "Locked Equipment Program," Revision 2
- BAP 330-6, "Caution Card Procedure," Revision 6
- BAP 340-2, "Initiation and Use of System Lineups (Mechanical and Electrical)," Revision 9
- Byron Site Policy Memo 200.22, "Plant Equipment Configuration Control," Revision 0
- Common Work Practice Instruction (CWPI) NSP-OP-1-11, "Verification Practices," Revision 0
- CWPI-NSP-OP-1-20, "Operational Configuration Control," Revision 0
- CWPI-NSP-OP-1-20, "Operational Configuration Control," Revision 1
- Quad Cities Administrative Procedure (QAP) 300-13, "Tagging Equipment," Revision 27
- QAP 300-16, "Vital Equipment Padlock Control," Revision 18
- QAP 300-18, "Valve, Breaker and Fuse Checklists," Revision 13
- Quad Cities Interim Procedure (IP) 99-0012, "Equipment Out-of-Service"
- Quad Cities Policy QCPP 0108, "Plant Equipment Configuration Control," Revision 00

b. Observations and Findings

b.1 Authorization to Manipulate Plant Equipment

The inspectors determined that a standardized process did not exist for delineating who was authorized to operate plant equipment at each of the stations. The inspectors had the following observations regarding who was authorized to manipulate plant equipment.

- Byron and Quad Cities Stations had implemented station policies regarding who was authorized to manipulate plant equipment. These policies were similar and each allowed specified personnel to operate certain equipment provided the manipulation was in accordance with an approved procedure which satisfied the site's verification practice requirements.

- Braidwood Station had not implemented a station policy regarding who was authorized to manipulate plant equipment (also see Section O7.2). Guidance had been provided to station personnel in the Braidwood Station Operations Manager Memorandum, "Manipulation of Plant Equipment," which did not allow anyone except operators to manipulate plant equipment within out-of-service boundaries. However, the inspectors noted that this guidance conflicted with similar guidance contained in the Braidwood Station Maintenance Manager Memorandum, "Maintenance Shop Work at Braidwood Station," and BwAP 330-1, which allowed maintenance personnel to operate equipment within out-of-service boundaries.

b.2 Operational Configuration Control

The inspectors noted that each of the stations had implemented CWPI-NSP-OP-1-20, "Operational Configuration Control." However, the inspectors determined that the stations had not consistently implemented this standardized procedure. The inspectors had the following observations regarding the implementation of CWPI-NSP-OP-1-20.

- Byron Station had not implemented CWPI-NSP-OP-1-20, Revision 1, which had previously been implemented at the Braidwood and Quad Cities Stations (also see Section O3.2). This revision deleted the requirement to perform a 10 CFR Part 50.59 evaluation as a prerequisite for the abnormal component position process. This requirement was relaxed in response to a previously identified concern at Byron Station which determined that the requirement was unnecessarily restrictive and had contributed to the process not always being implemented.

- Braidwood and Quad Cities Stations allowed the use of an administrative out-of-service for configuration control purposes as delineated in BwAP 330-1 and IP 99-0012, respectively. The inspectors determined that the use of an administrative out-of-service for configuration control purposes was not addressed in CWPI-NSP-OP-1-20. In addition, the inspectors determined that the review and approval requirements for the out-of-service process and for the abnormal component position process delineated in CWPI-NSP-OP-1-20 were not consistent. Specifically, the abnormal component position process required review and approval by two senior reactor operators whereas the out-of-service process did not.

- Quad Cities Station operations management expected that when the abnormal component position process was implemented in accordance with CWPI-NSP-OP-1-20, an out-of-service would also be placed on the equipment. However, the inspectors noted that this expectation was not consistent with CWPI-NSP-OP-1-20.

- Common Work Practice Instruction NSP-OP-1-20, Attachment C, "Abnormal Component Position Sheet," contained a blank to complete for a "caution card" number; however, the procedure did not specify whether or not the use of a "caution card" was required. The inspectors determined that both Byron and Braidwood Stations placed "caution cards" on equipment in an abnormal position, while Quad Cities Station did not.

b.3 Verification Practices

The inspectors noted that each of the stations had implemented CWPI-NSP-OP-1-11, "Verification Practices." However, the inspectors determined that the stations had not consistently implemented this standardized procedure. The inspectors had the following observations regarding the implementation of CWPI-NSP-OP-1-11.

- Braidwood and Byron operations management indicated that concurrent dual verifications were typically performed for all safety related equipment manipulations. Quad Cities operations management indicated that concurrent dual verifications were performed only when mis-operation of the equipment could result in a threat to the safe operation of the facility. However, the inspectors observed operators at the Braidwood and Quad Cities Stations perform concurrent dual verifications of out-of-service activities on nonsafety-related equipment which could not have resulted in a threat to the safe operation of the facility when independent verifications should have been performed.

- The inspectors determined that Braidwood Station Policy Memorandum 125, "Independent Verification," BwAP 100-18, "Braidwood Station Independent Verification Procedure," and CWPI-NSP-OP-1-11, "Verification Practices," contained duplicative and conflicting guidance on verification practices.

- Braidwood Station Policy Memorandum 125, "Independent Verification," described "Procedural Independent Verification" as an alternate verification technique. While alternate verification techniques were permitted by CWPI-NSP-OP-1-11, "Procedural Independent Verification" was not specified as one of the examples. This technique consisted of a single individual using a procedure during a task that required verification. The inspectors determined that the "Procedural Independent Verification" technique did not constitute an effective verification practice.

- While CWPI-NSP-OP-1-11 defined independent verification as a specific type of verification practice, various site specific procedures in affect at the Braidwood, Byron, and Quad Cities Stations referred to independent verification as a generic term for verification practices. The inspectors determined that the inconsistent use of terminology contributed to the confusion regarding the differences between the verification practices and when each should be performed (See Section O4.3).

- Braidwood, Byron, and Quad Cities Stations provided site specific procedure writer's guidance, which included information on verification practices. However, this guidance referred to independent verifications and did not provide specific direction on which verification technique was required (i.e., independent verification versus concurrent dual verification).

b.4 Out-of-Service (OOS) Program

The licensee had not implemented a standardized procedure governing the OOS program. As a result, differences existed in the implementation of the OOS program at each site. For example, the Braidwood and Quad Cities Stations allowed the use of an administrative OOS for configuration control purposes where Byron Station did not.

In addition, the inspectors noted that each of the OOS hang/return-to-service checklists specified an "IV" [independent verification]; however, the licensee routinely used concurrent dual verifications for OOS activities to a varying degree at each of the sites. The inspectors also noted that the licensee used OOS briefing checklists, which required a discussion of verification practices, at each of the sites, but only the Braidwood checklist specified which verification practice was required.

b.5 System Line-up Process

The licensee had not implemented a standardized procedure governing the system line-up process. As a result, differences existed in the performance of system line-ups at each site. The inspectors had the following observations regarding the licensee's implementation of the system line-up process.

- Braidwood Administrative Procedure 340-2, "Use of Mechanical and Electrical Lineups," specified, in part, that system line-ups be performed to maintain the line-ups current within a 3-year cycle. However, at the direction of the operations manager on June 14, 1999, the licensee stopped performing periodic system line-ups. The inspectors determined that four nonsafety-related system line-ups had exceeded this periodicity.

- Byron Administrative Procedure 340-2, "Initiation and Use of System Lineups (Mechanical and Electrical)," did not require that system line-ups be performed periodically. However, in response to the Nuclear Generation Group Configuration Control Action Plan, the licensee had initiated a process to perform periodic line-ups on selected systems.

- Quad Cities Administrative Procedure 300-18, "Valve, Breaker and Fuse Checklists," specified that system lineups be performed every two refueling cycles. However, the inspectors determined that the licensee's system for performing periodic system line-ups only ensured that the line-ups were performed every four refueling cycles.

- Quad Cities Administrative Procedure 300-18 prohibited equipment manipulations as part of the performance of a system line-up. However, BAP 340-2 and BwAP 340-2 both allowed equipment manipulations for the purpose of performing the system line-up.

b.6 Locked Valve Program

The licensee had not implemented a standardized procedure governing the locked valve program. As a result, differences existed in the locked valve program at each site. For example, both the Braidwood and Byron Stations implemented the abnormal component position process for components that were not in their normal position due to the installation or removal of a locking device. However, the Quad Cities Station did not consider a component in an abnormal position solely due to the installation or removal of a locking device.

c. Conclusions

(Braidwood, Byron, and Quad Cities) The licensee did not consistently implement the standardized processes for operational configuration control and verification practices. In addition, the policies and expectations were not proceduralized, and differences existed regarding who was authorized to manipulate plant equipment. The implementation of processes at each site which had not been standardized including aspects of the out-of-service program, the system line-up process, and the locked valve program. These inconsistencies were notable since the licensee frequently shared personnel between sites. These individuals may not be aware of the differences.

O3.2 Deficiencies with the Implementation of Standardized Procedures

a. Inspection Scope (71707)

The inspectors evaluated the effectiveness of the licensee's process for implementing standardized procedures. The inspectors reviewed Nuclear Station Procedure (NSP) AP-1001, "Nuclear Station Procedure Review and Approval Process," Revision 1, and interviewed operations, maintenance, engineering, regulatory assurance, nuclear oversight and administration department personnel.

b. Observations and Findings

During this inspection, the inspectors identified that Byron Station had not implemented CWPI-NSP-OP-1-20, "Operational Configuration Control," Revision 1, which had previously been implemented at the Braidwood and Quad Cities Stations. This procedure revision had been approved by the corporate functional area manager and forwarded to each of the sites for implementation on April 28, 1999. Byron personnel had received the revision, but had subsequently lost track of it. Consequently, the procedure revision had not been approved or implemented at Byron Station. As a result, the licensee initiated problem identification form (PIF) B1999-02440 to evaluate the cause and track corrective actions for this issue.

As a result of this occurrence, the inspectors reviewed the implementation of standardized procedures at each of the sites and had the following observations.

- A large backlog of standardized procedures existed in the review and approval process. Specifically:

(Braidwood) As of July 13, 1999, 88 procedures were in the review process, 36 of which had been in the review process for greater than 15 days but less than 45 days, and seven had been in the process for greater than 45 days;

(Byron) As of July 6, 1999, 111 procedures were in the review process, 48 of which had been in the review process for greater than 15 days but less than 45 days, and 40 had been in the process for greater than 45 days; and

(Quad Cities) As of July 12, 1999, 74 procedures were in the review process, 39 of which had been in the review process for greater than 15 days but less than 45 days, and four had been in the process for greater than 45 days.

- Station personnel indicated that in some cases standardized procedures were implemented without effective training being provided to the affected station personnel. For example, at Quad Cities Station, CWPI-NSP-OP-1-20, "Operational Configuration Control," Revision 1, which changed the safety evaluation requirements associated with the abnormal component position process, was implemented without the operators being effectively trained on the contents of the revision.

- Multiple procedures existed for the same topic, some of which provided conflicting guidance.

- Many procedures referenced other procedures which had been deleted or superceded.

- Most personnel at each of the stations were not familiar with the Nuclear Generation Group Corrective Action Program Guides.

c. Conclusions

(Braidwood, Byron, and Quad Cities) The manner in which standardized procedures had been implemented at each of the sites resulted in a large backlog of procedures in the review and approval process. Consequently, some standardized procedures were not implemented in a timely manner. In addition, a lack of rigor in the licensee's implementation of the procedural review and approval process resulted in multiple procedures existing for the same topic and insufficient training on some procedure changes, which contributed to knowledge weaknesses regarding the implementation of verification practices and the abnormal component position process.

O4 Operator Knowledge and Performance

O4.1 Licensee Staff Knowledge - Authorization to Operate Plant Equipment (71707)

The inspectors interviewed numerous supervisory and craft level station personnel in the operations, maintenance, and engineering departments at each of the sites to evaluate the licensee staff's knowledge of who was authorized to operate plant equipment. The inspectors also reviewed the applicable station procedures (also see Section O3.1). The inspectors concluded that the staff at both the Byron and Quad Cities Stations generally understood who was authorized to operate plant equipment and the staff's understanding was consistent with the station's policies. The inspectors also concluded

that the staff at the Braidwood Station had an inconsistent understanding of who was authorized to operate plant equipment, specifically, who was authorized to operate equipment within OOS boundaries.

O4.2 Licensee Staff Knowledge - Abnormal Component Position Process (71707)

The inspectors interviewed numerous supervisory and craft level station personnel in the operations, maintenance, and engineering departments at each of the sites to evaluate the staff's knowledge of the abnormal component position process. The inspectors also reviewed the applicable station procedures (also see Section O3.1). The inspectors concluded that with the exception of the operators, station personnel at the Braidwood, Byron, and Quad Cities Stations were not knowledgeable of the abnormal component position process delineated in CWPI-NSP-OP-1-20, "Operational Configuration Control." The inspectors also concluded that the operators were generally familiar with how the abnormal component position process was used to track equipment in an abnormal configuration and the requirements for its use. However, the inspectors determined that some of the operators at the Quad Cities Station believed that a 10 CFR Part 50.59 evaluation was a prerequisite for the abnormal component position process (also see Section O3.2).

O4.3 Licensee Staff Knowledge - Verification Practices

a. Inspection Scope (71707)

The inspectors interviewed numerous supervisory and craft level station personnel in the operations, maintenance, and engineering departments at each of the sites to evaluate their knowledge of verification practices. The inspectors also observed field activities which required verification practices and reviewed the following documents and procedures (also see Section O3.1).

- Braidwood OOS 970003064, "Roll Up Doors for MEER [Miscellaneous Electrical Equipment Room], 1A/1B DG [Diesel Generator] RMS [Rooms], Div 11 Div 2 RMS"
- Braidwood OOS 990001970, "Sight Gage Blown/Repair"
- Braidwood OOS 990007581, "2D RCFC [Reactor Containment Fan Cooler] Thermal Performance Testing"
- Braidwood OOS 990008855, "Isolate Steam Leak"
- Braidwood Operating Procedure (BwOP) AP-9, "Racking Out a 480V Air Circuit Breaker to the Disconnect Position," Revision 6E1
- Braidwood Personal OOS P99-304, "Flow Scan Steam Dump Valve 2MS004G"
- Byron OOS 990006991, "1WO020A - Thermal Overload Surveillance"
- Byron Operating Procedures (BOP) AF-5, "Motor Driven Auxiliary Feedwater Pump _A Startup on Recirc," Revision 11
- BOP AF-6, "Motor Driven Auxiliary Feedwater Pump _A Shutdown," Revision 12
- Byron Surveillance Procedure 0BOSR 10.b.5-1, "Monthly Fire Protection Valve Lineup Surveillance," Revision 1
- Byron Surveillance Procedure 2BOSR 8.1.2-1, "Unit Two 2A Diesel Generator Operability Monthly (Staggered) and Semi-Annual (Staggered) Surveillance," Revision 1
- Byron Surveillance Procedure 1BVSR 5.5.8.AF.1-1, "Unit 1 ASME Surveillance Requirements for the Motor Driven Auxiliary Feedwater Pump" Revision 2

- Quad Cities OOS 990007981, "Replace C/S B OGFB HVAC [Heating, Ventilation, and Air Conditioning]"
- Quad Cities OOS 990008347, "Replace HRSS [High Radiation Sample System] Waste Tank Evacuation Compressor"
- Quad Cities Personal OOS 990684, "Personnel Out-of-Service for ½ Emergency Diesel Generator"
- Quad Cities Personal OOS 990721, "Personnel Out-of-Service for MOV [Motor Operated Valve] 2-1001-19B"
- Quad Cities QCMMS 6600-03, "Emergency Diesel Generator Periodic Preventive Maintenance Inspection," Revision 11
- Quad Cities Work Request 960030032, "Perform Static VOTES Test on MOV 2-1001-19B"

b. Observations and Findings

The inspectors determined that station personnel at the Braidwood, Byron and Quad Cities Stations, including supervisory personnel, had an inconsistent understanding of the verification practices delineated in CWPI-NSP-OP-1-11, "Verification Practices." The inspectors noted that most personnel lacked a thorough understanding of the differences between independent verification and concurrent dual verification practices; when each verification practice was required to be performed; and who was allowed to perform the verifications. The inspectors also noted that when most personnel described or performed a concurrent dual verification, the verification lacked independence. In addition, the inspectors noted that station personnel were generally more familiar with the terminology of apart-in-time and apart-in-action rather than independent verification and concurrent dual verification.

The inspectors observed field activities which required verification practices and determined that the implementation of the verification practices was consistent with the results of the interviews. Some specific examples included the following.

- (Braidwood) During the clearance of Personal OOS P99-304, the inspectors identified that the operator did not perform a concurrent dual verification as required. Specifically: (1) the operator did not approach within approximately 8 feet of the valve which was operated; (2) the operator did not read the valve label plate; and (3) the operator did not physically verify that the valve was in the correct position. No violations of regulatory requirements occurred since the activity involved nonsafety-related equipment.

- (Braidwood and Quad Cities) During the concurrent dual verifications performed for Braidwood OOS 990007581, Quad Cities OOS 990008347 and Quad Cities OOS 990007981, the inspectors identified that one of the operators provided visual clues and prompting to the other operator. Consequently, the concurrent dual verifications lacked independence.

- (Byron) During the concurrent dual verification performed for the installation of a jumper as part of Byron Surveillance Procedure 1BVSR 5.5.8.AF.1-1, the inspectors identified that one of the electrical maintenance technicians provided visual clues and prompting to the other technician. Consequently, the concurrent dual verification lacked independence.

c. Conclusions

(Braidwood, Byron, and Quad Cities) Station personnel had an inconsistent understanding of verification practices. Specifically, confusion existed regarding the differences between the verification practices, when each was required to be performed, and who was allowed to perform these verification practices.

O4.4 Licensee Staff Knowledge - Recognition of Plant Issues (71707)

The inspectors interviewed numerous supervisory and craft level station personnel in the operations, maintenance, and engineering departments at each of the sites to evaluate their recognition and understanding of plant issues. The inspectors determined that station personnel at the Braidwood, Byron and Quad Cities Stations, including supervisory personnel, generally did not recognize and understand the configuration control and human performance issues that existed at their site. Most of the individuals interviewed fit into one of two categories. The first category believed that performance had improved relative to previous performance levels and that the current performance level was good. The second category did not recognize that the performance level in these areas had been or was currently in need of improvement. As a result, the licensee had not been fully effective in improving performance in these areas since station personnel did not recognize the need to improve.

O4.5 First Line Supervisor Reinforcement of Standards and Expectations

a. Inspection Scope (71707)

The inspectors interviewed numerous supervisory and craft level station personnel in the operations, maintenance, and engineering departments at each of the sites.

b. Observations and Findings

The inspectors determined through an interview process that first line supervisors at the Braidwood, Byron, and Quad Cities Stations were not meeting licensee management's expectation to spend between 40 and 50 percent of their time in the field reinforcing standards and expectations. The first line supervisors indicated that the cause was excessive administrative burden. While the inspectors noted that this issue existed at each of the stations, it appeared to be a more significant issue at Byron Station.

In addition, the inspectors noted that first line supervision exhibited an insufficient understanding of the station's performance issues (i.e., configuration control and human performance). First line supervision also demonstrated knowledge weaknesses regarding verification practices and the abnormal component position process (also see Sections O4.2, O4.3, and O4.4).

c. Conclusions

(Braidwood, Byron, and Quad Cities) First line supervision did not meet licensee management's expectation to spend between 40 and 50 percent of their time in the field reinforcing standards and expectations. First line supervision also exhibited an insufficient understanding of the station's performance issues and demonstrated knowledge weaknesses in the areas of verification practices and the abnormal

component position process. Consequently, the effectiveness of first line supervision was limited.

O7 Quality Assurance in Operations

O7.1 Corrective Action Approach to Address Recurring Configuration Control Occurrences (40500)

In June 1998, the licensee identified configuration control as a multi-site issue that affected all sites within the Nuclear Generation Group (NGG). In response to the continuing configuration control occurrences, the licensee implemented numerous corrective action initiatives to improve performance in this area. Some of the more significant initiatives included:

- Corporate Nuclear Oversight's performance of the Five Station Configuration Control Assessment;
- Development and implementation of a standardized configuration control procedure;
- Development and implementation of the NGG Configuration Control Action Plan;
- Coordinating with the Institute of Nuclear Power Operations to conduct assist visits in the area of human performance; and
- The recent development of a human performance team to address human performance issues across the NGG.

While these initiatives have resulted in improved performance in the area of configuration control, the continuing events at the Braidwood, Byron, and Quad Cities Stations indicated that the corrective actions had not been fully effective. These occurrences were primarily attributable to human performance deficiencies with the largest contributor to these occurrences involving maintenance activities.

O7.2 Nuclear Generation Group Configuration Control Action Plan

a. Inspection Scope (40500)

The inspectors reviewed the NGG Configuration Control Action Plan and interviewed operations, maintenance, engineering, and nuclear oversight department personnel at each of the sites.

b. Observations and Findings

In response to the continuing configuration control occurrences within the NGG, the licensee adopted the Byron Configuration Control Action Plan for implementation at each of the other sites within the NGG. This plan included 46 action items and represented a comprehensive corrective action initiative. The inspectors had the following observations regarding this action plan.

Braidwood:

- Action Item A.12 — Implement a procedure place-keeping policy throughout the site. The policy should state the expectations for each work group performing work in the power block.

  This action item had a 30-day time period for completion, which expired in mid-February 1999. However, the inspectors noted that the procedure place-keeping policy had not been implemented by July 16, 1999.

- Action Item B.1 — Develop a site policy that clearly states departmental boundary lines for equipment manipulations.

  This action item was expected to be completed immediately, mid-January 1999. However, the inspectors noted that the site policy which delineated who was authorized to manipulate plant equipment had not been implemented by July 16, 1999.

- Action Item B.4 — Perform M-lineups on systems that have not been verified within the past two years in order to establish a known baseline configuration. Establish an M-lineup rotation such that every system has an M-lineup performed every two refueling cycles.

  This action item was documented as being completed; however, on June 14, 1999, the operations manager directed that periodic lineups were no longer going to be performed. The inspectors noted that this direction was not consistent with the requirements of BwAP 340-2, "Use of Mechanical and Electrical Lineups," Revision 16E1, Section 2.a, which specified, in part, that system lineups be performed to maintain the lineups current within a 3 year cycle. The inspectors noted that four nonsafety-related system lineups had exceeded this periodicity.

- Braidwood personnel originally determined that Action Items G.3 through G.6, which involved enhancing the processes for updating drawings and reducing the drawing backlogs, were not applicable. However, the inspectors noted during this inspection that the licensee was re-evaluating this decision due to the recent identification of several configuration control occurrences involving drawing issues.

Byron:

- Action Item A.6 — Formalize the Event Review Board process. Develop charter or policy so that event review boards are performed in a consistent manner for all events.

  The licensee implemented Byron Site Policy Memorandum 200.26, "Event Review Board," on January 12, 1999. However, the inspectors determined that the licensee was not consistently performing event review boards as specified in this memorandum.

- Action Item A.7 — Communicate the results of Event Review Board to all site personnel through the reliable source or CETV [closed circuit television].

The inspectors determined that the licensee was not communicating the results of event review boards to all site personnel.

- Action Item B.4 — Perform M-lineups on systems that have not been verified within the past two years in order to establish a known baseline configuration. Establish an M-lineup rotation such that every system has an M-lineup performed every two refueling cycles.

This action item was documented as being completed; however, the licensee had not performed valve lineups on all systems within the past two years. The licensee closed this action item based on establishing a system which would result in the periodic lineup of selected systems.

- Action Item C.2 — Develop and implement a site policy on communications expectations.

The inspectors noted that the licensee's closure of this item was based on the fact that communications expectations were delineated in the CWPI-NSP-OP-1-1, "Operations Department Standards," and the Pocketbook for Administrative Excellence. However, the inspectors determined that the action item was not changed to allow for not issuing a site policy. A site policy on communications had been developed, but had not been implemented by July 21, 1999.

Quad Cities:

- Action Item B.4 — Perform M-lineups on systems that have not been verified within the past two years in order to establish a known baseline configuration. Establish an M-lineup rotation such that every system has an M-lineup performed every two refueling cycles.

This action item was documented as being completed; however, the inspectors determined that the licensee's system for performing system lineups every two refueling cycles only ensured that the lineups would have been performed every four refueling cycles.

All Stations:

- Action Item A.13 — Establish site policy requiring "independent verification" for all out-of-services.

Each of the sites indicated that this action item had been completed. However, the inspectors noted that the sites were performing both "independent verifications" and "concurrent dual verifications' for out-of-service activities. The

inspectors also noted that the sites were not consistent in which out-of-service activities required "independent verifications" and which required "concurrent dual verifications."

- The licensee had not evaluated the effectiveness of the action plan; consequently, the licensee had missed opportunities to proactively identify which action plan items had not been fully effective.

c. Conclusions

(Braidwood, Byron, and Quad Cities) The Nuclear Generation Group Configuration Control Action Plan represented a comprehensive corrective action initiative.

(Braidwood, Byron, and Quad Cities) Several of the Nuclear Generation Group Configuration Control Action Plan items had not been completed. In addition, the licensee had not evaluated the effectiveness of the action plan in addressing the long-standing configuration control issue at each of the sites.

O7.3 Corporate Nuclear Oversight Five Station Configuration Control Assessment

a. Inspection Scope (40500)

The inspectors reviewed Corporate Nuclear Oversight Five Station Configuration Control Assessment Report NODCA-98-100-CMW and interviewed operations, maintenance, engineering, and nuclear oversight department personnel. The inspectors also evaluated the corrective actions that each site implemented in response to this assessment.

b. Observations and Findings

In response to the continuing configuration control occurrences within the NGG, corporate nuclear oversight performed a Five Station Configuration Control Assessment in June 1998. The purpose of this assessment was to verify the adequacy of procedures, processes, and work practices to maintain control of the configuration of plant equipment. The results of this assessment included: (1) procedures and work practices did not meet licensee management's expectations for maintaining control of the configuration of plant equipment; (2) procedural guidance and management expectations regarding roles and responsibilities for component manipulations had not been effectively incorporated into site work practices; (3) site communication efforts to raise the level of awareness and communicate the seriousness of configuration control events were ineffective, which resulted in workers not being internally challenged to alter their work habits to minimize errors; and (4) site nuclear oversight organizations had inconsistently raised site management's awareness and ineffectively provided the stations with insights and recommendations for improving performance.

In response to the issues identified in this assessment, the licensee implemented Nuclear Station Procedure CC-3020, "Operational Configuration Control," at each station. The licensee also conducted training of station personnel and incorporated a configuration control topic into new employee training and periodic refresher training for site personnel. The inspectors noted that the licensee implemented additional corrective actions to address these issues as part of the NGG Configuration Control Action Plan.

However, the inspectors determined that the licensee did not implement any specific action to address the results of the assessment regarding the site nuclear oversight organizations. In addition, the inspectors noted that the licensee had not evaluated the effectiveness of the corrective actions following implementation; consequently, the licensee missed an opportunity to proactively identify corrective actions that had not been fully effective in addressing the long-standing configuration control issues at each of these stations.

c. Conclusions

(Braidwood, Byron, and Quad Cities) The licensee implemented corrective actions to address the issues identified during the Corporate Nuclear Oversight Five Station Configuration Control Assessment, which was conducted in June 1998, with the following exception. The licensee had not implement corrective actions to address the finding that nuclear oversight inconsistently responded to configuration control events and missed opportunities to provide the stations with configuration control event insights.

O7.4 Nuclear Oversight Assessment of Configuration Control

a. Inspection Scope (40500)

The inspectors evaluated the effectiveness of the nuclear oversight organizations at the Braidwood, Byron and Quad Cities Stations in regard to operational configuration control and human performance. The inspectors interviewed nuclear oversight department personnel and reviewed each of the Nuclear Oversight Monthly Issues Reports issued since January 1998. The inspectors also reviewed the following nuclear oversight assessments.

- Braidwood Station Quality Audit Report 20-98-01, "Operations"
- Braidwood Station Nuclear Oversight Assessment (NOA) 20-99-001, "Operations - Status Indication"
- Braidwood Station NOA 20-99-024, "Operations - Outage Activities"
- Byron Station Quality Audit Report 06-98-02, "Operations"
- Byron Station NOA 06-98-034, "Maintenance Human Performance"
- Byron Station Nuclear Oversight Letter 06-98-041, "Assessment of Byron's 1998 Performance Challenges"
- Byron Station NOA 06-99-005, "Operations Corrective Actions"
- Byron Station NOA 06-99-006, "Operations Standards"
- Byron Station NOA 06-99-009, "Maintenance Work Practices"
- Byron Station NOA 06-99-015, "Inspection, Test, and Operating Status (Temporary Alterations)"
- Byron Station NOA 06-99-022, "Operations Configuration Control"
- Byron Station NOA 06-99-024, "Work Package Adequacy"
- Byron Station NOA 06-99-026, "B1R09 Post Outage Report"
- Quad Cities Station NOA 04-98-031, "Plant Startup"
- Quad Cities Station NOA 04-98-049, "Quality of Maintenance Assessment"
- Quad Cities Station NOA 04-98-074, "Briefings, Peer Checks, Discreet Component Operations Assessment"
- Quad Cities Station NOA 04-98-084, "Out-of-Service"
- Quad Cities Station NOA 04-99-002, "Chemistry Work Practices"

- Quad Cities Station NOA 04-99-012, "Operations Work Practices"
- Quad Cities Station NOA 04-99-013, "Plant Shutdown - Q2P02"
- Quad Cities Station NOA 04-99-026, "Operations Standards"
- Quad Cities Station NOA 04-99-027, "Plant Start-up - Q2P02"
- Quad Cities Station NOA 04-99-031, "BWR [Boiling Water Reactor] Chemistry Program"
- Quad Cities Station NOA 04-99-033, "Surveillance Outage - Q1P02 - Operations"

b. Observations and Findings

The inspectors reviewed the Nuclear Oversight Monthly Issues Reports issued since January 1998 and determined that the reports contained a thorough evaluation of the issues that needed to be resolved at each station. The inspectors noted that most of the issues discussed in the Nuclear Oversight Monthly Issues Reports were self-revealing or station identified issues. The most prominent issue was configuration control. In June 1998, the licensee identified configuration control as a multi-site issue that effected all sites. The licensee maintained configuration control as a multi-site issue until April 1999 when the licensee expanded the scope of the issue to include human performance errors that resulted in consequential operational events. This issue remained a nuclear oversight multi-site issue that effected all sites through the end of this inspection.

The inspectors also determined that several of the issues documented in this inspection report had been repeatedly identified in the Nuclear Oversight Monthly Issues Reports. The most notable examples included the recurring configuration control and human performance events, deficiencies with the implementation of standardized procedures, and insufficient maintenance first line supervisor field time. The inspectors concluded that the site nuclear oversight organizations were not consistently escalating long-standing issues to ensure that the issues were addressed effectively and in a timely manner.

In addition, the inspectors noted that the nuclear oversight organizations had performed assessments in the areas of operational configuration control and human performance at each of the sites. While most of these assessments identified deficiencies that needed to be addressed, some of these assessments did not appear to be self-critical. The most notable example included Braidwood Nuclear Oversight Assessment 20-99-024, "Operations - Outage Activities," dated June 4, 1999. This assessment concluded that operators employed proper verification methodologies when manipulating plant equipment and that verification practices were acceptably implemented. However, during this inspection, the inspectors identified several deficiencies regarding verification practices of operators that contradicted the conclusions of this assessment.

c. Conclusions

(Braidwood, Byron, and Quad Cities) The inspectors concluded that the Nuclear Oversight Monthly Issues Report contained a thorough evaluation of the issues that needed to be resolved at each station.

(Braidwood, Byron, and Quad Cities) The inspectors concluded that the site nuclear oversight organizations were occasionally not effective at identifying precursor level

issues prior to their manifestation in plant events. In addition, site nuclear oversight organizations were not consistently escalating long-standing issues to ensure that the issues were addressed effectively and in a timely manner.

O7.5 Self-Assessment of Configuration Control and Human Performance

a. Inspection Scope (40500)

The inspectors evaluated the effectiveness of the self-assessments performed at the Braidwood, Byron, and Quad Cities Stations in regard to operational configuration control and human performance. The inspectors interviewed operations and maintenance department personnel and reviewed the following self-assessments.

- Braidwood Methods Used by WCC [Work Control Center] Supervisors for Equipment RTS [Return to Service] Following OOS Work Focus Area Assessment, conducted May 25 through June 26, 1998
- Braidwood 1998 Out-of-Service Process Errors Focus Area Assessment, conducted in February 1999
- Braidwood Maintenance Department Configuration Control Self-Assessment, conducted February 22 through March 10, 1999
- Byron Abnormal Configuration Tracking Self-Assessment, conducted June 23 through July 1, 1998
- Byron Instrument Maintenance Configuration Control Knowledge and Compliance Self-Assessment, conducted December 8 through 17, 1999
- Byron Mechanical Maintenance Configuration Control Self-Assessment, conducted on February 5, 1999
- Byron Maintenance Services Department Focus Area Self-Assessment, completed on February 25, 1999
- Byron Electrical Maintenance Configuration Control Work Practices Self-Assessment, conducted February 23 through March 5, 1999
- Quad Cities Non-Licensed Operator Performance Self-Assessment, conducted July 15 through 17, 1999
- Quad Cities EOOS [Electronic Out-of-Service] Training Self-Assessment, conducted August 3 through 5, 1998
- Quad Cities Instrument Maintenance Department Configuration Control Self-Assessment, completed on March 22, 1999
- Quad Cities Electrical Maintenance Department Configuration Control Self-Assessment, completed on March 23, 1999
- Quad Cities Operational Analysis Department Configuration Control Self-Assessment, completed on March 24, 1999
- Quad Cities Mechanical Maintenance Department Configuration Control Self-Assessment, completed on March 25, 1999
- Quad Cities NSP-CC-3020 Adherence and Effectiveness Self-Assessment, conducted March 29 through 31, 1999
- Quad Cities Compliance with the Out-of-Service Program Self-Assessment, conducted May 10 through 19, 1999

b. Observations and Findings

The inspectors noted that the self-assessments performed at each of the stations were not performed to a standard. The inspectors also noted that some of the self-

assessments were not self-critical, in that, the assessments did not result in the identification of any meaningful issues and were not consistent with the issues identified in the Nuclear Oversight Monthly Issues Report or as revealed by station events. This was most evident in the maintenance department configuration control self-assessments which were completed to satisfy NGG Configuration Control Action Plan Item B.8. Consequently, the quality and effectiveness of these self-assessments varied significantly.

In addition, the inspectors determined that the licensee did not always accomplish the corrective actions and recommendations delineated in self-assessments. For example, the licensee did not implement several recommendations specified in the Braidwood Maintenance Department Configuration Control Self-Assessment; and, the licensee did not perform an effectiveness review as specified in the Byron Abnormal Configuration Tracking Self-Assessment for the corrective actions implemented in response to the assessment. The inspectors noted that these occurrences were due to the licensee's failure to rigorously track these actions to completion.

c. Conclusions

(Braidwood, Byron, and Quad Cities) The licensee did not consistently perform self-assessments regarding operational configuration control and human performance to a standard; and in some cases, these assessments were not self-critical. Consequently, the quality and effectiveness of these self-assessments varied significantly.

(Braidwood and Byron) The licensee did not always accomplish the corrective actions and recommendations delineated in self-assessments due to the failure to rigorously track the actions to completion.

O7.6 Operating Experience Lessons Learned Program - Information Notices

a. Inspection Scope (40500)

The inspectors reviewed the licensee's evaluation of NRC Information Notice 98-34, "Configuration Control Errors," to assess how the licensee responded to issues identified at other facilities.

b. Observations and Findings

Information Notice 98-34 was issued to inform licensees of recent inspection findings related to configuration control of safety-related equipment. It illustrated examples involving the emergency diesel generator system and stated that there was a potential for similar problems to exist in other systems. The information notice did not contain NRC requirements, and no specific action was required to be taken by the licensee. The inspectors had the following observations regarding the licensee's evaluation of Information Notice 98-34.

- (Braidwood) The inspectors determined that the licensee adequately evaluated this information notice. The specific issues associated with the emergency diesel generator system were addressed and plans were in place to evaluate

other systems. While some of the generic aspects of configuration control were discussed in the assessment, the licensee did not specify that a detailed action plan to address configuration control issues was in place.

- (Byron) The inspectors determined that the licensee's evaluation of this information notice was incomplete. The specific issues associated with the emergency diesel generator system were addressed. However, other systems which may have been susceptible to similar concerns and the generic aspects of configuration control were not addressed. Although the licensee's assessment did not address the generic aspects of configuration control, the inspectors noted that the licensee had previously implemented a configuration control action plan to address these issues.

- (Quad Cities) The inspectors determined that the licensee's evaluation of this information notice was incomplete. The licensee did not evaluate the specific issues associated with the emergency diesel generator system or evaluate the applicability of these issues to other safety related systems. However, the inspectors noted that the licensee addressed the generic aspects of configuration control and referenced the configuration control action plan.

c. Conclusions

(Byron, and Quad Cities) The licensee's evaluation of NRC Information Notice 98-34, "Configuration Control Errors," was incomplete. Specifically, Byron Station focused too narrowly on the specific examples identified in the information notice and did not evaluate the issue generically. In addition, Quad Cities Station addressed the issue broadly, but did not evaluate the specific examples identified in the information notice.

O7.7 Operating Experience Lessons Learned Program - Nuclear Operations Notifications

a. Inspection Scope (40500)

The inspectors reviewed the licensee's evaluation of selected nuclear operations notifications (NONs) to assess how the licensee responded to configuration control issues identified at other Commonwealth Edison facilities. The inspectors reviewed 20 selected NONs including:

- NON BW-98-046, "DRPI [Digital Rod Position Indication] Cabling to RX [Reactor] Vessel Head Disconnected Before OOS Hung,"
- NON BW-99-016, "Boric Acid Storage Tank Found isolated During VCT [Volume Control Tank] Auto Make Up,"
- NON BY-99-022, "Electrical Jumper Installed Incorrectly During Diesel Generator Surveillance,"
- NON DR-98-047, "Discharge of Water from the Unit 2 CRD [Control Rod Drive]/CCSW [Containment Cooling Service Water] Pump Floor,"
- NON DR-98-074, "Out of Service Did not Cover Work Performed," and
- NON LS-98-047, "Configuration Control Issue: Work Performed OOS and Valves Closed, due to Worker Non-Compliance."

b. Observations and Findings

The inspectors determined that the licensee frequently focused too narrowly on the issue identified in the NONs and did not address the causes of the problem. As a result, each of the stations determined that some of the NONs were not applicable and did not implement any corrective actions even though the stations used similar processes and the causes for these problems were germane. The following items represent one example from a larger group at each site where NONs were not fully addressed.

Braidwood:

Byron Station issued NON BY-99-022 in response to the installation of a jumper on the wrong relay during testing. The prompt investigation conducted at Byron Station determined that the apparent causes for this occurrence included insufficient labeling, an inadequate pre-job briefing, and an inadequate in-field turnover. Braidwood Station personnel reviewed the NON and determined that no action was required because the jumpers used at Braidwood station contained a switch which would allow the performance of a verification prior to making the connection. The licensee did not address the causes for the occurrence or enter this NON into their corrective action program by initiating a problem identification form.

Byron:

Dresden Station issued NON DR-98-074 in response to the removal of a fire protection sprinkler head when the system was not isolated. The prompt investigation conducted at Dresden Station determined that the apparent causes for this occurrence included poor work practices, a human error by the work analyst, and the sprinkler heads not having specific identifiers. Byron Station personnel did not initiate any action in response to this NON or enter it into their corrective action program.

Quad Cities:

Braidwood Station issued NON BW-98-046 in response to work being performed prior to an out-of-service being implemented. Quad Cities Station personnel reviewed the NON and determined that no action was required because the occurrence involved plant specific equipment that did not exist at the Quad Cities Station. The licensee did not address the causes for the occurrence or enter this NON into their corrective action program.

c. Conclusions

(Braidwood, Byron, and Quad Cities) The licensee did not fully utilize the intra-lessons learned program to ensure that configuration control problems identified at other Commonwealth Edison stations were addressed at each site. Specifically, the licensee frequently focused too narrowly on the details of the issue identified in the nuclear operations notification and did not address the causes of the problem.

O7.8 Effectiveness Review of Implemented Corrective Actions

a. Inspection Scope (40500)

The inspectors evaluated the licensee's use of the effectiveness review process as it pertained to corrective actions implemented for configuration control and human performance issues. The inspectors interviewed operations, regulatory assurance and nuclear oversight department personnel and reviewed Nuclear Station Procedures (NSPs) AP-1004, "Corrective Action Program Process," Revision 1, and AP-4004, "Corrective Action Program Procedure," Revision 0.

b. Observations and Findings

The purpose of the effectiveness review process was to determine if the corrective actions implemented resolved the underlying issue and its causes. The licensee's process was delineated in their corrective action program procedures NSP AP-1004 and NSP AP-4004. Specifically, NSP AP-1004, Section 3.1, specified, in part, that effectiveness reviews were to be performed for corrective actions implemented for significant conditions adverse to quality, selected operating experience issues, and other significant corrective actions. Also, NSP AP-4004, Section 5.0, specified, in part, that these effectiveness reviews should be scheduled for completion 3 to 6 months following implementation of the corrective actions and shall be completed within 12 months. The inspectors determined that this process adequately evaluated the effectiveness of corrective actions when implemented properly.

However, the inspectors noted that the Braidwood, Byron, and Quad Cities Stations had not performed or scheduled effectiveness reviews for the corrective actions implemented in response to the Corporate Nuclear Oversight Five Station Configuration Control Assessment, the Nuclear Generation Group Configuration Control Action Plan, or numerous self-assessments in the area of configuration control. Consequently, the licensee had missed opportunities to proactively identify which corrective action initiatives had not been fully effective in addressing the long-standing configuration control issues at each of these stations.

c. Conclusions

(Braidwood, Byron, and Quad Cities) The licensee did not fully utilize the effectiveness review process to evaluate implemented corrective actions to address recurring configuration control issues. Consequently, the licensee had missed opportunities to proactively identify which corrective action initiatives had not been fully effective in addressing the long-standing configuration control issues at each of these stations.

O7.9 (Braidwood) Review of Corrective Actions Regarding Inadequate Out-of-Service (OOS) Preparation

a. Inspection Scope (40500)

The inspectors evaluated the effectiveness of the licensee's corrective action program regarding the continuing out-of-service preparation deficiencies. The inspectors reviewed the root cause and apparent cause reports for the following problem identification forms (PIFs):

- A1998-03026, "Unit 1 Blowdown Condenser Not Properly Isolated As Part Of OOS 980002528";
- A1998-04453, "Inadequate OOS";
- A1999-00212, "OOS Not Adequate To Perform Scheduled Work";
- A1999-00785, "OOS Not Adequate For Work Due To Engineering Request Recommendations"; and
- A1999-02053, "Improperly placed OOS on Gauge OPI-FC05."

b. Observations and Findings

On September 8, 1998, during the process of removing bolts from the Unit 1 steam generator blowdown condenser head, water began to leak from the flange. As a result, the licensee initiated PIF A1998-03026 to document the occurrence. The licensee's root cause investigation determined that the OOS boundary had not been adequate; specifically, non-essential service water had not been isolated from the condenser. The licensee determined that: (1) the OOS preparers failed to ensure that the OOS boundary encompassed the work scope; and (2) the operators that hung the OOS and the maintenance crew that walked down the OOS prior to the start of the work did not identify that the OOS boundary was not sufficient for the work to be performed. The licensee provided additional training to the OOS preparers and reinforced management's expectations with all work groups to ensure that OOS boundaries adequately isolated the scope of the work.

On December 23, 1998, during the return to service of an instrument air dryer, the licensee identified that maintenance had been performed on the dryer with an inadequate OOS boundary. As a result, the licensee initiated PIF A1998-04453 to document the occurrence. The licensee's apparent cause evaluation determined that the problem was due to inattention to detail by the preparers and the reviewer. The inspectors determined that this apparent cause evaluation was superficial and it did not address the recurring nature of the issue.

On January 25, 1999, a maintenance crew identified, prior to the start of work, that the OOS boundary was not adequate for the work to be performed on a circulating water flow instrument. As a result, the licensee initiated PIF A1999-00212 to document the occurrence. The licensee's apparent cause evaluation determined that the problem was due to a drawing error and an inadequate review of the job scope. In response to this occurrence, the licensee reinforced expectations with all operating crews that prints be used during the execution of OOSs and that the work associated with each OOS be covered as part of the pre-job briefing for hanging the OOS.

On March 24, 1999, a maintenance crew identified, prior to the start of work, that the OOS boundary was not adequate for the work to be performed on a 4-inch instrument air header. As a result, the licensee initiated PIF A1999-00785 to document the occurrence. The inspectors noted that if the maintenance had been performed on the inadequately isolated instrument air header, a loss of instrument air and a dual unit trip could have occurred. The licensee's investigation determined that: (1) the work planner submitted an engineering request for the work to be performed with incorrect isolation points; (2) the engineer that reviewed the engineering request did not perform a field walkdown to ensure that the engineering request was correct; and (3) the operators that prepared and hung the OOS did not verify that the boundary encompassed the work scope. The licensee subsequently reinforced management's expectations with each of

the involved work groups to ensure that OOS boundaries adequately isolated the scope of the work.

On July 6, 1999, a maintenance crew identified, prior to the start of work, that an OOS boundary was not adequate to isolate the work to be performed on the refueling water purification pump 0A discharge pressure gauge. As a result, the licensee initiated PIF A1999-02053 to document the occurrence. The licensee's apparent cause evaluation determined that the OOS was correctly written; however, there were two valves in the field with the same valve tag number. The licensee also determined that the operators that hung the OOS misunderstood the scope of the work, and as a result, did not recognize that the OOS boundary did not encompass the work. The licensee subsequently initiated an engineering request to have the labeling error corrected.

No violations of regulatory requirements occurred because all of these occurrences involved nonsafety-related systems.

c. Conclusions

(Braidwood) The licensee's corrective action program had not been fully effective in preventing recurring out-of-service errors involving inadequate isolation boundaries. The quality of the licensee's investigations into the causes for these errors varied significantly.

O7.10 (Braidwood) Review of Corrective Actions Regarding Inappropriate Actions by Operations Analysis Department Personnel

a. Inspection Scope (40500)

The inspectors evaluated the effectiveness of the licensee's corrective action program regarding the configuration control problems caused by operations analysis department (OAD) personnel. The inspectors reviewed the root cause or the apparent cause reports for the following PIFs:

- A1998-00214, "BTCB [Bus Tie Circuit Breaker] 7-8 Trip Coils";
- A1999-01383, "Inadvertent Trip of ACB [Air Circuit Breaker] 1445ZW";
- A1999-01578, "Inability To Close Switch Yard Breaker From Main Control Room After Maintenance"; and
- A1999-1946, "Annunciator Power Supply De-Energized."

b. Observations and Findings

The licensee had several configuration control events in 1998 and 1999 involving OAD personnel not complying with station standards and following station procedures. Operations analysis department personnel are Commonwealth Edison Company employees generally based offsite and periodically perform work onsite. They report to the station maintenance superintendent regarding their onsite duties.

On January 19, 1998, during troubleshooting activities associated with bus tie circuit breaker 7-8, OAD personnel isolated control power to the breaker without authorization. The inspectors noted that if a trip of offsite power line L2002 had occurred while control power was not available to breaker 7-8, the local breaker backup protective feature would have tripped bus tie circuit breaker 1-8, which would have caused a trip of the Unit 1 main generator. The licensee did not perform an apparent cause or root cause investigation into this occurrence. The licensee's corrective actions for this occurrence consisted of the shift manager counseling the OAD technician.

On May 2, 1999, during the performance of trip checks for unit substation 034W, OAD personnel inadvertently tripped air circuit breaker 1445ZW. The licensee's apparent cause investigation identified several problems during the performance of this surveillance activity including: (1) the pre-job brief was not adequate; (2) the labeling of the relays was insufficient; and (3) no independent verification was performed. The inspectors determined that the licensee's corrective actions for this occurrence were comprehensive and went beyond counseling the involved individuals. For example, the licensee initiated a review of all unit substation labeling which was planned to be completed by the end of August 1999.

On May 11, 1999, following completion of maintenance activities on bus tie circuit breaker 9-10, OAD personnel failed to close cutout switches in the breaker local control panel. Consequently, the operators were not able to close the breaker from the main control room. The licensee's investigation determined that the operation of these cutout switches was routine by OAD personnel and was not procedurally controlled; however, the licensee's corrective actions did not address this aspect of the event.

On June 22, 1999, during the removal of the Unit 1 sequence of events recorder, OAD personnel de-energized a backup power supply that had not been identified in the work package. Consequently, the annunciator horn to several control room panels was lost for approximately 2 hours. The licensee's corrective actions consisted of counseling the involved individuals and revising the work package for the scheduled maintenance on the Unit 2 sequence of events recorder.

No violations of regulatory requirements occurred because all of these occurrences involved nonsafety-related systems.

c. Conclusions

(Braidwood) The licensee's corrective action program had not been fully effective in preventing recurring configuration control events due to operations analysis department personnel not complying with station standards and following station procedures. Some of the licensee's investigations were limited in scope and depth. As a result, the licensee's corrective actions did not preclude similar errors from recurring.

O7.11 (Quad Cities) Review of Corrective Actions for Configuration Control Events

a. Inspection Scope (40500)

The inspectors evaluated the effectiveness of the licensee's corrective action program regarding the continuing configuration control events at Quad Cities Station. The inspectors reviewed the applicable PIFs, the corrective actions implemented by the licensee and the results of the corrective action effectiveness reviews, if applicable.

b. Observations and Findings

In April 1999, the licensee acknowledged a potential trend of human performance errors that adversely effected control of the configuration of plant systems and equipment. The licensee documented this concern on PIF Q1999-01508. As a result, the licensee held a site-wide stand down on April 23, 1999, to discuss the specific events and corrective actions.

Also, in response to the human performance issues that occurred between February and April 1999, the licensee established a human performance improvement team to develop a strategic approach to improving human performance. The team conducted a baseline assessment and concluded in mid-June 1999 that there was no adverse trend in configuration control events, but the number of events remained unsatisfactory. The team's report also concluded the following:

- The organization was over relying on self-check as a defense for evolutions performed for the first time;
- Procedures and panel nomenclature either did not match or were not unit specific;
- Error precursors, which were created by latent organizational weaknesses, were not well described in investigation reports; and
- Change or delay in scheduled work may have created time pressure (an error precursor).

The team developed a strategy to improve human performance which included:

- Educating the workforce on human performance;
- Implementing a new approach to work, which was to focus the organization on preventive behaviors, strengthening defenses and correcting organizational weaknesses; and
- Conducting quarterly human performance assessments.

The licensee planned to roll out this strategy to station personnel at the end of July 1999, after the completion of this inspection.

c. Conclusions

(Quad Cities) The licensee's corrective action program had not been fully effective in preventing recurring configuration control and human performance events. As a result, the licensee had developed, but not yet implemented, a human performance strategy to improve the human performance at the station.

O8 Miscellaneous Operations Issues

O8.1 Effectiveness of Communication Methods (40500)

The licensee at all three stations routinely utilized communication methods such as daily station bulletin handouts, departmental briefings ("tailgates"), and bulletin boards, such as the "Event Free Clock," to establish and maintain an awareness of plant issues with station personnel. These methods were also used to communicate operating experience information, corrective action information, and nuclear oversight performance issues, which were documented in the Nuclear Oversight Monthly Issues Reports. Based on numerous interviews of supervisory and craft level station personnel in the operations, maintenance, and engineering departments, the inspectors concluded that these communication methods had not been fully effective in establishing and maintaining a consistent awareness and understanding of plant issues. This was most evident by the station personnel in the lower levels of the organization not recognizing and understanding that configuration control and human performance were performance issues which existed at each of the stations.

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 July 21, 1999, including representatives from Quad Cities, Braidwood, Byron and ComEd corporate. 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

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(2)	R. Armitage	Training, Quad Cities
(2, 4)	G. Barnes	Station Manager, Quad Cities
(1)	C. Bontjes	NRC Coordinator, Byron
(3)	M. Cassidy	NRC Coordinator, Braidwood
(4)	R. Colglazier	NRC Coordinator, Byron
(2)	D. Cook	Maintenance, Quad Cities
(3)	R. Coon	Training Manager, Braidwood
(1)	D. Dillinger	Regulatory Assurance, Byron
(2)	J. Dimmette	Site Vice President, Quad Cities
(2)	K. Giadrosich	Nuclear Oversight, Quad Cities
(4)	L. Guaquil	Nuclear Oversight
(1, 2)	T. Hanley	Operations Support Manager, Byron
(1)	J. Heaton	Unit Planning Supervisor, Byron
(2)	R. Hebeler	Chemistry, Quad Cities
(3)	D. Hoots	Shift Operations Supervisor, Braidwood
(1)	B. Jacobs	Design Engineering, Byron
(4)	M. Jurmain	Maintenance Manager, Byron
(1, 4)	W. Kouba	Engineering Manager, Byron
(4)	J. Kramer Jr.	Work Control Manager, Byron
(4)	R. Krich	Vice President, Regulatory Services
(1)	S. Kuczynski	Nuclear Oversight Manager, Byron
(1)	B. Levis	Site Vice President, Byron
(1)	B. Long	Instrument Maintenance Superintendent, Byron
(4)	R. Lopriore	Site Manager, Byron
(3)	J. Madden	Nuclear Oversight Assessor, Braidwood
(4)	M. McDowell	Operations Manager, Quad Cities
(4)	D. Milroy	Engineering Administrations Supervisor, Byron
(4)	C. Peterson	Regulatory Assurance Manager, Quad Cities
(2)	G. Powell	Radiation Protection, Quad Cities
(4)	P. Reister	Site Manager Assistant, Byron
(4)	M. Riegel	Nuclear Oversight Manager, Braidwood
(4)	J. Roton	Assessment Manager, Byron
(3)	G. Schwartz	Station Manager, Braidwood
(3, 4)	T. Simpkin	Regulatory Assurance Manager, Braidwood
(1, 4)	M. Snow	Operations Manager, Byron
(2)	J. Thieve	Regulatory Assurance, Quad Cities
(4)	G. Waldrep	Nuclear Oversight
(3)	R. Washington	Corrective Actions Program Manager, Braidwood
(4)	R. Wegner	Operations Manager, Braidwood

PARTIAL LIST OF PERSONS CONTACTED (cont'd)

NRC

(1, 2, 3, 4)	E. Cobey	Senior Resident Inspector, Byron
(4)	M. Jordan	Chief, Reactor Projects Branch 3
(2)	C. Miller	Senior Resident Inspector, Quad Cities
(3)	C. Phillips	Senior Resident Inspector, Braidwood
(2)	K. Walton	Resident Inspector, Quad Cities
(1, 2, 3, 4)	D. Wrona	Resident Inspector, Monticello

(1) Attended Byron Station Management Debriefing
(2) Attended Quad Cities Station Management Debriefing
(3) Attended Braidwood Station Management Debriefing
(4) Attended Exit Meeting

INSPECTION PROCEDURES USED

IP 40500:	Effectiveness of Licensee Process to Identify, Resolve, and Prevent Problems
IP 71707:	Plant Operations

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

None

Discussed

None

LIST OF ACRONYMS USED

BAP	Byron Administrative Procedure
BOP	Byron Operating Procedure
BwAP	Braidwood Administrative Procedure
BwOP	Braidwood Operating Procedure
CWPI	Common Work Practice Instruction
IP	Quad Cities Interim Procedure
NGG	Nuclear Generation Group
NOA	Nuclear Oversight Assessment
NON	Nuclear Operations Notification
NRC	Nuclear Regulatory Commission
NSP	Nuclear Station Procedure
OAD	Operations Analysis Department
OOS	Out-of-Service
PIF	Problem Identification Form
QAP	Quad Cities Administrative Procedure