

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

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Report No: 50-454/97020(DRP); 50-455/97020(DRP)

Licensee: Commonwealth Edison Company

Facility: Byron Generating Station, Units 1 and 2

Location: 4450 N. German Church Road
Byron, IL 61010

Dates: September 9 - October 16, 1997

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EXECUTIVE SUMMARY

Eyrone Generating Station, Units 1 and 2
NRC Inspection Report No. 50-454/97020(DRP); 50-455/97020(DRP)

This inspection included aspects of licensee operations, maintenance, engineering, and plant support. The report covers a 6-week period of resident inspection. Additionally, this inspection included aspects of a security event that occurred on August 15, 1997.

Operations

- During the Unit 1 technical specification (TS) shutdown on October 9, 1997, the crew focus was safe and conservative. Operator distractions did not exist. The operators were attentive to the control boards and clear formal communications were observed by the inspectors. Operator performance during the shutdown was excellent. Consistent excellent performance was also observed during the start-up after repairs to the check valve were completed on October 15, 1997 (Section O1.2).
- The operating crew response to the Unit 2 trip on October 10, 1997, resulting from the failed rod drive power supplies, was excellent (Section O1.3). This was demonstrated by good command and control, control of personnel allowed in the control room, team work between the operating crew members, response to annunciators and reference to procedures and procedural compliance.
- The plans to shutdown Unit 2 due to the degraded extraction steam bellows were conducted in a thorough and conservative manner. Because of the preexisting plans in place for the maintenance outage, transition from the unexpected Unit 2 reactor trip into the maintenance outage was smooth. Excellent teamwork was displayed by all departments involved in the maintenance outage. Decisions concerning scheduling the outages and the impact of each unit's status on the other unit were safe and conservative (Section O1.4).
- The format of the operations crew shift change brief was changed to conduct a turnover at each watch station, then a crew brief was conducted outside the control room followed by watch relief. At first, the crews appeared rushed to return to the control room to relieve the watch and a concern existed that the time allowed for the brief may not always be sufficient for a thorough turnover. However, an excellent brief was observed in preparation for the Unit 1 cooldown on October 10, 1997. Routine briefs appeared time constrained; however, when required, the operators took the necessary time for a thorough brief (Section O1.5).
- The licensee had a controlled well managed process to track and trend overdue corrective actions (Section O7.1).
- The licensee did not incorporate issued TS amendments within the stated implementation time for each amendment. This resulted in not having current copies of TS available for personnel involved in licensed activities, i.e., control room operators. Without the current revisions available, the possibility of not adhering to TS existed. A violation was issued (Section O8.6).

Maintenance/Surveillance

- Observed maintenance activities and surveillance testing were conducted according to approved procedures, in accordance with TS, and had appropriate oversight by supervision, system engineer, and quality control personnel. One observed weakness in procedure adequacy was that expected alarms were not generally included in operations department surveillance test procedures (Sections M1.1 and M1.2).
- The inspectors identified a poor work practice where personnel signed for performing steps in a work instruction after all work was done, in lieu of signing for each step after each step was accomplished (Section M1.3)
- The licensee identified several problems associated with the 2B CV charging pump maintenance that prevented work completion within the expected 40 hours and delayed the pump's return to service. The delay caused operators to begin a TS required shutdown; however, the pump was returned to service, tested and declared operable prior to a significant power reduction. The inspector and the licensee determined many of the problems should have been prevented, including: confusion about whether the pump had been drained or not, lack of a fill and vent procedure, and communication problems between operators, mechanics, and system engineering personnel (Section M1.4).
- The receipt of new fuel was properly conducted in a safe and expeditious manner. Plant personnel were knowledgeable of their responsibilities as evidenced by referral to and use of the applicable procedures, their responsibilities, and the use of fuel movement equipment. Inspection of the new fuel was thorough (Section M4.1).

Engineering

- During the shutdown and subsequent startup, the inspectors observed the qualified nuclear engineer (QNE) perform shutdown margin calculations and dilution calculations. The QNE provided advice on control rod position to support control of flux distribution. The QNE remained out of the immediate area of the reactor controls, only entering the area to converse as necessary with the operators. Clear, formal communications between the QNE and the operators were observed. QNE support was excellent (Section E1.1).
- During the failed extraction steam bellows trending and planning for Unit 2 outage, the inspectors noted excellent system engineer knowledge level, actions, and communications with operators and station management. System engineering provided recommendations concerning continued unit operation and corrective actions. System engineering support for the failed bellows event was excellent (Section E1.2).
- The inspectors reviewed the temporary alterations program and determined that most of the temporary alterations were due to preparation for the Unit 1 steam generator replacement. The temporary alteration program was well controlled and the number of temporary alterations was justified (Section E8.1).

Plant Support

- Radiation protection personnel properly performed and documented surveys of the new fuel and shipping containers. The receipt of new fuel was well supported by the radiation protection personnel (Section R1.1).
- Observed worker contamination control practices were good and the transition from a three step off pad program to a single step off pad program was successfully implemented (Section R2.1).
- A no-response violation was cited for failure to comply with escort requirements within the protected area. The incident demonstrated a lack of sufficient knowledge of escort requirements by both a visitor and an escort (Section S8.1).

Report Details

Summary of Plant Status

Unit 1 operated at or near full power during this inspection period until October 9, 1997, when a technical specification (TS) required shutdown was commenced due to excessive emergency core cooling system (ECCS) check valve leakage. After repairing the leaking check valve, a start-up was completed on October 15, 1997, and the unit was returned to full power.

Unit 2 operated at or near full power until October 10, 1997, when a reactor trip occurred due to a degrading power supply in the rod drive control system. The unit remained shutdown for previously planned repair of an extraction steam bellows on a low pressure turbine.

I. Operations

O1 Conduct of Operations

O1.1 General Comments (71707)

Using Inspection Procedure 71707, the inspectors conducted frequent reviews of ongoing plant operations. In general, the conduct of operations was professional and safety-conscious. Observations indicated that the operations staff was knowledgeable of plant conditions and responded promptly and appropriately to alarms. Specific events and noteworthy observations are detailed in the sections below.

O1.2 Unit 1 Outage Due to Excessive ECCS Check Valve Leakage

On October 9, 1997, during the performance of the monthly ECCS venting surveillance, gas was vented from the safety injection (SI) discharge piping. The licensee determined that the source of the gas was nitrogen saturated water leaking from an SI accumulator through SI cold leg check valve 1SI8819C. The operators noted that the 1C SI accumulator level decreased from 54 percent to 42 percent during the test performance. The inspector calculated this to be about 80 gallons. Water in the SI piping was saturated with nitrogen from the SI accumulator and then came out of solution when the pressure was reduced downstream of the vent valve. Ultrasonic testing verified that the SI piping was full of water. Check valve testing verified that seat leakage through the check valve was approximately 5 gpm, which exceeded the TS 3.4.6.2 limit of 1 gpm. In response, the plant commenced a power reduction and plant shutdown to repair the check valve.

The inspectors observed portions of the shutdown. The crew focus was on shutting down Unit 1 in a safe and conservative, yet in a timely manner. Operator distractions did not exist. The operators were attentive to the control boards and clear formal communications were observed by the inspectors. The inspectors observed the operators manually trip the reactor after taking the turbine off-line and noted that all control rods inserted as expected. The inspectors concluded that operator performance during the shutdown was excellent. The inspectors also noted consistently excellent performance during observations of portions of the subsequent start-up after repairs to check valve 1SI8819C, on October 15, 1997.

O1.3 Unit 2 Reactor Trip

a. Inspection Scope (71707)

The inspectors observed the operating crew's response immediately following a Unit 2 reactor trip. The inspectors also conducted a follow-up on the apparent cause of the trip.

b. Observations and Findings

On October 10, 1997, an automatic reactor trip occurred due to a degrading power supply in the rod drive (RD) control system during maintenance troubleshooting. The inspectors observed the licensee stabilize the plant immediately following the trip. Operator manning was effective with a balance maintained between an adequate number of operators and preventing congestion in the control room. Good command and control existed as well as team work between the shift technical advisor (STA), unit supervisor, and reactor operators. The inspectors observed that procedures were followed. Annunciator response was appropriate with the sequence of events recorder used and the appropriate response procedure referenced. All safety-related equipment functioned as expected.

On the previous day, a Rod Control Non-Urgent Failure alarm cycled on and off in the control room, which precipitated the troubleshooting by maintenance personnel. The troubleshooting revealed that both redundant power supplies were failing. After discussions with Westinghouse, the licensee decided to install an external power supply to power the RD cabinet while the two degraded power supplies were changed out. Westinghouse indicated that this had been successfully completed at another facility. When the external power supply was connected to the -24 volt bus, the reactor tripped on high negative flux rate, due to one or more control rods falling. At that time, both power supplies were near the trip setpoint.

The licensee's investigation revealed that the power supplies could fail in a manner that was not detectable on-line by the current system design. Westinghouse Technical Bulletin (TB) 87-10 described the issue and proposed either a modification to increase the sensitivity of the power supply failure detection circuit by the installation of a shorting resistor, or periodically testing the power supply output during shutdown. The licensee determined at the time that the failure appeared to be infrequent and chose to perform the periodic testing on the power supplies.

On this occasion, the licensee checked all 20 power supplies for each unit and identified that a total of six power supplies had this undetected failure. The failed power supplies were replaced. The current power supplies were all installed around 1990 with approximately one failure identified per year since then. All previous failures had been annunciated. The licensee continued to work with Westinghouse to determine if the failures were age related. The inspectors considered the licensee's initial root cause investigation and short-term corrective actions appropriate. At the end of the inspection period, the licensee was reviewing potential modifications on the RD system as a long-term corrective action.

c. Conclusions

The inspectors concluded that the operating crew's response to the Unit 2 trip resulting from the failed rod drive power supplies was excellent.

O1.4 Extraction Steam Bellows Degradation

a. Inspection Scope (71707)

The inspectors reviewed the licensee's plans to shutdown Unit 2 to repair an extraction steam bellows on a low pressure turbine.

b. Observations and Findings

In September, the licensee noted a decrease of approximately 30 megawatts electric due to a degradation of an extraction steam bellows on a low pressure turbine. The bellows are inside the main condenser. The licensee developed a plan for a maintenance outage on October 11, 1997, to repair the bellows. The inspectors reviewed and discussed the plan with system engineering, plant operations, and site quality verification personnel. Based on these discussions, the inspectors concluded that the planned outage was well organized with excellent teamwork displayed by all departments involved. Management's decision to enter the maintenance outage prior to further bellows degradation was considered conservative and proactive.

The TS required shutdown of Unit 1 (Section O1.2) during the early morning of October 10, 1997, caused the licensee to postpone the Unit 2 outage until after Unit 1 was repaired. The inspectors considered the delay prudent to minimize distractions and a potential loss of focus caused by outages on both units.

After Unit 2 tripped on October 10, 1997, the licensee held Unit 2 stable and focused on the TS required shutdown and cool down of Unit 1. The licensee then decided to enter the previously planned Unit 2 outage after Unit 1 was repaired. The outage was delayed a few days until sufficient information was obtained regarding the trip. The outage duration was scheduled for approximately 14 days. The inspectors noted that the transition into the planned maintenance outage was smooth due to the preplanning that had already taken place for the bellows maintenance outage.

c. Conclusions

The inspectors concluded that plans to shutdown Unit 2 due to the degraded bellows was conducted thoroughly and conservatively. Because of the preexisting plans in place for the maintenance outage, transition from the unexpected Unit 2 reactor trip into the maintenance outage was smooth. Excellent teamwork was displayed by all departments involved in the maintenance outage. The inspectors considered all of the licensee decisions concerning scheduling the outages and the impact of each unit's status on the other unit safe and conservative.

O1.5 Shift Briefing Format Change

On September 29, 1997, the licensee changed the format of the operations crew brief. Before September 29, the operators turned over and relieved at each watch station and then conducted the crew brief in the control room. The turnover process was changed to conduct a turnover at each watch station, then a crew brief was conducted outside the control room followed by watch relief. The licensee's expectation was for the brief to typically be conducted within approximately 15 minutes. On several occasions, the inspectors observed that the crews appeared rushed to return to the control room to relieve the watch. The inspectors were concerned that the time allowed for the brief may

not always be sufficient for a thorough brief. However, the inspectors observed an excellent brief in preparation for the Unit 1 cool down on October 10, 1997. The brief was thorough and focused. The shift manager focused on operations directing plant activities and that there were no priorities greater than conducting a safe and expeditious cooldown. The inspectors concluded that although daily, routine briefs appeared time constrained, when required, the operator staff would take the time necessary for a thorough turnover.

O7 Quality Assurance in Operations

O7.1 Overdue Corrective Actions Backlog and Trending

a. Inspection Scope (71707)

The inspectors reviewed the licensee's overdue corrective action backlog and trend. The review consisted primarily of discussions with licensee personnel.

b. Observations and Findings

The licensee trended the overdue corrective actions for significant action items. Corrective actions from the following were trended; Licensee Event Reports (LER), Notice of Violations (NOV), Security Event Reports (SER), Root Cause Reports, Trend Reports, and Corrective Action Records (CAR). The performance criterion was less than or equal to 15 over due corrective action items per calendar quarter. The licensee's total for the second quarter was 10. Thus, the overdue corrective actions were well controlled and monitored. The inspectors noted that the reported number of overdue corrective actions was actually those items that were more than 2 days late. The licensee allowed 1 day for a grace period and 1 day for computer update. The inspectors noted that an extension of the due date was granted by the cognizant superintendent or someone with that technical signature authority.

c. Conclusions

The inspectors concluded that the overdue corrective actions backlog and trending was acceptable.

O8 Miscellaneous Operations Issues (92700, 92901)

O8.1 (Closed) LER 50-455/93008-01: Reactor trip/turbine trip due to a solid state protection system (SSPS) universal logic card intermittent failure. In response to the initial root cause findings, the licensee replaced numerous circuit cards in the SSPS. The inspectors reviewed the results of a Westinghouse investigation of the event, which determined that the reactor trip was due to an intermittent failure of a circuit board. The inspectors had no further concerns. This item is closed.

O8.2 (Closed) LER 50-454/94007: 1B wide range hot leg resistance temperature detector (RTD) indication spiked low and could not be restored within limiting condition for operation (LCO) time limit. The licensee determined the problem was associated with the instrument splice connection inside containment within the bioshield. The location of the problem within containment made it difficult to perform repairs during power operation. Prior to exceeding the LCO time limit, the licensee requested a notice of enforcement discretion (NOED). The NOED requested a relief from the TS for the remote shutdown

panel that required one operable hot leg temperature (T_{hot}) wide range temperature channel for each reactor coolant loop. The NOED was granted by the NRC on August 1, 1994, and allowed the licensee to operate with the inoperable T_{hot} wide range temperature channel on B loop until the September 1994 refueling outage. The licensee has subsequently removed the RTDs from the reactor coolant system during modifications. This item is closed.

- O8.3 (Closed) LER 50-455/96004: Source range detectors identified as inoperable with reactor trip breakers closed due to poor communications during shift turnover. As discussed in NRC inspection report 96007, source range detector (SR) N32 was placed in bypass due to spiking from electrical noise. This was not communicated during shift turnover. During the following shift, train B solid state protection system bimonthly surveillance was performed, which rendered SR detector N31 inoperable. Once the operators realized that both SR detectors were inoperable, SR N32 detector was restored, thus restoring the ability to trip open the reactor trip breakers. There were minimal safety consequences because of this event. During the period in which the reactor trip breakers were closed, all control rods were fully inserted. The inspectors reviewed the licensee's root cause and corrective actions implemented to address the poor communications and had no further concerns. This item is closed.
- O8.4 (Closed) IFL 50-454/455-96007-01: Both source range monitors out of service with reactor trip breakers closed. This item is a duplicate of LER 50-455/96004, which has been closed in Section O8.3 of this report. This item is closed.
- O8.5 (Closed) LER 50-454/95003: Containment leak detection systems inoperable and unintentional entry into TS 3.0.3. The TS LCO required that three subsystems remain operable. On September 13, 1997, the licensee allowed all three containment leak detection subsystems to be removed from service at the same time. Each individual subsystem removed from service had a specific action requirement and that requirement was met. However, the licensee did not properly evaluate the cumulative impact the individual LCOs had on TS requirements. The LCO action requirements did not allow all three subsystems to be removed from service; therefore, TS 3.0.3 was applicable. TS 3.0.3 required the plant to commence a shutdown within one hour. The inspectors reviewed the licensee's corrective actions, which included the issuance of an Operations Daily Order to clarify the TS LCO requirements for the containment leak detection systems, training to communicate the correct interpretation of TS requirements, and the revision of operations department procedures to prohibit entering multiple TS action statements. The inspector considered the corrective actions adequate to prevent a recurrence of this problem. This LER is closed.

O8.6 Technical Specification (TS) Amendment Distribution Control

a. Inspection Scope (71707)

On September 26, 1997, during a routine control room inspection, the inspectors noted that the control room TS copies did not contain the most recent amendments. The inspectors discussed the issue with control room operators, determined the missing amendments subject and effective dates, and reviewed a sample of the amendments that required more restrictive actions for compliance.

b. Observations and Findings

The inspectors identified that the TS (TS) did not contain amendment 86, which imposed requirements related to degrading Boraflex in the spent fuel pool. Further review by the operators identified that several amendments were not in the TS. The operators noted that the existence of some amendments had been identified using a daily order. The daily order book did not account for all of the amendments that were missing from the TS.

Further review by the inspectors and the licensee identified that amendments 84 through 92 had not been placed in the TS books. The inspectors later noted that amendments 85 and 92 were not TS amendments and did not require changes to the TS. The licensee's implementation practice included a review of the amendment to ensure that the amendment was the same as requested by the licensee, changing procedures if the amendment was less restrictive than current requirements (more restrictive requirements were generally placed in procedures before requesting an amendment), and an on-site review of the amendment to verify all appropriate actions had been taken prior to inserting the amendment into the TS books.

Amendment 84 was issued June 26, 1996, with an implementation date stated on the amendment of 30 days after issue. Amendments 85 through 92 were all issued in 1997; however, when the issue was identified by the inspectors, all of the issued amendments had exceeded the implementation period allowed by the amendment.

Operations management noted that the issue had been identified by operations personnel approximately one month prior to the identification by the inspectors. Additionally, the Manager of Quality and Safety Assessment had identified the issue to station management and documented the issue with a Site Quality Verification Letter. Station management focused additional personnel on the task of implementing the amendments immediately prior to the inspectors' independent identification. However, when the inspectors independently identified the issue, no significant progress had been made toward distributing the amendments for use in the TS books.

Title 10, Code of Federal Regulations, Part 19, Section 11 (10 CFR 19.11), "Posting of notices to workers," paragraph (a)(2) required each licensee to post current copies of the license, license conditions, or documents incorporated into a license by reference, and amendments thereto. The inspectors also noted that paragraph (b) of 10 CFR 19.11 allows that if a posting is not practicable, the licensee may post a notice which describes the document and states where it may be examined. License numbers NPF-37 and 66, Paragraph 2.C(2), stated, in part, that TS were incorporated into each respective license as Appendix A. Byron station posting indicated that a copy of the current Unit 1 and Unit 2 licenses could be located in central files. The inspectors concluded that the failure to place amendments 84 and 86 through 91 for each unit in the central file and control room copies of the TS and other locations for use by individuals engaged in licensed activities was eight examples of a violation of 10 CFR 19.11 (50-454/97020-01(DRP); 50-455/97020-01(DRP)). The examples are as follows:

- a. Amendment 84, issued June 26, 1996, to be implemented within 30 days
- b. Amendment 86, issued April 2, 1997, to be implemented within 45 days
- c. Amendment 87, issued April 15, 1997, to be implemented within 30 days

- d. Amendment 88, issued April 16, 1997, to be implemented within 30 days
- e. Amendment 89, issued May 6, 1997, to be implemented within 30 days
- f. Amendment 90 (Unit 1), issued August 13, 1997, to be implemented within 30 days
- g. Amendment 90 (Unit 2), issued July 10, 1997, to be implemented within 30 days
- h. Amendment 91 (Unit 2), issued August 13, 1997, to be implemented within 30 days

The inspectors sampled the amendments that contained more conservative requirements and did not identify any examples of administrative controls and required actions not in place.

At the end of the inspection period, the amendments had not been incorporated into TS. Approximately four were prepared to be incorporated; however, procedure revisions for amendment 84 were not complete and therefore the licensee had not incorporated all the required amendments into TS.

c. Conclusions

The inspectors concluded that the licensee was not responsive in incorporating the issued amendments into TS and did not adhere to the stated implementation time on each amendment. Further, the inspectors were concerned that the control room operators did not have the latest version of TS available in the control room or other locations as appropriate. Without the current revisions, operators had the possibility existed of not adhering to TS.

08.7 Unplanned Technical Specification Limiting Condition for Operation Action Requirement Entries

The inspectors reviewed the licensee's recent unplanned entries into limiting condition for operation (LCO) action requirement. The inspectors reviewed the trend and supporting documentations for the unplanned entries. The inspectors noted that Byron had an unplanned entry total greater than most other Commonwealth Edison (ComEd) stations. Discussions with the licensee indicated that there were several potential causes for unplanned LCO action requirement entries. Potential causes included: Byron/Braidwood have more TS related equipment than the other older ComEd sites; the method of counting entries varied between stations (In May both Byron and Braidwood entered a required shutdown LCO. Byron counted the LCO as one for each train (four total) and Braidwood counted the LCO as one for each unit (two total)); and Byron had entries for acts of nature (specifically tornado warnings) that were not required at any of the other ComEd stations.

The inspectors concluded that due to the variables in counting methodology, the fact that Byron had several more LCO entries compared with other ComEd stations was not a significant concern. At the end of the inspection period, the licensee was working to resolve the variables between stations.

II. Maintenance

M1 Conduct of Maintenance

M1.1 Maintenance Observations (62707)

a. Inspection Scope

The inspectors observed the performance of all or portions of the following work requests (WR). When applicable, the inspectors also reviewed TS and the Updated Final Safety Analysis Report (UFSAR) for potential issues.

- WR 970075244-01 Troubleshoot and repair fuel handling building ventilation exhaust damper, OVA59YB
- WR 960021269-01 Change the Unit 2 spent fuel pump coupling grease
- WR 970032439-01 Open and clean the Unit 2 spent fuel room cubicle cooler
- WR 970097510-01 Repair Unit 2 spent fuel pump (SFP) cubicle cooler essential service water (SX) inlet isolation valve, 2SX2165A
- WR 970097554-01 Repair Unit 2 SFP cubicle cooler SX inlet isolation valve, 2SX2165B
- WR 970097569-01 Repair Unit 2 SFP cubicle cooler SX outlet isolation valve, 2SX2184A
- WR 970097575-01 Repair Unit 2 SFP cubicle cooler SX outlet isolation valve, 2SX2184B

b. Observations and Findings

The inspectors observed that the maintenance activities were conducted according to approved procedures and were in conformance with TS. The inspectors observed maintenance supervisors and system engineers monitoring job progress. Quality control personnel were also present when required. When applicable, appropriate radiation control measures were in place.

c. Conclusions

Based on the inspectors observations, the inspectors concluded that most of the observed routine maintenance activities were well performed. However, Section M1.3 includes observations made during SFP cubicle cooler valve repairs.

M1.2 Surveillance Observations (61726)

a. Inspection Scope

The inspectors observed the performance of all or parts of the following surveillance test procedures. The inspectors also reviewed plant equipment and surveillance testing activities against the UFSAR descriptions.

- 1BOS 8.1.1.2.a-1 1A DG Operability; Monthly Surveillance
- 0BVS XLT-3 VOTES testing valve 1SX034
- 2BVS 7.1.5-2 Main Steam Isolation Valves Partial Stroke Test
- 0BVS WW-1 Biannual Deep Well Pump Structure Inspection

- 0BVS 7.6.c.1-3 Unit 0 0B Control Room Make-up System HEP Filter Performance Test
- 2BOS 1.3.1.2-1 Moveable Control Assemblies Quarterly Surveillance

b. Observations and Findings

The inspectors noted that proper authorization was routinely obtained from the control room senior reactor operator (SRO) before the start of each surveillance test. Components removed from service as part of the surveillance test were identified prior to commencing the surveillance test and the proper TS limiting condition for operation action requirement (LCOAR) was entered. At the completion of the surveillance test and after independent verification of system restoration, the TS LCOAR was cleared. Test instruments used were verified to be calibrated as applicable. The inspectors reviewed completed surveillance tests and verified the surveillance tests met the acceptance criteria.

Moveable Control Assemblies Quarterly Surveillance Test

On September 23, 1997, the inspectors observed portions of the control rod quarterly exercise. During the surveillance test, two annunciators alarmed that the operators did not expect. The inspectors observed good communications and alarm response procedure usage. During the operators review of the alarm response procedure, they realized that the alarms were actually expected. The inspectors questioned the operators if the surveillance test listed the expected alarms. Review of the test procedure indicated that expected alarms were not provided. The operators stated that operations department surveillance test procedures frequently do not have expected alarms identified. The inspectors noted that instrument mechanics were required to brief operators on expected alarms during instrument maintenance. The licensee agreed that listing expected alarms in operations test procedures would assist the operators and planned to begin including expected alarms during future routine procedure revisions.

M1.3 Spent Fuel Pool Cooling Pump Cubicle Cooler Isolation Valve Repair

a. Inspection Scope (62707)

On October 7, 1997, the inspectors observed portions of the work required to repair isolation valves for the spent fuel pool cubicle cooler isolation valve. The observation consisted primarily of a procedure review due to the job being nearly complete when the inspectors arrived at the job site. The inspectors reviewed WR's 970097510-01, 970097554-01, 970097569-01, and 970097575-01, and discussed issues identified during the procedure review with mechanical maintenance department management.

b. Observations and Findings

During the inspectors review of the work instructions on October 7, 1997, the inspectors noted that the information required in several steps for one WR was not completed, although the freeze seal isolation was in the process of thawing. The inspectors noted that some procedure documentation was not completed, including a signature for establishment of the freeze seal, documentation of whether or not certain components required replacement, and a quality control signature for cleanliness. The inspectors noted that the same steps in the other WRs were properly annotated and signed.

Discussions with the licensee indicated that the management expectation was to document any required information for the procedure step when the step was finished. The inspectors agreed that the expectation was reasonable and that it would help reduce procedure adherence issues. The licensee discussed procedure use expectations during periodic mechanical maintenance training.

c. Conclusions

The inspectors concluded the practice of documenting information on a procedure after the work was complete was poor. The inspectors were concerned that, although a failure to follow the procedure was not noted by the inspectors, a step could be missed when documenting information in a procedure that was not completed at the time the procedure was performed.

M1.4 Unit 2 Chemical Volume and Control System Pump Maintenance

On September 8, 1997, the licensee started a number of planned work packages on the 2B chemical volume and control (CV) charging pump. Planned work was scheduled for approximately 40 hours and the TS allowed outage time was 72 hours. Several problems prevented work completion within the expected 40 hours and delayed the return to service. Several issues were identified by the licensee, including; confusion on whether the water had been drained for the pump, lack of a CV pump fill and vent procedure for returning the pump to service during normal operating conditions; communications problems between operators, mechanics, and system engineers; a leaking weld that required repair prior to the return of the pump to service; and excessive leakage from the pump outboard seal when the pump was initially started after the maintenance period. In accordance with company policy, the operators began a TS required shutdown approximately 8 hours prior to the end of the allowed outage time. The pump was returned to service, tested, and declared operable prior to a significant power reduction and Unit 2 returned to full power. The inspector and the licensee determined several of these issues could have been prevented with proper planning.

At the end of the inspection period, the licensee was completing the root cause evaluation for the CV pump work window. The inspectors considered the 2B CV pump work window an open item pending review of the licensee's root cause and corrective actions (50-455-97020-02(DRP)).

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: Byron Administrative Procedure (BAP) 370-3, "Administrative Control During Refueling," Revision 18; Byron Fuel Handling Procedure (BFP) FH-1, "New Fuel Receipt," Revision 10; BFP FH-2, "New Fuel Inspection," Revision 10; BFP FH-3, "New Fuel Transfer To/From Storage Vault," Revision 6; and BFP FH-31, "Fuel Handling Cleanliness Zones and Requirements," Revision 4.

b. Observations and Findings

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 all procedures used 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 perform inspections of the tamper indicating devices, accelerometers, and the shipping containers. The fuel handling supervisor found all tamper indicating devices intact, all accelerometers in the unclipped condition, and all shipping containers in good condition. The fuel handling supervisor and nuclear engineering personnel inspected each fuel assembly according to the requirements contained in BFP 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 cleanliness zones and controlled according to procedure BFP FH-31.

c. Conclusions

The inspectors concluded that the receipt of new fuel was conducted properly, safely and expeditiously. Plant personnel were knowledgeable of the applicable procedures, their responsibilities, and the use of fuel movement equipment. Cleanliness zones were established and BFP FH-31 procedural requirements were observed by the personnel participating in the new fuel receipt. Inspection of the new fuel was thorough, properly documented and status boards were maintained as required.

M8 Miscellaneous Maintenance Issues (92700, 92902)

- M8.1 (Closed) LER 50-455/97008: inadequate manufacturer breaker repair program allowed wrong parts to be installed. The licensee sent five Westinghouse DS-206 safety-related breakers off-site for refurbishment at a Westinghouse repair facility. On April 30, 1997, the manufacturer issued a non-conformance report notifying the licensee that the five breakers had been refurbished with the wrong closing springs. The wrong closing springs exert excessive force when closing due to increased spring strength. Westinghouse determined that the excessive closing force would cause cracking of the breaker pole base after 10 to 15 cycles. Three of the five breakers were installed and provided power to the essential service water (ESW) cooling tower fans. The licensee considered the fans to be inoperable from breaker installation to problem identification. During the time that the refurbished breakers were placed in service and when Westinghouse informed the licensee that the breakers were inoperable the station had unknowingly entered TS 3.7.5.b. Technical Specification 3.7.5.b required a minimum of six of the eight high speed fans to be operable or the licensee must perform compensatory actions. Three times the licensee had less than the six high speed fans and did not take the required compensatory actions. The licensee determined that having three SX high speed fans out of service for short periods of times did not have a significant impact on overall plant safety. This evaluation was based on meteorological conditions and conservative assumptions in design. The inspector reviewed the licensee's safety evaluation, receipt inspection program, and use of qualified vendors for the repair of safety-related

components. The inspector determined that the licensee had adequate procedures in place and had taken proper corrective action. This item is closed.

III. Engineering

E1 Conduct of Engineering

E1.1 Qualified Nuclear Engineer Support During Unit 1 Shutdown and Start-up (37551)

On October 10, 1997, Unit 1 was shutdown due to seat leakage through a check valve (Section O1.2). During the shutdown and subsequent startup, the inspectors observed the qualified nuclear engineer (QNE) support for the operators. The inspectors observed the QNE perform shutdown margin calculations and dilution calculations. The QNE provided advice on control rod position to support flux distribution control. The inspectors noted that the QNE remained out of the immediate area of the reactivity controls, only entering the area to converse with the operators. Clear, formal communications between the QNE and the operators were observed. The inspectors concluded that the QNE support was excellent.

E1.2 Engineering Support for Unit 2 Bellows Degradation Concerns (37551)

The inspectors discussed the Unit 2 extraction steam bellows degradation described in Section O1.4 with system engineering. During the discussions with the system engineer, the inspectors noted excellent knowledge level, trending, and communications with operators and station management. System engineering provided recommendations concerning continued unit operation and corrective actions. The inspectors concluded that system engineering support for the failed bellows was excellent.

E8 Miscellaneous Engineering Issues

E8.1 Temporary Alteration Program

The inspectors reviewed portions of the temporary alteration program; specifically, the size and the content of the backlog, and the licensee's goals for reduction were reviewed. The backlog of temporary alterations primarily depended on the elapsed time since the previous outage. The station goal was to minimize the amount of temporary alterations. The backlog received detailed periodic reviews by senior management which included a plan for removing each temporary alteration. Most temporary alterations were a result of planning and preparation for the Unit 1 SGR.

The inspectors concluded that the temporary alteration program was well controlled and the number of temporary alterations was acceptable.

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 the Byron Radiation Protection Procedure (BRP) 5160-6, "Surveying Radioactive Material Shipments," Revision 6.

b. Observations and Findings

The inspectors observed radiation protection personnel survey new fuel and 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 fuel's protective plastic covering, and the new fuel. No contamination was found.

The inspectors verified that the radiation detection instruments were properly used and were in calibration. The results of the surveys were documented according to BRP 5160-6.

c. Conclusion

The inspectors concluded that radiation protection personnel properly performed and documented the surveys specified in BRP 5160-6. The receipt of new fuel was well supported by the radiation protection personnel.

R2 Status of RP&C Facilities and Equipment

R2.1 Contamination Control Program

a. Inspection Scope (71750)

During the inspection period, the inspectors observed contamination control practices and programs. The inspectors reviewed the implementation of a single step off pad program, and the contaminated floor space trending program.

b. Observations and Findings

On October 1, 1997, the licensee implemented a single step off pad procedure. The licensee had used three step off pads prior to October 1. The inspectors observed portions of a resin vessel baroscope inspection, specifically observing radiological protection activities. A radiation protection technician was present at the job site, appropriate radiation surveys had been taken, workers stayed in low dose areas, and the workers used the single step off pad appropriately. The inspectors did not identify any concerns with the new single step off pad procedure.

The inspectors also reviewed the licensee's contaminated floor space trend. The station goal was 1.5 percent of the plant floor space excluding high radiation areas with infrequent access, inaccessible areas, vaults, pits, and areas used for contaminated work. During discussions with the licensee, the inspectors noted that the exemption removed some large areas, such as the filter pull area, the area around the spent fuel pool, the laundry, rad waste tunnel, and a robotics work area from the calculation. The inspectors' calculations indicated that the total floor space contaminated would approximately triple if the exempted floor space was included.

The licensee's definition of infrequent access was not consistent between ComEd stations. At the end of the inspection period the licensee had resolved the definition of infrequent discrepancy between ComEd stations.

The inspector noted that the licensee's program was based heavily on historical data. The licensee had been trending contaminated floor space since the middle 1980's. The inspectors routinely observed radiological conditions during plant inspections. Operators were rarely required to use protective clothing during normal operation and equipment rounds. Although the actual amount of contaminated floor space was greater than the number used by the licensee for trending, the inspectors concluded that the amount of contaminated floor space was not a significant concern.

c. Conclusions

The inspectors concluded that the observed worker contamination control practices were good and the single step off pad program was successfully implemented. Although because of exemptions, the actual amount of contaminated floor space was greater than the number used by the licensee for trending, the inspectors concluded that the amount of contaminated floor space was not a significant concern.

S8 Miscellaneous Security and Safeguards Issues

S8.1 (Closed) Security Event Report 50-454/97-S01-00

a. Inspection Scope (81070)

The inspection consisted of an interview with the Station Security Administrator and review of a licensee's Security Event Report (SER) No. 97-S01-00, which documented that a contractor visitor was left unescorted within the protected area for about 30 minutes.

b. Observation and Findings

On August 15, 1997, an NRC inspector observed a contractor visitor (welder) within the protected area without an escort. The NRC inspector assumed responsibility for escorting the visitor and called the security department who responded and took appropriate actions.

The licensee's subsequent investigation (as documented in SER 97-S01-00) discovered that the visitor had been left unescorted within the protected area for about 30 minutes. The visitor had been escorted by the contractor supervisor upon initial entry into the protected area and the supervisor turned the visitor over to another authorized contractor to continue escort responsibilities. During a subsequent relief break, the second escort

was assigned another job and left the visitor unescorted. After the break, the visitor returned to his work area unescorted. The escort did not arrange for the visitor to be escorted by another authorized individual, and the visitor did not take effective actions to assure that he was being escorted within the protected area. The inspector concluded the unescorted visitor was a violation of the station security plan, Section 7.1.2, which required visitors to be escorted while within the protected and vital areas (50-454/455-97020-03(DRS)).

The licensee reported the incident by telephone to NRC Headquarters on August 15, 1997, in accordance with 10 CFR 73.71 and the station security reporting requirements. A written SER was submitted to the NRC on September 15, 1997. Corrective actions identified in the SER included: The visitor and escort were escorted offsite and their access placed on a temporary hold pending completion of the investigation; the escort was counseled and retrained on escort responsibilities; the contractor retrained all field craft personnel and supervisors on escort responsibilities; the contractor quality assurance department performed a surveillance on all visitors under the contractor's escort responsibilities and determined that the incident was isolated; and the contractor is to perform a follow-up surveillance for escort responsibilities to determine if their personnel are complying with escort responsibilities within the protected and vital areas.

c. Conclusions

The visitor left unescorted within the protected area constituted a violation of Section 7.1.2 of the station security plan. The inspector concluded that the incident demonstrated a lack of sufficient knowledge of escort requirements by both the visitor and the escort. No written response to the violation was required because the corrective actions identified in the SER appeared adequate to prevent recurrence.

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 October 16, 1997. 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

- K. Kofron, Byron Station Manager
- J. Bauer, Health Physics Supervisor
- D. Brindle, Regulatory Assurance Supervisor
- E. Campbell, Maintenance Superintendent
- D. Eder, System Engineer
- T. Gierich, Operations Manager
- B. Israel, Site Quality Verification Supervisor
- T. Schuster, Manager of Quality & Safety Assessment
- M. Snow, Work Control Superintendent
- D. Wozniak, Engineering Manager

INSPECTION PROCEDURES USED

IP 37551: Onsite Engineering
IP 61726: Surveillance Observations
IP 62707: Maintenance Observations
IP 71707: Plant Operations
IP 71750: Plant Support
IP 81070: Access Control - Personnel
IP 92700: Onsite Follow-up of Written Reports of Nonroutine Events at Power Reactor Facilities
IP 92901: Follow-up - Plant Operations
IP 92902: Follow-up - Maintenance

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-454/97020-01(DRP); 50-455/97020-01(DRP)	VIO	Failure to incorporate TS amendment 84, 86, 87, 88, 89, 90, 91
50-455-97020-02(DRP)	IFI	Review licensee's root cause and corrective actions for 2B CV pump work window
50-454/455-97020-03(DRS)	VIO	A visitor was not adequately escorted within the protected area.

Closed

50-454/97-S01-00	SER	Unescorted visitor in the protected area.
50-455/93008-01	LER	Reactor trip due to an SSPS universal logic card failure.
50-454/94007	LER	RTD failure could not be repaired within LCC time limit.
50-455/96004	LER	SR detectors inoperable with reactor trip breakers closed.
50-454/455-96007-01	IFI	Both SR detectors out of service with reactor trip breakers closed.
50-454/95003	LER	Containment Leak detection systems inoperable.
50-455/97008	LER	Inadequate manufacturer breaker repair program resulted in the installation of wrong parts.

LIST OF ACRONYMS USED

BAP	Byron Administrative Procedure
BFP	Byron Fuel Handling Procedure
BRP	Byron Radiation Protection Procedure
CAR	Corrective Action Records
ComEd	Commonwealth Edison
CV	Chemical Volume
DG	Diesel Generator
DRP	Division of Reactor Projects
DRS	Division of Reactor Safety
ECCS	Emergency Core Cooling System
FME	Foreign Material Exclusion
gpm	Gallons Per Minute
LCO	Limiting Condition for Operation
LCOAR	Limiting Condition for Operation Action Requirement
LER	Licensee Event Report
NOED	Notice of Enforcement Discretion
NOV	Notice of Violation
PDR	Public Document Room
QNE	Qualified Nuclear Engineer
RD	Rod Drive System
RTD	Resistance Temperature Detector
SER	Security Event Report
SFP	Spent Fuel Pool
SGR	Steam Generator Replacement
SI	Safety Injection
SPP	Special Plant Procedure
SQVL	Site Quality Verification Letter
SR	Source Range
SRO	Senior Reactor Operator
SSPS	Solid State Protection System
STA	Shift Technical Advisor
SX	Essential Service Water System
TB	Technical Bulletin
T _{HOT}	Hot Leg Temperature
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
WR	Work Request