

March 9, 2000

Mr. Oliver D. Kingsley  
President, Nuclear Generation Group  
Commonwealth Edison Company  
ATTN: Regulatory Services  
Executive Towers West III  
1400 Opus Place, Suite 500  
Downers Grove, IL 60515

SUBJECT: BYRON INSPECTION REPORT 50-454/2000001(DRP); 50-455/2000001(DRP)

Dear Mr. Kingsley:

On February 22, 2000, the NRC completed an inspection at the Byron 1 and 2 reactor facilities. The enclosed report presents the results of that inspection.

During this inspection period, the overall conduct of activities at the Byron Station was conservative, with a continuing focus on safety. Control room operations were consistently performed in a safe, professional and a controlled manner. Routine maintenance and surveillance testing activities were properly coordinated and performed per approved procedures. Engineering department personnel generally provided good support to maintenance and testing activities and appropriately addressed operability questions.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and the enclosure will be placed in the NRC Public Document Room.

We will gladly discuss any questions you have concerning this inspection.

Sincerely,

T. Tongue for

Michael J. Jordan, Chief  
Reactor Projects Branch 3

Docket Nos. 50-454; 50-455  
License Nos. NPF-37; NPF-66

Enclosure: Inspection Report 50-454/2000001(DRP);  
50-455/2000001(DRP)

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REGION III

Docket Nos: 50-454; 50-455  
License Nos: NPF-37; NPF-66

Report No: 50-454/2000001(DRP); 50-455/2000001(DRP)

Licensee: Commonwealth Edison Company

Facility: Byron Generating Station, Units 1 and 2

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

Dates: January 19 - February 22, 2000

Inspectors: E. Cobey, Senior Resident Inspector  
B. Kemker, Resident Inspector  
C. Thompson, Illinois Department of Nuclear Safety

Approved by: Michael J. Jordan, Chief  
Reactor Projects Branch 3  
Division of Reactor Projects

## EXECUTIVE SUMMARY

### Byron Generating Station Units 1 and 2 NRC Inspection Report 50-454/2000001(DRP); 50-455/2000001(DRP)

This inspection included aspects of licensee operations, maintenance, engineering, and plant support. The report covers a 5-week period of inspection activities by the resident staff and region based inspectors.

#### Operations

- Operations of the facility were conducted in a safe, professional and controlled manner. Operators closely monitored plant parameters, followed procedures while conducting plant operations, responded appropriately to main control room annunciators, and appropriately assessed plant status. One exception to the station appropriately assessing plant status was the operators not adequately monitoring a leaking check valve on a safety accumulator to assure system operability.
- The licensee failed to correct a fire protection valve problem that rendered the auxiliary building portion of the carbon dioxide fire suppression system inoperable for 24 days and resulted in an inadvertent discharge of carbon dioxide into the Unit 1 lower cable spreading room. The inspectors further concluded that following identification, the licensee initially conducted a poor evaluation of the impact of the valve's failure with respect to system operability and capability of the station to achieve and maintain hot shutdown in the event of a fire in an area affected by the inoperable carbon dioxide fire suppression system. (Section O2.1)
- The licensee improperly placed an out-of-service on the security equipment diesel generator due to three instances of failure to implement the out-of-service procedure. No violation of regulatory requirements occurred since the out-of-service involved non-safety related equipment. (Section O4.1)

#### Maintenance/Surveillance

- Observed surveillance tests were performed well. Each of the tested components met their respective acceptance criteria and each of the surveillance tests were found to satisfy the requirements of the Technical Specifications. (Section M1.1)
- Observed maintenance activities were generally conducted well. Maintenance personnel were knowledgeable of the tasks and professionally completed the work. (Section M1.2)
- An engineered safety feature actuation resulted from an unexpected loss of steam generator water level during maintenance on a main feedwater isolation valve. The inspectors concurred with the licensee's conclusion that the involved licensed operators did not recognize the potential impact of stroking the main feedwater isolation valve with the feedwater lines drained; the evolution was performed without appropriate procedural guidance; and the outage schedule presented an unnecessary challenge to the operators. The inspectors also concluded that the safety significance of this event was

minimal since the unit was in cold shutdown and the engineered safety features were not required to be operable in this condition. (Section M1.3)

#### Engineering

- The operability assessments reviewed provided reasonable justification for continued operability of the affected plant equipment. (Section E2.1)

#### Plant Support

- The inspectors concluded that the results of recently completed chemistry surveillance test procedures for reactor coolant system specific activity and secondary system specific activity satisfied the requirements of the Technical Specifications (TS). The inspectors identified a minor discrepancy with the licensee's calculation of dose equivalent iodine-131, which did not adversely affect the licensee's ability to satisfy the TS requirements. (Section R1.1)

## Report Details

### Summary of Plant Status

The licensee operated Units 1 and 2 at or near full power for the duration of this inspection period.

## I. Operations

### **O1 Conduct of Operations**

#### O1.1 General Observations

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

The inspectors routinely observed the conduct of plant operations from the main control room, including shift turnover briefings, routine reactivity manipulations, periodic testing, main control room annunciator response, and main control room board walkdowns. The inspectors also reviewed operator narrative logs and assessed the status of safety related structures, systems and components.

##### b. Observations and Findings

The inspectors observed consistent safety-conscious performance by control room operators throughout this inspection period. Shift turnover briefings were performed well. Specifically, the briefings included discussions of plant status, major equipment out-of-service, maintenance and testing in progress, existing limiting conditions for operation in effect, and work scheduled for the shift. Control room operators closely monitored plant parameters, followed procedures while conducting plant operations, and responded appropriately to main control room annunciators. The inspectors identified one concern regarding the operating shifts not being aware of the status of non-condensable gas accumulation in the Unit 1 emergency core cooling system (ECCS) piping.

The Unit 1 "D" safety injection system accumulator has been losing level at a rate of approximately 1 percent per day as a result of check valve leakage since Unit 1 returned to power on May 18, 1999, after a forced outage. This check valve leakage has resulted in non-condensable gas accumulation in the ECCS piping in the containment building. The licensee completed an operability assessment which concluded that the ECCS remained operable with gas pockets in the ECCS piping as long as the system was vented prior to the accumulation of 32.25 cubic feet of gas. The inspectors discussed this issue in NRC Inspection Report 50-454/455-99019(DRP).

During discussions with several operators, the inspectors identified that three unit supervisors did not know when the system piping inside the containment building had last been vented of gases, did not know how much gas had accumulated in the system

pipng since it was last vented, and did not know that the operability assessment limited the amount of gas accumulation to a specific quantity. While the operators logged the accumulator level once per day and noted accumulator level additions and losses on a data sheet provided by the system engineer, the operators relied solely on the system engineer to track the gas accumulation in the ECCS piping in containment and evaluate the impact on the operability of the system. The inspectors discussed the system status with the system engineer who was fully cognizant of the gas accumulation to date, but had not been expected to communicate his routine evaluations of system operability to the operations department. The inspectors discussed this observation with operations department management who indicated that this did not meet their expectations and subsequently implemented corrective actions to address this concern. No violation of regulatory requirements was identified.

c. Conclusions

Operations of the facility were conducted in a safe, professional and controlled manner. Operators closely monitored plant parameters, followed procedures while conducting plant operations, responded appropriately to main control room annunciators, and appropriately assessed plant status. One exception to the station appropriately assessing plant status was the operators not adequately monitoring a leaking check valve on a safety accumulator to assure system operability.

**O2 Operational Status of Facilities and Equipment**

**O2.1 Carbon Dioxide Fire Suppression System Rendered Inoperable due to Ineffective Corrective Actions**

a. Inspection Scope (71707, 62707, 37551)

The inspectors reviewed the circumstances surrounding an inadvertent discharge of carbon dioxide (CO<sub>2</sub>) into the Unit 1 lower cable spreading room (LCSR), which occurred during routine fire protection system surveillance testing. The inspectors interviewed operations, maintenance, and engineering department personnel; reviewed the licensee's prompt investigation and root cause reports; reviewed applicable portions of the Updated Final Safety Analysis Report, Byron Station Fire Protection Report, and Technical Requirements Manual; and reviewed the documents listed below.

- Unit 1 Byron Maintenance Electrical Surveillance Requirement Procedure (BHSR) 10.d-4, "Lower Cable Spreading Room 1S-43 (1Z1), Detection Zones 1D-49, 1D-50 Low Pressure CO<sub>2</sub> System Actuation," Revision 3
- 1BHSR 10.d-5, "Lower Cable Spreading Room 1S-44 (1Z2), Detection Zones 1D-51, 1D-52 Low Pressure CO<sub>2</sub> System Actuation," Revision 3
- Byron Station Letter BYRON-00-5003, "Byron Units 1 & 2 Fire Protection System Technical Safety Evaluation and Safety Significance of Degraded CO<sub>2</sub> Suppression System (PIF [Problem Identification Form] B2000-00106 and B1999-04628)," dated February 3, 2000
- National Fire Protection Association (NFPA) Standard Number 12, "Standard on Carbon Dioxide Extinguishing Systems," 1980

- Prompt Investigation Report, "Inadvertent Actuation of CO<sub>2</sub> into Zone 1S-43, Zone 3.2A-1"
- Root Cause Report 21136, "Inadvertent Discharge of CO<sub>2</sub> into Zone 1S-43"

b. Observations and Findings

On November 23, 1999, an excessive amount of CO<sub>2</sub> was discharged into LCSR zone 1S-43 during the performance of 1BHSR 10.d-4 because electrical maintenance personnel were not able to close individual zone 1S-43 manual actuation discharge valve, 0CO05JC. The flow of CO<sub>2</sub> was stopped by an operator who closed the CO<sub>2</sub> storage tank manual isolation valve, 0CO025, when he observed the CO<sub>2</sub> tank level and pressure decrease. During the evolution an electrician noted a problem with the operation of 0CO05JC and identified that the valve handle position for the "as-left" closed position was different than the "as-found" closed position. The licensee initiated an action request to repair the valve, but did not verify that the valve was closed and did not act on the action request prior to the performance of 1BHSR 10.d-5 on December 17, 1999.

On December 17, 1999, while conducting 1BHSR 10.d-5, CO<sub>2</sub> was unintentionally discharged into LCSR 1S-43. The flow of CO<sub>2</sub> was secured by an operator who closed the CO<sub>2</sub> storage tank manual isolation valve, 0CO025, when he unexpectedly heard gas flow and observed the tank level and pressure decrease. As a result of this inadvertent CO<sub>2</sub> actuation, the licensee evacuated personnel from the turbine and auxiliary buildings, initiated a prompt investigation into the causes of the event, and determined that no injuries resulted from the CO<sub>2</sub> actuation. The licensee subsequently determined that a failed pin on the cam shaft for the individual zone 1S-43 manual actuation discharge valve, 0CO05JC, allowed the handle to rotate beyond the closed position which resulted in the valve being open and caused the inadvertent CO<sub>2</sub> actuation during the performance of 1BHSR 10.d-5. The licensee also determined that 0CO05JC had been open since the performance of 1BHSR 10.d-4 on November 23, 1999.

The inspectors concurred with the licensee's prompt investigation and root cause reports for this event, which concluded that following the performance of 1BHSR 5.d-4 on November 23, 1999, the identified deficiency with 0CO05JC was not appropriately reviewed by the station and the corrective action was ineffective. Specifically, station personnel did not ensure that the valve was closed upon restoring the normal system configuration, did not appropriately investigate the impact that the malfunctioning valve had on system operation, and did not recognize the potential impact that the malfunctioning valve could have on the performance of other scheduled system testing. The licensee's root cause report further concluded that the failure to verify that the valve was closed was a result of inadequate knowledge of the operation of electro-manual pilot cabinet valves.

The inspectors were concerned that the licensee did not recognize that having 0CO05JC open affected the operability of the CO<sub>2</sub> fire suppression system. The inspectors noted that had an actual fire occurred in any of the auxiliary building zones (except LCSR zone 1S-43) protected by the CO<sub>2</sub> fire suppression system, CO<sub>2</sub> would have been discharged into two zones simultaneously upon actuation of the system. The inspectors reviewed the system design with engineering department personnel and

determined that the system had been rendered inoperable on November 23, 1999, and remained inoperable until December 17, 1999. Specifically, with CO<sub>2</sub> discharging simultaneously into two zones, the system would not have been capable of supplying sufficient CO<sub>2</sub> to the affected zone to achieve and maintain the required minimum CO<sub>2</sub> concentration specified in NFPA 12 for extinguishing a deep seated cable fire. Byron Station Fire Protection Report, Section 3.6.e, states that the licensee complies with the requirements of NFPA 12. Also, engineering design calculations for the system specify the required initial and extended discharge durations and flow rates to achieve a sufficient CO<sub>2</sub> concentration in the protected zones to meet the requirements of NFPA 12.

The inspectors discussed the potential safety significance of this event with engineering department personnel and were concerned that the licensee had not thoroughly reviewed the potential affect that the system inoperability had on the station's ability to achieve and maintain safe shutdown conditions in the event of a fire in the affected zones. The licensee identified one fire zone affected by the inoperable CO<sub>2</sub> fire suppression system (Unit 2 LCSR zone 2S-43) that had redundant train safe shutdown equipment located within the zone. This zone is separated from adjacent safety related areas by 3-hour rated fire barriers and also contains a cable wrapped in a 1-hour fire barrier to prevent fire-induced faults on Division 21 Bus in the event of loss of DC control power to bus. The licensee initially concluded that this one cable was the only safe shutdown equipment cable of concern in the zone and since detection capability was available, the station's fire brigade would have been able to extinguish a fire within one hour. The licensee concluded, based on engineering judgement, that the CO<sub>2</sub> fire suppression system would have provided a sufficient CO<sub>2</sub> concentration to prevent the fire from rapidly propagating to a deep seated condition and that the fire would have been extinguished by the station's fire brigade.

The inspectors subsequently identified that both power supply cables for the redundant division 21 and division 22 safety related battery chargers were routed through LCSR zone 2S-43 and were not protected by a 1-hour fire barrier. The inspectors noted that the Byron Station Fire Protection Report contained an approved deviation from 10 CFR Part 50, Appendix R, Section III.G.2 cable separation requirements for these cables that relied, in part, on an operable CO<sub>2</sub> fire suppression system. In response to the inspectors' questions, the licensee concluded that safe shutdown could still be demonstrated for a fire in Unit 2 LCSR zone 2S-43 by taking credit for the ability to cross-tie power from the Unit 1 division 11 direct current (DC) bus to the Unit 2 division 21 DC bus. The safe shutdown analysis designates the two battery chargers for each unit as "safe shutdown equipment" and does not credit the cross-tie capability to achieve safe shutdown. Although this action was beyond the current safe shutdown analysis, the licensee concluded that based on engineering judgement operators would have been capable of successfully identifying the loss of a battery charger and cross-tying one train of DC power. However, the inspectors noted that the cables for the division 21 and division 22 annunciator and indication circuitry associated with the DC system were also routed through LCSR zone 2S-43, which could complicate the operators ability to identify the loss of the battery chargers during a fire in this zone.

The inspectors noted that a design basis fire in LCSR zone 2S-43 would involve a loss of offsite power and would rely on division 21 equipment to achieve and maintain hot

shutdown conditions. However, numerous division 21 control power cables (most notably for the 2A diesel generator and 2A auxiliary feedwater pump) are routed in this zone and could be affected by the fire. The Byron Station Fire Protection Report credits local operation of affected equipment to achieve and maintain hot shutdown conditions. At the end of this inspection period, the licensee was reviewing the safe shutdown analysis description in the Byron Station Fire Protection Report for the affected fire zones to address appropriate corrections to the description of safe shutdown capability. This issue is considered an Unresolved Item (50-454/455-2000001-01(DRP)) pending NRC review of the licensee's capability to achieve and maintain safe shutdown conditions by crediting actions outside the safe shutdown analysis and the potential safety and risk implications associated with this event. This issue is in the licensee's corrective action program as PIF B2000-00363.

c. Conclusions

The licensee failed to correct a fire protection valve problem that rendered the auxiliary building portion of the carbon dioxide fire suppression system inoperable for 24 days and resulted in an inadvertent discharge of carbon dioxide into the Unit 1 lower cable spreading room. The inspectors further concluded that following identification, the licensee initially conducted a poor evaluation of the impact of the valve's failure with respect to system operability and capability of the station to achieve and maintain hot shutdown in the event of a fire in an area affected by the inoperable carbon dioxide fire suppression system.

**O4 Operator Knowledge and Performance**

**O4.1 Out-of-Service (OOS) Placement Error on the Security Equipment Diesel Generator**

a. Inspection Scope (71707)

The inspectors reviewed the circumstances surrounding an OOS placement error on the security equipment diesel generator. The inspectors interviewed operations department personnel and reviewed the following documents.

- Nuclear Station Procedure (NSP) OP-AA-101-201, "Station Equipment Out of Service," Revision 1
- OOS 990015575, "Station Auxiliary Security Diesel Generator Window Work"
- Prompt Investigation Report, "Improper Hanging of OOS 990015575, Security Diesel Generator"

b. Observations and Findings

On February 8, 2000, while re-hanging an OOS for maintenance on the security equipment diesel generator, a non-licensed operator improperly placed the OOS cards for the diesel generator battery terminals. The OOS checklist specified the OOS position for both the positive and negative battery leads as "lift." However, the operator placed the OOS cards with the battery leads landed. This error was not identified until

after the operations shift had released the diesel generator to the maintenance department to begin work.

During the Plan of the Day meeting that afternoon, a mechanical maintenance scheduler questioned the status of the OOS associated with the security equipment diesel generator and whether the battery leads had been lifted. As a result of this question, an electrical maintenance scheduler verified the status of the OOS and identified the improperly placed OOS cards on the battery leads. The electrical maintenance scheduler notified the Shift Manager, the work was suspended, and a prompt investigation was initiated.

The licensee's prompt investigation revealed that the non-licensed operator that improperly placed the OOS cards on the battery leads exhibited a poor questioning attitude, in that, the operator did not question the discrepancy between the actual position of the battery leads and the position required by the OOS checklist. The licensee's investigation also revealed that the OOS pre-job briefing required by NSP OP-AA-101-201, Section 4.3.8.3.E, was not performed using Attachment 6, "OOS Prejob Brief Checklist," for the re-hanging of the OOS. In addition, the inspectors identified during interviews of the involved operators that the operators who prepared, approved, and authorized the re-hanging of OOS 990015575 did not use Attachment 4, "OOS Hang Activity Preparers' Checklist," as required by NSP OP-AA-101-201, Section 4.3.8. The inspectors also identified during interviews that formal OOS pre-job briefings had not been consistently implemented for all of the OOS activities required by NSP OP-AA-101-201; however, the inspectors were not able to identify any instances where the failure to conduct a formal OOS pre-job briefing resulted in an OOS error associated with safety related equipment. No violation of regulatory requirements occurred since the out-of-service involved non-safety related equipment. At the end of the inspection period, the licensee's investigation and corrective action development were in progress.

c. Conclusions

The licensee improperly placed an out-of-service on the security equipment diesel generator due to three instances of failure to implement the out-of-service procedure. No violation of regulatory requirements occurred since the out-of-service involved non-safety related equipment.

## II. Maintenance

### **M1 Conduct of Maintenance**

#### **M1.1 Surveillance Test Observations**

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

The inspectors interviewed operations, maintenance, and engineering department personnel; reviewed the completed test documentation and applicable portions of the Updated Final Safety Analysis Report (UFSAR) and Technical Specifications (TS); and observed the performance of selected portions of the surveillance test procedures listed below.

- 0BOSR 7.9.6-1 Essential Service Water Makeup Pump 0A Monthly Operability Surveillance
- 1BOSR 3.2.7-608B Unit One ESFAS [Engineered Safety Feature Actuation System] Instrumentation Slave Relay Surveillance (Train B Automatic Safety Injection - K608)
- 1BOSR 3.2.7-609A Unit One ESFAS Instrumentation Slave Relay Surveillance (Train A Automatic Safety Injection - K609)
- 1BOSR 3.2.7-612A Unit One ESFAS Instrumentation Slave Relay Surveillance (Train A Containment Isolation Phase A - K612)
- 1BOSR 3.2.7-621B Unit One ESFAS Instrumentation Slave Relay Surveillance (Train B FW [Feedwater] Pump Trip, S/G [Steam Generator] Level HI-Hi - K621)
- 1BOSR 3.2.7-643B Unit One ESFAS Instrumentation Slave Relay Surveillance (Train B Automatic Containment Spray - K643)
- 1BOSR 5.2.2-1 Unit One ECCS [Emergency Core Cooling System] Venting and Valve Alignment Monthly Surveillance
- 1BOSR 8.1.2-2 Unit One 1B Diesel Generator Operability Monthly (Staggered) and Semi-Annual (Staggered) Surveillance
- 1BVSR 5.2.4-4 Unit 1 ASME [American Society of Mechanical Engineers] Surveillance Requirements for Residual Heat Removal Pump 1RH01PB
- 1BVSR 5.5.8.AF.1-2 Unit 1 ASME Surveillance Requirements for the Diesel Driven Auxiliary Feedwater Pump
- 2BOSR 3.2.7-607B Unit Two ESFAS Instrumentation Slave Relay Surveillance (Train B Containment Isolation Phase A - K607)
- 2BOSR 8.1.2-2 Unit Two 2B Diesel Generator Operability Monthly (Staggered) and Semi-Annual (Staggered) Surveillance
- 2BVSR 5.2.4-5 Unit 2 Train A ASME Surveillance Requirements for Centrifugal Charging Pump 2A and Chemical and Volume Control System Valve Stroke Test

c. Conclusions

Observed surveillance tests were performed well. Each of the tested components met their respective acceptance criteria and each of the surveillance tests were found to satisfy the requirements of the TSs.

M1.2 Maintenance Observations

a. Inspection Scope (62707)

The inspectors interviewed operations, maintenance, and engineering department personnel and observed the performance of all or portions of the work requests (WR) listed below. When applicable, the inspectors also reviewed portions of the TS and the UFSAR. Maintenance associated with the diesel drive auxiliary feedwater pump was selected for observation because the pump was identified as risk significant in the Byron Station Individual Plant Examination.

- WR 970108661-01 Remove 1B Containment Spray System Eductor Inlet Check Valve for Inspection
- WR 970108663-01 Remove 1B Containment Spray System Eductor Outlet Check Valve for Inspection
- WR 980065610-01 Calibrate the 2B Containment Spray Pump Room Cubicle Cooler Radiation Monitor
- WR 980067902-01 Replace 2F Steam Dump Valve Seat/Cage With New Twin Piece Design
- WR 980077792-01 Replace Actuator on 2C Steam Generator Power Operated Relief Valve 2MS018C
- WR 990039188-01 Repair Oil Leaks on the 0A Auxiliary Building Chiller
- WR 990061287-01 Remove 1B Containment Spray Pump Discharge Check Valve for Inspection
- WR 990132459-01 Install Temporary Modification Design Change Package 9900391, "Connect Interlock Circuitry From Non-Functioning Inlet Valve to the Operable Outlet Valve on the Essential Service Water Supply to the Unit 2 Diesel Driven Auxiliary Feedwater Pump"

c. Conclusions

Observed maintenance activities were generally conducted well. Maintenance personnel were knowledgeable of the tasks and professionally completed the work.

M1.3 Inadvertent Engineered Safety Feature (ESF) System Actuation Due to Low Steam Generator Water Level

a. Inspection Scope (62707 and 92902)

The inspectors reviewed the circumstances surrounding the inadvertent ESF actuation caused by the unexpected loss of steam generator water level during maintenance on

main feedwater isolation valve, 2FW009B. The inspectors interviewed operations and maintenance department personnel and reviewed the following documents.

- Byron Fuel Handling Procedure FW-9, "Changing Oil in the Feedwater Isolation Valves," Revision 1
- Byron Maintenance Procedure 3112-2, "Main Feedwater Isolation Valve Actuator Filling and Charging," Revision 7
- Byron Operating Procedure FW-3, "Filling and Venting the Feedwater System," Revision 4
- Licensee Event Report 50-455/1999-002-00, "Inadvertent Reactor Protection and Engineered Safety Feature System Actuations in Mode 5 Due to Unexpected Steam Generator Level Response When Stroking a Feedwater Isolation Valve"
- Root Cause Report 19098, "Backfill of Feed Water Lines from SG [Steam Generator] Caused RPS [Reactor Protection System] Actuation"
- WR 980068142-01, "Uncouple/Recouple Valve Actuator for Inspection"

b. Observations and Findings

On November 10, 1999, while priming the hydraulic system for the 2B main feedwater isolation valve, 2FW009B, the 2B steam generator level unexpectedly dropped below the reactor protection system trip setpoint which resulted in an ESF actuation. The reactor trip breakers opened and all plant systems and equipment operated as designed for the existing plant conditions. The licensee terminated the evolution and initiated a prompt investigation into the causes of the event.

The licensee's investigation revealed that the ESF actuation occurred because the involved operators did not recognize the potential impact of stroking the main feedwater isolation valve with the feedwater lines drained, and the unnecessary challenge to the operator due to sequencing of this activity in the outage schedule. The licensee's investigation also revealed that the evolution was performed without appropriate procedural guidance. The licensee's evaluation of this event concluded that there were no adverse safety consequences from this event since the unit was in cold shutdown and the engineered safety features were not required to be operable in this condition. The inspectors reviewed the licensee's evaluation and concurred with the results.

10 CFR Part 50, Appendix B, Criteria V, "Instructions, Procedures, and Drawings," requires, in part, that activities affecting quality shall be prescribed by documented instructions, procedures or drawings of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. The licensee's failure to provide appropriate procedural guidance for stroking the main feedwater isolation valves which filled the feedwater lines from the steam generators is a violation of 10 CFR Part 50, Appendix B, Criteria V. This violation constitutes a violation of minor significance and is not subject to formal enforcement action. The inspectors reviewed the licensee's corrective actions and determined that they were acceptable.

c. Conclusions

An engineered safety feature actuation resulted from an unexpected loss of steam generator water level during maintenance on a main feedwater isolation valve. The inspectors concurred with the licensee's conclusion that the involved licensed operators did not recognize the potential impact of stroking the main feedwater isolation valve with the feedwater lines drained; the evolution was performed without appropriate procedural guidance; and the outage schedule presented an unnecessary challenge to the operators. The inspectors also concluded that the safety significance of this event was minimal since the unit was in cold shutdown and the engineered safety features were not required to be operable in this condition.

**M8 Miscellaneous Maintenance Issues (92700)**

M8.1 (Closed) Licensee Event Report (LER) 50-455/1999-002-00: "Inadvertent Reactor Protection and Engineered Safety Feature System Actuations in Mode 5 Due to Unexpected Steam Generator Level Response When Stroking a Feedwater Isolation Valve." This issue is discussed in Section M1.3 of this report. This LER is closed.

**III. Engineering**

**E2 Engineering Support of Facilities and Equipment**

E2.1 Operability Assessments

a. Inspection Scope (37551)

The inspectors interviewed engineering department personnel, reviewed the applicable portions of the Updated Final Safety Analysis Report and TSs, and evaluated the following operability assessments.

- 1999-023 Operation with the Pressurizer Backup Heaters Energized During Normal Operation
- 1999-024 Storage of Lead Blankets in Containment
- 2000-001 Insufficient DC [Direct Current] Voltage at the Trip Coil for Air Circuit Breaker 2415Z due to Incorrectly Sized DC Control Circuit Cable
- 2000-002 Failure of One of Four Inlet Dampers for the Control Room Ventilation System Recirculation Charcoal Adsorber 0VC02FB
- 2000-003 Document and Confirm the RCS [Reactor Coolant System] Chemistry Remains Satisfactory for Continued Operation
- 2000-004 2B Diesel Generator Oil Storage Tank Room Watertight Door Degraded

c. Conclusions

The operability assessments reviewed provided reasonable justification for continued operability of the affected plant equipment.

#### **IV. Plant Support**

### **R1 Radiological Protection and Chemistry Controls (71750)**

#### **R1.1 Compliance with TS Chemistry Requirements**

a. Inspection Scope (71750)

The inspectors interviewed chemistry department personnel, observed chemistry technicians conduct sampling evolutions, and reviewed applicable portions of the Updated Final Safety Analysis Report and TSs. The inspectors evaluated the results of recently completed chemistry surveillance test procedures and verified that performance of the surveillance test procedures satisfied the requirements of the TS.

b. Observations and Findings

The inspectors observed chemistry technicians perform sampling from the Unit 1 reactor coolant system (RCS) for specific activity and from the Unit 2 steam generators for secondary system specific activity. The technicians were knowledgeable of the applicable procedures and techniques, employed appropriate sampling practices and professionally completed the sampling. No deficiencies were noted.

The inspectors reviewed the most recently completed chemistry surveillance test results to verify compliance with TS surveillance requirements for primary and secondary system specific activity. The results were well within the limits of the TS. The inspectors identified a minor discrepancy with the licensee's calculation of dose equivalent iodine-131; however, the error did not adversely affect the licensee's ability to meet the TS requirements. No other deficiencies were noted.

c. Conclusions

The inspectors concluded that the results of recently completed chemistry surveillance test procedures for reactor coolant system specific activity and secondary system specific activity satisfied the requirements of the TSs. The inspectors identified a minor discrepancy with the licensee's calculation of dose equivalent iodine-131 which did not adversely affect the licensee's ability to satisfy the TS requirements.

**P1 Conduct of Emergency Preparedness Activities (71750)**

During routine resident inspection activities, observations were conducted in the area of emergency preparedness. No discrepancies were noted.

**S1 Conduct of Security and Safeguards Activities (71750)**

During routine resident inspection activities, observations were conducted in the area of security and safeguards. No discrepancies were noted.

**F1 Control of Fire Protection Activities (71750)**

During routine resident inspection activities, observations were conducted in the area of fire protection. No discrepancies were noted.

**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 February 22, 2000. 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

B. Adams, Regulatory Assurance Manager  
R. Colglazier, NRC Coordinator  
M. Denniston, Operations Field Supervisor  
M. Jurmain, Maintenance Manager  
K. Jury, Support Services Manager  
W. Levis, Site Vice President  
R. Lopriore, Station Manager  
W. McNeill, Radiation Protection Manager  
D. Prisby, System Engineering Performance Monitoring Supervisor  
M. Snow, Operations Manager  
D. Spoerry, Training Manager  
C. Stanford, Chemist  
G. Stauffer, NRC Coordinator  
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 Activities  
IP 92700: Onsite Followup of Written Reports of Nonroutine Events at Power Reactor  
Facilities  
IP 92902: Follow-up Maintenance

## ITEMS OPENED, CLOSED, AND DISCUSSED

### Opened

|                       |     |   |
|-----------------------|-----|---|
| 50-454/455-2000001-01 | URI | Review of the licensee's capability to achieve and maintain safe shutdown by crediting actions outside the safe shutdown analysis |
|-----------------------|-----|---|

### Closed

|                    |     |   |
|--------------------|-----|---|
| 50-455/1999-002-00 | LER | Inadvertent reactor protection and engineered safety feature system actuations in Mode 5 due to unexpected steam generator level response when stroking a feedwater isolation valve |
|--------------------|-----|---|

### Discussed

none

## LIST OF ACRONYMS USED

|                 |   |
|-----------------|---|
| ASME            | American Society of Mechanical Engineers                        |
| BHSR            | Byron Maintenance Electrical Surveillance Requirement Procedure |
| BOSR            | Byron Operating Surveillance Requirement Procedure              |
| BVSR            | Byron Technical Surveillance Requirement Procedure              |
| CFR             | Code of Federal Regulations                                     |
| CO <sub>2</sub> | Carbon Dioxide  |
| DC              | Direct Current  |
| DRP             | Division of Reactor Projects                                    |
| ECCS            | Emergency Core Cooling System                                   |
| ESF             | Engineered Safety Feature                                       |
| ESFAS           | Engineered Safety Feature Actuation System                      |
| LCSR            | Lower Cable Spreading Room                                      |
| LER             | Licensee Event Report   |
| NFPA            | National Fire Protection Association                            |
| NRC             | Nuclear Regulatory Commission                                   |
| NSP             | Nuclear Station Procedure                                       |
| OOS             | Out-of-Service  |
| PIF             | Problem Identification Form                                     |
| RCS             | Reactor Coolant System  |
| TS              | Technical Specification   |
| UFSAR           | Updated Final Safety Analysis Report                            |
| URI             | Unresolved Item   |
| WR              | Work Request  |