

October 30, 2003

Mr. John L. Skolds, President
Exelon Nuclear
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: BYRON STATION, UNIT 1
NRC SPECIAL INSPECTION REPORT 05000454/2003008

Dear Mr. Skolds:

On October 3, 2003, the U. S. Nuclear Regulatory Commission (NRC) completed a special team inspection at your Byron Station, Unit 1. The enclosed report documents the inspection findings which were discussed with Mr. Kuczynski and other members of your staff on October 3, 2003.

On September 26, 2003, at 7:46 p.m., while transferring a fuel assembly from its core location to the containment upender/downender, the refueling machine mast contacted the rod cluster control assembly change fixture basket in the fuel transfer cavity. At the time of the incident, the refueling machine was being operated with travel interlocks bypassed continuously due to an obstruction (bent ladder) in the fuel transfer path. Based on the criteria specified in Management Directive 8.3 and Inspection Procedure 71153, a special inspection was initiated in accordance with Inspection Procedure 93812 and Regional Procedure RP-1219. The special inspection charter is included as an attachment to the enclosed inspection report. The special inspection evaluated the facts, potential significance, and your resolution of this issue.

The root cause determination for the fuel handling incident and bent ladder obstructing the normal fuel transfer path were not complete at the time of the special inspection. Your staff had completed a prompt investigation and a review of the management decision making processes leading up to the incident. The fuel handling incident may have been prevented if your staff had taken compensatory measures equivalent to the level of safety provided by the interlocks which were bypassed during the fuel transfer evolutions. The event would have been prevented if the obstruction had been promptly removed.

Based on the results of this inspection, one NRC-identified finding and one self-revealed finding of very low safety significance (Green) were identified. Both findings involved violations of NRC requirements which are being treated as Non-Cited Violations in accordance with Section VI.A.1 of the NRC's Enforcement Policy. First, a condition adverse to quality was not promptly identified in that your staff failed to realize that the mast of the refueling machine must have contacted the bent ladder on the initial transit to the core area, resulting in possible damage to the mast. No inspection of the mast was performed prior to handling fuel. The second finding involved another condition adverse to quality which was not promptly corrected. The bent ladder was not removed and, when the decision to bypass interlocks to avoid the obstruction

was made, no compensatory measures were put into place to ensure an equivalent level of safety in fuel transfer as was provided by the interlocks.

If you contest the violation or severity of these NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with a copy to the Regional Administrator, U.S. Nuclear Regulatory Commission - Region III, 801 Warrenville Road, Lisle, IL 60532-4351; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the Resident Inspector at the Byron facility.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

/RA by Patrick L. Hiland Acting for/

Steven A. Reynolds, Acting Director
Division of Reactor Projects

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

Enclosure: Inspection Report 05000454/2003008
w/Attachments:
1. Supplemental Information
2. Special Inspection Charter

See Attached Distribution

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J. Skolds

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No: 50-454
License No: NPF-37

Report No: 05000454/2003008

Licensee: Exelon Generation Company, LLC

Facility: Byron Station, Unit 1

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

Dates: October 1 through October 3, 2003

Inspectors: S. Ray, Braidwood Senior Resident Inspector, Team Lead
D. Tharp, Reactor Engineer, Region III

Approved by: Ann Marie Stone, Chief
Branch 3
Division of Reactor Projects

Enclosure

SUMMARY OF FINDINGS

IR 05000454/2003008; on 10/01/03 - 10/03/03, Byron Station, Unit 1; Special Inspection for fuel movement incident.

This special inspection examined the facts and circumstances surrounding a Unit 1 fuel handling incident on September 26, 2003, where the mast of the fuel handling machine made contact with the rod cluster control assembly change fixture basket in the fuel transfer cavity. The inspection was conducted by Region III inspectors. Two Green findings associated with two non-cited violations were identified. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609 "Significance Determination Process" (SDP). Findings for which the SDP does not apply may be "Green" or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July 2000.

Inspector-Identified and Self-Revealed Findings

Cornerstone: Barrier Integrity

- Green. A finding of very low safety significance was identified by the inspectors for a failure to promptly identify a condition adverse to quality. A bent ladder was obstructing the normal fuel transfer path from the core to the containment upender. The obstruction was not noticed until commencing the first fuel move from the core. The inspectors determined that the refueling machine mast must have caused the ladder to get bent or had at least made contact with the bent ladder as it passed on its way to the core. This contact could have resulted in damage to the refueling machine mast such that fuel damage might have occurred during later fuel handling. There was no inspection of the refueling machine mast conducted to check for damage from this contact prior to handling fuel.

This issue was more than minor because it was associated with the human performance attribute of protecting the fuel cladding barrier integrity and affected the cornerstone objective of providing reasonable assurance that physical barriers protect the public from radionuclide releases caused by accidents or events. Because this issue was not suited for analysis through the SDP, the finding was reviewed by regional management. The finding was determined to be of very low safety significance because, in this case, there was no apparent damage to the refueling machine mast. The issue was a Non-Cited Violation of 10 CFR 50, Appendix B, Criterion XVI. (1R2.2)

- Green. A finding of very low safety significance was self-revealed for failure to promptly correct a condition adverse to quality. When a bent ladder obstructing the normal fuel transfer path was identified, the fuel handlers, along with their supervisors, made the decision to avoid the obstruction by operating the refueling machine with travel interlocks bypassed so an alternate path could be followed. The purpose of those interlocks was to prevent the possibility of fuel damage resulting from contact of the mast with obstructions. Operation of the system with the interlocks bypassed for an

extended period of time was a condition adverse to quality. The obstruction was not promptly removed and, while operating in this condition, no compensatory measures were put into place to provide protection at a level equivalent to the interlocks. The finding was self-revealed when the mast contacted the rod cluster control assembly change fixture basket while the refueling machine was being operated off its normal transfer path.

This issue was more than minor because it was associated with the human performance attribute of protecting the fuel cladding barrier integrity and affected the cornerstone objective of providing reasonable assurance that physical barriers protect the public from radionuclide releases caused by accidents or events. Because this issue was not suited for analysis through the SDP, the finding was reviewed by regional management. The finding was determined to be of very low safety significance because there was no apparent damage done to the fuel barrier and no radioactive release occurred. The issue was a Non-Cited Violation of 10CFR50, Appendix B, Criterion XVI. (1R3.1)

REPORT DETAILS

Summary of fuel handling incident

On the night shift of September 25-26, 2003, operational checks of the refueling machine (RFM) were completed and it was positioned above the core in preparation for core off-load. After the day shift refueling crew assumed duty and latched the first fuel assembly, they noticed that a ladder in the reactor cavity was bent and obstructed the normal fuel transfer path. The refueling crew determined that the RFM needed to be operated with travel interlocks in bypass to get around the ladder. The first fuel assembly was withdrawn into the mast of the RFM and the trolley and bridge right interlocks were placed in bypass. After clearing the obstruction with the first fuel assembly, the bypass interlocks were returned to normal. After a discussion between the fuel handling supervisor (FHS) in the containment and the reactor services supervisor in the Outage Control Center (OCC), the same interlocks were placed in bypass again and remained in bypass. Fuel moves were completed in this manner throughout the day shift on September 26 with no complications. The night shift fuel handling crew continued with fuel movements in the same manner, except that they used a slightly different path to clear the ladder. At 7:46 p.m. on September 26, the mast of the RFM made contact with the rod cluster control assembly (RCCA) change fixture basket. A visual inspection of the fuel assembly and RFM mast was conducted and fuel moves continued until 9:25 p.m. when the OCC manager stopped the fuel transfer activities to discuss the mast bump. The licensee initiated a prompt investigation. Early on September 27, the ladder was removed and core alterations were resumed with no interlocks bypassed and the RFM operating on its normal path.

The Special Inspection

Based on the deterministic criteria specified in Management Directive 8.3, "NRC Incident Investigation Program," and Inspection Procedure 71153, "Event Follow-up," a special inspection was initiated in accordance with Inspection Procedure 93812, "Special Inspection." The charter for the inspection is included as Attachment 2.

1. Reactor Safety

Cornerstone: Barrier Integrity

1R1 Sequence of Events (93812)

a. Inspection Scope

The inspectors reviewed operator and OCC logs, fuel handling equipment interlock bypass logs, RFM operation procedures, condition reports (CRs), and other documentation listed in Attachment 1; interviewed licensee personnel; and developed a sequence of events for the September 26, 2003, fuel movement incident.

b. Issues and Observations

The inspectors determined the following sequence of events led to the RFM mast contacting the RCCA change fixture basket during core off-load on September 26, 2003:

<u>Time</u>	<u>Event Description</u>
<u>September 26, 2003</u>	
12:00-5:00 a.m.	The night shift fuel handling crew completed the RFM outage operational checklist and positioned the RFM over the core in preparation for core off-load.
5:00 a.m.	The fuel handling crews completed a shift turn-over.
5:55 a.m.	The first fuel assembly was latched.
6:25 a.m.	The RFM operator reported the ladder from elevation 400 to elevation 390 in the reactor cavity was bent and obstructed the normal refueling path. The FHS made the decision to place the RFM interlocks in bypass to allow movement on an alternate path to avoid the obstruction. The reactor services supervisor in the OCC evaluated this action as an acceptable means of operation.
7:25 a.m.	The RFM operator placed the trolley and bridge right interlocks in bypass and transferred the first fuel assembly past the obstruction.
7:30 a.m.	The RFM operator returned the trolley and bridge right interlocks to normal.
7:42 a.m.	The RFM operator bypassed the trolley and bridge right interlocks again. The interlocks then remained in bypass continuously until after the incident.
9:00 a.m.	At the OCC morning exceptions briefing, the reactor services supervisor notified OCC managers about the bent ladder obstructing the normal fuel transfer path and that an alternate path was being used. OCC members held a discussion regarding the possibility of removing the ladder, and entered the issue into the OCC issues log.
12:00 p.m.	The reactor services supervisor committed to write a condition report to determine the cause of the bent ladder and the OCC manager closed out the item on the issues log.

- 3:45 p.m. A nuclear oversight (NOS) auditor challenged the NOS manager and operations director on the operator workaround of interlock bypass as an “unnecessary challenge” and recommended removal of the ladder. The operations director agreed to review the recommendation.
- 6:00 p.m. Shift turn-over occurred. Following the shift meeting the operations director, OCC manager, OCC manager’s assistant, reactor services supervisor, and fuel services manager decided that the risk involved with the bypass operation was low due to the limited bypass area and determined that the ladder did not need to be removed. These individuals believed the bypasses were only in place when the mast was near the obstruction. In reality, the bypasses were involved continuously.
- 6:30 - 7:15 p.m. The FHS experienced trouble with the underload feature on RFM and requested the RFM vendor representative come to the containment to check the setpoints.
- 7:46 p.m. While the FHS and the RFM vendor representative were riding on refueling bridge, the mast of the RFM contacted the RCCA change fixture basket. The FHS informed the reactor services supervisor in the OCC, and the vendor representative conducted an inspection of the RFM mast. The FHS performed visual inspections of the fuel assembly and the basket and noted no visible damage.
- 7:46 -9:25 p.m. The refueling crew continued core off-load.
- 9:25 p.m. The OCC manager suspended fuel movements to get details about the fuel handling incident. The OCC called the FHS into the OCC for a conference call with station management.
- 11:00 p.m. Station management initiated a prompt investigation.

September 27, 2003

- 12:30 a.m. The refueling crew removed the obstruction (ladder) from the reactor cavity.
- 4:10 a.m. The RFM operator returned the trolley and bridge right interlocks to normal and resumed core alterations.

1R2 Adequacy in Operator Response and Management Actions in Decision Making Processes (93812)

.1 Response to the Incident

a. Inspection Scope

The inspectors reviewed operations and refueling logs, reactor services turn over sheets, the prompt investigation report, and interviewed reactor services, operations and nuclear engineering personnel to determine what actions were taken in response to the RFM mast making contact with the RCCA change fixture basket, and to assess the adequacy of those actions.

b. Issues and Observations

At 7:46 p.m. on September 26, 2003, the mast of the refueling machine made contact with the RCCA change fixture basket while moving a fuel assembly from the reactor core to the upender. Immediately following the contact, the RFM was inspected and no visual damage was noted. A RFM vendor representative was on the refueling bridge at the time of contact addressing another issue with underload feature set-point. The RFM operator then aligned the RFM mast with the upender basket and the fuel assembly was inspected as it was unloaded into the upender. No visual damage was observed on the fuel assembly. The RFM operator then moved the RFM mast back to where it had contacted the RCCA change fixture basket and aligned the contact points. The FHS and RFM vendor representative conducted another visual inspection of the RFM mast and basket, again noting no visible damage.

The FHS contacted the reactor services supervisor in the OCC and informed him of the contact between the RFM mast and RCCA change fixture basket. He then instructed the RFM operator to resume core off-load. At 9:25 p.m., the OCC contacted the FHS and ordered core alterations to stop and asked the FHS to report to the OCC. A conference call was conducted with site management to review the incident, and a prompt investigation was initiated.

The inspectors determined that those actions were adequate because the contact between the RFM mast and the RCCA change fixture basket was light and resulted in no apparent damage to the RFM mast or the fuel assembly. However, the inspectors had concerns about the timing of some actions and communication. Specifically:

- Although the reactor services supervisor in the OCC was informed immediately after the contact occurred, the OCC manager was not informed immediately of the incident, and fuel movements were allowed to continue for 1 hour and 40 minutes before being ordered to stop.
- Although in constant communication with the main control room, the RFM operator and FHS did not inform the reactor operator, unit supervisor, or shift manager of the incident. The shift manager was responsible for the safety of operations, including decisions on stopping core alterations as well as

evacuating or isolating containment. The lack of communication prevented the shift manager from making the informed decisions.

- The fuel assembly was inspected visually immediately following the bumping incident. No external damage was noted on the assembly. Nuclear engineering personnel determined that, because the fuel assembly was protected inside the mast of the RFM, the contact was light, the fuel assembly was in the vertical position when the contact occurred, and no external damage was evident, no internal fuel damage would be expected. The inspectors agreed that this conclusion was reasonable, but were noted that the nuclear engineer did not contact the fuel vendor for confirmation until 5 days after the incident, after the fuel assembly had already been re-loaded into the reactor.

.2 Review of Decision Making Process

a. Inspection Scope

The inspectors reviewed the prompt investigation report, a report of the licensee's review of the decision making process in operating the RFM with interlocks in bypass, and RFM operating procedures. The inspectors also interviewed OCC, operations, and NOS personnel to determine what decisions were made that contributed to the fuel handling incident.

b. Findings

Introduction: The inspectors identified that the licensee failed to promptly identify a condition adverse to quality in that the RFM mast could have been damaged on its initial transit to the core. This issue was considered to be of very low safety significance (Green) and was dispositioned as a Non-Cited Violation (NCV).

Description: At about 6:25 a.m. on September 26, 2003, while removing the first fuel assembly from the reactor, the licensee determined that a bent ladder was obstructing the normal path of the RFM between the core and the upender. The FHS made the decision to operate the RFM with travel interlocks bypassed to avoid the obstruction as authorized in Byron Refueling Procedure BFP FH-14. The FHS notified the OCC reactor services supervisor of the obstruction and his actions to bypass interlocks. The reactor services supervisor concurred with this action. At the 9:00 a.m. OCC daily briefing, the reactor services supervisor reported the bent ladder and that an alternate path was being taken for fuel movements. The OCC members discussed the use of interlock bypasses and the use of the alternate path. They agreed that operation in this mode was acceptable, and tasked the reactor services supervisor with identifying the cause of the bent ladder and developing a plan to remove the obstruction. Reactor services personnel conducted interviews with refueling operators and supervisors, but were unable to determine the cause of the bent ladder and provided a 3-hour estimate for removing the obstruction.

Through interviews with the individuals involved, the inspectors determined that no one realized at the time that the RFM mast must have contacted the ladder on its initial

transit out to the core area. Either the ladder was already bent before the start of operations, or the RFM mast actually caused the bending as it went by on the way to the core. Since no one realized that contact must have been made, until questioned by the inspectors, the mast was not inspected for damage prior to being used to move fuel. A damaged mast could have affected its ability to safely handle fuel.

The inspectors identified at least two contributing causes for the failure to identify the condition.

- Condition Report (CR) 00177974 was generated to investigate how the ladder got damaged, but not until 2 days after the incident occurred, and very little investigation had been done at the time of the inspection.
- The unit supervisor and shift manger were not informed about the problem with the ladder and were not involved in the subsequent decisions regarding it.

Analysis: The inspectors determined that the licensee's failure to identify that the RFM mast must have contacted the bent ladder before beginning core alterations was a performance deficiency. The inspectors determined that the finding was greater than minor in accordance with IMC 0612, "Power Reactor Inspection Reports," Appendix B, "Issue Screening," issued on June 20, 2003. The issue was more than minor because it was associated with the human performance attribute of protecting the fuel cladding barrier and affected the cornerstone objective of providing reasonable assurance that the physical barriers protect the public from releases caused by accidents or events.

This type of incident was not suited for analysis using the existing SDP. Therefore, the finding was reviewed by regional management and determined to be of very low safety significance (Green) because the contact between the RFM mast and the ladder must have been fairly light, since it was not felt by the RFM operator. The RFM mast performed well in subsequent refueling operations and no obvious damage was noted when it was later inspected.

Enforcement: 10 CFR 50, Appendix B, Criterion XVI, required that conditions adverse to quality be promptly identified and corrected. However, the licensee failed to promptly identify that the bent ladder obstructing the normal refueling path must have made contact with the RFM mast prior to handling any fuel, and did not take appropriate action to evaluate the condition of the RFM mast. The licensee entered the issue into its corrective action program as CR 177974 on September 28, 2003. Because this violation was of very low safety significance and it was entered into the licensee's corrective action program, the violation was being treated as a NCV, consistent with Section VI.A of the NRC Enforcement Policy (NCV 05000454/2003008-01). The finding was assigned to the barrier integrity cornerstone of Unit 1 and was also considered to be related to the cross-cutting area of human performance.

1R3 Impact and Safety Significance of Bypassing Interlocks on Fuel Moving Equipment and Bumping the Fuel Cell (93812)

.1 Safety Significance of Bypassing Interlocks

a. Inspection Scope

The inspectors reviewed refueling procedures and interviewed refueling operators and supervisors, and reactor services personnel to identify the requirements for taking the RFM interlocks to bypass and additional measures for ensuring safe operations while interlocks were in bypass.

b. Findings

Introduction: The inspectors concluded that the licensee failed to promptly correct a condition adverse to quality, in that, the licensee did not remove the obstruction, nor establish compensatory measures for operation of the RFM with travel interlocks continuously bypassed. This issue was considered to be self-revealed because the failure to correct the condition resulted in contact between the RFM mast and the RCCA change fixture basket. This issue was considered to be of very low safety significance (Green) and was dispositioned as an NCV.

Description: During the day shift on September 26, 2003, the licensee identified that a bent ladder was obstructing the normal fuel transfer path. The fuel handlers made the decision to use the trolley and bridge right interlock bypasses to allow movement of fuel assemblies past the obstruction on an alternate path. Procedure BFP FH-14 allowed operation with interlocks bypassed to permit operation in areas where there may be obstructions to free travel of the mast. The procedure specified that the FHS may authorize the use of interlock bypasses. Later on the night shift, while still operating the RFM with the travel interlocks bypassed, the RFM mast, with a fuel assembly inside, made contact with the RCCA change fixture basket, potentially damaging the fuel. The inspectors identified several contributing causes for the incident.

- An alternate safe path was not formally designated for operating the RFM in the bypass mode. The normal path used the 15 trolley index line. The day shift fuel handling operators used an index position of 13.5 from the core until past the obstruction and then back to the normal path once the bridge past the obstruction. The night shift operators, although given this guidance at shift turn-over, started using the 12.5 trolley index line. After completing several transits, they shifted to the 12.0 trolley index line. While this allowed more clearance from the bent ladder, the RCCA change fixture basket was located in the travel path, past the bent ladder.
- The licensee did not assign an extra spotter to watch for obstructions while operating the RFM off the normal path. At times, the FHS was not on the RFM during the transit period. Although the FHS happened to be on the RFM when the contact was made, the FHS was involved in other activities besides monitoring the travel path and may have actually distracted the RFM operator.

For the transit which resulted in the contact, the RFM operator failed to return to the normal transit path after clearing the bent ladder and continued in a straight line until contact with the RCCA change fixture basket was made.

- Although OCC management was aware of the obstruction, they did not understand in detail the alternate path that was being used. Some OCC members were not even aware that bypasses were being used, and most assumed that the interlock bypasses were being used only while avoiding the obstruction and were unaware the trolley and bridge right interlocks were bypassed continually.
- Time estimates of 2 to 3 hours for removing the ladder were not challenged, although several of the fuel handling personnel had experience in refueling operations at the Braidwood plant where the ladder was routinely removed. That operation normally took only a few minutes, as did removing the Byron ladder, once it was finally accomplished.
- The unit supervisor and shift manager were not informed of the obstruction or involved in any decision making related to the use of interlock bypasses. They were also not promptly informed when the contact happened.

Analysis: The inspectors determined that failing to correct the condition of having protection interlocks bypassed for an extended period of time was a performance deficiency. Removing the ladder was not given a high priority, nor were any compensatory measures put in place to establish an equivalent level of protection as would have been provided by the travel interlocks. Measures such as providing written instructions regarding a safe travel path or providing an extra spotter to watch for obstructions could have prevented the incident. Promptly removing the ladder certainly would have prevented the incident. A condition report (CR 177828) was generated to address the incident. The inspectors determined that the finding was greater than minor in accordance with IMC 0612, "Power Reactor Inspection Reports," Appendix B, "Issue Screening," issued on June 20, 2003. The issue was more than minor because it was associated with the human performance attribute of protecting the fuel cladding barrier and affected the cornerstone objective of providing reasonable assurance that the physical barriers protect the public from releases caused by accidents or events.

This type of incident was not suited for analysis using the existing SDP. Therefore, the finding was reviewed by regional management and determined to be of very low safety significance (Green) because the actual contact between the RFM mast and the RCCA change fixture basket was light and there was no actual damage to the fuel cladding. Also, the licensee immediately performed inspections of the fuel assembly and the refueling machine to ensure no visible damage existed.

Enforcement: 10 CFR 50, Appendix B, Criterion XVI, required that conditions adverse to quality be promptly identified and corrected. However, the licensee failed to promptly correct the operation of the RFM and bypassed interlocks with no compensatory measures, a condition adverse to quality. The licensee entered the issue into its corrective action program as CR 177828 on September 27, 2003. Because this

violation was of very low safety significance and it was entered into the licensee's corrective action program, the violation was being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy (NCV 05000454/2003008-02). The finding was assigned to the barrier integrity cornerstone of Unit 1 and was also considered to be related to the cross-cutting area of human performance.

.2 Impact on Fuel Cell from Bumping Incident

a. Inspection Scope

The inspectors interviewed nuclear engineering personnel to determine the impact on the fuel assembly that was in the RFM when it made contact with the RCCA change fixture basket.

b. Findings

The inspectors verified that the impact on the fuel assembly had been evaluated and found the evaluation to be adequate. However, the inspectors were concerned that following the incident, the licensee did not contact the fuel vendor for an opinion and confirmation of their conclusion until 5 days later, after the fuel assembly had already been reloaded into the reactor.

1R4 Adequacy of Root Cause Evaluation and Long-Term Corrective Actions (93812)

.1 Root Cause Evaluation

a. Inspection Scope

The inspectors reviewed the results of the licensee's prompt investigation to evaluate the licensee's determination of contributing factors and suspected causes. The inspectors also reviewed the root cause investigation charter to evaluate the licensee's approach to determining the root cause.

b. Findings

The root cause had not yet been determined at the time of the inspection. The inspectors found the licensee's approach to root cause determination as described in their root cause investigation charter to be adequate. As discussed in Section 1R2.2 of this report, the inspectors determined that the licensee's prompt investigation failed to identify that the RFM mast must have made contact with the bent ladder before fuel movements were started. The prompt investigation also failed to identify that the lack of communication with the shift supervisor and shift manager was a contributing factor.

.2 Long-term corrective action

a. Inspection scope

The inspectors interviewed licensee management personnel and reviewed the results of the prompt investigation performed by the licensee to determine the adequacy of long-term corrective actions.

b. Findings

Because the root cause evaluation had not been completed at the time of the inspection, no long-term corrective actions had been established. The licensee management personnel stated that the ladder will be removed prior to refueling in future outages, that FHSs with limited licenses would no longer be used for supervising fuel movements, and that other corrective actions would be put in place once the root cause investigation had been completed.

4OA4 Crossing-Cutting Aspects of Findings

.1 A finding described in Section 1R2.2 of this report had, as one of its contributing causes, human performance deficiencies, in that licensee personnel failed to determine that the RFM mast must have made contact with the bent ladder in the refueling cavity prior to the start of fuel moves. This was partially because an investigation into how the ladder got bent was not started until well after the bent condition was discovered.

.2 A finding described in Section 1R3.1 of this report had, as its primary cause, human performance deficiencies, in that licensee personnel, on several levels, failed to take adequate actions to ensure that fuel could be safely moved after an obstruction in the normal transit path was discovered. In addition, the RFM operator failed to move the RFM in such a way as to avoid contact with the RCCA change fixture basket.

4OA6 Meetings

Exit Meeting

The inspectors presented the inspection results to Mr. S. Kuczynski and other members of licensee management at the conclusion of the inspection on October 3, 2003. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

**ATTACHMENTS: 1. SUPPLEMENTAL INFORMATION
 2. INSPECTION CHARTER**

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

S. Kuczynski, Site Vice President
D. Hoots, Plant Manager
S. Stimac, Operations Manager
W. Grundmann, Regulatory Assurance Manager
D. Drawbaugh, Regulatory Assurance
K. Hansing, Nuclear Oversight
D. Kelly, Reactor Services
R. Nieder, Nuclear Engineering

Nuclear Regulatory Commission:

P. Hiland, Acting Deputy Director, Division of Reactor Projects
P. Loudon, Chief, Reactor Projects Branch 5
R. Skokowski, Byron Senior Resident Inspector

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000454/2003008-01	NCV	Failure to Promptly Identify a Condition Adverse to Quality in that the Refueling Machine Mast Could Have Been Damaged by Undetected Contact with an Obstruction (Section 1R2.2)
05000454/2003008-02	NCV	Failure to Promptly Correct a Condition Adverse to Quality in that the Refueling Machine was Being Operated with Interlocks Bypassed for an Extended Period with no Compensatory Measures (Section 1R3.1)

Discussed

None.

LIST OF DOCUMENTS REVIEWED

BFH FH-14; Operation of Refueling Machine; Revision 15
BFP FH-14T2; Refueling Machine Operational Checklist (Uponder Area); Revision 13
BFP FH-14T3; Refueling Machine Operational Checklist (Core Area); Revision 6
BAP 370-3; Administrative Controls During Refueling; Revision 32
BAP 370-3T4; Fuel Handling Equipment Interlock Bypass Log; Revision 2
OCC Issues log; B1R12 Issues; Items 81 through 89
Prompt investigation for CR 177828; September 26, 2003
Fuel Department Log; 1830 September 26, 2003, to 0550 September 27, 2003
B1R12 Reactor Services Turn-Over Logs; 0600 - 1800 Day Shift and 1800 - 0600 Night Shift;
September 26, 2003
Byron's Archival Operation Narrative Logs; September 26, 2003, through September 27, 2003
CR 177828; Refuel Machine Mast Contacted RCCA Change Fixture; September 27, 2003
CR 177974; Refuel Cavity Lower Cavity Access Ladder Damaged; September 28, 2003
CR 178013; Non-Conservative Decision Making Regarding Fuel Transfer; September 28, 2003
Exelon Procedure LS-AA-125-1001; Preliminary Root Cause Investigation Charter; Revision 3

LIST OF ACRONYMS USED

BAP	Byron Administrative Procedure
BFP	Byron Refueling Procedure
B1R10	Byron Unit 1 Tenth Refueling Outage
FHS	Fuel Handling Supervisor
CR	Condition Report
IMC	Inspection Manual Chapter
NOS	Nuclear Oversight
OCC	Outage Control Center
RCCA	Rod Cluster Control Assembly
RFM	Refueling Machine
SDP	Significance Determination Process

October 1, 2003

MEMORANDUM TO: Steve Ray, Senior Resident Inspector, Braidwood
Division of Reactor Projects

FROM: Ann Marie Stone, Chief, Branch 3 / ***RA by P. Loudon acting for*** /
Division of Reactor Projects

SUBJECT: SPECIAL INSPECTION CHARTER FOR BYRON FUEL MOVEMENT
INCIDENT SEPTEMBER 26, 2003

On September 26, 2003, at 7:46 p.m. CST, while transferring a fuel cell from its core location to the containment upender/downender, the refueling machine mast contacted the control rod cluster assembly change fixture basket in the fuel transfer cavity. At the time of the incident, the refueling machine was being operated with interlocks bypassed continuously due to an obstruction in the fuel transfer path.

Based on the criteria specified in Management Directive 8.3 and Inspection Procedure 71153, a special inspection was initiated in accordance with Inspection Procedure 93812. The Special Inspection will be performed by yourself, (inspection lead), and Doug Tharp, (Branch 3 Reactor Engineer). The special inspection will evaluate the facts, circumstances, and licensee actions surrounding this event. A charter was developed and is attached. The inspection will start on October 1, 2003.

Attachment: As stated

cc w/att: P. Hiland, DRP
T. Tongue, DRP
D. Tharp, DRP

SPECIAL INSPECTION (SI) TEAM CHARTER

BYRON FUEL MOVEMENT INCIDENT

The special inspection should assess the licensee's performance, and to the extent practicable, independently validate the licensee's efforts in the following areas:

2. Development of the sequence of events related to the fuel handling incident
3. Adequacy of the licensee's response to the incident and operator and management actions in the decision to bypass interlocks
4. Adequacy of the licensee's approach to evaluation of the root cause
5. Impact and safety significance of bypassing interlocks on fuel moving equipment and of the bumping on the fuel cell
6. Adequacy of the licensee's plan for long-term corrective actions to prevent recurrence of fuel handling issues