

**U. S. NUCLEAR REGULATORY COMMISSION**

**REGION III**

**Docket No:** 50-440  
**License No:** NPF-58

**Report No:** 50-440/99011(DRP)

**Licensee:** FirstEnergy Nuclear Operating Company  
P.O. Box 97 A200  
Perry, OH 44081

**Facility:** Perry Nuclear Power Plant

**Location:** Perry, OH

**Dates:** October 8 through November 15, 1999

**Inspectors:** C. Lipa, Senior Resident Inspector  
R. Vogt-Lowell, Resident Inspector

**Approved by:** Thomas J. Kozak, Chief  
Reactor Projects Branch 4  
Division of Reactor Projects

## EXECUTIVE SUMMARY

### Perry Nuclear Power Plant NRC Inspection Report 50-440/99011(DRP)

This inspection report included resident inspectors' evaluations of aspects of licensee operations, engineering, maintenance, and plant support activities.

#### Operations

- The inspectors concluded that the overall conduct of operations continued to be professional, with an appropriate focus on safety (Sections O1.1).
- Two minor operator errors, the failure to update an operator aid on two occasions, and an ineffective turnover of a reactor core isolation cooling system operability concern detracted from the thoroughness with which operators typically performed their duties (Sections O1.1, O1.2, and O1.3).
- Although plant operators took immediate actions in response to a minor error which occurred during control rod movements, they did not meet plant management's expectation to initiate a condition report for the error. This issue was eventually entered into the corrective action program by a system engineer. Once the issue was brought to plant management's attention, thorough actions were taken to address the error and the failure to promptly enter the issue into the corrective action program (Section O1.3).

#### Maintenance

- Maintenance and surveillance test activities were generally well-controlled and performed according to approved procedures (Section M1.1).
- The inspectors concluded that several inadequacies observed in the implementation of administrative requirements associated with tagouts and work orders were principally due to a lack of attention-to-detail on the part of clearance preparers/reviewers and the work group performing the maintenance activities. These inadequacies were promptly and appropriately addressed in the licensee's corrective action program (Section M1.2).
- The licensee's first use of the recently approved extended emergency diesel generator outage time was effectively implemented. Protected trains and risk status were clearly posted and communicated to plant staff to increase staff awareness and sensitivity to plant risk (Section M1.3).

#### Engineering

- Engineering department personnel provided good support for maintenance activities, surveillance tests, and operability questions during the inspection period (Section E1.1).

## Report Details

### Summary of Plant Status

The plant was operated at approximately 100 percent power throughout the inspection period except for brief, small reductions of power for testing. From October 30 to October 31, operators reduced reactor power to approximately 70 percent for a control rod sequence exchange and turbine valve testing activities.

## I. Operations

### **O1 Conduct of Operations**

#### **O1.1 Review of Routine Plant Operations**

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

The inspectors followed the guidance of Inspection Procedure (IP) 71707 and conducted frequent reviews of plant operations. This included observing routine control room activities, reviewing operator logs and system tagouts, attending shift turnovers and crew briefings, and performing panel walkdowns.

##### **b. Observations and Findings**

The conduct of operations was professional. In general, the inspectors observed strict use of procedures and thorough shift turnovers. Emergent equipment issues were promptly addressed and the conduct of operations was appropriately focused on safety. However, two operator errors occurred during the inspection period (as discussed in Sections O1.2 and O1.3) and the inspectors identified several minor attention-to-detail concerns as discussed below.

The inspectors identified two instances where operator aid placards in the control room were incorrect. There were two placards in the control room, one at the Unit Supervisor's (US) desk and one at the Operator-at-the-Controls desk, which contained information concerning the DC systems breaker line-up. Plant management's expectation was for operators to update both placards when the DC systems breaker line-up was changed. On October 22 and again on October 26, the inspectors identified that one of the two placards was incorrect and had not been updated to reflect a recent breaker line-up change. The Operations Superintendent permanently removed one of the placards and reinforced the expectation that the remaining placard be updated to accurately reflect the plant configuration.

On October 19, the inspectors identified that the logging of system unavailability time was not consistent with the plan-of-the-day (POD) schedule and maintenance rule (MR) program. The POD schedule specified that during surveillance testing of hydrogen igniters, the system would be inoperable and maintenance rule unavailable. The maintenance rule program relies on specific wording to be entered in the control room

logs to allow for accurate tracking of out-of-service times. The inspectors identified that the log entry concerning hydrogen igniters only addressed that the system was in operation to support the surveillance test. After the inspectors discussed the observation with the US, he held a discussion with the MR engineer, and subsequent log entries contained the necessary information to allow accurate tracking of equipment unavailability time for MR purposes.

On November 10, 1999, both the oncoming day shift US and Shift Supervisor (SS) did not receive a turnover regarding a reactor core isolation cooling (RCIC) system operability concern. Condition Report (CR) 99-2677 was written earlier in the week to document a concern with the RCIC system minimum flow line. Engineering personnel determined that the RCIC system was operable with the plant in Mode 1, but further evaluation was required to evaluate the system's operability in Modes 2 and 3. The Modes 2 and 3 restraint was documented in the Potential Limiting Condition for Operation (PLCO) book in the control room. Plant management expectations were that the PLCO entries would be reviewed sometime during the shift and this review was not required before taking the shift. When the inspectors questioned the US and SS 1 hour after they took the shift, they were not yet aware of the Mode 2 and 3 concern with the RCIC system. However, they stated that they planned to review the PLCO book during the shift. The failure to discuss the operability concern during the shift turnover was an exception to the typically thorough turnovers from crew to crew. After evaluating this issue, plant management clarified the expectation that operability issues associated with important-to-safety systems be communicated from crew to crew during shift turnovers.

#### **O1.2 Operator Error During Restoration of Reactor Protection (RPS) System Power Supply**

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

The inspectors followed the guidance of IP 71707 in reviewing routine control room activities and walking down panels. The inspectors identified an error that was made by a licensed operator during the restoration from an RPS bus transfer. The inspectors reviewed the circumstances involved with the error, corrective actions taken, and the associated procedure.

##### **b. Observations and Findings**

On October 24, 1999, while walking down the control room panels, the inspectors questioned why half of the Intermediate Range Monitors (IRM) were selected to Range 1 rather than the usual Range 3. The Operator-at-the-Controls informed the inspectors that they were in the process of restoring from an RPS bus A transfer to its alternate supply per System Operating Instruction (SOI) C71, "RPS Power Supply Distribution." During the power supply transfer, half of the IRMs reset to Range 1 as expected. Upon further discussion with the SS, the inspectors determined that the operator had already performed most of the 40 steps in SOI-C71, but had inadvertently failed to reset the four IRMs to the Range 3 as required by Step 20 in the instruction. The condition was promptly corrected, CR 99-2549 was initiated, and a lessons learned summary was prepared. The failure to reset the IRMs to Range 3 was of minimal safety significance.

Technical Specification (TS) 5.4.1.a requires that written procedures be established, implemented, and maintained covering the applicable procedures recommended in RG 1.33, Revision 2, Appendix A, dated February 1978. Section 4.y to Appendix A of RG 1.33, recommended procedures be implemented for activities associated with the reactor protection system. SOI-C71, "RPS Power Supply Distribution," is a procedure used during reactor protection system activities. Step 20 of SOI-C71 specified that IRMs be reset to Range 3 during restoration activities from an RPS bus A transfer to its alternate power supply. The failure of an operator to reset the applicable IRMs to Range 3 as required by SOI-C71 was a violation of TS 5.4.1.a. This failure constitutes a violation of minor significance and is not subject to formal enforcement action.

### **O1.3 Operator Error During Control Rod Movement**

#### **a. Inspection Scope (37551)**

The inspectors followed the guidance of IP 71707 in reviewing an error made by a licensed operator during control rod movements that was identified by the licensee. The inspectors reviewed the circumstances involved with the error, lessons learned from the error, corrective actions taken, the operator logs, and the associated procedures and TS requirements.

#### **b. Observations and Findings**

On Sunday, October 31, 1999, an operator error occurred during control rod scram time testing. SOI-C11, "Rod Control and Information System," requires operators to deselect and reselect any control rod that has been inserted to ensure that the rod withdrawal limiter properly identifies the starting position of the control rod. The rod withdrawal limiter functions to limit the withdrawal of a selected rod to two notches past its selected position. Following the insertion of control rod 38-35 from position 48 to position 00, an operator failed to deselect and reselect the rod. Therefore, the rod withdrawal limiter identified the starting position of the rod as 48 vice 00, and no control rod block was in place for the rod withdrawal. As a result, during the subsequent rod withdrawal, it was pulled past the expected control rod block at position 04 and ended up at position 06 before the operator released the rod withdrawal pushbutton.

In response to this error, the US and SS promptly notified the Operations Superintendent and the Operations Manager. In addition, the crew was briefed on the error and other actions to address the human performance issues associated with this error were taken in accordance with Operations Policy 2-1. However, this issue was not entered into the licensee's corrective action program by operations personnel and this error was not discussed with the licensee's senior managers during the next several days. On November 3, 1999, during a review of the rod test data, the system engineer identified the error and initiated a CR. When the inspectors' questioned the Operations Manager concerning the failure to enter the error into the corrective action program, he stated that it was his intention to issue a CR on November 3 when the crew involved in the error returned to the plant from its normal rotation of several days off after being on the midnight shift. The Operations Manager also stated that in retrospect, he should have written the CR at the time the error occurred. There were no safety issues associated with the error.

The licensee subsequently determined that the CR initiated by engineering personnel, CR 99-2634, would be investigated as a Category 2, Root Cause. The licensee indicated that the scope of the investigation would include the timeliness of the CR initiation. The operations department also initiated CR 99-2643 to evaluate the operability of the rod withdrawal limiter when the rod was not deselected and selected. The licensee determined on November 4, 1999, that the rod withdrawal limiter was inoperable when the operator withdrew the control rod on October 31 and reported this to the NRC according to 10 CFR 50.72 as a condition prohibited by TS (Event No. 36397). The inspectors will review the TS compliance aspects of this issue during review of the Licensee Event Report, when it is issued.

Technical Specification 5.4.1.a requires that written procedures be established, implemented, and maintained covering the applicable procedures recommended in RG 1.33, Revision 2, Appendix A, dated February 1978. Section 4.b to Appendix A of RG 1.33 recommended procedures be implemented for activities associated with the control rod drive system. SOI-C11, "Rod Control and Information System," is a procedure used during control rod manipulations. Precaution and Limitation 2.0.7 of SOI-C11 states that any time a control rod is inserted, it shall be deselected and reselected before being withdrawn. The failure of an operator to deselect and reselect control rod 38-35 after it was inserted as required by SOI-C11 was a violation of TS 5.4.1.a. This failure constitutes a violation of minor significance and is not subject to formal enforcement action.

**c. Conclusions on the Conduct of Operations**

The inspectors concluded that the overall conduct of operations continued to be professional, with an appropriate focus on safety. However, two minor operator errors, the failure to update an operator aid on two occasions, and an ineffective turnover of a reactor core isolation cooling system operability concern detracted from the thoroughness with which operators typically performed their duties during the inspection period.

Although plant operators took immediate actions in response to a minor error which occurred during control rod movements, they did not meet plant management's expectation to promptly initiate a condition report for the error. This issue was eventually entered into the corrective action program by a system engineer. Once the issue was brought to plant management's attention, thorough actions were taken to address the error and the failure to promptly enter the issue into the corrective action program.

**O2 Operational Status of Facilities and Equipment**

**O2.1 General Plant Tours and System Walkdowns (71707)**

The inspectors followed the guidance of IP 71707 in walking down accessible portions of several systems and areas, including:

- Control complex
- Containment building
- Turbine building/heater bay
- Emergency service water pump house
- High pressure core spray (HPCS) system
- Reactor core isolation cooling (RCIC) system
- Switchgear and station battery rooms
- Emergency Diesel Generator (EDG) rooms
- Remote shutdown panel

Equipment operability, material condition, and housekeeping were acceptable in all cases. Several minor discrepancies were brought to the licensee's attention and were corrected. For example, the inspectors identified several fire doors in the diesel generator building that were not self-closing during a period of high outside winds. Appropriate compensatory actions were taken and maintenance personnel adjusted the door closers the following day. The condition was documented on CR 99-2624. The inspectors identified no substantive concerns as a result of these walkdowns.

## **07 Quality Assurance In Operations**

### **07.1 Licensee Self-Assessment Activities (71707)**

During the inspection period, the inspectors reviewed multiple licensee self-assessment activities, including:

- Company Nuclear Review Board (CNRB), October 27 and 28, 1999
- Plant On-Site Review Committee, October 21, 1999
- Daily Manager Meeting - review of new CRs

The CNRB reviewed licensee performance in several areas in detail, including, self-assessments, quality assurance audits, the corrective action program, plant operations, maintenance, and training. The CNRB provided observations based on their review to the Perry Plant Senior Management Team during the meeting. Several items were assigned an Action Item tracking number. The discussion of new CRs at the Daily Manager Meeting continued to be an effective means of communicating the issues associated with the new CRs to the management team. The inspectors concluded that the self-assessment activities observed were effective.

## II. Maintenance

### **M1 Conduct of Maintenance**

#### **M1.1 Review of Routine Maintenance and Surveillance Activities**

##### **a. Inspection Scope (62707, 61726)**

The inspectors observed or reviewed portions of the following work activities:

- SVI-C11-T5376B, "SDV High Level Channel B Functional/Calibration for 1C11-N013B"
- SVI-C11-T5376D, "SDV High Level Channel D Functional/Calibration for 1C11-N013D"
- SVI-C11-T0044-D, "SDV Water Level High Channel D Functional for 1C11-N601D"
- SVI-C41-T2001A, "Standby Liquid Control A Pump and Valve Operability Test"
- SVI-G43-T2003, "Suppression Pool Make-up Check Valve Operability Test"
- SVI-B21-T5379A, "ECCS/ADS Division 1 Manual Inhibit Functional Test"
- SVI-M25-T1270A, "Control Room Ventilation Heat Removal Test - A Train"
- SVI-D23-T1214A, "Suppression Pool Water Temperature Channel Functional"
- SVI-M17-T0410B, "Containment Vacuum Breaker Differential Temperature"
- Work Order (WO) 98-0110 clean EDG lube oil system and replace strainers and filters
- WO 98-0933, replace EDG jacket water thermostatic valve elements
- WO 98-12210, sample inside EDG jacket water standpipe
- WO 98-13047, install new jacket water level gage, Engineering Change Package 98-8033
- WO 99-5693, EDG fuel oil differential pressure switch calibration
- WO 98-7894, pressure switch calibration

j. Observations and Findings

In general, the activities were performed using appropriate procedures and the results were satisfactory. Pre-job briefings were thorough and activities were properly coordinated between departments. The inspectors identified one concern with "unofficial" plant markings being used for a TS Surveillance test, as discussed below.

During the October 19, 1999, performance of SVI-C11-T5376B on the scram discharge volume, the inspector noted that scram discharge volume level switch 1C11N0013B had an "operator aid" in the form of a black marker line denoting the level switch trip point on the instrument. Similar markings were noted on level switches 1C11N0013A, 1C11N0013C, and 1C11N0013D. These markings were at elevations that were different than the punch marks used for the SVI. After the inspector discussed these observations with I&C Supervision, CR 99-2526 was written to investigate the matter. On October 20, 1999, I&C Supervision informed the inspector that maintenance engineering personnel had verified that the punch marks used in the SVI were the correct trip reference. During the exit interview for this inspection report period, the licensee stated that as part of the investigation of CR 99-2526, other areas of the containment building would be walked down to identify and eliminate any similar uncontrolled markings.

k. Conclusions

Maintenance and surveillance test activities were generally well-controlled and performed according to approved procedures.

M1.2 Hydraulic Control Unit (HCU) Directional Control Valve Replacements

a. Inspection Scope (62707)

The inspectors followed the guidance of IP 62707 and reviewed the tagouts and work orders for the replacement of several HCU directional control valves on four different control rods, prior to performance of the work. After work performance was complete, the inspectors interviewed operations and maintenance department personnel, and reviewed the completed work order packages.

b. Observations and Findings

On October 30, 1999, maintenance personnel completed directional control valve work activities under the following tagouts and corresponding work order (WO) numbers:

<u>Tagout</u>	<u>WO #</u>
33084	99-1122
33088	99-1621
33089	99-8207
33090	99-1622

During the inspector's review of the above work packages prior to their release to the working groups, the following was noted:

- The "Electrical Hot Work" box had been checked on each clearance sheet for the above tagouts.
- Three of the four clearance sheets stated "Electrical isolation is not provided" with the remaining clearance sheet stating "Solenoid Power is not Tagged."
- The specific voltages and locations of the energized components for the electrical hot work were not stated in the clearances.

The inspector reviewed the completed work packages and had the following observations:

- None of the "Worker's Acknowledgment" blanks on the clearance sheets had been initialed by the work groups.
- Changes were made on all four work order documents after the clearances were accepted by the work group.
- Although all clearance sheets contained a note that stated "tags result in isolation of cooling flow to HCU - minimize time," there were no specific instructions in the working documents on how or whom was to accomplish time minimization or any guidance on what would constitute excessive time and what to do should it occur.
- Several instances were noted within the working documents where the instruction incorrectly referred to "solenoid" when the correct reference should have been "valve."

Technical Specification 5.4.1.a specifies, in part, that written procedures shall be implemented covering the applicable procedures recommended in Appendix A of Regulatory Guide (RG) 1.33. Appendix A of RG 1.33 recommended that procedures be implemented for equipment control (such as tagging) and maintenance. PAP-1401, "Clearance/Tagout Program," is a procedure used for equipment control such as tagging. PAP-1401, Revision 9, Attachment 3, Sheet 2 of 2, directs the clearance preparer to include in the Notes of the clearance sheet the "voltage and location of energized components for electrical hot work." Step 6.7.2 of PAP-1401 states that if the electrical hot work box is checked, then the work group shall be entered and the workers acknowledgment of hot work block be initialed on the clearance sheet. A "Note" under Step 6.7.3 of PAP-1401 states that any change to the work document from the version used to generate the clearance requires a review of that clearance for adequacy. The following conditions existed in the completed work orders and constituted failures to follow the requirements of PAP-1401: a) the specific voltages and locations of the energized components for the electrical hot work were not stated in the clearances; b) the "Workers Acknowledgment" blanks on the clearance sheets had not been initialed

by the work groups; c) changes were made on all four work order documents after the clearances were accepted by the work group without a subsequent review of the clearance for adequacy.

The failure to fully implement PAP-1401 is a violation of TS 5.4.1.a. The circumstances surrounding this violation have been incorporated in the licensee's corrective action program as CR 99-2655 and CR 99-2656. The failure to fully implement PAP-1401 constitutes a violation of minor significance and is not subject to formal enforcement action.

c. Conclusions

The inspectors concluded that several inadequacies observed in the implementation of administrative requirements associated with tagouts and work orders were principally due to a lack of attention-to-detail on the part of clearance preparers/reviewers and the work group performing the maintenance activities. These inadequacies were promptly and appropriately addressed in the licensee's corrective action program.

M1.3 Review of Maintenance and Surveillance Activities Associated with Division I EDG Extended Allowed Outage Time (AOT)

a. Inspection Scope (62707, 61726)

The inspectors followed the guidance of IP 61726 and 62707 in reviewing portions of the work activities associated with the Div I EDG. The licensee received approval from the NRC for an extended EDG AOT and this was the first implementation of this AOT. The inspectors reviewed the applicable TS requirements, the work schedule, the licensee's risk-informed assessment required by TS 5.5.13.1, and the performance of several activities listed above in Section M1.1.

b. Observations and Findings

A planned outage of the Division I EDG was scheduled for November 2 through November 7, 1999. The inspectors reviewed the licensee's risk-informed assessment associated with the extended AOT for the Division I EDG maintenance. Amendment No. 99 to the TS associated with LCO 3.8.1 allowed the EDG to be out-of-service for up to 14 days provided a risk-informed assessment was conducted. The risk-informed assessment was documented in Operations Department Memorandum POS-99-0060 and included an evaluation of conditions such as weather, scheduled surveillance tests, and protected systems. The licensee determined that the plant would be in Medium Risk Category 3 during the EDG AOT, according to the On-Line Risk Assessment Program. The licensee posted several areas of the plant as protected systems or trains, which required the Operations Shift Supervisor's permission prior to entry. The licensee provided handouts at the entrance to the plant on the first day of the outage to alert plant staff to the Division I outage and which other plant systems were relied upon for the risk-informed assessment. The inspectors considered this communication to be a good initiative to increase awareness of protected system and trains. The outage was completed on schedule when the Div I EDG was restored to an operable status on November 7, 1999.

c. Conclusions

The licensee's first use of the recently approved extended emergency diesel generator outage time was effectively implemented. Protected trains and risk status were clearly posted and communicated to plant staff to increase staff awareness and sensitivity to plant risk.

### III Engineering

E1 **Conduct of Engineering**

E1.1 Review of Routine Engineering Activities

a. Inspection Scope (37551)

The inspectors evaluated the involvement of engineering personnel in the resolution of emergent equipment problems, CRs, and other routine activities. The inspectors reviewed areas such as operability determinations and the licensee's controls for the identification, resolution, and prevention of problems.

b. Observations and Findings

The inspectors determined that engineering department personnel were adequately involved in the resolution of several emergent equipment issues. Requested Operability Determinations were performed in a timely manner and included appropriate technical justification. Engineering provided assistance for maintenance and surveillance questions that arose during the Div I EDG outage. Also, during the Div I EDG outage, engineering provided a modification that eliminated a long standing operator work around on the jacket water level gage.

c. Conclusions

Engineering department personnel provided good support for maintenance activities, surveillance tests, and operability questions during the inspection period.

### 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 November 15, 1999. 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

J. Wood, Vice President, Nuclear  
H. Bergendahl, Director, Nuclear Services Department  
B. Boles, Manager, Plant Engineering  
N. Bonner, Director, Nuclear Maintenance Department  
S. Davis, Superintendent, Plant Operations  
G. Dunn, Manager, Regulatory Affairs  
D. Gudger, Supervisor, Compliance  
H. Hegrat, Manager, Quality Assurance  
W. Kanda, General Manager, Nuclear Power Plant Department  
T. Lentz, Manager, Design Engineering  
B. Luthanen, Compliance Engineer  
T. Rausch, Operations Manager  
S. Sanford, Senior Compliance Engineer  
R. Schrauder, Director, Nuclear Engineering Department  
J. Sears, Manager, Radiation Protection

## INSPECTION PROCEDURES USED

IP 37551: Onsite Engineering  
IP 61726: Surveillance Observation  
IP 62707: Maintenance Observation  
IP 71707: Plant Operations  
IP 71750: Plant Support

## ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

None

Discussed

None

## LIST OF ACRONYMS USED

ADS	Automatic Depressurization System
AOT	Allowed Outage Time
CFR	Code of Federal Regulations
CNRB	Company Nuclear Review Board
CR	Condition Report
CRD	Control Rod Drive
DRP	Division of Reactor Projects
ECCS	Emergency Core Cooling Systems
EDG	Emergency Diesel Generator
HCU	Hydraulic Control Unit
HPCS	High Pressure Core Spray
I&C	Instrumentation and Controls
IP	Inspection Procedure
IRM	Intermediate Range Monitor
LCO	Limiting Condition for Operation
MR	Maintenance Rule
NCV	Non-cited Violation
NRC	Nuclear Regulatory Commission
PAP	Plant Administrative Procedure
PDR	Public Document Room
PLCO	Potential Limiting Condition for Operation
POD	Plan-of-the-Day
RCIC	Reactor Core Isolation Cooling
RCIS	Rod Control and Information System
RG	Regulatory Guide
RPS	Reactor Protection System
SDV	Scram Discharge Volume
SOI	System Operating Instruction
SR	Surveillance Requirements
SVI	Surveillance Instruction
SS	Shift Supervisor
TS	Technical Specification
US	Unit Supervisor
WO	Work Order