U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No:	50-440
License No:	NPF-58
Report No:	50-440/99002(DRP)
Licensee:	FirstEnergy Nuclear Operating Company P.O. Box 97 A200 Perry, OH 44081
Facility:	Perry Nuclear Power Plant
Location:	Perry, OH
Dates:	February 25 through April 6, 1999
Inspectors:	C. Lipa, Senior Resident Inspector J. Clark, Resident Inspector S. Campbell, Senior Resident Inspector, Fermi Plant
Approved by:	Thomas J. Kozak, Chief Reactor Projects Branch 4 Division of Reactor Projects

EXECUTIVE SUMMARY

Perry Nuclear Power Plant
NRC Inspection Report 50-440/99002(DRP)

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

Operations

- One Non-Cited Violation was identified when a supervising operator failed to obtain the required approval from a unit supervisor prior to hydraulically isolating a hydraulic control unit which rendered the associated control rod inoperable. The licensee effectively dispositioned this item in the corrective actions program (Section O1.1).

- The inspectors concluded that the operators were well-prepared for refueling outage 7. Operators performed well and the minor equipment challenges which were encountered were effectively handled during the shutdown for the outage. Plant management's expectation for three-way communications between operators was not consistently implemented during the shutdown; however, this did not result in any operator errors (Section O1.2).

- Operators on shift responded effectively when an RHR pump failed to start for shutdown cooling. Maintenance personnel provided good support and promptly repaired a failed optical isolator (Section O1.3).

Maintenance

- During maintenance on APRM power supplies, there were two instances of unexpected results. The on-shift licensed operators held thorough pre-job briefings, properly monitored the activities, and responded promptly to unexpected indications (Section M1.2).

Engineering

- Through good use of industry operating experience, the licensee identified that the design of the control complex building was not sufficient to protect the interior walls in the case that a design basis tornado touched down onsite. Although final plans to address this issue were adequate to support continued plant operations, the inspectors determined that the licensee's initial operability evaluation did not adequately address all issues associated with this condition (Section E1.1).

Plant Support

- One Non-Cited Violation was identified concerning the failure to handle individual fuel rods in the spent fuel pool in accordance with the procedure in use for this evolution (Section R1.1).

Report Details

Summary of Plant Status

The plant began this inspection period at 96 percent power. The reactor remained in coast down until March 26, 1999, when a plant shutdown was commenced for a scheduled refueling outage. The plant was in Mode 5 at the end of the inspection period.

I. Operations

O1 Conduct of Operations

O1.1 Control Rod Hydraulic Control Unit (HCU) Isolated Without Proper Controls

a. Inspection Scope (71707, 92901)

The inspectors followed the guidance of Inspection Procedures (IP) 71707 and 92901 in reviewing a licensee-identified operator error. The inspectors also reviewed the applicable System Operating Instruction (SOI) and Technical Specification (TS) requirements.

b. Observations and Findings

On March 18, 1999, at 7:59 a.m., an HCU trouble alarm for control rod 38-51 was received in the control room. An HCU instrument trouble alarm is caused by water in the instrument drain block or low nitrogen pressure in the accumulator. A supervising operator (SO) used SOI-C11, "Control Rod Hydraulic Units," while responding to the alarm. Section 2.0.5 of SOI-C11 specifies that the unit supervisor (US) has responsibility to determine if excessive water accumulation has occurred in the accumulator instrument block. Section 5.1 of SOI-C11specifies that piston seal exercising (Section 7.5) should be performed if excessive water accumulation has occurred in the instrument drain block. An instrument drain block drain was performed on March 15, 1999. In response to the alarm and due to the recent instrument block drain, the SO determined, without consulting with the US, that excessive water accumulation had occurred in the instrument block and that Section 7.5 of SOI-C11 was required to be performed. The SO dispatched a non-licensed operator to the containment to perform Section 7.5 of SOI-C11. In accordance with the procedure, the non-licensed operator hydraulically isolated the HCU for control rod 38-51, which rendered it inoperable.

The non-licensed operator called the control room for clarification on the steps in SOI-C11. The US answered the phone and, during the discussion with the operator, was the first time he was informed that control rod 38-51 was inoperable. The US determined that the alarm was caused by minor water accumulation in the instrument drain block and that piston seal exercising was not required. He instructed the operator to restore the control rod to an operable status, which was completed at 8:55 a.m. Condition A of TS 3.1.3 requires the associated control rod drive to be disarmed within 2-hours for a stuck control rod. The control rod, which was at notch position 48 (fully withdrawn), was inoperable for only 56 minutes; therefore, even though the TS Limiting

Condition for Operation (LCO) action statement was not recognized as being in effect, the time required to take actions for a stuck control rod was not exceeded.

The US initiated Category 1 Condition Report (CR) 99-0610 and the SO was removed from shift, pending plant manager review of the issue. Technical Specification 5.4.1.a requires written procedures to be implemented covering the applicable procedures in Regulatory Guide (RG) 1.33. A procedure for the Control Rod Drive System specified in RG 1.33, Appendix A. The SO's failure to have the US determine if excessive water accumulation occurred in the accumulator instrument block in accordance with Section 2.0.5 of SOI-C11 is considered a violation of TS 5.4.1.a. This Severity Level IV violation is being treated as a Non-Cited Violation (NCV), consistent with Appendix C of the NRC Enforcement Policy. This Violation is in the licensee's corrective action program as CR 99-0610. **(NCV 50-440/99002-01(DRP))**

The inspectors reviewed completed CR 99-0610 and determined that the investigation was rigorous and completed in a timely manner. Corrective actions were initiated to reinforce expectations. The inspectors determined that this issue was effectively dispositioned per the corrective actions program.

c. Conclusions

One Non-Cited Violation was identified when a supervising operator failed to obtain the required approval from a unit supervisor prior to hydraulically isolating a hydraulic control unit which rendered the associated control rod inoperable. The licensee effectively dispositioned this item in the corrective actions program.

O1.2 Preparations for Refueling Outage

a. Inspection Scope (60705, 71707)

The inspectors followed the guidance of IP 60705 and 71707 in assessing the licensee's preparations for refueling outage 7 and the associated reactor shutdown. The inspectors provided 24-hour onsite coverage for the shutdown.

b. Observations and Findings

The inspectors observed several new fuel inspection activities. All inspections were well controlled and no abnormalities were noted by the inspectors. The inspectors also observed that operations crews were assigned to practice sessions in the simulator for specific shutdown activities. The inspectors noted that operations personnel effectively used the simulator sessions to prepare for the evolutions and to raise questions on approaches to various activities in the simulator, rather than during the actual plant shutdown.

The inspectors noted that operations personnel effectively performed all tasks associated with the plant shutdown to commence refueling outage 7. Operations personnel were well prepared for these activities. The inspectors observed that briefings were conducted by operations supervision throughout the shutdown. All procedures were appropriately followed throughout the shutdown activities observed by the inspectors. The plant generally responded as designed during the shutdown;

however, some minor challenges were noted during reduced power operations. One challenge occurred while changing condensate flow through filters when the condensate flow control valves were cycling more than desired. A second challenge was identified when the reactor water cleanup pump tripped while in the reduced feedwater temperature mode of operation. The licensee appropriately resolved these problems using existing plant procedural guidance.

During the shutdown, there were many more people the control room that had been previously observed during plant evolutions. The inspectors observed that there were typically 10 to 12 individuals in the controls area (horseshoe); with a high of 14. This was an unusually high number of people in the control room and, at times, it was difficult to determine what each individual was doing in the area.

Three-way communications were not consistently implemented during the shutdown evolution. There were numerous conversations about activities instead of direct 3-way communications. Numerous examples of "orders" were given throughout these conversations, without the accompanying repeat-back and verification. Although some individuals maintained consistent 3-way communications, the inspectors noted repeated instances of simple replies (e.g., okay, I understand, or all right). The inspectors also noted several instances of hand gestures being used to relay information. This was observed during the periods of congestion in the controls area. The inspectors discussed these observations with plant management and were informed that communications expectations would be reinforced.

c. Conclusions

The inspectors concluded that the operators were well-prepared for refueling outage 7. Operators performed well and the minor equipment challenges which were encountered were effectively handled during the shutdown for the outage. Plant management's expectation for three-way communications between operators was not consistently implemented during the shutdown; however, this did not result in any operator errors.

O1.3 Failure of RHR Pump to Start for Shutdown Cooling

a. Inspection Scope (71707, 92901)

The inspectors followed the guidance of IP 71707 and 92901 in reviewing a licensee-identified RHR pump failure. The inspectors observed operating crew actions in the control room. The inspectors reviewed the applicable TS requirements, System Operating Instruction (SOI), and the reporting criteria in 10 CFR 50.72, 50.73, and NUREG-1022, Rev. 1. The inspectors also reviewed the licensee's notification to NRC on March 27, 1999 and the subsequent retraction of the event on March 29, 1999.

b. Observations and Findings

On March 27, 1999, at 6:05 a.m., licensed operators attempted to start the "A" RHR pump to initiate shutdown cooling; however, the pump did not start when it was called upon. The plant was in Mode 3 (hot shutdown) at the time and operators were attempting to cool the plant down to enter Mode 4 (cold shutdown) as part of the pre-planned shutdown for the refueling outage. Operators maintained the plant in Mode 3

using the main condenser to remove decay heat and entered the actions specified in TS 3.4.9 for having less than two RHR shutdown cooling subsystems operable.

Action A.2 required that an alternate method of decay heat removal be verified as available within 1 hour. The Shift Supervisor and Operations Superintendent knew that the main condenser was available and removing decay heat, but they were uncertain as to whether this met the requirement of Action A.2. Therefore, the licensee conservatively entered TS 3.0.3, which has a required plant shutdown action statement, at 7:05 a.m. Operators then notified the NRC of the entry into TS 3.0.3 pursuant to 10 CFR 50.72 (Event Number 35517).

The pump failed to start due to a faulty optical isolator in the suction path valve position logic. This only prevented the RHR pump from starting in the shutdown cooling lineup; other modes of RHR were not affected. The optical isolator was replaced, the RHR "A" shutdown cooling subsystem was started up, and Mode 4 was reached at 11:48 a.m. on March 27. The licensee determined that it was not necessary to have notified the NRC of the entry into TS 3.0.3 action statement based on the fact that the plant was already shutdown when the event occurred and retracted the event notification on March 29. This was consistent with the guidance in NUREG-1022, Section 3.2.1. However, the licensee indicated it plans to submit a Licensee Event Report. This was consistent with NUREG-1022, Section 3.2.2(6), which states that entry into TS 3.0.3 for any reason is reportable pursuant to 10 CFR 50.73.

The inspectors observed that maintenance department personnel provided good support for trouble shooting and repair of the problem with the pump starting logic. The operating crew placed shutdown cooling in service in a timely manner.

c. Conclusions

Operators on shift responded effectively when an RHR pump failed to start for shutdown cooling. Maintenance personnel provided good support and promptly repaired a failed optical isolator.

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:

- Low pressure core spray
- Emergency service water
- Safety-related batteries
- Emergency diesel generators

Equipment operability, material condition, and housekeeping were acceptable in all cases. Minor discrepancies were brought to the licensee's attention and were corrected. The inspectors identified no substantive concerns as a result of these walkdowns.

O8 Miscellaneous Operations Issues

O8.1 (Closed) Inspection Followup Item 50-440/96009-01: Inadequate Monitoring of Control Room Panel Instrumentation During Emergency Planning Exercise. During the drill, the plant management expectation that operators more frequently monitor control room panels during a loss of annunciators was not implemented. This item was documented in Potential Issue Form 96-3092. The licensee took several actions to address this observation which included training and instructor evaluation of operators during simulator sessions. Additionally, the inspectors reviewed two documents, which contained appropriate guidance on panel monitoring. These were Off-Normal Instruction ONI-R61, "Loss of Control Room Annunciators" and "FirstEnergy Operations Section Expectations Handbook." The inspectors determined that these documents contained appropriate instructions for operators to follow in case a loss of annunciators occurs. This item is closed.

II. Maintenance

M1 Conduct of Maintenance

M1.1 Review of Routine Maintenance and Surveillance Activities (62707, 61726)

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

- Work Order (WO) 98-1636, Replace power supply for average power range monitors (APRM)
- WO 99-3947, Troubleshoot and repair APRM "C"
- SVI-B33-T0257A, EOC-RPT Breaker ARC Suppression Time for 1B33A-CB3A and 1B33A-CB3B
- SVI-R45-T2002, Division 2 Diesel Generator Fuel Oil Transfer Pump and Valve Operability Test
- Reactor Mode Switch Refuel Mode Channel Functional
- SVI-E22-T5217, Unit 1, Division 3 Battery Performance Test

In general, the activities observed were performed satisfactorily. There were appropriate controls and good coordination for the activities. Specific observations are discussed in Section M1.2.

M1.2 Power Supply Replacement for APRMs

a. Inspection Scope (62707)

The inspectors followed the guidance of IP 62707 while observing maintenance activities associated with the APRMs. The inspectors also reviewed operator logs, applicable TS requirements, work control procedures, and associated CR's.

b. Observations and Findings

The inspectors observed two activities associated with APRMs where the plant impact reviews for the work did not fully determine the potential impact during the work order review process. During the two activities, unexpected results occurred, as discussed below:

- On March 15, 1999, instrument and controls (I&C) technicians replaced the power supply monitor card for APRM "C" per WO 99-3947. This caused both APRM "C" and "G" indications to go downscale, which was not expected. The plant impact review determined that only the "C" APRM would be affected. The US, who was monitoring the activity, appropriately stopped the work and entered the applicable TS Action Statement. The US then directed the I&C technicians to back out of the activity and perform additional reviews. Condition Report 99-0581 was initiated to investigate.

- On March 17, 1999, I&C technicians deenergized a power supply for APRM "A" and "E" as part of WO 98-1636. After approximately 30 minutes, the indications for APRMs "A" and "E" drifted up and the US directed the licensed operator at the controls to lock up the reactor recirculation flow control valves. This direction was given because further drifting of the APRMs could have resulted in an automatic flow control valve run back, with a corresponding change in reactor power. Condition Report 99-0621 was initiated to document the unexpected results.

  The inspectors discussed this activity with the US, who indicated that the behavior of the APRMs was not expected. However, the crew knew that there was a connection between the two APRMs being worked and the recirculation system and held a briefing to establish additional monitoring of APRM indications. The Operations Superintendent informed the inspectors that meetings were held prior to the activity to ensure that the on-shift operating crew understood the scope of the activity and the potential for impact on the recirculation system.

The US and operating crew provided appropriate oversight and monitoring of parameters during the activities. The US for each activity provided prompt direction when the unexpected indications occurred.

c. Conclusions

During maintenance on APRM power supplies, there were two instances of unexpected results. The on-shift licensed operators held thorough pre-job briefings, properly monitored the activities, and responded promptly to unexpected indications.

III. Engineering

E1 Conduct of Engineering

E1.1 Tornado Vulnerability Identified Using Industry Operating Experience

a. Inspection Scope (37551)

The inspectors followed the guidance in IP 37551 when reviewing a licensee-identified design concern with postulated tornado depressurization effects on the control complex building. The inspectors reviewed CR 99-0603 and the licensee's operability evaluation.

b. Observations and Findings

The licensee reviewed industry operating experience from another nuclear plant and determined that the design of the control complex building may not protect certain interior walls in the case of a design basis tornado as described in the Perry USAR. The control complex contains the control room, the remote shutdown panels, and safety-related AC and DC equipment for all 3 Divisions. The licensee notified the NRC according to 10 CFR 50.72 of a condition outside the design basis on March 17, 1999.

The inspectors, NRC Region III management, and licensee management and staff had telephone conferences on March 18 and 19 to discuss the issue further. The inspectors did not initially understand the basis for the licensee's operability conclusion contained in its operability evaluation. Through further discussions, the licensee provided additional information to address the inspectors' questions. The operability conclusion was based on information contained in Generic Letter 91-18 for evaluating operability of support systems and the low probability of a high intensity (F5) tornado out of season.

The licensee researched historical records during the 49-year period of record and found that there were no occurrences of an F5 intensity tornado in a 40-mile radius of the site.

On March 17, the licensee implemented interim compensatory measures, which included direction to commence an orderly shutdown of the reactor if there was a Tornado Warning issued (tornado sighted in the County). After further review, the licensee lowered the threshold for compensatory measures to be initiated at a Tornado Watch (meteorological conditions favorable for the formation of a tornado). Other compensatory measures were immediately implemented including blocking certain doors open to minimize differential pressure across walls. Further actions, including plant modifications, were being implemented to prevent or reduce reliance on compensatory measures prior to startup from the refueling outage.

c. Conclusions

Through good use of industry operating experience, the licensee identified that the design of the control complex building was not sufficient to protect the interior walls in the case that a design basis tornado touched down onsite. Although final plans to address this issue were adequate to support continued plant operations, the inspectors determined that the licensee's initial operability evaluation did not adequately address all issues associated with this condition.

E8 Miscellaneous Engineering Issues (92903)

E8.1 (Closed) URI 50-440/97-201-10: Pipe Crack Criteria for Moderate-Energy Piping Outside Containment. This item was closed by a letter from NRC to FirstEnergy Nuclear Operating Company (FENOC), dated January 27, 1999.

E8.2 (Closed) URI 50-440/97-201-11: Suppression Pool Cleanup System Interface with High Pressure Core Spray System. This item was closed by a letter from NRC to FENOC, dated January 27, 1999.

IV. Plant Support

R1 Radiological Protection and Chemistry Controls

R1.1 Handling of Individual Irradiated Fuel Rods Not According to Procedure

a. Inspection Scope (60710, 71750)

The inspectors followed the guidance of IP 60710 and 71750 in reviewing activities associated with irradiated fuel disassembly, inspection, reassembly, and reconstitution in the spent fuel pool. The inspectors reviewed the applicable procedures, sections of the USAR, and TS requirements, and observed activities in the field.

b. Observations and Findings

Workers were using procedure TXI-0298 while manipulating a fuel assembly in the spent fuel pool. The inspectors identified discrepancies within the procedure and two instances where workers failed to follow the procedure. Precaution 2.0.1 of the procedure TXI-0298, "Fuel Bundle Upper Tie Plate Removal/Replacement and Individual Rod Handling," Revision 0, stated that movement of irradiated fuel rods shall be performed under at least 8 feet of water to provide shielding and cooling. Section 5.3.2 discussed that the individual fuel rod grapple was marked with red tape at 7-1/2 feet from the collet end. This marking method would allow the individual rods to have less than the 8 feet of water when the tape marking was maintained at or below the surface of the water. The inspectors also observed two instances where workers failed to maintain the tape marker below the surface of the water. In these instances, the tape marker was approximately 6 inches above the surface of the water for several seconds. With the tape 6 inches above the surface of the water, there was only approximately 7 feet of water above the fuel rod, rather than the 8-feet of water required by Precaution 2.0.1.

The inspectors discussed the observations with the radiation protection (RP) technician, the contract personnel performing the work, and the RP Manager. The licensee held a stand-down with contract personnel to reinforce the expectation that procedures be followed. Additionally, the procedure was revised to eliminate the discrepancies regarding the specific amount of water shielding required and CR 99-0903 was initiated.

There were no radiological consequences as a result of the fuel being within 7 feet of the surface of the water. There was a lanyard attached to the fuel grapple which would have limited the upward movement of the fuel rod to 5 feet below the surface. However,

the inspectors were concerned that the controls established for the activity were not adhered to. The failure of the workers to maintain the 8 feet of water above the fuel was a violation of TS 5.4.1.a, which requires written procedures be implemented covering activities specified in RG 1.33. A procedure for repair or replacement of safety-related equipment is listed in RG 1.33, Appendix A. This Severity Level IV violation is being treated as an NCV, consistent with Appendix C of the NRC Enforcement Policy. This violation is in the licensee's corrective action program as CR 99-0903.
(NCV 50-440/99002-02(DRP))

c. Conclusions

One Non-Cited Violation was identified concerning the failure to handle individual fuel rods in the spent fuel pool in accordance with the procedure in use for this evolution.

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 April 6, 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

H. Bergendahl, Director, Nuclear Services Department
N. Bonner, Director, Nuclear Maintenance Department
B. Boles, Manager, Plant Engineering
R. Collings, Manager, Quality Assurance
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R. Schrauder, Director, Nuclear Engineering Department
J. Sears, Manager, Radiation Protection
J. Sipp, Manager, Radwaste, Environmental, and Chemistry
J. Wood, Vice President, Nuclear

INSPECTION PROCEDURES USED

IP 37551:	Onsite Engineering
IP 40500:	Effectiveness of Licensee Controls in Identifying, Resolving, and Preventing Problems
IP 61726:	Surveillance Observation
IP 62707:	Maintenance Observation
IP 71707:	Plant Operations
IP 71750:	Plant Support
IP 92901:	Followup - Operations
IP 92902:	Followup - Maintenance
IP 92903:	Followup - Engineering

ITEMS OPENED, CLOSED AND DISCUSSED

Opened

50-440/99002-01	NCV	Operator Isolated Hydraulic Control Unit Without Proper Controls
50-440/99002-02	NCV	Handling of Individual Fuel Rods not According to Procedure

Closed

50-440/99002-01	NCV	Operator Isolated Hydraulic Control Unit Without Proper Controls
50-440/99002-02	NCV	Handling of Individual Fuel Rods not According to Procedure
50-440/96009-01	IFI	Inadequate Monitoring of Control Room Panel Instrumentation During Emergency Planning Exercise
50-440/97-201-10	URI	Pipe Crack Criteria for Moderate-Energy Piping Outside Containment
50-440/97-201-11	URI	Suppression Pool Cleanup System Interface with High Pressure Core Spray System

Discussed

None

LIST OF ACRONYMS USED

AC	Alternating Current
APRM	Average Power Range Monitors
CFR	Code of Federal Regulations
CR	Condition Report
CRD	Control Rod Drive
DC	Direct Current
DG	Diesel Generators
DRP	Division of Reactor Projects
FENOC	FirstEnergy Nuclear Operating Company
HCU	Hydraulic Control Unit
I&C	Instrumentation and Controls
IFI	Inspection Followup Item
IP	Inspection Procedure
IR	Inspection Report
LCO	Limiting Condition for Operation
NCV	Non-cited Violation
NRC	Nuclear Regulatory Commission
ONI	Off Normal Instruction
PAP	Plant Administrative Procedure
PDR	Public Document Room
RP	Radiological Protection
RG	Regulatory Guide
RHR	Residual Heat Removal
SDC	Shutdown Cooling
SO	Supervising Operator
SOI	System Operating Instruction
SVI	Surveillance Instruction
TS	Technical Specification
URI	Unresolved Item
US	Unit Supervisor
USAR	Updated Safety Analysis Report
WO	Work Order