U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No:	50-440
License No:	NPF-58
Report No:	50-440/97021(DRP)
Licensee:	Centerior Service Company
Facility:	Perry Nuclear Power Plant
Location:	P. O. Box 97 200 Perry, OH 44081
Dates:	December 2, 1997, to January 27, 1998
Inspectors:	D. Kosloff, Senior Resident Inspector (SRI) J. Clark, Resident Inspector (RI) S. Campbell, SRI, Davis-Besse K. Zellers, RI, Davis-Besse
Approved by:	Thomas J. Kozak, Chief Reactor Projects Branch 4

EXECUTIVE SUMMARY

Perry Nuclear Power Plant
NRC Inspection Report No. 50-440/97021(DRP)

This inspection included a review of aspects of licensee operations, maintenance, engineering, and plant support. The report covers an eight-week period of resident inspection. Three violations of NRC requirements were identified.

Operations

- The conduct of operations was generally effective and professional. Communications among operators and within the operations department were not as effective as had been observed during previous inspection periods (Section O1.1).

- Good preparations for activities associated with unusual plant conditions and the relatively good material condition of the plant, notwithstanding the electro-hydraulic control system and off gas cooling system problems, led to effective operator responses to the automatic reactor scram and the chemical spill during this inspection period (Section O1.3).

- The inspectors concluded that the guidelines and expectations for the change in the equipment tagging policy were not initially clearly communicated to the operators which resulted in some degraded equipment not being tagged as expected by operations management (Section O2.1).

Maintenance

- Effective preparations led to the completion of a number of maintenance activities during an unanticipated two day reactor shutdown which resulted in the resolution of several outstanding material condition deficiencies. Effective planning and work execution led to a relatively low corrective and preventative maintenance item backlog (Section M7.1).

- The licensee inadvertently allowed the degradation of required raceway markings over time to the extent that some were either illegible or missing, which was a violation of NRC requirements (Section M7.2).

Engineering

- An inadequate evaluation of a design change to the electro-hydraulic control system contributed to an automatic scram (Section E2.2).

Plant Support

- Actions to verify fire doors were closed on a daily basis were generally effective. However, the licensee failed to recognize that a floor sealant applied in the EDG rooms introduced the possibility for fire doors to stick open, which resulted in a violation of NRC requirements when a fire door was identified by an inspector to be stuck open (Section P1.1).

- Combustible materials were generally well controlled. However, the inspectors identified a violation involving the placement of excess combustible material in an ESW pump house combustible free zone (Section P1.2).

Report Details

Summary of Plant Status

The unit continued full power operation from the beginning of the report period until an automatic scram occurred due to an EHC leak and turbine trip on December 18, 1997. Recovery from the scram was completed on December 21, 1997. Full power operation continued throughout the remainder of the period, with the exception of normal power reductions for periodic valve testing and control rod manipulations.

I. Operations

O1 Conduct of Operations

O1.1 General Comments

The inspectors observed numerous pre-job briefings, shift turnover briefings, and operations activities that had been discussed at pre-job briefings. The inspectors observed the response to an automatic scram, and the subsequent recovery and plant startup activities. The inspectors also monitored the actions associated with the emergency response to a trichloroethylene leak. While the conduct of operations was generally effective and professional, communications among operators and within the operations department were not as effective as had been observed during previous inspection periods. Specific observations and conclusions are listed in the following sections.

O1.2 Communications

a. Inspection Scope (71707)

The inspectors conducted several periods of continuous control room observation to assess command and control activities, and operator communications.

b. Observations and Findings

The inspectors observed that three-way communications and repeat back communications for alarm responses were not consistently or effectively utilized by some operating crews, and some crew members, near the end of December. This was in contrast to the excellent communications and alarm response detailed in several preceding inspection reports. Specific observations were discussed with operations management. Subsequent briefings and training was conducted by operations management with their operating crews. No further lapses in communications were noted for the remainder of the inspection period.

c. Conclusions

The inspectors concluded that a lack of formality during the conduct of operations by certain crews resulted in their failure to use effective communication techniques such as three legged communications and repeat back of alarm acknowledgments in the middle

of this inspection period. Operations management responded quickly and effectively to correct this failure to meet management expectations.

O1.3 Abnormal Plant Operations

a. Inspection Scope (71707, 92901, and 93702)

The inspectors responded to an automatic reactor scram and to a declaration of an unusual event (UE). The inspectors assessed the effectiveness of operator responses, communications, and use of plant procedures.

b. Observations and Findings

Automatic Reactor Scram Due to Electro-Hydraulic Leak (EHC)

On December 18, 1997, the plant automatically scrammed due to an EHC leak and subsequent turbine trip. An inspector responded to the control room to monitor operator actions. The inspector observed clear and concise orders and communications being used. The operators effectively used plant procedures. The generally good material condition of the plant, notwithstanding this equipment failure, resulted in no other safety feature actuations or unanticipated challenges to the operators.

Unusual Event Due to Spill of Trichloroethylene (TCE)

On January 23, 1998, approximately 275 gallons of TCE leaked from the off gas (OG) brine system into the OG building. Since TCE is a mildly toxic gas, which required restricted access to areas of the OG building and the use of forced-air breathing devices for entry, a UE was declared at approximately 3:10 a.m. The inspectors monitored the emergency response actions and efforts to isolate and repair the OG system. Good coordination was observed between responding groups. Personnel displayed a cautious and thoughtful approach to handling the problems associated with the leak and the system recovery. However, the inspectors questioned the timeliness of the initial UE declaration, and the notifications of offsite personnel required by Plant Administrative Procedure (PAP) 806, "Oil/Chemical Release Contingency Plan," Revision 2 (November 1994). This issue will require further discussion between NRC Region III emergency preparedness personnel and Perry staff. Therefore, this is an **Unresolved Item (50-440/97021-01(DRS))** to be evaluated in a future inspection.

c. Conclusions

Good preparations for activities associated with unusual plant conditions and the relatively good material condition of the plant, notwithstanding the EHC and OG Cooling system problems, led to effective operator responses to the automatic reactor scram and the chemical spill during this inspection period.

O2 Operational Status of Facilities and Equipment

O2.1 Control Room Equipment Tagging

a. Inspection Scope (71707 and 92901)

The inspectors assessed the implementation of a change to the licensee's policy for tagging control room deficiencies.

b. Observations and Findings

Several different methods were used to tag control room devices and indicators that required supplemental instructions for operation or that were degraded in some way. Overlapping requirements for the various tagging methods resulted in some control room devices or indicators being marked with multiple tags (e.g., danger tags, operations administrative tags, material deficiency tags (MDT), and/or information tags). Operations management noted that this condition could unnecessarily distract or confuse operators. Therefore, after bench marking trips to other power plants, in November 1997, a new policy was formulated to modify control room equipment tagging requirements which resulted in the removal of many tags from the panels. The guidelines provided to the operators for the implementation of this policy included that redundant tags be removed, that control room MDTs be stored in a ROLODEX file in the control room if not placed on the equipment, and that operators evaluate which tag would be appropriate for the condition of the equipment to be tagged.

During control room observations, the inspectors identified several out-of-service or degraded equipment controllers or indicators that were not marked. During a subsequent walkdown of the control panels with the operations manager, he indicated that two meters should have been tagged per the new policy and promptly ensured they were appropriately tagged. While the operators and other personnel were aware of the equipment that was out-of-service, discussions with operations personnel revealed various levels of understanding and differences in interpretations of the new policy. These interpretation differences were apparent during the walkdown with the operations manager. In response, on January 18, 1998, operations management issued a memorandum to operations personnel which more clearly defined the guidelines and expectations for the new policy. Based on follow up observations and discussions with control room personnel, the inspectors concluded that the policy was more clearly understood.

c. Conclusions

The inspectors concluded that the guidelines and expectations for the control room equipment tagging policy change were not initially clearly communicated to the operators which resulted in some degraded equipment not being tagged as expected by operations management. Efforts to reduce operator distractions are considered positive initiatives. However, the net effect of reducing the amount of tags in the control room (i.e., less information provided on the control panels for the operators' use versus less distractions) can not be immediately assessed.

O8 Miscellaneous Operations Issues

O8.1 (Closed) LER 50-440/97-17-00: *"High Suppression Pool Level Signal Results in Engineered Safety Feature Actuation."* This event involved actuation of the logic to transfer the suction of the high pressure core spray pump due to a minor level change in the suppression pool. There was no actual equipment actuation. This event was discussed in Inspection Report No. 50-440/97009(DRP) and was the subject of a violation (50-440/97009-01) for failure to submit a licensee event report (LER). The logic actuation had no safety consequences and no corrective actions were necessary.

O8.2 (Closed) VIO 50-440/97009-01(DRP): Failure to submit an LER for high suppression pool level signal. The LER closed in Section O8.1 of this report was submitted in response to this violation. The corrective actions for this violation appear adequate and this item is considered closed.

II. Maintenance

M1 Conduct of Maintenance

M1.1 General Comments

a. Inspection Scope (61726, 62707, 71500, and 92902)

The inspectors used Inspection Procedures 61726 and 62707 to evaluate several work activities and surveillance tests. The inspectors observed emergent work as well as planned maintenance conducted during the forced outage, plant startup, and normal operations.

b. Observations and Findings

The activities observed were generally accomplished effectively with appropriate use of drawings and written instructions. Licensee personnel continued to maintain a low threshold in using the corrective action process and material deficiency tags to identify issues and potential equipment problems. Effective preparations for a forced outage enabled the licensee to resolve several previously identified material condition deficiencies during an unexpected plant shutdown. The overall maintenance backlog was at 414 items for combined corrective and general maintenance (CM/GM) as of January 26, 1998. Licensee management established a new, lower backlog goal of 250 CM/GM items by December, 31, 1998. A Division 3 equipment outage was well planned and executed, with safety equipment made available within the schedule despite emergent work.

The inspectors performed a detailed review of Surveillance Instruction (SVI) C71-T5232, "Reactor Protection System - Electrical Power Monitoring Calibration/Functional for 1C71-S003B and 1C71-S003D." This included a review of the technical specification basis, the Updated Safety Analysis Report (USAR), and associated drawings. The instruction was clearly written and contained appropriate guidance and instructions. The instrumentation and controls personnel who conducted the test were knowledgeable and the responsible system engineer provided appropriate technical support.

c. Conclusions

The inspectors concluded that effective preparations led to the completion of a number of maintenance activities during an unanticipated two day reactor shutdown which resulted in the resolution of several outstanding material condition deficiencies. Effective planning and work execution led to a relatively low corrective and preventative maintenance item backlog.

M7 Quality Assurance in Maintenance Activities

M7.1 Measuring and Test Equipment

a. Inspection Scope (61726, 62707, 71500, and 92902)

The inspectors assessed the effectiveness of various calibration activities for measuring and test equipment (M&TE). A number of surveillance procedures were reviewed to determine what M&TE was used, what the accuracy requirements were, and the calibration methods that were used.

b. Observations and Findings

The licensee's procedures for control and calibration of M&TE were detailed and thorough. The licensee used a common corporate calibration facility with personnel from the Davis-Besse Nuclear Power Plant (Beta Labs). Except for contaminated devices, M&TE are sent to Beta Labs (in Cleveland) for periodic checks.

The inspectors observed that more state-of-the-art M&TE was being used at Perry than in the past. Although this provides technicians with better M&TE, the licensee was not ensuring that the reference standards were still appropriate for the upgraded M&TE. The licensee is committed to Institute of Electrical and Electronics Engineers (IEEE) Standard 498, "IEEE Standard Requirements for the Calibration and Control of Measuring and Test Equipment Used in the Construction and Maintenance of Nuclear Power Generating Stations" (1977). This standard specifies that reference standards, used to calibrate M&TE, must be at least four times as accurate as the M&TE. While several years ago the reference standards were up to ten times more accurate than the M&TE, the inspectors determined that some reference standards were exactly four times the accuracy of the M&TE being used. The inspectors reviewed USAR Section 7.0, "Instrumentation and Controls Systems," which included information related to this issue.

c. Conclusions

The inspectors concluded that administrative procedures and quality assurance programs did not verify that calibration reference standards met accuracy requirements when the M&TE was upgraded and therefore, that it was fortuitous that the standards used met the IEEE requirements.

M7.2 Divisional Raceway Markings

a. Inspection Scope (61726, 62707, 71500, and 92902)

The inspectors toured the emergency diesel generator (EDG) rooms to assess maintenance activities and the general material condition of the equipment in the rooms.

b. Observations and Findings

On January 7, 1998, the inspectors observed numerous raceways in the EDG rooms that did not have divisional markings on them. The markings are used to provide a visual method to ensure proper separation of cables is maintained. The licensee concluded that the raceways had been marked at one time, but that the markings had deteriorated over time and had not been maintained.

Appendix B, Section V of 10 CFR Part 50 requires, in part, that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. Perry Drawing Number D215001, Sheet 1, Revision HH, dated May 3, 1995, prescribed the marking requirements for Class 1E raceways to ensure proper separation of cables is maintained. The marking of Class 1E raceways is an activity affecting quality. The failure to follow the prescribed drawing requirements was a **Violation (50-440/97021-02(DRP))** of NRC requirements.

c. Conclusions

The inspectors concluded that the licensee inadvertently allowed the degradation of required raceway markings over time to the extent that some were either illegible or missing which was a violation of NRC requirements.

III. Engineering

E2 Engineering Support of Facilities and Equipment

E2.1 Seismic Tubing Supports

a. Inspection Scope (37551, and 92903)

The inspectors assessed the adequacy of maintaining seismic supports in the EDG rooms and on EDG equipment.

b. Observations and Findings

On January 7, 1998, the inspectors identified numerous STAUFF clamps on all three divisional EDGs that did not appear to meet seismic qualification criteria. Many clamps were loose, possibly of the wrong type (2-dimensional instead of 3-dimensional, or vice versa), or had physical impairments that prevented them from operating correctly. These issues were reviewed in two subsequent walkdowns with licensee engineering personnel.

The engineering personnel stated that some of the physical impairments had probably existed since the tubing was installed.

A potential issue form (PIF) was generated for this issue on January 20, 1998, 13 days after the initial identification. The preliminary indication on the PIF was that an operability determination was not needed for this condition. However, in parallel with the generation of the PIF, engineering personnel were performing a review to determine if the EDGs were operable. Once this review was completed, the licensee stated that, based on engineering judgement, the EDGs were operable. A full technical review of the seismic qualifications was in progress at the end of the inspection period to assess the qualification and operability of the EDGs. In addition, work was initiated to correct the deficiencies that had been identified. This issue is an **Unresolved Item** (50-440/97021-03(DRP)) based on the completion and inspector review of the licensee's engineering evaluations.

c. Conclusions

The inspectors questioned the operability of the EDGs based on numerous identified differences in clamps provided for seismic qualifications. This item remained open at the end of the inspection period.

E2.2 Design Change Causes Scram

a. Inspection Scope (37551 and 92903)

The inspectors assessed the adequacy of a change in the design of nonsafety-related electro-hydraulic control oil tubing connections. Failure of one of the tubing connections caused a reactor scram on December 19, 1997 (see Section O1.3).

b. Observations and Findings

The licensee formed an incident response team to determine the causes of the scram. The team included vendor representatives in addition to licensee personnel from appropriate disciplines. The team's report included documentation of a systematic approach to identifying the root and contributing causes of the scram. The team also systematically evaluated various options for correcting the causes. The team concluded that the failure of the tubing connection was caused by hydraulically induced vibrations of the tubing. The vibration concern had been identified prior to the recently completed refueling outage and the design of the tubing was changed during the outage through the use of a specification change. The change consisted of replacing flared connections with compression fitting connections. The compression fittings were superior in preventing leakage. The engineers who had initiated the change had evaluated the compression fittings for use with vibration. However, their evaluation had not considered the increased stress in the tubing at the compression fitting. The increased stress combined with the tubing vibration caused high cycle fatigue failure of the tubing. The licensee's senior management team accepted the incident response team's recommendation to install flared tubing connections and accelerate preparation of the tubing design modification to allow it to be installed if another forced outage occurs.

c. Conclusions

The incident response team's evaluation of the scram was thorough and the conclusions were well supported. However, the team identified that an earlier change from flared to compression tubing connections had not been adequately evaluated prior to completion. As a result, the tubing failed which caused a plant scram. The inspectors concluded that a violation of NRC requirements did not occur in this case because the inadequate evaluation occurred on a non-safety related component and the maintenance rule requirements were satisfied.

IV. Plant Support

F2 Status of Fire Protection Facilities and Equipment

F2.1 Fire Barriers

a. Inspection Scope (71707)

Using Inspection Procedure 71707, the inspectors reviewed conditions affecting safety-related equipment, including fire barriers required by Appendix R of 10 CFR Part 50.

b. Observations and Findings

During an inspection of the Division 2 and 3 Emergency Diesel Generator (EDG) rooms on December 8, 1997, the inspectors noted that the fire door between the rooms was stuck open. This type of door was designed to close automatically, with no hold-open mechanism. The inspectors reported the door's condition to plant operations staff, and the door was reclosed. The licensee reviewed security records to identify who had been in the rooms shortly before the inspectors. The licensee concluded through interviews that the door had most likely been inadvertently left open when a cart was taken through the door several minutes before the inspector saw the door open. The licensee determined that a floor sealant, which had been applied in the rooms many months earlier, had caused the door to stick on the door stop. This condition had not been noticed because the door would stick open only if it was taken fully open or 90 degrees open, as when the closing mechanism was tested. The inspectors did not observe similar flaws in 20 additional doors inspected.

Appendix R, Section III.N.4 of 10 CFR Part 50 requires, in part, that fire doors shall be kept closed and inspected daily to verify that they are in the closed position. This NRC identified failure to keep a required fire door closed is considered a **Violation (50-440/97021-04(DRP))** of Appendix R.

c. Conclusions

The inspectors concluded that actions to verify fire doors were closed on a daily basis were generally effective. However, the licensee failed to recognize that a floor sealant applied in the EDG rooms introduced the possibility for fire doors to stick open which resulted in a violation of NRC requirements when a fire door was identified by an inspector to be stuck open.

F2.2 Combustible Materials

a. Inspection Scope (62707, 71750, and 92902)

The inspectors toured areas of the plant with safety-related equipment to assess the effectiveness of 10 CFR Part 50, Appendix R, fire prevention measures associated with ongoing maintenance activities.

b. Observations and Findings

On January 6, 1998, the inspectors informed the shift supervisor that various items of combustible material were in an area that was posted as a combustible free zone of the emergency service water (ESW) pump house. The licensee promptly inspected the area and removed the combustible material. The licensee also initiated a PIF to enter the issue in the corrective action system. The fire protection technician who inspected the area stated that when he had inspected the area a few days earlier, the combustible material had not been present. The combustible material appeared to be from a recently completed maintenance activity. The inspectors did not observe combustible materials in other combustible free zones. The inspectors reviewed USAR Section 9A.7, "Deviations to Appendix R," which included information related to this issue.

Appendix R, Section III.G.2.b of 10 CFR Part 50 requires, in part, separation of cables and equipment and associated non-safety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustibles or fire hazards. The combustible free zone in the ESW pump house had been established to comply with Appendix R. Administrative controls, postings, and boundary markings were in place to ensure compliance with Appendix R. However, the failure to follow the posted requirement was a **Violation (50-440/97021-05(DRP))** of NRC requirements.

c. Conclusions

The inspectors concluded that, in general, combustible materials were appropriately controlled. However, a violation involving the placement of excess combustible material originating from a maintenance work activity had been placed in an ESW pump house combustible free zone was identified by the inspectors.

X. Management Meetings

X1 Exit Meeting Summary

The inspectors presented the inspection results to members of licensee management at the conclusion of the inspection on January 27, 1998. 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

L. W. Myers, Vice President, Nuclear
W. R. Kanda, General Manager Nuclear Power Plant Department
T. S. Rausch, Director, Quality and Personnel Development Department
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F. A. Kearney, Superintendent Plant Operations

INSPECTION PROCEDURES USED

IP 37551:	Onsite Engineering
IP 61726:	Surveillance Observations
IP 62707:	Maintenance Observation
IP 71500	Balance of Plant
IP 71707:	Plant Operations
IP 71714:	Cold Weather Preparations
IP 71750:	Plant Support Activities
IP 92700:	Onsite Follow-up of Written Reports of Non-routine Events at Power Reactor Facilities
IP 92901:	Follow-up - Plant Operations
IP 92902:	Follow-up - Maintenance
IP 92903:	Follow-up - Engineering
IP 92904	Follow-up - Plant Support

ITEMS OPENED OR CLOSED (NONE DISCUSSED)

Opened

50-440/97021-01(DRP)	URI	Timeliness of Emergency Declaration and Notifications
50-440/97021-02(DRP)	VIO	Class 1E Raceway Markings
50-440/97021-03(DRP)	URI	Seismic Tubing Supports for EDGs
50-440/97021-04(DRP)	VIO	Failure to Keep Fire Door Closed
50-440/97021-05(DRP)	VIO	Combustibles In Combustible Free Zone

Closed

50-440/97-17-00	LER	High Suppression Pool Level Signal Results in Engineered Safety Feature Actuation
50-440/97009-01	VIO	Failure to submit and LER for High Suppression Pool Level Signal

LIST OF ACRONYMS AND INITIALISMS

CFR	Code of Federal Regulations
CM/GM	Corrective Maintenance / General Maintenance
EDG	Emergency Diesel Generator
EHC	Electro-Hydraulic Controls
ESW	Emergency Service Water
IEEE	Institute of Electrical and Electronics Engineers
IR	Inspection Report
LCO	Limiting Condition for Operation
LER	Licensee Event Report
MDT	Material Deficiency Tag
M&TE	Measuring and Test Equipment
NRC	Nuclear Regulatory Commission
OG	Off Gas
PAP	Plant Administrative Procedure
PDR	Public Document Room
PIF	Potential Issue Form
PLCO	Potential Limiting Condition for Operation
PSIG	Pounds per Square Inch, Gage
RFO6	Refueling Outage 6
RG	Regulatory Guide
RI	Resident Inspector
RO	Reactor Operator
RPS	Reactor Protection System
SRI	Senior Resident Inspector
SRO	Senior Reactor Operator
SVI	Surveillance Instruction
TCE	Trichloroethylene
TS	Technical Specification
UE	Unusual Event
URI	Unresolved Item
USAR	Updated Safety Analysis Report
VIO	Violation