

January 25, 2007

Mr. L. William Pearce  
Site Vice President  
FirstEnergy Nuclear Operating Company  
Perry Nuclear Power Plant  
P. O. Box 97, 10 Center Road, A290  
Perry, OH 44081-0097

SUBJECT: PERRY NUCLEAR POWER PLANT, UNIT 1  
FIRE PROTECTION TRIENNIAL BASELINE INSPECTION  
NRC INSPECTION REPORT 05000440/2006006(DRS)

Dear Mr. Pearce:

On December 15, 2006, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Perry Nuclear Power Plant, Unit 1. The enclosed report documents the inspection findings which were discussed on December 15, 2006, with you and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's Rules and Regulations, and with the conditions of your license. The team reviewed selected procedures and records, observed field activities, and interviewed personnel. Specifically, this inspection focused on the triennial fire protection baseline inspection.

Based on the results of this inspection, two NRC-identified findings of very low safety significance, both of which involved violations of NRC requirements were identified. However, because these violations were of very low safety significance, and because the findings were entered into your corrective action program, the NRC is treating these findings as Non-Cited Violations (NCV) in accordance with Section VI.A.1 of the NRC's Enforcement Policy.

If you contest the subject or severity of a NCV, 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 copies to the Regional Administrator, U.S. Nuclear Regulatory Commission - Region III, 2443 Warrenville Road, Suite 210, Lisle, IL 60532-4352; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the Resident Inspector Office at the Perry Nuclear Power Plant.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any), 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), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

**/RA/**

Julio F. Lara, Chief  
Engineering Branch 3  
Division of Reactor Safety

Docket No. 50-440  
License No. NPF-58

Enclosure: Inspection Report 05000440/2006006(DRS)  
w/Attachment: Supplemental Information

cc w/encl: G. Leidich, President and Chief Nuclear Officer - FENOC  
J. Hagan, Senior Vice President of Operations and Chief  
Operating Officer - FENOC  
D. Pace, Senior Vice President, Fleet Engineering - FENOC  
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Manager, Fleet Licensing  
Manager, Site Regulatory Compliance  
D. Jenkins, Attorney, FirstEnergy  
Public Utilities Commission of Ohio  
Ohio State Liaison Officer  
R. Owen, Ohio Department of Health

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

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

Report No: 05000440/2006006(DRS)

Licensee: FirstEnergy Nuclear Operating Company(FENOC)

Facility: Perry Nuclear Power Plant, Unit 1

Location: Perry, OH

Dates: November 27 through December 15, 2006

Inspectors: Z. Falevits, Senior Reactor Inspector, Lead  
D. Schrum, Reactor Inspector  
D. Szwarc, Reactor Inspector

Approved by: Julio F. Lara, Chief  
Engineering Branch 3  
Division of Reactor Safety

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## SUMMARY OF FINDINGS

IR 05000440/2006006(DRS); 11/27/06 - 12/15/06; Perry Nuclear Power Plant, Unit 1; Fire Protection Triennial Baseline Inspection.

This report covers an announced triennial fire protection baseline inspection. The inspection was conducted by Region III inspectors. Two Green findings associated with Non-Cited Violations (NCVs) 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 may 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.

### A. Inspector-Identified and Self-Revealed Findings

#### **Cornerstone: Mitigating Systems**

- Green. The team identified a NCV of the Perry 1 Nuclear Power Plant Facility Operating License Condition 2.C.(6) and 10 CFR Part 50, Appendix R, Section III.L.3, having very low safety significance (Green), for failure to provide the required electrical isolation in the design of the post-fire safe shutdown control logic circuitry. Specifically, the control logic for Emergency Service Water Pump Discharge Shutoff Valve 1P45F0130A, did not have a transfer switch isolation contact provided, that would open to isolate main control room (MCR) fire-induced electrical faults when transferring controls to the remote shutdown location. This is required to ensure that postulated fire-induced electrical faults would not result in the loss of post-fire alternative safe shutdown equipment. The licensee's immediate corrective action was to perform an extensive evaluation of the associated circuitry and cables, to contact the panel's vendor, and other BWR6 plants, and to perform an extent of condition review. The licensee entered the issue into the corrective action program as CR 06-11399.

The finding was more than minor because it was associated with the mitigating systems cornerstone attribute of protection against external factors (fire) and had the potential to impact the mitigating systems cornerstone objective of ensuring the capability of systems, that respond to initiating events to prevent undesirable consequences. The violation is associated with degradation of a fire protection feature. Using Part 1 of the Inspection Manual Chapter 0609, fire protection Significance Determination Process Phase 1 Worksheet, the performance issue was determined to be in the post-fire safe shutdown category. The degradation rating was low based on FirstEnergy Nuclear Operating Company's (FENOC's) engineering evaluation that concluded that there were no fire induced electrical faults resulting from a MCR fire that would prevent the plant from achieving and maintaining a safe shutdown in the event of a control room fire. Therefore, the finding screens as Green or of very low safety significance in the Phase 1 Worksheet. This violation is being treated as a NCV consistent with Section VI.A of the Enforcement Policy (Section 1R05.4). The cause of the finding related to cross-cutting aspect of problem identification and resolution.

- Green. The team identified a NCV of the Perry 1 Nuclear Power Plant Facility Operating License Condition 2.C.(6) having very low safety significance (Green) for failing to implement and maintain in effect all provisions of the approved fire protection program as described in section 9A.5, D.1.(i) of the Updated Safety Analysis Report (USAR). The USAR stated that floor drains were designed to remove the expected fire fighting water flow from areas where fixed fire suppression systems were installed or where a fire hose may be used. The team identified that the licensee failed to evaluate the water flow capacity of the floor drains in the Division 1 and 2 cable spreading rooms.

The finding was more than minor because it affected a cornerstone objective. The finding was associated with the Mitigating System cornerstone attribute of protection against external factors (i.e., flood hazard) and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events, (i.e., flood hazard) to prevent undesirable consequences. The finding was of very low safety significance due to the fact that internal flooding would not result in the total loss of any safety function because the loss of safety related equipment in one division cable spreading room would not affect the safety related equipment in the other division cable spreading room. (Section 1R05.10)

**B. Licensee-Identified Violations**

No findings of significance were identified.



## REPORT DETAILS

### 1. REACTOR SAFETY

#### **Cornerstones: Initiating Events and Mitigating Systems**

#### 1R05 Fire Protection (71111.05)

The purpose of this inspection was to review the Perry Nuclear Power Plant's (PNPPs) Fire Protection Program (FPP) for selected risk-significant fire areas. Emphasis was placed on verifying that the post-fire safe shutdown capability and the fire protection features were maintained free of fire damage to ensure that at least one post-fire safe shutdown success path was available. The inspection was performed in accordance with the Nuclear Regulatory Commission's (NRC) new regulatory oversight process using a risk-informed approach for selecting the fire areas and attributes to be inspected. The team used the Perry Nuclear Power Plant's Individual Plant Examination of External Events (IPEEE) to choose several risk-significant areas for detailed inspection and review. The fire zones chosen for review during this inspection were:

<u>Fire Zones</u>	<u>Description of Fire Zones Reviewed</u>
0CC - 1a,1b,& 1c	Unit 1 - Emergency Closed Cooling Pump Area (Control Complex, Elevation 620' - 6" and 574' - 10")
1CC-3d	Unit 1 - Remote Shutdown Room/Panel (Control Complex, Elevation 620' - 6")
1CC-4e	Unit 1 - Cable Spreading Room (Division 1) (Control Complex, Elevation 638' - 6")

For each of these fire areas, the inspection focused on the fire protection features, the systems and equipment necessary to achieve and maintain safe shutdown conditions, determination of licensee commitments, and changes to the FPP. The above areas constituted 3-inspection samples.

#### .1 Systems Required to Achieve and Maintain Post-Fire Safe Shutdown

The guidelines established by Branch Technical Position (BTP) Chemical Engineering Branch (CMEB) 9.5-1, Section C.5.b, "Safe Shutdown Capability," paragraph (1), required the licensee to provide fire protection features that were capable of limiting fire damage to structures, systems, and components (SSCs) important to safe shutdown. The SSCs that were necessary to achieve and maintain post-fire safe shutdown were required to be protected by fire protection features that were capable of limiting fire damage to the SSCs so that:

- One train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control station(s) was free of fire damage; and

- Systems necessary to achieve and maintain cold shutdown from either the control room or emergency control station(s) can be repaired within 72 hours.

a. Inspection Scope

The team reviewed the plant systems required to achieve and maintain post-fire safe shutdown to determine if the licensee had properly identified the components and systems necessary to achieve and maintain safe shutdown conditions for each fire area selected for review. Specifically, the review was performed to determine the adequacy of the systems selected for reactivity control, reactor coolant makeup, reactor heat removal, process monitoring, and support system functions. This review included the fire protection safe shutdown analysis (SSA) delineated in the Safe Shutdown Capability Report (SSCR) SSC-001, Revision 4.

The team also reviewed the operators' ability to perform the necessary manual actions for achieving safe shutdown by reviewing procedures, the accessibility of safe shutdown equipment, and the available time for performing the actions.

The team reviewed the PNPPs Updated Safety Analysis Report (USAR) and the licensee's engineering and/or licensing justifications (e.g., NRC guidance documents, license amendments, technical specifications, safety evaluation reports, exemptions, and deviations) to determine the licensing basis.

A comparison of the safe shutdown component identified in the SSCR to components on the plant Piping and Instrumentation Drawings (P & IDs) was made by the inspection team. On a sample basis, the inspection team verified that components having the potential to impact operation were properly analyzed in the SSCR.

b. Findings

No findings of significance were identified.

.2 Fire Protection of Safe Shutdown Capability

The guidelines established by BTP CMEB 9.5-1, Section C.5.b, "Safe Shutdown Capability," Paragraphs (2)(a) and (3), required separation of cables and equipment and associated circuits of redundant trains by a fire barrier having a 3-hour rating. If the guidelines cannot be met, then alternative or dedicated shutdown capability, and its associated circuits, independent of cables, systems or components in the area, room, or zone under consideration should be provided.

a. Inspection Scope

For each of the selected fire areas, the team reviewed the licensee's SSA to ensure that at least one post-fire safe shutdown success path was available in the event of a fire. This included a review of manual actions required to achieve and maintain hot shutdown conditions and to make the necessary repairs to reach cold shutdown within 72 hours. The team also reviewed procedures to verify that adequate direction was provided to operators to perform these manual actions. Factors such as timing, access to the equipment, and the availability of procedures, were considered in the review.

The team also evaluated the adequacy of fire suppression and detection systems, fire area barriers, penetration seals, and fire doors to ensure that at least one train of safe shutdown equipment was free of fire damage. To accomplish this, the team observed the material condition and configuration of the installed fire detection and suppression systems, fire barriers, construction details, and supporting fire tests for the installed fire barriers. In addition, the team reviewed licensee documentation, such as deviations, detector placement drawings, fire hose station drawings, carbon dioxide pre-operational test reports, smoke removal plans, Fire Hazard Analysis (FHA) reports, SSA, and National Fire Protection Association (NFPA) codes to verify that the fire barrier installations met license commitments.

b. Findings

No findings of significance were identified.

.3 Post-Fire Safe Shutdown Circuit Analysis

The guidelines established by BTP CMEB 9.5-1, Section C.5.b, "Safe Shutdown Capability," Paragraph (1), required that SSCs important to safe shutdown be provided with fire protection features capable of limiting fire damage to ensure that one train of systems necessary to achieve and maintain hot shutdown conditions remained free of fire damage. Options for providing this level of fire protection were delineated in BTP CMEB 9.5-1, Section C.5.b, "Safe Shutdown Capability," Paragraph (2). Where the protection of systems whose function was required for hot shutdown did not satisfy BTP CMEB 9.5-1, Section C.5.b, Paragraph (2), an alternative or dedicated shutdown capability and its associated circuits, were required to be provided that was independent of the cables, systems, and components in the area. For such areas, BTP CMEB 9.5-1, Section C.5.c, "Alternative or Dedicated Shutdown Capability," Paragraph (3), specifically required the alternative or dedicated shutdown capability to be physically and electrically independent of the specific fire areas and capable of accommodating post-fire conditions where offsite power was available and where offsite power was not available for 72 hours.

a. Inspection Scope

The team performed a review of the licensee's SSCR and selected electrical and raceway drawings to determine whether the licensee had appropriately identified and analyzed the safety related and non-safety related cables associated with safe shutdown equipment located in the selected plant fire zones. The team's review

included the assessment of the licensee's electrical systems and electrical circuit analyses.

A sample of safety and non-safety-related cables for equipment in the selected fire areas were evaluated to determine if the design requirements of Section III.G of Appendix R to 10 CFR Part 50 are being met. This included verifying that the licensee performed an assessment, per the plant's licensing basis and regulatory requirements, to ensure that hot shorts, open circuits, or shorts to ground would not prevent implementation of safe shutdown.

b. Findings

No findings of significance were identified.

.4 Alternative Shutdown Capability

The guidelines established by BTP CMEB 9.5-1, Section C.5.b, "Safe Shutdown Capability," Paragraph (1), required the licensee to provide fire protection features that were capable of limiting fire damage so that one train of systems necessary to achieve and maintain hot shutdown conditions remained free of fire damage. Specific design features for ensuring this capability were provided in BTP CMEB 9.5-1, Section C.5.b, Paragraph (2). Where compliance with the separation criteria of BTP CMEB 9.5-1, Section C.5.b, Paragraphs (1) and (2) could not be met, BTP CMEB 9.5-1, Section C.5.b, Paragraph (3) and Section C.5.c, required an alternative or dedicated shutdown capability be provided that was independent of the specific fire area under consideration. Additionally, alternative or dedicated shutdown capability must be able to achieve and maintain hot standby conditions and achieve cold shutdown conditions within 72 hours and maintain cold shutdown conditions thereafter.

a. Inspection Scope

The team reviewed the licensee's systems required to achieve safe shutdown to determine if the licensee had properly identified the components and systems necessary to achieve and maintain safe shutdown conditions in accordance with the requirements discussed above. The team focused on the adequacy of the systems to perform reactor pressure control, reactivity control, reactor coolant makeup, decay heat removal, process monitoring, and support system functions.

The team also reviewed selected components whose inadvertent operation due to a fire may adversely affect post-fire safe shutdown capability. The purpose of this review was to determine if a single exposure fire in one of the fire areas could prevent the proper operation of safe shutdown components. The team focused on the electrical isolation capability of selected equipment needed for post-fire safe shutdown to ensure that such equipment could be operated from the alternate remote shutdown panel(s).

b. Findings

Introduction: The team identified a finding involving an NCV of the Perry 1 Facility Operating License Condition 2.C.(6) and 10 CFR Part 50, Appendix R, Section III.L.3, having very low safety significance (Green) for failure to provide electrical isolation of post-fire shutdown electrical circuits from the MCR during transfer to the alternate RSP. This is required to ensure that postulated fire-induced electrical faults would not result in the loss of post-fire alternative safe shutdown equipment.

Description: The team examined the electrical circuit design associated with the remote shutdown control panel and local shutdown stations to determine compliance with the licensing and regulatory requirements to ensure that hot shorts, open circuits, or shorts to ground would not prevent implementation of safe shutdown. The team also reviewed the licensee's safe shutdown analysis, safe shutdown capability report, and selected electrical design drawings to determine whether the licensee had appropriately identified and analyzed the electrical circuits associated with safe shutdown components and if the licensee incorporated the required isolation transfer switches to ensure that the dedicated shutdown system was completely independent of dedicated fire areas.

In addition, the team reviewed surveillance test procedures and completed test records for the alternate shutdown panel control transfer switches and alternate power supplies, to ensure that functionality of the transfer switches and alternate power sources were adequately demonstrated and that an alternate or dedicated shutdown capability was provided that was electrically and physically independent of the specific fire area under consideration.

The team identified the following example of a remote shutdown circuit that was not completely electrically isolated from MCR circuits to meet independence requirements in 10 CFR Part 50, Appendix R, Section III.L.3.

- Emergency Service Water Pump Discharge Shutoff Valve 1P45-F130A, has transfer and control switches located at the remote shutdown control panel 1C61-P001. However, the electrical control logic for the valve did not have the required electrical transfer switch contact isolation between point L1 of relay K71 coil located in remote switchgear EH1106 and electrical circuits located in MCR panels 1H13-P743, 1H13-P872, 1H13-P621, and 1H13-P601. Specifically, the control circuitry in the alternate shutdown control panel was not electrically isolated (on the neutral side) from potential MCR fire induced faults (hot shorts, shorts to ground, open circuits) which could potentially have affected the operation of this valve from the remote shutdown location following a control room fire. An analysis on the potential adverse effects of fire induced faults on operation of this equipment from the remote locations was not available for review during the inspection. In addition, the team determined that the Extent of Condition (EOC) reviews performed by the licensee in 2006 for the lack of separation of Division 1 EDG Control Room (pull to lock) control switch contact from Control Room circuits, as documented in LER-2006-003, May 5, 2006, did not identify this issue.

Perry FSAR Section 7.4.1.4, "Remote Shutdown System (RSS)," stated, in part, that the RSS is designed to achieve a cold reactor shutdown from outside the control room following postulated fire in the MCR requiring control room evacuation and that the Division 1 remote shutdown capability is designed to control the required shutdown systems from outside the control room irrespective of shorts, opens, or grounds in the control circuit in the control room that may have resulted from an event causing an evacuation. The functions needed for Division 1 remote shutdown control are provided with manual transfer switches at the remote shutdown panel which override controls from the MCR and transfer the controls to the Division 1.

The licensee's immediate corrective action was to initiate CR 06-11399 on December 13, 2006, to perform an extensive evaluation of the associated circuits/cables, contact the CR panels vendor and other BWR6 plants, and perform an EOC review to determine if additional similar issues existed. Subsequently, after the exit, the licensee informed the team that based on their reviews of potential fire induced faults, the lack of electrical isolation would not affect safe shutdown capability for this circuit.

The team noted that during licensee's recent Fire-Protection self-assessment, the licensee identified a related issue concerning valve 1P45 F130A. The licensee issued CR 06-08881 to document that operation transfer switch 1C61-S102 (transfer switch for this valve in RSP) was not properly coordinated with fuse replacement actions for the valve.

Analysis: The team determined that failure to provide appropriate electrical isolation of post-fire shutdown electrical circuits from the MCR, was a performance deficiency warranting a significance evaluation. The finding was considered greater than minor in accordance with IMC 0612, "Power Reactor Inspection Reports," Appendix B, "Issue Screening," issued on May 19, 2005. The finding involved the attribute of protection against external factors (fire) and potentially affected the mitigating systems cornerstone objective of ensuring the capability of systems that respond to initiating events to prevent undesirable consequences. The violation is associated with degradation of a fire protection feature. Using Part 1 of the Fire Protection SDP Phase 1 Worksheet in Manual Chapter 0609, Significance Determination Process [SDP], the performance issue was determined to be in the post-fire safe shutdown category. The degradation rating was low based on FENOC's engineering evaluation of this design issue that concluded that there were no fire induced electrical faults resulting from a MCR fire that would prevent the plant from achieving and maintaining a safe shutdown in the event of a control room fire. Therefore, the finding screens as Green or of very low safety significance in the Phase 1 Worksheet.

This finding has a cross-cutting aspect in the area of problem identification and resolution because the licensee failed to implement effective extent of condition reviews for lack of separation of Division 1 EDG MCR (pull to lock) control switch contact from RSP circuits, as documented in LER-2006-003, May 5, 2006, and CR-06-01930, May 2, 2006. (also see "Related Issues" at the end of this section). To address this licensee finding the licensee modified the circuitry and provided isolation contacts on the positive and negative legs of the 125 Vdc, Division 1, EDG control circuit.

Enforcement: The 10 CFR Part 50, Appendix R, Paragraph III.G.3, states, in part, that the alternative shutdown capability shall be independent of the specific fire area(s). The requirements for the alternative means are described in Appendix R Section L.

Contrary to the above, on December 11, 2006, the team identified that the alternate shutdown capability was not fully independent of the specific fire area. Specifically, a lack of proper electrical isolation existed between the control logic circuitry in the MCR panels and the control logic circuitry at the alternate RSP. Because this violation was of very low safety significance and it was entered into the licensee's corrective action program, this violation is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy (NCV 05000440/2006006-01). The licensee entered the finding into their corrective action program as CR-11399.

#### Related Issue

During review of electrical design drawings, the team also identified that the control logic for Division 1 Control Complex Chilled Water Chiller 0P47 B001A, partly shown on elementary diagram drawing 208-0178-00013, "Control Complex Chilled Water Chiller "A" Controls B001A, Revision Z, did not depict the required electrical isolation contact between the MCR logic (line 12L2) at control room panels 1H13-P827A and B, 1H13-P904, and the neutral ground for the control room logic shown partly on elementary diagram drawing 208-0178-00012, Revision LL, (line L2). However, after the exit, the inspector was informed by the licensee on December 21, 2006, that the elementary diagrams 208-0178-00012, Revision LL and 208-0178-00013, Revision Z, used by the team for this review, contained several errors in that they did not depict correctly the as built configuration and intended design control logic for Chiller 0P47 B001A. The licensee stated that the required electrical isolation was shown correctly on the wiring diagrams and was therefore correctly installed in the plant. The licensee stated that they planned to perform an as built review of the installed Chiller circuitry in the plant to confirm that it was wired correctly per the wiring diagrams, including the electrical switch isolation contacts, and not the way it was erroneously depicted on the elementary diagrams. Subsequently, on January 8, 2007, the licensee informed the NRC that they completed the field inspection and determined that the installed configuration was per the wiring drawings. The licensee initiated corrective action No. 3 to CR 06-11399 to revise the elementary diagrams noted above to depict the correct plant design as verified by field walkdown.

#### .5 Operational Implementation of Alternate Shutdown Capability

The guidelines established by BTP CMEB 9.5-1, Section C.5.c, "Alternative or Dedicated Shutdown Capability," Paragraph (2)(d), required that the process monitoring function should be capable of providing direct readings of the process variables necessary to perform and control the functions necessary to achieve reactivity control, reactor coolant makeup, and decay heat removal.

a. Inspection Scope

The team performed a review of the licensee's operating procedures, which augment the post safe shutdown procedures. The review focused on ensuring that all required functions for post-fire safe shutdown and the corresponding equipment necessary to perform those functions were included in the procedures. The review also included operator procedural training. Plant walkdowns were performed to verify that the plant configuration was consistent with that described in the safe shutdown and fire hazards analyses. The team also performed a walk through of selected portions of the "Shutdown from Outside Control Room," procedure (IOI-11) to ensure the implementation and human factors adequacy of the procedure and its attachments.

b. Findings

No findings of significance were identified.

.6 Communications

The guidelines established by BTP CMEB 9.5-1, Section C.5.g, "Lighting and Communication," Paragraph (4), required that a portable communications system be provided for use by the fire brigade and other operations personnel required to achieve safe plant shutdown. This system should not interfere with the communications capabilities of the plant security force. Fixed repeaters installed to permit use of portable radio communication units should be protected from exposure to fire damage.

a. Inspection Scope

The team reviewed the adequacy of the communication system to support plant personnel in the performance of alternative safe shutdown functions and fire brigade duties. The team also conducted a review to verify that sufficient channels were available to support safe shutdown implementation. The team verified that fixed repeaters for the portable radio communications units were protected from exposure to fire damage.

b. Findings

No findings of significance were identified.

.7 Emergency Lighting

The guidelines established by BTP CMEB 9.5-1, Section C.5.g, "Lighting and Communication," Paragraph (1), required that fixed self-contained lighting consisting of fluorescent or sealed-beam units with individual 8-hour minimum battery power supplies should be provided in areas that must be manned for safe shutdown and for access and egress routes to and from all fire areas.



a. Inspection Scope

The team observed the placement of 8-hour emergency lights throughout the selected fire areas to evaluate their adequacy for illuminating access and egress pathways and any equipment requiring local operation and/or instrumentation monitoring for post-fire SSD. As part of the walkdowns, the team focused on the existence of sufficient emergency lighting for access and egress to areas and for performing necessary equipment operations.

b. Findings

No findings of significance were identified.

.8 Cold Shutdown Repairs

The guidelines established by BTP CMEB 9.5-1, Section C.5.c, "Alternative or Dedicated Shutdown Capability," Paragraph (5), required that equipment and systems comprising the means to achieve and maintain cold shutdown conditions should not be damaged by fire; or the fire damage to such equipment and systems should be limited so that the systems can be made operable and cold shutdown achieved within 72 hours. Materials for such repairs shall be readily available onsite, and procedures shall be in effect to implement such repairs.

a. Inspection Scope

The team reviewed the licensee's procedures to determine whether repairs were required to achieve cold shutdown and to verify that dedicated repair procedures, equipment, and material to accomplish those repairs were available on-site. The team also evaluated whether cold shutdown could be achieved within the required time using the licensee's procedures and repair methods.

b. Findings

No findings of significance were identified.

.9 Fire Barriers and Fire Zone/Room Penetration Seals

The guidelines established by BTP CMEB 9.5-1, Section C.5.a, "Building Design," Paragraph (3), required that penetration seal designs be qualified by tests that are comparable to tests used to rate fire barriers.

a. Inspection Scope

The team reviewed the test reports for 3-hour rated barriers installed in the plant and performed visual inspections of selected barriers to ensure that the barrier installations were consistent with the tested configuration. In addition, the team reviewed the fire loading for selected areas to ensure that existing barriers would not be challenged by a potential fire.

b. Findings

No findings of significance were identified.

.10 Fire Protection Systems, Features and Equipment

The guidelines established by BTP CMEB 9.5-1 required that fire protection systems, features and equipment, specifically the passive fire protection features and fire detection system, were designed in accordance with Sections C.5.a and C.6.a.

a. Inspection Scope

The team reviewed the material condition, operations lineup, operational effectiveness, and design of fire detection systems, fire suppression systems, manual fire fighting equipment, fire brigade capability, and passive fire protection features. The team reviewed deviations, detector placement drawings, fire hose station drawings, carbon dioxide system pre-operational test reports, and fire hazard analysis reports to ensure that selected fire detection systems, sprinkler systems, portable fire extinguishers, and hose stations were installed in accordance with their design, and that their design was adequate given the current equipment layout and plant configuration.

b. Findings

Introduction: The team identified a finding of very low safety significance (Green) and a NCV of License Condition 2.C.(6) for failing to implement and maintain in effect all provisions of the approved fire protection program as described in the USAR. Specifically, the licensee failed to evaluate the floor drain capacity in the Division 1 and 2 cable spreading rooms as committed to in the (USAR).

Description: The team identified that the licensee failed to evaluate the water flow capacity of the floor drains in the cable spreading rooms. The licensee had committed, in Section 9A.5, D.1.(i) of the USAR, to design floor drains to remove the expected water flow from areas where fixed fire suppression systems were installed or where a fire hose may be used. The cable spreading rooms had an automatic sprinkler system installed that would spray water upon actuation as well as manual hose stations.

The team reviewed a document titled, "Analysis of the Effect of Inadvertent Actuation of Fire Suppression Systems on Safety-Related Equipment," that stated that anticipated transient without scram Panel R14-S012 in the Division 1 cable spreading room was not protected from water entry. The licensee took credit for the redundant division in the Division 2 cable spreading room not being affected. This document only considered an inadvertent actuation of the sprinkler system and not the resulting water flow from an actuation of multiple sprinklers during a fire or the flow of water from hoses used during manual fire fighting activities. As a result, the team determined that this document was not a sufficient evaluation of internal flooding resulting from fire fighting activities.

The team was concerned that the water drains would not be capable of removing all water in the cable spreading rooms, safety related equipment in those rooms may be

affected. Additionally, water may flow underneath the doors of the cable spreading rooms into other areas of the plant and affect other systems.

Analysis: The team determined that the failure to perform a design analysis to ensure that the floor drains in the cable spreading rooms could handle the removal of water resulting from fire fighting activities or from the activation of the fire suppression system, was a performance deficiency warranting a significance evaluation. The team concluded that the finding was more than minor, in accordance with Inspection Manual Chapter (IMC) 0612, "Power Reactor Inspection Reports, "Appendix B," Issue Screening," issued November 2, 2006, because the finding affected a cornerstone objective. The finding was associated with the Mitigating System cornerstone attribute of protection against external factors (i.e., flood hazard), and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events (i.e., flood hazard) to prevent undesirable consequences.

The team performed a Significance Determination Process (SDP) Phase 1 screening in accordance with IMC 0609, "Significance Determination Process," Appendix A, "Determining the Significance of Reactor Inspection Findings for At-Power Situations," issued November 22, 2005. The team used the "Seismic, Flooding, and Severe Weather Screening Criteria" worksheet step 3 and determined that the finding was of very low safety significance (Green). This was due to the fact that the finding did not involve the total loss of any safety function because the loss of safety related equipment in one division cable spreading room would not affect the safety related equipment in the other division cable spreading room.

Enforcement: License Condition 2.C.(6), "Fire Protection," required FENOC to implement and maintain in effect all provisions of the approved fire protection program as described in the Final Safety Analysis Report (FSAR) for the Perry Nuclear Power Plant and as approved in the Safety Evaluation Report dated May 1982, and Supplement Nos. 1 through 10. Section 9A.5, D.1.(i) of the USAR, dated December 2003, stated that floor drains were designed to remove the expected fire fighting water flow from areas where fixed fire suppression systems are installed or where fire hose may be used. It further stated that protection of equipment exposed to water damage is provided as required, unless analysis has shown that there is no unacceptable damage due to expected water accumulation.

Contrary to the above, the licensee did not perform an evaluation to verify that the floor drains in the division 1 and 2 cable spreading rooms would remove the expected water resulting from manual fire fighting activities or the fixed suppression systems located in those rooms. Because this violation was of very low safety significance and it was entered into the licensee's corrective action program, this violation is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy (NCV 05000440/2006006-02). The licensee entered the finding into their corrective action program as CR-11325 to evaluate the design of the floor drains in the cable spreading rooms.

.11 Compensatory Measures

a. Inspection Scope

The team conducted a review to verify that compensatory measures were in place for out-of-service, degraded or inoperable fire protection and post-fire safe-shutdown equipment, systems, or features (e.g., detection and suppression systems and equipment, passive fire barriers, pumps, valves or electrical devices providing SSD functions or capabilities). The team also conducted a review on the adequacy of short term compensatory measures to compensate for a degraded function or feature until appropriate corrective actions were taken.

b. Findings

No findings of significance were identified.

**4. OTHER ACTIVITIES (OA)**

4OA2 Identification and Resolution of Problems (71152)

a. Inspection Scope

The team reviewed the corrective action procedure and samples of corrective action documents to verify that the licensee was identifying issues related to the FPP at an appropriate threshold and entering them in the corrective action process. The team reviewed these issues to verify an appropriate threshold for identifying issues and to evaluate the effectiveness of corrective actions related to the FPP. In addition, corrective action documents written on issues identified during the inspection were reviewed to verify adequate problem identification and incorporation of the problem into the corrective action system. The specific corrective action documents that were sampled and reviewed by the inspectors are listed in the attachment to this report.

b. Findings

No findings of significance were identified.

The team noted that an assessment had not yet been performed at Perry in response to NRC Regulatory Issue Summary RIS 2004-03, "Risk-Informed Approach for Post-Fire Safe Shutdown Associated Circuit Inspections," Revision 1 and RIS 2005-30, "Clarification of Post-Fire Safe Shutdown Circuit Regulatory Requirements," Revision 0. The licensee's recently completed self-assessment, conducted in preparation for this inspection, also identified a similar concern. The licensee issued CR 04-06707, CR 06-8915 and CR 06-10745 to document, evaluate and address this issue. This issue has not been addressed since it was identified in CR 04-06707 dated December 21, 2004.

#### 4OA6 Meetings

##### .1 Exit Meeting

The team presented the inspection results to Mr. W. Pearce and other members of licensee management at the conclusion of the inspection on December 15, 2006. The team asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

ATTACHMENT: SUPPLEMENTAL INFORMATION

## SUPPLEMENTAL INFORMATION

### KEY POINTS OF CONTACT

#### Licensee

B. Pearce, Vice President  
D. Evans, Operations Manager  
M. Makar, Design Engineer  
C. Elberfeld, Compliance Supervisor  
M. Johnson, Project Manager, Team Lead  
J. Eck, Fire Marshall  
K. Russell, Compliance Engineer  
C. Miller, Fire Protection Supervisor  
H. Kelly, Manager EP  
R. Dicola, Maintenance Superintendent  
J. Lausberg, Regulatory Affairs Manager  
K. Howard, Design Engineering Manager  
R. Matthys, Oversight Supervisor

#### Nuclear Regulatory Commission

M. Franke, Senior Resident Inspector  
M. Wilk, Resident Inspector

### LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

#### Opened

440/2006006-001	NCV	Failure to provide full electrical isolation in the design of the post-fire safe shutdown control logic circuitry (Section 1R05.4)
440/2006006-002	NCV	Failure to evaluate the floor drain capacity in the division 1 and 2 cable spreading rooms (Section 1R05.10)

#### Closed

440/2006006-001	NCV	Failure to provide full electrical isolation in the design of the post-fire safe shutdown control logic circuitry (Section 1R05.4)
440/2006006-002	NCV	Failure to evaluate the floor drain capacity in the division 1 and 2 cable spreading rooms (Section 1R05.10)

#### Discussed

None.

## LIST OF DOCUMENTS REVIEWED

The following is a list of documents reviewed during the inspection. Inclusion on this list does not imply that the NRC inspectors reviewed the documents in their entirety but rather that selected sections of portions of the documents were evaluated as part of the overall inspection effort. Inclusion of a document on this list does not imply NRC acceptance of the document or any part of it, unless this is stated in the body of the inspection report.

### **CALCULATIONS**

<b><u>Number</u></b>	<b><u>Title or Description</u></b>	<b><u>Date or Revision</u></b>
JL-083	Flooding Analysis of Ccb, IB, and FHB - Floor Elevation 574'-10"	Revision 2
SSC-001	Perry Safe Shutdown Capability Report	Revision 4
P54-205	Fire Barrier Penetration Seal Qualification and Application Basis	July 24, 1997
P54-16	Hose Station Pressure Calculation	Revision 1

### **CORRECTIVE ACTION PROGRAM DOCUMENTS ISSUED DURING INSPECTION**

<b><u>Number</u></b>	<b><u>Title or Description</u></b>	<b><u>Date or Revision</u></b>
CR 06-10656	PTI-R71-P0004 on 2/2/06 Missing Acceptance Criteria Initials	November 29, 2006
CR 06-10729	List of Generic Letter 86-10 Evaluations	November 30, 2006
CR 06-10745	Response to RIS 2004-03, Spurious Cable Failures	November 30, 2006
CR 06-10761	Appendix R Lighting Not Properly Aimed	October 25, 2006
CR 06-10891	No Consolidated List of Code Deviations	December 4, 2006
CR 06-10932	Conduit Labeled 1C95A24C VICE 1C95A242C	November 28, 2006
CR 06-10941	Lost/Misplaced Fire Watch Verification Log	December 5, 2006
CR 06-11325	NRC Fire Protection Inspection - Floor Drain Capacity for Removal of Fire Suppression System Water	December 11, 2006

**CORRECTIVE ACTION PROGRAM DOCUMENTS ISSUED DURING INSPECTION**

<b><u>Number</u></b>	<b><u>Title or Description</u></b>	<b><u>Date or Revision</u></b>
CR 06-11382	NRC Fire Protection Inspection Identified Knowledge Deficiency During Plant Walkthrough	December 13, 2006
CR 06-11399	Lack of Circuit Isolation for Control Room Fire	December 13, 2006
CR 06-11424	NRC ID Fire Protection Insp - Enhance Prefire Plans for 620' Control Complex	December 14, 2006

**CORRECTIVE ACTION PROGRAM DOCUMENTS ISSUED PRIOR TO INSPECTION**

<b><u>Number</u></b>	<b><u>Title or Description</u></b>	<b><u>Date or Revision</u></b>
CR 02-01754	Pre-Fire Plans Have Not Been Maintained Up to Date as Required by PAP-1922	June 5, 2002
CR 05-05704	95003 NCV Not Completely Captured in CAP	July 29, 2005
CR 06-03505	Pipe Cracks and Resultant Flood 620'-6" Control Complex	August 3, 2006
CR 06-8854	Fire Protection Assessment: Communications Study	October 26, 2006
CR 04-01299	Non-restorable Heat Detector	March 15, 2004
CR 05-05933	Auxiliary Building Floor Plugs	August 1, 2005
CR 06-02677	Appx. R Use of Control Room Circuit Isolation	June 14, 2006
CR 04-06707	PII B 743 PYDM Appx R Program Identifies "Associated circuits" Issue	December 21, 2004
CA CR 04-06707	A Perry Specific Self-Assessment Will Be Performed Using NEI 04-06 "Guidance for Self-Assessment of Circuit Failure Issues"	February 4, 2005
CR 06-00238	Plant Wiring Incorrect in 1c61-P001, Remote Shutdown Panel	January 17, 2006
CR 06-01930	Additional Fire Protection Evaluations Needed for EDG Circuits	May 2, 2006
CA CR 06-01930	Performed Using NEI 04-06 "Guidance for Self-Assessment of Circuit Failure Issues"	May 25, 2006



**DRAWINGS**

<b><u>Number</u></b>	<b><u>Title or Description</u></b>	<b><u>Date or Revision</u></b>
220-0001-00004	Emergency lighting Self-Contained Lighting Packs	Revision B
208-0176-00004	Elementary Diagram; Emergency Service Water System - A Emergency Service Water Pump Discharge Valve F130A	Revision AA
208-0178-00012	Elementary Diagram; Control Complex Chilled Water - Chiller A Controls B001A	Revision LL
208-0178-00013	Elementary Diagram; Control Complex Chilled Water - Chiller A Controls B001A	Revision Z
208-0013-00021	Elementary Diagram; NSSSS RHR Suction Cooling Isolation MOV (Inboard) 1E12-F009	Revision Y
208-0013-00022	Elementary Diagram; NSSSS RHR Suction Cooling Isolation MOV (Outboard) 1E12-F008	Revision T
208-0013-00023	Elementary Diagram; NSSSS RHR Reactor Head Spray Isol VLV (Throttling) Outboard 1E12-F023	Revision U
208-0055-00017	Elementary Diagram; Residual Heat Removal System RHR Pump C002A	Revision W
208-0173-00001	Elementary Diagram; Emergency Closed Cooling System Pump A - C001A	Revision R
208-0176-00001	Elementary Diagram; Emergency Service Water System; A Emergency Service Water Pump C001A	Revision AA
208-0039-00001	Elementary Diagram; Remote Shutdown System Power Distribution	Revision AA
209-0208-00032	Interconnection Wiring Diagram 480V MCC EF1A07 Compartments YD, YG and YH	Revision Z
206-0053-00000	Electrical One Line Diagram Class 1E 120Vac Panels EB-1-A1, EK-1-A1	Revision HH

**DRAWINGS**

<b><u>Number</u></b>	<b><u>Title or Description</u></b>	<b><u>Date or Revision</u></b>
302-0641-00000	Piping System Diagram; Residual Heat Removal System	Revision YY
302-0642-00000	Piping System Diagram; Residual Heat Removal System	Revision CC
302-0643-00000	Piping System Diagram; Residual Heat Removal System	Revision UU
302-0621-00000	Piping System Diagram; Emergency Closed Cooling System	Revision SS
302-0622-00000	Piping System Diagram; Emergency Closed Cooling System	Revision M
912-0623-00000	HVAC System Diagram; Emergency Closed Cooling Pump Area Cooling System	Revision K
913-0001-00000	HVAC System Diagram; Control complex Chilled Water	Revision DD
302-0791-00000	Piping System Diagram; Emergency Service Water System	Revision SS
302-0792-00000	Piping System Diagram; Emergency Service Water System	Revision LL
D913-002	HVAC System Diagram; Control complex Chilled Water	Revision N

**IMPAIRMENT/REMOVAL PERMITS**

<b><u>Number</u></b>	<b><u>Title or Description</u></b>	<b><u>Date or Revision</u></b>
FPI-A-C01	Fire Protection Program Control Processes (Burn Permits, Transient Combustibles, Impairments, and Fire Watches)	Revision 5
	Fire Protection Impairment List	November 27, 2006
	Fire Impairment/Barrier Removal Permits for 2006	December 12, 2006

**PROCEDURES**

<u>Number</u>	<u>Title or Description</u>	<u>Date or Revision</u>
IOI-11	Shutdown from Outside Control Room	Revision 15
ONI-C61	Evacuation of the Control Room	Revision 4
OAI-0201	Operations General Instructions and Operating Practices	Revision 10

**MISCELLANEOUS**

<u>Number</u>	<u>Title or Description</u>	<u>Date or Revision</u>
03-0111	Radio Communication	March 20, 2003
05-05441	Appendix R Evaluation: Safe Shutdown Capabilities Report	Revision 4
8282-20	Pre-Fire Plan for Emergency Closed Cooling B Fire Zone OCC-1A	September 3, 2002
8282-21	Pre-Fire Plan for Emergency Closed Cooling A	September 3, 2002
8282-22	Pre-Fire Plan for Control Complex Chilled Water System	April 27, 2005
8282-29	Pre-Fire Plan for Remote Shutdown Panel Room	September 3, 2002
8282-44	Pre-Fire Plan for Division 1 Cable Spreading Area	September 3, 2002
NFPA 92	Suggested Good Practice for Waterproofing of Floors, Drainage, installation of Scuppers	1937 (1960 reprint)
NFPA 12	Standard on Carbon Dioxide Extinguishing Systems	1972
NFPA 72D	Standard for the Installation, Maintenance and Use of Proprietary Protective Signaling Systems	1972
NFPA 72E	Standard on Automatic Fire Detectors	1974
NPF-58	PNPP Facility Operating License	Amendment No. 108

**MISCELLANEOUS**

<b><u>Number</u></b>	<b><u>Title or Description</u></b>	<b><u>Date or Revision</u></b>
NRC Generic Letter 81-12	Fire Protection Rule (45 FR 76602, November 19, 1980)	February 20, 1981
USAR	Perry Updated Safety Analysis Report	Revision 12
ECR 02-0213A	Separation of the ECCW "A" Loop From the NCCW System	February 14, 2003
	Perry Nuclear Power Plant, Unit No. 1 Facility Operating License	Amendment No. 108
SSER 3	Supplemental Safety Evaluation Report Memorandum: Update of the Resolution of Generic Letter 92-08, Thermo-Lag 330-1 Fire Barriers	Juanuary 12, 1998
	Fire Watch Verification Logs	November 13-26, 2006
	SAS Communications Log for Fire Watches	November 13-26, 2006
SOI-C61	Remote Shutdown System	Revision 3
PT1-P54-P0056	Penetration Seal Visual Inspection	Revision 3
GMI-077	Installation, Removal, and Repair of Foam Penetration Seals	March 13, 2005
LER 2006-003	Incorrect Wiring in Division 1 EDG Results in A Fire Protection Program Violation	Revision 00
PY-P54	Fire Protection System Health Report	November 28, 2006
915-PYPT-2006	PNPP Fire Protection Program Snapshot Assessment	November 12, 2006
743 PYDM 2005	Program Review Checklist for the Appx R Program Self-Assessment	April 14, 2005
865-PYPE-2006	PNPP Snapshot Self-Assessment Fire Protection	April 7, 2006

**SURVEILLANCES/TESTS**

<b><u>Number</u></b>	<b><u>Title or Description</u></b>	<b><u>Date or Revision</u></b>
PY-PTI-P54P0001	Fire Hose Monthly Inspection	October 30, 2006
PY-PTI-P54P0006	Portable Fire Extinguishers Monthly Inspection	October 30, 2006
SVI-C61-T1201	Remote Shutdown Panel 1C61-P001 Control Operability Test RHR A, ESW A, and ECC A	Revision 4
	Self-Contained Emergency Lighting Units Discharge Test (Part 3)	June 20, 2006
GEI-0017	Maintenance and Functional Testing of Self-Contained Emergency Lighting Units	Revision 4
	Bisco Test Report 748-112	August 23, 1983
	Bisco Report 748-79	May 31, 1983
	Bisco Report 748-64	January 15, 1982
748-57	Cable and Pipe Penetration Fire Stop System	November 17, 1981

**VENDOR DOCUMENTS**

<b><u>Number</u></b>	<b><u>Title or Description</u></b>	<b><u>Date or Revision</u></b>
P54-29	Analysis of the Effect of Inadvertent Actuation of Fire Suppression Systems on Safety-Related Equipment	September 24, 1985

## LIST OF ACRONYMS USED

AC or ac	Alternating Current
ADAMS	Agency-Wide Document Access and Management System
BTP	Branch Technical Position
BWR	Boiling Water Reactor
CFR	Code of Federal Regulations
CMEB	Chemical Engineering Branch
CO <sub>2</sub>	Carbon Dioxide
CR	Condition Report
DRS	Division of Reactor Safety
EDG	Emergency Diesel Generator
EOC	Extent of Condition
ESW	Essential Service Water
FPI	Fire Protection Instruction
FPP	Fire Protection Program
FENOC	FirstEnergy Nuclear Operating Company
FHA	Fire Hazard Analysis
FSAR	Final Safety Analysis Report
HS	Hand Switch
IMC	Inspection Manual Chapter
IOI	Integrated Operating Instruction
IPEEE	Individual Plant Examination of External Events
IR	Inspection Report
k	kilo
MCR	Main Control Room
MOV	Motor Operated Valve
NCV	Non Cited Violation
NFPA	National Fire Protection Association
NOP	Nuclear Operating Administrative Procedure
NRC	Nuclear Regulatory Commission
NUREG	NRC Technical Report Designation
ONI	Off-Normal Instruction
P&ID	Piping and Instrumentation Drawing
PARS	Publically Available Records System
PNPP	Perry Nuclear Power Plant
RSP	Remote Shutdown Panel
RSS	Remote Shutdown System
SDP	Significance Determination Process
SSA	Safe Shutdown Analysis
SSCs	Structures, Systems, and Components
SSCR	Safe Shutdown Capability Report
USAR	Updated Safety Analysis Report
V or v	Volt