August 29, 2005

Mr. William O'Connor, Jr.
Vice President
Nuclear Generation
Detroit Edison Company
6400 North Dixie Highway
Newport, MI 48166

SUBJECT: FERMI POWER PLANT, UNIT 2
TRIENNIAL FIRE PROTECTION BASELINE INSPECTION
NRC INSPECTION REPORT 05000341/2005006(DRS)

Dear Mr. O'Connor:

On July 15, 2005, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Fermi Power Plant, Unit 2. The enclosed report documents the inspection findings which were discussed on July 15, 2005, 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 inspectors reviewed selected procedures and records, observed activities, and interviewed personnel. Specifically, this inspection focused on the triennial fire protection baseline inspection.

Based on the results of this inspection, the NRC identified four findings of very low safety significance (Green) involving violations of NRC requirements. However, because of their very low safety significance and because they were entered into your corrective action program, the NRC is treating these findings as Non-Cited Violations consistent with Section VI.A of the NRC Enforcement Policy.

If you contest the subject or severity of a Non-Cited Violation, 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 Fermi 2 Nuclear Power Plant.

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Sincerely,

/RA by Ann Marie Stone Acting for/

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

Docket No. 50-341
License No. NPF-43

Enclosure: Inspection Report 05000341/2005006(DRS)
w/Attachment: Supplemental Information

cc w/encl: N. Peterson, Manager, Nuclear Licensing
D. Pettinari, Legal Department
Compliance Supervisor
G. White, Michigan Public Service Commission
L. Brandon, Michigan Department of Environmental Quality -
Waste and Hazardous Materials Division
Monroe County, Emergency Management Division
Planning Manager, Emergency Management Division
MI Department of State Police

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U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No:	50-341
License No:	DPR-43
Report No:	05000341/2005006 (DRS)
Licensee:	Detroit Edison Company
Facility:	Fermi Power Plant, Unit 2
Location:	6400 N. Dixie Hwy. Newport, MI 48166
Dates:	June 27 through July 1, and July 11 through July 15, 2005
Inspectors:	Z. Falevits, Senior Reactor Inspector, Lead A. Dahbur, Reactor Inspector A. Klett, Reactor Inspector
Approved by:	J. Lara, Chief Engineering Branch 3 Division of Reactor Safety

Enclosure

SUMMARY OF FINDINGS

IR 05000341/2005006(DRS); 06/27/2005 - 07/15/2005; Fermi Power Plant, Unit 2; Triennial Fire Protection Baseline Inspection.

This report covers an announced triennial fire protection baseline inspection. The inspection was conducted by Region III inspectors. Four 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 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 Non-Cited Violation of the Operating License for the failure to ensure that one redundant train of systems necessary to achieve and maintain hot shutdown conditions was free of fire damage. The licensee's preferred method for safe shutdown for a fire in Fire Zone 06RBN was from the main control room using Division II systems (including the High Pressure Coolant Injection [HPCI] system) since Division I equipment could have been damaged by a postulated fire. However, valve E4150F002, which allowed steam to the HPCI pump turbine when opened, had Division I control cables. Fire-induced cable failure to these cables could have caused this valve to spuriously close thus rendering the preferred method of safe shutdown unavailable. The licensee implemented appropriate plant and procedure changes to ensure that one redundant train of system necessary to achieve and maintain hot shutdown conditions was free of fire damage.

  The finding was greater than minor because it affected the mitigating systems cornerstone attribute of protection against external factors (fire) and it impacted the objective of the mitigating systems cornerstone. Spurious closure of valve E4150F002 due to fire-induced faults could have rendered the high pressure injection train unavailable to provide cooling water to achieve safe shutdown. The finding was of very low safety significance because for the specific fire scenario considered, other feasible methods of establishing hot shutdown existed. (Section 1R05.2)

- Green. The team identified a Non-Cited Violation of the Operating License for a failure to provide adequate electrical coordination of protective devices to ensure that postulated fire-induced electrical faults would not result in the loss of post-fire alternative safe shutdown equipment. Specifically, the team identified a lack of adequate electrical coordination between the 130 Vdc breaker control power supply fuse (upstream) and the breaker trip control circuit fuse (downstream) of the 4.16 kV Standby Feedwater (SBFW) System A Pump. The same adverse condition was also identified in the breaker control logic of the SBFW B pump. The SBFW A and B pumps were part of the post-fire alternative shutdown system that would have been used during a postulated

fire in the control room and other areas to maintain reactor core cooling and prevent uncovering of the core. This finding was applicable to Fire Zones 03AB and 07AB. The licensee's corrective action was to declare 10 4.16kV circuit breakers inoperable, issue an 8-hour notification to the NRC under 10 CFR 50.72(b)(3) for an unanalyzed condition, perform extent of condition reviews, and to restore adequate electrical coordination by replacing fuses with fuses of an appropriate size.

The finding was more than minor because it was associated with the protection against external factors attribute of the mitigating system cornerstone and degraded the reactor safety mitigating systems cornerstone objective. The finding adversely impacted the reliability and capability of equipment required to achieve and maintain a safe shutdown condition following a postulated fire. This finding was determined to be of very low safety significance (Green) based on the scenario involved and a Phase 3 SDP evaluation. (Section 1R05.3)

- Green. The team identified a Non-Cited Violation of the Operating License for the failure to have adequate fire detection installed in the Division I Switchgear Room (Fire Zone 04AB2) in accordance with the applicable National Fire Protection Association (NFPA) codes. Specifically, the licensee failed to install detectors in three beam pockets and in the mezzanine area. The licensee also failed to have compensatory measures established for the lack of adequate detection in the area. The team determined that the failure to have adequate detection and compensatory measures also affected the cross-cutting area of Problem Identification and Resolution because the lack of adequate detection in this fire zone and in other plant fire areas was previously identified. The licensee's corrective actions were to install adequate detection in the fire zone and reinstate the fire watch patrols.

  The finding was greater than minor because it affected the mitigating systems cornerstone attribute of protection against external factors (fire) and it impacted the objective of the mitigating systems cornerstone. As a result of not having an adequate number of detectors, detection of a fire at several locations in Division I Switchgear Room could have been delayed. This finding was determined to be of very low safety significance (Green) based on the availability of safe shutdown equipment and low number of ignition sources. (Section 1R05.10)

- Green. The team identified a Non-Cited Violation of the Operating License for the failure to implement adequate corrective actions in a timely manner. Specifically, the licensee failed to translate the issues identified in their 10 CFR Part 50, Appendix R re-analysis into procedures and operator training. The licensee also failed to take timely and adequate corrective actions for the lack of fuse coordination and cable protection related to above findings. The team determined that the failure to implement adequate corrective actions in a timely manner also affected the cross-cutting area of Problem Identification and Resolution because the Appendix R analysis issues and the lack of fuse coordination and cable protection were previously identified. The licensee's corrective action was to assess the aggregate impact of the issues and to revise operating procedures and train the operators on the new FP requirements in the revised calculation.

The finding was greater than minor because it affected the mitigating systems cornerstone attributes of Procedure Quality and Human Performance and it impacted the objective of the mitigating systems cornerstone. As a result of not implementing adequate corrective actions in a timely manner, the procedures in use at the time of the inspection would not have alerted operators to the plant conditions that could have existed due to fire-induced cable damage, operators were not trained to perform the manual actions described in the design calculation, and the lack of fuse coordination and cable protection could have rendered safe shutdown equipment inoperable. This finding was determined to be of very low safety significance based on management review. (Section 4OA2)

B. Licensee-Identified Violations

A violation of very low safety significance, which was identified by the licensee, has been reviewed by the team. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. The violation is described in Section 4OA7 of this report.

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 Fermi Power Plant's Fire Protection Program (FPP) for selected risk-significant fire areas. Emphasis was placed on determining 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 NRC's regulatory oversight process using a risk-informed approach for selecting the fire areas and attributes to be inspected. The inspectors used the Fermi 2 Individual Plant Examination External Events (IPEEE) and input from the RIII Senior Risk Analyst (SRA), to choose several risk-significant areas for detailed inspection and review. The fire zones chosen for review during this inspection were:

Fire Zones	Description
03AB	Auxiliary Building Relay Room
04AB2	Auxiliary Building Division I Switchgear
06RB	Reactor Building 2nd Floor

For each of these fire zones, the inspection focused on the fire protection features, the systems and equipment necessary to achieve and maintain safe shutdown conditions, determination of license commitments, and changes to the FPP.

.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) is 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.

General Description of Fermi's Safe Shutdown Paths and Capability

The licensee's safe shutdown methodology relied upon the identification of those components necessary and available to achieve and maintain hot shutdown conditions following a fire condition. Once identified for all plant areas, the licensee selected the components necessary to achieve and maintain the reactor in a hot shutdown condition which could be operated from the main control room or which could be operated locally and were not within the fire affected area. The methodology further identified those components necessary to achieve and maintain cold shutdown assuming limited repairs.

The licensee also identified an alternate or dedicated shutdown capability for fire conditions that affected the main control room and other areas requiring alternative or dedicated shutdown capability. For each of these areas, the licensee relied upon the operators' use of the dedicated shutdown panels and local operator actions to ensure that the reactor could be brought to and maintained in a hot shutdown status.

To direct the plant staff's response to fire conditions throughout the plant, the licensee relied upon the operators' use of the abnormal operating procedure (AOP) 20.000.22, "Plant Fires," in conjunction with other non-fire specific plant procedures and fire pre-plans. Operators used AOP 20.000.18, "Control of the Plant from the Dedicated Shutdown Panel," to direct the response to fires in zones that were designated as alternative shutdown zones. During the inspection, the licensee was in the process of reconstituting their Appendix R program, specifically the calculation DC-4921, "Appendix R Calculations." As a result of this effort, the licensee was in the process of developing changes to the fire response procedures during the inspection.

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 zone 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.

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

The team reviewed the Updated Final Safety Analysis Report (UFSAR) 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.

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 Safe Shutdown Analysis (SSA) to determine if 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 make the necessary repairs to reach cold shutdown within 72 hours. The team also reviewed procedures to determine whether or not 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 determine if 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 license 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 determine if the fire barrier installations met license commitments.

b. Findings

Introduction: The team identified a finding involving a Non-Cited Violation (NCV) of the Fermi 2 Facility Operating License having very low safety significance (Green) for failing to ensure that one redundant train of systems necessary to achieve and maintain hot shutdown conditions was free of fire damage.

Description: For a postulated fire in Fire Zone 06RBN (north side of the second floor of the reactor building), the licensee's safe shutdown strategy, as described in calculation DC-4921, "Appendix R Calculations," Revision E, was to shutdown using Division II equipment since that equipment was located on the south side of the room, and fire propagation from the north side to the south side would have been prevented by the presence of full detection, partial suppression, fire stops and fire wrap. The safe shutdown strategy was to use the High Pressure Coolant Injection (HPCI) system to inject water into the core. The calculation stated that a fire in Fire Zone 06RBN could have caused the loss of high pressure injection capability via the Reactor Core Isolation Cooling (RCIC) and Standby Feedwater (SBFW) systems. The calculation also stated

that HPCI would have been available with manual actions. The preferred method for safe shutdown for a fire in this fire zone was from the main control room using Division II systems and equipment since Division I equipment could have been damaged by a postulated fire. HPCI was considered a Division II system; however, the HPCI pump turbine steam supply inboard isolation valve, E4150F002, had Division I control cables. Fire-induced cable damage to these control cables could cause valve E4150F002 to spuriously close. A fire-induced failure (hot short) to one of the control cable conductors, No. 8 of 209782A-1C due to a fire in zone 06RBN, could bypass the torque and limit switches of the motor-operated valve and cause valve closure and motor burnout. The valve could not have been opened locally since it was located inside primary containment, and control cables from the main control room could also have been damaged by a postulated fire.

The licensee's calculation indicated that a preemptive manual action would have been taken after receipt of a confirmed fire alarm. This manual action was to prevent valve E4150F002 from closing by disconnecting power to the valve before the hot short occurred. Specifically, alternate current (AC) power would be turned off at Bus 72C which was located in the Division I Switchgear Room (Fire Zone 04AB2). The licensee assumed that a hot short would not have occurred within a specified time frame after exposure to a fire. The team questioned the feasability and the basis of this manual action.

The calculation also stated that if HPCI and RCIC were lost, Reactor Pressure Vessel (RPV) makeup could have been supplied by blowing down the RPV with Division II Safety Relief Valves (SRVs) and then initiating low pressure injection using Division II Residual Heat Removal (RHR) or Core Spray (CS) systems. However, only one Division II SRV, B2104F013G, would have been available for depressurization of the RPV during a Loss of Offsite Power (LOOP) unless Nitrogen bottles were connected to the Division II Drywell Pneumatic line. Since one SRV would not have been sufficient for depressurization, the calculation stated that HPCI could have been available with preemptive manual actions as described in the previous paragraph. The licensee also stated that Nitrogen bottles could have been staged for the use of additional Division II SRVs as an alternative to using the preemptive manual action, but the team determined that this action was a repair and therefore not in accordance with regulatory requirements. However, the team determined that this action was feasible because operators had procedures and training to perform this action. Operators also had procedures and training to perform manual actions that could restore SBFW as another means of high pressure injection.

The team determined that the feasability of the preemptive manual action to restore HPCI by disconnecting power to the valve before the hot short occurred was not credible and could not be assured under all postulated scenarios, and the other means of establishing hot shutdown conditions were subject to damage from a postulated fire. Therefore, the team concluded that one redundant train of systems necessary to achieve and maintain hot shutdown conditions was not free of fire damage in the event of a fire in this fire zone.

Analysis: The team determined that the failure to ensure that one redundant train of systems necessary to achieve and maintain hot shutdown conditions was free of fire damage resulted in a performance deficiency warranting a significance evaluation. The finding was considered more 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 affected the mitigating systems objective of ensuring the availability of systems that respond to initiating events to prevent undesirable consequences. Spurious closure of HPCI valve E4150F002 due to fire-induced faults in Fire Zone 06RBN could have rendered the high pressure injection train unavailable to provide cooling water to achieve safe shutdown.

In accordance with IMC 0609, Appendix A, the team performed an SDP Phase 1 screening and determined that the finding degraded the Fire Protection portion of the Mitigation Systems Cornerstone. As such, screening under IMC 0609, Appendix F, "Fire Protection Significance Determination Process," dated May 28, 2005, was required. Based on Table 1.1-1 in Appendix F, the finding was determined to affect Post-fire Safe Shutdown and was assigned a Moderate Degradation Rating in accordance with Table A2.3 in Attachment 2 of Appendix F because the feasability to perform the specified manual actions was not apparent. Considering a duration factor (DF) of greater than 30 days (DF=1.0) and a generic fire area fire frequency for the reactor building of F_{area} = 9E-2, the team determined that a Phase 2 evaluation was necessary to determine the significance of this issue. The inspectors determined that a credible fire in the Division I Motor Control Center (MCC) would have affected the E4150F002 valve control cables but would not have affected equipment on the south side of this zone (i.e., Division II SRVs) because of the presence of full detection, partial suppression, separation, fire stops and fire wrap. Therefore, the fire area frequency found in the Phase 1 analysis was modified to reflect a credible fire scenario in an electrical cabinet (480V Division I MCC with 10 vertical compartments) that resulted in a spurious closure of the E4150F002 valve. The inspectors determined based on information from the licensee that offsite power would have remained available for this specific fire scenario; therefore, safe shutdown could have been achieved from the main control room using depressurization and low pressure injection. The Phase 2 analysis also considered that the SBFW system could have been available with manual actions. The team determined that based on the availability of other systems to achieve safe shutdown, the core damage frequency value was less than 1E-6; therefore, this finding was considered to be of very low safety significance (Green).

Enforcement: Section 2.C.(9) of the Fermi 2 Facility Operating License stated, in part, that the licensee shall implement and maintain in effect all provisions of the approved FPP as described in its UFSAR. Section 9A of the UFSAR outlined the licensee commitments for fire protection. Section 9A.5 of the UFSAR provided a point-by-point comparison with Appendix A to NRC BTP APCSB 9.5-1, dated August 23, 1976. Position d.1(a)(2) in Section 9A.5 of the UFSAR identified the NRC position regarding separation of redundant safety-related systems from each other so that both are not subject to damage from a single fire hazard. The licensee response was that locations where redundant systems are exposed to a single fire hazard are identified in the fire hazard analysis (FHA), and adequate fire protection is provided for these areas.

Contrary to the above, cables for valve E4150F002 were not adequately protected. Consequently, a fire in Fire Zone 06RBN could have rendered Division II HPCI

unavailable. On July 14, 2005, the licensee entered this issue into its corrective action program as Condition Assessment Resolution Document (CARD) 05-24176. The licensee implemented appropriate plant and procedure changes to ensure that one redundant train of system necessary to achieve and maintain hot shutdown conditions was free of fire damage. Because this violation was of very low safety significance (Green) and was entered into the licensee's corrective action program, this violation is being treated as an NCV consistent with Section VI.A.1 of the NRC Enforcement Policy (NCV 05000341/2005006-01).

.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

On a sample basis, the team examined the adequacy of separation provided for the power, control and instrumentation cabling of balance-of-plant (BOP) and redundant trains of selected components in systems important for post-fire safe shutdown. 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 selected for this inspection could prevent the proper operation of both safe shutdown trains.

The team evaluated selected portions of licensee's fuse/breaker coordination analysis for ground faults on the 4.16 kV and 480 Vac systems and the vital low-voltage AC and DC power sources to determine whether fire-induced faults on distribution system cables or buses could degrade post-fire safe shutdown capability. Specifically, the team determined if selective coordination existed between branch circuit protective devices and the upstream distribution panel fuse/breaker feeders to ensure that in the event of a fire-induced short circuit in a dedicated area (i.e., control room, relay room, etc.), the fault would be isolated to the dedicated area and away from the alternative shutdown control station/panel before the upstream feeder fuse/breaker tripped. In addition, a sample of control circuits were reviewed on schematic and wiring diagrams to determine

if they incorporated isolation/transfer switches as necessary to ensure that the dedicated shutdown system was independent of dedicated fire areas.

b. Findings

Introduction: The team identified a finding involving an NCV of the Fermi 2 Facility Operating License having very low safety significance (Green) for failing to provide adequate electrical coordination of protective devices to ensure that postulated fire-induced electrical faults would not result in the loss of post-fire alternative safe shutdown equipment.

Description: The team identified a lack of adequate electrical coordination between the 130 Vdc breaker control power supply fuse (upstream) and the breaker trip control circuit fuse (downstream) for the 4.16 kV SBFW A pump. The same adverse condition was also identified in the breaker control circuitry of the SBFW B pump. The SBFW A and B pumps were part of the post-fire alternative shutdown system and would have been used during a severe fire in the control room and other dedicated areas to maintain reactor core cooling and prevent uncovering of the core. The team determined that the 130 Vdc breaker control power 60 Amperes (amp) circuit fuse and the breaker trip circuitry 50 amp load fuse did not meet the coordination criteria established in Fermi's design documents and the fuse manufacturer's specifications.

The team requested the licensee's fuse/breaker coordination study to determine if the electrical system used for alternate shutdown had been verified for proper fuse/breaker coordination. The team was informed that there had not been a specific study performed to verify the fuse coordination for the SBFW system. To determine if proper electrical protective device coordination existed, the team reviewed selected coordination curves, calculations, and electrical drawings. During review of electrical schematic diagram 6I721-2311-35, "Standby Feedwater System Pump 'A' N2103C001," Revision G, the team identified a lack of adequate coordination between the upstream 130 Vdc supply circuit fuse and the breaker trip circuit fuse in the control logic for SBFW A pump. The licensee's specified minimum fuse coordination ratio per Fermi Calculation DC-5272, Volume 1, was 2 to 1 between an upstream control fuse (line fuse) and its immediate downstream control fuse (load fuse). The fuse manufacturer's (Bussmann) coordination guidelines also required a selectivity ratio of 2 to 1 or greater when using 2 FRN-type fuses in series. The team determined that the size of the upstream fuse in the breaker's control circuit at the 130 Vdc distribution panel 2PS3-5, position 3, was a FRN 60 amp fuse whereas the size of the fuse in the positive leg of the breaker trip control circuit in the 4.16 kV switchgear was a 250V Bussmann Type FRN 50 amp fuse. The coordination ratio between the trip circuit fuse and the supply fuse was 1.2 to 1 (60 amps to 50 amps), which was less than the required ratio value of 2 to 1. The team determined that because the fuse coordination ratio was less than the required value, a mis-coordination condition existed between the 130 Vdc supply circuit and the breaker trip circuit in the SBFW A 4.16 kV switchgear (R1400S001V, Position V2).

Fermi's 130 Vdc breaker close/trip control logic circuitry for the 4.16 kV breakers were designed using two parallel separately fused control circuits. The licensee stated that this was done to isolate the breakers' tripping functions from other breakers' closing

functions and miscellaneous control circuits and to maximize trip circuit reliability per Design Calculation DC-5257, Volume 1. The purpose of having fuses in the breaker control circuits was to provide for short circuit protection for all fault conditions, proper selective coordination with upstream fuses, and maximum reliability of the breaker control circuits. Proper coordination of fuses was required where fuses were used in series. If the fuses were properly coordinated, a fault on any part of the breaker trip control circuit would have caused the downstream fuse nearest the fault to blow and isolate the faulted section from the upstream breaker control power supply circuitry. If the fuses were not properly coordinated, damage could have occurred to the breaker control power supply cable conductors prior to the downstream fuse clearing the fault. This would have caused other loads downstream of the control power supply circuitry to have been unavailable. The team determined that the failure to have adequate fuse coordination could have compromised the reliability of the breakers' closing and tripping functions and thus the availability of the alternate safe shutdown system.

The team determined that in the event of a fire in an alternative shutdown area (i.e., control room, relay room, cable spreading room) the operators were directed to start the SBFW pumps from the dedicated shutdown panel H21-P623, which provided alternative shutdown capability and was designed to be independent from the areas noted above. However, due to the lack of adequate fuse coordination in the SBFW pump control circuits, both the load 50 amp and the supply 60 amp FRN fuses would have blown in the event of a fire-induced short in one of the alternative areas. As a result, 130 Vdc power would not have been available for either of the SBFW A and B pumps' breaker control circuits until the licensee realized that the 60 amp fuse had blown. Consequently, placing the alternate transfer switches in the alternate position to isolate electrical circuit faults and provide alternate power from an independent source would not have functioned as designed to allow operation of the SBFW pumps from the H21-P623 panel.

On June 30, 2005, the licensee promptly initiated CARD 05-23959, "Potential Inadequate Coordination in Equipment Used in the Dedicated Shutdown Scenario," and declared 10 circuit breakers in Buses 64C, 64V, and 65W inoperable. This deficiency resulted in an 8-hour notification to the NRC under 10 CFR 50.72(b)(3) for an unanalyzed condition. The licensee's extent of condition (EOC) reviews identified 5 additional loads whereby a 60 amp source fuse was feeding a series 50 amp load fuse. The EOC reviews also identified that the fusing for the load shed strings associated with 480V Buses 72B, 72C, 72E, and 72F was protected by FRN-R-50 fuses as per Design Specification 3071-128-EZ-01 and Calculation DC-5272, Volume 1. However, the supply fuses from the associated 130 Vdc distribution panel were FRN-R-60 fuses. CARD 05-23972 was issued to document this issue. The licensee determined that the following switchgear units required fuse replacement: Bus 64A, units A4 through A14; Bus 64B, units B4 through B12; Bus 64C, units C5 through C11; Bus 65D, units D5 through D13; Bus 65E, units E4 through E12; Bus 65F, units F5 through F11; Bus 64V, units V1 through V3; and Bus 65W, units W4 and W5.

Following the NRC's identification of the lack of coordination issue, the licensee determined that breaker control trip circuits normally required less than 10 amps of continuous current to operate, and the energizing currents for the breaker trip coils were

less than 30 amps. Therefore, the licensee implemented Engineering Design Package (EDP) 33675 and Work Request (WR) 000Z052053 on July 2, 2005, to replace 50 amp FRN fuses with 35 amp type LPN fuses in six 4.16 kV cubicles (loads) associated with the operation and protection of the alternative shutdown system.

Analysis: The team determined that the failure to provide adequate electrical coordination of protective devices to ensure that postulated fire-induced electrical faults would not result in the loss of post-fire alternative safe shutdown equipment was a performance deficiency warranting a significance evaluation. The finding was considered more 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 affected the mitigating systems objective of ensuring the availability of systems that respond to initiating events to prevent undesirable consequences. The finding adversely impacted the reliability and capability of equipment required to achieve and maintain a safe shutdown condition following a postulated fire because the lack of adequate electrical coordination could have resulted in the loss of the SBFW pumps.

IMC 0609 Appendix F does not currently include explicit treatment of fires leading to main control room abandonment, either due to fire in the main control room or due to fires in other fire areas. Therefore, the RIII SRA performed a Phase 3 SDP analysis using data and information from the draft NUREG/CR-6850, "EPRI/NRC-RES Fire PRA Methodology for Nuclear Power Facilities." The overall control room fire frequency was determined to be 4.8E-3. The inspection finding involved a condition that the SBFW pumps were not properly electrically coordinated such that they could be non-functional during a control room fire scenario which required evacuation. For this to occur the control room fire would need to involve one specific control room cabinet and also be severe enough to result in evacuation. The control room fire frequency was adjusted by considering that a fire in only one of the 13 main control board cabinets would result in this scenario. The SRA also assumed that a fire lasting 15 minutes would be severe enough to require evacuation. The non-suppression probability for a control room fire lasting 15 minutes was estimated to be 7E-3. The result for an unsuppressed main control room fire that also resulted in the SBFW pumps failing due to electrical coordination issues was estimated at 1E-6. The SRA determined that this result was bounding and additional analysis would remove conservative assumptions. Therefore, the finding was determined to be best characterized as having very low safety significance (Green).

Enforcement: Fermi 2 Facility Operating License Condition 2.C.(9) requires, in part, that the licensee shall implement and maintain in effect all provisions of the approved FPP as described in it's UFSAR through Amendment 60 and as approved in the Safety Evaluation Report (SER) through Supplement 5. Section 9A.3 of the UFSAR for the facility stated, in part, that an alternative shutdown system had been designed and installed to meet the technical requirements of 10 CFR Part 50, Appendix R, Sections III.G.3 and L. Appendix R of 10 CFR Part 50, Section III.L.3 stated, in part, that the alternative shutdown capability shall be independent of the specific fire area(s).

Contrary to the above, on June 30, 2005, the team identified that the alternate shutdown capability was not independent of the specific fire area(s). Specifically, a miscoordination of breaker control circuit protective fuses existed in the breaker control logic of post-fire Alternate Shutdown SBFW A pump and SBFW B pump. 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 05000341/2005006-02).

.4 Alternative Safe 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. During the post-fire safe shutdown, the reactor coolant process variables must remain within those predicted for a loss of normal AC power, and the fission product boundary integrity must not be affected (i.e., no fuel clad damage, rupture of any primary coolant boundary, or rupture of the containment boundary).

a. Inspection Scope

The team reviewed the licensee's systems required to achieve alternative safe shutdown to determine if the licensee had properly identified the components and systems necessary to achieve and maintain safe shutdown conditions. The team also 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.

b. Findings

No findings of significance were identified.

.5 Operational Implementation of Alternative 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 walkdown of a sample of the actions defined in Procedure AOP 20.000.18, “Control of the Plant from the Dedicated Shutdown Panel,” which was the procedure for performing a plant alternative shutdown from outside the control room. The team conducted the walkdown to determine if operators could reasonably be expected to perform the procedure actions within the identified applicable plant shutdown time requirements and that equipment labeling was consistent with the procedure. The review also looked at operator training as well as consistency between the operations shutdown procedures and any associated administrative controls.

The team’s review of the adequacy of communications and emergency lighting associated with these procedures are documented in Sections 1R05.6 and 1R05.7 of this report.

b. Findings

Introduction: The team identified an Unresolved Item (URI) associated with the environmental conditions of the BOP Switchgear Room where the Dedicated Shutdown Panel was located. The team raised concerns about the habitability for operators in this room during a postulated fire that would cause evacuation of the main control room, manning of the Dedicated Shutdown Panel, and the loss of ventilation in this room. The team was also concerned that the dedicated shutdown procedure did not provide operators direction for establishing cooling to this room.

Description: During a walkdown of the dedicated shutdown panel in the BOP switchgear room located in the Radwaste Building, the team requested a copy of the heat-up rate calculation for this room assuming a loss of ventilation which would have occurred while operators performed AOP 20.000.18, the dedicated shutdown procedure. The licensee provided the calculation EDP-32110.B006, “Electrical Heat Load Evaluation For R/W Building and its Mezzanine Area Due to Energized Electrical Component.” The heat load evaluation was performed for plant conditions during normal plant operations, Station Blackout, and Appendix R scenarios. The calculation was performed to evaluate the effect of high temperatures on equipment in various rooms. The calculation’s acceptance criteria for temperatures were based on the Fermi 2 UFSAR. The calculation stated that the temperature acceptance criteria were less than or equal to 125 degrees Fahrenheit (F) because the UFSAR indicated that personnel ambient requirement design temperatures should be below 125 degrees F. However, the UFSAR’s temperature design criteria for sizing the Radwaste Building ventilation system components were below 105 degrees F for general access areas and below 125 degrees F for all other areas. The calculation’s acceptance criteria appeared to have considered the BOP switchgear room as one of the “other areas” required to be below 125 degrees F instead of as a general access area containing a local control station that would be manned in the event of a postulated fire.

The calculation assumed that during an Appendix R scenario, some of the heating, ventilation, and air conditioning (HVAC) fans were expected to run, which would help lower the BOP Switchgear Room temperature. This assumption appeared to be in

contradiction to AOP 20.000.18 which directed operators to remove ventilation to the radwaste building. AOP 20.000.18 also did not direct operators to restore building ventilation. The calculation stated that during an Appendix R scenario assuming an outside temperature of 95 degrees F, the BOP Switchgear Room temperature would increase from 108.3 to 110.26 degrees F in 8 hours, and from 110.26 to 130.5 degrees between 8 and 72 hours. The calculation was also performed assuming a worst-case outside air ambient temperature of 105 degrees F, which was based on a historical temperatures listed in the UFSAR Table 2.3-2. Under these conditions, radwaste building ambient temperature could have reached 128.9 degrees F during normal plant operations which could have been assumed at the onset of a postulated fire. The calculation stated this may be acceptable for equipment operation, but the team questioned the ability of operators to enter a room at this temperature. According to the calculation, during the first 8 hours of an Appendix R scenario with an outside temperature of 105 degrees F, radwaste building ambient temperatures could have increased to 120.26 degrees F, and increased from 120.26 to 140.48 degrees F between 8 and 72 hours. The licensee indicated that 125 degrees F was the personnel ambient requirement for this room, but the team questioned the operators' ability to perform safe shutdown operations under these high temperature conditions while stationed at the Dedicated Shutdown Panel.

The licensee provided the team a copy of CARD 00-15868 which stated that in the BOP Switchgear room where the 3L panel was located, "it is reasonable to assume that operators in attendance will take action to prop open a door to ventilate if necessary. Therefore, the initial action to provide an analysis is changed based on this engineering judgement and no calculation will be performed." The inspectors questioned what temperatures would exist in the rooms adjacent to the BOP switchgear room and if this action would sufficiently cool the room for the operators to be able to perform their safe shutdown duties.

The team requested that the licensee provide information regarding the effects of the temperatures stated in the heat-up rate calculation on operators stationed at the dedicated shutdown panel for a postulated fire scenario. The team also requested that the licensee provide justification for the assertion that opening doors to adjacent rooms would provide the cooling necessary for operators to remain at the dedicated shutdown panel. The licensee entered this issue into their corrective action program under CARDs 05-24173 and 05-24166. This issue is considered a URI pending NRC review of the licensee's response to the issues raised by the team (URI 05000341/2005006-03).

.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 other plant personnel. 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 to determine compliance.

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 eight-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 performed a walkdown of a sample of the actions defined in plant procedures used to control local equipment operations. As part of the walkdowns, the team determined if sufficient emergency lighting existed for access and egress to areas and for performing necessary equipment operations. The team also determined if testing of emergency lighting ensured a minimum of eight hours of emergency lighting.

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 if any repairs were required to achieve cold shutdown.

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 test reports for three-hour rated barriers installed in the plant, performed visual inspections of selected barriers to determine if the barrier installations were consistent with tested configuration, and reviewed drawings and penetration seal schedules.

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 were designed in accordance with the following:

Fire Protection Systems, Features and Equipment	**BTP CMEB 9.5-1 Section**	**BTP CMEB 9.5-1 Title**
Fire Brigade Capabilities	C.3	Fire Brigade
Passive Fire Protection Features	C.5.a	Building Design
Fire Detection System	C.6.a	Fire Detection
Fire Suppression System	C.6.b	Fire Protection Water Supply Systems
	C.6.c	Water Sprinkler and Hose Standpipe Systems
Manual Fire Fighting Equipment	C.6.f and C.3	Portable Extinguishers and Fire Brigade

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, and FHA reports to determine if 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 involving an NCV of the Fermi 2 Facility Operating License having very low safety significance (Green) for the failure to install smoke detectors in several locations in the Division I Switchgear Room including the mezzanine area (Fire Zone 04AB2).

Description: During a walkdown of the Division I Switchgear Room (Fire Zone 04AB2), the team identified a lack of required smoke detection capability in three beam pockets and in the mezzanine above the personnel air lock area. The mezzanine area contained several cable trays and was also located in the same fire zone as the Division I Switchgear Room. The dimensions of the mezzanine area were approximately 10' W x 22' L x 5' H, and the area consisted of three solid walls and a large opening toward the Division I Switchgear Room. In response to the team's observation, the licensee provided information which showed that the issue of inadequate detection in several areas of the plant including the lack of detectors in beam pockets in Division I Switchgear Room was previously identified by the licensee as a result of the licensee's evaluation, EVAL-DE0035-02. However, the lack of detection in the mezzanine area had not been previously identified by the licensee.

The ceiling in the Division I Switchgear Room was not considered a smooth ceiling because it was partitioned by a total of 7 beam pockets that were more than 18 inches in depth and more than 8 feet on center. At the time of this inspection, a total of 4 early warning high voltage smoke detectors were installed in this area. Paragraph 3330 of NFPA 72D-1975 stated that fire detecting equipment shall be installed in accordance with NFPA 72E. Section 4-4.2 of NFPA 72E-1974 stated, "On a smooth ceiling, with no forced air flow, spacing of 30 feet may be used as a guide. In all cases, the manufacturer's recommendations shall be followed. Other spacing may be used depending on ceiling height, different conditions or response requirements." Section 4-4.6 of NFPA 72E-1974 stated, "In beam construction over 8 inches in depth, movement of heated air and smoke may be slowed by the pocket or bay formed by the beams. In this case, spacing shall be reduced. If the beams exceed 18 inches in depth and are more than 8 feet on centers, each bay shall be treated as a separate area requiring at least one detector." The licensee's evaluation, EVAL-DE0035-02, which was completed on March 12, 2004, documented that there were significant areas of concern with Fermi's detection systems. The evaluation stated that for the high voltage early warning smoke detector system, the criteria for detector spacing for smooth ceilings and the criteria for detector spacing for beam construction did not meet the

code of record in most of the areas evaluated. Attachment D of the evaluation provided a section-by-section compliance evaluation for the detection system (for zone 04AB2 and other fire areas) with NFPA code 72E-1974. Attachment D indicated that the detector spacing criteria for beam construction were not met in the Division I Switchgear Room by noting that there were pockets requiring individual detectors. Based on inspection walkdowns and discussions with licensee staff, the team determined that the licensee had not implemented any actions to address these issues.

A self-assessment conducted in May 2002 identified concerns with fire detection systems and problems with detector locations and spacing. It also indicated that these issues warranted further review to evaluate the detection system's compliance with NFPA codes. The licensee initiated corrective action CARD 01-20359 which documented the concern from the self-assessment. On March 12, 2004, the licensee issued an evaluation, EVAL-DE0035-02, which identified significant areas of concern regarding noncompliance of fire detection systems with the applicable NFPA codes. However, the licensee did not enter the issues documented in EVAL-DE0035-02 in their corrective action program until July 1, 2004, as CARD 04-22965. An hourly roving fire watch was established in the Division I Switchgear Room among other fire zones as a compensatory measure. The licensee stopped the fire watch patrols two weeks later because the patrols placed a burden on personnel. The team concluded that the licensee's basis for stopping the fire watch patrols was inappropriate. On July 12, 2005, in response to NRC questions, the licensee initiated CARD 05-24130 and re-established the hourly fire watch patrols for the affected areas.

Analysis: The team determined that the failure to install adequate detection in the three beam pockets and the mezzanine area located in the Division I Switchgear Room (Fire Zone 04AB2) was a performance deficiency warranting a significance evaluation. The team concluded that the finding was greater than minor in accordance with IMC 0612, Appendix B, "Issue Disposition Screening," in that the finding involved the attribute of protection against external factors (fire), which affected the mitigating systems cornerstone objective of ensuring the availability of systems that respond to initiating events. Smoke from a fire in that area could have accumulated in the ceiling areas in the beam pockets or in the mezzanine area where the lack of required detection existed and delayed detection of a postulated fire. This delay in detection would also have delayed any subsequent manual fire suppression activities. The finding also affected the cross-cutting area of Problem Identification and Resolution because the licensee failed to initiate a CARD in a timely manner, establish adequate compensatory measures (fire watch patrols), and install adequate detection systems.

The team completed a significance determination of this issue using IMC 0609, Appendix F, "Fire Protection Significance Determination Process," dated May 28, 2005. The team assigned a degradation rating of moderate because the lack of smoke detectors would have impacted the performance of fire detection in this location. However, the fire protection element impacted by the finding was still expected to provide some substantial defense-in-depth benefit due to other fire detectors located in the room. Considering the duration factor (DF) of greater than 30 days (DF=1.0) and generic fire area fire frequencies in switchgear room (F_{Area} = 2E-2), the team determined that a Phase 2 evaluation was necessary to determine the significance of this issue.

The Division I Switchgear Room (Fire Area 04AB2) contained numerous Division I safety-related equipment/cables and several Division II safety-related cables. The team reviewed the equipment and manual actions credited for post-fire safe shutdown operations to determine if, for a postulated fire in this area, there was equipment available and/or the manual actions were feasible. The team determined that based on the availability of a safe shutdown train which would not be impacted by a fire in the area and the low number of ignition sources in the locations where the lack of detection existed, the change in core damage frequency value as a result of a fire in this fire zone was very low. Therefore, this finding was considered to be of very low safety significance (Green).

Enforcement: The Fermi 2 Facility Operating License Condition 2.C.(9) stated, in part, that the licensee shall implement and maintain in effect all provisions of the approved fire protection program as described in its UFSAR. Section 9A.5 of the UFSAR provided a point-by-point comparison with Appendix A to NRC BTP APCSB 9.5-1, dated August 23, 1976. Position E.1 (a) on Fire Detection stated, "Fire detection systems should as a minimum comply with NFPA 72D, 'Standard for Installation Maintenance and Use of Proprietary Protective Signaling Systems.' Deviations from the requirements of NFPA 72D should be identified and justified." Section 4-4.6 of NFPA 72E-1974 stated, "If the beams exceed 18 inches in depth and are more than 8 feet on centers, each bay shall be treated as a separate area requiring at least one detector."

Contrary to the above, the fire detection system installed in the Division I Switchgear Room (Fire Zone 04AB2) did not meet the applicable NFPA requirements. Specifically, three beam pockets and the mezzanine area located in the fire zone did not have detectors. Consequently, detection of a fire in these locations would have been delayed. The licensee entered the issue into its corrective action program as CARD 04-22965 and planned to install detectors at these locations. The licensee also re-established hourly fire watch patrols in the Division I Switchgear Room and in other fire areas in the plant per CARD 05-24130. Because this violation was of very low safety significance (Green) and was entered into the licensee's corrective action program, this violation is being treated as an NCV consistent with Section VI.A.1 of the NRC Enforcement Policy (NCV 05000341/2005006-04).

.11 Compensatory Measures

a. Inspection Scope

The team conducted a review to determine if adequate compensatory measures were put in place by the licensee for out-of-service, degraded, or inoperable fire protection and post-fire safe shutdown equipment, systems, or features. The team also reviewed 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)

The guidelines established by BTP CMEB 9.5-1, Section C.4, "Quality Assurance [QA] Program," Paragraph h, required that measures be established to ensure that conditions adverse to fire protection, such as failures, malfunctions, deficiencies, deviations, defective components, uncontrolled combustible material and nonconformance, are promptly identified, reported, and corrected.

a. Inspection Scope

The team reviewed a selected sample of condition reports associated with the Fermi FPP to determine if the licensee had an appropriate threshold for identifying issues. The team evaluated the effectiveness of the corrective actions for the identified issues. During the inspection, the team verified that licensee personnel were documenting fire protection problems in the corrective action program in accordance with 10 CFR Part 50, Appendix B, Criterion XVI, and licensee corrective action program procedures. The team determined if the apparent cause evaluation and corrective actions were appropriate, timely, and commensurate with the safety significance of the problem. In addition, the team reviewed a sample of the FPP self-assessments which the licensee performed in the previous two-year period. The team evaluated the effectiveness of the corrective actions for the identified issues.

b. Findings

Introduction: The team identified a finding involving an NCV of the Fermi 2 Facility Operating License having very low safety significance (Green) for failing to implement adequate corrective actions in a timely manner.

Description: The team identified two examples in which the licensee failed to implement adequate corrective actions in a timely manner. The first example illustrates the licensee's failure to implement corrective actions for the issues identified in their 10 CFR Part 50, Appendix R analysis. The second example illustrates the licensee's failure to take timely and adequate corrective actions for the lack of fuse coordination and cable protection.

Example 1: In December 2004, the licensee issued calculation DC-4921, "Appendix R Calculations." This calculation identified manual actions that would need to be performed as compensatory measures for postulated fire-induced cable damage in several fire zones. During this inspection, the team identified that the licensee had not incorporated manual actions and other compensatory measures that were specified in DC-4921. Six months after the calculation was issued, revisions to the procedures that were used as a result of a fire had not been issued which implemented these manual actions as compensatory measures to achieve safe shutdown. In addition, operators had not been trained on the issues identified in the calculation. For a postulated fire in a fire zone that required manual actions according to the results of DC-4921, operations staff would not have been aware of the potential plant conditions that could have

resulted from fire-induced cable damage and the manual actions they may have had to take to achieve safe shutdown. During the inspection, the licensee had draft procedures and had just implemented training for some of the operating staff. The licensee failed to implement corrective actions in a timely manner by failing to communicate the issues identified in DC-4921 to operations staff through procedures and training.

Example 2: The licensee identified that the control circuits for the trip coil of several feeder breakers were using 50 amp fuses. In 1999, the licensee identified concerns regarding the sizing of these fuses in addition to protection of downstream 12 American Wire Gauge (AWG) cables. Since 2001, four CARDS (corrective action documents) had been generated discussing the lack of fuse coordination and protection. On March 3, 2001, CARD 01-10613, "A Fuse/Breaker Coordination Study is Needed for the Fire Protection Program," was issued. The licensee's corrective action was a "road map" that showed which design calculations demonstrated coordination without performing a new analysis to correct the issue. On July 17, 2001, CARD 01-13209, "Review for Electrical Protection on Cables is Required to Ensure Agreement with BWROG Report," was initiated to perform an investigation to identify cables with protective fuses that did not meet the NEC (National Electric Code) because of a concern that there was no electrical protection for cables (a common enclosure issue). The licensee's CARD Review Board downgraded the significance level of this CARD from a Level 3 (a condition adverse to quality) to a Level 4 and assigned the CARD to the licensee's electrical engineering staff (PSE-Electrical) which concluded that the NEC need not be met. On October 17, 2002, CARD 02-19911, "Justifications Required for Cables That Are Potentially Appendix R Common Enclosure Issues," was initiated after it was discovered that CARD 01-13209 had been closed without justifying the

Appendix R common enclosure issue. This CARD also recommended establishing a guideline based on NEC criteria. This time, the CARD resolution team did identify a concern with the 12 AWG cable being protected by a 50 amp fuse, but this CARD was prematurely closed in February 2004 after inadequate justifications were provided. On June 6, 2003, CARD 03-17944, "Further Evaluation is Required from PSE-Electrical on 12 AWG Protected by a 50 Amp FRN-R-50 Fuse Protection," was issued after the licensee discovered that the use of 50A fuses to protect 12 AWG cable did not address the short circuit fault concern. The licensee decided to replace the 50 amp fuses with 35 amp fuses. The replacement of the fuses in several 4160 V circuit breaker cubicles was planned to be accomplished by December 2010.

In May 2002, a FPP self-assessment identified a discrepancy between electrical coordination calculations and the Appendix R analysis. The assessment confirmed the existence of cables not protected in accordance with NEC and identified that the CARD covering this issue was nine months old at the time. The self-assessment team recommended that this issue receive a higher priority for resolution based on known deviations from the baseline acceptance criteria.

The team determined that the timeliness of the corrective action to replace the fuses and provide protection of cables was inadequate. The issues were identified by the licensee five years prior to the inspection and did not have adequate resolution for the

coordination and protection issues at the time of the inspection. This resulted in an adverse condition to alternative safe shutdown capability.

Analysis: The team determined that the failure to implement timely and adequate corrective actions was a performance deficiency warranting a significance evaluation. Each example of the performance deficiency was considered greater than minor in accordance with IMC 0612, "Power Reactor Inspection Reports," Appendix B, "Issue Screening," issued on May 19, 2005. The first example of the performance deficiency affected the Mitigating Systems Cornerstone and was associated with the attributes of Procedure Quality and Human Performance. This finding also affected the mitigating systems objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences because the procedures in use at the time of the inspection would not have alerted operators to the plant conditions that could exist due to fire-induced cable damage, and the operators were not trained to perform the manual actions described in the design calculation. The second example of the performance deficiency affected the Mitigating Systems Cornerstone and was associated with the attribute of Design Control. This finding also affected the mitigating systems objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences because the lack of fuse coordination and cable protection could have rendered safe shutdown equipment inoperable. The team determined that the failures to implement adequate corrective actions in a timely manner also affected the cross-cutting area of Problem Identification and Resolution because although both issues were previously identified, the licensee failed to take prompt and adequate corrective actions.

This finding is not suitable for SDP evaluation, but has been reviewed by NRC management. Because no actual fire occurred, operators were not required to respond to an actual event, and the lack of fuse coordination and cable protection did not cause equipment to be inoperable, this finding was determined to be a Green finding of very low safety significance.

Enforcement: Section 2.C(9) of the Fermi 2 Operating License stated, in part, that the licensee shall implement and maintain in effect all provisions of the approved FPP as described in its UFSAR for the facility. Section 9A of the UFSAR outlined the licensee commitments for fire protection. Section 9A.5 of the UFSAR provided a point-by-point comparison with Appendix A to NRC BTP APCSB 9.5-1, dated August 23, 1976. Position c.8 listed in Section 9A.5 of the UFSAR identified the NRC position regarding quality assurance requirements for corrective action. The licensee response was that this item is included in the quality assurance program. Section 17 of the UFSAR is the quality assurance program for the licensee. Section 17.2.16 of the UFSAR established the quality assurance requirements for corrective action. Section 17.2.16 of the UFSAR stated, in part, that measures are established to ensure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances, are promptly identified and corrected.

Contrary to the above, the licensee failed to: (a) promptly correct the procedures used for safe shutdown in the event of a fire and establish training for operators; and

(b) promptly identify the lack of fuse coordination and correct the cable protection issues in safe shutdown systems. Although the inadequacies associated with the safe shutdown procedures were known since December 2004, the inadequacies were not corrected as of July 15, 2005. Although the inadequacies associated with the fuse coordination and cable protection were known since 1999, the inadequacies were not corrected until July 2, 2005. The licensee entered the issue of corrective action timeliness into its corrective action program as CARDs 05-24178 and 05-24180 on July 14, 2005, to assess the aggregate impact of the issues. Because this violation was of very low safety significance and 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 05000341/2005006-05).

4OA4 Cross Cutting Aspects of Findings

.1 A finding described in Section 1R05.10 of this report was related to the cross-cutting area of problem identification and resolution. Specifically, the licensee failed to implement corrective actions to address a previously identified deficiency involving the lack of an adequate detection system in the Division I Switchgear Room. The issue of inadequate detector spacing in several areas of the plant had been previously identified during a self-assessment which was conducted in May 2002. However, the licensee did not install any additional detectors in these areas. The licensee did establish fire watch patrols as compensatory measures but then terminated them without an adequate basis. On July 12, 2005, in response to NRC questions, the licensee initiated CARD 05-24130 and re-established the hourly fire watch patrols for the affected areas.

.2 A finding described in Section 4OA2 of this report was related to the cross-cutting area of problem identification and resolution. Specifically, the team identified two examples of the licensee's failure to implement adequate corrective actions after identification of issues. The first example illustrated the licensee's failure to implement corrective actions for issues identified in their Appendix R analysis, which was completed in December 2004, by not incorporating the issues into procedures and operator training. The second example illustrated the licensee's failure to take timely and adequate corrective actions for the lack of fuse coordination and cable protection after the issues were identified in 2001.

4OA6 Meetings

.1 Exit Meeting

The team presented the inspection results to Mr. W. O'Connor and other members of licensee management at the conclusion of the inspection on July 15, 2005. The team asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

4OA7 Licensee-Identified Violation

The following violation of very low safety significance was identified by the licensee and was a violation of NRC requirements which meets the criteria of Section VI of the NRC Enforcement Policy, NUREG-1600, for being dispositioned as a Non-Cited Violation.

Cornerstone: Mitigating Systems

On May 18, 2005, the licensee reported via LER 05-003, an unanalyzed condition related to design and operating procedure deficiencies which resulted in the failure to meet the requirements of 10 CFR Part 50, Appendix R, Sections III.G.3 and III.L. Specifically, the licensee identified that the control circuits for BOP battery chargers 2C-1 and 2C1-2, which were required to provide DC power to alternate shutdown equipment, were routed through the control room and relay room envelopes, thereby becoming susceptible to fire-induced damage in the event of a fire in any of these two areas. The licensee revised procedure AOP 20.000.18 as an interim corrective action to manually close the power supply M-coil contactors associated with battery chargers 2C-1 and 2C1-2. This issue was documented in the licensee's corrective action program as CARD 05-23111 to evaluate the root cause of this deficiency and to implement long-term corrective actions (EDP 33660).

Findings involving main control room abandonment and use of the alternate shutdown system could not be evaluated with the current Fire Protection SDP. Therefore, the RIII SRA performed a Phase 3 SDP analysis using data and information from the draft NUREG/CR-6850, "EPRI/NRC-RES Fire PRA Methodology for Nuclear Power Facilities." The overall control room fire frequency was determined to be 4.8E-3. The inspection finding involved a condition that the SBFW system would not function properly after battery depletion (approximately 2-1/2 hours) because required battery chargers would be affected by the postulated fire. For this to occur, the control room fire would need to involve one of three specific control room cabinets and also be severe enough to result in evacuation. The control room fire frequency was adjusted by considering that a fire in one of three of the 13 main control board cabinets would result in this scenario. The SRA also assumed that a fire lasting 15 minutes would be severe enough to require evacuation. Additionally the SRA assumed that the SBFW system could be recovered by resetting the battery chargers and that the actions required were feasible. Therefore a recovery probability of 0.1 was applied to the failed SBFW system. The result for an unsuppressed main control room fire that also resulted in the SBFW system failing due to battery depletion was estimated at less than 1E-6 and best characterized as very low safety significance (Green).

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

D. Cobb, Plant Manager
R. Libra, Director, Nuclear Engineering
W. Colonnello, Director, Nuclear Support
R. Zyduck, Manager, System Engineering
K. Burke, Supervisor, Performance Engineering
T. Dong, Manager, Performance Engineering
M. Philippon, Manager, Operations
E. Kokosky, Manager, Training
W. O'Connor, Vice President, Nuclear Generation
L. Tremonti, Supervisor, System Engineering
G. DePalma, Supervisor, Plant Support Engineering
N. Peterson, Manager, Nuclear Licensing
P. Smith, Director, Nuclear Assessment
J. Chinavare, Supervisor, Fire Protection
R. Gaston, Licensing
M. Caragher, Manager, Engineering First Team
D. Wood, Fire Protection Consultant
M. McDonough, Fire Protection Engineer
J. Lavelline, PSA
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J. Louwers, NQA
J. South, PSE
D. Kusumawati, Engineer - Licensing

Nuclear Regulatory Commission

S. Campbell, Fermi Senior Resident Inspector
E. Duncan, Chief, Reactor Projects Branch 6

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

05000341/2005006-001	NCV	Failure to Have Separation Between Redundant Safe Shutdown Cables (Section 1R05.2)
05000341/2005006-002	NCV	Failure to Ensure that Adequate Electrical Coordination Existed in Post -Fire Alternate Shutdown Circuits (Section 1R05.3)
05000341/2005006-003	URI	Temperatures in Dedicated Shutdown Panel Area - BOP Switchgear Room (Section 1R05.5)
05000341/2005006-004	NCV	Failure to Install Smoke Detectors in Accordance with NFPA 72-E (Section 1R05.10)
05000341/2005006-005	NCV	Failure to Implement Adequate Corrective Actions in a Timely Manner (Section 4OA2)

Closed

05000341/2005006-001	NCV	Failure to Have Separation Between Redundant Safe Shutdown Cables (Section 1R05.2)
05000341/2005006-002	NCV	Failure to Ensure that Adequate Electrical Coordination Existed in Post -Fire Alternate Shutdown Circuits (Section 1R05.3)
05000341/2005006-004	NCV	Failure to Install Smoke Detectors in Accordance with NFPA 72-E (Section 1R05.10)
05000341/2005006-005	NCV	Failure to Implement Adequate Corrective Actions in a Timely Manner (Section 4OA2)

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 and Evaluations

DC-1310; R/W BLDG Switchgear Room Temperature Following Loss of Ventilation; dated August 30, 1982

DC-2574; Emergency Lighting for Appendix R, Fire Protection and Station Blackout; Revision I

DC-4921; Appendix R Calculations; Revision E

DC-5272; Sizing Criteria and Basis for Fuses Used in Power Distribution System and Control Circuits; Revision B

EDP-32110.B006; Electrical Heat Load Evaluation For R/W Building and its Mezzanine Area Due to Energized Electrical Component; Revision A

EDP-33558; Replace 50 and 60 Amp Fuses With 35 Amp Fuses. This Work Is a Corrective Action for CARD 03-17944; Revision 0

EDP 33675; SBFW Breaker Controls Fuse Replacement to Satisfy Fuse Coordination; dated July 1, 2005

EF2-69542; Basis for Sizing Fuses on Fermi 2 480 Vac and 260 Vdc Motor Control Centers, Switchgear Metering and Control Circuits, 120 Vac 24V/48 Vdc and 130 Vdc Control Power Supplies; dated August 12, 1985

EVAL-DE0035-02; Evaluation of Fermi 2 Automatic Fire Detection Systems for Compliance with the Requirements of NFPA-72E and NFPA-72D; Revision 0; dated March 15, 2004

FPEE-02-0003; Halon Discharge Test Evaluation; dated November 7, 2002

FPEE-02-0005; Relay Room Northeast Stairwell; dated October 28, 2002

FPEE-04-0003; NRC IN 92018 Issues - Potential For Loss of Remote Shutdown Capabilities; dated May 12, 2005

FPEE-05-0001; Evaluation of a Change to the Fire Protection Program from Safe Shutdown Design Calculations DC-4921, DC-6196, DC-6197; dated February 9, 2005

FPEE-05-0009; Evaluation of Hatch Between 11ABE and 13AB; dated March 24, 2005

FPEE-05-0013; Evaluation of 20.000.18 Rev. 35 and TRM LCO 3.3.9 and 3.7.7 Operability; dated May 20, 2005

Corrective Action Program Documents (CARDs) Issued During this Inspection

05-23646; Wood Found in Cable Tray 0P-409; dated June 17, 2005

05-23651; Loose Fuse Found on Top of Panel H21P624; dated June 17, 2005

05-23653; Drawing I-2784-01 Needs to Be Revised; dated June 17, 2005

05-23895; Add Note to Procedures 28.503.01 and 28.503.03 Explaining Gauges Are Reading in Red Ban; dated June 28, 2005

05-23918; Green Trickle Light Out on Emergency Light Unit; dated June 29, 2005

05-23920; Disconnected Conduit; dated June 29, 2005

05-23946; Card Tag 01-00887 Has Been in Place for 4 Years; dated June 30, 2005

05-23953; The DC Feed to B21P401 for B2104F013G at the Dedicated Shutdown Panel Is Normally Energized; dated June 30, 2005

05-23955; Single Failure Question Regarding Dedicated Shutdown Transfer Relay C36-K2 and B2104F013G; dated June 30, 2005

05-23957; Revise the Emergency Lighting Vendor Manual and Procedure to Correct the Model Number; dated June 30, 2005

05-23959; Potential Inadequate Coordination in Equipment Used in the Dedicated Shutdown Scenario; dated June 30, 2005

05-23966; Evaluate Impact of NFPA 72E Noncompliances in Fire Detection on Performance of Manual Action for Risk Significant Fire Zones

05-23970; 4160 Vac BOP Bus Breaker Control Circuits Coordination Issues; dated July 1, 2005

05-23972; Fuse Coordination Design Deficiency with 480V Load Shed String Circuits; dated July 3, 2005

05-23975; Wrong Fuse Installed in H21P636 (3L Back-up Control for T4100C001); dated July 2, 2005

05-24038; Design Calculation DC-4921 Typographical Error; dated July 6, 2005

05-24061; Minor Clarification to Engineering Support Conduct Manual MES03; dated July 7, 2005

05-24071; Add Repair Equipment for Safe Shutdown to Procedure 28.508.04

05-24103; Clarify DC-4921 Statement to Indicate It Is Not a Required Action

05-24130; SDP Basis for Termination of Fire Watches Was Not Appropriate; dated July 12, 2005

05-24166; Recommended Enhancement to 20.000.18; dated July 14, 2005

05-24173; The BOP Switchgear Room Has a Potential Habitability Problem During III.G.3 Fire; dated July 14, 2005

05-24176; Use of Manual Action in DC-4921; dated July 14, 2005

05-24178; Failure to Implement Timely Corrective Action for Fire Protection Program Issues (Issue 1 only); dated July 14, 2005

05-24179; Failure to Implement Timely Corrective Action for Fire Protection Program Issues (Issue 2); dated July 14, 2005

05-24180; Failure to Implement Timely Corrective Actions for Fire Protection Program Issues (Issue 3); dated July 14, 2005

05-24200; Modifications to Add Backup NAIS Supply to D2 DW Pneumatics and/or Protect Cables Are Required for Appendix R Compliance; dated July 15, 2005

05-24251; Fire Damage in D1 or D2 Switchgear Room Can Cause Opposite Division EDGs to Trip; dated July 17, 2005

05-24254; Multiple, Diverse Fire Protection Program Regulatory Noncompliance Issues; dated July 17, 2005

Corrective Action Program Documents (CARDs) Reviewed During the Inspection

01-20359; NRC Resident Questions Whether Location of Fire Detectors is Acceptable; dated December 118, 2001

02-14714; Fire Detection System Review to NFPA 72E; dated May 24, 2002

02-19225; EOP Interaction with Post-Fire Shutdown Using AOP 20.000.18; dated November 22, 2002

02-19400; Provide Documentation Specifying Contingent Actions for Emergency Lighting Out of Service; dated September 13, 2002

02-19401; Untimely Corrective Actions for Zone 11AB Fire Scenario (AB3 DC MCC Area; dated November 26, 2002

03-16529; Fire Induced Spurious Actuations Potentially Result in RHR Piping Exceeding Design Pressure; dated November 20, 2003

03-17944; Further Evaluation Required from PSE-Electrical on #12 AWG Cable with 50 Amp FRN-R-50 Fuse Protection

03-19129; Recommendations to Document Calculation Regarding Time it Takes to Uncover the Core With a Stuck Open SRV; dated July 28, 2003

03-19169; Audit Finding Discrepancy Between Manual Actions for Carrying Out 10 CFR Part 50, Appendix R, III.G.2 and III.G.3 Manual Actions In One Appendix R Analysis Area

04-10277; Penetration Needs to be Resealed; dated February 20, 2004

04-12244; Update Fire Protection Flag and QA Level in CECO; dated July 27, 2004

04-20324; Potential Loss of CST Inventory During Certain Fire Scenarios; dated January 29, 2004

04-20325; Manual Action Required to Restore Division II Drywell Pneumatics During Certain Fire Scenarios; dated January 29, 2004

04-22251; Fire Protection Safe Shutdown Strategy Found Not to Be in Strict Regulatory Compliance for 2 Aux. Building Areas; dated May 20, 2004

04-22965; NFPA 72E and 72D Noncompliance in Quality and Location of Detectors; dated July 1, 2004

04-22968; NFPA 72D and 72E Noncompliance for Fire Protection System Concerning Circuit Supervision and Configuration, Power Supplies, Test Procedures and Misc.; dated July 1, 2004

04-24536; Evaluate Industry Fire PRA Guidance for Applicability to Fermi; dated September 30, 2004

04-26014; NFPA 14 Noncompliances With Fire Protection Standpipe and Hose System; dated November 24, 2004

05-20601; Battery Unit Failed 8-Hour Discharge Test; dated January 29, 2005

05-20607; Emergency Light R3600-S174 (AFCC 3); dated January 30, 2005

05-20688; Emergency Light Failed As Found Discharge Test; dated February 1, 2005

05-20744; Evaluation for Single Failure Vulnerability of Division I and Division II ESS Busses; dated February 3, 2005

05-21229; Potential Discrepancy in Associated Circuit Analysis in DC-4921

05-21289; Fire Barrier Not Sealed In Accordance With Drawings; dated February 25, 2005

05-22476; Procedure Enhancement 28.504.04; dated April 19, 2005

05-22633; Exterior Wall Penn Seals Are Not Checked in Fire Protection on Penn Seal Schedule Drawings; dated April 25, 2005

05-22807; Failed Emergency Battery Light Discharge Test AFCC 4; dated May 3, 2005

05-22972; Fire Door Not Latching; dated May 11, 2005

05-23005; Procedure Enhancement; dated May 12, 2005

05-23111; Possible Design and Procedure Deficiencies Affecting the Dedicated Shutdown Scenario; dated May 18, 2005

05-23358; Fire Door Frame Has 1/4-inch Hole In It; dated June 1, 2005

Drawings

C0101; Specification 3071-198: Fire Seal Conduit Penetration 6-inch Seal - Wall; Revision E

C-0126; Specification 3071-198: Fire Seal Conduit Penetration 6-inch Seal - Wall - Exterior; Revision E

E-0119; Specification 3071-198: Fire Seal Electrical Penetration Piping and Tray Thru Barrier Wall; Revision E

M0105; Specification 3071-198: Fire Seal Mechanical Penetration Multiple Piping - Wall; Revision E

4A721-4045; Corridor II West Wall Reactor-Aux. BLDG. EL. 613'-6-inch RM. B-12; Revision B

4A721-4327; Relay Room Floor Reactor Aux. BLDG., EL. 613'-6-inch RM. B-15; Revision B

4A721-4361; Battery Charging Room Division I; West Wall Reactor Building Elevation 643'-6-inch; Revision B

4I721-2310-24; Logic Diagram - Standby Feedwater System Pump A, Bus 64V, Breaker Position V2; Revision A

4I721-2310-25; Logic Diagram - Standby Feedwater System Pump B, Bus 65W, Breaker Position W4; Revision A

6A721-2183; Reactor and Aux BLDG, INT. Wall Elevations Showing Penetrations Second Floor; Revision AI

6A721-2184; Reactor Building Third Floor Wall Penetrations Elevation 643'-6-inch; Revision W

6A721-2254; Auxiliary Building NE Area Second Floor Plan El. 613'-6-inch Floor Penetrations; Revision F

6A721-2310; Reactor and Auxiliary Building Second Floor Penetrations (El. 613'-6-inch) Sealant and Shielding Schedule; Revision K

6A721-2360; Reactor and Auxiliary Building Second FLR. Walls (EL. 613'-6-inch and 613'-8 ½-inch) Wall Penetrations Sealants and Shielding Schedule; Revision R

6A721-2366-01; Reactor and Auxiliary Building Third Floor Walls Elevation 641'-6-inch and 643'-6-inch; Wall Penetrations Sealants and Shielding Schedule; Revision Q

6C721-2405; Auxiliary Building Framing Plan EL. 631'-0-inch; Revision I

6I721-2002-9; Penetrations and Gateway Inserts Auxiliary Building Relay Room Second Floor El. 613'-6-inch North East; Revision H

6E721-2801-03; Cable Tray Identification (Control) Enlarged Plan - Aux Bldg.; Revision M

6E721-2801-06; Cable Tray Identification Reactor and Aux. Bldgs - First Floor Division I, Division II and BOP - Control; Revision W

6E721-2801-8; Cable Tray Ident (Control) Enlarged Plan Aux. Building NE Area Elevation 583'6-inch, First Floor; Revision M

6E721-2821-08; Cable Tray Identification Radwaste Bldg - First Floor Division I, Division II and BOP - Control; Revision J

6E721-2838-27B; Class 1 Conduit As Built Installation Section Power, Control and Instr. Conduit, Aux. Bldg. EL 631'-0-inch Second Floor Mezz.; Revision E

6E721-2838-27K; Class 1 Conduit As Built Installation Section Power, Control and Instr. Conduit, Aux. Bldg. EL 631'-0-inch Second Floor Mezz. DOC. CTL. T5103 - Ceiling Plan; Revision C

6E721-2882-13; Elect Equip - Conduit Plan Radwaste Building, Second Floor EL 613'6-inch West Area; Revision M

6E721-2998-11; Assembly Drawing - Bus 64C Shutdown Panel H21-P624; Revision A

6I721-2095-04; Schematic Diagram - Automatic Depress. System Sol Valves B2104F013F, G, and H; Revision T

6I721-2221-10; Schematic Diagram HPCI System Vacuum Breaker Isolation Valves E4150F075 and E4150F079; Revision T

6I721-2311-35; Schematic Diagram - Standby Feedwater System Pump A N2103C001; Revision G

6I721-2311-36; Schematic Diagram - Standby Feedwater System Pump B N2103C002; Revision G

6I721-2311-39; Schematic Diagram - Standby Feedwater System 4160V Bus 64V Incoming Breaker; Revision C

6I721-2311-40; Schematic Diagram - Standby Feedwater System 4160V Bus 65W Incoming Breaker; Revision C

6I721-2311-41; Schematic Diagram - Standby Feedwater System 4160V Bus 64V, 65W Tie Breaker Position V3; Revision C

6I721-2317-28; Schematic Diagram - SBFW System Isolation Valve N2103F001; Revision G

6I721-2317-29; Schematic Diagram - SBFW System Flow Control Valve A N2103F002; Revision D

6I721-2317-30; Schematic Diagram - SBFW System Flow Control Valve B; Revision C

6I721-2530-04; Schematic Diagram; 130V Battery Charger ON/OFF Control; Revision B

6I721-2572-15; Schematic Diagram - 4160V ESS Bus 64C Position C6; Revision S

6I721-2782-01; Arrangement and Tabulation of Equipment - Dedicated Shutdown Panel H21-P923; Revision A

6I721-2783-04; Connection Diagram - Dedicated Shutdown Panel H21-P623 Terminations; Revision D

6I721-2785-01; Schematic Diagram - Dedicated Shutdown Panel H21-P623 Transfer Relaying; Revision D

6I721-2785-02; Loop Diagram - Dedicated Shutdown Panel H21-P623 Instrumentation; Revision Q

6I721-2868-13; Installation-Fire Detection System Reactor Building Second Floor EL. 613'-6-inch; Revision N

6M721-2035; Diagram - High Pressure Coolant Injection System (HPCI) Reactor Building; Revision BF

6M721-2135-01; Diagram; Fire Protection System (Sheet 2); Revision Z

6M721-5083; Pimping and Instrument Diagram - Standby Feedwater System; Revision R

6M721-5733-01; Fire Protection Functional Operating Sketch; Revision AN

6SD721-2500-01; One Line Diagram - Plant 4160V and 480V System Service Unit 2; Revision AC

6SD721-2500-05; One Line Diagram - 4160V Service Buses 64A, 65D, 65L Radwaste Building; Revision S

6SD721-2501-82; Wiring Diagram - 4160V SWGR Bus 64V Position V2 Standby Feedwater Pump A; Revision D

6SD721-2501-84; Wiring Diagram - 4160V SWGR 65W Position W4 Standby Feedwater Pump B; Revision D

6SD721-2501-85; Wiring, Diagram - SBFW System 4160V S.S. Bus 64V - Incoming Breaker; Revision D

6SD721-2530-12; One Line Diagram; 260/130V BOP Battery 2PC Distribution; Revision AQ

3071-198; Specification - Fire Seal; Revision E

Miscellaneous

Cable Pull Cards for Cables 237925-OC, 237945-OC, 237918-OC, 23708-OC, 237922-OC, 237921-OC, 237925-OC, and 237955-OC; Revision 1

Datasheet for 8-Hour Emergency Lighting Conductance Testing

Design Instruction No. 136; Standby Feedwater System Fermi Unit 2; dated April 21, 1982

Design Specification 3071-128-EZ-01; Electrical Design Instruction - Power and Control Fuse Sizing; dated Mary 27, 1995

Detroit Edison Company, Fermi 2 Nuclear Power Plant; Fire Protection Program Self-assessment; dated May 31, 2002

EPRI Report 1003326; Characterization of Fire Induced Circuit Faults: Results of Cable Fire Testing, EPRI, Palo Alto, CA; 2002

LER 2005-002; Combustion Turbine Generator 11-1 Unable to Perform As Designed During Certain Appendix R Scenarios; dated May 18, 2005

LER 2005-003; Design and Operating Procedure Deficiencies Related to Appendix R Events; dated June 29, 2005

TSR 28196; Updated Fuse Time-Current Curves; dated March 22, 1996

TSR 29429; Revision of Spec. 3071-128 to Provide Installation Instructions; dated March 16, 1999

TSR 30431; Bussmann Type FRS-R, KLM, and KTK Fuses, Time-Current Characteristics Curves Have Been Removed; dated May 24, 1999

TSR 32747; Revise Design Documents - Change Standard for 4160V Switchgear with FRN-R-50 Fuse Protection to FRN-R-35 Fuses Maximum (for #12 AWG Cable Protection) for Trip and Load Shedding Circuits; dated December 23, 2003

03-5734-001; Fire Qualification Test on Floor Penetration Seals; dated November 30, 1979

05-FPI-28-4-1; Verification of Protective Device Coordination for All Electrical Components, Including Associated Circuit Analysis, and AC and DC for SBFW; dated July 6, 2005

Pre-fire Plans

FP-AB-2-8; Relay Room, Zone 8, EL. 613'6-inch; Revision 5

FP-AB-2-9b; Auxiliary Building, Division I Switchgear Room, Zone 9, EL. 613' 6-inch; Revision 1

Procedures

Abnormal Operating Procedure (AOP) 20.000.18; Control of the Plant From the Dedicated Shutdown Panel; Revision 35

AOP 20.000.21; Reactor Scram; Revision 55

AOP 20.000.22; Plant Fires, Revision 34

AOP 20.300.Offsite; Loss of Offsite Power; Revision 4

COMM 201; HICOM Handset Station Test; Revision 1

COMM 301; HICOM Portable Test Set and Operating Instructions; Revision 1

COMM 501; Routine Maintenance and Trouble Isolation in Plant Radio System; Revision 2

COMM 601; Radio Control Console Test; Revision 1

EOP 29.100.01 SH 1; RPV Control; Revision 11

Emergency Support Procedure 29.ESP.19; Defeat of Standby Feedwater Level 8 Isolation; Revision 9

Fire Protection Procedure 28.506.01; Emergency Lighting 30-Day Inspections; Revision 26

Fire Protection Procedure 28.507.05; Inspection of Penetration Fire Stops; Revision 12

Fire Protection Procedure 28.508.04; Emergency Equipment Monthly Inventory/Inspection; Revision 24

General Operating Procedure (GOP) 22.000.03; Power Operation 25 Percent to 100 Percent to 25 Percent; Revision 72

GOP 22.000.04; Plant Shutdown From 25 Percent Power; Revision 53

Maintenance Procedure 35.322.001; Battery Operated Emergency Light Component Replacements; Revision 36

Maintenance Procedure 35.323.001; Inspection and Testing of Communications and Evacuation Alarm Systems; Revision 22

MOP01011; Shift Assignments for June 28, 2005; Revision 4

MOP03; Operations Conduct Manual, Chapter 3 - Policies and Practices; Revision 16

Performance Evaluation Procedure 37.000.014; Emergency Lighting Performance Evaluation; Revision 44

System Operating Procedure (SOP) 23.322; Normal and Emergency Plant Lighting; Revision 20

SOP 23.323; Communication Systems; Revision 11

24.000.45; Monthly Continuity Light and Channel Check; Revision 41; dated July 23, 2004

24.107.03; SBFW Pump and Valve Operability and Lineup Verification Test; Revision 34 and 35; dated April 22, 2005, May 31, 2005, and June 3, 2005

References

Fermi 2 UFSAR, Section 9.5.1; Fire Protection System

Fermi 2 UFSAR Appendix 9A; Fire Protection Analysis and Review of Appendix A to BTP APCSB 9.5-1

Fermi 2 UFSAR Figure 7.5-5; One Line Diagram - Alternative Shutdown System; Revision 9

Generic Letter (GL) 81-12; Fire Protection Rule (45 FR 76602); dated February 20, 1981

TR 3.12.1; Fire Protection Instrumentation; Revision 31

Training Documents

LP-OP-202-0133; Licensed Operator Requalification - Dedicated Shutdown System Review; Revision 1

LP-OP-213-0211; Nuclear Operator Continuing Training - Reactor Building and EOP Associated Continuing Training; Revision 0

LP-OP-213-0232; Nuclear Operator Continuing Training - Electrical Overview Cycle 02-03; Revision 0

LP-OP-315-0199; Fermi 2 Systems - Dedicated Shutdown Systems; Revision 3

LP-OP-315-0299; Fermi 2 Systems - Dedicated Shutdown Systems; Revision 2

LP-OP-802-2001; Operating Characteristics and Procedures - Introduction to Abnormal Operating Procedures; Revision 4

ST-OP-315-00999-001; Operations Training - Dedicated Shutdown System; Revision 5

Vendor Documents

SD-319-78.1; Air Balance Inc. Fire/Seal UL-Classified Fire Door Models 319P and 319W; No Date or Revision Provided

VMB10-1; Teledyne Big Beam S6L and S6N Series 6 Volt Emergency Lighting; Revision A

Work Requests

AA01050323; Perform 28.506.01 Attachment 1 Emergency Lighting 30-Day Inspection; dated March 24, 2005

AA37050406; Perform 28.506.01 Attachment 2 Emergency Lighting 30-Day Inspection; dated April 6, 2005

AG41030217; Perform Plant Hi-Com Handset Functional Test; dated February 12, 2003

C930040100; Completed Surveillance of 37.000.014; dated April 15, 2005

C992050100; Completed Surveillance of 37.000.014; dated March 12, 2005

H4000Y000; Perform PM on Operations Radio Equipment; dated May 19, 2005

WR 000Z052053; Replace Bus 64V Positions V1, V2, V3, and 64W; Position W4, W5 Breaker Trip Fuses Per EPP 33675

LIST OF ACRONYMS USED

AC	Alternating Current
AMP	Amperes
AOP	Abnormal Operating Procedure
APCSB	Auxiliary Power Conversion Systems Branch
AWG	American Wire Gauge
BOP	Balance of Plant
BTP	Branch Technical Position
CARD	Condition Assessment Resolution Document
CFR	Code of Federal Regulations
CMEB	Chemical Engineering Branch
CS	Core Spray
DC	Direct Current or Design Calculation
DF	Duration Factor
DRS	Division of Reactor Safety
EDP	Engineering Design Package
EOC	Extent of Condition
F	Fahrenheit
FHA	Fire Hazards Analysis
FPP	Fire Protection Program
GL	Generic Letter
HPCI	High Pressure Coolant Injection
HVAC	Heating, Ventilation, Air Conditioning
ICEA	Insulated Cable Engineers Association
IMC	Inspection Manual Chapter
IPEEE	Individual Plant Examination External Events
kV	kilovolts
LOOP	Loss Of Offsite Power
NCV	Non-Cited Violation
NFPA	National Fire Protection Association
NRC	Nuclear Regulatory Commission
MCC	Motor Control Center
PARS	Publically Available Records
RCIC	Reactor Core Isolation Cooling
RHR	Residual Heat Removal
RIII	Region III
RPV	Reactor Pressure Vessel
SBFW	Standby Feedwater
SDP	Significance Determination Process
SER	Safety Evaluation Report
SRA	Senior Risk Analyst
SRV	Safety Relief Valve
SSA	Safe Shutdown Analysis
SSCs	Structures, Systems, and Components
SSD	Safe Shutdown
UFSAR	Updated Final Safety Analysis Report
URI	Unresolved Item

LIST OF ACRONYMS USED

V	Volts
Vac	Volts - alternating current
Vdc	Volts - direct current