U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-341/84-49(DRS)

Docket No. 50-341 License No. CPPR-87

Licensee: Detroit Edison Company
2000 Second Avenue
Detroit, MI 48224

Facility Name: Fermi 2 Nuclear Power Plant

Inspection At: Fermi 2 Site, Monroe, Michigan

Inspection Conducted: October 29-31, November 1, 2, 14-16, 26-30, 1984, and January 22-25, 1985

Inspectors: C. Ramsey for L. A. Reyes — Date 2/15/85

H. Thomas for L. A. Reyes — Date 2/15/85

A. Coppola for L. A. Reyes — Date 2/15/85

J. Ulie for L. A. Reyes — Date 2/15/85

J. Holmes Jeffrey Holmes — Date 2/15/85

Approved By: L. A. Reyes, Acting Chief
Operational Programs Section — Date 2/15/85

Inspection Summary

Inspection on October 29-31, November 1, 2, 14-16, 26-30, 1984 and January 22-25, 1985 (Report No. 50-341/84-49(DRS))
Areas Inspected: Special safety inspection conducted to verify the adequacy of the facility's fire protection program implementation, interim post fire safe shutdown method and supplemental procedures in accordance with commitments made to the NRC. The inspection involved 546 inspector-hours by five NRC inspectors including 71 inspector-hours onsite during offshifts and in-office review at the Region III office.

Results: Of the 7 areas inspected, no items of noncompliance or deviations were identified in 5 areas; two deviations were identified in the remaining two areas (installation of portable fire extinguishers with less extinguishing capability than those identified in the FSAR - Paragraph 6.F.(4); failure to design and install fire detectors in accordance with FSAR commitments - Paragraph 6.C).

DETAILS

1. Persons Contacted

R. Anderson, System Engineer
D. Aniols, Nuclear Shift Supervisor, Nuclear Operations
*L. Bregni, Engineer, Licensing
R. Buehler, Nuclear Shift Operator, Nuclear Operations
*J. Clark, Operations
J. Conen, Engineer Licensing
A. Dixon, Assistant Reactor Operator
T. Dong, Nuclear Engineer
K. Earle, Nuclear Engineering Licensing
D. Edwards, Start Up Engineer
*W. Fahrner, Manager Fermi 2
E. Griffing, Assistant Manager, Nuclear Operations
J. Hale, Respiratory Protection Specialist, RAD Services Incorporated
R. Henson, Nuclear Shift Supervisor, Nuclear Operations
*D. Holland, Nuclear Fire Protection Specialist
*W. Holland, Vice President Fermi 2
A. Inks, Nuclear Supervising Operator, Nuclear Operations
W. Jens, Vice President, Detroit Edison, Nuclear Operations
L. Karas, Startup Test Engineer
J. Kenney, Jr., Work Leader
E. Leighton, System Designer
R. Lenart, Superintendent, Nuclear Production
*J. Contoni, Principal Resident Engineer
J. Martin, Quality Assurance Auditor
W. Miller, Construction Quality Assurance Supervisor
*R. Olson, System Engineer, Fire Protection
M. Rager, Licensing Engineer
A. Randolph, Foreman, Bechtel
F. Schwar, Quality Assurance Supervisor
L. Schuerman, Nuclear Engineer Supervisor
*E. Schwartz, Supervisor, Quality Assurance
R. Speek, Jr., Nuclear Assistant Supervisor, Nuclear Operations
F. Svetkovich, Nuclear Engineer, Systems
A. Thiel, Engineer
*G. Wilson Fire Protection Engineer, Gilbert Commonwealth

*Denotes persons attending the exit meeting January 25, 1985.

The following NRC personnel were also in attendance at the exit meeting of January 25, 1985.

*P. Byron, Senior Resident Inspector.
*L. Reyes, Acting Chief, Operational Programs Section
*R. Knop, Section Chief, Reactor Projects Section

2. Action on Previous Inspection Findings

a. (Open) IE Circular 78-18 dated November 6, 1978 identified three concerns as follows:

(1) Small Fires May Not Actuate Sprinklers-Use Fast Response Sprinklers

On September 15, 1978, a full scale fire test was conducted by Underwriters Laboratories Inc. (U.L.), as part of the Fire Protection Research Program managed by Sandia's Laboratories Inc., under NRC contract. The purpose of the test was to demonstrate the effectiveness of area sprinklers and cable tray fire barriers (ceramic fiber blankets) in preventing damage to cables as a result of a flammable liquids exposure fire.

The test resulted in damage to some electrical cables even though the sprinkler and fire detector arrangements were in accordance with NFPA codes. However, no water was actually discharged from the sprinklers at any time during this test due to the failure of sprinkler heads to actuate.

The test results concluded that some small fires may not actuate sprinkler heads. To reduce this possibility, the Circular recommended that consideration be given to using fast response sprinkler heads (less than approximately 3 minutes as discussed in U.L. Standard 199 and U.S.'s Fire Protection Equipment Directory) in Automatic Sprinkler Installations in Nuclear Power Plants.

The licensee's February 4, 1980 (EF2-47,859) and April 23, 1984 (EF2-68,261) internal response to IE Circular 78-18 indicates that the cable tray sprinkler system was developed by Stone & Webster (S&W). The design requires branch arms with nozzles in between the trays on groups of trays of 5 or greater. This design apparently supplements the area ceiling sprinklers and according to the licensee, provides adequate sprinkler coverage and response time.

The inspectors reviewed a sample of hydraulic calculations (Reactor Building 4th floor evaluation 659 feet-6 inches drawing No. 6M721-5065 Revision E, calculations sheets 1-7 for M.G. sets dated 5-2-83) where the sprinkler system installation included branch line extensions between groups of cable trays (similar to the in-rack sprinklers and storage arrangements discussed in NFPA 231 and 231C) as discussed in the licensee's April 23, 1984 internal correspondence. The calculations were found to be acceptable. However, based on the licensee's internal responses, it is not clear that licensee considered in the system layouts the concerns for small fires not actuating sprinkler heads. No documentation was presented to verify proper response time due to the location of sprinklers relative to the origin of fire and components being protected such as

cable tray arrangements, room configurations, thermal inertia and how the path of air movement in the area influences the actuation of sprinklers. Where obstructions may interfere with sprinkler actuation and discharge, NFPA 13 references NFPA 231 and 231C for these installations. NFPA 231 and 231C require that consideration be given to ceiling configurations and height, room and storage configuration (cable trays) in determining temperature rating and location of sprinklers. These parameters have not been verified in the licensee's sprinkler installations.

(2) The Path of Air Movement Influences the Actuation of Fire Detection Devices - Locations of Detectors

The tentative conclusions from the test also identified the concern that the locations of fire detection devices is of great importance. The path of air movement in the area influences the actuation of such devices and should be considered in the system layouts.

The licensee's internal correspondences did not discuss how various air flows affected the actuation of fire detection devices. However, the April 23, 1984 internal correspondence (EF2-68,261) indicated that air flow movements were considered in the fire detection system design and the designs were being reviewed to the guidance of NFPA 72E. The results of this review were not provided to the inspectors. Therefore, the inspectors could not determine the acceptability of the licensee's considerations for mechanically induced air movement in fire detection system designs.

(3) Flammastic 77 Fire Retardant Coatings Consider the Wick Effect and Provide Curbs

The tentative conclusion from the test identified the most probable cause of fire damage to certain cable trays to be related to the absorption or seepage of flammable liquid (heptane) under the ceramic fire blanket at the juncture with the floor. This caused ignition in the interior regions of the cable tray and some of the cable damage was apparently caused by absorption of the flammable liquid and ignition on the inside of the barrier (the Wick effect). This was concluded to be the most significant failure mode of the test.

The licensee's April 24, 1984 internal correspondence (EF2-68,261) states that "Fermi 2 no longer is planning to use Flamemastic 77 fire retardant coatings" and indicates that the licensee is installing the 3M Brand one hour fire barrier on certain cable trays. This material will not absorb flammable liquid as does mineral wool blankets.

The inspectors verified that the licensee has installed the 3M one hour fire barrier material described in the licensee's internal correspondence dated August 23, 1984

(EF2-68,261) around certain cable trays. By letters dated December 4, 1984, (internal correspondence No. EF2-72,323) the licensee verified that the density of the 3M brand one hour fire barrier wrap material and the design used at the facility will provide suitable protection of cable trays/ conduits from flammable liquid spills. Therefore, the concern for the "wick effect" discussed in the U.L. test is resolved. This circular (Items 1 and 2) remains open pending review of additional information verifying the statements made in the licensee's internal correspondence dated February 4, 1980 (EF2-47,859) and April 23, 1984 (EF2-68,261) and that these considerations have been included in the plant's design.

b. (Open) 10 CFR 50.55(e) Report, Item No. 116, "Potential Design Deficiency by Allowing Freezing of Buried Piping System" and 10 CFR 50.55(e) Report, Item No. 111, "Design Deficiency on the RHR Reservoir Freeze Over" (See Region III Inspection Report No. 50-341/85-05.)

On February 29, 1984, the licensee's correspondence No. QA-84-326 reported a potential design deficiency that allowed freezing of the buried underground piping system for the fire main.

During severe cold weather experienced in January 1984, the water supply to the fire protection system in the Division I RHR building was found to be inoperable due to the suspected presence of ice in the pipe between the underground twelve inch ring header which circles the power block as originally reported by the licensee. The exact area of the freezing could not be substantiated due to a subsequent warming spell, but the potential areas in which the freezing could have occurred were identified.

At the request of the NRC, by letter dated June 18, 1984, the licensee agreed to provide a second underground feed from the main fire loop (ring header) to the Division II RHR complex that would be properly valved to the extent that one of the two RHR fire suppression systems would always be available. Therefore, the licensee was able to restore the inoperable Division I RHR building fire protection system to an operable status.

Subsequently, the licensee reported to Region III in an August 23, 1984 correspondence (EF2-69,698) that upon engineering review, the scope of the reportable deficiency was determined to be limited to potential freezing of the RHR Complex fire protection system supply line in an area where it is routed into the RHR Complex and not in the underground feed main as originally reported. The supply line is routed from below ground level to the first floor of the building and is embedded in an unheated space inside the buildings concrete foundation walls. This wall is exposed to ambient temperatures on both sides. There is no source of heat in the wall to prevent the supply line from freezing.

The supply lines to the RHR Complex for both the Division I and Division II fire protection systems are of identical designs. They are routed into the building at different locations. However, both supply lines have the same potential to freeze. To prevent any additional f ezing of these lines during the remaining cold weather in 1983/1984, water was passed through both supply lines once a shift while the potential for freezing existed.

In the licensee's August 23, 1984 submittal to Region III (EF2-69,698), the licensee indicated that new lines would be installed which bypass the section of the lines currently embedded in the foundation walls. Subsequently, the licensee determined this was not a feasible solution.

During the inspection, the licensee indicated to the inspectors that another letter amending the August 23, 1984 submittal to Region III would be forthcoming, indicating that adequate protection from freezing of the supply lines could be provided by adding insulation to the outside foundation walls in which the supply lines are embedded. Therefore, the insulation would be added and the affected supply lines would not be rerouted. The inspectors verified that the insulation was provided on the exterior foundation walls.

To verify the effectiveness of this solution, the licensee indicated that instrumentation would be installed to monitor the temperature between the outside wall and the new insulation. The inside wall is exposed to the RHR reservoir and the air space above the reservoir and below the emergency diesel generator building. The reservoir was frozen at the same time the Division I RHR fire protection system supply line was frozen (10 CFR 50.55(e) report Item No. III).

According to the licensee, this interim solution to the problem of freezing to the RHR complex fire protection supply lines is supported by heat balance calculations which conclude that the supply lines will not freeze if a minimum of 6 inches of styrofoam insulation is installed on the outside wall of the RHR complex adjacent to the embedded piping. This conclusion was based on the assumption that the reservoir will be maintained above 40°F and that the air space above the reservoir will equalize to this temperature. The reservoir will be the heat source to prevent the supply lines from freezing. For the interim, the air space temperature above the reservoir will also be monitored.

The data collected during the 1984/1985 winter will be used to validate calculation assumptions and to determine if the added insulation will be sufficient during an abnormally severe winter. While the effectiveness of the added insulation is being evaluated the licensee proposed to maintain a continuous flow rate (1 gpm) through the affected supply lines sufficient to prevent freezing. The inspectors verified that this flow is continuous and is measured by flow meters.

The inspectors evaluated the licensee's heat balance calculations which were based on the following limited design conditions:

- An outside ambient temperature of -25°F.
- The room temperature inside the RHR Complex was maintained at a minimum of 60°F.
- The reservoir temperature was maintained at 40°F or above.

According to the licensee, these assumptions were made based on ground temperatures which are consistent with the geographic location.

The inspectors informed the licensee that the calculations were very conservative and very much dependent on, and sensitive to the temperature assumed for the air above the reservoir.

For the current winter (1984/1985), the licensee acknowledges that there is insufficient heat to maintain the reservoir temperature above 43°F. Therefore, the licensee has installed an auxiliary boiler to heat the reservoir.

Since the actual temperature of the reservoir will be extremely difficult to predict during winters, the licensee has devised an extensive temperature monitoring program for the current winter (1984/1985) to establish a more accurate data base. This was determined acceptable as an interim measure in conjunction with the installation of 6 inches of styrofoam insulation on the exterior of the RHR complex foundation wall for 10 feet on both sides of the supply bins, and extending a minimum of 5 feet below grade. In addition, the licensee must implement an administrative procedure that requires verification of water flow (1 gpm) through both supply lines on a once per shift basis during winter months until the long term (permanent) solution to this problem has been accepted by Region III.

The inspectors did not determine the feasibility or acceptability of the proposed long term solutions by the licensee. This item (10 CFR 50.55(e) report item No. 116) remains open pending Region III's review and acceptance of the licensee's submittal describing final resolution.

c. (Closed) Open Item (341/82-06-01): Inclusion in plant procedures measures to establish safe shutdown conditions in the event the power distribution system is disrupted by a control room fire and the control room functions are lost in the control room and at the remote shutdown panels.

This item was discussed in item Nos. 341/83-12-02 and 341/83-12-05 of Inspection Report No. 50-341/83-12; and item No. 341/84-16-03 of Inspection Report No. 50-341/84-16. Procedure Nos. 20.000.22, 20.501.02 and 20.000.19 establish this capability. These are interim procedures at present. Existing deficiencies in the procedures are discussed in item No. 341/84-49-16 of this report.

d. (Closed) Open Item (341/83-12-02): RHR, torus and drywell cooling requires re-entry into the control room if shutdown from outside the control room is required as a result of a control room fire. In the November 2, 1984 meeting with the NRC staff in Bethesda, Maryland, the licensee agreed to provide the capability to accomplish torus cooling, drywell cooling or the necessary shutdown modes outside of the control room or any area that has been involved in fire. Repairs for hot shutdown were accepted by NRR as interim operating measures in order for the licensee to accomplish these functions for the short term. This is further discussed in Item No. 341/84-49-16 of this report.

e. (Open) Noncompliance (341/83-12-09): Fire door Nos. T3-6, R3-13, R3-20, RM2-1, 42-13, R2-16, R2-11, RM-2-2, RM2-3, and RM2-4 did not have labels attesting to fire endurance capability. In pursuing resolution of this concern, the licensee's fire protection engineering staff performed a review of all fire door assemblies located in the plant. The fire door assembly review was performed in part by Underwriters' Laboratories, Inc. personnel and completed and formulated by a consultant. The inspector's copy of the fire door report was dated September 3, 1984, and titled, "Fermi 2 Fire Door Assembly Qualification Review" package. This fire door assembly review identified five concerns as the following:

(1) Fire door assemblies with the proper rating labels but with additional equipment mounted on them.

(2) One and one half hour rated doors in an opening requiring a three hour rated door.

(3) Properly rated door hinges in unrated steel channel frames.

(4) Combination fire/security door assemblies that are not UL labeled.

(5) The amount and method of attachment of additional hardware to the doors and frames.

It was determined in a conferance call on November 29, 1984 between NRR and Region III that the fire door assembly review package be sent to NRR for review. On January 24, 1985 the licensee sent the fire door package to NRR for review. This item will remain open pending NRR's review of the fire door assembly review package. In addition, the licensee was informed that if fuel load occurs prior to resolution of this item that compensatory measures in accordance with the licensee's technical specification action statement for fire rated assemblies would be required to be instituted during the interim. The licensee acknowledged their understanding of this concern.

f. (Closed) Open Item (341/83-12-10): Fire barriers not installed around cable trays. The inspectors observed that an acceptable (3M material) 1 hour fire barrier had been installed around certain cable trays required for safe shutdown in accordance with the FSAR.

The licensees internal letter dated August 24, 1984, identifies the following list of cable trays required to be wrapped:

AREA DESIGNATION	CABLE TRAY NUMBER	APPROX. FT. OF WRAP
BOBO	2C-027	92
BOBO	2C-030	10
BOBO	2C-035	08
BOBO	2C-036	74
BOBO	2P-019*	66
BOBO	2P-026!	08
BOBO	DC2P-019*	--
BOBO	DC2P-026!	--
DAN	1C-033	56
DAN	1P-038	06
DAN	1P-040	57
DAN	1P-051	03
IDA	1C-006	04
IDA	1P-007	30
IDA	1P-045	20

* 2P-019 and DC2P-019 are physically the same tray.

! 2P-026 and DC2P-026 are physically the same tray.

During a plant tour of the reactor building, the inspectors sampled three of the cable trays numbered IDA 1C-006, IDA 1P-007, and IDA 1P-045 and verified that these three trays were completely enclosed in the 3M product.

g. (Closed) Open Item (341/83-12-11): Documentation must be provided verifying the fire endurance capability of fire damper installed in diesel fire pump room, fiberfax insulating and damming material used in penetration seal assemblies and 1 hour and 3 hour fire material. The inspectors reviewed the licensee's documentation attesting to the fire endurance capability of the 3 materials in question and found it acceptable.

h. (Closed) Open Item (341/83-12-12): Physical barriers were not installed around sectional isolation valves (post indicator valves) and fire hydrants for the underground fire main in the plant yard as required by the FSAR and governing code. Inspectors verified that physical barriers (concrete post) were properly installed to protect hydrants and isolation valves from physical damage (i.e. vehicular traffic) in accordance with the governing code.

i. (Closed) Open Item (341/83-12-13): Fire hose was disconnected from hose station and pressure reducing device was not installed on standpipe outlet on the refueling floor (fifth floor of the reactor building). The inspectors verified that all fire hoses on the refueling floor were attached to their respective outlets and pressure reducers were installed on standpipes on the refuel floor.

However, pressure reducers were not installed on other standpipe outlets throughout the plant. This is discussed in Item No. 341/84-49-09 of this report.

j. (Open) Unresolved Item (341/84-16-01): Relay room not in compliance with requirements for safe shutdown. By letter, dated October 22, 1984, the licensee committed to provide alternative shutdown capability for this area by startup after the first fuel cycle. For interim operation, the licensee will implement compensatory measures. This item remains open pending completion of this installation.

k. (Open) Deviation (341/84-16-02): Control room panels P601, P602, P808, P809 and P810 containing the controls instrumentation and associated circuits for all required safe shutdown functions were not designed and installed for fire endurance in accordance with the FSAR and commitments made to the NRC. By letter dated October 22, 1984, the licensee committed to provide alternative shutdown capability for this area by startup after the first fuel cycle. For interim operation, the licensee will implement compensatory measures. This item remains open pending completion of this installation.

l. (Open) Unresolved Item (341/84-16-03): Present alternative shutdown systems are not electrically independent of the control room. Power distribution systems could be disrupted by a control room fire, causing the loss of all safe shutdown functions. Safe shutdown procedures developed for this condition were not acceptable and it was determined that the procedures would not prevent uncovering of the reactor core within the allotted time. By letter dated October 22, 1984, the licensee committed to provide alternative shutdown capability for this area by startup after the first fuel cycle. For interim operation, in the meeting of November 2, 1984, in Bethesda, Maryland with NRR, the licensee proposed a limited fire concept to the NRC which would allow the development of acceptable supplemental safe shutdown procedures. NRR accepted the licensee's limited fire concept with the proviso that acceptable supplemental safe shutdown procedures be developed for interim operation. This is further discussed in open item No. 341/84-49-16 of this report.

m. (Closed) Unresolved Item (341/84-16-04): DC MCC Room (Zone 11) contains Division I DC motor control centers for the RCIC system and the Division II Motor control centers for the HPCI system. The divisional MCC's are separated by a horizontal distance of approximately 10 feet. A partial height, partial width (approximately 7 feet by 7 feet) partition is centered between the divisional MCC's and serves to shield the divisional MCCs from direct flame impingement from fire and water impingement due to manual fire fighting hose streams. This partition is not a rated fire barrier and will not stop the spread of fire from one divisional MCC to the other. The simultaneous loss of these systems could result in the loss of makeup water to the reactor vessel. The licensee elected to use the ADS and LPCI systems as redundant systems to HPCI and RCIC. All of the controls and instrumentation for ADS and LPCI are independent of this fire area. Therefore, at least one train of systems will be able to provide this function in the event of a fire in Zone 11.

n. (Open) Open Item (341/84-16-05): Associated circuits - a fire in the control room which damages control room panels H-11 P601 and H-11 P602 will also cause the loss of both remote shutdown panels. The control circuits and instrumentation circuits for the Division 1 and Division II shutdown systems are not electrically isolated between the control room panels and remote shutdown panels (H-21 P100 and H-21 P101). On the basis that the NRC has accepted the licensees limited fire concept for interim operation, the concerns identified in this item are not relevant for interim operation. However, this item will remain open pending the completed installation of the alternative shutdown capability discussed in the licensees submittal of October 22, 1984.

o. (Open) Open Item (341/84-16-06): Associated circuits - the relay room contains all of the relays and interlocks for all redundant equipment required for safe shutdown. The licensee had not performed a documented analysis of the relay room, determining the affects of spurious signals due to a relay room fire. By letter dated October 22, 1984, the licensee committed to provide alterative shutdown capability for this area by startup after the first fuel cycle. For interim operation, the licensee will implement compensatory measures. This item remains open pending completion of this installation.

p. (Closed) Open Item (341/84-16-07): The hi-low pressure interface concerns had been analyzed, but no final report had been issued. Based on information which was available during the audit, one hi-low pressure interface has been identified, namely the RHR suction isolation valves from the recirculating pump section. These were valves EL1-50F008, EL1-50F009, and EL1-50F608. The licensee identified two high low pressure interfaces, namely:

- RHR isolation valves 50F008, 50F009 and 50F608. The control and power for 50F008 is obtained from Division 1. The circuit breaker for valve 50F608 will be racked out and tagged. This use of this method to maintain the integrity of this system is satisfactory.

- The other high low pressure interface consisted of reactor recirculation loop A check valve (V8 2163) in series with motor operated valve V82161. There is a 1" diameter air operated bypass valve (V8-7687) around the check valve which could fail open concurrently with the motor operated valve. The licensee presented a calculation which demonstrated that an existing relief valve in the RHR pump discharge line is capable of handling any blowdown flow resulting from a spurious opening of the bypass valve. The reactor recirculation loop B has the same configuration as loop A and the above analysis is applicable.

q. (Open) Open item (341/84-16-08): The present control system for the emergency diesel generator, service water pumps, RHR service water pumps and fuel oil transfer pump could be lost due to a fire in the control room. This condition also applies to the emergency diesel generator bus breakers EA3, EB3, EC3 and ED3 due to a fire which

occurs in the relay room. The loss of these breakers would inhibit the ability to load the safe shutdown system on the emergency busses. By letter dated October 22, 1984, the licensee committed to provide alternative shutdown capability for this area by startup after the first fuel cycle. For interim operation, the licensee will implement compensatory measures. This item remains open pending completion of this installation.

r. (Closed) Deviation (341/84-16-09): The diesel fire pump fuel oil storage tank is installed above ground outside of the fire pump house and is exposed to freezing temperatures and gelling of the diesel fuel during cold weather. To resolve this concern, the licensee provided the inspectors with the following documentation as justification for deviating from the FSAR and governing code requirements:

(1) Amoco product information sheets describing Amoco's diesel fuel oil blends, including pour points, cloud points and other pertinent information. While the pour point indicated that the fuel blend used by the licensee could withstand temperatures of -25°F before gelling occurred, the cloud point indicated that gelling and/or fuel filtering problems would occur at -5°F.

(2) A fuel delivery ticket indicated that a 50/50 No. 1 and No. 2 fuel oil blend had been received and stored in the diesel fire pump fuel oil storage tank on October 18, 1984.

(3) The licensees "Materials Management System Order to Initiating Departments", including vendor instructions to provide fuel in accordance with Amoco 50/50 blend No. 23,329 (American diesel fuel - G) as identified in the Amoco engineering service typical inspection sheet of February 4, 1980, verified characteristics of the fuel.

(4) Oil sample data sheet type No. P11 indicated that an oil sample of the diesel fire pump fuel oil storage tank had been taken on November 19, 1984, showing that the cloud point allowed value was less than -5°F. The measured value was -4°F. Since the sample failed, the licensee indicated that a second sample was taken on November 26, 1984 to verify the measured cloud point value. The licensee suspected that the individual taking the first sample failed to follow the sample procedure properly. The measured value of the second sample was within the allowed value of -5°F. To provide additional assurance of the fuel blend the licensee indicated that subsequent sampling of the diesel fuel oil would be conducted upon delivery. The inspectors requested that a procedure be implemented to require this sampling on a semi annual basis within 7 days of each fuel delivery.

(5) To further justify this deviation from the FSAR and governing code requirements, in the November 2, 1984 meeting with the NRC staff in Bethesda, Maryland, the licensee committed to

install a fuel warmer for the fuel oil filter to the diesel fire pump. The inspectors reviewed the manufactures literature on the fuel oil filter warmer and found it to be satisfactory. Design change No. PDC 1794 was initiated to install the fuel warmer on the diesel fire pump fuel oil supply to increase the diesel fuel oil temperature above the cloud point in order to prevent paraffined crystals from forming and clogging the fuel filters.

The inspectors verified that the fuel warmer was installed. This licensee's weekly fire inspection sheet required visual inspection of the warmer to verify no leakage.

No items of noncompliance or deviations were identified.

3. Documents Reviewed

Procedures

Number	Title
FP-N-00a-590, Rev. 0	Residual Heat Removal (RHR) Complex Emergency Diesel Generator (EDG) No. 11 Storage Room
FP-N-00b-590, Rev. 0	Fire Protection Implementing Procedures Residual Heat Removal (RHR) Complex Emergency Generator (EDG) No. 12 Oil Storage Room, EL 590'0"
FP-N-00c-590, Rev. 0	Fire Protection Implementing Procedures Residual Heat Removal (RHR) Complex, Emergency Diesel Generator (EDG) No. 13 Oil Storage Room EL 590'0".
FP-N-00d-590, Rev. 0	Residual Heat Removal (RHR) Complex Emergency Diesel Generator (EDG) No. 14 Oil Storage Room, EL 590'-0"
FP-N-00e-590, Rev. 0	Residual Heat Removal (RHR) Complex, Emergency Diesel Generator (EDG) No. 11, EL 590'-0"
FP-N-00f-590, Rev. 0	Residual Heat Removal (RHR) Complex, Emergency Diesel Generator (EDG) No. 12 Room, EL 590'0"
FP-N-00g, Rev. 0	Residual Heat Removal (RHR) Complex Emergency Diesel Generator (EDG) No. 13 Room, EL 590'0"
FP-N-00h-590, Rev. 0	Residual Heat Removal (RHR) Complex Emergency Diesel Generator (EDG) No. 14 Room, EL 590'0"

Number	Title
FP-T-008-613, Rev. 0	Relay Rooms, Zone 8, EL 613'-6
FP-T-011-630, Rev. 0	Auxiliary Building, Cable Spreading Room, Zone 11, EL 630'
FP-T-013-655, Rev. 0	Computer Rooms, Zone 13, EL 655'-6"
FP-T-02a-540, Rev. 0	Reactor Building Sub-Basement Northwest Corner Room, Zone 2, EL 540'0"
FP-T-02b-562, Rev. 0	Reactor Building Basement Northwest Corner Zone 2, EL 562'0"
FP-T-03a-540, Rev. 0	Reactor Building Sub-Basement Northwest Corner Room, Zone 3, EL 562'0"
FP-T-03b-562, Rev. 0	Reactor Building Basement Southwest Corner Room, Zone 3, EL 562'0"
FP-T-04a-540, Rev. 0	High Pressure Coolant Injection Pump and Turbine Room, Zone 4, EL 540'0"
FP-T-04b-562, Rev. 0	Control Rod Drive Pump Room, Zone 4, EL 562'0"
FP-T-04c-540, Rev. 0	Reactor Building Sub-Basement Southeast Corner Room, Zone 4, EL 540'0"
FP-T-04d-562, Rev. 0	Reactor Building Basement Southeast Corner Room, Zone 4, EL 562'0"
FP-T-05a-540, Rev. 0	Reactor Building Sub-Basement Northeast Corner Room, Zone 5, EL 540'0"
FP-T-05b-562, Rev. 0	Reactor Building Basement Northeast Corner Room, Zone 5, EL 562'0"
FP-T-05c-562, Rev. 0	Reactor Building Basement Corridor, Zone 5, EL 562'0" and EL 564'0"
FP-T-06a-583, Rev. 0	Auxiliary Building Cable Tray Area, North, Zone 6, EL 583'-6"
FP-T-06b-583, Rev. 0	Auxiliary Building Cable Entry Room, Zone 6, EL 583'-6"
FP-T-06c-583, Rev. 0	Auxiliary Building Cable Tray Area, South, Zone 6, EL 583'-6"
FP-T-06d-603, Rev. 0	Auxiliary Building, First Floor Mezzanine, Zone 6, EL 603'-6"
FP-T-07a-583, Rev. 0	Reactor Building North Control Rod Drive (CRD) Area Zone 7, EL 583'-6"

Number	Title
FP-T-07b-583, Rev. 0	Reactor Building South Control Rod Drive (CRD) Area, Zone 7, EL 583'-6"
FP-T-17a-659, Rev. 0	Reactor Building Standby Liquid Control System 17, EL 659'-6"

Number	Title
12.000.14	Industrial Hazard Awareness (Revision 2)
12.000.48	Plant Housekeeping (Revision 4)
12.000.36	Fire Brigade Facilitating Guidelines (Revision 4)
20.000.22	Plant Fires (Revision 3)
20.501.02	Control Center Complex Fires (Revision 1)
21.000.01	Shift Operations and Control Room (Revision 9)
14123-FEP-2.0	Power Cable Termination and Splicing (Revision 3)
42.306.01	480 Volt Breaker Operations and Inspections (Revision 0)
42.138.01	Protective Relay Calibration and Breaker Functional Test (Revision 0)
42.138.02	4.16 KV Circuit Breaker Inspection (Revision 0)
12.000.78	Fire Protection Guidelines (Revision 2)
12.000.07	OSRO Comment Control Form (Revision 10)
27.501.05	Fire Suppression Water System Simulated Automatic Actuation Test (Revision 0)
44.160.04	Halon Fire Suppression Systems Operability and Functional Test (Revision 1)
24.504.02	Halon System Manual Activation Puff Test (Revision 1)
FP-T-16a-677	Auxiliary Building, North Standby Gas Treatment (SGTS) Room, Zone 16, EL. 677 feet, 6 inches
44.160.01	Fire Detection Operability and Functional Test (Revision 2)
34.000.05	Fire Pump (Diesel) Inspection (Revision 1)
42.501.02	Diesel Fire Pump Battery Inspection - 18 Months (Revision 0)
71.000.03	Sampling and Analysis (Revision 2)
P80-00-SD	Functional System Description for Fire Protection and Detection System (Revision 2)
71.000.15	Oil Sample Data Sheet (Revision 0)
24.501.01	Electric Fire Pump Operability Test (Revision 6)
24.501.02	Fire Protection Valve Lineup Verification
24.501.03	Fire Suppression Water System Flush (Revision 3)
24.501.04	Fire Suppression and Sprinkler System Valve Operability Test (Revision 1)
24.501.05	Fire Suppression Water System Simulated Automatic Actuation Test (Revision 4)
24.501.06	Fire Suppression Water System Functional Flow Test (Revision 2)
24.501.07	Diesel Fire Pump Engine Operability Test (Revision 6)
24.501.08	Fire Door Surveillance Test (Revision 0)
24.501.09	Fire Hose Station Inspection
24.501.10	Fire Hose Station, 18 Month Operability Test
24.501.12	Fire Barrier Inspection (Revision 2)
24.501.14	Yard Fire Hose Hydrostatic Test and Inspection (Revision 2)
FP-T-17b-659 Rev. 0	Reactor

Name	Title
27.322.01 Rev. 0	Drafts - Emergency Lighting Monthly Inspection
CAIO.000.073 Rev. 1	Fire Damper Inspection
20.501.02	Control Center Complex Fires, Revision 1, October 16, 1983
20.000.19	Shutdown from outside the Control Room, Revision 3, August 11, 1984
20.000.22	Plant Fires, Revision 3, October 22, 1984

Mechanical Drawings

Number	Title
6M721 4499, Rev. 1	Damper and Isolation Valve Schedule for EF-2 Ventilation and Air Conditioning System Reactor Building
6M721 4500, Rev. 1	Damper and Isolation Valve Schedule for EF-2 Ventilation and Air Conditioning System Reactor Building
6M721-5073, Rev. G	Fire Protection Plan - Cable Spreading Room
6M721-5065, Rev. G	Fire Protection Plan - Railway Unloading & M.G. Sets Reactor Building
6M721-2135, Rev. X	Fire Protection System
6M721-2010, Rev. X	General Service Water System
6M721-2125, Rev. AJ	Yard Piping Plot
6M721-2126, Rev. E	Yard Piping Plot
6M721-2127, Rev. AC	Yard Piping Plot
6M721-2128, Rev. AE	Yard Piping Plot
6M721-2129, Rev. B	Yard Piping Plot
6M721-2130, Rev. P	Yard Piping Plot
6M721-2131, Rev. J	Piping Details
6M721-2293, Rev. Q	Piping - Fire Fighting Headers
6M721-2294, Rev. P	Piping - Fire Fighting Headers
6M721-2295, Rev. K	Piping - Fire Fighting Headers
6M721-2669, Rev. L	Yard Piping Material Specification Codes
6A-721-2176	Partial Site Plan
6C721Y-2018	Asphalt Paving Around Power Plant
6C721Y-2019	Asphalt Paving Around Power Plant
6M721-4526-1, Rev. E	Piping Isometric

Pre-Operational Test Results

Number	Title
PRET. P8000.001	Fire Protection System

Electrical Drawings

6E-721-2913-1, Rev. G	Emergency Lighting
6E-721-2922-1, Rev. L	Emergency Lighting
6E-721-2903-1, Rev. T	Emergency Lighting

Fire Brigade Lesson Plans

Lesson #1	Introduction and Overview
Lesson #4	Class of Fire and Fire Extinguishers
Lesson #5	Water, Hose Streams, Hydraulics, and Water Supply
Lesson #6	Protective Breathing Apparatus
Lesson #8	Personal Protective Equipment

Proposed Operating Technical Specifications

No.	Title
3.3.7.9	Fire Detection Instrumentation
3.7.7.1	Fire Suppression Water System
3.7.7.2	Spray and/or Sprinkler Systems
3.7.7.3	CO_2 Systems
3.7.7.4	Halon Systems
3.7.7.5	Fire Hose Stations
3.7.7.6	Yard Fire Hydrants and Hydrant Hose Houses
3.7.8	Fire Rated Assemblies
3.8.4.2	Primary Containment Penetration Conductor Overcurrent Protective Devices
6.0	Administrate Controls
3.3.7.4	Remote Shutdown System Instrumentation and Controls
3.4.9.1	Residual Heat Removal Hot Shutdown
3.4.9.2	Reactor Coolant System Cold Shutdown
3.6.2.3	Suppression Pool Cooling

Letters

Detroit Edison to H. Denton (NRC) of October 22, 1984 (EF2-71994).
Subject: Implementation of Alternate Shutdown at Fermi 2.

Detroit Edison to B. J. Youngblood (NRC) of October 22, 1984 (EF2-72001).
Subject: Design of Alternate Shutdown Approach.

T. J. O'Keefe to O. K. Earle (DECo) of August 4, 1984 (NE-84-0733).
Subject: Source Organization Review of IE Circular 78-18.

J. G. Keppler (NRC) to E. Hines (DECo) of November 6, 1978.
Subject: Enclosing I.E. Circular 78-18.

R. C. Anderson to T. J. O'Keefe (DECo) of April 23, 1984 (EF2-68261).
Subject: Updating of Compliance Review of I.E. Circular 78-18 U.L. Fire Test.

R. C. Anderson to E. Lusis (DECo) of February 4, 1980 (EF2-47859).
Subject: Review of I.E. Circular 78-18 - U.S. Fire Test.

W. H. Jens (DECo) to H. Denton (NRC) of August 16, 1984 (EF2-72718).
Subject: Alternative Shutdown in the Control Center Complex.

W. J. Jens (DECo) to B. J. Youngblood (NRC) of August 3, 1984 (EF2-72717). Subject: Submittal of Deviations from Staff Interpretations of Fire Protection Features in 10 CFR 50, Appendix R and Justification.

T. J. O'Keefe (DECo) to M. Parker (NRC) of August 20, 1984. Subject: Open Items 83-12-01.

F. J. Svetkovich (DECo) to M. Parker (NRC) of September 25, 1984. Subject: Appendix R Open Items.

F. Sondgeroth (DECo) to M. Parker (NRC) of October 22, 1984. Subject: Inspection Report 84-16, Item 07.

W. H. Jens (DECo) to B. J. Youngblood (NRC) of October 22, 1984 (EF2-72266). Subject: Qualification of 3M Fire Wrap.

C. Scheibelhut to C. Ramsey (NRC) of December 19, 1984. Subject: 10 CFR 50.55(e) Item 116 (341/84-08-EE).

Minutes of meeting (DECo) of November 14, 1984 (EF2-72311). Subject: ERD Recommendations to Prevent Freezing of Fire Protection Supply Lines in RHR Complex.

W. H. Jens (DECo) to J. G. Keppler (NRC) of August 23, 1984 (EF2-69698). Subject: Final Report of 10 CFR 50.55(e) Item 116, "Potential Design Deficiency by Allowing Freezing of Buried Piping Systems."

W. H. Jens (DECo) to J. G. Keppler (NRC) of November 30, 1984 (EF2-70219). Subject: Clarification of Final Report of 10 CFR 50.55(e), Item 111, "Design Deficiency on the RHR Reservoir Freeze Over."

D. A. Wells (DECo) to J. G. Keppler (NRC) of February 29, 1984 (QA-84-326). Subject: Report of 10 CFR 50.55(e) Item on Potential Design Deficiency by Allowing Freezing of Buried Piping Systems (#116).

D. A. Wells (DECo) to J. G. Keppler (NRC) of November 25, 1983 (EF2-66478). Subject: Interim Report of 10 CFR 50.55(e) Item on Equipment Supported from Block Walls (#84).

R. Olson to John Cox (DECo) of March 15, 1983. Subject: Results of Hydro Static Testing of Fire Protection Underground and Bulk Main Piping.

T. Randazzo to O. K. Earle (DECo) of April 30, 1984 (ME-84-0305). Subject: Licensing Commitment Closeout (Letter of Agreement with Frenchtown Fire Department).

P. Byron to R. C. Knop (NRC) of October 23, 1984. Subject: Safeteam Concern Responses.

D. B. Vassallo (NRC) to W. H. Jens (DECo) of August 29, 1977. Subject: Fire Protection Functional Responsibilities (Enrico Fermi 2).

H. Tauber (DECo) to B. J. Youngblood (NRC) of March 1, 1983 (EF2-61562). Subject: Changes in Provisions for Plant Fire Protection.

F. T. Schwartz (DECo) to C. Ramsey (NRC) of November 29, 1984 (QA-84-3193). Subject: QA Program for Fire Protection.

W. H. Bornhoeft (ANI) to R. Feldman (TSI) of December 2, 1982. Subject: Three Hour Fire Endurance Tests Conducted on Test Articles Containing 'Generic' Cables Protected with Thermo-Lag 330-1 Subliming Coating Envelope System."

T. E. Sheehan (3M) to R. Olson (DECo) of August 8, 1984. Subject: U.L. test report, file No. R 10125 electrical circuit protection system for steel junction box.

R. M. Berhining (U.L.) to R. Licht (3M) of November 2, 1983. Subject: Type M20-A Intumescent Mat Used as an Electrical Circuit Protective System for Nominal 24 inches Wide Open - Ladder Cable Tray.

DECo (EF2-69218) of August 4, 1984 to B. J. Youngblood (NRC). Subject: Transmittal of Fire Protection Information.

Specifications and Test Reports

Number	Title
P41-00-SD	Functional System Description for General Service Water System
3071-59	General Service Water Pumps Purchase Specification
3071-61	Electric Fire Pump Purchase Specification
3071-62	Diesel Fire Pump Purchase Specification
Cardox Job No. VXH 113	Halon System Field Test Report
Cardox Job No. VXH 112	Halon System Field Test Report

Quality Assurance Reviews, Audits and Surveillances

Source Inspections (by purchasing department) for pipe supports fabricated by Contractor/Phoenix Company, dated October 19, 1981; December 17, 1981; February 12, 1982; March 22, 1982; June 10, 1982.

Project Quality Assurance witness of final inspections and surveillances of pipe hangers installed by Contractor/Phoenix, dated

March 4, 1982; May 6, 1982; May 24, 1982; June 1, 1982; June 5, 1982; June 17, 1982; June 22, 1982.

Quality Control receiving inspections of 3M material, dated April 5, 1984; July 14, 1984; July 21, 1984.

Contractor/ICMS Quality Control Inspections of penetration sealing activities, dated September 14, 1982; February 16, 1983; May 7, 1984.

QA Surveillances of contractors activities for compliance to QA requirements, report Nos. 82348, 83151, 83256, 83284, and 84038.

Project Quality Assurance Audits of Contractor/ICMS for penetration sealing (Audit #82-20, and Audit 83-19) and Contractor/Sussman Co. for 3M Fire Barrier Installation (Audit #84-03 and 84-17) to verify compliance to QA requirements.

Nuclear Quality Assurance review of the Fermi 2 Fire Protection Program (QA-84-1153) with an independent fire protection consultant, dated May 10, 1984.

Nuclear Quality Assurance scheduled Tech. Spec. Audit of Fire Protection No. A-QS-P/TS-84-33.

Operational Assurance Surveillances of temporary modifications and the restoring of systems to normal at completion of the temporary modification, report Nos. S-OA-U-84-826, S-OA-P-84-851, and S-OA-U-84-853.

Operational Assurance In-Process Surveillance of Pre-Operational Test of the Fire Detection and Fire Protection Systems, file Nos. OA-1235 and OA-1677.

Operational Assurance Review of Pre-Operational Test results for Fire Protection Systems, report No. OS-0278.

Operational Assurance scheduled Surveillance of Tech. Spec. requirements for Fire Protection, report No. 3-OA-U-84-780.

4. Preoperational Test Procedures and Test Results

Section 14.1.3.2.37 of the Fermi 2 FSAR requires preoperational testing of fire protection systems to verify their proper operation prior to fuel load. Section C of Appendix 9B of the Fermi 2 FSAR requires that a Quality Assurance Program be established and implemented during the construction phase to assure that this testing is performed and verified through inspection and audit to demonstrate conformance with design and system readiness requirements.

The inspectors reviewed selected samples of preoperational tests for the fire protection system to determine the degree that the tests incorporated applicable design test parameters and demonstrated operability of the systems in accordance with governing code requirements as stated in the FSAR. The results of this review is discussed in the applicable sections of paragraph No. 6 of the report.

5. Fire Protection/Prevention Program Implementation

a. Program Organization and Personnel Staffing

Appendix 9B of the Fermi 2 FSAR requires that the licensee establish and implement a fire protection program utilizing the guidance contained in NRC guidance document Appendix A to BTP APCSB 9.5-1.

The inspectors reviewed the licensee's fire protection program to determine that adequate staffing had been provided to assure a balanced approach was taken in directing programmatic activities.

Operations Procedure No. 12.000.78 (Revision No. 2), "Fire Protection Guideline," describes the conduct of operations for compliance with the licensee's commitments to administer the site fire protection program as approved by the NRC staff. Nuclear Production is responsible for implementing the fire protection program for the facility. The fire protection program is designed to conform with the requirements of 10 CFR 50, Appendix A, General Design Criterion 3, Appendix R to 10 CFR 50, 10 CFR 50.48 and Appendix A to BTP APCSB 9.5-1.

The Superintendent of Nuclear Production is responsible for the administration of plant operations and emergency plans concerning fire protection. The supervisor of Operational Assurance is responsible for verifying that the fire protection guidelines are implemented and conducted in a manner appropriate to meet NRC regulations. The Operations Engineer administers the plant specific portions of the fire protection program.

A Technical Engineer insures timely scheduling of all surveillances and preventive maintenance activities, evaluates proposed configuration changes to fire protection systems and coordinates the repair and recalibration of all fire protection instrumentation. A Radiation Chemistry Engineer is responsible for self-contained breathing apparatus and radiological support to the fire brigade. The Maintenance Engineer repairs and maintains fire suppression systems and ensures completion of all surveillances on schedule.

The Nuclear Shift Supervisor on duty conducts periodic inspection of fire protection systems, housekeeping practices, handling of flammable and combustible materials, and fire brigade activities. The Nuclear Fire Protection Specialist reports to the Operations Engineer and is responsible for fire protection equipment and supplies, training of the fire brigade, evaluation of proposed work activities and identification of potential fire hazards, and maintains interface with offsite fire fighting assistance and emergency organizations. The Nuclear Fire Protection Specialist is qualified by training (graduate degree) and over 25 years experience in fire protection.

The On-site Review Organization (OSRO) reviews the fire protection program and pre-fire plans (implementing procedures) as well as

proposed changes to the fire protection program. Enclosure No. 2 of Operations Procedure No. 12.000.07 (Revision No. 10) indicates that a qualified Fire Protection Engineer participates in the OSRO review cycle for the fire protection.

Detroit Edison's Insurance department is responsible for providing a fire protection engineer to Nuclear Safety and Plant Engineering and to assist nuclear operations in formation, maintenance and periodic review of the overall fire protection program. The manager of nuclear operations has management responsibility for establishing and implementing an effective site fire protection program. This position is responsible for ensuring that the program conforms to NRC requirements by:

- Reviewing fire protection practices and evaluating designs for compliance with FSAR and 10 CFR 50 Appendix R criteria.

- Performance of fire hazard analyses as required.

- Evaluation of current fire codes and standards for potential applicability to the facility.

- Evaluation of operating experience reports (i.e., LERs, SERs, Bulletins, Circulars and Notices) for potential impact on safe operation of the facility.

According to Nuclear Operations Program Description No. 026, dated May 8, 1984, the Site Fire Protection Engineer provided by the insurance department has the functional responsibility of reporting indirectly to the Manager of Nuclear Operations.

No items of noncompliance or deviations were identified.

b. Administrative Controls and Fire Brigade

Section 9.B. of the Fermi 2 FSAR requires that the licensee develop and implement administrative procedures which are consistent with the need for maintaining the performance of fire protection systems and personnel. A site fire brigade is required to be established for fighting fires. The authority and responsibility for each fire brigade position is required to be clearly defined. Fire brigade member qualifications are required to include periodic training, drills and physical examinations.

The inspectors reviewed a selected sample of the licensee's administrative controls established to minimize fire hazards such as plant housekeeping, control of combustibles and flammable material, fire watch training, welding/cutting and industrial fire hazard awareness. The fire brigade organization, training, equipment and member qualifications were also reviewed to determine the adequacy of manual fire fighting capability. Areas reviewed that were found unacceptable are discussed below:

(1) Fire Brigade Lesson Plans

Section V of Lesson Guide No. 4 and Section III of Lesson Guide No. 5 (Water, Hose Streams, Hydraulics, and Water Supply) instructs fire brigade members that the fire hose located on-site has a woven fabric exterior jacket and is rubber lined. Contrary to this statement the inspectors found the 1½ inch fire hose connected to interior fire hose stations to be polyurethane lined. The inspectors acknowledged the known hydraulic advantages of using polyurethane lined hose; however, it was still necessary to update the FSAR.

Section 7 of Lesson Guide No. 5 did not properly specify the safety precautions in handling 1½ inch charged fire hoses during fire attacks in that at least two fire brigade members must man the 1½ inch fire hose during fire attacks. On January 25, 1985, the inspectors were provided with documentation showing the necessary changes to Lesson Plans 4 and 5. The inspector has no further questions in this area.

(2) Requalification Training - The inspectors observed that 6 of approximately 88 fire brigade members who were originally qualified in 1982 had not been requalified as of November 29, 1984. This is not in conformance with the biannual requalification training for fire brigade members specified in Appendix 9B of the Fermi 2 FSAR and the criteria of 10 CFR 50 Appendix R.

During the inspection the licensee informed the inspectors that only those fire brigade members qualified through requalification training would be assigned to the site fire brigade during plant operation. Subsequently, on January 23, 1985, the inspectors reviewed documentation that indicated those six brigade members previously identified as not having been qualified in the past two years have now completed their requalification training during the week of December 30, 1984.

c. Proposed Operating Technical Specifications

The inspectors reviewed the licensee's proposed operating technical specifications for fire protection for conformance with existing standard technical specifications, FSAR commitments to applicable codes and standards and the NRC's standard technical specifications for alternative shutdown systems required by 10 CFR Part 50, Appendix R.

(1) 6.0 "Administrative Controls"

Table 6.2.2-1 does not include the minimum shift crew composition exclusive of the fire brigade that is required to achieve post fire safe shutdown in accordance with Appendix R criteria stated in Appendix 9B of the FSAR. Revision 9 of Proposed Operating Procedure No. 21.000.01, Section 6.2.1 (page 7) references the minimum shift crew composition specified in table 6.2.2-1 of Technical Specification 6.0. The licensee

indicated there were no other administrative controls proposed to require that the minimum shift crew composition included the necessary manpower to man the fire brigade concurrent with implementation of procedure No. 20.000.19, "Shutdown from Outside the Control Room."

To implement Revision No. 3 of Procedure No. 20.000.19, one senior reactor operator, two reactor operators and two equipment attendants appear to be required. Additional operations personnel may be required when Procedure No. 20.000.19, Revision 4 is implemented. The minimum shift crew composition shown in Table 6.2.2-1 of Technical Specification 6.0 is inadequate to accomplish both post fire safe shutdown and fire fighting activities by the fire brigade. This is considered an Open Item (341/84-49-01(DRS)), pending Region III's verification of revised administrative controls specifying this minimum shift crew composition.

(2) 3.3.7.4 "Remote Shutdown System Instrumentation and Controls"

All of the requirements for operability of the controls and instrumentation specified for safe shutdown outside of the control room given a fire and Appendix R criteria stated in Appendix 9B of the FSAR are not contained in the Technical Specification. The operability and surveillance requirements of the Technical Specification pertain to those controls and instrumentation provided to meet the requirements of 10 CFR 50 Appendix A, General Design Criterion (GDC) 19.

According to Region III's guidance from NRR the design for remote shutdown stations to meet the requirements of GDC-19 should comply with requirements of Appendix R to 10 CFR 50 as stated in the FSAR.

On March 10, 1983, the NRC issued model Technical Specifications for alternative shutdown systems required by Appendix R to 10 CFR 50. As the licensee completes the modifications for installing alternative/dedicated shutdown capability, it should be verified that the equipment and components used for safe shutdown, including all instrumentation, controls and transfer switches for the alternative/dedicated shutdown systems are included in the Technical Specifications for remote shutdown systems. The licensee agreed to submit surveillance requirements and limiting conditions for operation for this equipment by September 30, 1985. This is considered an Open Item (341/84-49-02(DRS)) pending Region III's verification of the licensee's actions.

d. Technical Specification Surveillance Procedures

Each of the proposed Technical Specifications for fire protection require periodic surveillance testing and inspection to verify operability of the systems. Section C of Appendix 9B of the Fermi II FSAR requires that a quality assurance program be established

and implemented during the operations phase to assure that this testing is performed and verified through inspection and audit to demonstrate conformance with design and system readiness requirements.

The inspectors reviewed a selected sample of the licensees proposed technical specification surveillances identified in paragraph 2 of the report. Areas reviewed that were found unacceptable are discussed below:

(1) All procedures reviewed did not incorporate appropriate reference to NFPA Standards or acceptance criteria. Throughout the FSAR the licensee committed to design and install fire protection systems in accordance with NFPA Standards.

During the inspection the licensee agreed to revise all of the technical specification surveillance procedures so that the appropriate acceptance criteria will be referenced. This is considered an Open Item (314/84-49-03(DRS)), pending Region III's verification of the revised procedures.

(2) Chemistry procedure No. 71.000.03 was revised to clearly indicate the method of sampling diesel fuel from the diesel fire pump storage tank at least once per 92 days in accordance with Technical Specification 3.7.7.1. The inspectors found the procedure to be acceptable to verify the cloud point and pour point of the fuel mix.

No items of noncompliance or deviations were identified.

6. Facility Design-FSAR Comparison to As-Built Fire Protection Features

a. FSAR Commitments

Throughout the FSAR the licensee makes commitments to NRC guidance documents and regulations by the use of terms such as "Conforms to the guidance of", "Conforms to the intent of", or "As discussed in a meeting with the NRC staff." The inspectors informed the licensee that the use of such statements do not provide a clear understanding of the licensees commitments to conform or to deviate from NRC guidelines and regulations.

Due to the lack of clarity and specificity of the licensees FSAR commitments, the licensee was requested to reassess each FSAR commitment to the NRC's fire protection criteria (i.e., NFPA codes and standards, Appendix R and Appendix A 10 CFR 50, etc.) and identify all areas of nonconformance, deviation and exceptions. The results of this reassessment are to be formally submitted to NRR for review and acceptance with a copy forwarded to Region III. This is considered an Open Item (341/84-49-04(DRS)), pending the NRC's review and acceptance of the licensee's submittal.

b. Water Supplies

(1) General Description

The water supply system consists of the fire main system piping which is connected to the general service water system. Isolation valves, fire hydrants and system piping to manual and automatic fire suppression systems are provided. According to the licensee's FSAR statement, the underground fire main was installed using NFPA 24 as guidance. The FSAR indicates that the underground piping is coated, wrapped carbon steel with cathodic protection. There appears to be an adequate water supply available to furnish the anticipated fire water requirements.

The fire main was designed to provide a continuous maximum flow of 5,000 gallons per minute (gpm). The minimum system design pressure is stated to be 65 psig on top of the reactor building roof with maximum flow in the system. The primary source of water supply to the fire main system piping is provided by the general service water pumps which operate continuously, maintaining a system pressure of 150 psig in the fire main. The electric fire pump starts automatically when the water supply system pressure drops to 130 psig. The diesel fire pump starts when the system pressure drops to 110 psig. Both the electric and diesel fire pumps require manual shutdown once started.

(2) Installations

The FSAR indicates that the distribution fire main is installed in the yard surrounding the plant below the frost line. Adequate isolation valves are installed in the fire main on each side of the branch lines leading from the fire main and at fire hydrants to permit proper isolation of damaged sections of the fire main and allow minimum interruption of service to undamaged sections. According to the FSAR statement, all fire hydrants and underground fittings are provided with suitable thrust blocks to prevent blow outs of the system.

The inspectors review of the fire water supply system verified proper installation of the system in accordance with governing code requirements, except as discussed below:

(a) Fire Main Pipe Joint Assemblies

Based on the drawings reviewed, the inspectors determined that the type of joints used in the underground fire main were acceptable. Some connections to the underground main are the push on type (slip joint) without special locking devices. However, to prevent movement of this section of pipe and to resist separation at the joints, this section of pipe is provided with thrust blocking. This is further discussed in Paragraph below.

(b) Thrust Blocking

Regarding SAFETEAM concern No. 565-F, the licensee's October 5, 1984 response indicates that the outside underground fire main from valve 201, east to valve 216 and south and west to warehouse 21 was installed as a temporary fire line (approximately 2500 feet of pipe). This service to warehouses B, 21, 22 and 30 was not rodded or thrust blocked when originally installed.

The SAFETEAM concern indicates that the licensee intends to classify this section of the underground fire main as permanent. The licensee's October 5, 1984 response indicates that Edison Design Instruction No. 19 was utilized to design the underground fire main system. Under the section titled "codes" in Edison's specification DI-19, NFPA 24-1969 is referenced (refer to drawing No. 6M721-2131).

The inspectors review of drawing Nos. 6M721-2125, 2126, 2127, 2129, 2130, 2135, 2176, 6C721Y-2018 and 2019 provided an understanding of the method used for installing thrust blocks to prevent blow outs of sections of the fire main system. Thrust blocking and typical methods of restraining joints did appear to be consistent with NFPA 24. However, the inspectors questioned the factors that were used in determining the size of the thrust blocks, since the entire fire main system was not hydrostatically tested in accordance with governing code requirements. This is discussed in Paragraph (c) below.

Therefore, the licensee was requested to provide valid documentation detailing the complete methodology and technique used in thrust blocking the underground fire main. This is considered an Open Item (341/84-49-05(DRS)), pending Region III's review and acceptance of the licensee's submittal.

(c) Preoperational Test Results

Test No. 1 NFPA P80-001, for the underground fire main piping indicates that the underground main was hydrostatically tested to 200 psig on September 11, 1982 for two hours.

Section E.2. of Appendix 9B to the FSAR indicates that the underground fire main is installed in accordance with NFPA 24. NFPA 24 requires that all new fire mains be hydrostatically tested for two hours at 50 psig above the maximum static pressure when the maximum static pressure is in excess of 150 psig. According to NFPA Formal Interpretation No. 81-3, with a pump shut-off pressure of 195 psi the hydrostatic test system pressure should be 245 psi (50 psig in excess of the maximum static pressure).

The shut-off head for the station fire pumps is approximately 210 psig. Page 2 of test No. INFPA P80-001 indicates that the circulating relief valve setting for the fire pumps was set at 220 psig for fire main hydrostatic test. Therefore, the hydrostatic test pressure for the system should have been 50 psig in excess of 210 psig (260 psig) instead of only 200 psig as indicated in the test. Furthermore, the leakage rate recorded during the test was a total of 151 gallons for two hours. This appears to be above the allowable leakage rate specified in NFPA 24.

NFPA 24 specifies that the amount of leakage at the joints shall not exceed two quarts per hour per 100 gaskets or joints irrespective of pipe diameter. This allowable leakage may be increased by one fluid ounce per inch valve diameter for each metal seated valve isolating the test section and if dry barrel fire hydrants are tested with the main valve open (so the hydrants are under pressure) an additional five ounces leakage per minute is permitted for each hydrant.

The licensee's March 15, 1983 internal correspondence (R. Olson to J. Cox) regarding the results of the test states in part, "for the last hour of the test the system had a leak rate of approximately 0.80 gallons per minute (gpm). The National Fire Code (NFPA-24) allows a leak rate of 0.55 gpm for a new underground system. Since our underground system is approximately 10 years old, a leakage rate of 0.25 gpm in excess of the minimum for new systems is considered acceptable." This is not consistent with the requirements of NFPA 24.

NFPA 24 recommends that the underground main be prepared for testing 24 hours prior to the test. The test pressure should be applied to the system to stabilize it. The test procedure should require the water pressure is increased in 50 psi increments until the test pressure is attained. After each increase in pressure observations are to be made of leakage or other factors likely to affect the continued use of the system. During the test, the pressure is not to be increased by the next increment until the system has become stabilized. After the pressure has been increased to the required maximum value and held for one hour, the pressure is to be decreased to 0 psi while observations are made for leakage. The pressure is again to be slowly increased to the required maximum value and held for one more hour whole observations are made for leakage and the leakage measurement is taken.

The data sheet (7A) contained in the licensee's test No. 1 NFPA P80-001 does not indicate that the test procedure recommended in NFPA 24 was followed. The pressures recorded varied and were inconsistent.

The leakage rate appears to have been measured at ten minute intervals by a meter identified in the data sheet. Data sheet meter reading 5364 indicated a leakage of 24 gallons after the first 10 minutes of the test. This resulted in a leakage rate of 2.4 gallons per minute (gpm). Data sheet meter reading 5384 indicated a leakage of 44 gallons after 20 minutes, which resulted in a leakage rate of 2.2 gpm. Seventy minutes into the test, data sheet meter reading 5444 indicated a leakage of 104 gallons which resulted in a leakage rate of 1.7 gpm at the highest test pressure of 219 psi. After 120 minutes (2 hours) data sheet meter reading 5491 recorded a leakage of 151 gallons which resulted in a leakage rate of 1.26 gpm at the conclusion of the test.

According to the licensee's October 5, 1984 final response to SAFETEAM Interview No. 565 regarding concern No. 565-F, the licensee stated that NFPA 24 would allow a leak rate of 18 gallons per hour if the underground main system was new and hydrostatically tested at 200 psig and concluded that after approximately 15 years, to have a leak rate of 30 gallons per hour would indicate that the fire main system is in good condition with no large leaks. This statement is inconsistent with NFPA 24 requirements regarding the 2500 feet of transit pipe connected to the fire main system.

Furthermore, item 565-F of the licensee's October 5, 1984 SAFETEAM response states in part, "As the fire pumps are provided with automatic relief valves, the underground piping will only see a pressure of approximately 150 psi, not one in excess of 200 psi when the fire pumps are operating". This is inconsistent with page 2 of test No. INFPA P 80-001 which indicates that the circulating relief valves for the fire pumps were set at 220 psi for the fire main hydrostatic test. The maximum static pressure is approximately 210 psi or the shut-off pressure for the station fire pumps. Therefore, it appears that the fire main system, including that portion of the system identified in SAFETEAM concern No. 565-F, should have been hydrostatically tested at 260 psi in order to meet the requirements specified in NFPA 24.

During the inspection, the licensee acknowledged the inconsistencies in the test and agreed to retest the system at 200 psi. Based on the fire pump relief valve settings and the overflow and regulating feature of the service water system, the licensee indicated that a code interpretation would be obtained to determine the maximum test pressure for the system. If the code interpretation states that the test pressure should be greater than 200 psi, the licensee agreed to retest the system to the higher pressure. A test pressure greater than 200 psi

would also require retesting interior standpipe hose stations and automatic sprinkler systems at this higher pressure.

Due to the current weather conditions, the licensee indicated that a request for delay of the testing will be submitted to NRR. The new test will incorporate governing code recommended test procedures and the appropriate acceptance criteria will be established prior to performing the test. If the 2500 feet section of transit pipe fails the test, this portion of pipe will be isolated from the power block fire main system during normal operation.

This is considered an unresolved item (341/84-49-06(DRS)) pending Region III and NRR review and acceptance of the licensee's submittal.

(d) Depth of Underground Fire Main

Drawing Nos. 6M721-2125, 2126, 2127, 2129, 2130, 2135, 2176, 6C721Y-2019 and 6C721Y-2018 indicate that the fire main system is installed underground surrounding the plant below the frost line (5 feet to 7 feet below ground level). This is consistent with the requirements of NFPA 24 which recommends the depth of cover above the top of underground mains installed in Michigan be between 5 feet and 5½ feet or greater.

(3) Service Water Pumps as a Backup to the Station's Fire Pumps

There are 5 general service water pumps designed to operate in parallel at all loads with identical conditions of service. The pumps exhibit a continuously rising constant speed head-curve. The pumps total head at shut-off is approximately 130% of the total head at rated design condition. The pumps are guaranteed to deliver a rated design condition of 7,700 gpm at low water level at 150 psig discharge pressure. The maximum load condition corresponds to 9,000 gpm of actual flow at a slightly lower discharge pressure (refer to DECo purchase specification No. 3071-59 dated August 14, 1971).

The general service water pumps were manufactured by Johnston Pump Company of Glendora, California. According to the licensee, each general service water pump is capable of delivering approximately 4,000 gpm at 170 psig.

As a result of the inspector's review, it appears that the service water pumps are capable of providing the greatest anticipated flow required for fire protection.

The licensee's proposal to use the general service water pumps as a backup to the station's fire pumps is acceptable. However, at present, the primary source of water supply in the fire main system piping is the general service water

system pumps. The station fire pumps function as a backup to the general service water pumps. This arrangement is also acceptable.

One of the general service water pumps is normally on standby. The other four pumps operate continuously providing water to the plant heat exchangers for use in waste heat removal flow to the chlorine injectors, the reactor building closed cooling water (RBCCW) heat exchangers, the turbine building closed cooling water (TBCCW) heat exchangers, the main generator hydrogen coolers, auxiliary boiler house, traveling water screen backwashing system, lawn sprinkling system, RHR complex, Radwaste evaporators and the fire protection system.

The electric fire pump will activate when the fire main system decreases to 130 psig. The diesel fire pump will start when the fire main system pressure decreases to 110 psig. Both the electric and diesel fire pumps are provided with circulating relief valves which open and relieve system pressure at approximately 170 psi.

(4) Fire Pump Preoperational Test Results

According to the licensee's statement in Appendix 9.B of the FSAR, Section E.2.(c), the details of the fire pump installation as a minimum, conforms to NFPA 20. Chapter 11 of NFPA 20 requires that a field acceptance test be conducted of fire pump installations by the installing contractor with the pump manufacturer or his representative present for the test. A copy of the pump manufacturer's certified pump test curve is required to be available for comparison of the results of the field acceptance test. The fire pumps as installed are required to equal the performance as indicated on the manufacturer's certified shop test curve within the accuracy limits of the test equipment.

Fire pumps are required to perform at minimum (shutoff-no flow), rated (100 percent capacity) and peak loads (150 percent capacity) without objectionable overheating, overload or stress of any component. Measurement of quality affecting parameters such as voltage, frequency, and amperes for electric motors, vibrations, water jacket temperature, speed (rpm), suction and discharge pressure are required to be recorded at minimum, rated and peak load conditions. The governor for diesel driven pumps is required to be set to properly regulate the minimum engine speed at rated pump speed and at the maximum pump brake horsepower.

The results of preoperational test No. PRET 8000.001 for the fire protection system were approved by the Onsite-Review Organization (OSRO) on December 28, 1982. Sections 6.1 and 6.2 of this test did not demonstrate the capability of the electric and diesel fire pumps to perform their intended

functions in accordance with NFPA 20 and the design requirements of the licensee's purchase specification Nos. 3071-61 and 3071-62. The inspectors identified the following deficiencies:

(a) Manufacturers Shop Test and Field Acceptance Test Data

The licensee failed to provide the inspectors with a copy of manufacturer's certified shop test curve for the diesel fire pump and could not provide results of field acceptance tests for the electric or diesel fire pump for comparison of the results of test No. PRET 8000.001.

(b) Vibrations

Measurement of vibrations was not included in the test procedure. The licensee indicated that vibration measurements were taken separately and could be included in the test package. The inspectors determined this would be acceptable if the licensee could verify that such vibration measurements were taken at the minimum, rated and peak load conditions specified in NFPA 20.

(c) Diesel Fire Pump Speed Control

Revolutions per minute (rpms) were recorded at 1775 and 1780 for all flows during the diesel fire pump test. According to the licensee's purchase specification 3071-62 the diesel fire pump is designed to deliver rated capacity (2500 gpm) at 150 psi, at 1770 rpms. The performance characteristic stated in purchase specification 3071-62 requires that "the constant speed characteristics of the pump be such that the shutoff pressure will be approximately 130% of normal rated load". The pump curve is required to have "a continuously rising characteristic and at no point shall the pressure be higher than the shut off pressure." This performance criteria in Section 9 of purchase specification 3071-62 appears to be inconsistent with the design and construction criteria of section 10.L of the specification which states in part that, "The pump, engine and all necessary equipment shall conform to the requirements of the National Fire Protection Association and shall bear the Underwriters Label".

According to NFPA 20, the characteristic curve for fire pumps assume operation at constant rated speed. Actually the speed of diesel engine driven pumps vary within a range of 8 to 10% between shutoff and maximum load. This operational characteristic was not demonstrated in the pump speed measurements recorded in test No. PRET 8000.001. It appears that the governor to the diesel engine may have been manually throttled during the test to achieve rpm's at 1775 and 1780 for all flows recorded during the test.

(d) Shutoff Test

NFPA 20 requires that the shutoff test for vertical shaft fire pumps do not exceed 140 percent of rated discharge pressure. This operating characteristic of the diesel and electric fire pumps was not included in the test results of preoperational test No. PRET 8000.001. The test procedure indicates that the circulating relief valve for the pumps is set at 170 psi ±5. Therefore, the shutoff head test was not included in the test. The inspectors found this to be unacceptable because the circulating relief valves can be isolated in order to perform the shutoff head test as specified by NFPA 20.

(e) Pump Characteristic Curves

The data reduced from the test results did not clearly indicate acceptable pump performances for the electric and diesel fire pumps when plotted on Dynamic Head and Flow Graph Nos. 6.1.2.7.C and 6.2.2.5.C of the test package. It was acknowledged by the inspectors that a review of the data did not necessarily indicate unacceptable pump performances. However, clarification of the data and comparison of the test results to the original manufacturer's shop test and field acceptance test results is needed in order to determine acceptable pump performances.

During the inspection the licensee agreed to retest the electric and diesel fire pumps and to acquire the original manufacturer's shop test or field acceptance test results in order to determine acceptability of the pump performances. This is considered an Open Item (341/84-49-07(DRS)) pending verification of the licensee's corrective actions.

e. Automatic Fire Suppression Systems

Section E.3 of Appendix 9.B. to the FSAR requires that automatic sprinkler systems conform to the minimum standards of the National Fire Protection Association such as NFPA 13 and NFPA 15. The inspectors observed random samples of the licensee's automatic sprinkler installations to determine conformance with design and system readiness requirements.

(1) Hydraulic Design of Sprinklers

The hydraulic calculation sheet and drawing No. 6M721-5065 Revision E for sprinklers installed in the reactor building, elevation 659 feet, 6 inches for the hazard of motor generator (MG) set were designed on accordance with NFPA standard 13. The design density is stated to be 0.3 gallons per minute per square foot over 4,000 square feet with an allowance of 500 gallons per minute (gpm) for hose streams. The total water supply required to meet this demand is 2,104 gpm at a minimum pressure of 133 psi at the discharge of the fire pump.

A total of 45 ceiling sprinklers and eight underduct sprinklers were installed in the design area. The line by line calculations verified proper consideration for hydraulic losses due to elevation, fittings, valves, etc., and it appeared that an adequate design density would be delivered throughout the design area.

(2) Preoperational Test Results

PRET. P-8000.001 and the contractor's material and test certificate for the fire protection underground and bulk main piping indicated that wet pipe and deluge sprinkler system installed to protect safe shutdown areas may not have been hydrostatically tested in accordance with NFPA 13 requirements. This is further discussed in Paragraph 6.b(2)(c) of the report.

The following areas are provided with automatic sprinkler systems that are governed by NFPA requirements:

Reactor Building

Torus Room, Zone 1, Elevation 560'
Basement NR Corner Room, Zone 2, Elevation 540'
HPCI Turbine and Pump Room, Zone 3, Elevation 540'
Corridor Area, Zone 4, Elevation 562'
Fire Floor, Zone 5, Elevation 583' (railroad bay)
Second Floor, Zone 6, Elevation 613' (cable trays)

Auxiliary Building

Basement Zone 1, Elevation 551' and 562'
Mezzanine and Cable Tray Area, Zone 2, Elevation 583-603'
Ventilation Equipment Area Zone 15, Elevation 677'
(manual water spray)
Cable Spreading Room, Zone 7, Elevation 630'6" (manual spray system)

Residual Heat Removal Complex

Fuel Oil Storage Tank Room

Radwaste Building

Baled Waste Storage Area
Voltage Regulator (automatic deluge)
Chemical Stores
Coalescer Rooms
Extruder - Evaporator Rooms
Drum Turn Table Room
Drum Capper Room
Drum Transfer Corridor
Drum Conveyor Room
First Floor Main Corridor
Main Decontamination Room

Turbine Building

Reactor Feed Pump Turbine
Turbine Oil Reservoir
Main Lube Oil Reservoir
Oil Storage and Turbine Oil Tank Rooms
First Floor Equipment Hatch
Second Floor Pipe Space
Hydrogen Seal Oil Unit (automatic deluge)

Outside Areas

North Main Transformer (automatic deluge)
South Main Transformer (automatic deluge)
North System Service Transformer (automatic deluge)
South System Service Transformer (automatic deluge)

(3) Halon System Installation

Halon systems are installed in safe shutdown areas such as the relay room, cable spreading room and Zone 14, elevation 677 feet - 6 inches. The results of PRET. 8000.001 indicated acceptable functional characteristics of the systems and the inspector's observation of the as-built installations appeared satisfactory. Due to time constraints the inspectors did not review the results of concentration tests performed on the systems. However, the licensee indicated that acceptable results were obtained from concentration tests conducted on all Halon system installations.

(4) Carbon Dioxide (CO_2) System Installation

Automatic low pressure carbon dioxide systems are installed in safe shutdown areas such as emergency diesel generator rooms, RHR complex miscellaneous room, Zone 11, elevation 643 feet - 6 inches, Auxiliary Building, Cable Tunnel, Zone 5, Elevation 613 feet - 6 inches, Auxiliary Building and Cable Tray Area, Zone 8, elevation 631 feet, Auxiliary Building.

(a) SAFETEAM Concern No. 565-A

SAFETEAM concern No. 565-A identified the installation of a defective liquid level gauge on the 12 and one-half ton CO_2 supply tank located outside of the north wall to the reactor building. Apparently, when this tank was originally filled with CO_2, proper maintenance had not been performed on it. As a result of blowing the tank out with air, moisture was pushed into the 1/2 inch valve for the liquid level gauge. The valve froze and broke apparently due to adjoining screw-on fittings being too tight (brass screw-on fittings and valve).

The valve was replaced with an unqualified valve for use in CO_2 systems by contractor personnel. The valve was not Underwriters' Laboratories listed or Factory Mutual Laboratories approved for use in CO_2 systems, but was Compressed Gas Association (C.G.A.) approved (meaning that the valve is approved for use in compressed gas systems.

The licensee's October 5, 1984 response to SAFETEAM concern No. 565-A indicates that no approval is required on the valve in question.

The licensee's FSAR statement in Appendix 9.B. and Supplement No. 5 of the SER states that the CO_2 system installations satisfy the provisions of Appendix A to Branch Technical Position (B.T.P.) 9.5-1 and are in accordance with the applicable portions of NFPA 12.

NFPA 12 provides a definition of approved, listed and labeled equipment to be used in CO_2 systems. The code is specific and states in Section 1.7 that "only listed or approved equipment and devices shall be used in the systems". To determine if the system has been properly installed and will function as specified, the code requires a check of labeling devices for proper designation, instruction and a nondestructive operational test on all devices necessary for proper functioning of the system. All valves used in CO_2 systems are required to be suitable for the intended use, particularly in regard to flow capacity and operation. They are required to be rated for equivalent length in terms of the pipe and tubing sizes with which they will be used.

The licensee's October 5, 1984 final response to SAFETEAM concern No. 565-A is inconsistent with NFPA 12 requirements. Therefore, the licensee was requested to provide a complete rationale and basis for accepting the unlisted and non-labeled 1/2 inch valve for the liquid level gauge described above. The licensee needs to include in this response pertinent, valid documentation supporting all positions taken. This is considered an Open Item (341/84-49-08(DRS)) pending Region III and NRR review and acceptance of the licensee's submittal.

(b) SAFETEAM Concern No. 565-B

SAFETEAM Concern No. 565-B identified a potentially lock-out valve to a selector valve leader to the same CO_2 system discussed in SAFETEAM Concern 565-A. The selector valve leader is located in the auxiliary building between rows H and 10. Apparently the lock-out valve installed downstream of selector valves in this system can cause CO_2 to be trapped in screw and grooved pipes, causing pressure within the system to exceed specified ratings for pipe fittings.

The licensee's October 5, 1984 response to SAFETEAM concern 565-B acknowledged the validity of this concern. The response indicated that start-up was in the process of writing an SFR (start-up field request) to engineering so that the concern could be further reviewed. The response indicated that a review revealed that the installation was made as required by drawings and a walkdown of the system was conducted to identify potential problems. The results of the engineering review and system walkdown was not included in the licensee's response to SAFETEAM concern No. 565-B.

NFPA-12 provides specific discussion and requirements on CO_2 systems where the valve arrangement should be designed to prevent entrapment of liquid carbon dioxide. Design Change Notice No. 10752, dated August 3, 1984, required the removal of the victaulic elbow and fittings (lock out valve) discussed above and the installation of a threaded flange and elbow. The inspectors verified that this installation had been completed and that appropriate consideration (for overpressure within CO_2 systems due to valving arrangements) is included in the installations in accordance with NFPA 12. This concern is considered satisfactorily resolved.

(c) SAFETEAM Concern No. 565-C

SAFETEAM Concern No. 565-C identified a potential problem with the timed vapor nozzles at CO_2 hose stations on the 2nd and 3rd floor of the relay room in the auxiliary building. The concern indicates that the timed vapor nozzles are directly above positions where operators could be standing. Thus the potential exists for operators to be injured in the event of a CO_2 discharge.

The licensee's October 5, 1984 response indicates that this is not a factual concern. The response states in part, "The CO_2 hose stations are to be operated by operators only (signs will be put up stating this). Operators have had formal training on how to use the CO_2 stations. When the hose is pulled out, this will activate the CO_2 release from the nozzle that is at the operator's head level (in reality, it is off to the side). The operator will not be 'standing' there while the vapor is being released; he should be running toward the scene of the fire. Furthermore, the operators have been trained to use Scott air pacs when using this equipment (thus the likelihood of being killed with CO_2 gas is not likely). Also at the present time, the nozzles are considered piped to a 'large open area'".

Upon evaluation of the CO_2 hose station installations, the inspectors determined that the SAFETEAM concern was valid. However, the licensee's corrective actions discussed below were found to be acceptable.

1 Signs indicating that CO_2 hose stations are to be operated by operators only.

During the inspection, the inspectors observed such signs posted in the relay room and switchgear room. The licensee General Employee Training (GET) Program was revised to state that "only operators are to use CO_2 hose stations." The training program instructs general employees in the extinguishment of the four classes of fires with portable fire extinguishers, and restricts general employees from using CO_2 hose stations.

2 Operator Training in the Use of CO_2 Hose Stations and Fire Brigade Member Qualifications

The inspectors verified that all operators are provided with fire brigade training. Persons on fire watch duty will not be allowed to use CO_2 hose stations. This concern is satisfactorily resolved.

(d) SAFETEAM Concern No. 565-D

SAFETEAM Concern No. 565-D identified the installation of cast iron fittings instead of 300 pound pressure rated malleable iron fittings in the Fill and Equalizing Lines of CO_2 systems installed in the RHR Building. Also 150 pound pressure rated fittings were installed in the pilot piping to the EMPC Cabinet instead of 3,000 pound forged steel pressure rated fittings. The concern pointed out that this is contrary to Cardox specification No. H.75.

The licensee's October 5, 1984 response to SAFETEAM concern No. 565-D indicates that this concern was addressed by Field Engineering Memorandum No. B-1055 on August 11, 1983. The response indicates that on August 22, 1983 engineering determined that the CO_2 fill and vapor return lines should be inspected and all ductile iron fittings should be replaced with malleable iron fittings. The control line from tanks to the control valve must be leak proof; therefore, all screwed fittings were to be replaced with 300 pound forged steel socket weld fittings. This would have made the system's design in accordance with NFPA-12, Edison Specification No. 3071-200 and drawing No. 6M721-5050. However, the licensee determined that no rework was required.

NFPA-12 specifically states that valves and fittings in CO_2 systems shall be listed or approved and suitable for the intended use. Therefore, this concern was valid. However, the licensee provided the inspectors with a copy of Phoenix Fire Protection letter of November 14, 1983 (PCI 83-032) which indicates that the type of

fittings used in the fill, vent and pilot lines of the RHR complex CO_2 systems are 300 pound malleable iron banded fittings per the project specifications.

(e) SAFETEAM Concern No. 565-E

SAFETEAM Concern No. 565-E identified the concern for an insufficient time delay for activation of the RHR Building CO_2 systems due to the security card reader system provided for the double locked doors which permit entrance and exit from the building. This concern is discussed in Region III Inspection Report No. 50-341/84-60.

f. Manual Fire Fighting Capability

The inspectors reviewed selected portions of the licensees manual fire fighting capability in order to determine the adequacy of equipment provided to support effective fire fighting measures by the fire brigade and off-site fire departments.

(1) Interior Fire Hose Stations

With exception of the fire hose stations installed on the re-fueling floor of the Reactor Building and below-grade level in the Auxiliary Building, pressure reducing devices are not installed on interior fire hose stations as required by NFPA-14.

According to the licensee statement contained in Section E.2. of Appendix 9.B of the FSAR and the NRC understanding of the system design and installation stated in supplement No. 5 of the SER, all of the interior standpipe fire hose station designs satisfy the requirements of NFPA-14.

Where flowing pressures at any hose valve outlet exceeds 100 psi, NFPA 14 requires that an approved device be installed at the outlet to reduce the pressure with required flow at the outlet to 100 psi. The discussion provided in Sections 6.C. and 6.D. of the report verifies that a pressure greater than 100 psi is available with water flowing at hose valve outlet installed in the plant. Therefore, the licensee is requested to provide a detailed rationale and technical basis for deviating from FSAR commitments and NFPA code requirements. The positions taken by the licensee must be supported by valid technical documentation which demonstrates equivalent protection to that required by NFPA-14. This is considered an Unresolved Item (341/84-49-09(DRS)) pending Region III and NRR's review and acceptance of the licensee's submittal.

(2) Preoperational Test Results for Internal Fire Hose Stations

The inspectors were provided with the results of tests that verified operating parameters such as functioning valves,

nozzles, etc., for fire hose stations. However, contractors material and test certificates for hydrostatic tests conducted on the reactor, auxiliary, turbine, radwaste and RHR building hose reel and bulk piping indicate that these systems may not have been properly hydrostatically tested. This is further discussed in Paragraph 6.b(2)(c) of the report.

(3) Interior Fire Hose Construction

Appendix 9B.E.3.(d) of the FSAR dated July, 1984, (Amendment 58) identifies interior manual 1 1/2" fire hose as being Dacron rubber lined hose. On the plant tour of November 26, 1984, the inspectors observed that the Dacron rubber lined hose had been replaced with polyurethane lined hose due to numerous hydrostatic test failures of the Dacron rubber lined fire hose.

During the inspection the licensee was requested by the inspectors to revise the FSAR statements to be consistent with the as built installation. Subsequently, on January 25, 1985, the inspectors were provided with FSAR Change Notice (FCN) No. 85-19 showing the necessary changes to the FSAR have been implemented. This item is considered closed.

(4) Portable Fire Extinguishers

Section 9.5.1.2.1 of the FSAR dated March, 1984 stated that multipurpose thirty pound portable dry chemical fire extinguishers for Class A, B, and C fires are distributed throughout all the floors of the reactor, auxiliary, RHR, turbine, and radwaste buildings. The fire brigade training lesson plant regarding handheld dry chemical fire extinguishers located in the plant identified these units as twenty-five pound Class A, B, C type (Foray, Multipurpose Powder) extinguishers with a UL rating of 20A:80B:C.

During the plant tour, the inspectors observed ten pound portable fire extinguishers installed in the plant having a U.L. rating of 10A:60B:C. By comparison a ten pound A, B, C type fire extinguisher has a 50 percent reduction in extinguishing capacity on Class A (ordinary combustible) fires and has a 25 percent reduction in extinguishing capacity on Class B (flammable liquid) fires. However, due to the adequacy of the location and spacing of 10A:60B:C (ten pound type Class A, B, C extinguishers), the inspectors determined this to be acceptable and in accordance with NFPA-10.

However, the licensee's FSAR statements and the fire brigade training lesson plan are inconsistent with the size of portable extinguishers presently installed in the plant. During the inspection, the licensee was requested to revise the FSAR statements and the fire brigade lesson plans to be consistent with the fire extinguishers presently installed. This is considered a deviation from the FSAR commitment

(341/84-49-10(DRS)). Subsequently, on January 26, 1985, the inspectors reviewed FCN No. 85-19 that showed the necessary FSAR changes had been implemented. This item is considered closed.

(5) Plant Yard

The inspectors toured the plant yard on November 16, 1984, including the open areas of the plant site not occupied by buildings. The major equipment located in the plant yard included the condensate storage tanks, auxiliary boiler fuel oil storage tank, auxiliary boiler house, transformers and the storage facility for hydrogen. Of this equipment, only the condensate storage tanks are needed for safe shutdown of the plant during the interim, until the 3L panel is installed and becomes operable. The inspectors examined the fire protection equipment located in these areas which consisted of fire hydrants, post indicator valves, and fire fighting equipment located inside of the yard hydrant houses.

Regarding fire fighting strategy, the licensee's staff agreed with the inspectors that by attaching a 2 1/2" fire hose to one of the yard fire hydrant's 2 1/2" outlets, the fire brigade would have the capability of providing a more timely response for fighting fires in the plant yard area. In addition, the installing of a 2½" gate valve on the other 2½" hydrant outlet would eliminate the need for the fire brigade to shut-off the hydrant water flow to attach additional fire hose attack lines.

During the inspection, the licensee agreed to the above noted changes. This is considered an Open Item (341/84-49-11(DRS)). Subsequently, on January 25, 1985, the inspectors verified that a 2½" hose in yard hydrant house No. 2 was connected to one of hydrant outlets. However, the 2½" gate valve has yet to be installed but is on order. This item will remain open pending installation of the 2½" gate valve in yard hydrant house No. 2.

g. Fire Detection System Installation

Section 9.B.2.2.5 of the FSAR discussed the fire protection layout drawings (Figures 9B-1 through 9B-18) which were developed to present much of the information gathered for the fire hazards analysis. The drawings show each safety related building, separating fire barriers within each building, the required shutdown equipment found within each building and fire detection and suppression equipment. As noted in this section of the FSAR these drawings form the basis for the fire hazards analysis.

Section 9B.1.2 of the FSAR indicated that the licensee used NFPA-72D (1975) and NFPA-72E (1974) as the governing code for the design and installation of fire detection systems. With exception of one deviation from NFPA-72D (the lack of a permanent alarm recording device), Amendment No. 5 to the SER concludes that the design and installation of the fire protection systems meets the

guidelines of Appendix A to B.T.P. APCSB 9.5-1 and are in conformance with NFPA-72D (1975) and NFPA-72E (1974).

NFPA-72E (1974) specifies spacing considerations for fire detector units which specifically limit the distance between detectors by their listed spacing. Requirements are stated for specific considerations that must be given to irregular areas, high ceilings, solid joist construction, beam construction, sloped ceilings, ventilation air flow velocities, and other criteria for the design and installation of the systems. For example, section 4-3.1 of NFPA 72E requires spot-type smoke detectors shall be located on the ceiling not less than six inches from a sidewall. Section 8-1.1.2 of NFPA 72E-1974 states that an air duct smoke detector installation shall not be used as a substitute for open area protection.

The following fire detector installation deficiencies were identified:

(1) Reactor Building

During the plant tour of November 26, 1984, of the reactor building, the inspectors were unable to locate any fire detectors installed in the ceiling area designated as the personnel hatch interlock area on elevation 583 feet 6 inches. Figure 9B.4 of the FSAR indicates that fire detection is provided for this area. The area contains two redundant safe shutdown valves Nos. E11-F015A and E11-F008. As a result of this concern the inspectors requested that the licensee determine whether or not figure 9B.4 was in error or whether any fire detectors were to be installed in this area.

In response to the above concern, during the inspection the licensee determined that fire detection capability was required for this area. However, the licensee took the position that the location of the fire detector for the area in question was located outside the physical boundaries of the room at the exhaust of the return duct for the area. The inspectors determined this to be unacceptable. This is considered a deviation from the FSAR commitment (341/84-49-12 (DRS)).

(2) Auxiliary Building Elevation 615 Feet Northeast Corner Stairway Adjacent to Control Room, Cable Spreading Room and Relay Room

In response to concerns raised by the NRC, by letter dated June 18, 1981 the licensee agreed to install additional fire detectors in the auxiliary building northeast corner stairway adjacent to the control room, cable spreading room and relay room.

Contrary to the above commitment, the inspectors observed that one fire detector was installed in the stairway at elevation

615 feet adjacent to the relay room but no fire detector was installed at the stairway ceiling adjacent to the control room. Redundant safe shutdown cables are installed vertically the full length of this stairway. This is considered an unresolved item (341/84-49-13(DRS)). During the exit meeting of January 25, 1985, the licensee committed and submitted a letter dated January 27, 1985 to install a detector at the stairway ceiling adjacent to the control room.

(3) Plant-Wide Fire Detection System

In response to the inspector concerns regarding the adequacy of fire detector installations and conformance to 72E design requirements, the licensee's staff provided the inspectors with a "Report Summary of Fire Detection Study" (no date) that identified the inadequacy of fire detection installations in eleven areas of the plant. The unofficial study identified deficiencies in fire detector installations in Zone 1 of the torus, Zone 4D of the auxiliary building basement, elevation 551 to 562 feet; Zone 6B of the auxiliary building mezzanine area elevation 583 and 603 feet; Zone 9 of the auxiliary building, switchgear room elevation 613 feet; Zone 12 of the auxiliary building, area above the control room ceiling; Zone 14-1 of the auxiliary building, switchgear room; Zone 16B of the auxiliary building 5th floor; Zone 7 of the reactor building 1st floor; Zone 10 of the reactor building 2nd floor elevation 613 feet; Zone 15-1 of the reactor building 3rd floor and in the RHR building. The deficiencies identified included the following: inadequate number of detectors, detectors improperly located such as four feet below ceilings with no detectors installed at ceiling level, total reliance on detectors installed in exhaust ducts (air return), inadequate consideration for ceiling beams and ventilation air flows, etc. In response to IE Circular No. 78-18, the licensee's internal letters dated February 4, 1984 (EF2-47,859) and April 23, 1984 (EF2-68,261) stated "The location of the fire detectors in Fermi 2 has considered the air flow movement. The detector design is being reviewed to the guidance of NFPA-72E."

In view of the apparent inadequacies of the existing fire detector installations, the licensee was requested to document a complete reassessment of fire detector installations throughout the facility for conformance with NFPA standards 72D and 72E. Where deviations exist that have not been previously identified and have not received NRR approvals, the installation needs to conform to the applicable NFPA standard. Positions taken by the licensee that deviate from these standards need to be identified and the technical basis for these deviations justified by valid technical documentation. This is considered an Open Item (341/84-49-14(DRS)) pending NRC's review and acceptance of the licensees submittal.

H. Fire Barriers and Fire Barrier Penetrations

The licensee's FSAR statements indicates that rated fire barriers will be installed throughout the plant. Cable penetrations, ventilation openings, stairwells and exit routes are required to be protected with equivalently rated fire barriers.

The inspectors examined fire rated assemblies including fire dampers, and penetration fire seals located in safety-related areas of the plant and areas containing equipment required for safe shutdown.

(1) Penetration Seals

During plant tours of the Reactor Building and Auxiliary Building on November 16, 25, 28 and 30, 1984, the inspectors performed visual inspections of the installed penetration fire seals. These observations showed no noticeable deficiencies of the installed fire seals.

(2) Fire Dampers

(a) Functional Surveillance Testing

At the request of the inspectors, a surveillance test was performed by the licensee on ventilation duct and wall penetration fire dampers to determine the operability of the dampers in their installed conditions. The results were as follows:

1 Fire Zone F-11 (elevation 643'), Number T4100-F136 closed completely during the surveillance test.

2 Fire Zone H-17 (elevation 677'), Number T4100-F099 closed completely during the surveillance test.

3 Fire Zone G-16 (elevation 613'-6"), Number T4100-F086 closed completely during the surveillance test.

There were no deficiencies identified during the performance of the fire damper surveillance test.

(b) Cable Spreading Room/Relay Room Ventilation System Duct Fire Dampers

Section 9B.4.2.10.1 of the FSAR indicated that the supply and return ducts for the cable spreading room and relay rooms that pass through the control room were not provided with dampers at the floor or ceiling. The licensee stated that dampers have since been installed in these supply and return ducts. The inspectors requested the licensee to remove covers located on the supply and return ducts for the cable spreading and relay rooms that pass through the control room so as to verify installation of these fire

dampers. The inspectors were accompanied by members of the licensee's staff during this walkdown. The inspectors verified that fire dampers in question had been installed.

(c) Ganged Fire Damper Installations

In several applications throughout the plant where large openings are provided through fire barrier walls for ventilation purposes, the licensee has installed ganged fire dampers (damper stacked vertically on top of each other and placed side by side horizontally). The licensee indicated that in many of these installations, continuous air flow velocities greater than 3900 feet per minute may not allow the dampers to close in the event of a fire. Therefore, where the air velocities are greater than 3900 feet per minute, the licensee has developed a procedure to locally shut down the ventilation system in the fire area of concern.

Where air velocities are less than 3900 feet per minute the licensee has added springs to the damper assembly to assist the damper closure should the damper fusible link be activated as a result of fire.

During the inspection, the licensees staff indicated that the fire damper manufacturer has documented test results that verifies the closure of the dampers which are additionally spring loaded in air flows up to 3900 feet per minute. Such valid documentation was not provided to the inspectors for review.

Since the closure of fire dampers under full ventilation flow conditions is of significant concern when there are various sized penetration openings through fire barrier walls, the closure mechanism should be suitable and functional or the ventilation system should be automatically shutdown to prevent the spread of fire and fire products. NFPA-90A specifies that the reliability characteristics for such designs should be investigated by test such as those identified in Underwriters Laboratories Standard 555. Furthermore, the size of some damper installations (24 dampers in parallel) appeared to exceed tested configurations that established the damper fire ratings.

To resolve this concern, the licensee is requested to provide all documentation that verifies the reliability of the spring closing force on dampers installed in mechanically induced air flows greater than those specified in the fire rating of the damper. In addition, the licensee is requested to provide certified test data from an accredited testing laboratory attesting to the fire endurance capability of all damper installations

that exceed the tested configuration that established the damper fire ratings. Furthermore, the licensee is requested to demonstrate that all such damper installations provide an equivalent fire rating to the fire barrier in which they are installed. This is considered an Open Item (341/84-49-15(DRS)) pending Region III review and acceptance of the licensee's submittal.

No items of noncomplaince were identified.

7. Safe Shutdown Capability

During the period May 14 through 18, 1984 Region III conducted an inspection of the Fermi 2 facility for compliance with the FSAR and SER criteria for safe shutdown of the plant in the event of a fire. It was determined from this inspection that the licensee failed to provide proper design features in several areas of the plant to limit fire damage to redundant safe shutdown trains in order to mitigate the adverse consequences of a single fire. Safe shutdown procedures provided required unacceptable repairs to equipment in order to attempt to stabilize the plant in hot shutdown conditions.

Subsequently, the licensee proposed alternative and dedicated safe shutdown capability for eight areas of concern which were reviewed and accepted by NRR. For the interim, until the system are designed, installed and operational, the licensee proposed to operate the plant safely by employing 7 roving fire watches and 1 continuous fire watch in the areas of concern in accordance with plant technical specifications, and to revise safe shutdown procedures so that all safe shutdown functions could be achieved within the minimum threshold criteria specified in the FSAR and plant technical specifications. These interim measures were determined acceptable by NRR.

On November 15 through 16, 1984, members of the May 14 through 18, 1984 inspection team revisited the facility to review and verify the licensees commitment to the interim measures. The following resulted from this review:

a. Interim Safe Shutdown Procedures

Procedure No. 20.000.22 details the actions required for general plant fires and directs plant operators to procedure No. 20.501.02 for control center complex fires. Procedure No. 20.000.22 also describes operator actions for particular fires in fire zones which may affect reactor pressure indication. The actions required in these cases were determined acceptable to ensure continuity of air supply and reactor pressure indication.

Procedure No. 20.501.02 provides general instruction for a control center complex fire and directs plant operators to use Procedure No. 20.000.19 for shutdown from outside the control room. Procedure No. 20.501.02 also gives specific operator actions in the event of fire damage to control room panel No. H11-P611

(containing Division 1 safe shutdown circuits and affects safety relief valves and torus water level indication), and Panel No. H11-P877 (which affects mechanical draft cooling tower fans). The operator actions required to prevent spurious signals from opening safety relief valves consist of manual opening of breakers (no repairs are required). The actions required to restore torus water level indication involve lifting and jumpering leads in Panel H11-P915 in the relay room. These are small gauge, low voltage wires and such actions are considered repairs. However, the operation can easily be accomplished by one properly trained operator. The actions required to restore mechanical cooling tower fan operation involve the same type of repair operation (lifting and jumpering leads). However, these actions may not be required for approximately two hours after a fire.

The enclosures to Procedure No. 20.000.19 describe manual operation of breakers in cases where the remote shutdown panel functions are inoperative due to a control room fire. These operations involve removal of fuses and are considered repairs. However, they can be accomplished by a single trained operator without special tools.

Attachment No. 2 of Procedure No. 20.000.19 describes the operations required to establish suppression pool cooling. If the residual heat removal functions on the remote shutdown panel are not functioning due to a control room fire, the procedure specifies re-entering the control room to establish this function. This was determined unacceptable by the inspectors.

For interim operation as approved by NRR, the inspectors discussed and the licensee acknowledged the following commitments to the NRC:

(1) Revision of Interim Supplemental Safe Shutdown Procedures

For interim operation (for a period not to exceed startup after the first fuel cycle), the NRC will allow operation of the existing plant design with compensatory measures as described in the licensee's correspondence to the NRC (EF2-72,266) dated October 22, 1984 and supplemental safe shutdown procedures must be revised as follows:

(a) Repairs

Repairs will be allowed for interim operation. However, repair procedures must be in place and all materials required to make such repairs must be stored onsite and designated for this purpose.

(b) Shutdown from Outside the Control Room

Reliance on short term re-entry into the area (i.e. control room) that has been involved in fire to accomplish the shutdown mode is unacceptable. Functions such as torus cooling and drywell cooling must be accomplished from outside the area that has been involved in fire.

(c) During the interim operating period, power is to be removed from the RHR suction valves and the cooling tower bypass for the Division I cooling tower. Power may have to be removed from one or two RHR valves since there are three valves in the RHR suction line. One valve is in series with two parallel valves. (This item a, b and c) is considered an Open Item (341/84-49-16(DRS)) pending verification by Region III.

(2) Manpower Requirements

During the inspection, the licensee indicated that six operators (4 licensed and 2 non-licensed equipment operators) were required to perform the shutdown procedures as written. The inspectors informed the licensee that the revised procedures may require additional personnel who will be required to be onsite at all times during plant operations. Administrative controls or plant technical specifications must specify this minimum shift crew compliment. All personnel must be properly trained in implementing the procedures. This is considered an Open Item (341/84-49-17(DRS)) pending verification by Region III.

(3) Communications

During the inspection, the inspectors discussed the need for suitable communications to support safe shutdown and clarified that reliance on multiple methods of communications is acceptable, as long as it can be demonstrated that at least one method permits communicating with all required personnel in all areas. The station P.A. System, for example, cannot be relied upon since it could be lost as a result of several different plant fires.

Apparently, there is concern by the licensee about the use of portable radios in the areas of the remote shutdown panels. There was a caution sign posted on remote shutdown panel H21-P100, warning against the operation (transmission) of any two-way radios within 6 feet of the panel. This inhibits the shutdown capability if operators have to stand 6 feet away from the panel. The licensee indicated this was a general practice throughout the plant to preclude radio induced malfunctions in any control cabinet or device.

The licensee was requested to perform a complete communications analysis and determine suitable means of communications for all areas required for safe shutdown in particular, between the remote shutdown panels and the relay room. If portable radios are designated for this purpose, test results must show that the warning signs are unnecessary and the signs must be removed.

This is considered an open item (341/84-49-18(DRS)) pending verification by Region III.

(4) Interim Compensatory Measures

As discussed in the licensee's October 22, 1984 submittal to the NRC, the licensee committed to provide a total of 8 fire watches as compensatory measures for interim operation. A continuous fire watch will be in the relay room (this is further discussed in Section 6 of the report) An hourly roving fire watch will be provided for the following areas until the alternative or dedicated shutdown capability is provided:

(a) Fire Zone 1, Auxiliary building basement, Elevations 551 and 562 feet.

(b) Fire Zone 2, Mezzanine and cable tray area, Auxiliary building elevations 583 and 603 feet.

(c) Fire Zone 8, Cable Tray Area, Auxiliary building, Elevation 631 feet.

(d) Fire Zone 7, Cable Spreading Room, Auxiliary building, Elevation 630 feet.

(e) Fire Zone 11, Miscellaneous rooms, Auxiliary building, Elevations 643 feet.

(f) Fire Zone 13, Ventilation equipment area, Auxiliary building, Elevation 659 feet.

(g) Fire Zone 9, Control Room, Auxiliary building, elevations 643 feet 6 inches to 655 feet 6 inches.

This is considered an open item (341/84-49-19(DRS)) pending verification by Region III.

(5) Warmers on Filter to Diesel Fuel Oil Supply for Combustion Turbine Generator

During the November 2, 1984, meeting in Bethesda, Maryland with NRR, the licensee committed to install a warmer on the fuel oil supply filter for the combustion turbine generator which will provide power to the dedicated or alternative shutdown capability. The warmer for the filters is to be installed by the time the system is operational. This is considered an open item (341/84-40-20(DRS)) pending verification by Region III.

b. Emergency Lighting

The inspectors examined the licensee's emergency lighting system using the requirements of the FSAR, SER, manufacturer's recommendations, and supporting licensee documentation used in determining illumination levels for access paths and in areas requiring operator actions.

The lighting units installed were Teledyne Big Beam Model Number 2S-6L100-80 enclosed in brown cases (most recently installed) having up to three 21 watt sealed beam lamps attached locally or remotely to the units and Model Number 2S-6N40-80 enclosed in gray cases having two 21 watt sealed beam lamps attached locally to the units. According to the manufacturer's literature, both of these models are designed to provide light minimally for 8 hours with the type lamps noted above.

(1) Eight Hour Lighting Units Discharge Test

The licensee's FSAR commitment required that emergency lighting units with at least an eight hour battery power supply be provided in all areas needed for operation of safe shutdown equipment and in access and egress routes to those areas. Section 9.5.3.2 of the FSAR dated May, 1984, stated that emergency lighting units consisting of battery operated sealed-beam units capable of eight hours of continuous operation are provided in these critical areas. Further stating that the emergency lighting units are activated automatically on loss of normal power.

On November 15, 1984, at the request of the inspectors a full eight hour discharge test was performed on three emergency lighting units to determine the operability of the units in their installed condition. However, the startup test engineer chose to disconnect power to these lighting units at feeder sources which provided power to three additional lighting units. Since the three additional units would also be lighted, it was determined to include these units in the discharge test. The following are the six lighting units tested:

(a) Light No. 1, numbered R3600S133, located in the auxiliary building, on the second floor near column F-9 in stairwell R-11. The three lighting unit lamps continued to light after eight hours.

(b) Light No. 2, numbered R3600S134, located in the auxiliary building, on the third floor near column F-9 in stairwell R-11. The three lighting unit lamps continued to light after eight hours.

(c) Light No. 3, numbered R3600S139, located in the auxiliary building, on the third floor near column F-10 in Division 2 by the battery room. The three lighting unit lamps failed to light at the start of the discharge test as explained further in this paragraph. Once the problem was determined, the three lighting unit lamps continued to light after eight hours.

(d) Light No. 4, numbered R3600S140, located in the auxiliary building, on the third floor near Column G-11 by the reactor protection system motor generator set room. The three lighting unit lamps failed to light at the start of

the discharge test as explained further in this paragraph. Once the problem was determined, the three lighting unit lamps continued to light after eight hours.

(e) Light No. 5, numbered R3600S155, located in the turbine building, on the third floor near column J-17 in stairwell T-2. The three lighting unit lamps continued to light after eight hours.

(f) Light No. 6, numbered R3600S156, located in the turbine building, on the third floor near column K-16. The three lighting unit lamps continued to light after eight hours.

These six lighting units had been pre-operationally tested on August 12, 1984 or on August 30, 1984.

The licensee provided the inspectors with a draft emergency lighting inspection procedure numbered 27.322.01 to be performed on a monthly surveillance frequency.

Two of the lighting units numbered R3600S139 and R3600S140 failed to light at the beginning of the test when the normal AC power was turned off at the circuit breaker panel. The cause of the failure determined by the licensee was a on/off toggle switch located inside the individual lighting unit cases which was found in the "off" position preventing power from getting to the remote lamps. The licensee has included a step to Surveillance Procedure No. 27.332.01 to simulate a power failure and thus verify illumination of the emergency lighting unit lamps. This item is considered an open item (341/84-49-21(DRS)) pending implementation of surveillance procedure No. 27.322.01 prior to fuel load.

(2) Walkdown of Emergency Lighting Units

The inspectors performed a walkdown on November 14, 15, and 16 to verify that emergency lighting units having at least an eight hour battery power supply were provided along two paths from the control room to the Division I and II remote shutdown panels and other areas needed for operation of safe shutdown equipment. Subsequent to the July 10-11, 1984 inspection conducted by Region III staff and their consultants (Inspection Report 50-341/84-16(DRS)) additional changes in the safe shutdown procedures have been required, thus, requiring the licensee to add additional emergency lighting units in those areas.

During the walkdown, the inspectors identified one emergency lighting unit as being fully discharged having the number R3600S135 attached and being located in the auxiliary building stairwell number R-11 near column F-9. The licensee provided the inspectors with documentation indicating that the startup test engineer in charge of maintaining the emergency lighting

units found this deficiency on August 29, 1984, and initiated the unit to be recharged. The inspectors verified on November 30, 1984 that this unit had been recharged and restored to operable service. Upon the inspectors request, the licensee performed a check to identify the probable cause of the unit being discharged. According to the licensee, this unit's circuit breaker switch (Feeder Source 123A-8) was found in the "off" position due to the switch being marked as a spare switch. The inspectors verified that this spare switch had been relabeled correctly.

(3) Eighteen Month Emergency Lighting Surveillance Procedure

During discussions with DECo staff it was determined that the eighteen month emergency lighting surveillance procedure would include an eight hour discharge test on ten percent of the lighting units required for safe shutdown of the plant. This would provide for one hundred percent of the required lighting units to have an eight hour discharge test performed on them once every fifteen years. However, the inspectors' past discussions with the lighting unit manufacturer representatives have indicated that the lead acid type batteries used at Fermi have a warranty of only seven years and their experience showed that these batteries will last on a average of ten years.

Based on this information the inspectors requested the licensee to increase the number of lighting units to be tested during the surveillance to twenty percent of the required lighting units so as to test all required lighting units during a seven and one half year time period. Subsequently, this matter was discussed in a call on December 6, 1984, between Region III staff and DECo's Engineering staff and at the exit meeting of January 25, 1985, in which the licensee agreed to increase the number of lighting units tested in the surveillance procedure to twenty percent of the lighting units required for safe shutdown. This is considered an open item (341/84-49-22(DRS)) pending revision and approval of this procedure.

8. Quality Assurance/Control

The licensee's commitment to a Quality Assurance Program for fire protection is discussed in Section C of Appendix 9B to the FSAR. The inspectors reviewed the licensees Quality Assurance Program requirements to determine that appropriate measures were established to ensure that the quality criteria for design, procurement, installation, testing and administrative control for fire protection was satisfied. The results of this review are as follows:

Operational Quality Assurance/Program

The licensees FSAR statements indicated that the Quality Assurance Program for plant operation governs all activities which may affect safety related structures, systems, and components at the plant. The FSAR indicated that

the Quality Assurance Program during plant operations will assure that fire protection in safety related areas is maintained through requirements on design, procurement, installation, testing and administrative controls.

The FSAR also indicated that all portions of the fire protection program which impact safety related areas of the plant will meet the appropriate requirements in Section 17.2 of the EF2 FSAR as addressed in Appendix A of NRC Branch Technical Position APCSB 9.5-1 with the stipulation that the fire protection system was not originally designed to be safety related, but its operation and maintenance will meet safety related system requirements.

During the inspection, the inconsistency between the licensees FSAR commitment stating that the operation and maintenance of the fire protection system will meet safety related system requirements and the approved quality assurance requirements contained in QAPR 30 was discussed with the licensee's staff. The staff acknowledged the inspector concerns and indicated that the FSAR statements would be further reviewed and clarified if necessary. Subsequently, on January 25, 1984, the inspectors were provided with FCN No. 85-19 showing the FSAR changes had been implemented. This item is considered closed.

9. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items or items of noncompliance. An unresolved item is contained in paragraph 6.B.(2)(c).

10. Open Items

Open items are matters which have been discussed with the licensee, which will be reviewed further by the inspector, and which involve some action on the part of the NRC or licensee or both. Open items disclosed during the inspection are discussed in Paragraphs 2, 5, 6 and 7.

11. Exit Interview

The inspectors met with licensee's representatives (denoted in Paragraph 1) on January 25, 1985. The inspector summarized the scope and findings of the inspection.