

April 28, 2003

Mr. William T. O'Connor, Jr.
Vice President - Nuclear Generation
Detroit Edison Company
6400 North Dixie Highway
Newport, MI 48166

SUBJECT: FERMI 2 - ISSUANCE OF AMENDMENT RE: REFUELING EQUIPMENT
INTERLOCKS (TAC NO. MB6387)

Dear Mr. O'Connor:

The Commission has issued the enclosed Amendment No. 154 to Facility Operating License No. NPF-43 for the Fermi 2 facility. The amendment consists of changes to the Technical Specifications (TSs) in response to your application dated September 26, 2002.

The amendment revises TS 3.9.1, "Refueling Equipment Interlocks," to allow in-vessel fuel movement to continue if the refueling interlocks become inoperable. Specifically, the amendment adds Required Action A.2.1 to immediately block control rod withdrawal and Required Action A.2.2 to perform a verification that all of the control rods are fully inserted.

A copy of our safety evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

/RA/

John F. Stang, Senior Project Manager, Section 1
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-341

Enclosures: 1. Amendment No. 154 to NPF-43
2. Safety Evaluation

cc w/encls: See next page

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*SE input by memo

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OFFICIAL RECORD COPY

Fermi 2

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December 2002

DETROIT EDISON COMPANY

DOCKET NO. 50-341

FERMI 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 154
License No. NPF-43

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by the Detroit Edison Company (the licensee) dated September 26, 2002, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and paragraph 2.C.(2) of Facility Operating License No. NPF-43 is hereby amended to read as follows:

Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 154, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the license. DECo shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

L. Raghavan, Chief, Section 1
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: April 28, 2003

ATTACHMENT TO LICENSE AMENDMENT NO. 154

FACILITY OPERATING LICENSE NO. NPF-43

DOCKET NO. 50-341

Replace the following page of the Appendix A Technical Specifications with the attached revised page. The revised page is identified by amendment number and contains marginal lines indicating the areas of change.

REMOVE

3.9-1

INSERT

3.9-1

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 154 FACILITY OPERATING LICENSE NO. NPF-43

DETROIT EDISON COMPANY

FERMI 2

DOCKET NO. 50-341

1.0 INTRODUCTION

By application dated September 26, 2002, the Detroit Edison Company (the licensee) requested changes to the Technical Specifications (TSs) for Fermi 2. The proposed changes would revise TS 3.9.1, "Refueling Equipment Interlocks," to allow in-vessel fuel movement to continue if the refueling interlocks become inoperable. Specifically, the amendment would add Required Action A.2.1 to immediately block control rod withdrawal and Required Action A.2.2 to perform a verification that all of the control rods are fully inserted.

2.0 REGULATORY REQUIREMENTS

General Design Criterion (GDC) 26, "Reactivity Control System Redundancy and Capability," of Appendix A to Part 50 of Title 10 of the *Code of Federal Regulations* (10 CFR Part 50) requires, in part, that the reactivity control system be capable of holding the reactor subcritical under cold conditions. The control rods serve the function of the reactivity control system by ensuring that the core is kept subcritical when the core reactivity is being changed by fuel loading or control rod withdrawals.

Section 15.4, "Reactivity and Power Distribution Anomalies," of the Fermi 2 Updated Final Safety Analysis Report (UFSAR) analyzes an inadvertent criticality caused by the complete withdrawal, during refueling, of the most reactive control rod. The analysis states that "...there is no postulated set of circumstances that results in an inadvertent rod withdrawal error while in the refuel mode." It also states that, "During refueling operations, safety system interlocks provide assurance that inadvertent criticality does not occur because a control rod has been removed or is withdrawn in coincidence with another control rod."

As described in UFSAR Section 7.6.1.1, "Refueling Interlocks Systems," the refueling interlocks circuitry senses the condition of the refueling equipment and the control rods. Depending on the sensed condition, interlocks are actuated to prevent the movement of the refueling equipment or withdrawal of the control rods. Circuitry is provided to sense the following

conditions: (1) all rods inserted; (2) refueling platform positioned near or over the reactor core; (3) refueling platform hoists (fuel grapple, frame-mounted hoist, or trolley-mounted hoist) fuel-loaded; and (4) fuel grapple not at the full-up position.

With the reactor mode switch in the refuel position, the refueling interlocks receive and process signals from the refueling equipment. The refueling equipment interlocks combine the signals to enforce the design-basis assumptions by: 1) preventing the operation of the refueling equipment to move fuel if all control rods are not inserted, and 2) preventing control rod withdrawals if fuel loading is in progress.

The refueling equipment interlocks prevent fuel loading unless all control rods are inserted. If fuel loading is in progress, the interlocks prevent control rod withdrawals. These restrictions minimize the impact of more reactive mislocated fuel assemblies because control rod withdrawals will not be allowed before core loading verifications are completed.

As an additional safety feature, the control rod design makes it physically difficult to decouple and remove a control rod without initially removing the fuel assemblies from the corresponding fuel cell.

BWR reactor cores are designed with sufficient shutdown margin to ensure that the core will remain subcritical, with the most reactive control rod withdrawn to its full-out position. With one control rod withdrawn, the one-rod-out interlock prevents the selection or withdrawal of a second control rod. The one-rod-out interlock and the refueling equipment interlocks are designed to prevent inadvertent fuel loading into de-fueled, uncontrolled cells and withdrawal of a control rod adjacent to or near another loaded fuel cell with a withdrawn control rod. These interlocks are designed to prevent inadvertent fuel loading and control rod withdrawal errors. TS 3.9.1 and TS 3.9.2, "Refuel Position One-Rod-Out Interlock," require the operability of these functions during the specified applicable conditions.

3.0 TECHNICAL EVALUATION

The licensee proposed to revise TS 3.9.1 to allow in-vessel fuel movement to continue if the refueling interlocks become inoperable. Specifically, the amendment would add Required Action A.2.1 to immediately block control rod withdrawal and Required Action A.2.2 to immediately perform a verification that all of the control rods are fully inserted. The control rod withdrawal block electrically or hydraulically prevents withdrawal of a control rod. These actions together would provide an alternative to the existing Required Action A.1, which requires that in-vessel fuel movement with equipment associated with the inoperable interlock(s) be immediately suspended.

The licensee stated that the proposed changes would be beneficial by allowing refueling activities to continue in the event one or more of the refueling equipment interlocks fail, while continuing to maintain a sufficient level of protection against inadvertent criticality. The licensee further stated that proposed Required Actions A.2.1 and A.2.2 would be beneficial in circumstances where Surveillance Requirement (SR) 3.9.1.1, which requires a channel functional test of the refueling equipment interlocks on a 7-day frequency, comes due shortly before the completion of fuel movement activities. Under proposed Required Actions A.2.1

and A.2.2, the licensee could continue the in-vessel fuel movement, rather than halting refueling activities to perform SR 3.9.1.1. Continuing the fuel movement operation reduces the risks associated with halting and resuming fuel movement activities. The proposed change is not intended to avoid performing SR 3.9.1.1 before starting in-vessel fuel movement, by declaring the refueling equipment interlocks inoperable, and entering into Required Actions A.2.1 and A.2.2.

The refueling equipment interlocks block control rod withdrawals whenever fuel is being moved over or in the reactor vessel. Conversely, when a control rod is withdrawn, the refueling equipment interlocks prevent fuel movement over or in the vessel. Therefore, operable refueling interlocks permit fuel loading to continue without the need to have a control rod withdrawal block "in effect" at all times.

The first safety function of refueling equipment interlocks is to block control rod withdrawal whenever fuel is being moved over or near the reactor. Proposed Required Action A.2.1 would require an action comparable to this function by requiring a continuous control rod withdrawal block. The second safety function of refueling equipment interlocks is to prevent fuel from being loaded into the vessel when a control rod is withdrawn. Required Action A.2.1, which would prevent control rods from being withdrawn, and Required Action A.2.2, which would require verification that all control rods are fully inserted, together would provide adequate fulfillment of the second safety function in cases where the required refueling equipment interlocks have become inoperable during refueling operations.

Additionally, SR 3.9.3.1 of TS 3.9.3, "Control Rod Position," requires that the control rod positions be verified every 12 hours when loading fuel assemblies into the reactor core. Proposed Required Actions A.2.1 and A.2.2, in conjunction with SR 3.9.3.1, would provide adequate assurance that control rods are not and cannot be inappropriately withdrawn because an electrical or hydraulic block to prevent control rod withdrawal will be in place. Proposed Required Actions A.2.1 and A.2.2 would also provide adequate assurance that unacceptable operations, such as mis-loading of fuel into cells with control rods withdrawn, are blocked.

This amendment will not affect any requirements that involve the operability and reliability of the refueling equipment hardware. Limiting Conditions for Operation or SRs (whether in the TSs or licensee-controlled documents) ensure that the refueling platform and the fuel grapple main hoist are operable and can perform their functions. This amendment involves only the instrumentation and logic of the refueling equipment interlocks.

The refueling equipment interlock logic combines the input signals from the refueling and service platform, grapple hoist loading, and the all-rods-in permissive signals to detect and physically prevent in-vessel fuel movement unless all control rods are inserted. The NRC staff agrees with the licensee that successfully verifying that all control rods are in their full-in position and disabling any control rod withdrawal would provide adequate assurance that all control rods are inserted and remain inserted, while fuel movement is in progress. Therefore, the NRC staff finds the proposed amendment acceptable. The NRC staff notes that proposed Required Action A.2.2 would replace an automatic all-rod-in permissive feature with a manual verification that all control rods are inserted, which is subject to human error. The licensee has the option of using a visual aid (such as under-water cameras) to ensure that all control rods are in their full-in positions. If the reading from a position indication probe (PIP) is suspected to

be incorrect or false, the NRC staff expects that the license will use visual aids or other dependable methods to ensure that all the control rods are inserted, rather than relying on a reading from a potentially inoperable PIP.

The licensee also proposed to add the following to TS Bases 3.9.1:

“Alternatively, Required Action A.2.1 and A.2.2 require a control rod withdrawal block to be inserted, and all control rods to be subsequently verified to be fully inserted. Required Action A.2.1 ensures no control rods can be withdrawn, because a block to control rod withdrawal is in place. The withdrawal block utilized must ensure that if rod withdrawal is requested, the rod will not respond (i.e., it will remain inserted). Required Action A.2.2 is normally performed after placing the rod withdrawal block in effect, and provides a verification that all control rods are fully inserted. This verification that all control rods are fully inserted is in addition to the periodic verification required by SR 3.9.3.1. Similar to Required Action A.1, Required Action A.2.1 and A.2.2 ensure unacceptable operations are blocked (e.g., loading fuel into a cell with control rod withdrawn). For this action all 185 control rods must be fully inserted, including core cells containing no fuel assemblies. This will eliminate the possibility of a reloading error in cells which are not protected by refueling interlocks or an inserted control rod. It is not the intent of this alternative action to eliminate the first performance of SR 3.9.1.1. prior to in-vessel fuel movement (e.g.; fuel shuffle). It is expected that the refueling interlocks would be operable except for equipment failures or expiration of the required surveillance intervals.”

The NRC staff considers that the explanation in TS Bases 3.9.1 clearly establishes the intent of the proposed changes and delineates the reasons proposed Required Actions A.2.1 and A.2.2 are necessary to provide equivalent protection.

4.0 SUMMARY

The NRC staff has evaluated the proposed changes to TS 3.9.1 and finds them acceptable on the bases that: (1) the proposed changes adequately compensate for the functions of the inoperable refueling equipment interlocks, (2) the refueling equipment hardware will still be required to be operable, (3) the licensee will still perform SR 3.9.1.1 and SR 3.9.3.1 at their required frequencies.

5.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Michigan State official was notified of the proposed issuance of the amendment. The State official had no comments.

6.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration and there has been no public comment on such finding

(67 FR 70764). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

7.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: Z. Abdullahi

Date: April 28, 2003