December 5, 1997

Mr. Douglas R. Gipson
Senior Vice President
Nuclear Generation
Detroit Edison Company
6400 North Dixie Highway
Newport, Michigan 48166

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION (RAI) RELATED TO THE FERMI-2 INDIVIDUAL PLANT EXAMINATION FOR EXTERNAL EVENTS SUBMITTAL (TAC NO. M83621)

Dear Mr. Gipson:

On March 29, 1996 (NRC-96-0037), Detroit Edison submitted the required response to Generic Letter 88-20, Supplement 4, "Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities," dated June 28, 1991. Based on the staff's ongoing review of that submittal, additional information, as discussed in the enclosure, is requested in order for the staff to complete its review. The RAI is related to the fire and seismic areas of the IPEEE submittal. Currently, there are no questions in the high winds, flood, and other external events (HFO) area of the submittal. NRC requests that Detroit Edison respond within 60 days of the date of this letter.

If you have any questions concerning this request, please contact me at (301) 415-2828

Sincerely,

Original signed by:

Andrew J. Kugler, Project Manager
Project Directorate III-1
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Docket No. 50-341

Enclosure: As stated

cc w/encl: See next page

DF01

DISTRIBUTION:

Docket File	OGC
PUBLIC	ACRS
PD31 r/f	BBurgess, RIII (BLB)
EAdensam, EGA1	EChow, RES

DOCUMENT NAME: G:\WPDOCS\FERMI\WP61\FE83621.RAI

To receive a copy of this document, indicate in the box: "C" = Copy without attachment/enclosure "E" = Copy with attachment/enclosure "N" = No copy

OFFICE	PM:PD31	E	LA:PD31	E	D:PD31	
NAME	AKugler:db		CJamerson		JHannon	
DATE	12/4/97		12/4/97		12/5/97	

OFFICIAL RECORD COPY

cc:

John Flynn, Esquire
Senior Attorney
Detroit Edison Company
2000 Second Avenue
Detroit, Michigan 48226

Drinking Water and Radiological
Protection Division
Michigan Department of
Environmental Quality
3423 N. Martin Luther King Jr Blvd
P. O. Box 30630 CPH Mailroom
Lansing, Michigan 48909-8130

U.S. Nuclear Regulatory Commission
Resident Inspector's Office
6450 W. Dixie Highway
Newport, Michigan 48166

Monroe County Emergency Management
Division
963 South Raisinville
Monroe, Michigan 48161

Regional Administrator, Region III
U.S. Nuclear Regulatory Commission
801 Warrenville Road
Lisle, Illinois 60532-4351

Norman K. Peterson
Director, Nuclear Licensing
Detroit Edison Company
Fermi 2 - 280 TAC
6400 North Dixie Highway
Newport, Michigan 48166

REQUEST FOR ADDITIONAL INFORMATION (RAI) RELATED TO
THE FERMI-2 INDIVIDUAL PLANT EXAMINATION FOR
EXTERNAL EVENTS SUBMITTAL (TAC NO. M83621)

Fire

1. It is important that the human error probabilities (HEPs) used in the screening phase of the analysis properly reflect the potential effects of fire (e.g., smoke, heat, loss of lighting, and poor communication), even if these effects do not directly cause equipment damage in the scenarios being analyzed. If these effects are not treated, the HEPs may be optimistic and result in the improper screening of scenarios. Note that HEPs that are realistic with respect to an internal events analysis could be optimistic with respect to a fire risk analysis.

   Please identify: (a) the scenarios screened out from further analysis whose quantification involved one or more HEPs, (b) the HEPs (descriptions and numerical values) for each of these scenarios, and (c) how the effects (e.g., smoke, heat, loss of lighting, and poor communication) of the postulated fires on HEPs were treated.

2. NUREG-1407 ("Procedural and Submittal Guidance for the Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities, Final Report"), Section 4.2 and Appendix C, and GL 88-20 ("Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities"), Supplement 4, request that documentation be submitted with the IPEEE submittal with regard to the fire risk scoping study (FRSS) issues, including the basis and assumptions used to address these issues, and a discussion of the findings and conclusions. NUREG-1407 also requests that evaluation results and potential improvements be specifically highlighted. Control system interactions involving a combination of fire-induced failures and high probability random equipment failures were identified in the FRSS as potential contributors to fire risk.

   The issue of control systems interactions is associated primarily with the potential that a fire in the plant (e.g., the main control room (MCR)) might lead to potential control systems vulnerabilities. Given a fire in the plant, the likely sources of control systems interactions could happen between the MCR, the remote shutdown panel (RSP), and shutdown systems. Specific areas that have been identified as requiring attention in the resolution of this issue include:

   (a) Electrical independence of the remote shutdown control systems: The primary concern of control systems interactions occurs at plants that do not provide independent remote shutdown control systems. The electrical independence of the RSP and the evaluation of the level of indication and control of remote shutdown control and monitoring circuits need to be assessed.

ENCLOSURE

(b) Loss of control equipment or power before transfer: The potential for loss of control power for certain control circuits as a result of hot shorts and/or blown fuses before transferring control from the MCR to remote shutdown locations needs to be assessed.

(c) Spurious actuation of components leading to component damage, loss-of-coolant accident (LOCA), or interfacing systems LOCA: The spurious actuation of one or more safety-related to safe-shutdown-related components as a result of fire-induced cable faults, hot shorts, or component failures leading to component damage, LOCA, or interfacing systems LOCA, prior to taking control from the RSP, needs to be assessed. This assessment also needs to include the spurious starting and running of pumps as well as the spurious repositioning of valves.

(d) Total loss of system function: The potential for total loss of system function as a result of fire-induced redundant component failures or electrical distribution system (power source) failure needs to be addressed.

Please provide an evaluation of whether loss of control power due to hot shorts and/or blown fuses could occur prior to transferring control to the remote shutdown location and identify the risk contribution of these types of failures (if these failures are screened, please provide the basis for the screening). Finally, provide an evaluation of whether spurious actuation of components as a result of fire-induced cable faults, hot shorts, or component failures could lead to component damage, a LOCA, or an interfacing systems LOCA prior to taking control from the RSP (considering both spurious starting and running of pumps as well as the spurious repositioning of valves).

3. The previous question addresses the potential for hot shorts due to fires in the MCR. Fires in other areas of the plant can also result in hot shorts that result in adverse conditions. Hot shorts in control cables can simulate the closing of control switches leading, for example, to the repositioning of valves, spurious operation of motors and pumps, or the shutdown of operating equipment. These types of faults might, for example, lead to a LOCA, diversion of flow within various plant systems, deadheading and failure of important pumps, premature or undesirable switching of pump suction sources, or undesirable equipment operations. In instrumentation circuits, hot shorts may cause misleading plant readings potentially leading to inappropriate control actions or generation of actuation signals for emergency safeguard features. From the submittal, it cannot be determined to what extent the licensee has considered hot shorts as a failure mode for control or instrumentation cables. In particular, hot short considerations should include the treatment of conductor-to-conductor shorts within a given cable.

Discuss to what extent these issues have been considered in the IPEEE. If they have not been considered, please provide an assessment of how inclusion of potential hot shorts would impact the quantification of fire risk scenarios in the IPEEE.

4. In the Electric Power Research Institute (EPRI) fire probabilistic risk analysis (PRA) implementation guide, test results for the control cabinet heat release rate have been misinterpreted and have been inappropriately extrapolated. Cabinet heat release rates as low as 65 Btu/sec are used in the guide. In contrast, experimental work has developed heat release rates ranging from 23 to 1171 Btu/sec.

   Considering the range of heat release rates that could be applicable to different control cabinet fires, and to ensure that cabinet fire areas are not prematurely screened out of the analysis, a heat release rate in the mid-range of the currently available experimental data (e.g., 550 Btu/sec) should be used for the analysis.

   Discuss the heat release rates used in your assessment of control cabinet fires. Please provide a discussion of changes in the IPEEE fire assessment results if it is assumed that the heat release from a cabinet fire is increased to 550 Btu/sec.

5. On page 4-78 of the submittal, it is indicated that the quantitative screening approach used in the Fermi 2 fire assessment deviates from the fire-induced vulnerability evaluation (FIVE) methodology in that all equipment in a fire compartment is not assumed to be failed. The submittal states that "obvious non-failures" were eliminated. Three areas were screened in this phase of the analysis. Please indicate what equipment was assumed not to fail in any areas screened using this argument.

6. Section 4.1.2 of the submittal indicates that some minor discrepancies in the assessment were uncovered during the final confirmatory walkdowns (e.g., equipment being located in wrong compartments) but concludes that these errors would have no significant impact on the final results. Please provide a description of these discrepancies and a basis for the submittal's conclusion.

7. The submittal indicates that some fire dampers have been declared inoperable. Please indicate if the inoperability of these dampers was included in the fire compartment interaction analysis (FCIA) portion of the fire assessment. If credit was taken for these dampers, provide the basis for their assumed operation.

Seismic

1. Section 3.1.2.3.2 of the Fermi Unit 2 IPEEE submittal addresses control relays. Detroit Edison identified 13 low-seismic-ruggedness relays which perform a "control interface" function (Category 4). Based on a review of the affected circuits, Detroit Edison concluded that all 13 of these relays were "acceptable for the seismic margins assessment (SMA) review."

   Please provide the applicable sections of Reference 3.42 and/or other documentation, as applicable, which provides the technical basis for the acceptability of the 13 control interface relays.

2. Sections 3.1.3 through 3.1.5 of the Fermi Unit 2 IPEEE submittal document Detroit Edison's seismic evaluation in accordance with EPRI's SMA methodology for the IPEEE review level earthquake (RLE) (0.3g peak ground acceleration, NUREG/CR-0098 ("Development of Criteria for Seismic Review of Selected Nuclear Power Plants") median-centered rock site spectrum). Considerable description of the approach, the results of the assessment, and the resolution of outliers is provided. However, the information provided is primarily of a qualitative nature. For example, while RLE in-structure response spectra were specifically developed for the IPEEE, these are not provided in the submittal. In addition, since evaluation to the RLE was apparently based on extrapolation from design basis calculations, a comparison of the RLE in-structure response spectra to the design basis in-structure response spectra is necessary to assess Detroit Edison's approach. Lastly, the process of extrapolation from design calculations is only generally described. The conservative deterministic failure margin (CDFM) method of EPRI NP-6041-SL ("A Methodology for Assessment of Nuclear Power Plant Seismic Margin, Revision 1") is not referenced as a basis for this extrapolation; consequently, the high-confidence low-probability of failure (HCLPF) capacities provided in the submittal have no defined technical basis.

   To provide a more quantitative basis for assessment of Detroit Edison's approach, please identify the five most limiting components or structural elements with respect to plant HCLPF capacity, and provide the following information:

   a) the applicable RLE in-structure response spectra
   b) the applicable design basis in-structure response spectra
   c) the calculations performed to determine the HCLPF capacity.

3. For the following items, please provide the same (or comparable) information as requested in Seismic question #2 above:

   a) Motor control center (limiting case)
   b) Control and instrumentation cabinet (limiting case)
   c) Masonry wall No. 212
   d) Residual heat removal (RHR) heat exchanger supports
   e) Emergency diesel generator (EDG) fuel oil tank supports
   f) 4160 volt emergency switchgear/bus

High Wind, Flood and Other External Events (HFO)

1. There are no questions in the HFO area.