

June 22, 2010

Mr. Jack M. Davis  
Senior Vice President and Chief Nuclear Officer  
Detroit Edison Company  
Fermi 2 – 210 NOC  
6400 North Dixie Highway  
Newport, MI 48166

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 36 RELATED TO  
THE SRP SECTIONS 2.5.2 AND 2.5.4 FOR THE FERMI 3 COMBINED  
LICENSE APPLICATION

Dear Mr. Davis:

By letter dated September 18, 2008, Detroit Edison Company (Detroit Edison) submitted for approval a combined license application pursuant to 10 CFR Part 52. The U.S. Nuclear Regulatory Commission (NRC) staff is performing a detailed review of this application to enable the staff to reach a conclusion on the safety of the proposed application.

The NRC staff has identified that additional information is needed to continue portions of the review. The staff's request for additional information (RAI) is contained in the enclosure to this letter. To support the review schedule, you are requested to respond within 45 days of the date of this letter. If changes are needed to the safety analysis report, the staff requests that the RAI response include the proposed wording changes.

If you have any questions or comments concerning this matter, I can be reached at 301-415-8148 or by e-mail at [jerry.hale@nrc.gov](mailto:jerry.hale@nrc.gov).

Sincerely,

*/RA/*

Jerry Hale, Project Manager  
BWR Projects Branch  
Division of New Reactor Licensing  
Office of New Reactors

Docket Nos. 052-033

eRAI Tracking Nos. 4764 and 4766

Enclosure:  
Request for Additional Information

June 22, 2010

Mr. Jack M. Davis  
Senior Vice President and Chief Nuclear Officer  
Detroit Edison Company  
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6400 North Dixie Highway  
Newport, MI 48166

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 36 RELATED TO  
THE SRP SECTIONS 2.5.2 AND 2.5.4 FOR THE FERMI 3 COMBINED  
LICENSE APPLICATION

Dear Mr. Davis:

By letter dated September 18, 2008, Detroit Edison Company (Detroit Edison) submitted for approval a combined license application pursuant to 10 CFR Part 52. The U.S. Nuclear Regulatory Commission (NRC) staff is performing a detailed review of this application to enable the staff to reach a conclusion on the safety of the proposed application.

The NRC staff has identified that additional information is needed to continue portions of the review. The staff's request for additional information (RAI) is contained in the enclosure to this letter. To support the review schedule, you are requested to respond within 45 days of the date of this letter. If changes are needed to the safety analysis report, the staff requests that the RAI response include the proposed wording changes.

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Sincerely,

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Jerry Hale, Project Manager  
ESBWR/ABWR Projects Branch 1  
Division of New Reactor Licensing  
Office of New Reactors

Docket Nos. 052-033  
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Enclosure:

Request for Additional Information

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DATE	5/28/10	6/14/10	6/22/10

**\*Approval captured electronically in the electronic RAI system.**

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## Request for Additional Information No. 4764 Revision 0

Fermi Unit 3  
Detroit Edison  
Docket No. 52-033

SRP Section: 02.05.04 - Stability of Subsurface Materials and Foundations  
Application Section: SRP 2.5.4

02.05.04-29

In the response to RAI 02.05.04-2, it was indicated that the observed orientation of discontinuities in the Bass Islands Group vary from horizontal to vertical, with near horizontal and near vertical joints dominating. However, the response also stated that "The orientation of the discontinuities tested is nearly horizontal, except the orientation of samples CB-C4 at 57.0 feet and RB-C3 at 46.9 feet, which were at inclined angles." You concluded in the response that both the discontinuities tested and the results are representative of the discontinuities observed within the Bass Islands Group. In accordance with 10CFR100.23, please justify why the test results from mostly horizontal discontinuities (one dominant orientation) can be representative of vertical discontinuities (another dominant orientation), and provide the basis for your conclusion.

02.05.04-30

In the response to RAI 02.05.04-3, you stated that "Guidelines are discussed in the FSAR Reference 2.5.4-201 for determination of  $\sigma'_{3\max}$  for slopes and for shallow and deep tunnels. For Fermi 3, the equation of  $\sigma'_{3\max}$  developed for slopes was selected." In accordance with 10 CFR 100.23, please explain why the use of "the equation of  $\sigma'_{3\max}$  developed for slopes" would provide an adequate representation of the Hoek-Brown criteria for evaluation of foundation behavior beneath key structures.

02.05.04-31

In the response to RAI 2.5.4-5, you provided chemical test results for groundwater sulfate and chloride concentrations, and indicated that all sample results for sulfate concentration from the monitoring wells fell into the categories of "moderate" and "severe" sulfate exposure for concrete based on ACI 349. In accordance with 10CFR100.23, provide groundwater pH values since concrete, being highly alkaline, is degraded by strong acids. Also, evaluate the potential aging effects (e.g., an increase in porosity and permeability, cracking, and/or the loss of material due to spalling or scaling) on the concrete fill due to aggressive groundwater conditions (e.g., pH < 5.5, chlorides > 500 ppm, or sulfates > 1500 ppm). In addition, provide a commitment in the FSAR to ensure that ACI 349 requirements for concrete exposed to sulfate-containing solutions, including cement type, water-cement ratio, and minimum compressive strength, will be followed.

02.05.04-32

In the response to RAI 02.05.04-22, you stated the reason for using the upper-bound Hoek-Brown effective friction angle and cohesion for the Bass Islands Group, stating that the upper-bound Hoek-Brown effective friction angle of 53 degrees matches well with the mean residual friction angle of 52 degrees measured from the rock direct shear tests on discontinuities. In accordance with 10 CFR 100.23:

- a. Please discuss why a lower value of measured effective friction angle, such as mean effective friction angle minus one standard deviation, is not used to account for variability of the tests to ensure that your Hoek-Brown criterion is conservatively applied.
- b. Please clarify the basis for concluding that using the upper bound Hoek-Brown cohesion is appropriate based on the upper bound Hoek-Brown effective friction angle matching well with the measured mean effective friction angle.

02.05.04-33

In the response to RAI 02.05.04-23, you stated that the Terzaghi approach takes into consideration the effect of the weaker zone below the Bass Islands Group based on general bearing capacity failure behavior, and the Uniform Building Code approach considers the allowable contact pressure on unweathered bedrock under a uniaxial loading condition to assure that the foundation bedrock has sufficient capacity against rupture. However, the Terzaghi approach is based on a particular class of potential failure mode involving homogeneous foundation material, and the Uniform Building Code approach is based on a more empirically based information mainly for buildings. In accordance with 10 CFR 100.23, please provide the basis for selecting these two approaches for the possible failure modes of foundation rock units at the site.

02.05.04-34

In RAI response 2.5.4-20, you presented a liquefaction analysis for backfill to be placed adjacent to Category I structures. An assumed  $N_{60}$  of 30 blows/ft was assumed at the ground surface increasing linearly to 60 blows/ft down to a depth of 65 ft. In accordance with 10CFR100.23, please capture this liquefaction evaluation in the FSAR. Also provide details regarding how the assumed  $N_{60}$  values will be verified, and provide specific commitments to those verification methods in the FSAR. In addition, please provide the expected field backfill compaction (for example, 95% Modified Proctor, if applicable) and specify commitment in the FSAR.

**Request for Additional Information No. 4766 Revision 2**

Fermi Unit 3  
Detroit Edison  
Docket No. 52-033  
SRP Section: 02.05.02 - Vibratory Ground Motion  
Application Section: 2.5.2

02.05.02-11

You indicated in the response to RAI 2.5.2-2 that you followed SSHAC Level 2 procedures for updating EPRI/SOG seismic sources with respect to the Fermi 3 site. In accordance with 10 CFR 100.23, please provide a detailed description on the process that you followed including a listing of the Technical Integrators (TIs) and the Review Panel members. In addition, please fully explain how you incorporated differing expert opinions. Finally, please update the FSAR to incorporate this information.

02.05.02-12

FSAR Section 2.5.2 (Revision 2) includes multiple figures that are either truncated in the lower portions (e.g., FSAR Figure 2.5.2-261, and others) or do not include tick marks on the x axes (e.g., FSAR Figures 2.5.2-222 through 2.5.2-227). Please make the appropriate corrections to these FSAR figures. This request is in accordance with 10 CFR 100.23.

02.05.02-13

FSAR Section 2.5.2.5.1.2 states that attenuation models for CEUS hard rock assume a shallow crustal  $\kappa$  (attenuation parameter) value of approximately 0.006 seconds, which refers to a point at elevation 48 m (156 ft) at the Fermi 3 site. The FSAR further states that the material above this elevation will contribute additional damping and add to the total site  $\kappa$ . Using FSAR Section 2.5.2 Equation 11, you calculated an additional  $\kappa$  value of 0.013 seconds based on an average shear wave velocity of 5700 fps for the materials above elevation 48 m (156 ft). You then subtracted the hard rock  $\kappa$  value of 0.006, which yields a remaining  $\kappa$  of 0.007 seconds. In accordance with 10 CFR 100.23, please provide the following:

- a) Please confirm if the  $\kappa$  value of 0.013 seconds represents an additional damping contribution from the materials above elevation 48 m (156 ft).
- b) If the  $\kappa$  value of 0.013 seconds does represent an additional damping contribution (and the  $\kappa$  value of 0.006 seconds represents the contribution from the crystalline rocks beneath elevation 48 m), please explain why you subtracted 0.006 seconds from the 0.013 seconds value.

02.05.02-14

In response to RAI 2.5.2-5, you stated that you conducted the Fermi site response analysis prior to completion of the laboratory dynamic testing performed on the glacial till. Furthermore, you stated that you selected the shear modulus reduction and damping relationships for the glacial till from literature. You then used those literature-based shear modulus reduction and damping curves in your site response analysis. Please update relevant FSAR figures that compare the shear modulus reduction and damping curves used in the site response analysis to the dynamic laboratory test results, similar to the figures provided in response to RAI 2.5.2-5. This request is in accordance with 10 CFR 100.23.

02.05.02-15

In response to RAI 2.5.2-8, you indicated that, based on the occurrence of two post-EPRI/SOG earthquakes of mb 5.0 and 5.2, the probability of activity for the Dames and Moore source zone DAM08 increased from 0.08 to 1 in the Fermi 3 PSHA. Therefore, please explain why the hazard contribution from the source zone DAM08 appears to be so low in comparison to other sources included in FSAR Figure 2.5.2-223. In addition, please demonstrate your ability to back calculate rock hazard curves for source zone DAM08 (shown in FSAR Figure 2.5.2-223) using the GMRS hazard curves shown in Figure 10 of your response to RAI 2.5.2-8 by factoring in corresponding amplification factors. This request is in accordance with 10 CFR 100.23.