April 28, 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. 31 RELATED TO THE SRP SECTION 10.02.03 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.

Sincerely,

/RA/

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

Docket Nos. 052-033

eRAI Tracking Nos. 4641

Enclosure:
Request for Additional Information

April 28, 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. 31 RELATED TO THE SRP SECTION 10.02.03 FOR THE FERMI 3 COMBINED LICENSE APPLICATION

Dear Mr. Smith:

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.

Sincerely,

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

Docket Nos. 052-033
eRAI Tracking Nos. 4641
Enclosure:
Request for Additional Information
Distribution:
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OFFICE	NRO/CIB2	OGC	NGE1/LPM
NAME	MNorato	M. Carpentier	JHale
DATE	4/13/10	4/19/10	4/27/10

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

OFFICIAL RECORD COPY

Request for Additional Information No. 4641 Revision 2

Fermi Unit 3
Detroit Edison
Docket No. 52-033
SRP Section: 10.02.03 - Turbine Rotor Integrity
Application Section: 10.2.3

10.02.03-1

The FERMI ,Unit 3, COL FSAR provided information to STD COL 10.2-2-A by referencing the GE-Energy Steam Turbines (GE-ST) report ST-56834/P, Revision 1 as the bounding analysis for the probability of turbine missile generation. Clarify whether the GE-ST report ST-56834/P, Revision 1 is applicable to the GE Model N3R-6F52 turbine.

10.02.03-2

Sections 2.1, 5.1 and 5.1.5 of GE Report ST-56834/P, Revision 1 specify a MARK ™ IVe turbine generator control system (TGCS), while Sections 5.1.6 specifies a MARK ™ VIe TGCS. Clarify whether the ESBWR turbine generator uses a General Electric MARK ™ IVe TGCS or a General Electric MARK ™ VIe TGCS.

10.02.03-3

Clarify whether the reference of 120 percent of rated speed in Section 2.2 of GE Report ST-56834/P, Revision 1 is the design overspeed of the turbine used in the analysis.

10.02.03-4

Section 3.1 of GE Report ST-56834/P, Revision 1 states that the low pressure (LP) turbine rotor forgings are NiCrMoV alloy material in accordance with B50A373B8. Provide the General Electric specification B50A373B8 and confirm that this material is used for both existing turbine rotors and the proposed forgings for the ESBWR turbine rotors. Also, provide operational experience of this turbine rotor material, or provide justification for the use of this material if there is no operational experience.

10.02.03-5

Section 3.1.1 of GE Report ST-56834/P, Revision 1 specifies “Deep seated FATT testing, however, will be performed for each production rotor forging during routine material acceptance testing and the fracture toughness at the forging centerline will be derived based on historical correlations.” Discuss how the deep seated FATT testing will be performed, including information about the specimen material if it is not from the production rotor forging and the depth of the forging material from where the specimens will be obtained. Present the historical correlations for deriving the fracture toughness at the forging centerline. Justify the use of the historical correlations, since this correlation may not be applicable to the ESBWR rotor forging (e.g., a FATT temperature of 30 °F) due to the different material specification and properties used in the historical data.

10.02.03-6

Section 3.1 of GE Report ST-56834/P, Revision 1 specifies that the ESBWR low pressure turbine rotor has a FATT temperature of -1.1ºC (+30 ºF) for a large integral forging. However, Section 3.1.1 states that for missile generation probability calculations, a normally distributed FATT featuring a -30 ºF mean and a 30 ºF standard deviation is assumed. For a normal distribution, 95% of the sampling will be between the mean value, plus or minus 2σ, i.e., between -90 ºF and +30 ºF. Demonstrate that the FATT distribution (normally distributed FATT featuring a -30 ºF mean and a 30 ºF standard deviation) used in the missile generation probability calculation is representative of the material having a FATT value of -1.1ºC (+30 ºF). In addition, clarify whether the mean FATT value in the turbine missile probability calculations changes as the postulated crack grows.

10.02.03-7

Confirm that Figure 3-1 of GE Report ST-56834/P, Revision 1 for the NiCrMoV toughness curve is based on actual test samples from General Electric specification B50A373B8 referenced in Section 3.1. Otherwise, provide justification for using the Figure 3-1 curves for the ESBWR turbine missile analysis.

10.02.03-8

Sections 3.1.3, 4.2.2 and 8.0 of GE Report ST-56834/P, Revision 1 imply that the low pressure turbine rotors can be either bored or solid. Typically, rotors are bored to allow for inspections and to remove material that may have degraded material properties. Therefore, discuss the operating experience of solid rotors, including any effects due to the degraded material properties of the rotor core. Also, discuss the past volumetric in-service inspection (ISI) results and the current ISI technology to establish the minimum flaw size in the turbine rotors that can be detected by the ISI. Compare this minimum flaw size to the average undetected embedded flaw specified in Section 4.2.2.

10.02.03-9

Discuss how the stresses in Section 4.2 of GE Report ST-56834/P, Revision 1 for a solid rotor were derived.

10.02.03-10

Provide the tangential stresses at the slot bottoms of axial entry dovetails in Section 4.3 of GE Report ST-56834/P, Revision 1 and the corresponding stresses around the shrunk-on-wheel keyways for a similar size turbine to demonstrate that the current designs “feature dramatically low tangential stress.” Besides low stresses, discuss other reasons which make the use of shrunk-on-wheel crack initiation and growth characteristics in the integral forging application for the GE Model N3R-6F52 turbine conservative.

10.02.03-11

The following is related to Section 5 of GE Report ST-56834/P, Revision 1 which provides an evaluation of the overspeed probability.

a. Section 5.1.2 states that ESBWR valves are equivalent to those found on the current fleet. The only visible difference is the use of direct actuators on the main steam control and the intercept valves. Provide information, especially from testing and actual operation of direct actuators, demonstrating that the direct actuators are equivalent to nuclear actuators in all design features and functionality.

b. Section 5.1.2.1 states that the steam valve failure rates used for this ESBWR analysis have been updated to include 1993 and 2008 failure data assessment. Provide the 1993 and 2008 failure rates similar to the format provided in the 1984 report, Appendix G.

c. Section 5.1.2.1 states that approximately the same level of missile probability risk is realized for a valve test frequency of 120-days (with the updated failure rates) versus a 90-day test interval with the older failure rates. Substantiate this statement by providing calculated missile probabilities based on different test frequencies. What is the percentage of the updated failure rates that are associated with turbine units with a valve test frequency of 120-days?

d. Section 5.1.4 states that the component failure rates used in the hydraulic model are consistent with the values in the 1984 report. Discuss whether these values have been updated with additional data since the 1984 report.

e. Section 5.1.6 states that for the MARK ™ VIe TGCS analysis, it was assumed that a load loss occurs once per year. Discuss how this assumption is typical along with any supporting data for this assumption.

f. Section 5.1.6 states that the MARK™ VIe TGCS analysis yields a lower overspeed probability than the MARK II TGCS specified in the 1984 report. Provide quantitatively the margin for using the 1984 overspeed probability based on the MARK ™ II TGCS (for existing fleet control and mechanical trip systems) compared to the MARK ™ VIe TGCS analysis overspeed probability result.

g. Discuss and compare in tabular form why the valves and TGCS (for the MARK™ II) used in the 1984 report are similar (or more conservative) than the valves and TGCS (for the MARK ™ VIe) used for the ESBWR design, so that it can be concluded that the components are similar so that the failure rates (past operating experience) from the 1984 report (current fleet) can be used for the analysis of the ESBWR design.