**Jack M. Davis**
Senior Vice President & Chief Nuclear Officer

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**DTE Energy**

10 CFR 52.79

February 16, 2009
NRC3-09-0001

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington DC 20555-0001

References: 1) Fermi 3
Docket No. 52-033
2) Letter from Jerry Hale (USNRC) to Peter W. Smith (Detroit Edison), "Request for Additional Information Letter No. 1 Related to the SRP Sections 19.2 and 19.5 for the Fermi 3 Combined License Application", dated January 14, 2009
3) Letter from Jerry Hale (USNRC) to Peter W. Smith (Detroit Edison), "Request for Additional Information Letter No. 2 Related to the SRP Sections 02.04.13 for the Fermi 3 Combined License Application", dated January 14, 2009

Subject: Detroit Edison Company Response to NRC Request for Additional Information Letters No. 1 and No. 2

In the referenced letters, the NRC requested additional information to support the review of certain portions of the Fermi 3 Combined License Application (COLA). The responses to the following Requests for Additional Information (RAIs) are provided as Attachments 1 through 7 of this letter:

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| • RAI Question 19-1 | PRA Licensing |
| • RAI Question 2.4.13-1 | Radionuclide Transport Analysis |
| • RAI Question 2.4.13-2 | Radioactive Constituents Determination |
| • RAI Question 2.4.13-3 | Chelating Agents |
| • RAI Question 2.4.13-4 | Post-Construction Groundwater Levels |
| • RAI Question 2.4.13-5 | Transport Considering Decay Only |
| • RAI Question 2.4-13-6 | Surface and Subsurface Pathways |

Information contained in these responses will be incorporated into a future submission of the Fermi 3 COLA as described in the responses. Additional commitments identified in this letter are provided in Attachment 8.

If you have any questions, or need additional information, please contact Mr. Peter W. Smith at (313)235-3341.

Sincerely,

Jack M. Davis
Senior Vice President and
Chief Nuclear Officer
Detroit Edison Company

Attachments: 1) Response to RAI Letter No. 1 (Question No. 19-1)
2) Response to RAI Letter No. 2 (Question No. 2.4.13-1)
3) Response to RAI Letter No. 2 (Question No. 2.4.13-2)
4) Response to RAI Letter No. 2 (Question No. 2.4.13-3)
5) Response to RAI Letter No. 2 (Question No. 2.4.13-4)
6) Response to RAI Letter No. 2 (Question No. 2.4.13-5)
7) Response to RAI Letter No. 2 (Question No. 2.4.13-6)
8) List of Commitments

cc: NRC Fermi 3 Project Manager
Fermi 2 Resident Inspector
NRC Region III Regional Administrator
NRC Region II Regional Administrator
Supervisor, Electric Operators, Michigan Public Service Commission
Michigan Department of Environmental Quality
Radiological Protection and Medical Waste Section

I, Jack M. Davis, do hereby affirm that the foregoing statements are based on facts and circumstances which are true and accurate to the best of my knowledge and belief.

JACK M. DAVIS
Senior Vice President
and Chief Nuclear Officer

On this 16th day of February, 2009 before me personally appeared Jack M. Davis, being first duly sworn and says that he executed the foregoing as his free act and deed.

STACY OAKES
NOTARY PUBLIC, STATE OF MI
COUNTY OF MONROE
MY COMMISSION EXPIRES Jul 23, 2012
ACTING IN COUNTY OF MONROE, MI

Notary Public

# Attachment 1
# NRC3-09-0001

## Response to RAI Letter No. 1
## (eRAI Tracking No. 1747)

## RAI Question No. 19-1

**NRC RAI 19.1**

*1. Fire zones for service water structure/building and yard area are provided in Figure 9A.2-33R and Figure 9A.2-201, respectively in Fermi-3 FSAR. However, flooding zones for this building and yard area are not provided. In support of meeting the requirement of 10 CFR 52.79(a)(46) pertaining to the plant-specific PRA, the staff requests the applicant to provide: (1) description of flooding zones for the Fermi-3 yard area and service water structure/building, and (2) description of the impact of these plant-specific fire areas and flooding zones on the PRA results.*

*2. FSAR Section 19.5, in support of the requirement of 10 CFR 52.79(a)(46) pertaining to the plant-specific probabilistic risk assessment (PRA), states the following: "The review of site- specific information and plant-specific design information determined that: (1) the DCD PRA bounds site-specific and plant-specific design parameters and design features, and 2) these parameters and features have no significant impact on the DCD PRA results and insights," The staff requests that the applicant justify the FSAR statements by providing the following: (1) describe the criteria used to determine whether or not site-specific and plant-specific design parameters and design features are bounded by the DCD PRA, and explain how the criteria were applied in the evaluation, (2) describe the quantitative criteria and the technical basis used to determine whether or not a site-specific or plant-specific design parameter or design feature has a significant impact on the DCD PRA results and insights, and 3) describe each of the site-specific and plant-specific design parameters and design features that were considered in the evaluation.*

**Detroit Edison Response to Question No. 1**

Internal Flooding Associated with the Yard Area

The yard flood zone is essentially all outside areas of the site, and thus the site plot drawing (FSAR Figure 2.1-201) illustrates the areas of concern. In addition, DCD Section 3.4.1.1 stipulates that the plant grade level is above the design flood level. The only components located in the yard that support a safety function are the manual fire hose connections to the Reactor Building and Fuel Building. They provide the capability to connect another source of water to the Isolation Condenser (IC)/Passive Containment Cooling System (PCCS) pools and the Spent Fuel Pool after seven days following a postulated accident. This timeframe is beyond the time required to be considered for the PRA; therefore, external flooding in the yard does not affect PRA equipment.

Internal Flooding Associated with the Service Water Building

The Service Water Structure is a site-specific design feature. It is treated in a bounding manner in the ESBWR PRA to demonstrate that site-specific differences in Service Water Structure design do not have a significant effect on the PRA results. The Service Water Structure houses the four Service Water pumps and their associated power supplies and controls. Because Service Water is a Regulatory Treatment of Non-Safety Systems (RTNSS) function, in accordance with DCD Table 19A-4, the design and installation of the Service Water Structure is required to include protection from the effects of external and internal flooding.

In the ESBWR PRA model, the Service Water Structure is conservatively considered to be one flood zone. All four pumps are assumed to fail in an internal flood. Thus, the ESBWR PRA is bounding for design differences in the Service Water Structure. In addition, the ESBWR PRA model does not credit operator actions to mitigate a flooding event, so differences in building location are not significant.

The conclusion in DCD Section 19.2.3.2.2 is that there are no significant flood initiated accident sequences due to the low core damage frequency (CDF). Overall, the potential effects of Service Water Structure design differences are accounted for by using a bounding analysis, and therefore, are not significant to the ESBWR PRA.

**Detroit Edison Response to Question No. 2**

The ESBWR PRA used the following Fermi 3 site-specific PRA information to develop bounding PRA parameters:

- Loss of Preferred Power (LOPP) frequency — to determine if the site has unusual off-site power availability problems. The LOPP frequency is divided into plant-centered, switchyard, grid-related, and weather-related initiating events.

- Loss of Service Water frequency — to determine if any unusual characteristics would apply to a particular site, with consideration to loss of ultimate heat sink, and the effects of extreme seasonal temperatures.

- Seismic fragilities – to determine whether the site specific design response spectra affects the ESBWR Seismic Margins Analysis (SMA) or the PRA. Note that High Confidence Low Probability of Failure (HCLPF) values will be confirmed as described in Section 19.2.3.2.4.

- Other Known Site-Specific Issues — to identify site-specific initiating events that are not identified in the ESBWR PRA, such as unique offsite consequence issues.

These parameters represent site-specific features that have the potential to affect the PRA. To ensure that the ESBWR PRA is a bounding standard design, the site-specific values for these parameters were used to develop the ESBWR PRA standard values.

The ESBWR LOPP frequencies are based on NUREG/CR-6890, "Reevaluation of Station Blackout Risk at Nuclear Power Plants Analysis of Loss of Offsite Power Events: 1986-2004." GEH obtained the Fermi 2 LOPP frequencies and compared them to the ESBWR frequencies to identify any outliers. The data shows that grid-related losses of power are significantly more frequent than plant-centered, switchyard, or weather-related losses of power. Although there is a variance in the values for the LOPP frequencies, GEH concluded that the Fermi 2 values are

slightly lower than the ESBWR values, thus the range is acceptable. The conclusions in ESBWR DCD Section 19.2.3.1, Risk from Internal Events, remain valid for the minor variances in LOPP frequencies.

The ESBWR Loss of Service Water frequency is based on NUREG/CR-5750, "Rates of Initiating Events at U. S. Nuclear Power Plants: 1987-1995." The contribution of loss of Service Water is less than one percent of Core Damage Frequency (CDF). Variances between the reported values depend on the design configuration (e.g., redundancy) of the current plants versus the ESBWR design, or external influences such as loss or degradation of heat sink. GEH obtained Fermi 2 Loss of Service Water data frequencies and compared them to the ESBWR frequencies to identify any outliers. GEH concluded that although there is a variance in the values for the Loss of Service Water frequencies, their range is acceptable. Higher Fermi 2 Loss of Service Water frequencies are attributed to the Fermi 2 AC power configuration and assumptions on loss or degradation of cooling water from Lake Erie. No site specific vulnerabilities that cause the frequency to be high were identified. The conclusions in EWBWR DCD Section 19.2.3.1, Risk from Internal Events, also remain valid for the minor variances in Loss of Service Water frequencies.

The ESBWR design incorporates a seismic response spectrum that bounds the potential U.S. sites. The conclusions in ESBWR DCD Section 19.2.3.2.4, Evaluation of External Event Seismic, remain valid for site-specific differences in seismic response.

There are no unusual terrain features that would affect meteorological data or plume dispersion. The conclusions in ESBWR DCD Section 192.5 for offsite consequences remain valid for any potential differences between site features.

In addition to the bounding treatment of PRA parameters, there are no departures from the standard design in any systems considered in the PRA model. Therefore, there are no site-specific design features (and no shared systems) that affect the PRA because the boundary of the certified design covers all of the Structures Systems and Components (SSCs) necessary for the PRA.

The effect of outage planning and controls on the PRA is included in DCD Table 19.2-3, Risk Insights and Assumptions, and is addressed through operational program procedures. This DCD Table states that the outage planning and control program is consistent with NUMARC 91-06, "Guidelines for Industry Actions to Assess Shutdown Management." The implementation of outage planning procedures is described in FSAR Section 13.5.2.2.9, which states that procedures will provide guidance for the development of refueling and outage plans that will address the guidance described in NUMARC 91-06.

In summary, the ESBWR PRA provides a reasonable representation of the parameters and conditions that are specific to the Fermi site.

**Proposed COLA Revision for Questions No. 1 and No. 2**

- Appendix 19AA, Summary of Plant-Specific PRA Review, will be added to the FSAR to incorporate the response to this RAI.
- FSAR Section 19.5, NAPS Sup 19.5-1 will be revised to include a reference to Appendix 19AA.

These changes are shown on the attached FSAR markup.

## Markup of Detroit Edison COLA

The attached markup represents Detroit Edison's good faith effort to show how the COLA will be revised in a future COLA submittal in response to the subject RAI. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAI's, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be somewhat different that as presented herein.

# Chapter 19 Probabilistic Risk Assessment and Severe Accidents

## 19.1 Introduction

This section of the referenced DCD is incorporated by reference with no departures or supplements.

## 19.2 PRA Results and Insights

This section of the referenced DCD is incorporated by reference with the following departures or supplements.

19.2.3.2.4 **Evaluation of External Event Seismic**

**Significant Core Damage Sequences of External Event Seismic**

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Replace the second and third sentences of the first paragraph with the following.

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**STD COL 19.2.6-1-H** **[START COM 19.2-001]** As-built SSC High Confidence Low Probability of Failure (HCLPF)s will be compared to those assumed in the ESBWR seismic margin analysis shown in DCD Table 19.2-4. Deviations from the HCLPF values or other assumptions in the seismic margins evaluation will be analyzed to determine if any new vulnerabilities have been introduced. This comparison and analysis will be completed prior to fuel load. **[END COM 19.2-001]**

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19.2.6 **COL Information**

19.2.6-1-H **Seismic High Confidence Low Probability of Failure Margins**

**STD COL 19.2.6-1-H** This COL Item is addressed in Section 19.2.3.2.4.

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## 19.3 Severe Accident Evaluations

This section of the referenced DCD is incorporated by reference with no departures or supplements.

## 19.4 PRA Maintenance

This section of the referenced DCD is incorporated by reference with no departures or supplements.

## 19.5 Conclusions

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

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**EF3 SUP 19.5-1**

In accordance with 10 CFR 52.79(a)(46), this report is required to contain a description of the plant-specific PRA and its results. As part of the development of the certified design PRA, site and plant specific information were reviewed to determine if any changes from the certified design PRA were warranted. This review included consideration of site-specific information such as site meteorological data and site-specific population distributions, as well as plant-specific design information that replaced conceptual design information described in the DCD. Section 1.8.5 was also reviewed to determine if there were any departures affecting the PRA results. This review is summarized in Appendix 19AA.

The review of site-specific information and plant-specific design information determined that: 1) the DCD PRA bounds site-specific and plant-specific design parameters and design features and 2) these parameters and features have no significant impact on the DCD PRA results and insights. Therefore, based on this review, it is concluded that there is no significant change from the certified design PRA. In that there are no significant changes from the certified design PRA, incorporation of DCD Chapter 19 into the FSAR satisfies the requirement of 10 CFR 52.79(a)(46) for a description of the plant-specific PRA and its results.

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## 19A Regulatory Treatment of Non-Safety Systems (RTNSS)

This section of the referenced DCD is incorporated by reference with no departures or supplements.

## 19ACM Availability Controls Manual

This section of the referenced DCD is incorporated by reference with no departures or supplements.

## 19B Deterministic Analysis for Containment Pressure Capability

This section of the referenced DCD is incorporated by reference with no departures or supplements.

## 19C Probabilistic Analysis for Containment Pressure Fragility

This section of the referenced DCD is incorporated by reference with no departures or supplements.

EF3 SUP 19.5-2

## 19AA Summary of Plant-Specific PRA Review

### 19AA.1 Introduction

In accordance with 10 CFR 52.79(a)(46), this appendix provides a summary of plant-specific PRA and its results.

### 19AA.2 Development of the ESBWR and Plant-Specific PRAs

The following Fermi site-specific PRA attributes were compared to the ESBWR PRA to determine if the ESBWR PRA is suitable for assessing risks and insights for Fermi 3:

- Loss of Preferred Power (LOPP) frequency – to determine if the site has unusual off-site power availability problems. The LOPP frequency is divided into plant-centered, switchyard, grid-related, and weather-related initiating events.
- Loss of Service Water frequency – to determine if any unusual characteristics would apply to a particular site, with consideration to loss of ultimate heat sink, and the effects of extreme seasonal temperatures.
- Seismic fragilities – to determine whether the site specific design response spectra affects the ESBWR Seismic Margins Analysis (SMA) or the PRA. Note that High Confidence Low Probability of Failure (HCLPF) values will be confirmed as described in Section 19.2.3.2.4.
- Other Known Site-Specific Issues – to identify site-specific initiating events that are not identified in the ESBWR PRA, such as unique offsite consequence issues.

These parameters represent site-specific features that have the potential to affect the PRA. To ensure that the ESBWR PRA is a bounding standard design, the site-specific values for these parameters were reviewed.

The ESBWR LOPP frequencies are based on NUREG/CR-6890, "Reevaluation of Stations Blackout Risk at Nuclear Power Plants Analysis of Loss of Offsite Power Events: 1986-2004." The Fermi LOPP frequencies were compared to the ESBWR frequencies to identify any outliers. The data shows that grid-related losses are significantly more frequent than plant-centered, switchyard, or weather-related losses of power. Although there is a variance in the values for the LOPP frequencies, their range is acceptable. The conclusions in ESBWR DCD Section 19.2.3.1, Risk from Internal Events, remain valid for the minor variances in LOPP frequencies.

The ESBWR Loss of Service Water frequency is based on NUREG/CR-5750, "Rates of Initiating Events at U. S. Nuclear Power Plants: 1987-1995." The contribution of Loss of Service Water is less than one percent of core damage frequency (CDF). Variances between the reported values depend on the design configuration (e.g., redundancy) of the current plants versus the ESBWR design, or external influences such as loss or degradation of heat sink. Although there is a variance in the values for the Loss of Service Water frequencies, their range is acceptable. The conclusions in DCD Section 19.2.3.1, Risk from Internal Events, also remain valid for the minor variances in Loss of Service Water frequencies.

The ESBWR design incorporates a seismic response spectrum that bounds the potential U.S. sites. The conclusions in DCD Section 19.2.3.2.4, Evaluation of External Event Seismic, remain valid for site-specific differences in seismic response.

There are no unusual terrain features that would affect meteorological data or plume dispersion. The conclusions in DCD Section 19.2.5 for offsite consequences remain valid for any potential differences between site features.

In addition to the bounding treatment of PRA parameters, there are no departures from the standard design in any systems considered in the PRA model. Therefore, there are no site-specific design features that affect the PRA because the boundary of the certified design covers all of the SSCs necessary for the PRA.

## 19AA.3 Internal Flooding

### 19AA.3.1 Internal Flooding Associated with the Yard Area

The yard flood zone is essentially all outside areas of the site, and thus the site plot drawing (FSAR Figure 2.1-204) illustrates the areas of concern. In addition DCD Section 3.4.1.1 stipulates that the plant grade

level is above the design flood level. The only components located in the yard that support a safety function are the manual fire hose connections to the Reactor Building and Fuel Building. These connections are also above design flood level. These connections provide the capability to connect another source of water to the IC/PCCS pools and the Spent Fuel Pool after seven days following a postulated accident. This timeframe is beyond the time required to be considered for the PRA; therefore, external flooding in the yard does not affect PRA equipment.

### 19AA.3.2 Internal Flooding Associated with the Service Water Building

The Service Water Structure is a site-specific design feature. It is treated in a bounding manner in the ESBWR PRA to demonstrate that site-specific differences in Service Water Structure design do not have a significant effect on the PRA results. The Service Water Structure houses the four Service Water pumps and their associated power supplies and controls. Because Service Water is a RTNSS function, in accordance with DCD Table 19A-4, the design and installation of the Service Water Structure is required to include protection from the effects of external and internal flooding.

In the ESBWR PRA model, the Service Water Structure is conservatively considered to be one flood zone. All four pumps are assumed to fail in an internal flood. Thus, the ESBWR PRA is bounding for design differences in the Service Water Structure. In addition, the ESBWR PRA model does not credit operator actions to mitigate a flooding event, so differences in building location are not significant.

The conclusion in DCD Section 19.2.3.2.2 is that there are no significant flood-initiated accident sequences due to the low CDF. Overall, the potential effects of Service Water Structure design differences are accounted for by using a bounding analysis, and therefore, are not significant to the ESBWR PRA.

In summary, the ESBWR PRA provides a reasonable representation of the parameters and conditions that are specific to the Fermi site.

# Attachment 2
# NRC3-09-0001

## Response to RAI Letter No. 2
## (eRAI Tracking No. 1944)

## RAI Question No. 2.4.13-1

**NRC RAI 2.4.13-1**

*Provide site-specific measured hydrologic parameters necessary to perform radionuclide transport analysis under the assumed release scenario as required in 10 CFR 100.20(c). More specifically, provide data and discussions about the hydrologic characteristics of the bedrock aquifer (Bass Islands Group) and the glacial overburden near Fermi Unit 3, including their thickness, depths to water tables, hydraulic conductivities, distribution coefficients, porosities; bulk mass densities, and retardation factors; the vertical and horizontal groundwater velocities of the overburden; suction heads; and the groundwater velocity of the bedrock aquifer.*

**Detroit Edison Response**

As described in Detroit Edison Company Submittal of Fermi 3 FSAR Section 2.4.13 Analysis, dated November 11, 2008, distribution coefficients and retardation factors were not determined. At the time of the development of FSAR Section 2.4.13, due to fractured nature of the Bass Islands Group, testing methods were considered to be limited in their capability to represent the sub-surface conditions. Subsequently, Detroit Edison has identified a laboratory that can employ a testing method to determine distribution coefficients and retardation factors for sub-surface conditions representative of the Fermi site. Based on this contact, Detroit Edison is now able to perform this testing. Using the results from the laboratory testing, Detroit Edison will update the analysis to credit these factors. The results from the testing and the updated analysis will be provided in a subsequent submittal by September 1, 2009.

Other site specific hydrologic parameters are contained in the FSAR as detailed in the paragraphs below.

FSAR Section 2.5.4 provides a discussion of the properties of the subsurface materials. Approximate elevation ranges and average thickness for each subsurface material type encountered at the Fermi 3 site is provided in Table 2.5.4-201. Static and dynamic engineering properties are summarized in Table 2.5.4-202, including the total unit weight for the Overburden and Bass Islands Group. A more detailed discussion of the Overburden and Bass Islands Group subsurface materials is provided in Sections 2.5.4.2.1.1.3 and 2.5.4.2.1.2.1, respectively.

FSAR Section 2.4.12.2.3.2 describes the site groundwater levels and movement. The data presented was developed based on piezometers and monitoring wells installed and developed in support of the Fermi 3 project. In addition, water levels in some existing Fermi site wells installed as part of other projects were also measured and recorded. Table 2.4-229 presents construction details of wells considered in the analysis in Section 2.4.12. Water elevation recorded in each well is presented in Table 2.4-231. Water level contour maps were developed based on the recorded water elevations in each well for both the Overburden and the Bass Islands aquifer. Figures 2.4-242 through 2.4-245 provide the water table maps for the Overburden and Figures 2.4-246 through 2.4-249 provide the potentiometric maps for the Bass Islands aquifer.

These are the quarterly water level maps. Monthly water level maps are provided in FSAR Appendix 2.4.BB. Groundwater flow patterns for both the Overburden and the Bass Islands aquifer are depicted on the associated figures.

Section 2.4.12.2.4 provides a discussion of the hydrogeologic properties of the subsurface materials. Hydraulic conductivity of the Overburden was determined as described in Section 2.4.12.2.4.1. Data for the hydraulic conductivity for the Overburden, at the various monitoring locations, is provided in Table 2.4-232 for the monitored strata. Hydraulic conductivity of the Bass Islands aquifer was determined as described in Section 2.4.12.2.4.2. Data for the hydraulic conductivity for the Bass Island aquifer is provided in Table 2.4-233 for the monitored depth of the well or piezometer. The hydraulic conductivity are also displayed by location on Figures 2.4-252 and 2.4-253 for the Overburden and Bass Islands aquifer, respectively.

Section 2.4.12.3.2 describes the transport model for groundwater at the site. As described therein groundwater velocity is locally dependent on hydraulic conductivity, hydraulic gradient, and porosity. Hydraulic gradient was determined based on the water elevation maps described above. Hydraulic conductivity was determined in Section 2.4.12.2.4, as described above. As described in Section 2.4.12.3.2, no porosity field data was collected. In lieu of using field data, literature values for porosity were used to determine groundwater velocity. Velocity calculations were performed using high and low range estimates (10 – 25 percent for glacial till, 25 percent for rock fill, 1 – 20 percent for limestone/dolomite) to bracket the range of possible results. Based on these values, calculated groundwater velocities and estimated travel times to the closest postulated receptors are reported in Section 2.4.12.3.2.

**Proposed COLA Revision**

A revised COLA markup will be included with the results and the updated analysis upon completion of the laboratory testing.

# Attachment 3
# NRC3-09-0001

## Response to RAI Letter No. 2
## (eRAI Tracking No. 1944)

## RAI Question No. 2.4.13-2

**NRC RAI 2.4.13-2**

*Provide a description of the screening process used to determine the radioactive constituents in the drain collection tank considered for the failure analysis and how the inventory described in Table 12.2-13a of the ESBWR DCD was used to derive the radionuclide constituents for the subsequent radionuclide transport analysis.*

**Detroit Edison Response**

ESBWR DCD, Revision 5, Table 12.2-13a, identifies the radioactive constituents in the drain collection tank. As described in DCD Section 12.2.1.4, the sources are based upon the stream concentrations in Section 11.1. The radionuclide constituents (initial concentration) for the transport analysis are taken directly from DCD Table 12.2-13a and are converted from $MBq/m^3$ to $\mu Ci/cm^3$.

**Proposed COLA Revision**

None

# Attachment 4
# NRC3-09-0001

## Response to RAI Letter No. 2
## (eRAI Tracking No. 1944)

## RAI Question No. 2.4.13-3

**NRC RAI 2.4.13-3**

*Provide a discussion on the presence or absence of chelating agents and other chemical agents that would modify the transport characteristics of radionuclides at the site. The discussion needs to include whether these chemicals are to be used anywhere at the site and not limited to the tanks.*

**Detroit Edison Response**

Detroit Edison Company Submittal of Fermi 3 FSAR Section 2.4.13 Analysis, dated November 11, 2008, provides an analysis of a postulated accidental release of radioactive liquid effluents to the groundwater at the Unit 3 site. The analysis is based on the rupture of a liquid radwaste tank outside of containment. The ESBWR standard plant design does not envision the use of chelating agents in liquid radwaste processing. In addition, based on current operating experience at Fermi 2, Detroit Edison does not currently use chelating agents in liquid radwaste processing. Therefore, based on the above there are no plans to use chelating agents for Fermi 3.

**Proposed COLA Revision**

None

# Attachment 5
# NRC3-09-0001

## Response to RAI Letter No. 2
## (eRAI Tracking No. 1944)

## RAI Question No. 2.4.13-4

**NRC RAI 2.4.13-4**

*Provide a discussion on post-construction groundwater levels and their influence on the radionuclide pathways.*

**Detroit Edison Response**

FSAR, Section 2.4.12, discusses groundwater conditions at the Fermi 3 site. Section 2.4.12.2.5 describes that current groundwater flow conditions are influenced by the quarry operations in the vicinity. As described, due to the quarry operations, the present flow pattern is reversed from the pre-quarry development flow pattern. If the quarries were to stop operating, water levels in the county could potentially recover to the point that the flow direction beneath the site might revert to the natural pre-development patterns.

As further discussed in Section 2.4.12.2.5, construction of Fermi 3 includes excavation into the Bass Islands Group to build foundations. This activity will require temporary dewatering of the excavation site to levels approximately 45 to 50 feet below the present groundwater elevation. This will alter groundwater flow locally near the site. As described in Section 2.4.12.2.5.1, this temporary condition was evaluated, including construction techniques to minimize the impacts.

There will be localized altered groundwater flows, around newly constructed buildings, post-construction, however these altered groundwater flows are not expected to have an effect on the overall groundwater flow for the area.

Fermi 3 operations do not rely on groundwater. Thus, groundwater conditions would be expected to return to the present day conditions following construction and there would be no influence to radionuclide pathways than those evaluated in the Detroit Edison Company Submittal of Fermi 3 FSAR Section 2.4.13 Analysis, dated November 11, 2008.

Section 2.4.12.4 discusses post-construction groundwater monitoring. One of the purposes of the post-construction groundwater monitoring is to ensure that any construction impacts are identified and evaluated. If necessary, the analysis would be updated to reflect any post-construction changes to the local groundwater flow.

**Proposed COLA Revision**

None

# Attachment 6
# NRC3-09-0001

## Response to RAI Letter No. 2
## (eRAI Tracking No. 1944)

## RAI Question No. 2.4.13-5

**NRC RAI 2.4.13-5**

*Provide an explanation of the "two possible sources" mentioned in the discussion of "Transport Considering Radioactive Decay Only" portion of the supplemental information.*

**Detroit Edison Response**

The referenced discussion in the section titled "Transport Considering Radioactive Decay Only" should have read "two possible receptors" in lieu of "two possible sources" and will be corrected in Revision 1 of the Fermi 3 FSAR. As described in this section the two possible receptors are the shoreline of Lake Erie (to the East) and a groundwater well (to the West). There is only one source of radioactive water that is postulated to be released and that is the Equipment Drain Collection Tank as stated in Section 2.4.13.

**Proposed COLA Revision**

FSAR Section 2.4.13.1.3(a) will be revised as described in the above response.

# Attachment 7
# NRC3-09-0001

## Response to RAI Letter No. 2
## (eRAI Tracking No. 1944)

## RAI Question No. 2.4.13-6

**NRC RAI 2.4.13-6**

*Provide a description of the process followed to determine the conceptual models for surface and subsurface pathways and for site characteristics that affect transport of radioactive liquid effluents in ground and surface waters to ensure that the most conservative of plausible conceptual models has been identified pursuant to the guidance provided in SRP 2.4.13. Also provide analysis based on the most conservative of all the plausible models to demonstrate compliance with 10 CFR part 20 Appendix B Table 2 ECL limits. In the supplemental information that contained the analysis of radionuclide transport for an assumed failure, the results show exceedance of the ECL limits for 12 radionuclide isotopes for both assumed receptors (Lake Erie to the east and a receptor well to the west). The applicant also stated that even if the conservatism assumed in the analysis, more specifically the maximum groundwater velocity, dilution, assumption of continuous ingestion were to be relaxed, the resulting concentrations will still be above the ECL limits. Please include in the analysis the basis for the preceding conclusion of the applicant.*

**Detroit Edison Response**

Section 2.4.12.3.2 describes the transport model for groundwater at the site. As described therein groundwater velocity is locally dependent on hydraulic conductivity, hydraulic gradient, and porosity. Hydraulic gradient was determined based on the water elevation maps described above. Hydraulic conductivity was determined in Section 2.4.12.2.4, as described above. As described in Section 2.4.12.3.2, no porosity field data was collected. In lieu of using field data, literature values for porosity were used to determine groundwater velocity. Velocity calculations were performed using high and low range estimates (10 – 25 percent for glacial till, 25 percent for rock fill, 1 – 20 percent for limestone/dolomite) to bracket the range of possible results. Based on these values, calculated groundwater velocities and estimated travel times to the closest postulated receptors are reported in Section 2.4.12.3.2.

The analysis of the most conservative of the plausible scenarios was provided in Detroit Edison Company Submittal of Fermi 3 FSAR Section 2.4.13 Analysis, dated November 11, 2008; which will also be included in Revision 1 to the FSAR Section 2.4.13. The analysis concluded that even with relaxation of conservatisms the results would be expected to exceed the Effluent Concentration Limits (ECL). The basis for this conclusion is that the concentration of several of the radionuclides were well above the ECL; and one of the radionuclides exceeds the ECL by a factor of more than 5E+03.

As noted in the responses above, Detroit Edison is now able to perform laboratory testing to determine site specific values for distribution coefficients and retardation factors. Using these factors, coupled with relaxation of other conservatisms (for example, crediting dilution in the Radwaste Building prior to release), Detroit Edison expects the subsequent results to be less than the ECL. Using the results from the laboratory testing, Detroit Edison will update the analysis to credit these factors. The results from the testing and the updated analysis will be provided in a subsequent submittal to the NRC by September 1, 2009.

**Proposed COLA Revision**

A revised COLA markup will be included with the results and the updated analysis upon completion of the laboratory testing.

**List of Detroit Edison Commitments**

1. The following commitment was made in this letter. Detroit Edison will perform laboratory testing to determine site specific values for distribution coefficients and retardation factors. Using these factors, coupled with relaxation of other conservatisms (for example, crediting dilution in the Radwaste Building prior to release), Detroit Edison expects the results to be less than the ECL. Using the results from the laboratory testing, Detroit Edison will update the analysis to credit these factors. The results from the testing and the updated analysis will be provided in a subsequent submittal to the NRC by September 1, 2009.