The Detroit Edison Company
One Energy Plaza, Detroit, MI 48226-1279

DTE Energy
Detroit Edison

10 CFR 52.79

January 10, 2011
NRC3-11-0003

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 (NRC) to Jack M. Davis (Detroit Edison), "Request for Additional Information Letter No. 49 Related to the SRP Section 2.3.1, 2.3.3, 2.3.5 and 13.6.6 for the Fermi 3 Combined License Application," dated December 9, 2010

Subject: Detroit Edison Company Response to NRC Requests for Additional Information Letter No. 49

In Reference 2, the NRC requested additional information to support the review of certain portions of the Fermi 3 Combined License Application (COLA). The responses to the Request for Additional Information (RAI) are provided in Attachments 1 through 5 of this letter. Information contained in these responses will be incorporated into a future COLA submission as described in the RAI responses.

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

I state under penalty of perjury that the foregoing is true and correct. Executed on the 10th day of January 2011.

Sincerely,

Peter W. Smith, Director
Nuclear Development – Licensing & Engineering
Detroit Edison Company

D095
NRO

Attachments:
1) Response to RAI Letter No. 49, (RAI Question No. 02.03.01-18)
2) Response to RAI Letter No. 49, (RAI Question No. 02.03.01-19)
3) Response to RAI Letter No. 49, (RAI Question No. 02.03.03-9)
4) Response to RAI Letter No. 49, (RAI Question No. 02.03.05-5)
5) Response to RAI Letter No. 49, (RAI Question No. 13.06.06-3)

cc:
Jerry Hale, NRC Fermi 3 Project Manager
Adrian Muniz, NRC Fermi 3 Project Manager
Bruce Olson, NRC Fermi 3 Environmental Project Manager
Fermi 2 Resident Inspector (w/o attachments)
NRC Region III Regional Administrator (w/o attachments)
NRC Region II Regional Administrator (w/o attachments)
Supervisor, Electric Operators, Michigan Public Service Commission (w/o attachments)
Michigan Department of Environmental Quality, Radiological Protection and Medical Waste Section (w/o attachments)

Attachment 1
NRC3-11-0003

Response to RAI Letter No. 49
(eRAI Tracking No. 5268)

RAI Question No. 02.03.01-18

NRC RAI 02.03.01-18

This question is related to the applicant's response to RAI 02.03.01-9 and its incorporation into Revision 2 of the Fermi 3 FSAR.

The last paragraph of Revision 2 to Fermi 3 FSAR Section 2.3.1.3.4.3, "Maximum Roof Load," states that the ESBWR Site Design Parameter extreme winter precipitation event maximum roof snow load is 163.5 psf. The FSAR derives the 163.5 psf value by summing the roof load resulting from the normal winter precipitation event (38.5 psf) and the extreme winter precipitation event (125 psf) values listed in ESBWR DCD Tier 2, Table 3G.1-2. This summation conflicts with the GEH response to RAI 2.3-4 S05 dated May 11, 2009 (ML091320434), which states that the 125 psf extreme live loads for roofs includes the contribution of 38.5 psf from the normal winter precipitation event. Similarly, footnote 5 to ESBWR DCD Tier 2, Table 2.0.1, states the maximum ground snow load for the extreme winter precipitation event (162 psf) includes the contribution from the normal winter precipitation event (50 psf). Please address this apparent contradiction in defining the ESBWR extreme winter precipitation event roof load.

The staff notes that GEH derived its 125 psf extreme winter precipitation event roof snow load by assuming that water from the extreme liquid winter precipitation event will not accumulate above the height of the 2 ft parapet if the roof scuppers and drains are assumed to be clogged To facilitate a direct comparison with site parameters that are intended to represent ground loads, GEH converted the 125 psf extreme winter precipitation event roof load to an equivalent extreme winter precipitation event ground snow load of 162 psf using guidance provided in ISG-7.

Response

FSAR Section 2.3.1.3.4.3, "Maximum Roof Load" submitted with the response to RAI 02.03.01-9 derived the maximum roof load by summing the roof load resulting from the normal winter precipitation event and the extreme winter precipitation event. Although this methodology yields conservative roof loading results, it is not consistent with the DCD.

The normal and extreme (frozen and liquid) winter precipitation events for the Fermi site are as follows:

1. Normal Winter Precipitation Events

• 100-year return period snowpack	29.3 lb_f/ft^2
• Historical maximum snowpack	32.4 lb_f/ft^2
• 100-year return period snowfall	14.3 lb_f/ft^2
• Historical maximum snowfall	19.1 lb_f/ft^2

These ground snow load values are previously described in the markup for FSAR Section 2.3.1.3.4.1 provided as part of the response to RAI 02.03.01-16 in Detroit Edison letter NRC3-10-0036 (ML102570700), dated September 2, 2010.

All of these ground snow load site characteristic values for the normal winter precipitation event are bounded by the "Maximum Ground Snow Load for normal winter precipitation event" site parameter value of 50 lb_f/ft^2 in DCD Table 2.0-1.

2. Extreme Frozen Winter Precipitation Event

The extreme frozen winter precipitation event is the higher of the ground-level weight between the 100-year return period snowfall event and the historical maximum snowfall event in the site region added to the historical maximum snowpack. As described above, the historical maximum snowfall is 19.1 lb_f/ft^2. This is added to the historical maximum snowpack (ground snow load for the normal precipitation event) of 32.4 lb_f/ft^2 for a total extreme frozen winter precipitation event of 51.5 lb_f/ft^2. These values are previously described in the markup for FSAR Section 2.3.1.3.4.1 provided as part of the response to RAI 02.03.01-16; however, they were not summed. This ground snow load site characteristic value for the extreme frozen winter precipitation event is bounded by the "Maximum Ground Snow Load for extreme winter precipitation event" site parameter value of 162 lb_f/ft^2 in DCD Table 2.0-1.

3. Extreme Liquid Winter Precipitation Event

This is the greatest depth of precipitation (in inches of water) for a 48-hour period that is physically possible over a 25.9 square-kilometer (10 square mile) area for a particular geographical location during those months with the historically highest snowpacks. Extreme liquid winter precipitation event is determined in accordance with Hydrometeorological Report No. 53 (HMR 53). The 48-hour liquid winter precipitation event for the Fermi site using the methodology described in HMR 53 is 19.3 inches. This value was previously described in the markup for FSAR Section 2.3.1.3.4.1 provided as part of the response to RAI 02.03.01-16.

For the purposes of roof design, the DCD assumes a roof loading based on the 24 inch height of the parapet and the specific weight of water as stated in the notes to DCD Table 3G.1-2.

FSAR Section 2.3.1.3.4.2 will be updated to reflect the above discussion. The roof loading information in FSAR Section 2.3.1.3.4.3 will be replaced with text that indicates that the maximum roof loading from the Fermi site characteristic maximum ground snow load for normal winter precipitation event and extreme winter precipitation event are bounded by the ESBWR maximum roof snow load design parameters.

To be consistent with the above discussed update to FSAR Section 2.3.1.3.4.3, the discussion of the historical amounts of freezing rain events and the calculated ice accretion values that have occurred in the Fermi region discussed in FSAR Subsection 2.3.1.3.4.3 will be moved to FSAR Subsection 2.3.1.3.3.

Proposed COLA Revision

A proposed markup to the markup of FSAR Sections 2.3.1.3.3, 2.3.1.3.4.2, and 2.3.1.3.4.3, from RAI 02.03.01-16 is provided to reflect the changes described above.

Markup of Detroit Edison COLA
(following 8 page(s))

The following markup represents how Detroit Edison intends to reflect this RAI response in a future submittal of the Fermi 3 COLA. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAIs, 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 different than presented here.

at the Fermi site is 7 hours, the longest duration of discrete events occurring during the 1961-1995 time period.

2.3.1.3.3 Probable Maximum Annual Frequency of Occurrence, ~~and~~ Duration of Freezing Rain

, and Historical Amounts

Freezing rain is defined as an accretion of ice resulting from liquid precipitation striking a frozen surface (e.g., tree branches or power lines) and freezing. Typically the liquid droplets are supercooled droplets falling through an air layer of sub-freezing temperatures, during their descent to the ground. The weight of the ice accretion on surface objects can become sufficient to cause damage to trees and power lines, as well as slow down or even halt transportation on ice covered roads and bridges. The surface air temperature during freezing rain events typically ranges between -3.9°C (25°F) and 0°C (32°F) (Reference 2.3-232). Ice pellets are also a common occurrence at the Fermi site during wintertime storms. Ice pellets are created when a snowflake melts during its descent to the ground, but then refreezes as it falls through a sub-freezing air layer near the surface.

<u>Frequency of Occurrence</u>

Cortinas et al. analyzed freezing rain and ice pellets events for the Fermi region during the period 1976-1990. In particular, freezing rain and ice pellet events are most common from December to March, although a few events have occurred in November and April. The Fermi site averages approximately 4-5 days per year when an observation of freezing rain has occurred, while ice pellets are reported four days per year (Reference 2.3-233).

Ice storm reports were obtained from the NCDC storm database in order to estimate the frequency of occurrence and duration of freezing rain events at the Fermi site. A total of 24 freezing rain events were reported in the five-county area surrounding the Fermi site during the period 1993-2007 (Reference 2.3-220). Table 2.3-209 displays the dates of the freezing rain events and the reported accumulations. In some cases amounts of freezing rain amounted to only a trace or were not available from the storm data records. From the data the frequency of freezing rain events during the 15-year period is 1.6 events per year (24 events/15 years). The high number of freezing rain events during the last 15 years provides an assessment of how frequent they are in the Fermi region.

Probable Maximum Annual Duration

In order to determine the duration of each freezing rain event that occurred in the five-county region surrounding the Fermi site, hourly temperature and precipitation data was obtained from Detroit Metropolitan Airport. To provide a conservative estimate of the duration for each event, only hours that reported measurable precipitation were counted. In addition, the precipitation type was ignored such that hours with rain are included. Table 2.3-209 provides the duration of each freezing rain event during the 1993-2007 time period. The freezing rain event with the longest duration occurred from January 30 into the afternoon of February 1, 2002 when 62 consecutive hours of precipitation was reported.

Using the method of moments as suggested by Wilks with the durations of freezing rain events listed in Table 2.3-209, the Gumbel probability distribution estimates a probable maximum annual duration of 72 hours for ice events in the Fermi region (Reference 2.3-234). This provides a conservative estimate of the maximum duration for freezing rain events at Fermi 3.

Insert 1 Here

2.3.1.3.4 Roof Loads of Winter Precipitation Events on Fermi Structures

It is important to determine the potential maximum weight of frozen and liquid precipitation on structures at the Fermi site for safety reasons. The following subsections provide estimates for the resulting ground-level weights and roof loads from the 100-year return period snowpack, historical maximum snowpack, 100-year return period snowfall, historical maximum snowfall, and 48-hour probable maximum winter precipitation (PMWP) in the Fermi region. In accordance with the Interim Staff Guidance (ISG) DC/COL-ISG-07, "Interim Staff Guidance on Assessment of Normal and Extreme Winter Precipitation Loads on the Roofs of Seismic Category I Structures," winter precipitation roof loads to be considered in the design of Fermi 3 structures should be based on the weight of the maximum Normal Winter Precipitation (NWP) event plus the weight of the maximum Extreme Winter Precipitation (EWP) event. This estimate will provide a conservative and realistic maximum roof load of frozen and liquid precipitation on structures for design purposes at Fermi 3.

Insert 1)

Historical Freezing Rain and Ice Accretion Amounts

Table 2.3-209 provides freezing rain and calculated ice accretion values for the 24 freezing rain events that occurred in the five-counties surrounding the Fermi site during the 1993-2007 period. The ice accretion values were estimated from liquid precipitation amounts obtained from hourly observations at Detroit Metropolitan Airport. To provide a conservative estimate of the ice accretion for each event, all hourly precipitation was considered to fall as freezing rain. A conversion factor (1.09) for the expansion of water to ice as it freezes was applied to the liquid equivalent amounts for each event. The highest ice accumulation displayed in Table 2.3-209 occurred on March 13, 1997 when a major ice storm struck southeastern Michigan and deposited ice accumulations of 3.8-6.4 cm (1.5-2.5 inches) from Detroit to Ann Arbor and south to the Ohio-Michigan state line. A general search for ice storms in the southeast Michigan and northwestern Ohio region prior to 1993 resulted in an ice storm producing a higher amount. On January 26-27, 1967 a storm produced freezing rain and sleet that lasted nearly 24 hours and produced ice accumulations of up to 7.6 cm (3 inches) across northwestern Ohio and parts of southern Michigan (Reference 2.3-236).

The extreme frozen winter precipitation event is considered to be the higher ground-level weight between the 100-year return period snowfall event and the historical maximum snowfall event, which for the Fermi region is 19.1 lb_f/ft^2.

Adding this value to the historical maximum snowpack (NWP event) of 32.4 lb_f/ft^2 results in a total extreme frozen winter precipitation event of 51.5 lb_f/ft^2.

The extreme liquid winter precipitation event is defined as the theoretical greatest depth of precipitation during a 48-hour period for a 25.9-square-kilometer (10-square-mile) area during the months having the historically greatest snowpack. Hydrometeorological Report No. 53 (HMR 53) provides a method to determine the 48-hour PMWP for the Fermi site based on long-term climatological normals. The winter precipitation amounts provided in HMR 53 are liquid equivalent amounts and incorporate all winter precipitation in the 10 square mile area that surrounds the Fermi site (Reference 2.3-235). Section 5 of HMR 53 recommends interpolation with a smooth depth-duration curve of the 24-hour and 72-hour PMWP amounts through the point of origin (0,0) to estimate the 48-hour PMWP. In the Fermi region, the greatest snowpack historically has occurred between the months of November through April; therefore, these months have been examined to develop the highest 48-hour PMWP. From Figures 24, 34, and 44 in Reference 2.3-235, the 6-, 24-, and 72-hour PMWP are determined to be 27.9, 40.6, and 52.1 cm (11, 16 and 20.5 inches), respectively, occurring in November. Using the method recommended by HMR 53 yields a 48-hour PMWP of 49 cm (19.3 inches) for the Fermi site. The parapets on the roof of the ESBWR are designed to allow water accumulation of no more than 60.96 cm (24 inches) during the extreme winter precipitation event when the roof scuppers and drains are assumed to be clogged. The weight of 60.96 cm (24 inches) of water is calculated to be 124.8 lb_f/ft^2 (24 inches of water x 5.2 $lb_f/in\ ft^2$).

The ESBWR design uses 125 lb_f/ft^2 for the extreme live load for roof design based on the 24 inch height of the parapet and the specific weight of water as stated in the notes to DCD Table 3G.1-2.

~~Therefore, the weight of the 48-hour PMWP (124.8 lb_f/ft^2) is considered a conservative estimate for the EWP event at the Fermi site.~~

~~Table 2.0-201 shows the standard plant site parameter for the maximum ground snow load for the EWP event. The maximum ground snow load for the EWP event includes the contribution from the NWP event. The combined ground-level weight from the NWP and EWP event at the Fermi site is 154.1 lb_f/ft^2 (124.8 lb_f/ft^2 + 29.3 lb_f/ft^2). This estimate is bounded by the ESBWR standard plant site parameters of 162 lb_f/ft^2 given in Table 2.0-201.~~

~~157.2~~ ~~32.4~~

As shown in Table 2.0-201, the Fermi site characteristics for the maximum ground snow load for the normal winter precipitation event and for the extreme winter precipitation event are bounded by the Site Parameters in the ESBWR DCD. Therefore, the maximum roof load resulting from the Fermi site characteristic maximum ground snow load for the normal winter precipitation event and extreme winter precipitation event are also bounded by the ESBWR Maximum Roof Snow Load Site Design parameters.

Proposed markup to the RAI 02.03.01-16 response in Detroit Edison letter NRC3-10-0036 dated September 2, 2010 (ML102570700)

2.3.1.3.4.3 **Maximum Roof Load**

~~As described in Subsection 2.3.1.2.4, the Fermi region can be characterized as experiencing liquid and frozen precipitation extremes during the late fall, winter, and early spring seasons. A method for determining the maximum roof load from the ground-level weights of the maximum normal and extreme winter precipitation events is described in ISG DC/COL-ISG- 07. The maximum roof load for the Fermi site can theoretically occur during one of the following scenarios: historical maximum snowfall on top of~~ ~~historical maximum~~ ~~100-year return period snowpack, 48-hour PMWP on top of 100-year return period ice accretion, or 48-hour PMWP on top of~~ ~~historical maximum~~ ~~100-year return period snowpack. The scenario that results in the maximum roof load can be considered a conservative estimate of the maximum roof load for Seismic I Structures at the Fermi site.~~

~~Historical Maximum Snowfall Event on the~~ ~~Historical Maximum~~ ~~100-Year Return Period Snowpack~~

~~Subsection 2.3.1.3.4.1 indicates that maximum ground-level weight of the NWP event for the Fermi region is~~ ~~32.4~~ ~~29.3 lb$_f$/ft^2, which is the value for the~~ ~~historical maximum~~ ~~100-year return period snowpack. The maximum ground-level weight of the extreme frozen winter precipitation event for the Fermi region is 19.1 lb$_f$/ft^2, resulting from the historical maximum snowfall. In the event that the historical maximum snowfall event occurs while the Fermi site is experiencing a~~ ~~historical maximum~~ ~~100-year return period snowpack, the resulting ground-level weight is~~ ~~51.5~~ ~~48.4 lb$_f$/ft^2 (19.1 lb$_f$/ft^2 +~~ ~~32.4~~ ~~29.3 lb$_f$/ft^2). SEI/ASCE 7-05 provides a method to convert ground-level weights of snow to roof snow loads by using the following formula for flat roofs:~~

~~$p_f = 0.7 \times C_e \times C_t \times I \times p_g$~~

~~where:~~

~~p_f = Snow load on flat roofs, in lb$_f$/ft^2~~

~~C_e = Exposure factor for sheltered roofs as listed in Table 7-2 of SEI/ASCE 7-05~~

~~C_t = Thermal factor as determined from Table 7-3 of SEI/ASCE 7-05~~

~~I = Importance factor as determines from Table 7-4 of SEI/ASCE 7-05~~

~~p_g = Ground-level snow load, in lb$_f$/ft^2~~

~~Using an exposure factor (C_e) of 1.1, a thermal factor (C_t) of 1, an importance factor (I) of 1, and a ground-level snow load (p_g) of~~

~~51.5~~ ~~historical maximum~~ ~~39.7~~

~~48.4~~ lb_f/ft^2~~, the roof load~~ ~~(p_f)~~ ~~for the historical maximum snowfall on top of the 100-year return period snowpack becomes 37.3~~ lb_f/ft^2~~.~~

~~48-Hour PMWP on the 100-Year Return Period Ice Accretion Event~~

~~The propensity of the Fermi site to experience significant ice accretion events presents an additional scenario in which the 48-hour PMWP falls on top of the 100-year return period ice accretion. Table 2.3-209 provides ice accretion values for the 24 freezing rain events that occurred in the five counties surrounding the Fermi site during the 1993-2007 period. The ice accretion values were estimated from liquid precipitation amounts obtained from hourly observations at Detroit Metropolitan Airport. To provide a conservative estimate of the ice accretion for each event, all hourly precipitation was considered to fall as freezing rain. A conversion factor (1.09) for the expansion of water to ice as it freezes was applied to the liquid equivalent amounts for each event. The highest ice accumulation displayed in Table 2.3-209 occurred on March 13, 1997 when a major ice storm struck southeastern Michigan and deposited ice accumulations of 3.8-6.4 cm (1.5-2.5 inches) from Detroit to Ann Arbor and south to the Ohio-Michigan state line. A general search for ice storms in the southeast Michigan and northwestern Ohio region prior to 1993 resulted in an ice storm producing a higher amount. On January 26-27, 1967 a storm produced freezing rain and sleet that lasted nearly 24 hours and produced ice accumulations of up to 7.6 cm (3 inches) across northwestern Ohio and parts of southern Michigan (Reference 2.3-236).~~

~~In order to determine the 100-year return period ice accretion for the Fermi site, Gumbel distributions were calculated from the method of moments as described by Wilks (Reference 2.3-234). Using this method, the 100-year return period ice accretion becomes 8.4 cm (3.31 inches). The significant accumulations of ice that have occurred in the Fermi region confirm that 8.4 cm (3.31 inches) represents the 100-year return period ice accretion event.~~

~~It is reasonable to use the weight of 8.4 cm (3.31 inches) of ice and the 60.96 cm (24 inches) of water to estimate the maximum roof load for the 48-hour PMWP falling on top of the 100- year return period ice accretion event. The weight of 60.96 cm (24 inches) of water is calculated to be 124.8~~ lb_f/ft^2 ~~(24 inches of water x 5.2~~ $lb_f/in\ ft^2$~~). The weight of 8.4 cm (3.31 inches) of ice (equivalent to 7.7 cm [3.04 inches of water]) is calculated to~~

Proposed markup to the RAI 02.03.01-16 response in Detroit Edison letter NRC3-10-0036 dated September 2, 2010 (ML102570700)

~~be 15.8 lb_f/ft^2 (3.04 inches of water x 5.2 $lb_f/in\ ft^2$). The summation of these two roof loads yields 140.6 lb_f/ft^2 as the maximum roof load for the 48-hour PMWP on the 100-year return period ice accretion event scenario.~~

Historical Maximum

~~48-Hour PMWP on the 100-Year Return Period Snowpack~~

historical maximum
32.4
historical maximum
24.9
32.4

~~As previously mentioned, the maximum roof load for 60.96 cm (24 inches) of water resulting from the 48-hour PMWP is 124.8 lb_f/ft^2. The ground-level weight of the 100-year return period snowpack on safety-related structures at the Fermi site is 29.3 lb_f/ft^2. Using equation 7-1 from SEI/ASCE 7-05, the roof load of the 100-year return period snowpack becomes 22.6 lb_f/ft^2 (0.7 x 1.1 x 1 x 1 x 29.3 lb_f/ft^2). SEI/ASCE 7-05 also mentions for rain on snow loads a surcharge of 5 lb_f/ft^2 must be added to account for heavy rain events where rain will flow through the snowpack and then drain away. This is reasonable since thunderstorms are possible at the Fermi site during the wintertime. Therefore, the roof load of the 48-hour PMWP on the 100-year return period snowpack for design purposes at the Fermi site is determined as:~~

historical maximum

24.9
154.7

~~124.8 lb_f/ft^2 + 22.6 lb_f/ft^2 + 5 lb_f/ft^2 = 152.4 lb_f/ft^2~~

historical maximum

~~Based upon the discussions above, the roof load scenario of the 48-hour PMWP on the 100-year return period snowpack provides a conservative estimate of the maximum roof load resulting from the normal and extreme winter precipitation events for the roofs of safety-related structures at the Fermi site. This estimate is bounded by the ESBWR site design parameters shown in Table 3G.1-2 of the ESBWR DCD that provides the maximum roof load resulting from the normal and extreme winter precipitation event determinded as:~~

~~38.5 lb_f/ft^2 + 125 lb_f/ft^2 = 163.5 lb_f/ft^2~~

2.3.1.3.5 Design Basis Ambient Temperature and Humidity Statistics

The design of structures at power generating facilities, such as the plant heat sink and plant heating, ventilation, and air conditioning systems, is based upon long-term climatological data such as that produced in the 2005 ASHRAE Handbook (Reference 2.3-239). ASHRAE for design purposes provides 2.0 percent and 1.0 percent maximum ambient threshold values (annual exceedance probabilities) for the dry-bulb (DB) temperature and the mean coincident wet-bulb (MCWB) temperature, as well as the non-coincident wet-bulb (WB) temperatures. The 99.0 percent

Proposed markup to the RAI 02.03.01-16 response in Detroit Edison letter NRC3-10-0036 dated September 2, 2010 (ML102570700)

Subject (16)	DCD Site Parameter Value(1)(16)	Fermi 3 Site Characteristic	Evaluation
Precipitation (for Roof Design) (continued)			
Maximum Ground Snow Load for Normal Winter Precipitation Event(5)	2394 Pa (50 lbf/ft^2)	~~1403~~ 1551 Pa (~~29.3~~ 32.4 lbf/ft^2)	The Fermi 3 site characteristic value for maximum Ground Snow Load for Normal Winter Precipitation Event is based on site characteristic value for the historical maximum ~~100-yr return period~~ snow pack. The Fermi 3 site characteristic value of ~~1403~~ 1551 pa (~~29.3~~ 32.4 lbf/ft^2) falls within (is lower than) the DCD site parameter value of 2394 pa (50 lbf/ft^2).
Maximum Ground Snow Load for Extreme Winter Precipitation Event(5)	7757 Pa (162 lbf/ft^2)	~~7378~~ 2466 Pa (~~154.1~~ 51.5 lbf/ft^2)	The site characteristic value for maximum ground snow load for Extreme Frozen Winter Precipitation Event is defined as the combined weight of the historical maximum ~~100-year return period~~ snowpack and the ~~48-hour probable maximum winter precipitation~~ historical maximum snowfall event. The site characteristic value falls within (is lower than) the DCD site parameter value.
Ambient Design Temperature(6)			
2% Annual Exceedance Values			
Maximum	35.6°C (96°F) dry bulb 26.1°C (79°F) wet bulb (mean coincident)	29.3°C (84.7°F) dry bulb with 21.6°C (70.8°F) wet bulb (mean coincident) (2% Annual exceedance values)	The Fermi 3 site characteristic values for maximum dry-bulb temperature with mean coincident wet-bulb temperature for 2% annual exceedance are the ambient dry-bulb temperature (and mean coincident wet-bulb temperature) that will be exceeded 2% of the time annually. The site characteristic values fall within (are lower than) the DCD site parameter values.
	27.2°C (81°F) wet bulb (non-coincident)	22.8°C (73.1°F) wet bulb (non-coincident)	The Fermi 3 site characteristic value for the maximum wet bulb temperature (non-coincident) for 2% annual exceedance is defined as the ambient wet-bulb temperature that will be exceeded 2% of the time annually. This value falls within (is less than) the DCD site parameter value for 2% exceedance.

Attachment 2
NRC3-11-0003

Response to RAI Letter No. 49
(eRAI Tracking No. 5268)

RAI Question No. 02.03.01-19

NRC RAI 02.03.01-19

Attachment 1 to the applicant's letter NRC3-10-0049 dated November 9, 2010 (ML103140612) submitted proposed changes to the Fermi 3 COL FSAR in response to anticipated changes to ESBWR DCD Revision 8. GEH added three new site parameters related to the ESBWR control room habitability area (CRHA) heat-up analysis in Revision 8 to DCD Tier 2, Table 2.0-1. Insert 2 in Attachment 1 to NRC3-10-0049 proposes changes to the FSAR in response to the three new CRHA heat-up analysis site parameters.

The following questions relate to the contents of Insert 2 in Attachment 1 to NRC3-10-0049:

a. *Staff requests the applicant use the term "Fermi site characteristics" instead of "Fermi site parameters" when referring to the site-specific CRHA values. Pursuant to 10 CFR 52.1(a), site parameters are the postulated features of an assumed site that are specified in a standard design certification whereas site characteristics are the actual features of a site that are specified in a COL FSAR.*

b. *Staff requests the applicant more precisely describe the methodology used in determining the CRHA site characteristic values in accordance with the definitions presented in Revision 8 to ESBWR DCD Tier 2, Appendix 3H, Section 3H.3.2.1.*

Response

Detroit Edison letter NRC3-10-0049, dated November 9, 2010 [ML103140612] provided proposed changes to the Fermi 3 FSAR to reflect ESBWR DCD Revision 7 and anticipated changes in DCD Revision 8. Specifically, Insert 2 in Attachment 1 to Detroit Edison letter NRC3-10-0049 provided proposed changes to reflect the addition of three site parameters in the DCD (Revision 8), Table 2.0-1, related to the control room habitability area (CRHA) transient room temperature analysis.

In order to address the specific questions in this RAI, the following clarifications are being made to Insert 2 in Attachment 1 to NRC3-10-0049.

- The term "Fermi site parameters" will be changed to "Fermi site characteristics" when referring to the site-specific CRHA values.
- The description of the methodology used in determining the CRHA site characteristic values will be updated to more precisely describe the methodology used in determining the CRHA site characteristic values in accordance with definitions in DCD Revision 8, Appendix 3H, Section 3H.3.2.1.

It is noted that these clarifications did not change the results or conclusions of the determination of the Fermi site characteristic values for the CRHA transient room temperature analysis.

Proposed COLA Revision

A proposed markup reflecting the above clarifications is attached. The attached markup replaces Insert 2 previously provided in Attachment 1 to Detroit Edison letter NRC3-10-0049 (ML103140612). The clarifications to Insert 2 that are proposed as part of this RAI response are clearly identified inside of boxes.

Markup of Detroit Edison COLA
(following 4 page(s))

The following markup represents how Detroit Edison intends to reflect this RAI response in a future submittal of the Fermi 3 COLA. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAIs, 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 different than presented here.

return period DB temperature is considered the 0 percent exceedance value for maximum DB temperature. The 100-year return period minimum DB temperatures and 100-year return period maximum WB temperature (non-coincident) are considered the 0 percent exceedance values for the Fermi site. Table 2.3-210 displays the 0 percent exceedance values that are considered representative of the Fermi site for design purposes. In addition, the Fermi 3 specific design ambient temperature and humidity values are bounded by the values in DCD Table 2.0-1.

Insert 2 Here

2.3.1.3.6 Potential Changes in Climate

Natural climate variation is cyclical phenomenon that deviates on both a time and spatial scale. Prediction of these events over any length of time on a global scale is often speculative at best. The uncertainty is especially compounded when referring to specific areas or locations.

A large resource of historical climatic data allows for the evaluation of climate conditions and thus climate changes over the expected life span of Fermi 3. Long-term historical temperature, precipitation and storm data including both normal and extreme conditions that may affect plant operation and design are readily available for the region.

The National Climatic Data Center (NCDC) publishes "Climatography of the United States, No. 85". The publication summarizes 344 climate divisions in the lower 48 contiguous states. Trends of temperature as well as precipitation and their appropriate standard deviations have been collected over five 30-year periods and the 70-year period between 1931-2000 for each climate division in a state. Climate divisions, which typically follow county lines, are designed to represent regions within a state that have similar climates. The Fermi 3 facility is located within the Michigan-10 Climate Division.

In general the temperature data in "Climatography of the United States, No. 85" shows little in the way of change or variability over the 70-year period, with both the beginning period of 1931-1960 and the latest time period of 1971-2000 showing an average annual temperature of 9.0°C (48.3°F). Precipitation on the other hand, did show some increase during the 70-year period, especially when compared with the latest 30-year interval. The average precipitation increased from 78.0 cm (30.72 in) per year for the 1931-1960 time period to 83.5 cm (32.86 in) per year over the 1971-2000 time period.

Proposed Markup to FSAR incorporating DCD Rev 7 and 8 in Detroit Edison letter NRC3-10-0049 dated November 9, 2010 (ML103140612) Pages 21-25.

Insert 2)

Comparison of Fermi Site Characteristics to DCD Control Room Habitability Area Transient Room Temperature Analysis Parameters

Fermi site characteristics used in the comparison to DCD Control Room Habitability Area (CRHA) transient room temperature analysis parameters are the Maximum Average Dry Bulb Temperature for 0 percent Exceedance Maximum Temperature Day, Minimum Average Dry Bulb Temperature for 0 percent Exceedance Minimum Temperature Day, and Maximum High Humidity Average Wet Bulb Globe Temperature Index for 0 percent Exceedance Maximum Wet Bulb Temperature Day. DCD Table 2.0-1 contains the ESBWR standard plant CRHA transient room temperature analysis parameters that the Fermi site must be within to satisfy the DCD CRHA transient room temperature analysis for an ESBWR.

DCD Sections 3H.3.2.1.1 through 3H.3.2.1.3 explain the methodology to determine Fermi site characteristics used in the comparison to DCD CRHA transient room temperature analysis parameters. As indicated in the DCD, the 0 percent exceedance maximum and minimum dry bulb temperatures, as well as maximum wet bulb temperature (non-coincident) are used in the calculations of the Fermi site characteristics. As previously stated, the 0 percent exceedance ambient design temperature site characteristic values are the more extreme of either the historic recorded values or the 100-year return period values. For the Fermi site, the 100-year return period values are more extreme for the 0 percent exceedance maximum dry bulb, 0 percent exceedance minimum dry bulb, and 0 percent exceedance maximum (non-coincident) wet bulb temperature values. 100-year return period values are calculated using a dataset of extreme values of dry bulb and wet bulb for a long term reporting period (i.e., 30 years) and do not have a date and time associated with their occurrence. As indicated in the DCD, the daily temperature range is determined by evaluating the 24 hour periods before and after the 0 percent exceedance maximum and minimum dry bulb temperatures, and six 24 hour periods before and after the 0 percent exceedance maximum wet bulb (non-coincident) temperature. For this analysis, it is assumed that the date and hour of occurrence for historic recorded values of dry bulb and wet bulb temperatures recorded at Detroit Metropolitan Airport during the 1961-2007 time period are used to set the date and hour of occurrence for the 0 percent exceedance temperature values (i.e. 100-year return period values) in order to determine the dry or wet bulb temperature resulting from a daily temperature range for the calculation of the Fermi site characteristics. Using the 0 percent exceedance values (100-year return period values) in the calculations of the Fermi site characteristics provides conservative values for the Fermi site. The discussion below provides the values of the corresponding site characteristics for Fermi 3.

Maximum Average Dry Bulb Temperature for 0 percent Exceedance Maximum Temperature Day

As described in DCD Section 3H.3.2.1.1, the Maximum Average Dry Bulb Temperature for the 0 percent Exceedance Maximum Temperature Day is defined as the average of the 0 percent exceedance maximum dry bulb temperature and the dry bulb temperature resulting from a daily temperature range. The daily temperature range for summer conditions is defined as the dry bulb temperature difference between the 0 percent exceedance maximum dry bulb temperature and the dry bulb temperature that corresponds to the higher of the two lows occurring within 24 hours before and after that maximum. The 0 percent exceedance maximum dry bulb temperature is 40.05°C (104.1°F). The historic maximum dry bulb temperature is 40.0°C (104.0°F) and occurred on June 25, 1988 (Reference 2.3-227). Hourly ambient dry bulb temperature data from Detroit Metropolitan Airport for the 24 hours before and after the historic maximum temperature are provided in the line chart in Figure 2.3-X. 18.9°C (66.0°F) is the higher of the two lows occurring within 24 hours before and after the historic maximum dry bulb temperature. Therefore, the average of the low dry bulb temperature prior to the historic maximum temperature and the 0 percent exceedance maximum temperature is 29.48°C (85.1°F). This value is the Maximum Average Dry Bulb Temperature for the 0 percent Exceedance Maximum Temperature Day for the Fermi site and is bounded by the site parameters in Table 2.0-1 of the ESBWR DCD.

<u>Minimum Average Dry Bulb Temperature for 0 percent Exceedance Minimum Temperature Day</u>

As described in DCD Section 3H.3.2.1.2, the Minimum Average Dry Bulb Temperature for the 0 percent Exceedance Minimum Temperature Day is defined as the average of the 0 percent exceedance minimum dry bulb temperature and the dry bulb temperature resulting from a daily temperature range. The daily temperature range for winter conditions is defined as the dry bulb temperature difference between the 0 percent exceedance minimum dry bulb temperature and the dry bulb temperature that corresponds to the lower of the two highs occurring within 24 hours before and after that minimum. The 0 percent exceedance minimum dry bulb temperature is -34.89°C (-30.8°F). The historic minimum dry bulb temperature is -29.44°C (-21.0°F) and occurred on January 21, 1984 (Reference 2.3-227). Hourly ambient dry bulb temperature data from Detroit Metropolitan Airport for the 24 hours before and after the historic minimum temperature are provided in the line chart in Figure 2.3-Y. -17.8°C (-0.04°F) is the lower of the two highs occurring within 24 hours before and after the historic minimum dry bulb temperature. Therefore, the average of the high dry bulb temperature after the historic maximum temperature and the 0 percent exceedance maximum temperature is -26.35°C (-15.4°F). This value is the Minimum Average Dry Bulb Temperature for the 0 percent Exceedance Minimum Temperature Day for the Fermi site and is bounded by the site parameters in Table 2.0-1 of the ESBWR DCD.

<u>Maximum High Humidity Average Wet Bulb Globe Temperature Index for 0 percent Exceedance Maximum Wet Bulb Temperature Day</u>

As described in DCD Section 3H.3.2.1.3, the Maximum High Humidity Average Wet Bulb Globe Temperature Index for 0 percent Exceedance Maximum Wet Bulb Temperature Day is defined as the average of the Wet Bulb Globe Temperature (WBGT) index values for the temperatures used to determine the High Humidity Diurnal Swing. The High Humidity Diurnal Swing is defined as the dry bulb temperature range determined by the maximum and the minimum wet bulb temperatures for the worst three-day period over which the 0 percent exceedance wet bulb temperature occurs. The WBGT index is determined by the dry bulb temperature multiplied by 0.3 plus the wet bulb temperature multiplied by 0.7.

The 0 percent exceedance maximum wet bulb (non-coincident) temperature is 30.0°C (86.0°F). The historic maximum wet bulb temperature is 29.44°C (85.0°F) and occurred on July 14, 1995

(Reference 2.3-228). The hourly dry bulb temperature data from the Detroit Metropolitan airport on July 14, 1995 indicates that the coincident dry bulb temperature with the historic maximum wet bulb temperature is 36.7°C (98.1°F). The resulting WBGT index for the 0 percent exceedance maximum wet bulb temperature is 32.01°C (89.62°F).

Hourly ambient wet bulb and dry bulb temperature data from Detroit Metropolitan Airport for the three 24 hour periods before and after the historic maximum wet bulb temperature are provided in the line chart in Figure 2.3-Z. The highest of the six low wet bulb temperatures that occurred in each of the three 24 hour periods before and after the historic maximum wet bulb temperature is 24.1°C (75.4°F). The dry bulb temperature occurring coincident with the highest of the six low wet bulb temperatures is 28.9°C (84.0°F). The resulting WBGT index for the highest of the six low wet bulb temperatures that occurred in each of the three 24 hour periods before and after the historical maximum wet bulb temperature is 25.54°C (77.97°F).

Using the WBGT index values for the 0 percent exceedance maximum wet bulb and the highest of the six low wet bulb temperatures in each of the three 24 hour periods before and after the historical wet bulb temperature, the Maximum High Humidity Average Wet Bulb Globe Temperature Index for the 0 percent Exceedance Maximum Wet Bulb Temperature Day is 28.78°C (83.80°F).

The Fermi site characteristics for Maximum Average Dry Bulb Temperature for 0 percent Exceedance Maximum Temperature Day, Minimum Average Dry Bulb Temperature for 0 percent Exceedance Minimum Temperature Day, and Maximum High Humidity Average Wet Bulb Globe Temperature Index for 0 percent Exceedance Maximum Wet Bulb Temperature Day are bounded by the ESBWR Standard Plant Site Parameters in DCD Table 2.0-1.

Attachment 3
NRC3-11-0003

Response to RAI Letter No. 49
(eRAI Tracking No. 5269)

RAI Question No. 02.03.03-9

NRC RAI 02.03.03-9

This question is related to the applicant's response to RAI 02.03.03-8. The staff finds the applicant's response to RAI 02.03.03-8 incomplete.

The response to RAI 02.03.03-8 states that the new meteorological tower that will be erected to support the pre-operational and operational meteorological monitoring program (i.e., the monitoring program to be used during plant construction and operation) will meet the guidance in Revision 1 to RG 1.23 (March 2007). Correspondingly, the response to RAI 02.03.03-8 proposes a revision to FSAR Table 1.9-202 which states the meteorological monitoring program for pre-operational and operational phases complies with Revision 1 to RG 1.23.

In contrast, Revision 2 to FSAR Section 2.3.3.2.2 states the new meteorological tower will use meteorological instrumentation that matches the manufacturer and model numbers used on the current tower and FSAR Table 2.3-289 provides the accuracies for each meteorological sensor located on the current meteorological tower. Revision 2 to FSAR Table 2.3-289 shows that the system accuracy for the differential temperature instrumentation is ±0.15 °C which exceeds the Revision 1 to RG 1.23 (March 2007) specified accuracy of ±0.1 °C.

Please justify why the differential temperature instrumentation accuracy for the new meteorological tower that will be erected to support the pre-operational and operational meteorological monitoring program will exceed the Revision 1 to RG 1.23 (March 2007) criterion of ±0.1 °C.

Response

FSAR Section 2.3.3.2.2 states:

> "For the new meteorological tower Fermi 3 intends to use meteorological instrumentation that matches the manufacturer and model numbers in use on the current meteorological tower. The accuracies and thresholds for each meteorological sensor located on the current onsite meteorological tower are presented in Table 2.3-289. The accuracies and thresholds for each sensor on the new meteorological tower will be within the values specified in NRC Regulatory Guide 1.23."

As indicated in the markup for FSAR Table 1.9-202 provided with the response to RAI 02.03.03-8 in Detroit Edison letter NRC3-10-0036, dated September 2, 2010 [ML102570700], the instrumentation for the new meteorological tower, including the differential temperature sensors, will comply with RG 1.23, Revision 1 (March 2007).

The reference to Table 2.3-289 in Section 2.3.3.2.2 was intended to only point to the accuracies for the current instrumentation and not to imply that these same accuracies would be used for the new meteorological tower instrumentation. To clarify the discussion in Section 2.3.3.2.2, in the sub-section titled "Meteorological Sensors" on Page 2-197, the reference to Table 2.3-289 for the discussion of accuracies and thresholds for the current meteorological tower instrumentation will be removed. In addition, the revision level and date of RG 1.23 will be included for the reference for the new meteorological tower instrumentation. With these changes, the last paragraph in this sub-section will only discuss the new meteorological tower instrumentation.

Proposed COLA Revision

A proposed markup is provided for FSAR Section 2.3.3.2.2 to reflect the above described changes. In addition, selected other sections are updated to ensure that the reference to RG 1.23, Revision 1 (March 2007), for the new meteorological tower are clear.

A similar markup is provided for ER Section 6.4.2.2.

Markup of Detroit Edison FSAR
(following 4 page(s))

The following markup represents how Detroit Edison intends to reflect this RAI response in a future submittal of the Fermi 3 COLA. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAIs, 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 different than presented here.

thus will not represent a significant alteration to the flat and gently sloping topographic character of the Fermi region. Additionally, construction of new roads to accommodate the construction traffic for the new facility and the addition of buildings, parking areas and other structures should have little to no effect on the local meteorology of the site.

Estimated Impacts of New Structures

The addition of a NDCT, two multi-cell MDCTs, and reactor building will add additional effects to the airflow trajectories downwind of the new structures. Regulatory Guide 1.23 estimates that a meteorological tower located at least a distance of 10-building-heights horizontal distance downwind from the nearest structure will not have adverse wake effects exerted by the structure. The NDCT for Fermi 3 will be built in the approximate location of the current onsite meteorological tower. Thus, a new meteorological tower will be erected in the southeast corner of the Fermi site prior to construction of Fermi 3. Figure 2.1-204 of Section 2.1 provides the location of the NDCT, two multi-cell MDCTs, and reactor building in relation to the new onsite meteorological tower. The Fermi site according to Figure 2.3-258 is located at an elevation approximately 177.7 m (583 ft.) above mean sea level. The plant area where the structures will be located is relatively flat with only minor differences in plant grade. The two multi-cell MDCTs are located approximately 1235.5 m (4054 ft.) north of the new onsite meteorological tower and at a distance that will not affect wind measurements at the new meteorological tower. The reactor building is located approximately 1341.1 m (4400 ft.) north-northwest of the new onsite meteorological tower. ~~The height~~ of the reactor building is approximately 48.2 m (158 ft.) above plant grade. ~~Using the method suggested by~~ Regulatory Guide 1.23, the zone of turbulent flow created by the reactor building will be limited to approximately 481.6 m (1580 ft.). Since the new meteorological tower will be at a distance of approximately 1341.1 m (4400 ft.), the reactor building will not produce adverse wake effects on the wind direction and speed measurements at the new meteorological tower when winds blow from the north through north-northwest directions.

Based on

, Revision 1 (March 2007),

The NDCT for Fermi 3 will be constructed in the location of the current onsite meteorological tower and will be built to a height of 182.3 m (600 ft) above plant grade, the tallest structure at the Fermi site. The NDCT is hyperbolically shaped and has a maximum width at the base of the tower, which has an outer diameter of 140.2 m (460 ft.). The downwind wake undergo a detailed analysis to ensure the meteorological parameters measured at the new meteorological tower are representative of the atmospheric conditions at the Fermi site **[END COM FSAR-2.3-003]**. Actual and perceived data biases between the current and new meteorological towers will be documented and evaluated. The site preparation and construction, pre-operational, and operational onsite meteorological monitoring program is described in greater detail in the following subsections.

2.3.3.2.1 **Tower and Instrument Siting**

The location of the new onsite meteorological tower in respect to the current onsite meteorological tower and Fermi 3 site layout is provided in Figure 2.1-204. The new meteorological tower will be a guyed open-latticed tower built to ANSI/TIA/EIA-222-G standards, located approximately 1341.1 m (4400 ft.) south-southeast of the Fermi 3 reactor containment building and will have a height of 60 m (197 ft.). This location of the new meteorological tower is at a distance that is greater than 10 times the height of the Fermi 3 reactor building, and therefore meets the siting criteria of ~~NRC~~ Regulatory Guide 1.23, Rev. 1 (March 2007).

Structures near the location of the new meteorological tower include a water tower with a height of 44.2 m (144.9 ft.) and a maximum width of approximately 16.2 m (53.3 ft.) at the equator of the tank head. ~~The NRC Regulatory Guide 1.23 suggests that a 10- building-height distance of separation is typically applied to square and rectangular structures having sharp edges.~~ The tank head of the water tower structure is spherical and has a sloping surface, and thus can be expected to produce a smaller wake zone. 40 CFR 51.100(ii)(3) defines good engineering practices (GEP) stack height as that which ensures that emissions from a stack do not result in excessive concentrations of any air pollutant as a result of atmospheric downwash, wakes, or eddy effects created by the source itself, nearby structures, or nearby terrain features. "Nearby structures" is defined in 40 CFR 51.100(jj)(1) as that distance up to five times the lesser of the height or width dimension of a structure. Thus, for the water tower with a maximum width of 16.2 m (53.3 ft.), the outermost boundary of influence exerted by the water tower is conservatively estimated to be 81 m (265.8 ft.). The water tower is located approximately 210.9 m (692 ft.) southeast of the new meteorological tower. Thus, the new meteorological tower is at a distance that will not be affected by the wake zone of the water tower.

between the 10-m and 60-m levels and, if necessary, between the 10-m level

, Rev. 1 (March 2007) states

or higher

Natural obstructions that can influence wind measurements near the new meteorological tower include trees that are taller than 5 m (16 ft.). The location of the new meteorological tower is wooded and contains trees that would influence wind measurements if left at their current height. However, prior to installing the new meteorological tower the trees will be trimmed to a height less than 5 m (16 ft.) in height outwards to a distance that satisfies the 10-building-height distance of separation stated in Regulatory Guide 1.23. , Rev. 1 (March 2007)

Wind sensors on the side of the tower will be mounted at a distance equal to at least twice the longest horizontal dimension of the tower (e.g., the side of a triangular tower). Temperature sensors will be oriented such that the aspirated temperature shields are either pointed downward or laterally towards the north and the shield inlet is at least 1-1/2 times the tower horizontal width away from the nearest point on the tower.
[This insert and the deletion of text following is from the markup associated with RAI 02.03.03-8]

~~NRC~~ Regulatory Guide 1.23 ~~indicates~~ that delta T should be measured ~~at 10 and 60 m, and if necessary at 10 m~~ and a higher level that is representative of diffusion conditions from release points ~~higher than~~ that are 85-m (278.9 ft.). The atmospheric release heights above plant grade for Fermi 3 are 52.6 m (172.6 ft.) for the reactor building/fuel building stack, 71.3 m (233.9 ft.) for the turbine building stack, and 18 m (59.1 ft.) for the radwaste building stack. All release heights for Fermi 3 are below 85 m (278.9 ft.); therefore, the new meteorological tower will have meteorological sensors located at 10 m and 60 m elevations to estimate dispersion conditions for ground-level and the plant's heat dissipation system. ~~The meteorological sensors will be mounted on booms, which will be greater than one tower width away from the tower and will be oriented normal to the prevailing wind direction.~~

The influence of terrain near the base of the new meteorological tower on temperature measurements is expected to be minimal. The area surrounding the new meteorological tower will not be paved or contain temporary land disturbances, such as plowed fields or rock piles. In addition, the tower will be situated in a relatively flat area that will be at a similar elevation as the plant structures. A climate-controlled instrument shelter will be installed on a concrete slab at the base of the tower; however, materials that minimize influence on the measurements will be used to construct the shelter. The new tower will be built close to the shoreline of Lake Erie such that it can measure the dynamic onshore and offshore flow conditions within the thermal internal boundary layer. Fermi 2 and Fermi 3 are located at similar distances to the western shoreline of Lake Erie, such that measurements made at the new meteorological tower will be representative of atmospheric dispersion conditions that could affect gaseous effluent releases.

2.3.3.2.2 **Instrumentation**

Meteorological Sensors

The instrumentation on the new meteorological tower will consist of the following: wind speed and wind direction sensors at the 10 m and 60 m levels, a 10 m air temperature sensor, a 10 m to 60 m delta T, and a 10 m dewpoint temperature sensor. To minimize data loss due to ice storms, external heaters will be installed on the primary wind sensors. The heaters will be thermostatically controlled and of the slip-on/slip-off design for easy attachment. The wind sensor specifications are not affected by these heaters. In addition, a heated tipping bucket rain gauge will be mounted at ground level on a concrete slab at the base of the meteorological tower away from any potential obstructions. A windscreen will be mounted around the precipitation gage to minimize the amount of windblown snow and debris deposited in the gage.

Redundant, secondary sensors at the 10 m and 60 m levels will also be installed on the new meteorological tower for air temperature, vertical wind speed, horizontal wind speed, and wind direction measurements. Table 2.3-288 provides a listing of the meteorological parameters that will be monitored on the new meteorological tower, the sampling height(s), as well as the sensing technique for the primary and secondary systems.

For the new meteorological tower Fermi 3 intends to use meteorological instrumentation that matches the manufacturer and model numbers in use on the current meteorological tower. ~~The accuracies and thresholds for each meteorological sensor located on the current onsite meteorological tower are presented in Table 2.3-289.~~ The accuracies and thresholds for each sensor on the new meteorological tower will be within the values specified in NRC Regulatory Guide 1.23.

, Revision 1, March 2007

For the new meteorological tower Fermi 3 intends to use meteorological instrumentation that matches the manufacturer and model numbers in use on the current meteorological tower.

Data Recording ~~Equipment~~

The data recording process planned ~~for the~~ new meteorological monitoring program will mirror the data recording process ~~for~~ the preapplication monitoring as described in Subsection 2.3.3.1. ~~The manufacturer and model numbers for the data recording equipment that is listed in Table 2.3-289 will be used for the new meteorological monitoring program.~~ One exception is that the signal conditioning equipment used for the current meteorological monitoring program is no longer available from the manufacturer. Therefore, the signal conditioning equipment for the new meteorological monitoring program will be

Markup of Detroit Edison ER
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The following markup represents how Detroit Edison intends to reflect this RAI response in a future submittal of the Fermi 3 COLA. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAIs, 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 different than presented here.

NRC Regulatory Guide 1.23 indicates that ΔT should be measured at 10 m and 60 m, and if necessary at 10 m and a higher level that is representative of diffusion conditions from release points higher than 85 m (278.9 ft). The atmospheric release heights above plant grade for Fermi 3 are 52.6 m (172.6 ft) for the reactor building/fuel building stack, 71.3 m (233.9 ft) for the turbine building stack, and 18 m (59.1 ft) for the radwaste building stack. All release heights for Fermi 3 are below 85 m (278.9 ft); therefore, the new meteorological tower will have meteorological sensors located at 10 m and 60 m elevations to estimate dispersion conditions for ground-level and the plant's heat dissipation system. The meteorological sensors will be mounted on booms, which will be greater than one tower width away from the tower and will be oriented normal to the prevailing wind direction.

The influence of terrain near the base of the new meteorological tower on temperature measurements is expected to be minimal. The area surrounding the new meteorological tower will not be paved or contain temporary land disturbances, such as plowed fields or rock piles. In addition, the tower will be situated in a relatively flat area that will be at a similar elevation as the plant structures. A climate-controlled instrument shelter will be installed on a concrete slab at the base of the tower; however, materials that minimize influence on the measurements will be used to construct the shelter. The new meteorological tower will be built close to the shoreline of Lake Erie such that it can measure the dynamic onshore and offshore flow conditions within the thermal internal boundary layer. Fermi 2 and Fermi 3 are located at similar distances to the western shoreline of Lake Erie, such that measurements made at the new meteorological tower will be representative of atmospheric dispersion conditions that could affect gaseous effluent releases.

6.4.2.2 **Instrumentation**

Meteorological Sensors

The instrumentation on the new meteorological tower will consist of the following: wind speed and wind direction sensors at the 10 m and 60 m levels, a 10 m air temperature sensor, a 10 m to 60 m ΔT, and a 10 m dewpoint temperature sensor. To minimize data loss due to ice storms, external heaters will be installed on the primary wind sensors. The heaters will be thermostatically controlled and of the slip-on/slip-off design for easy attachment. The wind sensor specifications are not affected by these heaters. In addition, a heated tipping bucket rain gauge will be mounted at ground level on a concrete slab at the base of the meteorological tower away from any potential obstructions. A windscreen will be mounted around the precipitation gage to minimize the amount of windblown snow and debris deposited in the gage.

Redundant, secondary sensors at the 10 m and 60 m levels will also be installed on the new meteorological tower for air temperature, vertical wind speed, horizontal wind speed, and wind direction measurements. Table 6.4-1 provides a listing of the meteorological parameters that will be monitored on the new meteorological tower, the sampling height(s), as well as the sensing technique for the primary and secondary systems.

For the new meteorological tower the applicant intends to use meteorological instrumentation that matches the manufacturer and model numbers in use on the current meteorological tower. ~~The accuracies and thresholds for each meteorological sensor located on the current onsite~~

For the new meteorological tower the applicant intends to use meteorological instrumentation that matches the manufacturer and model numbers in use on the current meteorological tower.

~~meteorological tower are presented in Table 6.4-2.~~ The accuracies and thresholds for each sensor on the new meteorological tower will be within the values specified in NRC Regulatory Guide 1.23.

, Revision 1, March 2007

Data Recording Equipment

The data recording process planned for the new meteorological monitoring program will mirror the data recording process for the preapplication monitoring program as described in Subsection 6.4.1.2. ~~The manufacturer and model numbers for the data recording equipment that is listed in Table 6.4-2 will be used for the new meteorological monitoring program.~~ One exception is that the signal conditioning equipment used for the current meteorological monitoring program is no longer available from the manufacturer. Therefore, the signal conditioning equipment for the new meteorological monitoring program will be replaced with signal conditioning equipment that has accuracies that are equal or better than the accuracies listed for the current signal conditioning equipment.

Electrical power for the new meteorological monitoring program will continue to be supplied to the primary and secondary systems by independent power supplies. One source of power will be Fermi 2; the other will be an offsite source. If one supply fails, the other automatically supplies the necessary power for both systems. The new meteorological tower will be built with two precautions to minimize lightning damage to the system. Two of the three legs of the tower will be grounded and the signal cables will be routed through a lightning protection panel. Each signal line will be protected by transient protection diodes specifically designed to stay below the individual line voltage breakdown point.

6.4.2.3 Instrument Calibration, Service, and Maintenance

The instrument calibration, service, and maintenance procedures in place for the current meteorological monitoring program will continue for the new meteorological monitoring program. Subsection 6.4.1.3 provides a description of the instrument calibrations program, while Subsection 6.4.1.4 provides a description of the instrument service and maintenance program. System components that collect, transmit, process, record, and display the meteorological data will be inspected, calibrated, serviced, and maintained such that at least 90% data recovery is achieved for the new meteorological monitoring system.

6.4.2.4 Data Reduction, Transmission, Acquisition, and Processing

The method of data reduction, transmission, acquisition, and processing that is described in Subsections 6.4.1.5 and 6.4.1.6 for the preapplication monitoring program will be used for the construction, pre-operational, and operational monitoring programs.

6.4.3 References

6.4-1 Detroit Edison, "Fermi 2 Updated Final Safety Analysis Report," Revision 14, November 2006

Attachment 4
NRC3-11-0003

Response to RAI Letter No. 49
(eRAI Tracking No. 5272)

RAI Question No. 02.03.05-5

NRC RAI 02.03.05-5

This RAI focuses on information contained in FSAR Revision 2, Appendix 2B. Note that this appendix is not listed in the FSAR Table of Contents and therefore has not been previously reviewed by the staff.

Table 2B-201 in FSAR Revision 2, Appendix 2B, provides gaseous effluent release pathway information for each of the three ventilation stacks. The ventilation stack parameter values presented in FSAR Table 2B-201 reflect the values presented in Revision 6 to ESBWR DCD Tier 2, Table 2B-1. Several of these parameter values (i.e., stack inside diameter, height of building above grade, and building dimensions for the reactor/fuel building stack and radwaste building stack) were revised in Revision 7 to ESBWR DCD Tier 2, Table 2B-1. However, the applicant's letter NRC3-10-0049 dated November 9, 2010 (ML103140612), which was submitted to identify proposed changes to the Fermi 3 COL FSAR to reflect ESBWR DCD Revision 7 and anticipated changes of ESBWR DCD Revision 8, did not identify these changes in FSAR Table 2B-201 ventilation stack parameter values.

Please revise the FSAR as stated below, or justify why these revisions are not necessary.

a. *Revise Table 2B-201 in FSAR Appendix 2B to reflect the gaseous effluent release pathway information presented in Revision 8 to the ESBWR DCD.*

b. *Indicate in FSAR Appendix 2B any assumptions used to deriving the Fermi 3 long-term dispersion site characteristic values that differ from the information presented in the revised FSAR Table 2B-201 (e.g., the building area for the reactor/fuel building stack and turbine building stack releases was set to zero to neglect the building wake credit).*

Response

FSAR Appendix 2B is intended to incorporate the information in the ESBWR DCD Appendix 2B with no site specific changes. However, FSAR Appendix 2B does not reflect changes made in DCD Revision 7. The inputs used in the XOQDOQ analyses are described in FSAR Section 2.3.5. The markup for FSAR Section 2.3.5 provided as part of the response to RAI 02.03.05-3, Detroit Edison Letter NRC3-10-0033[ML102180224], dated July 26, 2010 , reflects the input values in DCD Revision 7 and these are the same as Revision 9 of the DCD. Other assumptions used in deriving the Fermi 3 long-term dispersion site characteristic values (e.g., the building area for the reactor/fuel building stack and turbine building stack releases being set to zero to neglect building wake credit) are described in FSAR Section 2.3.5.

As FSAR Appendix 2B does not make any changes to the information provided in DCD Appendix 2B, including Table 2B-1, FSAR Appendix 2B will be updated to indicate that DCD Appendix 2B is incorporated by reference with no departures and/or supplements.

Proposed COLA Revision

A proposed markup is provided for FSAR Appendix 2B to reflect the above described changes.

Markup of Detroit Edison COLA
(following 2 page(s))

The following markup represents how Detroit Edison intends to reflect this RAI response in a future submittal of the Fermi 3 COLA. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAIs, 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 different than presented here.

Appendix 2B Ventilation Stack Pathway Information for Long-Term X/Q Values

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

2B.1 Discussion

~~This appendix provides the gaseous effluent release pathway information for each of the three ventilation stacks used in calculating the standard plant long term X/Q values; this gaseous effluent release pathway information may also be used in generating site-specific long term X/Q values. Table 2B-201 provides the relevant ventilation stack parameters for use with the XOQDOQ computer code (Reference 2B-1).~~

~~2B.2 COL Information~~

~~None~~

~~2B.3 References~~

~~2B-1 U.S. Nuclear Regulatory Commission, "XOQDOQ: Computer Program for the Meteorological Evaluation of Routine Effluent Releases at Nuclear Power Stations," NUREG/CR-2919, September 1982.~~

Table 2B-201 Ventilation Stack Parameters

Building Stack (Release Point)	Stack Average Velocity m/sec (ft/sec)	Stack Inside Diameter m (ft)	Stack Release Height Above Grade m (ft)	Height of Building Above Grade m (ft)	Building Dimensions m
Reactor/Fuel Building Stack	17.78 (3,500)	2.40 (7.9)	52.62 (172.6)	48.05 (157.6)	Reactor Building: X-Z plane: 49 x 48.05 Y-Z plane: 48 x 48.05 Fuel Building: X-Z plane: 21 x 22.85 Y-Z plane: 49 x 22.85
Turbine Building Stack	17.78 (3,500)	1.95 (6.4)	71.3 (234.0)	52.0 (170.6)	X-Z plane: 115 x 52 Y-Z plane: 59 x 52
Radwaste Building Stack(1)	17.78 (3,500)	1.34 (4.4)	18 (59.1)	12.0 (39.4)	X-Z plane: 32.8 x 12 Y-Z plane: 65 x 12

1. As discussed in FSAR Subsection 2.3.5, The Radwaste Building vent stack was tested as a ground release point.

Attachment 5
NRC3-11-0003

Response to RAI Letter No. 49
(eRAI Tracking No. 5275)

RAI Question No. 13.06.06-3

NRC RAI 13.06.06-3

Please see ML103270097

Response

Revision 1 of the Cyber Security Plan submitted for Fermi 3 is based upon NEI 08-09, Revision 6 and Section 4.13, "Document Control and Records Retention and Handling," of the Fermi 3 Cyber Security Plan is consistent with the text contained in NEI 08-09, Revision 6.

In a May 5, 2010 letter from Richard P. Correia (NRC) to Jack Roe (NRC) relating to the NEI 08-09, Revision 6 template, the NRC stated that:

> *Based on a technical review of the document, the NRC staff concludes that submission of a cyber security plan using the template provided in NEI 08-09, Rev. 6 dated April 2010, would be acceptable for use by licensees to comply with the requirements of 10 CFR 73.54 with the exception of the definition of "cyber attack."*

Therefore, Detroit Edison concluded that fidelity with the NEI 08-09, Revision 6 template was adequate to meet the requirements of 10 CFR 73.54 with regard to records retention.

On December 16, 2010, a public meeting was held between representatives of the industry and the NRC staff to discuss the records retention requirements contained in NEI 08-09, Revision 6. It is our understanding that, as a result of this discussion; the industry (through NEI) will provide clarifications to the text contained in Section 4.13 of NEI 08-09, Revision 6.

It is Detroit Edison's intent to maintain fidelity with the approved NEI template and Detroit Edison will revise the Fermi 3 Cyber Security Plan, if appropriate, upon approval of the aforementioned clarifications.

Proposed COLA Revision

None